

OPERATING INSTRUCTIONS

Mobile Hydraulic Loading Machine MHL 350

AUSGABE • EDITION

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GÜLTIG AB FAHRZEUGIDENTNUMMER • VALID FROM VEHICLE IDENTITY NUMBER • A PARTIR DU NUMERO D'IDENTIFICATION DU VEHICULE

493 – 584

The FUCHS Operating Instructions consist of 9 chapters aimed at different staff members:

Chapter	Subject	Staff members
1	FOREWORD	Operating staff Inspection and Maintenance staff Repair staff
2	SAFETY AND ACCIDENT PREVENTION	Operating staff Inspection and Maintenance staff Repair staff
3	TECHNICAL DATA	Operating staff Inspection and Maintenance staff Repair staff
4	CONTROL	Operating staff The operating staff must be familiar with the contents of the Operating Instructions and the use of this or comparable machinery.
5	WORK OPERATION	Operating staff The operating staff must be familiar with the contents of the Operating Instructions and the use of this or comparable machinery.
6	TRANSPORT AND RECOVERY	Operating staff Inspection and Maintenance staff Repair staff
7	CARE AND MAINTENANCE	Inspection, Maintenance and Repair staff The inspection, maintenance and repair staff must have expert knowledge as well as experience about inspection, maintenance and repair of this or comparable machinery.
8	TROUBLE SHOOTING	Operating staff Inspection and Maintenance staff Repair staff
9	APPENDIX	Operating staff Inspection and Maintenance staff Repair staff



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1.1 General

The **MHL 350 Mobile Hydraulic Loading Machine** was thoroughly tested before it left the factory. The final inspection showed that all parts are in perfect working order, and the machine achieves the expected level of performance.

This instruction book is intended to help you to familiarize yourself with your machine and the uses to which it may be put.

The instruction book contains important information telling you how to use the machine safely, expertly and economically. Observing these instructions will help you to avoid danger and to increase the reliability and life expectancy of the machine.

1.2 Proper use

The MHL 350 loading machine is intended solely for work which is suited to the function of the machine and its work attachment. Such work involves the

- loading,
- moving and
- shifting

of materials such as scrap, scrap metal, chips as well as different recycling materials.

The appropriate work attachments to these purposes are:

- sorting grabs
- hydraulic rock breakers and shears
- clamshell and cactus grabs
- magnets
- lift hooks

In the observation of this, all manufacturer's instructions contained in this instruction book must be complied with.

Before using the machine for timber rehandling, consult the manufacturer.

Any usage above and beyond that specified here and any non-compliance with the manufacturer's instructions is regarded as improper use. The manufacturer shall not be liable for damages resulting from improper use. This risk is borne solely by the plant operator.

When mounting work attachments (provided by outside suppliers) the proper use of this attachment as stated by its manufacturer must be observed.

Compliance with the instruction book, the performance of maintenance work as specified and adherence to replacement intervals are all aspects of proper use.

1 FOREWORD

1.3 Abbreviations and equivalent expressions

Below is an explanation of abbreviations and equivalent expressions which are used in this instruction book:

MHL 350: **M**obile **H**ydraulic **L**oading **M**achine

StVO : Road Traffic Regulations

StVZO : Regulations Authorizing the Use of Vehicles for Road Traffic

UVV : Accident Prevention Regulation

CEB-control : Excavator Electronic Control Unit

Mobile hydraulic loading machine: Machine, loading machine

1.4 Introduction

It is basically assumed that the machine will only be operated by authorized, trained and specially instructed personnel.

This instruction book and any other supplied operating instructions must be kept handy in the machine at all times.

Your attention is drawn in these instruction books to points of special importance for safe, expert use of the machine.

Only if the user is familiar with these instructions can errors be prevented and trouble-free operation assured. It is therefore very important that those persons who are actually responsible for operation are familiar with the instructions. They must be thoroughly read and understood, as the manufacturer will not assume liability for damages and operating problems arising as a result of non-compliance with instructions.

If you require additional information or if any point is unclear, please contact your dealer immediately.

We reserve the right to make improvements on the machine within the scope of impending technical developments, without effectively changing these operating instructions.

1.5 Warranty and maintenance



FUCHS can provide no warranty for modifications or attachments to equipment on FUCHS products which have not been approved by us or have not received our express written consent. In such cases, our warranty for the machine lapses, as does our product liability for any resulting consequential damages.

The warranty period covers 12 months or 1,000 operating hours, and commences from the time that the machine is delivered to the purchaser.

Safe working conditions and good working order of the machine are prerequisites for efficient work. Your machine fulfils these requirements when correctly handled and when serviced and maintained as specified.

Careful observation of the machine whilst in function and the use of the specified fuels, lubricants and coolants will prevent malfunction.

Trained specialist personnel are responsible for any servicing of the machine which requires expert knowledge. Inspections and repairs must therefore be carried out by your dealer's customer service.

In respect of possible claims for damages during the warranty period, all work contained in the maintenance and inspection plan must be carried out at the specified intervals.

After the warranty period, too, regular maintenance must be performed in order to ensure that the machine is constantly in good working order and enjoys a reasonable service life.

Insist that only **original FUCHS spare parts** are used in the event of any repair work. In this way, you will have a product of lasting high quality, thereby ensuring that your machine maintains its original condition.



Please state the vehicle identity number when making inquiries or orders, and in all written correspondence.



The vehicle identity number of the machine is stamped on the identification plate (fig. 1/1) and on the right of the undercarriage (fig. 1/2), as seen in the direction of travel.

1.6 Environmental standards

When operating or working on the machine the environmental standards currently valid must be observed at all times.

When performing installation, maintenance and repair work, special care must be taken to ensure that ecologically harmful substances such as

- lubricating oil and grease
- hydraulic oil
- fuel
- coolant
- liquid detergents containing solvent

do not seep into the ground or the sewerage system.

These substances must be kept, transported, collected and disposed of in suitable containers.

If above-mentioned liquids seep into the ground, their escape must be stopped immediately and the liquid be bound with suitable binding agents. If necessary, the contaminated soil must be excavated. Binding agents and excavated material must be disposed of in the proper manner. The environmental standards currently valid must be observed.

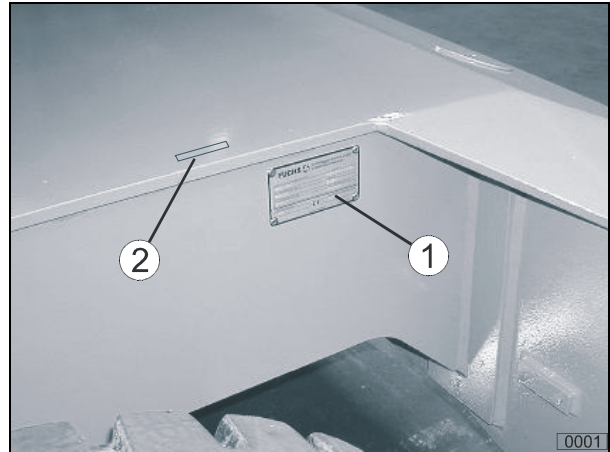


Fig. 1 Vehicle identity number

1.7 Notes on using the instruction book

1.7.1 References to pictures and items

The references to pictures and items contained in the text, such as (14/1), for example, mean figure 14, item 1.

1.7.2 Dangers and important notes



DANGER

This symbol is employed for a high risk of injury to persons. It is essential that the safety notes are observed.



Warning

This symbol is employed for information whose non-compliance may lead to severe material damage. It is essential that the safety notes are observed.



Note

This symbol is employed for information containing important notes about the correct use and/or how to proceed. Non-compliance may lead to malfunction.

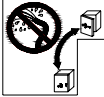
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1.7.3 Pictograms

The table below explains the meaning of the pictograms on the operator control panel.

Display Symbol	Description (Monitors)	Function Symbol	Description (Switch)
	Direction indicator control lamp		Working floodlight(s)
	Battery charge indicator		Lower beam
	Engine oil pressure		Cab up/down
	Parking brake		Central lubricating system Trigger additional lubrication
	Pre-heating		Work zone extension
	Engine air filter clogging indicator		Speed range 1 st /2 nd gear
	Brake pressure of service brake		in an emergency only: disconnect thermo switch disable all work functions
	Hydraulic oil temperature		Windshield wash/wipe
	CEB-control		Overload warning device
	Coolant level indicator lamp		Magnet system
	Coolant temperature		Auto-idling system
	Fuel level		Hazard warning system
	Operating hour meter		Oscillating axle lock/ Oscillating axle lock release

The table below explains the meaning of the pictograms on the machine.

Symbol	Description	Symbol	Description
	Safety distance		Hydraulic oil
	Danger of injury		Fuel
	Lashing point		Suspension point for loading by crane
	No pressure jet!		

1 FOREWORD

1.8 Operating instructions provided by outside suppliers

The operator must also observe operating instructions covering components from outside suppliers. Reference is made to these operating instructions in the FUCHS instruction book.

Operating instructions	Manufacturer
Diesel engine BF 6 M 1013 E	Deutz
Central lubricating system	Lincoln
optional:	
Generator	EME
Supplementary heating	Eberspächer
Air conditioning	Wölfle
Overload cut-off	Krüger

1.9 Copyright

This instruction book is the copyright of the **Fuchs-Bagger GmbH & Co. KG** Maschinenfabrik. This instruction book is intended for use by personnel responsible for operation, maintenance, repair and supervision of the machine.

This instruction book may not, either in whole or in part, be reproduced, transmitted or used for the purpose of competition without our prior written permission.

1.10 Company address

1.10.1 Headquarters / Sales and Customer Service

Fuchs-Bagger GmbH & Co. KG Maschinenfabrik
 Postfach 1161 Industriestraße 3
 D-76662 Bad Schönborn D-76669 Bad Schönborn

Telephone: +49-7253-84-0
 Facsimile: +49-7253-84-411

1.10.2 Spare parts

Schaeff Ersatzteile Service GmbH & Co. KG
 Postfach 1264 Erlbacher Straße 115
 D-91534 Rothenburg D-91541 Rothenburg

Telephone: +49-9861-972-0
 Facsimile: +49-9861-972-410

Reference number: **5 781 120 707**
 Vehicle identity number: 350/0493>

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2.1 Introductory remarks

This section contains information for the safe operation of loading machines.

National safety regulations – e.g. the Accident Prevention Regulations, “Earth-Moving Machinery” (VBG 40) and “Vehicles” (VBG 12) in the Federal Republic of Germany – must also be complied with.

In addition to the operating instructions, legal regulations governing road traffic and road safety measures must also be observed. Such requirements could also apply in respect of handling hazardous goods or the wearing of personal safety gear, for example.

Furthermore, safety laws governing work in particular locations (tunnels, adits, quarries, pontoons, contaminated areas, etc.) must likewise be observed.

Protective work clothing must be worn during operation. Rings, scarves and unbuttoned jackets are to be avoided. Protective goggles, protective boots, helmets, gloves, reflecting jackets, ear-muffs, etc. may be required.

Before commencing work, information must be obtained on first aid and possible means of rescue (ambulance, fire brigade, helicopters).

The fire extinguisher (max. 4 kg) is located in the driver's cab on the rear left-hand pillar. Personnel must be aware of the operation of the fire extinguisher as well as on-site fire-warning and fire-fighting equipment.

Loose parts such as tools or other accessories must be secured to the loading machine.

2.2 General safety notes

It is important to refrain from any working methods which impair safety.

The loading machine may only be used when it is in a safe, operational condition.

The manufacturer's instructions must be complied with for operation, maintenance, repair, assembly and transportation.

The plant operator must provide additional special safety instructions, wherever necessary, for specific local conditions.

The operating instructions and any information pertaining to safety must be carefully kept in the driver's cab.

The operating instructions and safety notes must be complete and fully readable.

Safety devices on the loading machine must not be deactivated or removed during operation.

2 SAFETY AND ACCIDENT PREVENTION

2.3 Operation

Loading machines may only be independently operated and serviced by persons who

- are physically and mentally suitable
- have been instructed in the operation or maintenance of the loading machine and have demonstrated this ability to the plant operator
- can be expected to perform their allocated duties reliably

All such persons must be of the legal minimum age.

They must be designated by the plant operator to operate or service the loading machine.

Operating equipment (controls) may only be activated from the driver's cab or operator console.

The loading machine may only be ascended and entered using the entrances and surfaces intended for this purpose. They must be kept in good, safe condition.

2.4 Danger zone

No one may enter the danger zone of the loading machine.

The danger zone encompasses the area around the loading machine in which persons may be injured by movements of the machine during operation, its implements and attachments, or by swinging out or falling loads.

The machine operator must give a warning signal to persons who may be in danger.

The machine operator shall stop work with the loading machine if anyone remains in the danger zone despite the warning.

To ensure no danger of crushing, a sufficient safety distance (min. 500 mm) must be kept from solid objects, e.g. buildings, excavation slopes, scaffolding, other machines, etc.

If the above safety distance cannot be maintained, the area between solid objects and the working zone of the loading machine must be blocked off.

If conditions are such that the machine operator's view of the driving and working zone is restricted, he must be guided or the driving and working zone must be marked by a solid barricade.

2.5 Transport of persons

The transport of passengers on the machine is prohibited.

2.6 Stability

Loading machines must be used, driven and operated in such a manner that their stability against overturning is ensured at all times.

The machine operator must drive at speeds which are suitable for local conditions, and must keep the loading equipment as close to the ground as possible when working/driving on sloping or uneven ground.

The permitted payload of the loading machine shall not be exceeded.

Loading machines must remain at a sufficient distance from the edges of quarries, pits, mounds and slopes to ensure there is no risk of falling.

Loading machines must be secured so that they cannot roll or slip when in the vicinity of excavations, shafts, ditches, pits and slopes.

2.7 Travel operation

Before putting the loading machine into operation, the driver's seat, mirrors and controls must be adjusted so as to ensure safe working.

The windows must be clean and free of ice.

Driving tracks must be designed so as to ensure smooth, safe operation, i.e. they must be sufficiently wide, on ground which has sufficient carrying capacity and as few slopes as possible.

Downhill tracks must be set out in such a way that loading machines can be safely braked.

The carrying capacity of bridges, cellar roofs, vaults, etc. must be verified before the loading machine can drive over them.

The internal dimensions of constructions must be noted before entering underground passages, tunnels, etc.

On steep drops and uphill gradients, the load must be carried on the uphill side, if possible, in order to increase stability.

Before driving downhill, the appropriate gear for the terrain must be selected and the gear lever shall not be moved during downhill travel (on-road or off-road gear).

Loading machines may only be driven on the open road when the machine and the driver both have the appropriate license as required by the country in question.



*The **MHL 350** is not licensed for use on the road, and therefore shall not be driven on public highways in Germany.*

Outside areas covered by general traffic regulations, e.g. on construction sites, traffic regulations should be applied in the proper manner. This should also apply with regard to drivers' licenses.

2 SAFETY AND ACCIDENT PREVENTION

2.8 Loading and unloading

The machine operator may only swing the loading equipment over occupied driver's seats, operator consoles and workplaces of other machines when these are protected by overhead guards (FOPS).

If a cab does not have the required protection, the driver of this vehicle must leave the driver's seat when the loading equipment has to be slewed overhead.

The vehicles must be loaded in such a manner as to ensure that there is no overloading and no material can be lost during travel. The vehicle must be loaded from the lowest possible height.

At dumping points, loading machines may only be operated when suitable measures have been taken to prevent rolling or falling.

2.9 Guides

Guides must be easily recognizable, e.g. by means of warning clothing. They must remain within the machine operator's field of vision.

For better communication between the machine operator and the guide signals must be agreed upon. These must only be given by the machine operator and the guide.

While guiding the machine, guides must not be given other jobs which may distract them from their task.

2.10 Danger of falling objects

Loading machines may only be used where there is a danger of falling objects when the driver's seat and operator consoles have an overhead guard (FOPS). A front guard must be employed if there is a risk of materials breaking into the cab.

In front of walls e.g. of stacked materials, loading machines must be positioned and operated in such a way that the driver's seat and entry to the driver's seat are not situated on the side facing the wall.

Demolition work may only be performed by loading machines where there is no danger to persons and if the machine is equipped with canopy (overhead guard), front guard on the cab and the appropriate work implement.

2.11 Working in the vicinity of overhead power lines

When the loading machine is being used in the vicinity of overhead power lines and trolley wires, a safety distance which varies depending upon the nominal voltage of the overhead line must be maintained between the lines and the loading machine and its loading equipment, in order to prevent current overspill. This also applies to the distance between these lines and attached implements or loads.

The safety distances specified below must be complied with:

Nominal voltage	Safety distance in meters
– 1000 V	1.0 m
over 1 kV – 110 kV	3.0 m
over 110 kV – 220 kV	4.0 m
over 220 kV – 380 kV	5.0 m
nom. voltage unknown	5.0 m

In the observation of safety distances, all working movements of the loading machine, e.g. positions of the boom, swinging ropes and the dimensions of attached loads must be taken into consideration. Uneven ground which would cause the loading machine to be inclined and thus nearer to overhead lines must also be taken into account.

During work in windy conditions, both overhead lines and loading equipment may swing out, thus reducing the safety distance.

If it is impossible to maintain sufficient distance from overhead power lines and trolley wires, the plant operator must consult with the proprietor or operator of the overhead lines to find other safety precautions to prevent current overspill. Such measures could be, e.g.

- Switching off the current
- Re-routing the overhead line
- Cabling, or
- Limiting the work zone of loading machines.

2.12 Operation in closed rooms

If loading machines are used in closed rooms, these areas must be sufficiently ventilated and the special regulations observed.

2 SAFETY AND ACCIDENT PREVENTION

2.13 Work stoppages

Before rest periods and at the end of the working day, the driver of the loading machine must park the machine on ground which has sufficient carrying capacity and is as even as possible, and must secure it against movement.

Before rest periods and at the end of the working day, the driver must lower loading equipment onto the ground or secure it so that it cannot move about.

The driver may not leave the loading machine when loading equipment has not been lowered to the ground or secured.

Loading machines may only be parked in places where they do not present an obstacle, e.g. on the construction site or to plant traffic. Warning devices, e.g. triangles, warning cordons, flashing or hazard lights are to be used if necessary.

Before leaving the control console, the driver must bring all loading equipment into home position and apply the brakes.

If the driver is leaving the loading machine unattended, he must first turn off the drive motors and ensure that they cannot be started up by unauthorized persons.

2.14 Crane operations

Crane operations are the hoisting, transporting and lowering of loads with the aid of a fixing device (rope, chain, etc.), whereby the assistance of personnel is required to attach and release the load.

Loading machines may only be used for crane operations when the prescribed safety devices are present and in full working order.

According to the EEC-Machinery Directives and Euronorm EN 474-5 of June 1996, these are:

- Overload warning device
- Hose-rupture safety valves on the lift cylinders *
- Table of carrying capacity in the cab
- Secure attachment of loading implements (e.g. crane hook or shackle)

* only if carrying capacity exceeds 1,000 kg

If a loading machine is to be equipped for crane operations, an overload warning device and hose-rupture safety valves on the lift cylinders and, if necessary, a load hook must be installed.

During crane operations the following points must be observed:

- Loads must be attached in such a way that they cannot slip or fall out.
- Personnel guiding the machine and attaching loads shall remain only in the machine operator's field of vision.
- The machine operator must carry loads as close to the ground as possible and prevent them from swinging.
- Loading machines may only travel with an attached load if the path of travel is fairly even.
- Personnel attaching loads shall only approach the machine and the boom from the side and with the machine operator's permission.
- The machine operator may only give his permission if the loading machine is standing still and the work equipment is not in motion.
- Do not use fixing devices (ropes, chains) which are damaged or of inadequate dimensions.
- Protective gloves must always be worn when working with fixing devices.

2.15 Assembly, maintenance, repair

Loading machines may only be assembled, converted or disassembled under the guidance of a suitable person designated by the plant operator and following the manufacturer's operating instructions.

Work on braking, steering, hydraulic and electric systems of the loading machine may only be carried out by expert personnel specially trained in these areas.

Stability must be ensured at all times during work on loading machines.

The work equipment must be secured against movement by lowering them to the ground or equivalent measures, e.g. stays, trestles. If necessary, the revolving uppercarriage of the loading machine must be secured so that it cannot swivel round.

Counterweights may only be attached at the locations designated by the manufacturer.

When jacking up loading machines, jacking devices must be positioned so that they cannot slip. Jacks must be positioned and applied absolutely straight, without tilting.

Raised loading machines must be supported by suitable structures such as crosswise stacks of planks, square timbers or steel trusses.

Loading machines which are raised with work equipment must be stabilized by a supporting structure immediately after lifting. Do not work under raised loading machines which are only supported by the hydraulics.

The engine/motor must be turned off prior to all maintenance and repair work.

These requirements may only be ignored in the case of maintenance or repair work which cannot be performed without the engine/motor running.

Before working on the electrics or when performing arc-welding on the machine, the connection to the battery must be interrupted.

When disconnecting the battery, first the negative pole then the positive pole must be disconnected. The battery must be re-connected in reverse order.

During repair work around the battery, the latter must be covered with insulating material; tools must not be deposited on the battery.

Protective devices of moving machine parts may only be opened or removed when the drive has been switched off and cannot be switched on again by unauthorized persons.

Protective devices are e.g. engine/motor covers, doors, protective grating, trim.

Upon completion of assembly, maintenance or repair work, all protective devices must once more be attached in the proper manner.

Load-bearing parts of the machine may only be welded following consultation with the manufacturer and in accordance with recognized welding principles.

Overhead guards (FOPS) shall not be welded or drilled in any way.

Alterations, such as welding of the hydraulic system, shall only be undertaken with the manufacturer's permission.

Before commencing work on the hydraulic system, the pilot pressure, back pressure and pressure inside the tank must be let off.

Only the hoses specified by the manufacturer may be used.

Hydraulic hoses must be routed and assembled by expert personnel.

When filling the tank, smoking and naked flames are prohibited.

2 SAFETY AND ACCIDENT PREVENTION

2.16 Recovery, transportation

Loading machines may only be loaded onto recovery vehicles when adequate fixing devices are used.

Fixing devices specified by the manufacturer, e.g. eyes, hooks, must be employed.

For loading and transportation, loading machines and all necessary auxiliary equipment must be secured against unwanted movement.

The traveling gear and track-laying gear of loading machines must be sufficiently cleaned of mud, snow and ice to ensure that ramps can be driven up without risk of slipping.

Before setting off, the route to be taken must be examined to determine whether the roads are wide enough, entrances and passages under bridges are large enough and that roads and bridges have sufficient carrying capacity.

2.17 Monitoring and inspections

The machine must be submitted to a general inspection carried out by an expert:

- before the machine is put into operation for the first time and before the machine is again put into operation when essential modifications have been made
- at least once a year
- in the meantime, according to operating conditions and local environments

Furthermore, prior to each work shift, the machine operator must check the function of driving and working equipment in accordance with the manufacturer's instructions, see chapter 4 "Control" and section 5 "Work Operation".

When work equipment is attached to quick-change systems, the equipment in question must be moved in all positions to ensure that it is securely fastened; during this process, no one shall be in the danger zone.

Hydraulic hoses must be replaced as soon as the following damages are recognized:

- Damages to the outer layer which reach the intermediate layer.
- Embrittled patches on the outer layer.
- Deformations when under pressure or without pressure which differ from the original shape of the installed hose.
- Leaks
- Damages to hose fittings or to the connection between the fitting and the hose.

The coolant level shall only be checked when the engine has **cooled down**; the cap must be turned carefully in order to let off excess pressure.

Prior to crane operations, the machine operator must check the function of the safety devices specially required for this type of work.

The machine operator must advise the supervisor immediately – and his replacement, if there is a change of operator – with regard to any shortcomings.

In the event of shortcomings which jeopardize the operating safety of the loading machine, it shall not be used until these have been eliminated.

2.18 FOPS roof guard to DIN ISO 3449-II

The cab features four holes in the roof for fastening a FOPS roof guard. This guard is a special version for the applications in question. Test certificates to DIN ISO 3449-II can be obtained from the manufacturer.

2.19 FOPS / front guard to DIN ISO 10262

The cab features six holes on the front side and in the roof for fastening the roof guard with front guard. Test certificates to DIN ISO 10262-1998 and SAE I 1356-February 88 can be obtained from the manufacturer.

2.20 Emergency exit

The front window acts as an emergency exit. If a front roof guard is fitted or this exit can no longer be used for any other reason, the rear window must be used as an emergency exit. An emergency hammer is affixed inside the driver's cab on the rear right-hand pillar.

2.21 Other dangers



Danger

2.21.1 Failure of the hydraulic system

If the standstill of the diesel engine, a defect of the hydraulic pump or the loss of hydraulic oil leads to the failure of the hydraulic system, only the following **emergency functions** remain possible:

- manual steering (not servo-assisted)
- lower work equipment (only if ignition is switched on)

2.21.2 Elevating cab

When the elevating cab is lowered to its end position, there is a danger to third parties of being crushed by the lift frame, as the driver (operator) in the cab does not have a complete view of the area beneath him.

This also applies to the emergency lowering function of the elevating cab through the ball valve located outside.

When driving with the cab raised, even small irregularities in the ground cause the cab to dip. This may result in injuries of the driver (operator) or to incorrect operation of the machine.



While the cab is being moved, and during driving and working, the left-hand armrest must be folded down and the cab door shut.

2.21.3 Working operation

When loading long and thin parts such as tubes, pipes, bars, which stand out of the loading grab, these parts may break into the driver's cab despite protective grating (front guard) when the loading grab swings out strongly.

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3.1 Dimensions

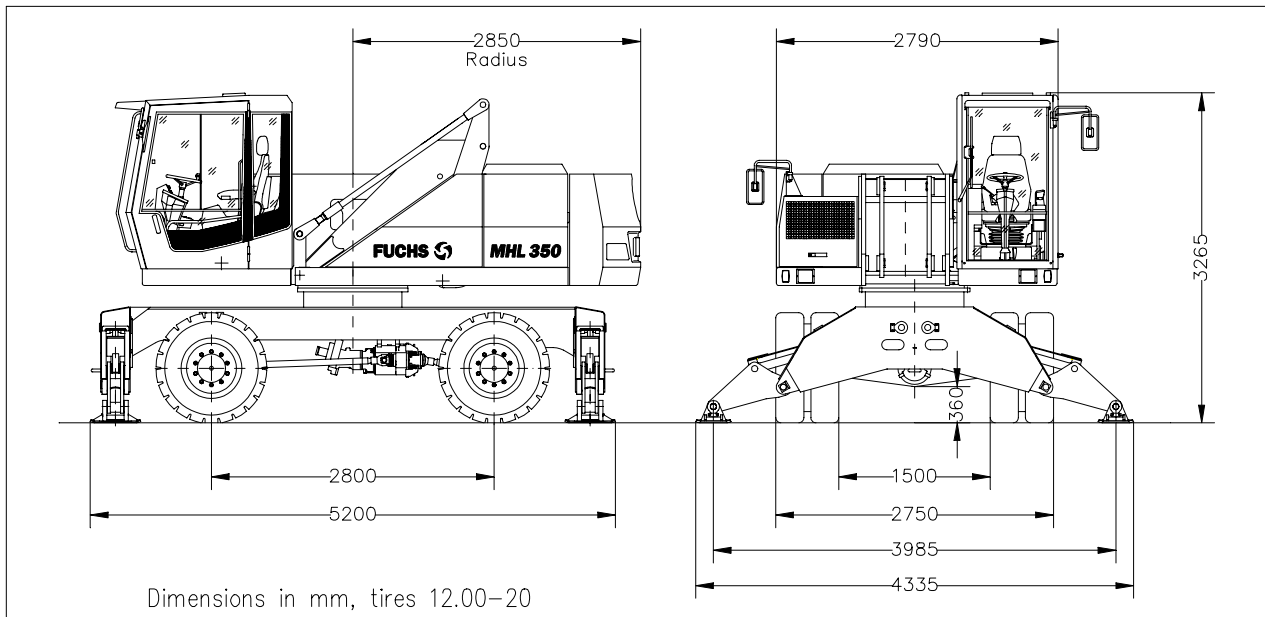


Fig. 2 Dimensions

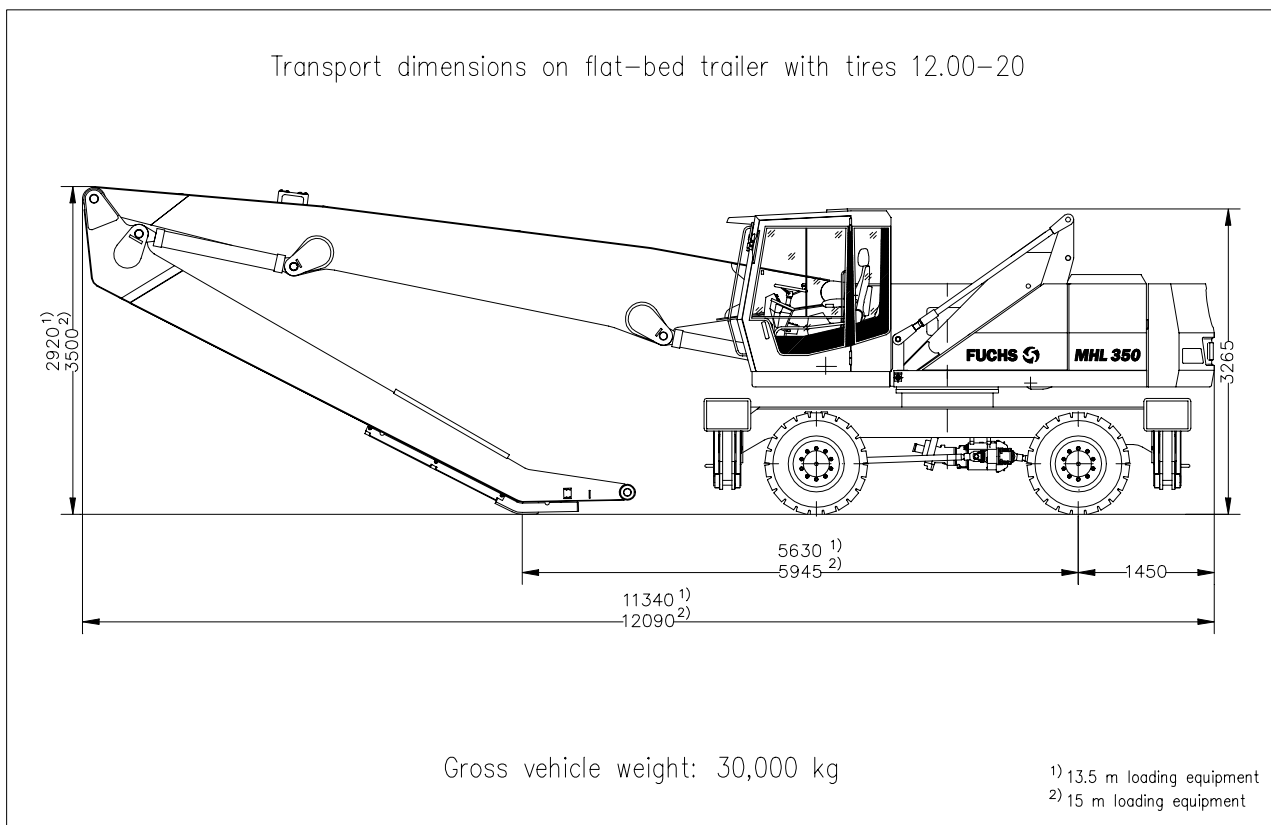


Fig. 3 Dimensions

3 TECHNICAL DATA

3.2 General structure

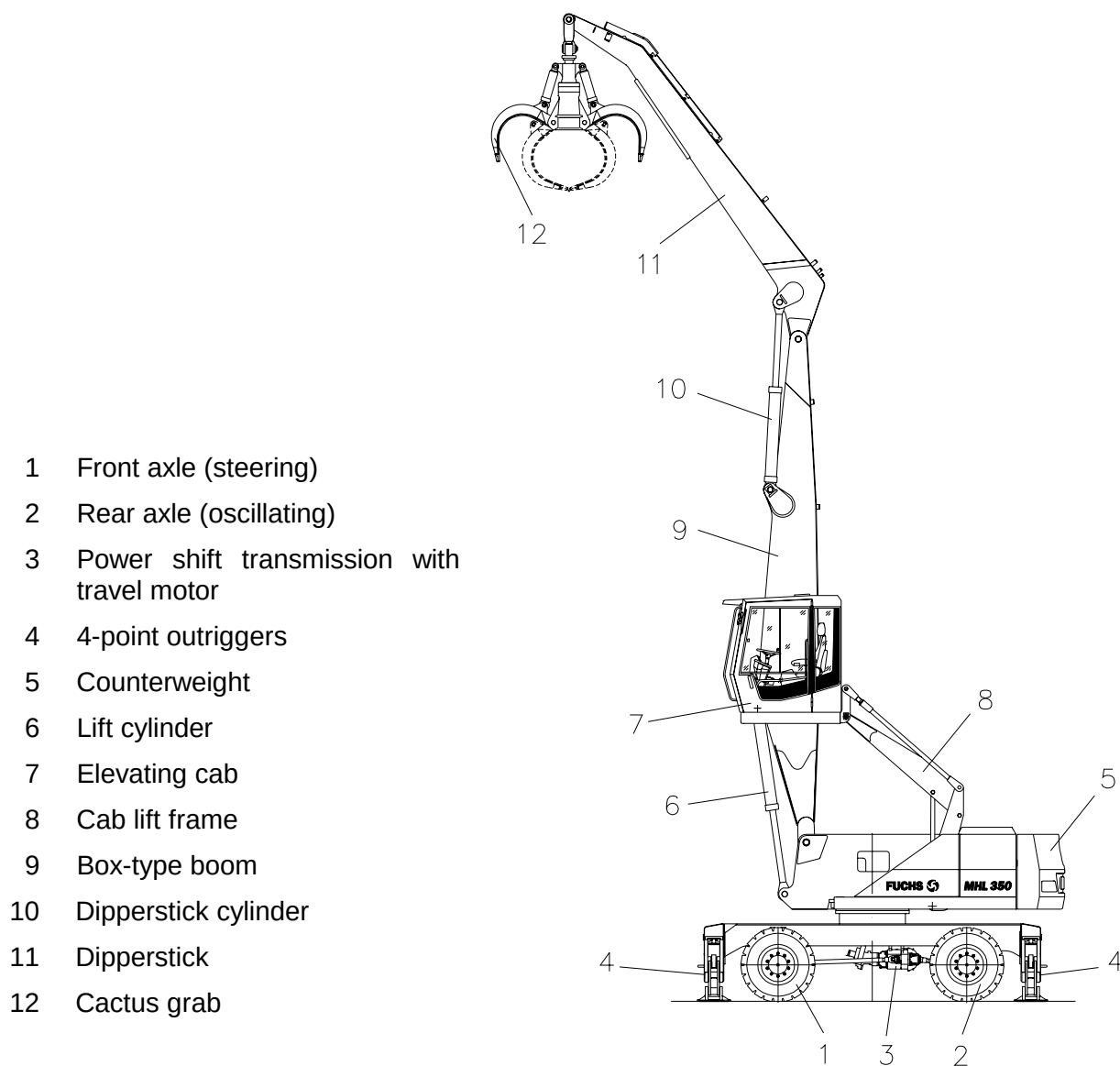


Fig. 4 General structure

3.3 Engine

Make	Deutz
Type	BF 6 M 1013 E
Design	Water-cooled in-line 6-cylinder engine with turbocharger
Power to DIN 70020	122 kW at n = 2,000 rpm auto-idling system
Cooling system	Electrical coolant level monitor, radiator drive via viscous clutch

3.4 Electrical system

Operating voltage	24 V
Battery	2 x 12 V (series-connected) = 24 V 95 Ah
Generator	28 V 55 A
Starter	24 V 4.0 kW

3.5 Travel drive

	Infinitely variable speed drive via variable displacement motor. 2-gear power shift transmission Continuous speed regulation forward and in reverse in both gear ranges: 1 st gear 0 – 5.5 km/h 2 nd gear 0 – 20 km/h
Power transmission	Variable displacement motor with 2-gear power shift transmission Four-wheel drive via propeller shaft connection
Gradability	45 % in low gear
Turning radius	8.2 m
Operating pressure	320/360 bar

3.6 Brakes

Service brake	Hydraulic power-assisted braking system acting on all four drum brakes. The hydrostatic drive acts as an additional, non-wearing service brake on all wheels by means of four-wheel drive.
Parking brake	Hydraulic disc brake acting on the 2-gear power shift transmission.
Slewing brake	Non-muscular-energy slewing brake, pedal can be locked in place

3 TECHNICAL DATA

3.7 Hydraulic system

Main circuit (axial piston pump)

Max. pump capacity : max. 580 l/min
Operating pressure : 320/360 bar

Auxiliary circuit: Single gear pump
Dual gear pump

Pump capacity : 41 l/min
+ 24 l/min + 4.5 l/min

Swing assembly

The uppercarriage is driven by an internally toothed ring gear and a planetary transmission with integrated multi-disc brake. Lubrication of the toothing through central lubrication system.

Swing range : 360° unlimited
Uppercarriage swing speed : 0 – 8 rpm

Steering

Pump capacity : 24 l/min
Steering pressure : 175 bar

Hydrostatic power-assisted steering system

Max. steering angle : 27°

Oil radiator

Separate oil radiator which is activated at an oil temperature of 45° C; drive of the ventilator via a hydraulic motor.

3.8 Axles

Front axle

Rigid steering axle, with drum brakes

Rear axle

Oscillating, with hydraulic oscillating lock and drum brake, angle of oscillation $\pm 7^\circ$

3.9 Tires

Tire size	Type	Arrangement of tires
12.00-20 8-fold	elastic	twin tires

3.10 Heating

Heating

Three-stage fan/hot-water heater and ventilation, adjustable defroster nozzle

3.11 Permissible loads

Permissible gross vehicle weight	30,000 kg
Permissible axle load, front	18,000 kg
Permissible axle load, rear	18,000 kg

3.12 Sound level values according to directive 2000/14/EC and ISO 6395 appendix A

The machine has CE-approval (confirmed by German Civil Engineering Trade Association) and fulfills EC-Type Examination standards according to the Dynamic Measuring Method.

Representative values measured on the model

sound power level: $L_{WA} = 104.2 \text{ dB(A)}$

Guaranteed sound power level: $L_{WA} = 106 \text{ dB(A)}$

Sound pressure level, driver's seat: $L_{pA} = 74 \text{ dB(A)}^*$

* This value is smaller than the permissible limit value of $L_{pA} = 85 \text{ dB(A)}$.

3.13 Vibrations

Weighted r.m.s. value of acceleration of upper limbs is below 2.5 m/s^2 .

Weighted r.m.s. value of acceleration of seat area and feet is below 0.5 m/s^2 .

3.14 Control

The loading machine is equipped as standard with an ISO control (see chapter 5.1).

3 TECHNICAL DATA

3.15 Working zone of the machine

3.15.1 Working envelope (13.5 m loading equipment)

– Work equipment: box-type boom 7.4 m, dipperstick 5.8 m and cactus grab

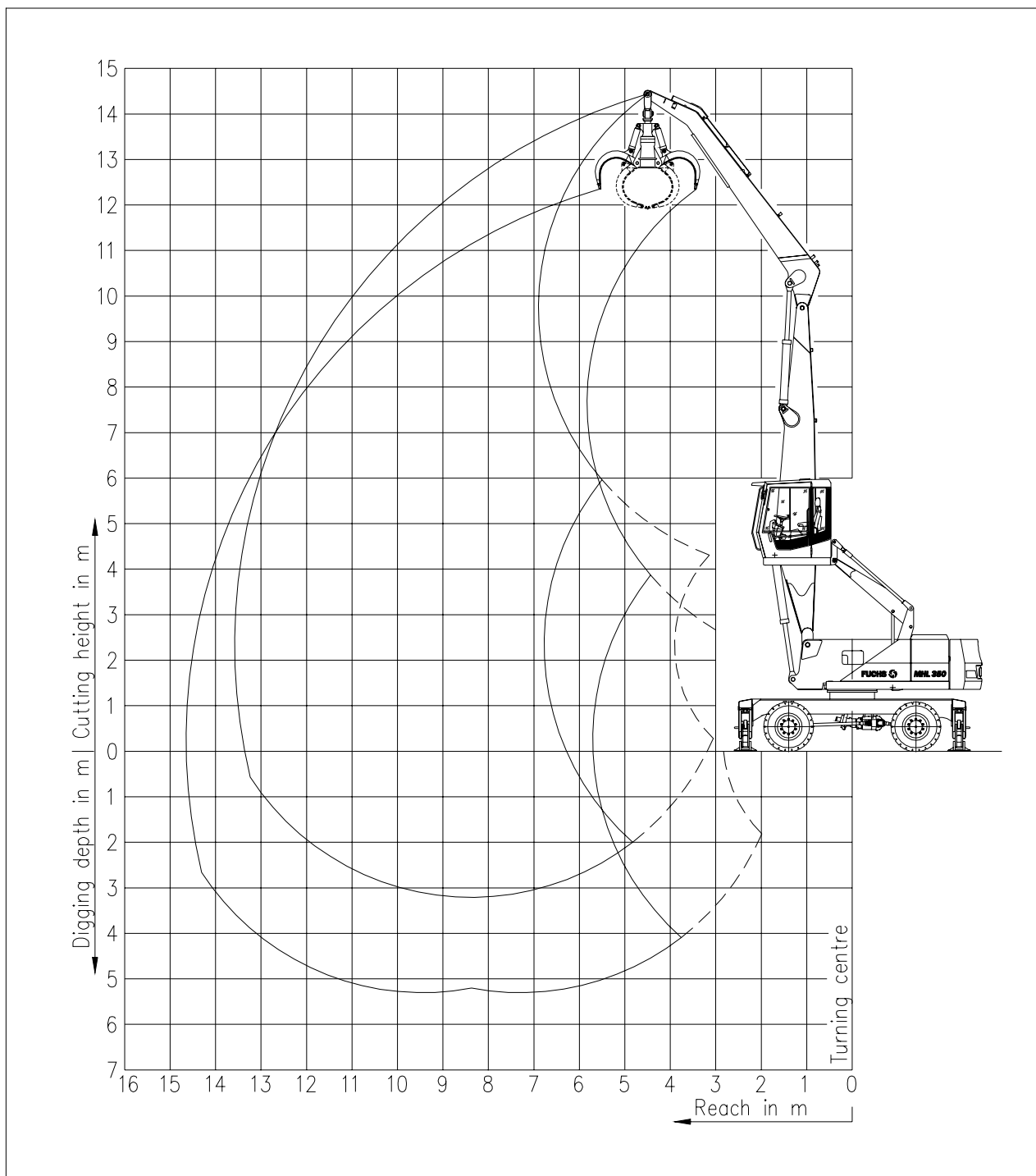


Fig. 5 Working envelope (13.5 m loading equipment)

3.15.2 Table of carrying capacity (13.5 m loading equipment)

The carrying capacity values are stated in tons (t). The pump pressure for this table is 360 bar. The values amount to 75 % of the static overturning limit or 87 % of the hydraulic lifting force, in accordance with ISO 10567.

When the machine is standing on solid, even ground, the values apply to slewing operation through 360°. The values in brackets apply in the lengthwise direction of the undercarriage. The "outriggers up" values only apply when the load is lifted above the front or rear axle respectively.



The weight of the attached load hoisting implement (grab, magnet, lift hook, etc.) must be deducted from the carrying capacity values. If a FUCHS quick-mount hitch is mounted on the boom, carrying capacity values are reduced by 300 kg.

Key to symbols: °° Limited by lift cylinders
 ° Limited by dipperstick cylinders

In accordance with CE guidelines, hose-rupture safety valves on the lift cylinders and an overload warning device are required for crane operations.

Work equipment: box-type boom 7.4 m, dipperstick 5.8 m									
Height m	Undercarriage Outriggers	4.5	6	7.5	Reach in m		12	13.5	15
12	outriggers up 4-pt. outriggers down			(5.9°) 5.9° (5.9°)					
10.5	outriggers up 4-pt. outriggers down			(5.9°) 5.9° (5.9°)	(4.6°) 5.4° (5.4°)	(3.6°) 5.1° (5.1°)			
9	outriggers up 4-pt. outriggers down			(5.8°) 5.8° (5.9°)	(4.6°) 5.4° (5.4°)	(3.6°) 5.1° (5.1°)			
7.5	outriggers up 4-pt. outriggers down			(6.0°) 6.2° (6.2°)	(4.5°) 5.6° (5.6°)	(3.5°) 5.1° (5.2°)	(2.8°) 4.1° (4.8°)		
6	outriggers up 4-pt. outriggers down		(7.8°) 7.8° (7.8°)	(5.8°) 6.8° (6.7°)	(4.4°) 6.0° (6.0°)	(3.4°) 5.0° (5.4°)	(2.7°) 4.1° (5.0)		
4.5	outriggers up 4-pt. outriggers down	(11.9°) 12.1° (12.1°)	(7.7°) 9.2° (9.2°)	(5.5°) 7.6° (7.6°)	(4.2°) 6.1° (6.5°)	(3.3°) 4.9° (5.7)	(2.7°) 4.0° (5.1)		
3	outriggers up 4-pt. outriggers down	(10.6°) 15.5° (15.5°)	(7.0°) 10.7° (10.8°)	(5.2°) 7.7° (8.4°)	(4.0°) 5.9° (6.9)	(3.2°) 4.7° (6.0)	(2.6°) 3.9° (5.0)	(2.1°) 3.2° (4.2)	
1.5	outriggers up 4-pt. outriggers down		(6.5°) 10.2° (12.0°)	(4.8°) 7.4° (9.1°)	(3.8°) 5.7° (7.4)	(3.0°) 4.6° (6.0)	(2.5°) 3.8° (5.0)	(2.1°) 3.2° (4.2)	
0	outriggers up 4-pt. outriggers down		(6.1°) 9.8° (11.9°)	(4.6°) 7.1° (9.5)	(3.6°) 5.5° (7.3)	(2.9°) 4.5° (5.9)	(2.4°) 3.7° (4.9)		
-1.5	outriggers up 4-pt. outriggers down		(5.9°) 9.5° (10.0°)	(4.4°) 6.9° (9.4)	(3.5°) 5.4° (7.2)	(2.8°) 4.4° (5.8)	(2.4°) 3.7° (4.8)		
-3	outriggers up 4-pt. outriggers down			(4.3°) 6.8° (9.2)	(3.4°) 5.3° (7.1)				

Fig. 6 Table of carrying capacity (13.5 m loading equipment)

3 TECHNICAL DATA

3.15.3 Working envelope (15 m loading equipment)

– Work equipment: box-type boom 8.2 m, dipperstick 6.5 m and cactus grab

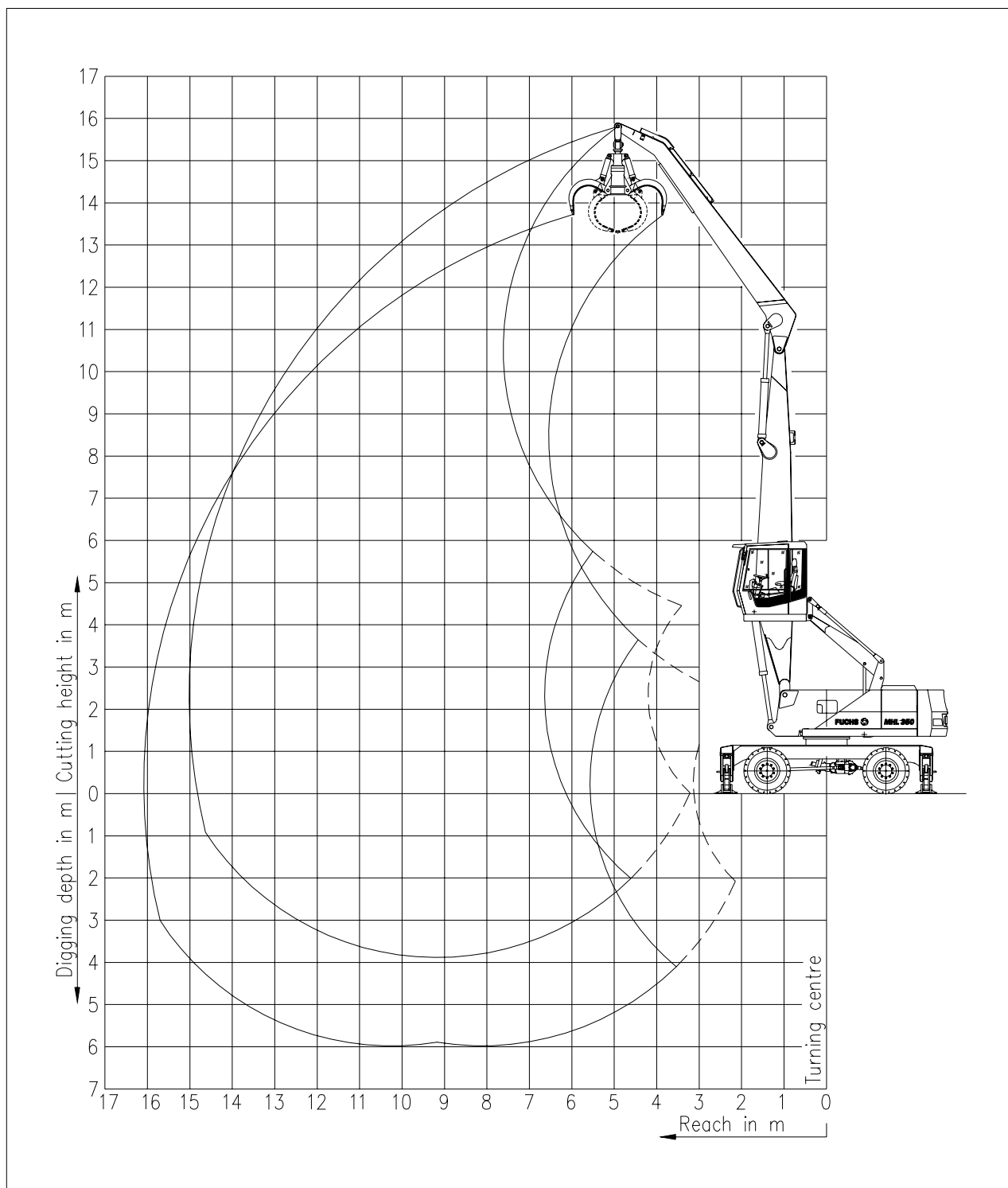


Fig. 7 Working envelope (15 m loading equipment)

3.15.4 Table of carrying capacity (15 m loading equipment)

The carrying capacity values are stated in tons (t). The pump pressure for this table is 360 bar. The values amount to 75 % of the static overturning limit or 87 % of the hydraulic lifting force, in accordance with ISO 10567.

When the machine is standing on solid, even ground, the values apply to slewing operation through 360°. The values in brackets apply in the lengthwise direction of the undercarriage. The "outriggers up" values only apply when the load is lifted above the front or rear axle respectively.



The weight of the attached load hoisting implement (grab, magnet, lift hook, etc.) must be deducted from the carrying capacity values. If a FUCHS quick-mount hitch is mounted on the boom, carrying capacity values are reduced by 300 kg.

Key to symbols: °° Limited by lift cylinders
 ° Limited by dipperstick cylinders

In accordance with CE guidelines, hose-rupture safety valves on the lift cylinders and an overload warning device are required for crane operations.

Work equipment: box-type boom 8.2 m, dipperstick 6.5 m									
Height m	Undercarriage Outriggers	Reach in m							
		4.5	6	7.5	9	10.5	12	13.5	15
12	outriggers up 4-pt. outriggers down			(5.9") 5.9" (5.9")	(4.6) 5.5" (5.5")	(3.5) 5.1 (5.3")			
10.5	outriggers up 4-pt. outriggers down				(4.6) 5.4" (5.4")	(3.6) 5.1" (5.1")	(2.8) 4.1 (4.8")		
9	outriggers up 4-pt. outriggers down			(5.8) 5.8 (5.9")	(4.6) 5.4" (5.4")	(3.6) 5.1" (5.1")	(2.8) 4.1 (4.8")	(2.3) 3.4 (4.4)	
7.5	outriggers up 4-pt. outriggers down			(6.0) 6.2" (6.2")	(4.5) 5.6" (5.6")	(3.5) 5.1 (5.2")	(2.8) 4.1 (4.8")	(2.3) 3.4 (4.4)	
6	outriggers up 4-pt. outriggers down		(7.8") 7.8" (7.8")	(5.8) 6.8" (6.7")	(4.4) 6.0" (6.0")	(3.4) 5.0 (5.4")	(2.7) 4.1 (5.0)	(2.2) 3.4 (4.3)	
4.5	outriggers up 4-pt. outriggers down	(11.9) 12.1" (12.1")	(7.7) 9.2" (9.2")	(5.5) 7.6" (7.6")	(4.2) 6.1 (6.5")	(3.3) 4.9 (5.7)	(2.7) 4.0 (5.1)	(2.2) 3.3 (4.3)	
3	outriggers up 4-pt. outriggers down	(10.6) 15.5" (15.5")	(7.0) 10.7 (10.8")	(5.2) 7.7 (8.4")	(4.0) 5.9 (6.9)	(3.2) 4.7 (6.0)	(2.6) 3.9 (5.0)	(2.1) 3.2 (4.2)	(1.8) 2.8 (3.7)
1.5	outriggers up 4-pt. outriggers down		(6.5) 10.2 (12.0")	(4.8) 7.4 (9.1")	(3.8) 5.7 (7.4)	(3.0) 4.6 (6.0)	(2.5) 3.8 (5.0)	(2.1) 3.2 (4.2)	(1.8) 2.8 (3.7)
0	outriggers up 4-pt. outriggers down		(6.1) 9.8 (11.9")	(4.6) 7.1 (9.5)	(3.6) 5.5 (7.3)	(2.9) 4.5 (5.9)	(2.4) 3.7 (4.9)	(2.0) 3.1 (4.1)	
-1.5	outriggers up 4-pt. outriggers down		(5.9) 9.5 (10.0")	(4.4) 6.9 (9.4)	(3.5) 5.4 (7.2)	(2.8) 4.4 (5.8)	(2.4) 3.7 (4.8)	(2.0) 3.1 (4.1)	
-3	outriggers up 4-pt. outriggers down		(5.9) 9.5 (10.0")	(4.3) 6.8 (9.2)	(3.4) 5.3 (7.1)	(2.8) 4.3 (5.7)	(2.3) 3.6 (4.8)		

Fig. 8 Table of carrying capacity (15 m loading equipment)

3 TECHNICAL DATA

3.16 Work attachments

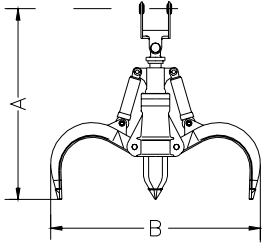
Cactus grab					
	Capacity m ³	A mm	B mm	Weight kg	
				open prongs	half-open prongs
				closed prongs	
	0.4	2020	2030	1250	1340
	0.6	2050	2360	1360	1490
	0.85	2160	2700	1550	1790
In the case of grabs with quick-mount hitch, the gross vehicle weight increases by 40 kg.					

Fig. 9 Grab

Magnet w. hydraulic rotation

Magnet $\varnothing$	1150	1250
Dim. A mm	1488	1513
Weight kg	1570	1865

In the case of magnets with quick-mount hitch, the gross vehicle weight increases by 40 kg.

(for further magnets, see sep. data sheet)

Fig. 10 Magnet

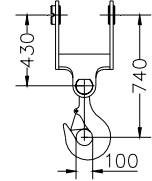
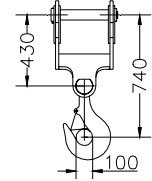
Lift hook with:	Perm. carrying capacity	Weight
 Mounting, rigid or rotatable.	10 t	90 kg
 Quick-mount hitch, rigid or rotatable.	10 t	130 kg

Fig. 11 Lift hook

3.16.1 Other equipment (optional)

- Overload warning device
- Overload cut-off
- Boom height limitation
- Individual actuation of 4-point outriggers
- Hose-rupture safety valves of lift cylinders
- Hose-rupture safety valves of dipperstick cylinders
- Magnet system
- Air conditioning
- Supplementary heating
- Dozer blade
- Cab guard
- Protective grid for working floodlights
- Bullet-proof glass for front windshield and the skylight
- Diverse electrical accessories such as additional working floodlights, rotating beacon, radio, etc.

Further supplementary equipment available on request.



FUCHS products may not be modified or fitted with supplementary equipment or work attachments which are not included in our delivery range without our express written permission. Without such permission our warranty expires, as does our product liability for any resulting consequential damages.

3.17 Filling quantities

Designation	Filling quantity	Fluid	Remarks
Fuel tank	350 l	Diesel	
Engine oil	20 l	HD oil	First filling: 21 l
Hydraulic oil tank	380 l	Hydraulic oil	Change quantity
Front axle	16 l	Transmission oil	
per planetary gear train	1.5 l	Transmission oil	
differential	13 l	Transmission oil	
Rear axle	22.2 l	Transmission oil	
per planetary gear train	1.6 l	Transmission oil	
differential	19 l	Transmission oil	
Power shift transmission	5.5 l	Transmission oil	
Swing gear	10 l	Transmission oil	
Grease lubrication system	3 kg	Lubricating grease	
Service brake	Supplied by hydraulic system		
Oil-immersed air filter (heater)	0.16 l	Engine oil	only when supplementary heating fitted
Cooling system	36 l	Water-glysantine mixture	
Windshield wash system	2 l	Water with windshield detergent	
Grab gear	0.7 l	Transmission oil	



The level marking is always the decisive factor for the correct filling quantity, not the values stated above.

3 TECHNICAL DATA

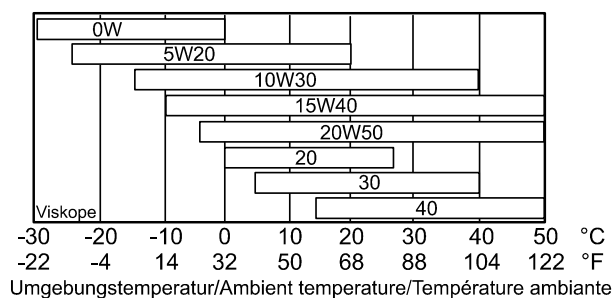
3.18 Fuel, lubricant and coolant specifications

Application	Code designation according to Bi 1)	Prescribed fuels, lubricants and coolants for Central Europe		Remarks
		Designation	Specification, Standards, Quality	
Engine	—	Diesel fuel	DIN 51601 ASTM D975 1-D/2-D	Before using RME-fuels (rape oil methyl ester), it is essential to consult your responsible FUCHS dealer for further details.
Engine	EO 1540 A	Engine oil	SAE 15W-40 API CF 4	See also engine manufacturer's instructions
Cooling for engine	SP-C	Coolant	Clean water and anti-freeze based on ethylene glycol	See also engine manufacturer's instructions
Hydraulic working circuits	HYD 0530	Hydraulic oil or multi-grade oil	H-LP 46 or SAE 5W-30	The following viscosity limit values must be kept (according to ASTM 445) at 100° C min. 7 mm ² /s (cSt) at -10° C approx. 1,000 mm ² /s (cSt)
	BIO-E-HYD-HEES	Biodegradable hydraulic oil on synthetic ester base	Filling according to customer specifications. Brand label on machine. Do not mix biodegradable oils of different suppliers.	The same viscosity specifications apply as for mineral hydraulic oils. When changing from mineral to biodegradable hydraulic oils, the tank and hydraulic system must be completely drained, cleaned and flushed. For further details before changing oils, please consult your FUCHS dealer.
Transmission(s), wheel hubs, axles, grab and magnet gears	GO 90 LS	Transmission oil	SAE 80W-90LS API-GL 5	Alternative recommendations: SAE 90 LS SAE 85W-90 LS
Grease lubrication system, other lubricating points	MPG-A	Multi-purpose, lithium-soap based grease	KP2N-30 DIN 51825	
Ring gear of slewing joint				Lubrication via grease lubrication system

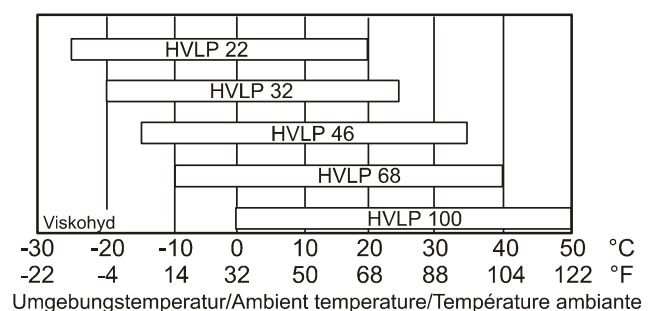
¹⁾ In conformity with the regulation lubricants of the Main Association of the German Building Industry e.V.

3.18.1 Alternative recommendations for other temperature ranges

Engine oil according to API CG 4 or CF 4 and to ACEA E3 or E2



Hydraulic oil according to DIN 51524.T3 HLP



3.18.2 Biodegradable hydraulic oils

We recommend biodegradable hydraulic oils based on synthetic ester as an alternative to mineral oils. The same viscosity limit values apply as for mineral oils.



When changing from mineral to biodegradable hydraulic oil, the system and the tank must be completely drained, cleaned and flushed.

Do not mix biodegradable oils of different suppliers.

Before changing oils, please ask your FUCHS dealer for more details.

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4.1 First commissioning

If you are not familiar with the operating and display elements of this machine, read this chapter carefully **before** operating the machine.

This chapter deals with all functions.

Before driving and working with the machine it is necessary to thoroughly familiarize yourself with the display elements and operator controls.

Each time before putting the machine into operation it must be subjected to a thorough visual inspection. Take care to ensure that there are no damages, loose or missing screws, oil accumulations, oil or fuel leakages. Defects must be remedied immediately. In the event of shortcomings which jeopardize the operating safety, the machine shall not be put into operation until these have been eliminated.

Each time before putting the machine into operation, the inspections according to chapter 7.3 must be carried out.

4 CONTROL

4.2 Operator controls in cab

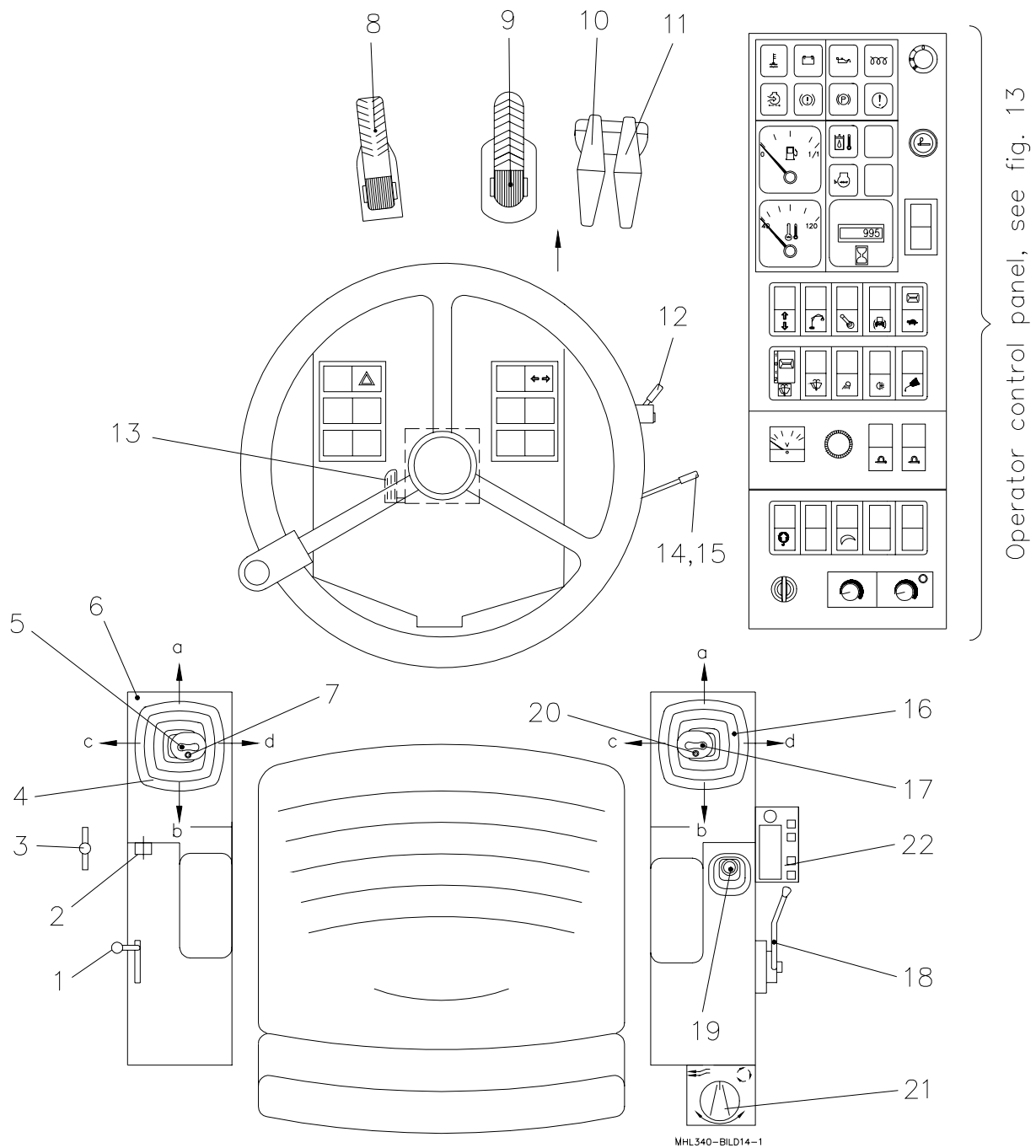


Fig. 12 Operator controls

Operator controls in cab

- 1 = Lever for outriggers up/down
- 2 = "Fine Mode" potentiometer
- 3 = Emergency lowering of cab
- 4 = Four-way control lever (ISO control)
- 5 = Push-button for magnet device (optional)
- 6 = Upward folding armrest
- 7 = Push-button for kick-down function
- 8 = Slewing brake pedal, can be locked in place
- 9 = Service brake pedal, can be locked in place
- 10 = Accelerator pedal, forward
- 11 = Accelerator pedal, reverse
- 12 = Height adjustment of steering wheel
- 13 = Tilt adjustment of steering wheel
- 14 = Turn signal flasher
- 15 = Horn
- 16 = Four-way control lever (ISO control)
- 17 = Push-button for grab rotation
- 18 = Engine speed control lever
- 19 = Parking brake (hand brake)
 - Lever forward ⇒ brake released; lever backward ⇒ brake applied
- 20 = Push-button for raising the operating pressure
- 21 = Control knob for fresh air/air conditioning circulating air (optional)
- 22 = Operator control panel for supplementary heating (optional)

4 CONTROL

4.3 Operator control panel in cab

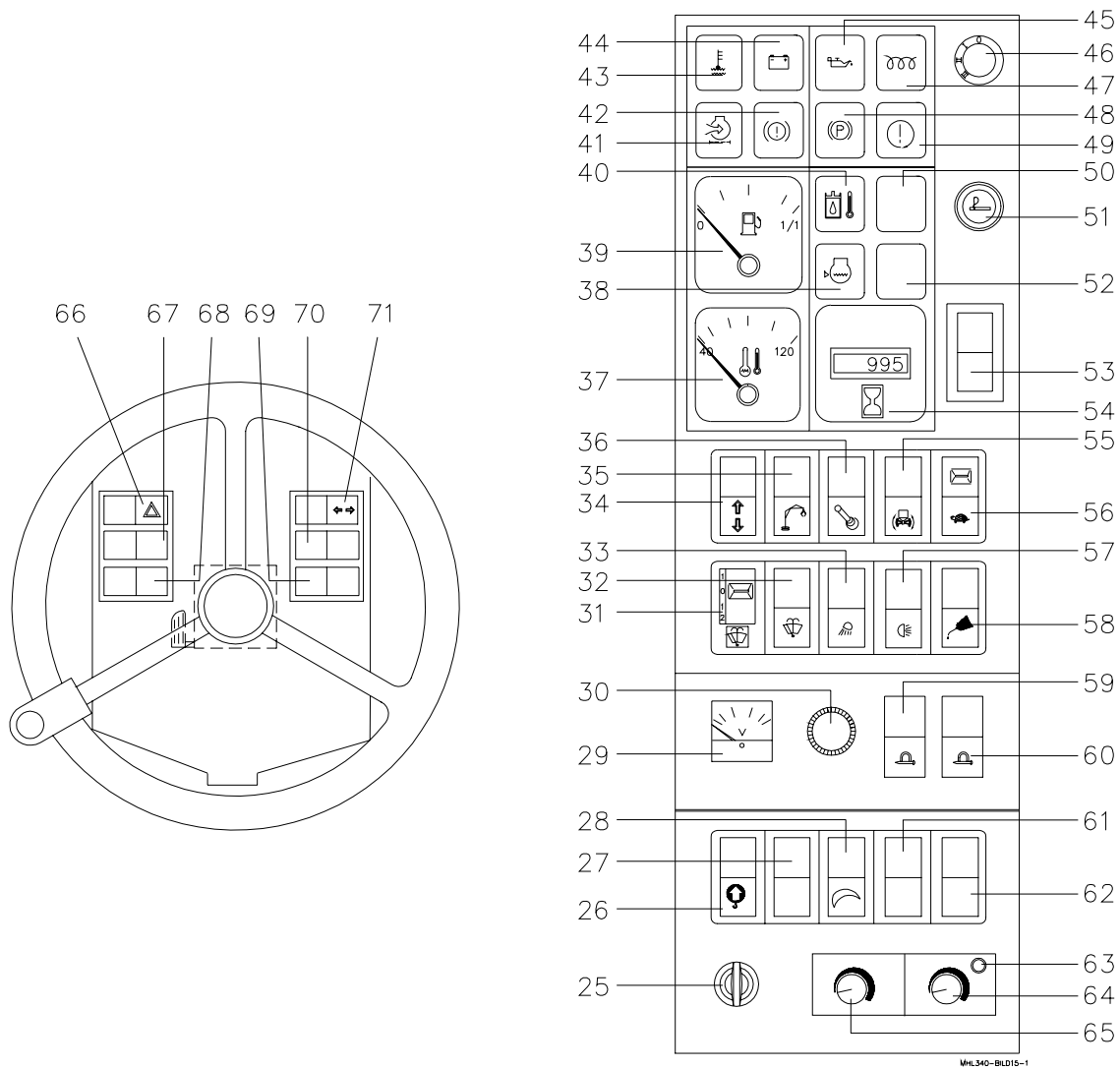


Fig. 13 Operator control panel

Operator control panel in cab

- 25 = Ignition lock
- 26 = Toggle switch for overload warning device (optional)
- 27 = not assigned
- 28 = Toggle switch for auto-idling system
- 29 = Generator voltage gauge (optional)
- 30 = not assigned
- 31 = Switch for windshield wiper (upper window section)
 - Position 1, bottom : windshield wiper
 - Position 1, top : intermittent
 - Position 2, top : wash/wipe
- 32 = Toggle switch for windshield wiper, wash/wipe (lower window section)
- 33 = Toggle switch for working floodlight(s)
- 34 = Push-button for cab up/down
- 35 = Toggle switch for work zone extension
- 36 = Toggle switch for disabling work functions
- 37 = Engine coolant temperature indicator
- 38 = Coolant level indicator lamp
- 39 = Fuel gauge
- 40 = Hydraulic oil temperature indicator lamp
- 41 = Air filter clogging indicator lamp
- 42 = Service brake indicator lamp
- 43 = Coolant temperature indicator lamp
- 44 = Battery charge indicator lamp
- 45 = Engine oil pressure indicator lamp
- 46 = Rotary knob for fan
- 47 = Pre-heating indicator
- 48 = Parking brake indicator lamp
- 49 = CEB-control indicator lamp
- 50 = Indicator lamp for "work functions disabled"
- 51 = Cigarette lighter
- 52 = Indicator lamp for work zone extension
- 53 = not assigned
- 54 = Operating hour meter
- 55 = Oscillating axle lock toggle switch
- 56 = 1st/2nd gear toggle switch
- 57 = Headlamp toggle switch
- 58 = Push-button for triggering additional lubrication
- 59 = Magnet device indicator lamp (optional)
- 60 = Magnet device toggle switch (optional)
- 61 = not assigned
- 62 = not assigned
- 63 = Air conditioning indicator lamp (optional)
- 64 = Rotary knob for air conditioning (optional)
- 65 = Rotary knob for hot water heating
- 66 = Hazard warning system toggle switch
- 67 = not assigned
- 68 = not assigned
- 69 = not assigned
- 70 = not assigned
- 71 = Turn signal indicator

4 CONTROL

4.4 Engine

Before starting the engine the battery disconnect switch must be closed. This switch is located in front of the oil radiator.



Before switching on the engine, the operator has to take care to ensure that no one is on the machine or in the immediate vicinity of it.

4.4.1 Starting the engine



Every time the machine is put into operation, the inspections described in chapter 7.3 must first be performed.

- All gearshift levers to neutral.
- Apply parking brake (hand brake) (14/19).

If, once the engine has been started, a buzzer sounds and the red service brake indicator lamp (14/42) lights up, the necessary braking pressure has not yet been built up.

Once the engine is running and the braking pressure has built up, the buzzer stops and the indicator lamp is extinguished.

4.4.1.1 Normal start / hot start

- Insert ignition key in ignition lock (14/25).
- Set the engine speed control lever (14/18) to medium position.
- Turn the ignition key clockwise to I. Indicator lamps (14/44, 14/45, 14/47) on the operator control panel light up.
- After the pre-ignition indicator lamp (14/47) has extinguished, turn the ignition key to position III. As soon as the engine starts running, turn the ignition key back to position I and lower the engine revs to bottom-end idle speed. The indicator lamps (14/44, 14/45) should go out.

4.4.1.2 Cold start with glow plug

- Insert the ignition key into the ignition lock (14/25).
- Bring the engine speed control lever (14/18) to full-throttle position.
- Turn the ignition key to I. After the pre-heat/indicator lamp (14/47) has gone out, turn the ignition key to III to start the engine.
- As soon as the engine starts running, turn the ignition key back to I and lower the engine revs to bottom-end idle speed. The indicator lamps (14/44, 14/45) should go out.

If the engine does not start up after 15 seconds max., turn the ignition key to position I or 0 and, after waiting at least 30 seconds, repeat the start-up procedure.



Do not drive the engine at full throttle right away. Drive with restraint until the engine reaches operating temperature.

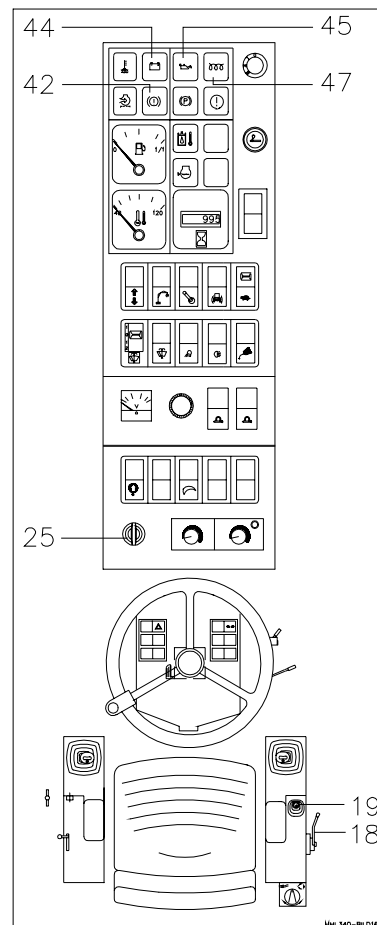


Fig. 14 Starting the engine

4.4.2 Monitoring during operation

- If the battery charge (15/44) or engine oil pressure (15/45) indicator lamps light up, switch off the engine immediately and determine the cause, or call for service personnel if necessary.
- If the permitted coolant temperature of approx. 110° C (15/37) is exceeded, the work and drive functions are deactivated. The indicator lamp (15/43) lights up. Open the engine hood in order to let the engine run at idle to cool down. Once the coolant temperature is within the permitted limits, the deactivated functions are re-activated.
- If the indicator lamp (15/38) lights up, there is not enough coolant in the engine cooling system. Stop work immediately and replenish coolant **after** the engine has cooled down.
- If the hydraulic oil exceeds the permitted temperature, the indicator lamp (15/40) lights up red. Work must be discontinued immediately and the engine switched off. For possible causes and remedies, see chapter 8; if necessary, call for service personnel.

4.4.2.1 Deactivating the overheat protection

The overheat protection can be deactivated using the push-button (15/36). The machine can be relocated and the work equipment moved.



As long as the overheat protection is deactivated, the machine may only be moved briefly as otherwise damage to the engine may occur.

The deactivation only takes effect as long as the push-button (15/36) is pressed.

4.4.3 Switching off the engine

Do not switch off the engine when running at full throttle, but allow it to run for a short time at no load.

- Bring the engine speed control lever (15/18) to idle position.
- Turn the ignition key (15/25) to "0". The engine stops automatically.

4.4.4 CEB-control

The machine is equipped with a CEB-control. This control includes

- a load sensing control
- an electrical speed control
- an auto-idling system
- a sensitive adjustment of the pump response characteristic (Fine Mode)
- a kick-down function

The variable pump is controlled by the load sensing control and adjusted acc. to the momentary consumption of the consumers.

For possible malfunctions in the CEB-control system, see chapter 8.1.5.

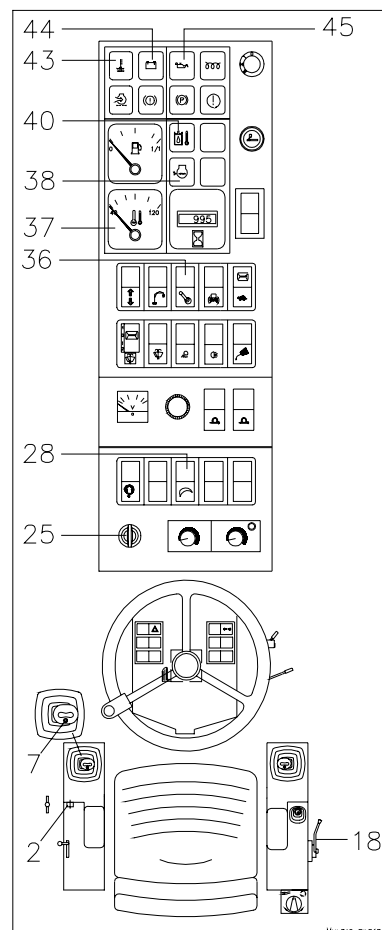


Fig. 15 Switching off the engine

4 CONTROL

4.4.4.1 Auto-idling system

The auto-idling system has the effect of lowering the engine speed if there is no work maneuver during the pre-set time of 3 seconds.

The auto-idling system can be switched on/off using the toggle switch (15/28). Once the auto-idling system has been activated the indicator lamp in the switch lights up.

4.4.4.2 Fine Mode

On the potentiometer (15/2) the flow rate of the pump can be continuously adjusted between the settings "Normal" and "Sensitive".

- Turn to the left (→ 0): normal (max. flow rate)
- Turn to the right (→ 100): sensitive (min. flow rate)



During normal working operations the potentiometer must be set to "0".

4.4.4.3 Kick-down function

With the kick-down function the engine can be brought to max. speed by pressing the push-button (15/7) in the left-hand four-way control lever. The function remains effective as long as the button is pressed.

This function takes effect with the auto-idling system both activated and deactivated.

4.4.5 Notes for use in winter

The following points – and the relevant notes in the instruction book of the engine manufacturer – should be observed during use in winter:

• Hydraulic oil

If the machine is not used for longer periods at temperatures around and below freezing, warm up the engine by running at medium speed. The operating temperature must be reached by performing the following work maneuvers:

- Raise/lower box-type boom
- Open/close grab
- Extend/retract dipperstick.



When the loading machine is warmed up by the engine running at idle, the following guidelines apply:

Temperature in ° C	Warm-up time in minutes
0° C and over	approx. 15 min
-18° C – 0° C	approx. 30 min
below -18° C	over 30 min

• Engine oil

The viscosity class (SAE class) of the engine oil should be selected according to the ambient temperature at the machine's place of operation (see fuels, lubricants and coolants, chapter 3.18).

• Battery

For good cold start performance, always keep the battery fully charged. By warming up the battery to approx. +20° C (remove the battery after the engine has been turned off and store it in a warm room), the starting temperature range can be lowered by approx. 4 – 5° C.

When installing the battery, ensure good contact of terminal connections.

Only tighten terminal screws so that they are "hand tight" in order to avoid deformation of the terminal cones!

• Fuel

Only use commercially available brand-name diesel fuel with a sulfur content of less than 0.5 % (see chapter 3.18 "fuels, lubricants and coolants").

Only use brand-name diesel fuel with additives for cold temperatures to prevent clogging of the fuel system due to paraffin separation. Even if winter diesel fuel is used, disturbing paraffin separations (jelling) can occur at very low temperatures.

4.5 Operator's stand

4.5.1 Driver's seat

The deluxe driver's seat is an air-cushioned seat with shock absorbers.

The seat satisfies international quality and safety requirements.

- (16/1) Rocker switch for upper and lower lumbar support
 - tilt forward $\Rightarrow$ lumbar part round;
 - tilt backward $\Rightarrow$ lumbar part straight
- (16/2) Handle for seat back adjustment (tilt)
- (16/3) Handle for seat upholstery adjustment (tilt)
- (16/4) Handle for seat depth adjustment (leg support)
- (16/5) Handle for longitudinal adjustment of seat (upper part)
- (16/6) Lever for horizontal spring system (reduces horizontal bouncing in the travel direction)
 - lever locked in place backward $\Rightarrow$ seat locked in place
 - lever set forward $\Rightarrow$ seat not locked in place
- (16/7) Handle for combined height and body weight adjustment
 - press handle briefly: weight is adjusted automatically
 - raise or press lever: adjust height
- (16/8) Handle for longitudinal adjustment of entire seat assembly
- (16/9) Two point safety belt (optional)
- (16/10) Rocker switch seat heating (optional)



*The two-point safety belt (lap belt) **must** be fastened before commencing work.*

4.5.2 Steering wheel position

Height adjustment of steering wheel:

- The locking device is released using the lever (17/12). Adjust the desired height of the steering wheel. Re-lock the steering wheel after adjustment.

Tilt adjustment of steering column:

- Press lever (17/13) forward using your foot and adjust the desired tilt of the steering column. Set lever (17/3) to home position. Slightly move steering column back and forth until the lever (17/3) clicks in.

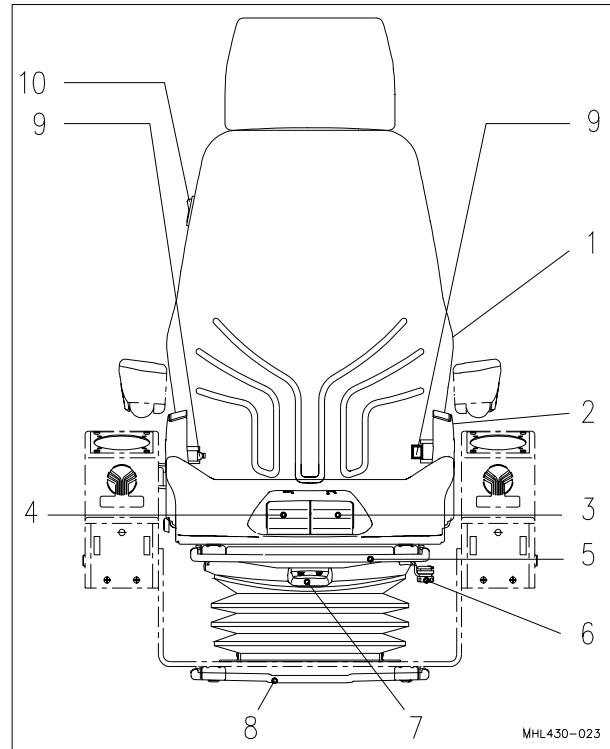


Fig. 16 Driver's seat

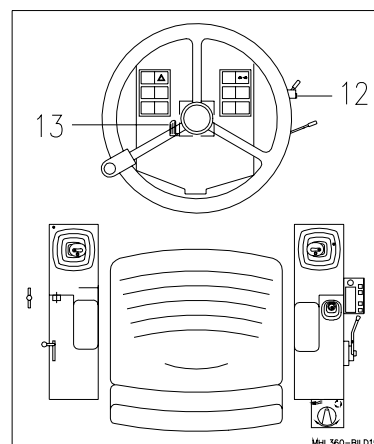


Fig. 17 Steering wheel adjustment

4 CONTROL

4.6 Ventilation and heating

4.6.1 Hot water heating

The cab heating is dependent upon the engine coolant temperature. The fan air flow is routed through a heat exchanger whose temperature is regulated by the flow rate of the coolant.

The heater is operated as follows:

- Adjust the desired level of heat using the rotary knob (20/65). Turn clockwise $\Rightarrow$ greater heat.
- Adjust the desired fan setting using the rotary knob (20/46).
- Adjust the heating vents (18/1), (18/2) and (18/3) as desired.

To ensure that the heater functions correctly, the circulating air / fresh air is drawn off through the air filter (rear of cab below driver's seat).



In the case of high exposure to dust, the filter matting should be cleaned or changed every 100 operating hours. See chapter 7.5.

- Open the fan cover using the knob (18/21), remove the filter matting, clean or replace if required.
- When re-fitting the matting, make sure that the blue side of the matting shows to the inside to ensure optimum filtering of the circulating air / fresh air.

4.6.2 Supplementary heating (optional)

Heating and ventilation can also be operated when the engine is not running. Ignition does not have to be switched on.

Heating is operated on the operator control panel (18/22) in the right-hand armrest of the driver's seat.

The functions and the operation of the heater may be read up in the Operating Instructions provided by the heater manufacturer.



The heating must always be switched off when filling up with fuel. The heating shall not be operated in enclosed spaces.



In order to ensure that the heater functions correctly, the combustion air is drawn off through the oil-immersed air filter (rear of cab). In the case of high exposure to dust, the oil should be changed every 100 operating hours (see chapter 7.5 and oil analyses, 7.1.1).

The air is distributed and aimed as desired by adjusting the air vents (18/1), (18/2) and (18/3).

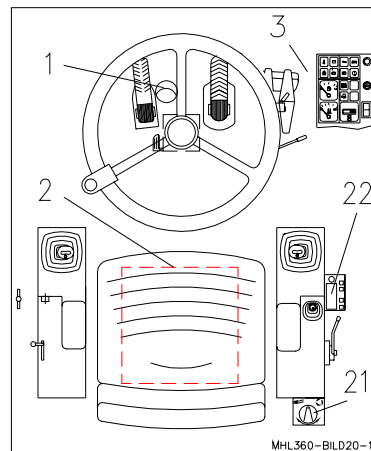


Fig. 18 Heating and ventilation

The heater is located in the driver's cab, on the right-hand side under a sheet-metal cover.

The following maintenance tasks must be carried out before each heating period:

- Check the flame glow plug (19/1) for burn-off and replace if necessary.
- Examine the fuel filter for clogging and replace if necessary.
- Check that electrical connections are securely fastened.
- Check that fuel lines and connections are not leaking.
- Check the oil level in the oil-immersed air filter.

If the heating does not come on, proceed as follows:

- Switch heating off
- Check fuses
- Switch heating on

If the heating still does not function when switched on for the third time, please contact the Customer Service of Messrs. Eberspächer. In the case of further unsuccessful attempts, the heating is completely switched off and cannot be switched on again.

If the heating overheats:

Concealed vents are a possible cause.

- Switch heating off
- Uncover vents
- Switch heating on

Other malfunctions which cannot be remedied by self-help measures shall be checked and repaired by Customer Service only.



The battery disconnect switch shall only be pressed approx. 5 minutes after the heating has been switched off. Otherwise, the heater cooling process is interrupted, which can lead to fire.

The battery disconnect switch is located in front of the oil radiator.

4.6.3 Air conditioning (optional)

The air conditioning is switched on using the rotary knob (20/64). At the same time, the rotary knob (20/46) must be set to at least "1", so that the air conditioning starts to operate. The indicator lamp (20/63) lights up.

Temperature is adjusted by operating the rotary knob (20/64):

- Turn clockwise ⇒ increase in cooling performance.



Fig. 19 Heating

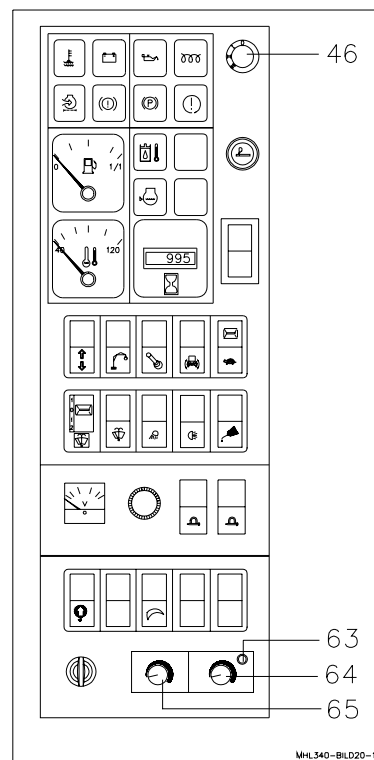


Fig. 20 Air conditioning

4 CONTROL

4.7 Driver's cab

4.7.1 Opening/closing the windshield

The windshield can only be opened completely, not in stages. The windshield is released from the catch by pressing in both release levers (21/1) and can be pulled in under the cab roof.

Release the windshield from the catch by pressing in the two release levers (21/1). It can be brought back to the end position.



Always take care to ensure that the windshield is locked in the end position.



When opening and closing the windshield, take care to ensure that the window does not collide with the steering wheel. If it does, alter the position of the steering wheel.



At customer's request the front windshield and the skylight may be made out of bullet-proof glass. If made out of bullet-proof glass, the front windshield can no longer be opened completely.

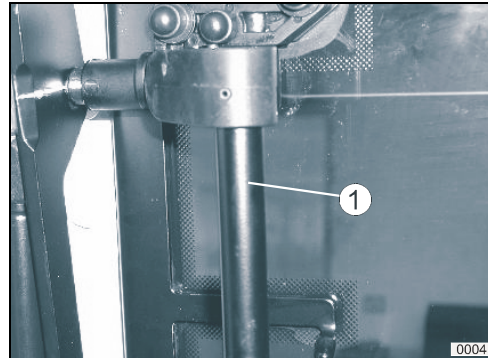


Fig. 21 Opening/closing the windshield

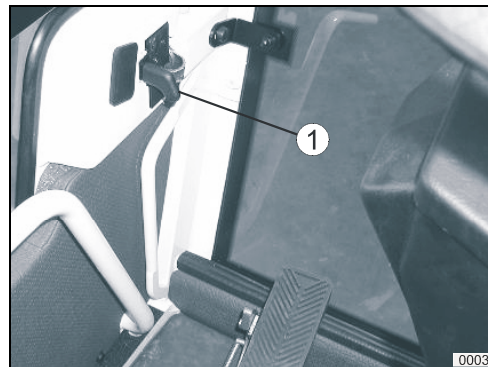


Fig. 22 Opening the door

4.7.2 Sunblind

Above the upper front window, there is a pull-down sunblind which can be engaged in three different positions to reduce glare.

A second sunblind is below the skylight and can be engaged in one position.

4.7.3 Cab door

From the interior, the cab door is released by means of the lever (22/1).



When working or driving with the cab door open, the cab door must be engaged in the catch (23/2) by means of the locking device (23/1).

The cab door is released from the catch by means of the lever (24/1).

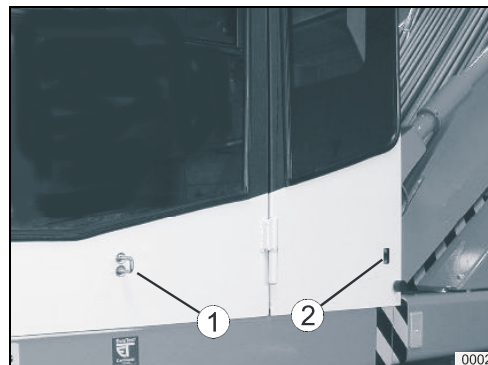


Fig. 23 Door catch



Fig. 24 Releasing the door from the catch

4.7.4 Door window

Adjust the sliding window in the door of the driver's cab using the handle as required.

4.7.5 Skylight of driver's cab

To ventilate the cab, the skylight can be tilted up.

4.7.6 Interior lighting of driver's cab

The interior lighting is switched on and off by turning the lamp glass.

4.7.7 Windshield wash/wipe system

The container for the windshield washer fluid is situated in the cab behind the driver's seat. The container holds approx. 2 liters. We recommend that you always add window cleaner with antifreeze to the water.

4 CONTROL

4.8 Cab with hydraulic elevation

The cab can be infinitely adjusted in vertical direction.

4.8.1 Before putting into operation

The lifting equipment of the cab must be tested daily.



The cab may only be repaired whilst in elevated position when it is adequately supported.

A sleeve may be affixed to the piston rod of the lift frame cylinder to support the cab. This support sleeve can be obtained from FUCHS, under order number 6090031600.

4.8.2 During operation

Only enter or leave the cab when it is in the lower end position. Do not remain on the chassis or undercarriage or on the steps. During all movements of the cab, the machine operator must take care to ensure that s/he and other persons are not in danger.



When driving with the cab raised, special care must be taken to ensure that no overhead power lines are touched. If the machine has touched an overhead power line, it shall only be left or touched by persons standing outside the cab when it is certain that the machine is no longer in touch with the power line or the current has been switched off. See also chapter 2.11.

4.8.3 Driving with elevated cab



When driving with the cab elevated, even small irregularities in the ground cause the cab to dip. This may result in injuries of the driver (operator) or to incorrect operation of the machine.

The machine may only be driven with the cab elevated when the door is closed, and not on public roads.

When driving with the cab raised, it must be made sure that there are sufficient entrance heights to work bays and other premises. In the event of a collision the operator is exposed to an increased risk of injury.

The following points must also be observed:

- There must be no obstacles in the vehicle's path.
- The route must be such as not to endanger the stability of the machine and the safety of the person in the cab.
- The driver must have a sufficient overview of the vehicle's path, or the area must be marked, e.g. by safety posts.

4.8.4 Switching off the machine

The cab must be returned to the rest position.

4.8.5 Positioning the cab

The cab with hydraulic elevation can be infinitely adjusted in horizontal position.



While the cab is being moved, and during driving and working, the left-hand armrest must be folded down and the cab door shut.

Adjust the cab as follows:

- Close the cab door and fold down the left-hand armrest.
- Press the push-button (25/34, arrow pointing upward) until the cab reaches the desired height.
- The cab is lowered by pressing the push-button (25/34, arrow pointing downward).

4.8.6 Procedure for manual lowering of elevated cab (in case of malfunction)

The cab can be lowered from the cab interior using the ball valve (25/3) or from the superstructure using the ball valve on the hydraulic tank (26/1).

In order to raise the cab once more, after lowering, the ball valves (25/3) and (26/1) must be returned to the shut-off position.



When lowering the elevating cab, there is a danger to third parties of being crushed by the lift frame, as the machine operator cannot fully see the area beneath it.

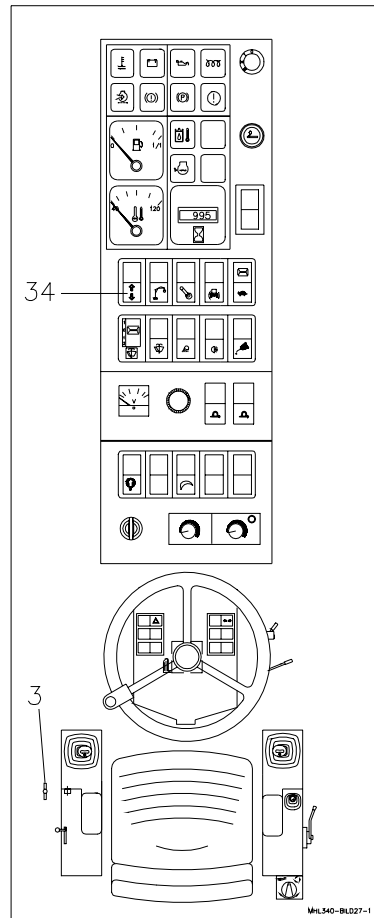


Fig. 25 Positioning the cab

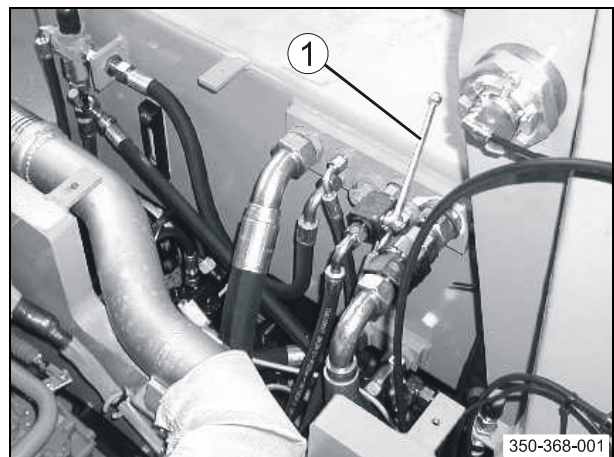


Fig. 26 Ball valve

4 CONTROL

4.9 Driving

 *The loading machine is not licensed for use on the road, and therefore shall not be driven on public high-ways (in Germany).*

4.9.1 Driving off

 *The direction of travel is always based on the normal position of the undercarriage (steering axle to the front).*

- Start the engine as described on page 4.6.
- Select 1st or 2nd gear by pressing the toggle switch (27/56) when the machine is standing still.
- Release the parking brake (27/19) or service brake (27/9) respectively.

 *The machine cannot be driven off if the parking brake is applied. Indicator (27/48) lights up red.*

- Drive forward by pressing pedal (27/10), reverse by pressing pedal (27/11).
- Driving speed is regulated by means of the accelerator pedals (27/10) and (27/11).

 *Change from forward to reverse driving and vice versa only when the machine is at a standstill. Do **not** change direction while the machine is still moving.*

 *Do not change gears while the machine is in motion; otherwise danger of damage affecting the transmission.*

If the machine is stuck in difficult terrain, do not attempt to free it by rocking. See chapter 6, "Transport and Recovery" for how to proceed.

The machine operator must be absolutely certain that no one is in the vehicle's path.

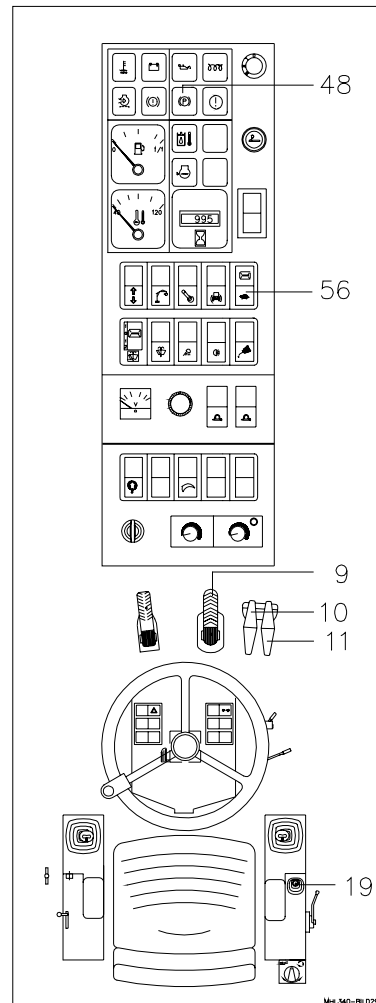


Fig. 27 Driving

4.9.2 Coming to a halt

Driving speed is reduced by releasing the accelerator pedals (28/10) and (28/11). The hydrostatic drive acts as a non-wearing service brake. See also chapter 4.9.4, "Braking".

4.9.3 Steering

The steering of the front axle of the loading machine is fully hydraulic.



In the event of steering malfunctions, stop work immediately, determine the cause (see trouble-shooting section) and call for service personnel if necessary.

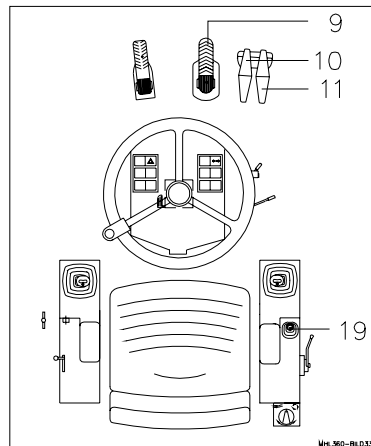


Fig. 28 Driving

4.9.4 Braking

- Service brake (can be locked in place)

Apply the service brake (28/9) as required.

- Parking brake/hand brake

Apply the parking/hand brake (28/19) when stopping the machine.



Only apply the parking brake when the machine is stationary.



When the parking brake is applied the oscillating axle lock is activated at the same time.

4 CONTROL

4.10 Parking the machine

- Only park the machine in a safe place.
- Lower the work equipment to the ground and retract the cylinders as far as possible, so that the piston rods are protected against the weather.
- Apply the parking brake (29/19).
- Apply the slewing brake by pressing the pedal (29/8).
- Reduce the engine speed by moving the engine speed control lever (29/18) forward, and allow the engine to run at idle for a short time in order to cool down.
- Move the engine-speed control lever (29/18) forward until the stop; switch off the engine. Turn the ignition key to "0".
- Turn the ignition key to "I". Briefly actuate all hydraulic levers in order to relieve the hydraulic system of pressure.
- Turn the ignition key to "0" and withdraw it.
- Fold up the left-hand armrest (29/6).
- Lock the cab when work is over, so that it cannot be entered by unauthorized persons.
- Thoroughly clean the machine after each major job.

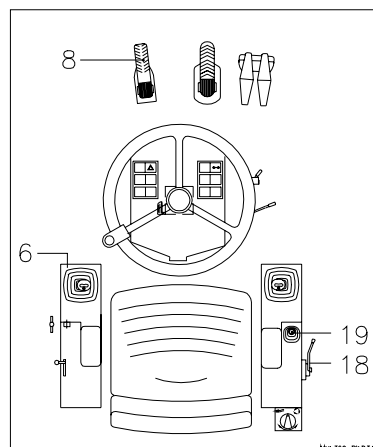


Fig. 29 Parking the machine

5 WORK OPERATION

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5.1 Loading operations

The loading machine is equipped as standard with ISO control (fig. 30), upon which the following description is based.



If the customer so wishes, the loading machine may be equipped with a non-standard control. Your loading machine must therefore be checked to see whether or not a non-standard control is installed. Incorrect operation may endanger persons or objects.

Before commencing work, memorize the lever controls well. Commence at low engine speed when familiarizing yourself with the controls.

5.1.1 Operation of work equipment**Four-way control lever, left**

- a = Extend dipperstick
- b = Retract dipperstick
- c = Slew uppercarriage anti-clockwise
- d = Slew uppercarriage clockwise

Four-way control lever, right

- a = Lower box-type boom
- b = Raise box-type boom
- c = Close grab
- d = Open grab

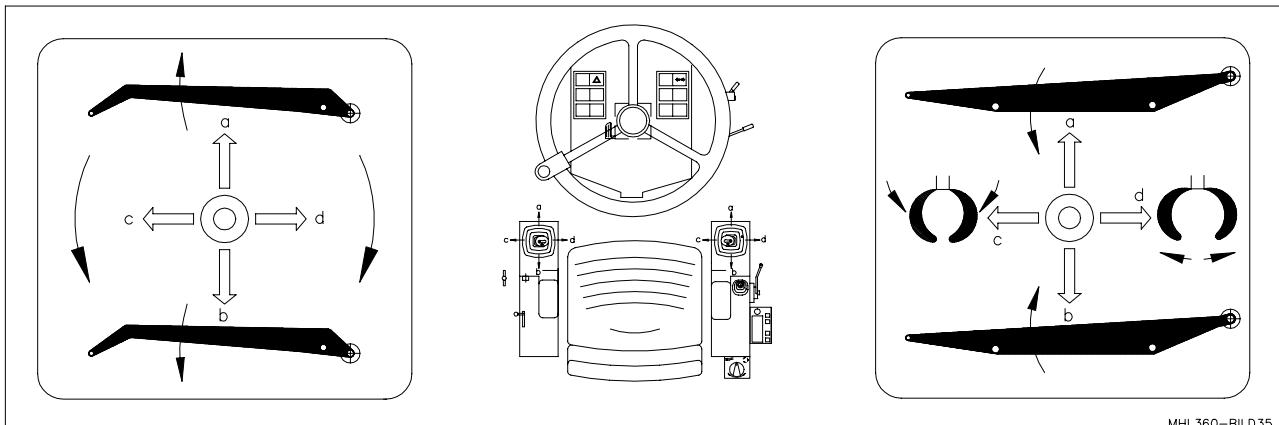


Fig. 30 ISO control

5.1.2 Increasing the operating pressure

With the function "increase operating pressure", the hydraulic pressure can be increased from 320 to 360 bar. This may be necessary for heavy-duty work. To increase pressure, press the push-button in the right-hand four-way control lever (see fig. 31). The function only takes effect whilst the push-button is being pressed.

The pressure increase affects the boom only. There is no pressure increase for the functions "travel" and "open/close grab".

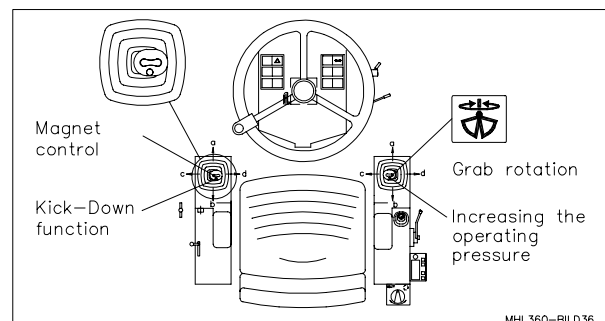


Fig. 31 Increasing the operating pressure

5 WORK OPERATION

5.1.3 Kick-down function

see chapter 4.4.4.3

5.1.4 Operation of outriggers

- Lever (32/1) forward : Outriggers down
- Lever (32/1) backward : Outriggers up

5.1.5 Disabling all work functions

- All work functions can be disabled using the toggle switch (33/36). The indicator lamp in the switch does **not** light up; the indicator lamp (33/50) lights up.
- All work functions are disabled when the armrest (33/6) is folded up. The indicator lamp (33/50) lights up.
- All work functions are disabled when the service ladder is folded down. The indicator lamp (33/50) lights up.
- If the permitted coolant temperature is exceeded, all travel and work functions are disabled. The indicator lamp (33/43) lights up (see also chapter 4.4.2).

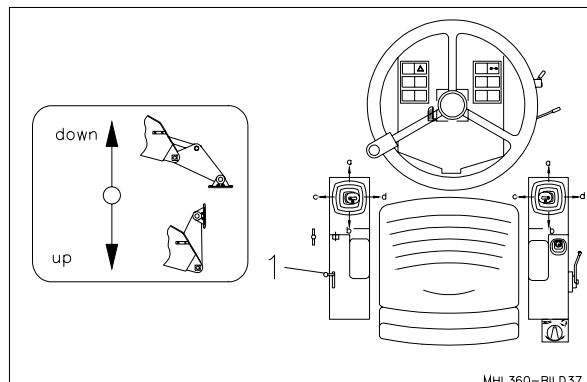


Fig. 32 Outriggers

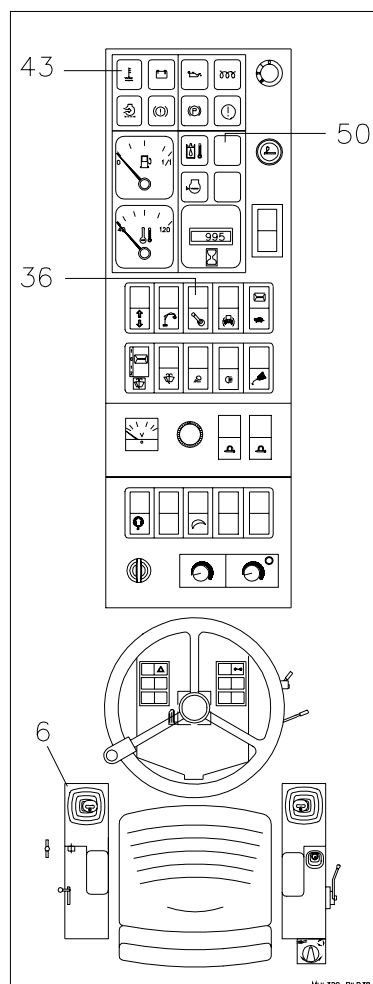


Fig. 33 Disabling work functions

5.1.6 Operation of oscillating axle lock

The oscillating axle lock is activated by the parking brake (34/19), i.e. the oscillating axle is locked automatically when the brake is applied. The oscillating axle may also be locked independently from the parking brake by means of the toggle switch (34/55). The indicator lamp in the switch does **not** light up.

- For slewing and loading operations, lock the oscillating axle. The indicator lamp in the switch (34/55) does **not** light up.
- For driving (without load), unlock the oscillating axle. The indicator lamp in the switch (34/55) lights up.

5.1.7 Work zone extension

The work zone extension function is activated by means of the toggle switch (34/35), i.e. the dipperstick may be moved inside the safety zone between the cab and the work attachment mounting.

Work zone extension active: The lamp in the toggle switch (34/35) lights up.



When the work zone extension is active, the work attachment may knock into the cab.

If the dipperstick reaches the limit of the safety distance, the indicator lamp (34/52) lights up red.

5.1.8 Overload warning device (optional)

The machine can be equipped with an overload warning device. This emits an acoustic signal (discontinuous buzzing tone) when the permissible load limit is reached. If this signal sounds, work movements increasing the load moment are prohibited.



The overload warning device requires the machine to be supported by outriggers.



The overload warning device is a safety device and shall not be used as part of normal operation. The values in the table of carrying capacity must be strictly observed. We recommend that you work only with the overload warning device switched on.

The overload warning device is switched on using the toggle switch (34/26). The indicator lamp in the toggle switch lights up red.

5.1.9 Overload cut-off (optional)

The machine can be equipped with an overload cut-off. This cuts off the work equipment when the permissible load limit is reached. It only remains possible to retract the stick in order to reduce the load moment.



The overload cut-off requires the machine to be supported by outriggers.

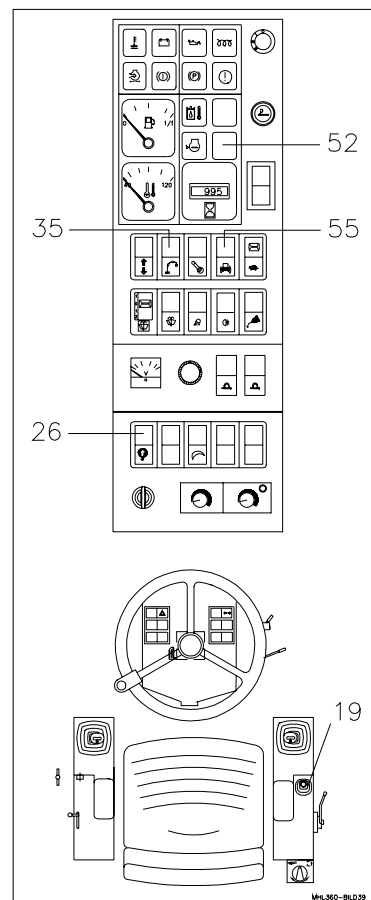


Fig. 34 Oscillating axle lock

5 WORK OPERATION



The overload cut-off is a safety device and shall not be used as part of normal operation. The values in the table of carrying capacity must be strictly observed. We recommend that you work only with the overload cut-off switched on.

Please follow the instructions of Messrs. Krüger for how to operate the overload cut-off.

5.2 Changing and mounting work attachments

The loading machine can be equipped with various work attachments, e.g. grab, magnet, lift hook.

This section describes the mounting and removal of both directly mounted work attachments and those with quick-attach system.



Special care must be taken to ensure that removed work attachments are placed on the ground in such a way that they cannot overturn or move. We recommend opening cactus grabs before placing them on the ground. Clamshell grabs, in particular, must be secured against overturning.



Before hydraulic connections can be detached, the hydraulic system must be relieved of pressure. To do so, see chapter 7.1.1 "Letting off residual pressure in the hydraulic circuit".

5.2.1 Changing directly mounted work attachments



The work attachment must be mounted in such a way that the hydraulic connections of the attachment are on the same side as the hydraulic connections of the dipperstick.

5.2.1.1 Mounting

Work attachments are mounted as follows:

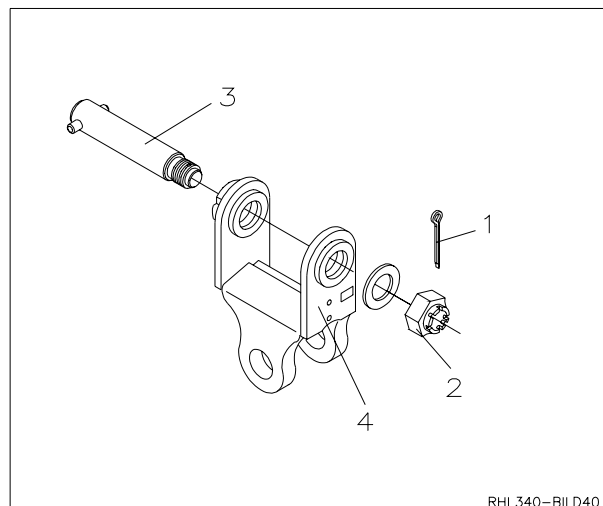
- Remove the cotter pin (35/1).
- Unscrew the castle nut (35/2).
- Remove the pin (35/3) from the holding fixture.
- Move the dipperstick onto the holding fixture (35/4) so that the pin is pushed into the fixture and into the bearing on the dipperstick.
- Screw on the castle nut.
- Secure the castle nut with the cotter pin.
- Connect the hydraulic lines and electric cables (magnet) of the work attachment to the connections on the dipperstick. Ensure that lines and cables are not crossed.



The bearings on the dipperstick and work attachment must be clean.

5.2.1.2 Removal

For removal, proceed in the reverse order to mounting, described in chapter 5.2.1.1.



RHL340-BILD40

Fig. 35 Direct mounting

5.2.2 Changing work attachments with quick-attach system

When changing work attachments with quick-attach system, the pin remains in the bearing of the dipperstick. The work attachments are fastened to the pin by means of a clamping device.



The work attachment must be mounted in such a way that the hydraulic connections of the work attachment are on the same side as those of the dipperstick.

5.2.2.1 Mounting

Attachments are mounted as follows:

- Remove the locking clip (36/4).
- Slacken the nuts of both turnscrews (36/1) (do not unscrew completely).
- Open the quick-attach system on the work attachment.
- Open the turnscrews (36/1).
- Open the clamps (36/2).
- Move the dipperstick onto the work attachment until the pin (36/3) is in the bearing of the quick-mount hitch.
- Re-close the clamps (36/2).
- Re-tighten the nuts of the two turnscrews. Secure the nut with the locking clip (36/4).
- Connect the hydraulic lines and electric cables (magnet) of the work attachment to the connections on the dipperstick. Ensure that lines and cables are not crossed.

5.2.2.2 Removal

For removal, proceed in the reverse order to mounting, described in chapter 5.2.2.1.

5.2.3 Venting the hydraulics of the work attachment

When defective hydraulic hoses or cylinders are replaced, air may collect in the hydraulic system. In order to prevent damage to the piston seals of the hydraulic cylinders, the system must be vented before use.

- To this purpose, slightly loosen the swivel nuts on the adjustable angles of the two supply hoses on the work attachment (grab). Hold against the screw couplings using a wrench!
- Perform several work maneuvers (open/close grab).
- When oil escapes without bubbles, tighten the swivel nuts at the adjustable angles parts by 1/3 turn above the point of perceptible increase in force. To do so, hold against the screw couplings using a wrench!

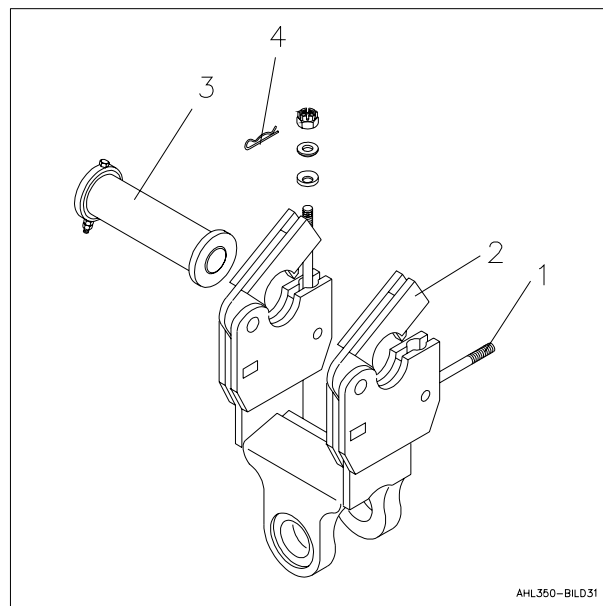


Fig. 36 Quick-attach system

5 WORK OPERATION

5.3 Slewing and loading operations

Observation of the following points is essential:

• Machine with outriggers up

- ⇒ When the outriggers are up, loads may only be hoisted above the front or rear axle respectively, see table of carrying capacity.
- ⇒ When the outriggers are up, perform work operations only with the oscillating axle being locked, see chapter 5.1.6.
- ⇒ When the machine is standing still, the parking brake must be applied. When the parking brake is applied, the oscillating axle is locked.

• Machine with outriggers down

- ⇒ When the outriggers are down, the wheels must be blocked with the service brake.
- ⇒ The 4-point outriggers must rest firmly upon the ground during work operations. This must also be monitored continuously during work, and the support cylinders re-adjusted if necessary.

• General notes

- ⇒ **The values in the table of carrying capacity must be strictly observed.**
- ⇒ Released whilst the uppercarriage is slewing, the left-hand four-way control lever (35/4) automatically goes to neutral position, and the uppercarriage is "sensitively" braked. The uppercarriage may also be braked by countering, i.e. steering in the opposite direction of slewing.
- ⇒ The uppercarriage can be kept in a certain position by pressing the pedal (37/8). **The slewing brake (37/8) shall not be used to brake the uppercarriage.**
- ⇒ Do not level the ground in front of the loading machine with the work equipment by slewing the uppercarriage to and fro.
- ⇒ Neither knock nor beat the grab.
- ⇒ Pay attention to hoses when lowering the grab into a shaft.
- ⇒ Do not pull loads with the swing assembly.

- ⇒ Do not slew the uppercarriage so fast that the load is pulled strongly outward through centrifugal force or the load swings when braking.
- ⇒ Do not brake the slewing motion of the uppercarriage by dropping the work equipment.
- ⇒ When slewing, ensure sufficient all-round carrying capacity.
- ⇒ No one shall remain in the danger zone of the machine during operation.
- ⇒ Never force the controls.

5.4 Crane operations

see chapter 2.14

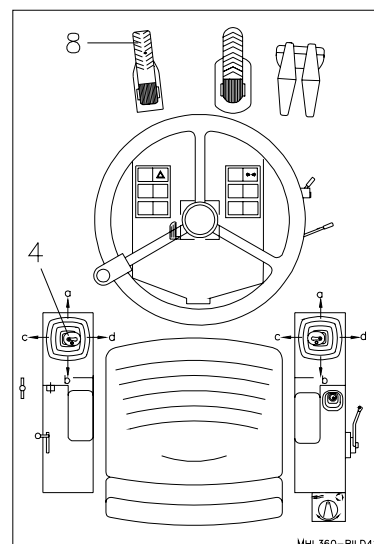


Fig. 37 Slewing the uppercarriage

5.5 Magnet device (optional)

5.5.1 Operation of magnet device

- Switch on the magnet device using the toggle switch (38/60). The indicator lamp in the switch (38/60) lights up.
- Move the magnetic plate onto the material to be picked up.
- Activate the magnet using the button (38/5) on the left-hand four-way control lever. The lamp (38/59) lights up.

In order to achieve optimum performance when picking up material with the magnetic plate, only magnetize the plate immediately before positioning the magnet on the material to be picked up. Do so using the button (38/5) on the left-hand four-way control lever. Lift the magnetic plate up out of the material after max. 5 seconds.

- Withdraw the magnetic plate with attached material.
- To drop the material, deactivate the magnet by means of the button (38/5). The lamp (38/59) goes out.

If the material drops too slowly, the potentiometer (38/30) must be turned clockwise. If the material is attracted back to the magnet whilst being dropped, the potentiometer must be turned anti-clockwise. The voltage gauge (38/29) indicates the momentary voltage. The operating voltage shall not exceed 220 – 230 V.

To avoid excessive generator overload, the respective max. permissible output of the magnet plates installed on our loading machines is not to be exceeded in accordance with below-mentioned table and the generator system installed.

Output of the generator system installed	Max. permissible output of magnet plate
13 kW	9 kW *
20 kW	14 kW *

* It is always possible to install smaller magnet plates.

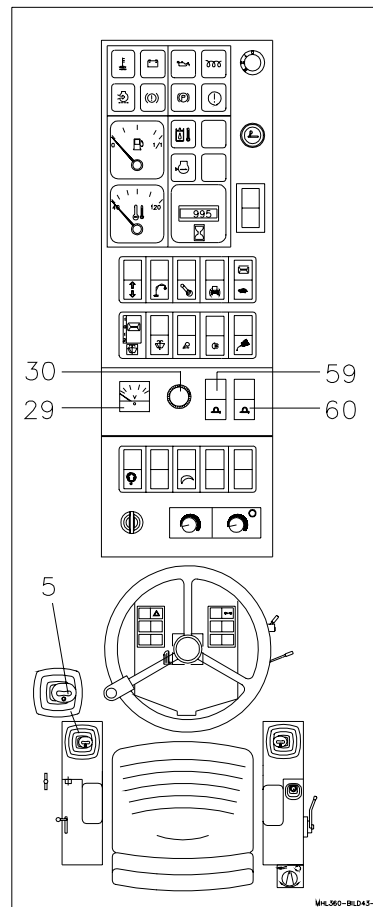


Fig. 38 Operation of magnet device



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6.1 Towing the machine

The machine is equipped with two towing lugs, one on the front and one on the rear of the undercarriage.

Symbol:



The towing lugs have a maximum bearing pressure of 120 kN.

Before the machine can be towed, the power shift transmission must be set to neutral position (idle running). The way to proceed depends on the diesel engine (if it is running during towing or not).



When the diesel engine is switched off it must be observed that the machine can neither be steered nor braked.

Diesel engine is standing still

- Switch on the ignition.
- Switch the transmission through using the push-button (39/56) for approx. 10x. The transmission control is now pressureless; the transmission is in neutral position.

Diesel engine is running during towing

- Switch off the diesel engine; switch on the ignition.
- Switch through the transmission (39/56) for approx. 10x. The transmission control is now pressureless; the transmission is in neutral position.
- Switch off the ignition.
- Unscrew the hoses (40/1) and (40/2) on the transmission.
- Tightly seal the hoses and connections on the transmission; fasten the loosened hoses on the undercarriage.
- Start the engine.

The transmission is pressureless and remains in neutral position with the engine running.

After towing, the hoses must be re-attached to the transmission.

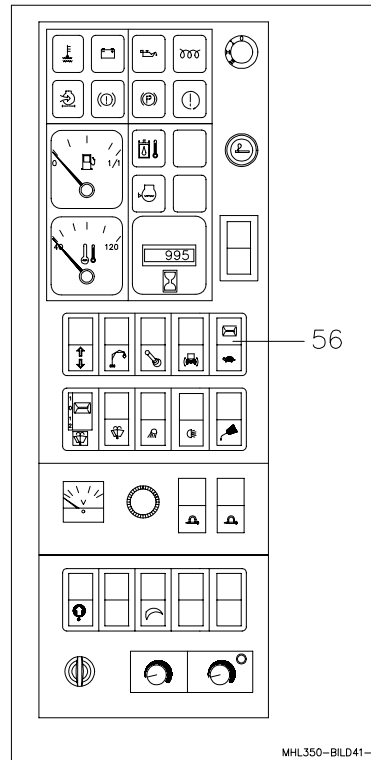


Fig. 39 Transmission control

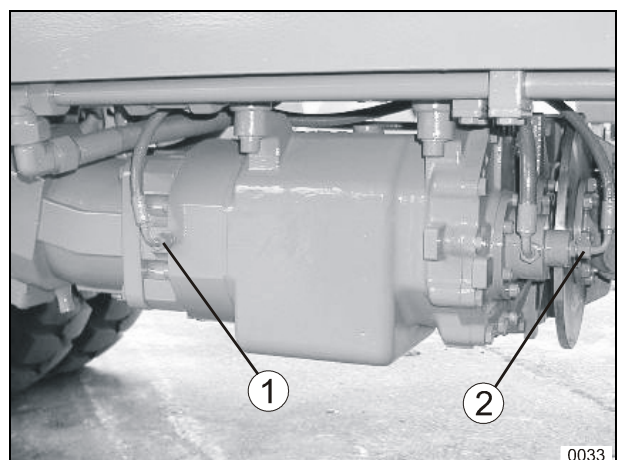


Fig. 40 Transmission control

6 TRANSPORT AND RECOVERY

6.2 Recovery of the machine

If the machine is stuck fast in difficult terrain, do not attempt to free it by rocking.

The machine can be pulled free with the aid of the work equipment. Here, it must be in 1st gear (13/56). In certain conditions, the work attachment must be removed.

If the machine cannot be freed using the work equipment, it must be towed clear following the instructions in chapter 6.1.

6.3 Loading onto a flat-bed trailer or train

For transport on a flat-bed trailer or train wagon, the machine must be lashed in place so that it cannot move. The machine is equipped with two lashing points for this purpose (see fig. 41).

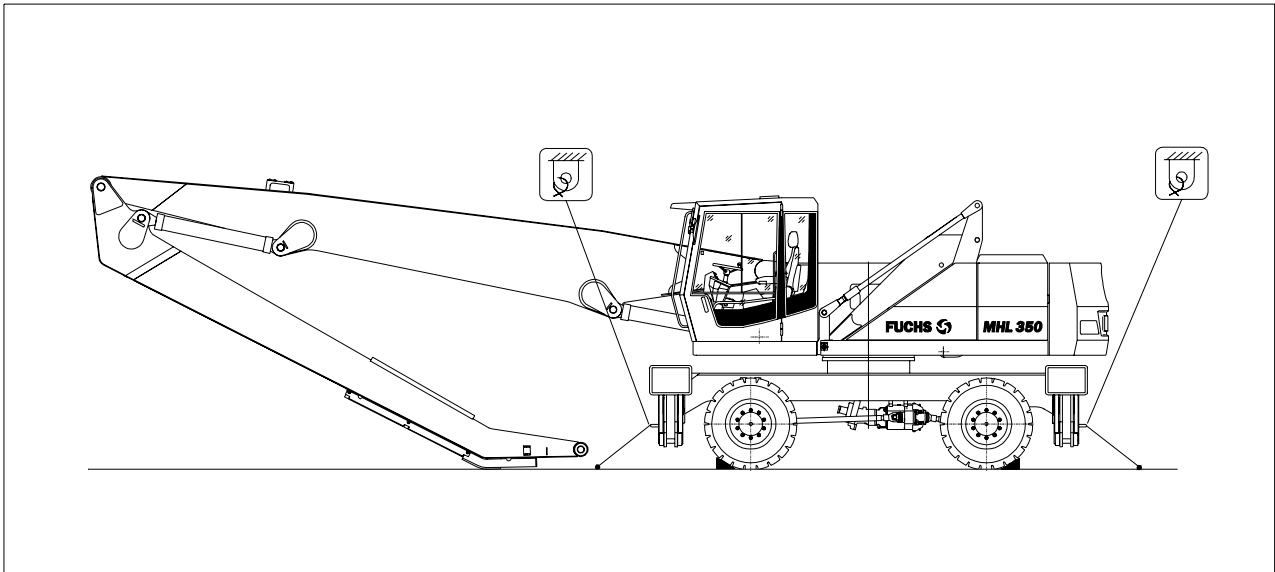


Fig. 41 Loading onto a flat-bed trailer or train

To ensure safe transport, the machine must be prepared as follows:

- Bring the uppercarriage into the direction of travel and lock the slewing brake (42/8).
- Lay the work equipment on the loading area, do not lift the machine.
- Apply the parking brake (42/19).
- Place wooden chocks under the four twin tires to keep the machine in place.
- Attach ropes or chains to the lashing points and secure the machine on the loading area (see fig. 41).

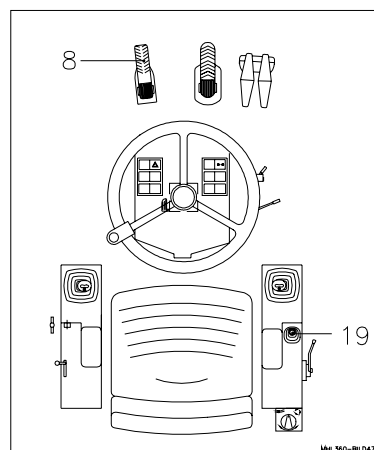


Fig. 42 Transport of the machine

6.4 Fixing points for lifting the machine with a crane

For loading onto flat-bed trailers, etc., the entire machine may be lifted.



Pivot-mounted work attachments such as a grab or magnet must be removed before the machine is lifted. Swinging movements of the work attachment would otherwise make safe lifting impossible.

Dismantle the supporting feet from the outriggers.

Fasten the hoisting device (43/1) with the pins (43/2) and fastening elements (43/3). Move the supports (43/4) to horizontal position.

The pins and fastening elements match the attachment of the supporting feet.

If required, the fixing device may be obtained from FUCHS.

Shackle size 20 to DIN 82101 is recommended, in accordance with the weight of the machine.

Bring the work equipment to the transport position, as for loading onto a flat-bed trailer (see fig. 41).

In this position, the load, based on the fixing points, is distributed fairly evenly.

The minimum lifting capacity per rope must be 100 kN (10 t).

The four fixing ropes shall not be shorter than 13 m for reasons of weight distribution, otherwise a lifting harness must be used.

The ropes must be routed so that no damage occurs to the cab or paneling.

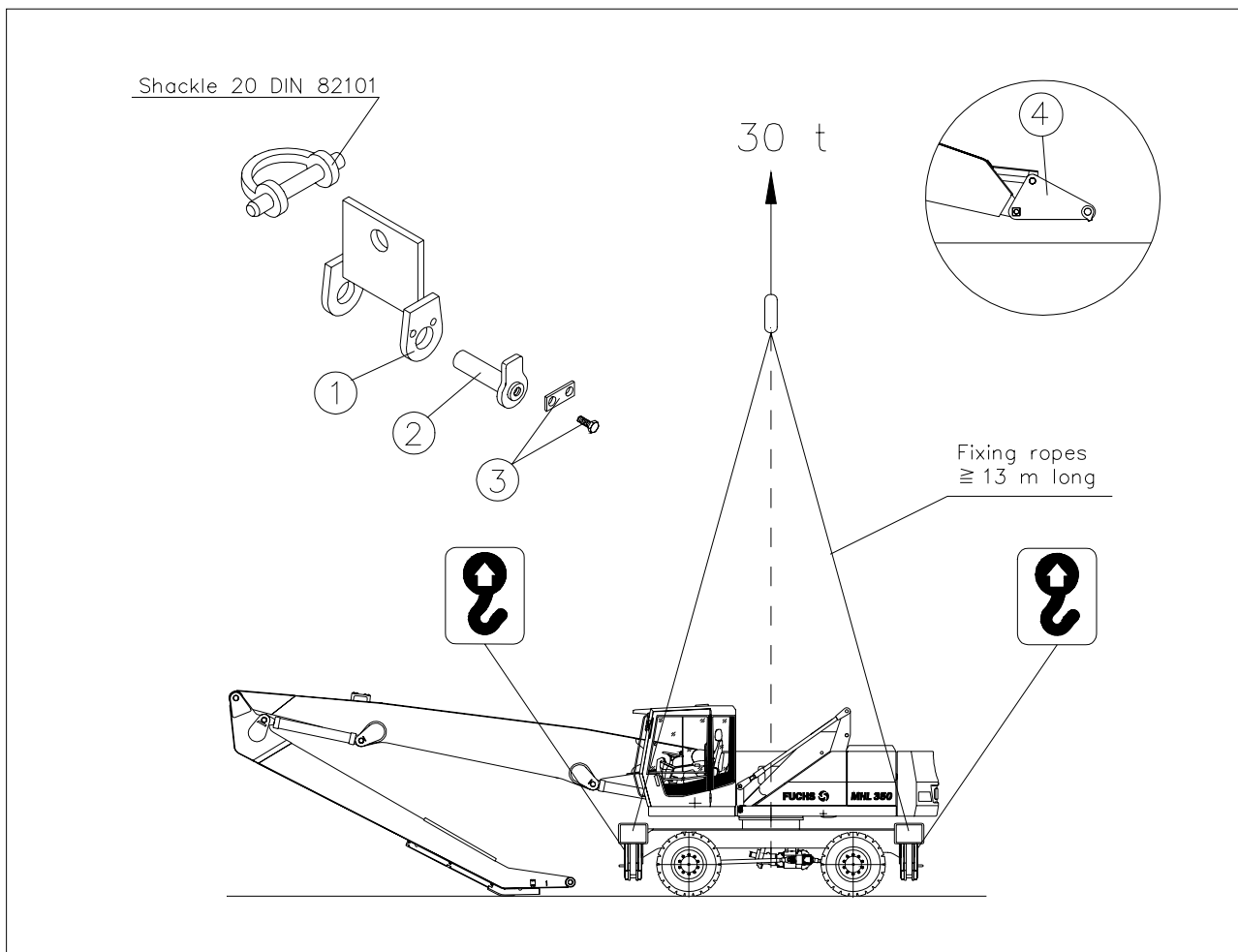


Fig. 43 Attaching the machine

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7.1 General information

The good operating condition and life expectancy of the machine are largely influenced by care and maintenance.

For this reason, it is in every machine owner's interest to comply with these maintenance instructions. This instruction book contains detailed information on daily and weekly maintenance, inspection and lubrication tasks in chapter 9.

During the warranty period **three** inspections are stipulated, which must be carried out by trained specialist personnel.

Inspection intervals

Inspection intervals in operating hours	
1 st inspection	after approx. 100 operating hours
2 nd inspection	after approx. 500 operating hours
3 rd inspection	after approx. 1,000 operating hours
Subsequently,	every 500 operating hours



The three inspections at 100, 500 and 1,000 operating hours are obligatory and must be paid for.

The performance of the inspections as specified shall be confirmed on the inspection cards in the warranty and handing-over certificate.

If this is omitted, the warranty may be subject to restrictions.



The battery disconnect switch is located in front of the oil radiator. Before working on the electrical system, the electric circuit must be interrupted by means of the battery disconnect switch. Before welding, the electric circuit must be interrupted by disconnecting the battery ground cable. The running machine shall not be switched off using the battery disconnect switch, as this causes damage to the electrics.



When changing fuels, lubricants and coolants, such as engine oil, lubricating oil, hydraulic oil, fuel, etc., care must be taken to ensure that these fluids do not seep into the ground. Suitable containers must be used to collect them. If they do run into the soil nevertheless, their escape must be stopped immediately and the fluid bound with suitable binding agents. If necessary, this area of soil must be excavated. Binding agents and excavated soil must be disposed of in the proper manner. The relevant environmental regulations must be complied with.



Repair work may only be performed on the elevated cab when it is securely supported (see chapter 4.8).



When performing maintenance and repair work, the necessary safety precautions according to chapter 2.15 ff must be observed.

7 CARE AND MAINTENANCE

7.1.1 Regular oil analyses

Oil analyses are not to question the oil change intervals specified but take into account a potential reduction of maintenance costs, the early recognition of imminent damage as well as increased environmental consciousness.

Advantages of an oil analysis

- Extension of oil change intervals in the case of normal or light-duty operating conditions.
- Minimum wear of high-quality components because of optimum utilization of fuels, lubricants and coolants.
- Periodic lab analyses allow early recognition of imminent damage.
- Early service/repair work protects equipment from serious and unforeseeable damage.
- Consequential damage is avoided.

At what intervals should the oil be analyzed?

Regular oil analyses show the development of the oil condition and the condition of the machine.

Upon reaching the scheduled oil sampling point, oils should be checked at the following intervals in order to check the quality of the oil and thus extend oil change intervals:

- hydraulic oil: 1,000 operating hours
- transmission oil: 500 operating hours
- engine oil: 100 operating hours

Oil sample intervals according to the first results and as specified by test lab.

A detailed leaflet specifying oil test procedures, etc. can be obtained from your FUCHS dealer.

7.1.2 Letting off residual pressure in the hydraulic circuit



When performing maintenance and repair work on the hydraulic system, the residual pressure in the hydraulic circuit must be let off. Before performing this work, the work equipment must be safely lowered onto the ground.

To let off pressure, the following operator controls must be actuated for at least 5 operating cycles with the diesel engine switched off. **The ignition must be switched on** (ignition key set to I).



Observe the given sequence for points 2 & 3!

1. Four-way control levers (44/4) and (44/16), lower work equipment, slew up-percarriage, open/close grab
2. Service brake pedal (44/9) (actuate 20 times)
3. Parking brake (44/19)
4. Accelerator pedals (44/10), (44/11)
5. Slewing brake pedal (44/8)
6. Push-button (44/34) for elevating cab
7. Lever for outriggers (44/1)
8. Push-button (44/17) for grab rotation
9. Push-button (44/55) for oscillating axle
10. Toggle switch for transmission control (44/56)

7.2 Service parts

Service parts	Spare part number
Return filter element 2x	5 003 660 422
Insert of ventilation filter	5 003 730 010
Engine oil filter	5 411 656 298
Fuel filter	5 411 656 493
Fuel pre-filter cartridge	5 411 656 722
Engine air filter:	
Main cartridge	5 501 656 762
Safety cartridge	5 411 656 759
V-belts:	
Water and fuel pump drive	5 411 656 691
Generator drive	
Generator V-belt 2x	1 490 953 789

Service parts for inspections must be stocked in good time!

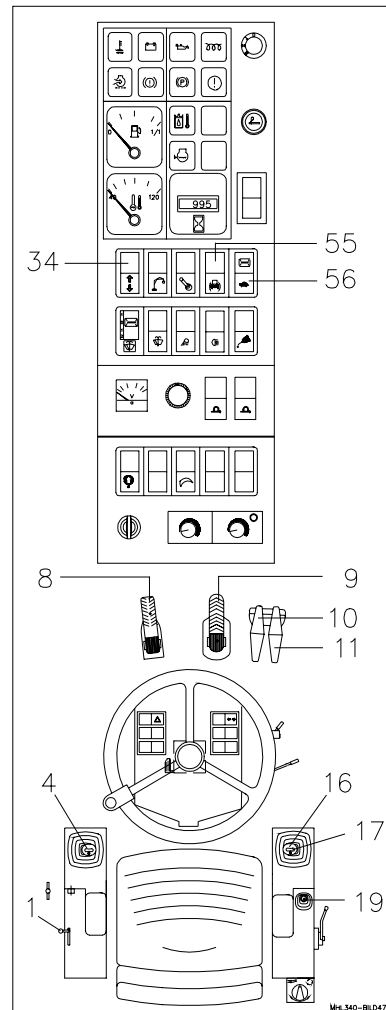


Fig. 44 Letting off residual pressure

Fuels, lubricants and coolants

The machine's life expectancy and operating condition are largely dependent upon the use of the specified fuels, lubricants and coolants and compliance with the service intervals.

If fuels, lubricants and coolants which do not conform to our recommendations are used, consequential damage may occur for which we will not assume liability, even inside the warranty period.

FILLING QUANTITIES see chapter 3.17

FUELS, LUBRICANTS AND COOLANTS see chapter 3.18

7 CARE AND MAINTENANCE

7.3 Work before putting into operation

7.3.1 Checking the engine oil level

- The oil level must be checked daily before start-up, with the machine standing on level ground.
- The notches on the oil dipstick indicate the minimum and maximum oil levels.
- Top up the existing level of engine oil if necessary. Unscrew the cap and add the same oil from a clean container.

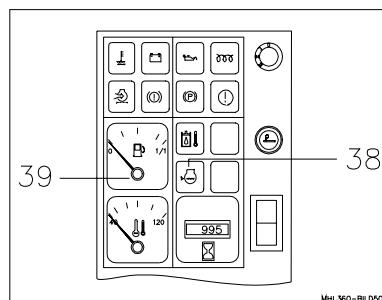


Fig. 45 Fuel level

7.3.2 Fuel system

7.3.2.1 Fuel level

Check the fuel level on the fuel gauge (45/39). In order to prevent condensation forming before the next time the machine is used, fill the tank with fuel after daily use. To do so, open tank cap (46/1).



Never allow the fuel tank to run empty, as otherwise the fuel system has to be vented.

7.3.2.2 Water separator

Open the drain plug on the water separator (47/1) once a week and observe the escaping liquid. As soon as fuel instead of water escapes tighten drain plug.

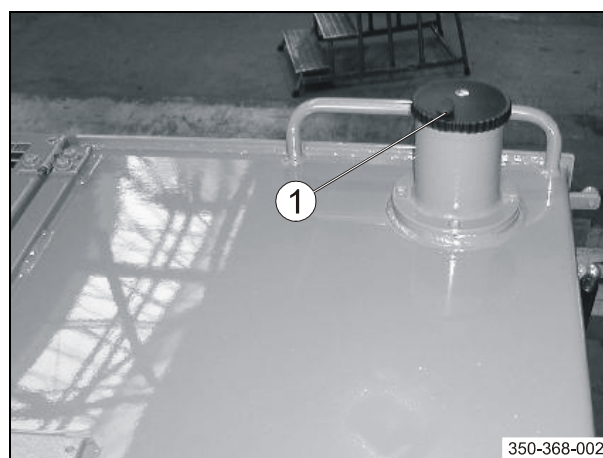


Fig. 46 Tank cap

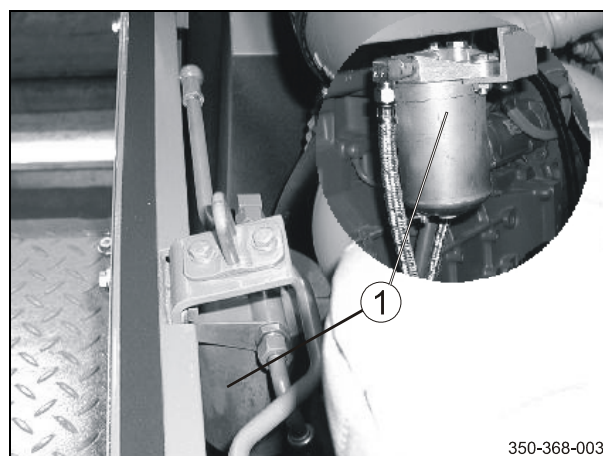


Fig. 47 Water separator

7.3.3 Cooling system**7.3.3.1 Coolant level**

Only check the coolant level when the engine is cold. Hot coolant may scald!

Engine coolant radiator

If the coolant level is too low, the lamp (45/38) lights up.

- Remove the protective cover.
- Remove the cap (48/1) and check the coolant level.
- The coolant must be up to the overflow pipe.

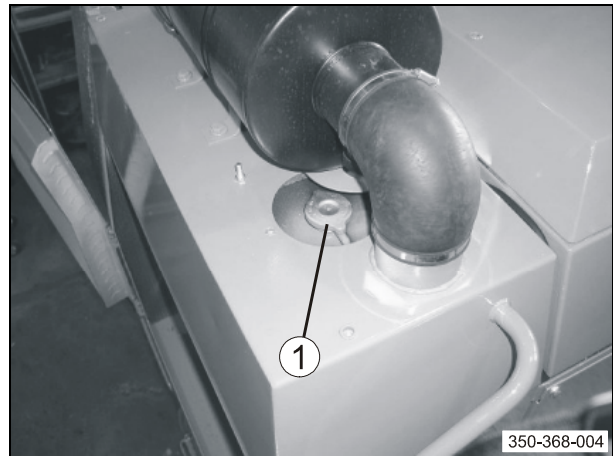


Fig. 48 Engine radiator

7.3.3.2 Checking the antifreeze

Check the level of antifreeze protection before the beginning of the cold season.



Always use an antifreeze with anti-corrosion protection. The antifreeze level is set to approx. -35° C at the factory. When topping up, only a mixture of 50 % water and 50 % antifreeze should be used. Antifreeze in higher concentrations than 50 % must be avoided, as this impairs the effectiveness of the cooling system.

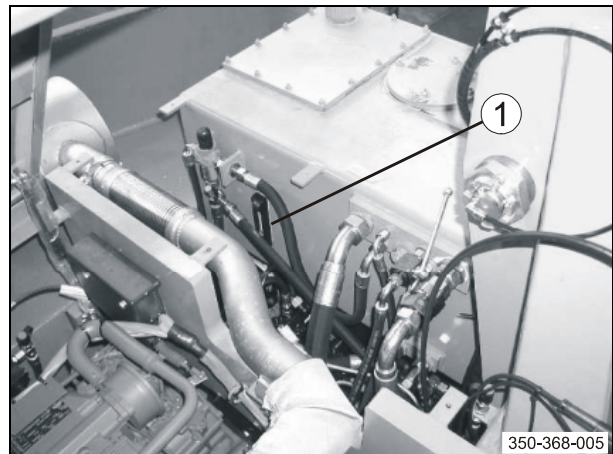


Fig. 49 Hydraulic oil sight glass

7.3.4 Checking the hydraulic oil level

Check the oil level using the sight glass (49/2), and top up if necessary.



To check the oil the work equipment must be extended and lowered to the ground, and the outriggers moved to their uppermost position.

The hydraulic oil level must lie between the two markings on the sight glass (49/2).

7.3.5 Cleaning the radiator

The cooling fins of the engine coolant radiator (50/2) and the hydraulic oil radiator (50/1) must be cleaned from dirt taken in.

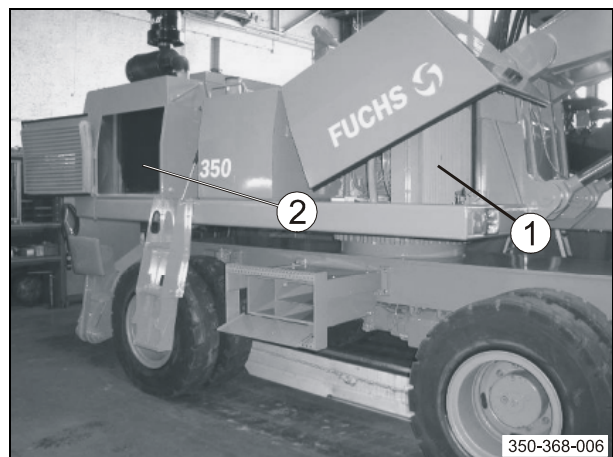


Fig. 50 Cleaning the radiator

7 CARE AND MAINTENANCE

7.3.6 Tires

Tightness of wheel nuts

During the first 50 operating hours, check the torque of the wheel nuts daily, and subsequently at regular intervals, and tighten to the correct torque if necessary.

Tightening torque: 450 Nm

When changing a wheel, always tighten the nuts to the specified torque crosswise in several steps.

7.3.7 Checking the oil levels in axles, swing transmission and power shift transmission

- Park the machine on level ground.
- Turn the wheel until the drain plug (53/2) is at the bottom.

Remove the checking plugs from the:

- Rear axle (51/1)
- Front axle (52/1)
- Wheel hub (53/1)
- Power shift transmission (55/1),

check the oil level and top up if necessary.

7.3.8 Electrical equipment

The lighting and warning equipment, including the function of the indicator lamps, must be checked prior to use.

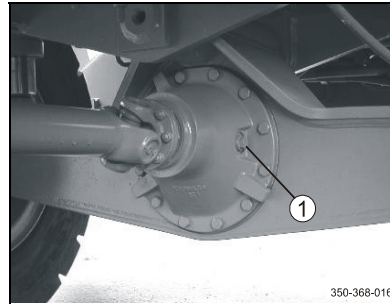


Fig. 51 Rear axle

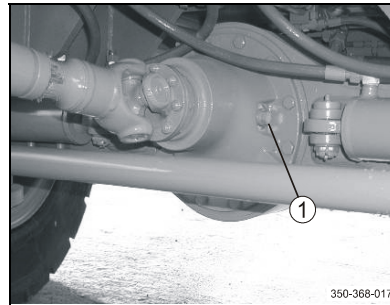


Fig. 52 Front axle

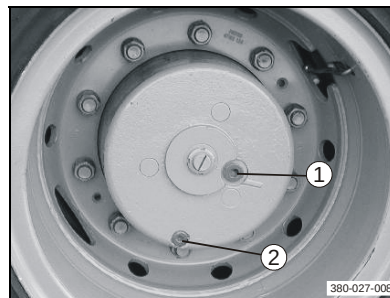


Fig. 53 Wheel hub

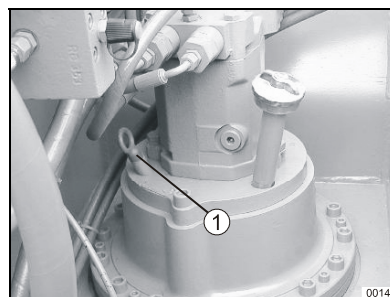


Fig. 54 Swing transmission

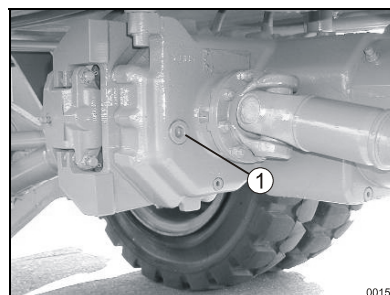


Fig. 55 Power shift transmission

7.3.9 Transmission oil levels in grab and magnet

For checking see inspection plan, chapter 7.5 and oil analyses, chapter 7.1.1.

- Position the clamshell grab, cactus grab or magnet vertically on a level surface.
- Remove the screw plugs (56/1), (57/1).
- The oil level must be up to the hole.
- Top up oil if necessary.

7.3.10 Fastening bolts of grab and magnet

For checking see inspection plan, chapter 7.5 as well as fuels, lubricants and coolants, chapter 3.18.

- Tighten the fastening bolts (56/2) of the clamshell grab and cactus grab to a torque of 210 Nm.
- Tighten the fastening bolts (57/2) of the magnet to a torque of 290 Nm.

When a magnet is fitted, the damping distance must be checked. To do so, the magnet is placed on an even surface and pressed down using the work equipment of the machine. The damping distance must be approximately the same all round. If this is not the case, and the difference is greater than 3 mm (see fig. 57), the annular spring set must be replaced. Fill the space for the annular springs with grease, then install the springs. Take care that the rings are not crooked and lie snugly against one another.

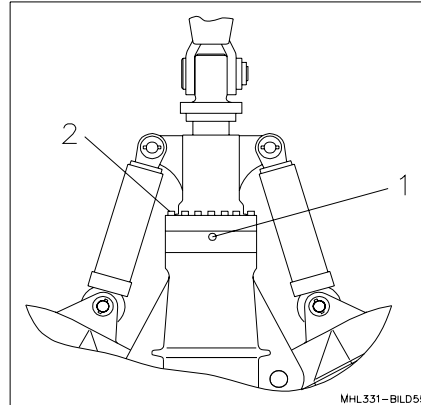


Fig. 56 Grab

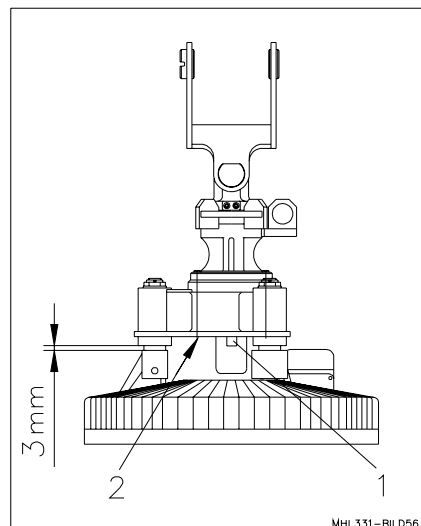


Fig. 57 Magnet

Overview of lubricating points

No.	Lubricating points	Qty.	Daily	Weekly	Remarks	
1	Bearing of outrigger foot	4		X	manual lubrication see fig. 61	
2	Bearing of outrigger claw	4		X		
3	Bearing of outrigger cylinder	8		X		
4	Propeller shafts (if not maintenance-free)	6		X		
5	Cab door	2		X	central lubrication uppercarriage	
6 *	Bearing of elevating cab	10	X			
7	Bearing of box-type boom	2	X			
8	Boom cylinder bearing	4	X			
9	Dipperstick bearing	2	X			
10	Dipperstick cylinder bearing	4	X			
11	Rotary transmission	8	X		manual lubrication see fig. 60 see fig. 59 see fig. 62	
12	Bearing of work attachment mounting	2	X			
13	Rocking shaft bearing (cactus grab)	1	X			
14	Cylinder bearing (cactus grab)	10	X			
15	Bearing of grab arms (cactus grab)	5	X			
16	Engine hood hinge	2		X		
17	Service ladder hinge	2		X		
18	Hinge of engine radiator cover	2		X		
19	Hinge of hydraulic oil radiator cover	2		X		
20	Speed control cylinder	2		X		
21	Steering gear case	4		X		
22	Steering cylinder bearing	4		X		
23	Oscillating axle bearing	2		X		
24	Grease nipple on rod eye	1	X		perform additional lubrication (manual lubrication) with loading equipment lowered to the ground (system without pressure)	



* The points marked must be subjected to a visual and functional inspection **every 500 operating hours** (see chapter 7.5). In particular, general damage and wear must be observed.

7 CARE AND MAINTENANCE

Overview of lubricating points

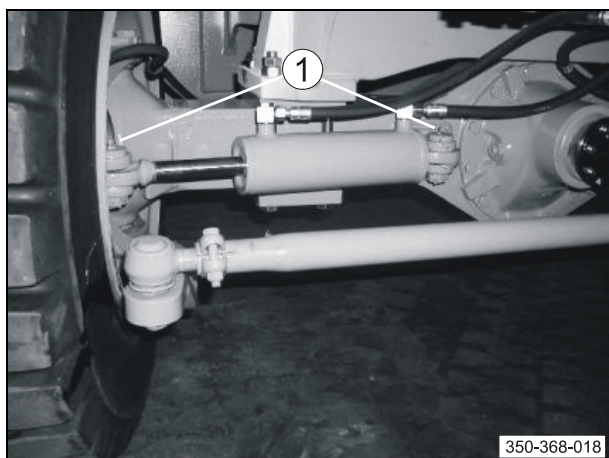


Fig. 59 Steering cylinder

Steering cylinder: 4 lubricating points

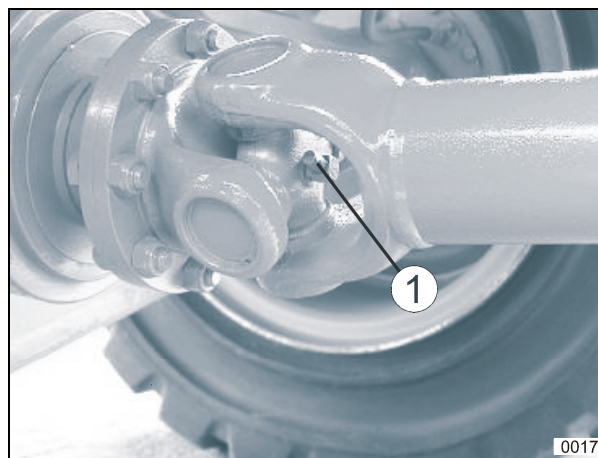


Fig. 61 Propeller shaft

Propeller shaft: 6 lubricating points

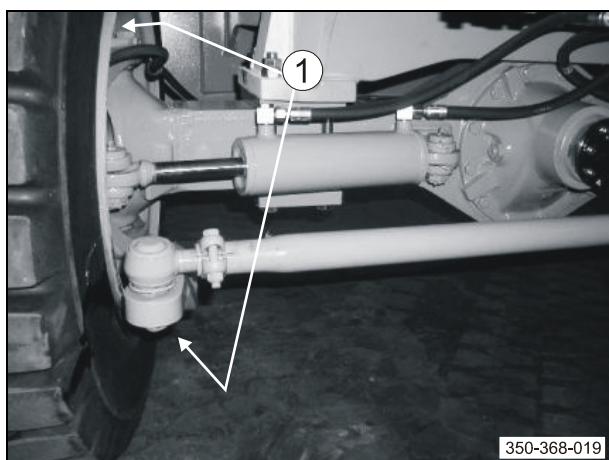


Fig. 60 Steering gear case

Steering gear case: 4 lubricating points

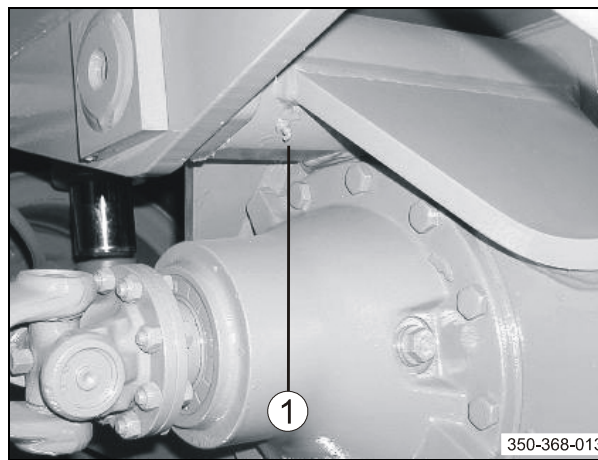


Fig. 62 Oscillating axle

Oscillating axle: 2 lubricating points

7.4.1 Central lubricating system

The machine is equipped with a central lubricating system which automatically supplies certain bearing points on the uppercarriage with grease (as shown in "Overview of lubricating points").

7.4.1.1 Automatic check

Each time that the ignition (63/25) is switched on, a function check of the central lubricating system drive motor and indicator lamp (63/58) takes place. The indicator lamp (63/58) in the button lights up for 2 seconds. If no malfunction is present, the indicator lamp goes out.

If the indicator lamp flashes, there is a malfunction in the drive motor of the lubricating system.

If the indicator lamp does not light up at all, it is defective.

If the indicator lamp flashes during operation, please read the meaning of the flash code signals in the central lubricating system instruction booklet.

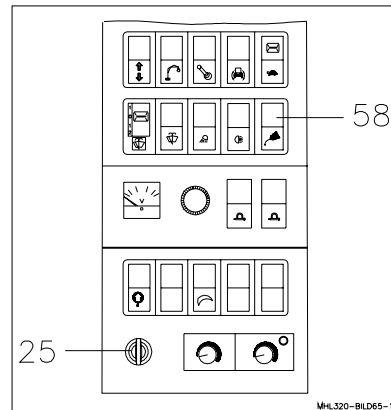


Fig. 63 Button for lubrication

7 CARE AND MAINTENANCE

7.4.1.2 Filling the grease container

Fill the grease container using the filler pump which is in the tool kit.

- To do so, insert an appropriate re-fill cartridge into the filler pump.
- Remove the protective plug (64/1).
- Screw the filler pump onto the gland with thread.
- Operate the filler pump (container has a capacity of approx. 3 kg. low-viscosity grease).

It is also possible to fill the container via the filler nipple (64/2) up to the "Max" mark.

For the grease to be used, see fuels, lubricants and coolants, chapter 3.18.



Grease must be free from impurities and its viscosity shall not change over time. Grease additives, such as molybdenum disulfide, shall not be added.



Run the pump whilst filling. The lines are vented automatically up to the lubricating point.

After filling, additional lubrication can be triggered if necessary (see chapter 7.4.1.4), in order to ensure that lines are fully vented.

7.4.1.3 Lubrication when lubricating pump is defective

If the lubricating pump is defective, the bearing points may be greased manually via the lubricating nipple (64/3) on the pump.

7.4.1.4 Triggering additional lubrication

The operator may trigger additional lubrication at any time.

Additional lubrication is triggered as follows:

- Press the button (63/58) and hold for approx. 3 seconds. The indicator lamp lights up while lubrication takes place.

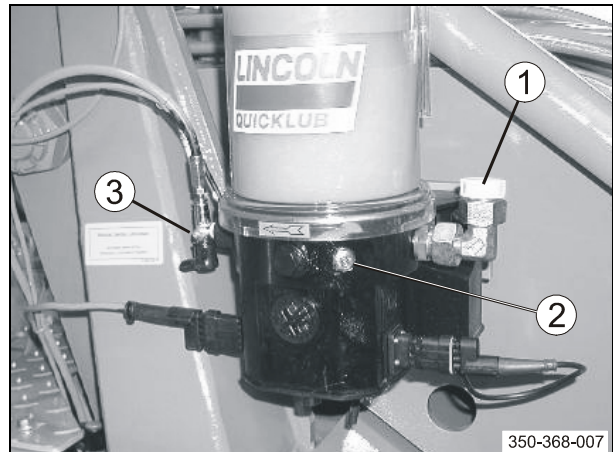


Fig. 64 Grease container

7.5 Inspection plan

Work to be performed by trained dealer or service personnel.

O = Checking, maintenance X = Replacement		Operating hours			
Perform work with machine at operating temperature!		after 100	every 500	every 1000	min. 1 x yearly
1	Check whether machine-specific instruction book is in the machine	O	O	O	O
2	Engine oil		X	X	X
3	Engine oil filter		X	X	X
4	Drain water from fuel tank	O	O	O	O
5	Replace back leak fuel pipes	O	O	X	X
6	Fuel filter		X	X	X
7	Fuel pre-filter		X	X	X
8	Air intake	O	O	O	O
9	Air filter	according to service indicator			X
10	Clean cooling fins of engine and hydraulic oil radiator The cleaning intervals should be shortened if there is high exposure to dust.	O	O	O	O
11	Coolant antifreeze (AVIA, BASF, SHELL)				O
12	Change coolant ¹⁾	as required			
13	V-belt tension	O	O	O	O
14	Engine mounts, pump attachments	O	O	O	O
15	Engine speed control/CEB-control	O	O	O	O
16	Function of electro-hydraulic gas adjustment	O	O	O	O
17	Exhaust system	O	O	O	O
18	Engine valve lash	O		O	O
19	Wheel nuts	O	O	O	O
20	Secure fastening of axles and propeller shafts	O	O	O	O
21	Tighten the fastening bolts on the counterweight (1,000 Nm)	O	O	O	O
22	Bearing of height-adjustable cab (see chapter 7.4)		O		O
23	Perfect function of door catches	O	O	O	O
24	Function of brakes	O	O	O	O

1) at least every 2 years

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O = Checking, maintenance X = Replacement		Operating hours			
Perform work with machine at operating temperature!		after 100	every 500	every 1000	min. 1 x yearly
25	Brake pads (service brake and parking brake)			O	O
26	Bleed service brake and parking brake (if required)	O	O	O	O
27	Adjust play of parking brake (if required)	O	O	O	O
28	Bearing bushings and bolts of work equipment	O	O	O	O
29	Electrical indicating and warning elements and lighting system	O	O	O	O
30	Ease of movement of operator controls	O	O	O	O
31	Check hydraulic axle lock and vent oscillating axle cylinders	O	O	O	O
32	Steering function	O	O	O	O
33	Condition and function of outriggers	O	O	O	O
34	Check tightness of all lines, hoses, control valves, hydr. pumps, cylinders, etc. When tightening hose and line connections, the screw couplings must be locked to prevent rotation.	O	O	O	O
35	Pump drive	O	O	O	O
36	Secure fastening of slewing ring attachment, swing transmission, swing transmission motor	O	O	O	O
37	Grease machine according to overview of lubricating points	see chapter 7.4			
38	Check function, condition and completeness of safety equipment	O	O	O	O
39	Hydraulic function check with pressure function test	O	O	O	O
40	Fastening bolts of grab and magnet	O	O	O	O
41	Oil-immersed air filter (heater, optional): oil change ²⁾	X	O	O	X
42	Air filter (hot water heating)	X	O	O	X
43	V-belt tension, generator	O	O	O	O
44	Check V-belt tension and condition of air conditioning system (optional)	X	X	X	X
45	Test run and test work	O	O	O	O
46	Power shift transmission: oil check or oil change	X	O	X	X
47	Swing transmission: oil check or oil change	X	O	X	X
48	Hydraulic oil tank ventilation filter	X		X	X
49	Initial inspection cards and return to FUCHS	O	O	O	

2) The cleaning intervals should be shortened if there is high exposure to dust.

O = Checking, maintenance X = Replacement		Operating hours			
Perform work with machine at operating temperature!		after 100	every 500	every 2000	min. 1 x yearly
50	Differential of front and rear axles, oil check or oil change	X	O	X	X
51	Wheel hubs of front and rear axles, oil check or oil change	X	O	X	X

O = Checking, maintenance X = Replacement		Operating hours			
Perform work with machine at operating temperature!		after 100	every 500	every 3000	min. 1 x yearly
52	Hydraulic oil return filter insert			X	X
53	Check hydraulic oil, or oil change ³⁾	O	O	X	X

3) **Extension of hydraulic oil change interval -**

Hydraulic oil change according to oil sample analysis and lab. report. Oil sample interval as specified by test lab.

7 CARE AND MAINTENANCE

7.6 Inspection and maintenance work

7.6.1 Diesel engine

All inspection and maintenance work not contained here should be performed as described in the separately supplied diesel engine instruction book.

7.6.2 Changing the engine oil

For engine oil change filling quantity and lubricating oil specifications, see chapters 3.17 – 3.18.

Change acc. to inspection plan, chapter 7.5 and oil analyses chapter 7.1.1.



*Collect the oil, do not allow it to seep into the ground. **Dispose of in the proper manner!***

Oil change

- Bring the engine to operating temperature, lubricating oil temperature approx. 80° C.
- Park the machine on level ground.
- Stop the engine.
- Place suitable oil drip pan below the outlet.
- Unscrew the protective cap from the valve (65/1).
- Screw the oil drain hose (65/2) onto the oil change valve (65/1) and drain the oil.



Danger of scalding when hot oil is drained!

- Remove the oil drain hose (65/2) and screw the protective cap onto the valve (65/1).
- Replace the engine oil filter (see 7.6.3).
- Remove the cap (66/2).
- Fill with lubricating oil up to the "Max." mark on the oil dipstick.
- Close the cap (66/2).
- Start the engine and run at bottom-end idle for approx. 2 minutes.
- Switch off the engine.
- Check the oil level after approx. 15 minutes and top up oil if necessary.

7.6.3 Engine oil filter

- The engine oil filter must be replaced every time the engine oil is changed.
- Clean the outside of the engine oil filter cartridge (66/1).
- Unscrew the engine oil filter cartridge (66/1) and dispose of in the proper manner.
- Clean the sealing area of the filter carrier.
- Wet the sealing ring of the new filter with oil.
- Screw in the engine oil filter cartridge by hand until the gasket of the engine oil filter cartridge touches the filter head.
- Turn the engine oil filter cartridge manually with one more half turn.
- **Only start the engine if there is sufficient oil in the engine (see chapter 7.6.2).**
- Check the tightness of the engine oil filter cartridge.

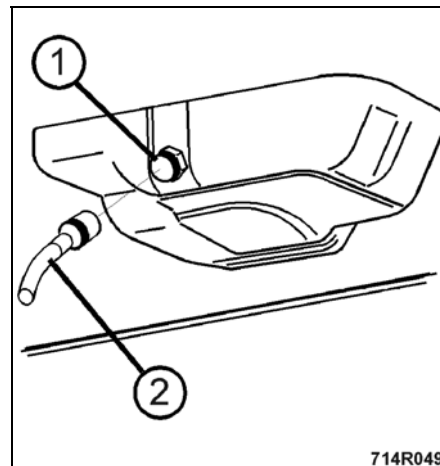


Fig. 65 Oil change valve

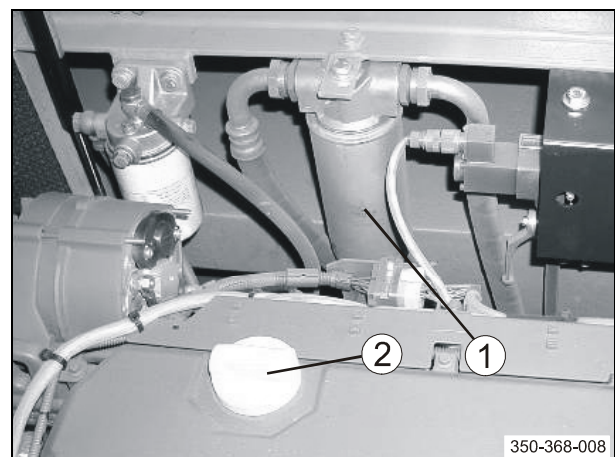


Fig. 66 Engine oil filter cartridge

7.6.4 Fuel system**7.6.4.1 Fuel filter**

Change according to inspection plan, chapter 7.5.

- Thoroughly clean the outside of the fuel filter unit.
- Unscrew the fuel filter cartridge (67/1) (by possibly using a tightening scrap wrench) and dispose of according to regulations.
- Clean the sealing area of the filter carrier.
- Fill the fuel filter with fuel.
- Coat the seal on the fuel filter with fuel, and screw in by hand until the seal of the fuel filter cartridge touches the filter head.
- Turn the fuel filter cartridge with one more half turn.
- Check the tightness of the fuel filter cartridge.

7.6.4.2 Cleaning/replacing the fuel pre-filter

Change according to inspection plan, chapter 7.5.

- Place suitable container below the filter housing (68/1).
- Open the drain plug (69/4) and drain the fuel.
- Tighten the drain plug (69/4).
- Unscrew the straining screw (69/1) and remove the filter housing (69/5) with the filter insert (69/3).
- Clean the sealing area of the filter carrier (69/7) and the filter housing (69/5).
- Insert the new sealing ring (69/6) and filter insert (69/3) (replace the filter insert if necessary).
- Push the filter insert on the guide into the filter housing (69/5) until approx. 3 cm are projecting above the rim of the housing.
- Fill fuel pre-filter with fuel.
- Press the filter housing (69/5) with the filter insert (69/3) and the sealing ring (69/6) against the filter bracket (69/7) and screw in position with clamping screw (69/1) (tightening torque 25 Nm).
- Start the engine; check if the fuel pre-filter is tight.

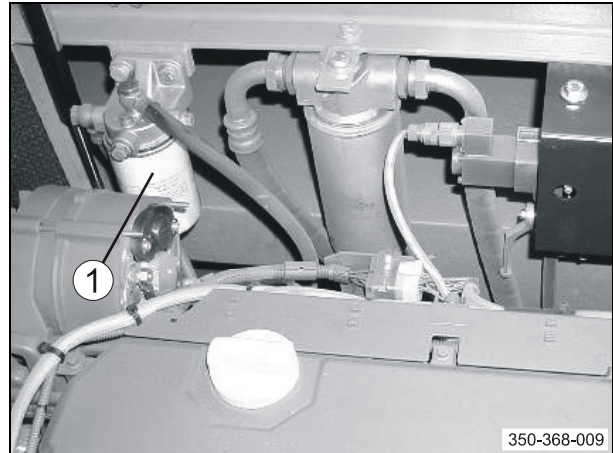


Fig. 67 Fuel filter cartridge

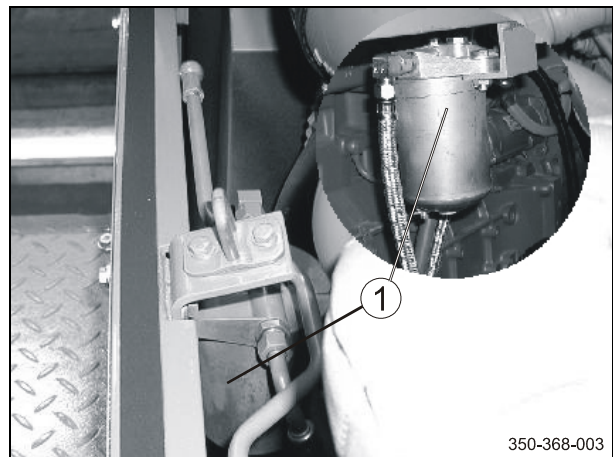


Fig. 68 Fuel pre-filter

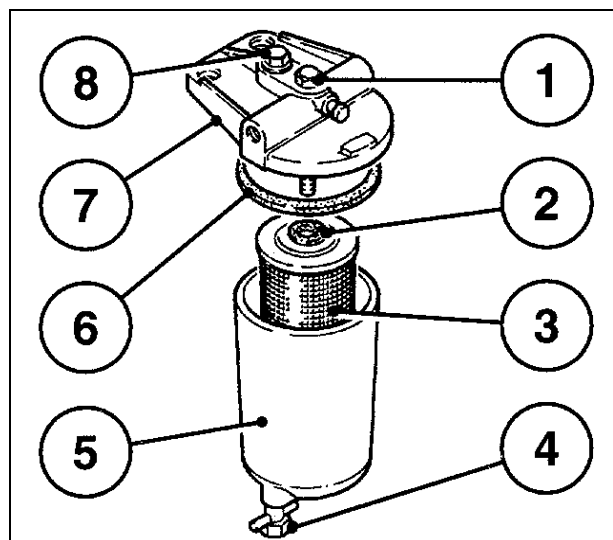


Fig. 69 Fuel pre-filter

7 CARE AND MAINTENANCE

7.6.4.3 Draining water from the fuel system

Maintenance according to inspection plan, chapter 7.5.

Water must be drained from the fuel system through the fuel tank and the fuel pre-filter.



Collect the fuel-water mixture in a suitable container.

Fuel tank

- Drain water from the fuel tank via the drain valve (70/1).
- Screw the drain hose onto the drain valve and drain water. As soon as fuel instead of water escapes tighten drain valve.

Fuel pre-filter

- Open the drain plug (69/4) once a week and observe the escaping liquid. As soon as fuel instead of water escapes tighten drain plug.

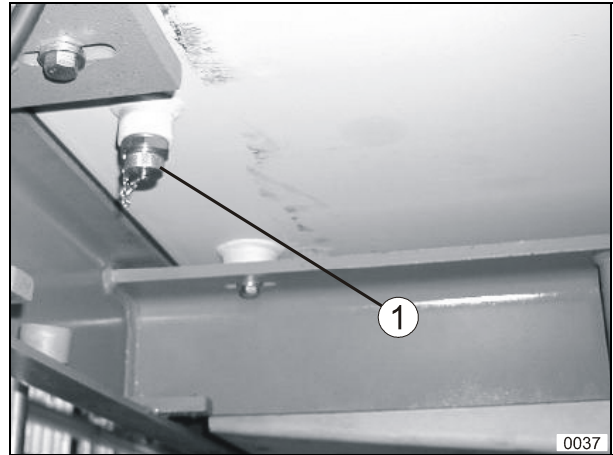


Fig. 70 Drain valve

7.6.4.4 Venting the fuel system

- Start the engine and keep it running for approx. 2 minutes – fuel system is filled.
- Unscrew the vent plug (69/8) until fuel escapes without bubbles.
- Tighten the vent plug (69/8) (tightening torque 25 Nm).



If the engine has not started after max. 30 sec., turn the ignition key to pos. "1" or "0", and pause for at least 30 sec. before trying again. Repeat the start-up procedure.



Do not drive the engine at full throttle straight away. Drive with restraint until the engine reaches operating temperature.

7.6.5 Air filter, air filter pipe

All maintenance work on the air filter system must be carried out with the engine off. Do not start the engine while the main cartridge and safety cartridge is removed.

7.6.5.1 Air filter pipe

- Check the air filter attachment.
- Check the tightness of the air filter pipe section after the air filter. Examine rubber parts for damage. Replace defective parts immediately.
- Empty the dust collector (72/5) and clean it.

The air filter must be serviced as soon as the indicator lamp (71/41) on the operator control panel lights up continuously. This lamp may light up briefly, but this is unimportant and is mostly due to the engine speed being increased too quickly.

Furthermore, a clogged filter makes itself noticeable through smoky exhaust fumes and perceptibly lower engine power.

7.6.5.2 Removal of the main cartridge

- Folding back the brackets (72/1) and remove the cover (72/2).
- Detach the hexagon nut and strain washer (72/4) from the center rod.
- Withdraw the main cartridge (72/3) by twisting it slightly to and fro.

The main cartridge must be installed in reverse order.

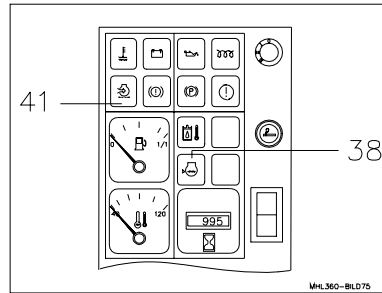


Fig. 71 Air filter indicator lamp

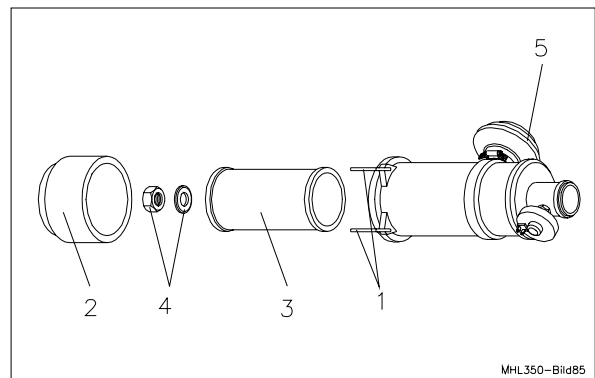


Fig. 72 Dust collector

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7.6.5.3 Cleaning the main cartridge



Never wash or brush out the main cartridge. When blowing out, take care to ensure that dust does not land on the inside of the main cartridge.

The main cartridge can be cleaned up to 5x if necessary. The main cartridge must be replaced once it reaches its maximum service life of one year, at the latest. A note must be made of the number of times it is cleaned.

For cleaning, a pipe the end of which is bent at 90° should be attached to the compressed-air pistol. It must be sufficiently long to reach the floor of the cartridge. Blow out the main cartridge from the inside to the outside with dry compressed air (max. 5 bar) by moving the pipe up and down in the cartridge. Continue until no more dust escapes (fig. 73).

Check the clean main cartridge for damage to the paper bellows and rubber seals. Tears and perforations in the paper bellows can be determined using a torch.



Never continue to use a damaged main cartridge. If in doubt, use a new one.

The main cartridge must be installed in reverse order.

7.6.5.4 Removing the safety cartridge

The safety cartridge is in the main cartridge.



Do not clean the safety cartridge and do not use it again.

- Remove the main cartridge.
- The safety cartridge is removed in the same manner as the main cartridge.
- Insert a new safety cartridge.
- Re-assemble the safety cartridge in reverse order.

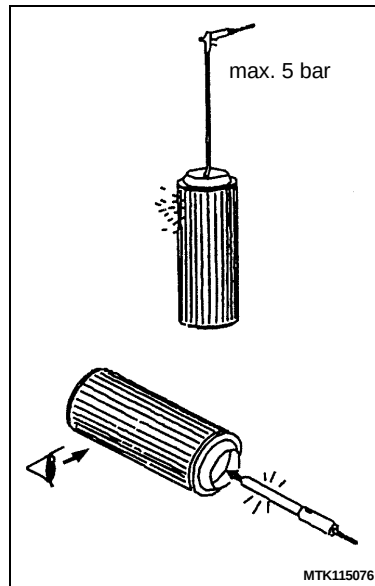


Fig. 73 Cleaning the main cartridge

7.6.6 Cooling system

The machine has separate radiators for engine cooling and hydraulic oil.

7.6.6.1 Cleaning the radiator

The radiator shall only be maintained and cleaned when the engine is not running.

Clean according to inspection plan, chapter 7.5.



Dirt accumulation in radiators causes the engine and/or the hydraulic oil to overheat.

- Clean both radiators (engine and hydraulics) from the outlet side with compressed air.
- Blow out the engine with compressed air.
- Remove any dirt.

7.6.6.2 Changing the coolant (engine radiator)

Change according to inspection plan, chapter 7.5.



All work on the cooling system (e.g. opening the radiator cap, removing hoses) shall only be carried out when the engine and the coolant have cooled down. Hot coolant carries a risk of scalding!

- Park the machine on level ground.
- Remove the radiator cap.
- Unscrew the drain plug (75/1) on the cylinder block and drain off the coolant.
- Remove the lower water hose on the radiator and drain off the coolant.
- Screw the drain plug back on to the engine and re-fit the water hose.
- Release the vent plug (74/1) by 2 turns.
- Fill the cooling system with coolant (see "Filling quantities", chapter 3.17 and chapter 7.3.3.2). Close the cap and tighten the vent plug (74/1).

- Start the engine and bring to operating temperature.
- Turn off the engine and allow to cool down.
- Check the coolant level and top up if required (several times, if necessary).
- Check the tightness of the cooling system.

If the coolant level is too low, the indicator lamp (71/38) lights up.

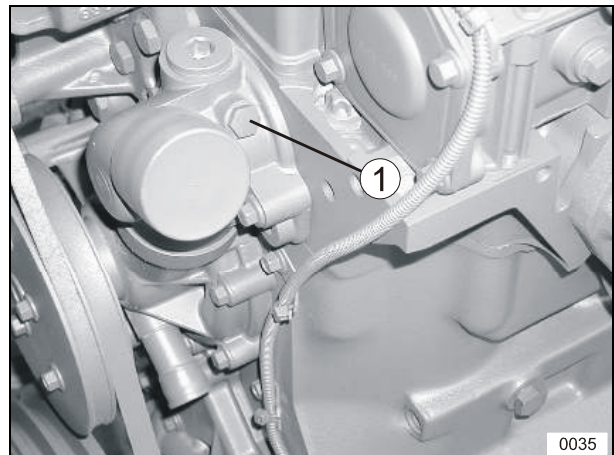


Fig. 74 Vent plug

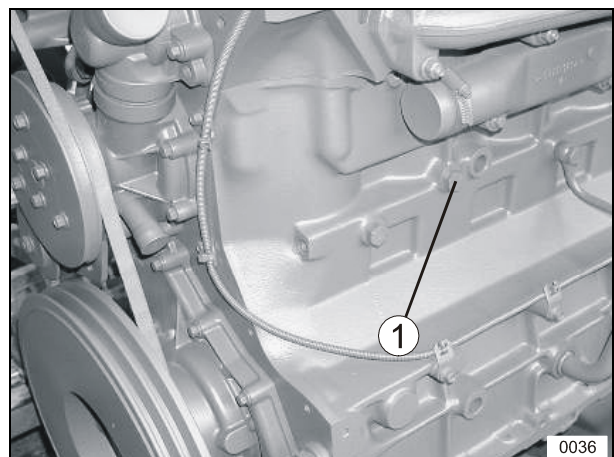


Fig. 75 Draining coolant

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7.6.7 Checking V-belts

Maintenance according to inspection plan, chapter 7.5.



Worn or damaged V-belts must be replaced immediately.

To check the tension, press the V-belt with your thumb (exactly between the belt pulleys). Using moderate thumb pressure of approx. 45 N, the V-belt sag should equal 10 mm.

If a V-belt shows cracks or if it is dirtied by oil, coolant, grease and the like, it must be replaced.

If new V-belts are mounted, their tension must be checked after 15 minutes of operation.

7.6.7.1 Tensioning V-belts (generator)

- Slacken the fastening screw (76/1) (do not screw out completely).
- Loosen the screws (76/2); do not unscrew completely.
- With the aid of a suitable tool, e.g. a crow-bar, swivel the generator until the belt tension is correct.
- Re-tighten the screws (76/1) and (76/2).

7.6.7.2 Replacing V-belts (generator)

- Loosen the adjusting screw (76/1) (do not screw out completely).
- Loosen the screws (76/2); do not unscrew completely.
- Swivel the generator until the V-belt can be removed.
- Fit new V-belt.
- Tension the V-belt as described in chapter 7.6.7.1.

7.6.7.3 Tensioning V-belts (water/fuel pump)

- Loosen the screws (77/1) and (77/2).
- Push the fuel pump (77/3) in the direction of arrow until the V-belt tension is correct.
- Re-tighten the screws (77/1) and (77/2).

7.6.7.4 Replacing V-belts (water/fuel pump)

- Loosen the screws (77/1) and (77/2).
- Push the fuel pump (77/3) in opposite direction of arrow until the V-belt can be removed.
- Fit new V-belt.
- Push the fuel pump (77/3) in the direction of arrow until the V-belt tension is correct.
- Re-tighten the screws (77/1) and (77/2).

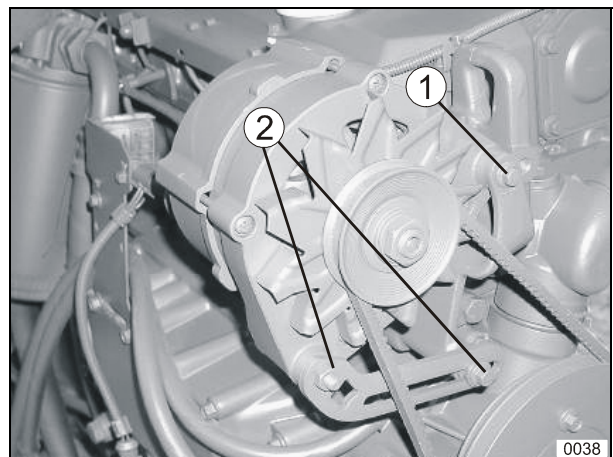


Fig. 76 V-belt (generator)

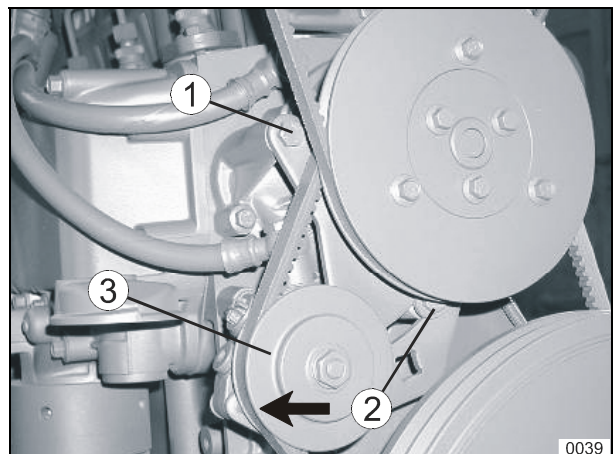


Fig. 77 V-belt (water/fuel pump)

7.6.8 Checking and adjusting the valve lash

Maintenance acc. to inspection plan, chapter 7.5.

The valve lash shall be tested according to the operating instructions provided by the engine manufacturer and adjusted if necessary.

7.6.9 Battery



Before installing or removing the battery, the electric circuit must be interrupted by means of the battery disconnect switch.



The instructions of the battery manufacturer must be observed when using the battery for the first time.

Removing the battery

- Disconnect first the negative then the positive cable.
- Remove the fastening bracket and lift out the battery.

Installing the battery

- Insert the battery.
- Connect first the positive then the negative cable.



Ensure that the negative terminal is attached to the negative pole (-) and the positive terminal to the positive pole (+).

In winter, in particular, the battery charge should be closely monitored.

7 CARE AND MAINTENANCE

7.6.10 Bleeding the brake

Maintenance and inspection plan, chapter 7.5.



*Collect the waste oil, do not allow it to seep into the ground. **Dispose of according to regulations!***

- Let the engine run at medium speed.
- Apply the parking brake!
- Press the service brake pedal and lock in place.
- Remove the cap on the ventilation valve (78/1) and fit suitable hose.
- Direct the hose into a container.
- Slightly loosen the ventilation valve using a key (W/F 9) and keep open until the escaping hydraulic oil is without bubbles in the container.
- Tighten the ventilation valve and re-fit dust cap.
- Bleed the other three brakes as described.

7.6.11 Bleeding the parking brake

Maintenance and inspection plan, chapter 7.5.



*Collect the waste oil, do not allow it to seep into the ground. **Dispose of according to regulations!***

- Let the engine run at medium revs.
- Open the bleeder screws (79/1) on the parking brake.
- Apply the parking brake (81/19).
- When hydraulic oil escapes without bubbles, close the bleeder screw (79/1).

7.6.12 Adjusting the play of the parking brake

Maintenance and inspection plan, chapter 7.5.

- Remove the cover (80/1).
- Loosen the counternut (80/2).

- Screw in the set screw (80/3) until resistance is tangible (brake linings sit close to the brake disc).
- Screw the set screw (80/3) back by half a turn.
- Counter with nut (80/2).
- Re-fit the cover (80/1).



Fig. 78 Brake

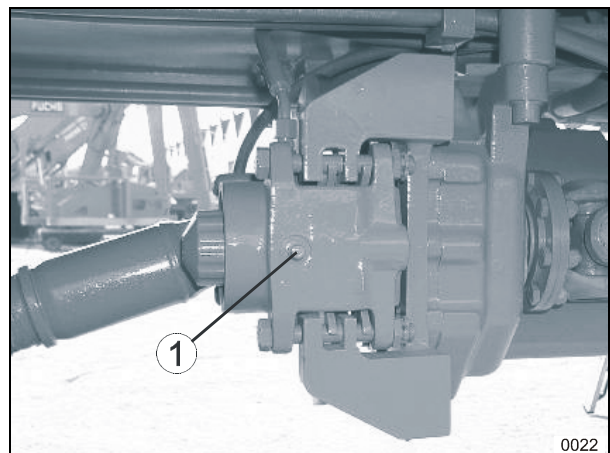


Fig. 79 Parking brake

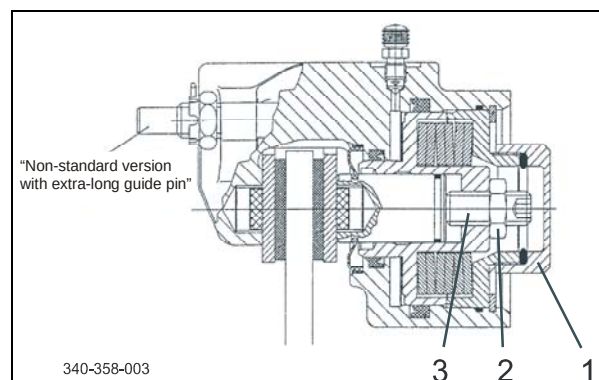


Fig. 80 Adjusting the parking brake

7.6.13 Venting the oscillating axle cylinders



*Collect the waste oil, do not allow it to seep into the ground. **Dispose of according to regulations!***

- The oscillating axle shall not be locked; indicator lamp (81/55) lights up.
- Jack up the machine so that the wheels of the oscillating axle are off the ground.
- Release the parking brake (hand brake) (81/19).
- Run the engine at medium speed.
- Open the vent plugs (82/1) one after the other, until there are no bubbles in the escaping hydraulic oil.
- Close the vent plugs.

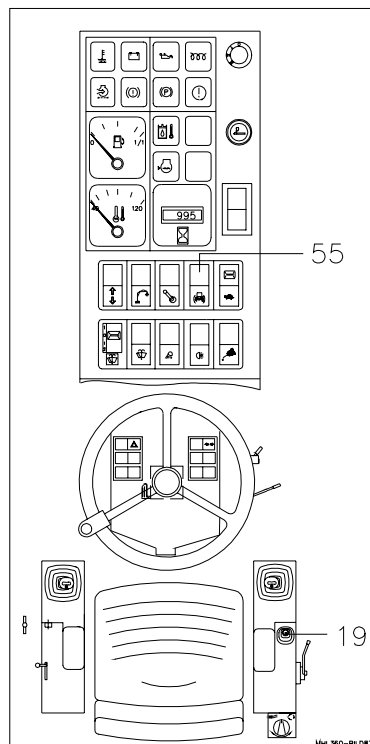


Fig. 81 Oscillating axle lock

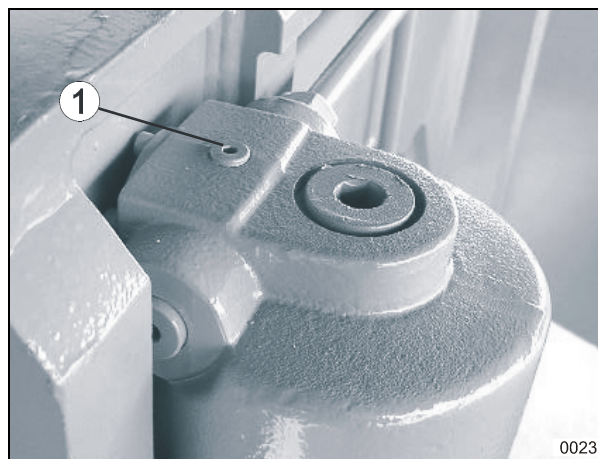


Fig. 82 Vent plugs

7 CARE AND MAINTENANCE

7.6.14 Hydraulic oil

For hydraulic oil filling quantities and specifications, see chapter 3.17 – 3.18.

Change according to inspection plan, chapter 7.5 and oil analyses, chapter 7.1.1.

Changing the hydraulic oil



Change the hydraulic oil at operating temperature.



*Collect the oil, do not allow it to seep into the ground. **Dispose of in the proper manner!***



Before filling in hydraulic oil the appropriate preparations for the work to be done must be made (e.g. a platform).

- Retract all hydraulic cylinders.
- Switch off the diesel engine.
- Unscrew the ventilation filter (84/1).
- Open the covers (84/2) of the return filters and remove the complete filter assemblies.
- Unscrew the cap (83/1) of the drain valve.
- Insert the oil drain hose (included in the tool set) into a collecting pan before it is screwed on.
- Screw on the oil drain hose.
- Flush and clean the hydraulic tank as required.
- Unscrew the oil drain hose and seal the drain valve with the cap.
- Fill up with clean hydraulic oil via the openings of the return filters (84/2).
- Screw in the ventilation filter.
- Close the covers (84/2) of the return filters and install the complete filter assembly.

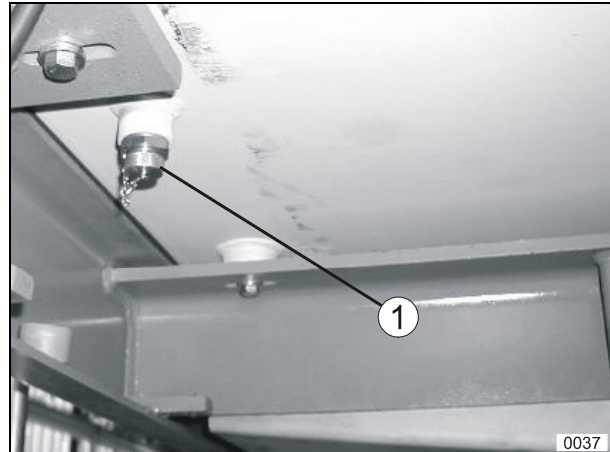


Fig. 83 Cap

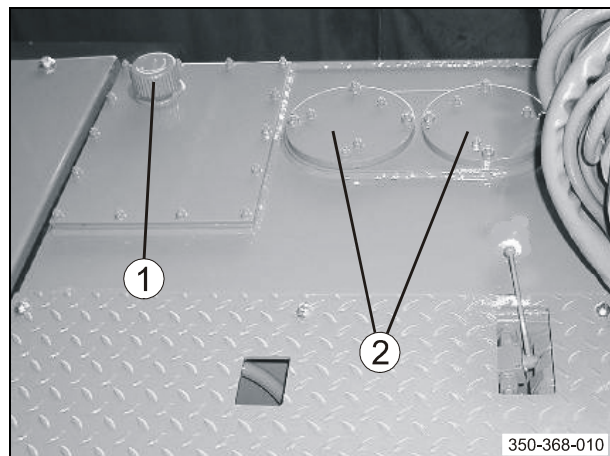


Fig. 84 Filter covers

7.6.15 Hydraulic oil return filters

Change according to inspection plan, chapter 7.5.

Replacing the return filter

Before replacing the hydraulic oil return filter, the appropriate preparations for the work to be done must be made (e.g. a platform).

The way how to proceed applies to both return filters!

The filter element (85/2) (Exapor) cannot be cleaned.

- Remove the cover (85/1) of the return filter.
- Remove the complete return filter from the tank by the bracket (85/6).
- Place an open-jaw wrench on the hex head (85/5) and push a rod through the bracket (85/6). Release the screen element (85/7) from the return filter (85/2) by turning.



The screen element (85/7) must be cleaned as described below every time the filter element is changed!

- Unscrew the screen element (85/7) and clean with a neutral detergent.
- Using a compressed-air pistol, blow out from the outside to the inside.
- Screw the new filter element on the cleaned screen element.
- Ensure that the seal between the screen element and filter element is lying flat.
- Clean the O-ring (85/3) between the hydraulic tank and the return filter cover.
- Check the O-ring (85/4) and replace if necessary.
- Insert the new return filter in the tank with the O-ring.
- Fasten the cover of the return filter to the tank with the O-ring.

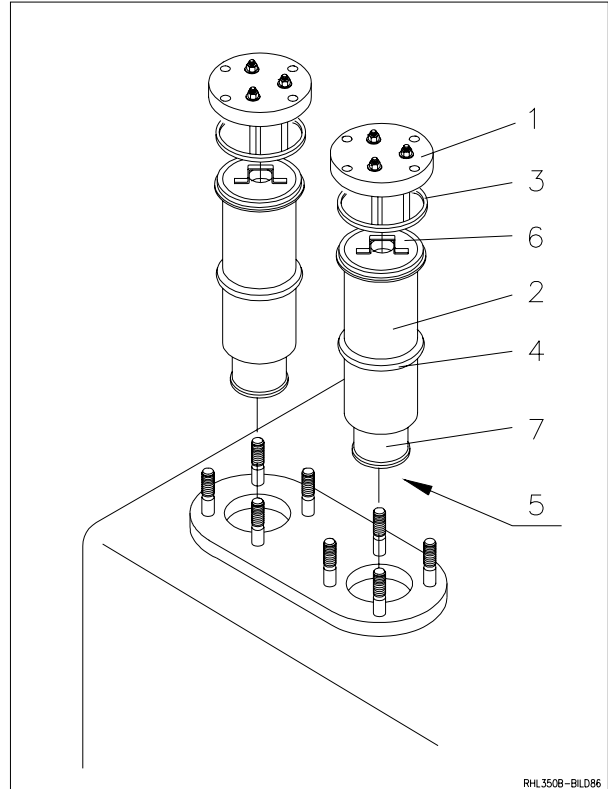


Fig. 85 Return filters

7 CARE AND MAINTENANCE

7.6.16 Hydraulic oil tank ventilation filter

Change according to inspection plan, chapter 7.5.

Remove the ventilation filter (84/1), replace it with a new one and tighten by hand.



Replace the ventilation filter if the cap is dirty, e.g. due to overfoaming hydraulic oil.

7.6.17 Blocking off the hydraulic oil on the tank

To enable repairs to the intake line, the hydraulic pump or the hydraulic lines to be undertaken without having to drain the oil from the tank, the oil supply line to the hydraulic pumps can be blocked off.

- Remove the fillister-head screws (86/1) on the retaining fixture.
- Remove the retaining fixture (86/2).
- The square is turned 90° using a fork wrench from the open position (87/1) to the shut-off position (87/2).



The marking on the end face of the square must lie across the passage.



When repair work is complete, it is essential to turn back the square to the open position (87/1) before the engine is switched on.

- Fasten the retaining fixture (86/2) once more with the fillister-head screws (86/1).

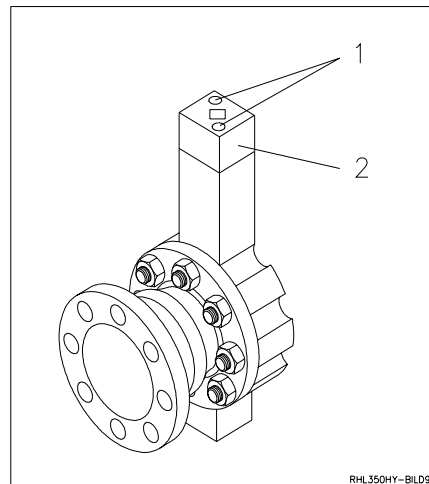


Fig. 86 Blocking off the hydraulic oil

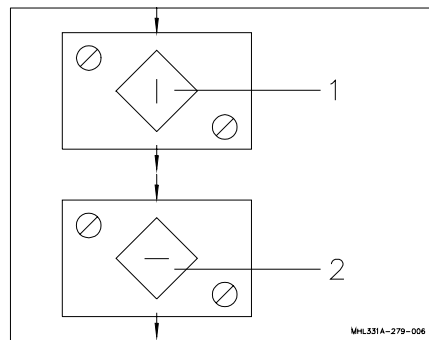


Fig. 87 Direction of flow

7.6.18 Changing axle oil and transmission oil

For filling quantities and oil specifications, see chapters 3.17 – 3.18.

Change according to inspection plan, chapter 7.5 and oil analyses, chapter 7.1.1.

The axle oil must be changed at operating temperature.



*Collect the oil, do not allow it to seep into the ground. **Dispose of in the proper manner!***



After filling the axles with oil, move the machine for approx. 5 minutes in order to ensure that the oil is distributed. Check the oil level again and top up if necessary.

7.6.18.1 Front axle differential



The wheel hubs and axle casings (differentials) of the steering axle have separate oil chambers.

- Park the machine on level ground.
- Apply the parking brake.
- Open the checking and filler plug (88/1).
- Open the drain plug (88/2) and drain the oil.
- Purge the axle if necessary.
- Close the drain plug carefully.
- Fill in oil.
- Carefully close the checking and filler plug.

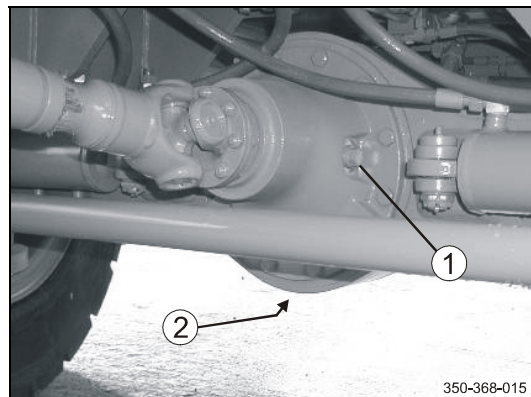


Fig. 88 Front axle differential

7.6.18.2 Rear axle differential

- Park the machine on level ground.
- Apply the parking brake.
- Open the checking and filler plug (89/1).
- Open the drain plug (89/2) and drain the oil.
- Purge the axle if necessary.
- Carefully close the drain plug.
- Fill in oil.
- Carefully close the checking and filler plug.

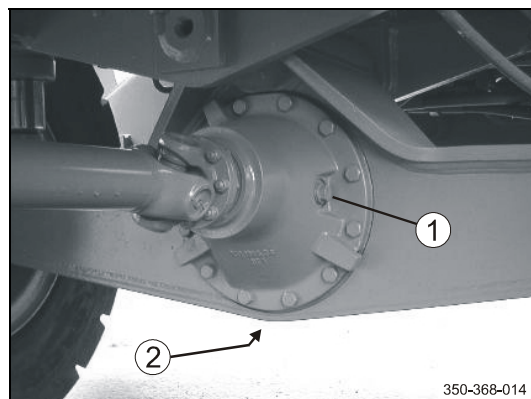


Fig. 89 Rear axle differential

7 CARE AND MAINTENANCE

7.6.18.3 Wheel hubs



The wheel hubs and axle casings (differentials) of the steering axle have separate oil chambers.

- Turn the wheel until the drain plug (90/2) is at the bottom.
- Open the checking and filler plug (90/1).
- Open the drain plug and drain the oil.
- Purge if necessary.
- Close the drain plug carefully.
- Fill in oil via the checking and filler plug (90/1).
- Close the screw plug carefully.

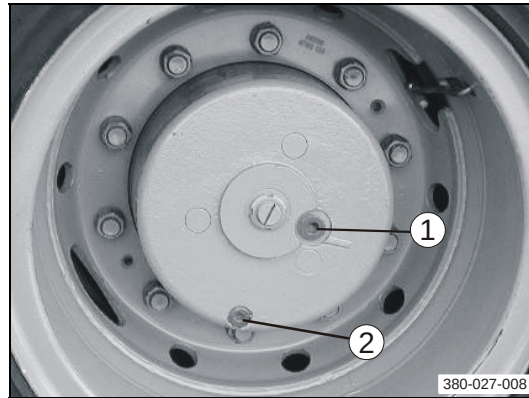


Fig. 90 Wheel hubs

7.6.18.4 Power shift transmission

- Park the machine on level ground.
- Open the checking and filler plug (91/1).
- Open the drain plug (91/2) and drain the oil.
- Purge if necessary.
- Carefully close the drain plug.
- Fill in oil.
- Carefully close the checking and filler plug.

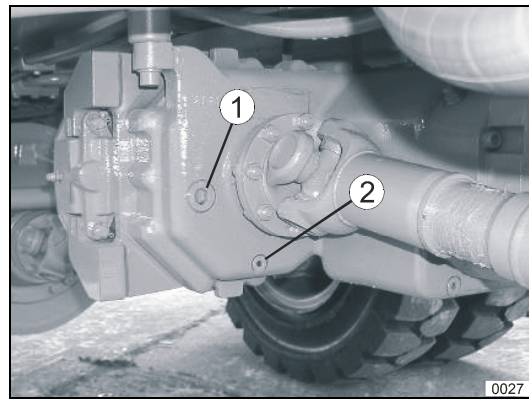


Fig. 91 Power shift transmission

7.6.19 Swing transmission

- Park the machine on level ground.
- Unscrew the cap on the oil filler neck (92/2).
- Remove the cover (92/4).
- Remove the hose (92/3) through the service opening.
- Open the drain valve on the hose (92/3) and drain the oil.
- Carefully close the drain valve and reposition the hose.
- Re-fit the cover (92/4).
- Pour in oil.
- Check the oil level using the oil dipstick (92/1).
- Carefully close the oil filler neck (92/2) with the cap.

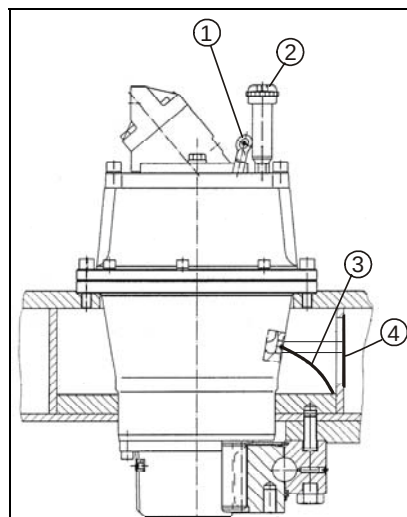


Fig. 92 Swing transmission

7.6.20 Tightening torques



Contact faces of bolt heads must be of bright metal.

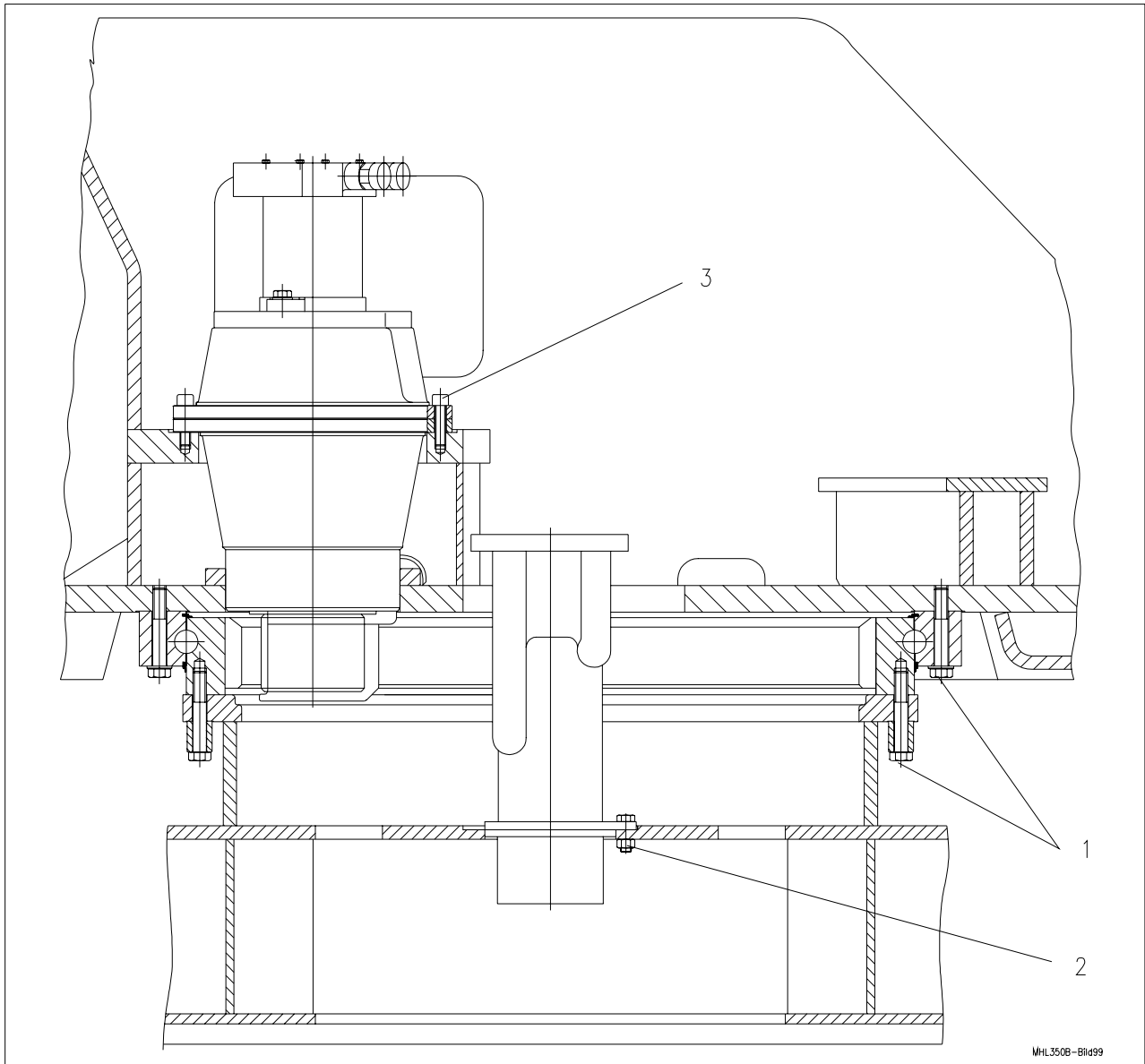


Fig. 93 Tightening torques

Position	Tightening torque
1	630 Nm
2	195 Nm
3	195 Nm

7 CARE AND MAINTENANCE

7.6.21 Changing transmission oil – grab and magnet

For oil specifications and filling quantities, see chapters 3.17 – 3.18.

Change according to inspection plan, chapter 7.5 and oil analyses, chapter 7.1.1.

The transmission oil must be changed at operating temperature.



*Collect the oil, do not allow it to seep into the ground. **Dispose of in the proper manner!***

- Lay the grab or magnet down so that oil can flow unhindered into an oil pan.
- Slacken the screw plug (94/1, 95/1).
- Stand the grab or magnet upright again and position horizontally.
- Pour in oil and close the screw plug carefully.

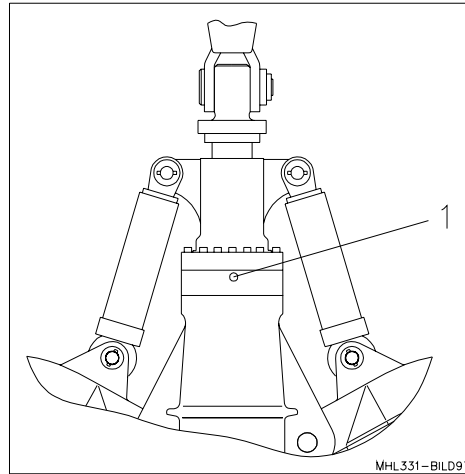


Fig. 94 Transmission oil change

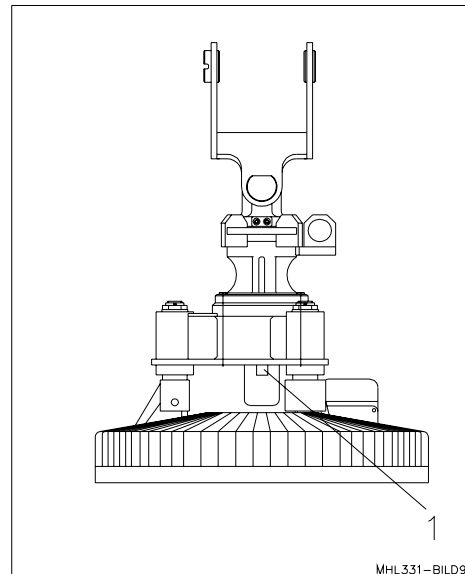


Fig. 95 Transmission oil change

7.7 Care and cleaning

- The machine must be cleaned on a suitable surface with an oil separator.
- A steam-jet appliance shall not be used for cleaning during the first two months after the machine is used for the first time or when newly painted.
- Do not use aggressive detergents for cleaning the machine. We recommend using commercially available cleaning agents for passenger cars.
- When cleaning with a steam-jet appliance, the hot water jet shall not exceed 80° C and a spray pressure of 20 bar. The nozzle must be at a minimum distance of 30 cm from the machine.
- The slewing ring of the machine shall **not** be cleaned with a high-pressure or steam-jet cleaner, as otherwise the grease is washed away.
- Linings (insulating materials, etc.) shall not be exposed directly to water, steam or high-pressure jets.
- When cleaning with water or steam jets, take care not to spray exhaust-gas and air filter openings.
- If cleaning the engine with water or steam jets, do not expose sensitive engine parts, such as generator, cabling, oil pressure switch, etc. directly to the jet.
- Remove dirt from the twin tires.
- After each wet clean, the machine must be lubricated in accordance with the lubrication plan. In the case of machines with central lubricating system, three lubricating processes must be manually triggered. To activate manual lubrication, please read chapter 7.4.1.4, "Trigger additional lubrication".
- After each wet clean, all work cycles and driving functions must be performed.

7.8 Preservation (temporary shutdown)

In order to prevent damage (corrosion, etc.) from storage during shutdown periods over three months, certain preservation measures must be taken:

- We recommend keeping the machine in a dry, dust-free room during the storage period.
- Clean the inside and outside of the machine thoroughly, including the engine.
- Lubricate the machine according to the lubrication plan.
- Check the oil levels of all assemblies such as axles, transmissions, etc. and top up if necessary.
- Check the hydraulic oil level and top up if necessary.
- Repair paint damages.
- Fill the diesel tank completely, in order to prevent corrosion of the tank walls.
- Check the antifreeze level in the coolant and adjust if necessary.
- Perform all the preservation measures contained in the diesel engine operating instructions.
- Treat bare piston rods with a commercially available anti-corrosion agent.
- Remove and clean the battery and store it as specified in a dry – in winter, frost-proof – room. Coat connections with a little pole grease.
- Seal off the air intake opening of the air filter system and the exhaust pipe opening.

7 CARE AND MAINTENANCE

7.8.1 During shutdown

When the machine is out of use for 6 months, after this time all assemblies must be brought to operating temperature and maneuvered for approx. 15 minutes. Beforehand, the anti-corrosion coat must be removed from the piston rods, and the openings of the air filter system and the exhaust pipe freed. After the maneuvering cycle, preserve the machine once more as previously described.

7.8.2 After shutdown

- Before putting the machine into operation once more, the anti-corrosion coat must be cleaned from the piston rods. The openings of the air filter and exhaust pipe must be freed. Clean the machine with a neutral detergent (see chapter 7.7).
- Check and install the battery.
- Carry out all measures for putting the diesel engine back into operation stated in the engine operating instructions.
- If the machine has been out of use for more than 6 months, the oil in assemblies such as axles, transmissions, etc. must be changed.
- Lubricate the machine according to the lubrication plan.



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8.1 Trouble-shooting**8.1.1 General**

Malfunctions are often the result of incorrect handling of the machine, the use of unsuitable fuels, lubricants and coolants, or irregular maintenance.

The following table presents a summary of a range of problems and their probable causes.

If a problem can only be eliminated through repair, then the responsible **Service Agent** must be called in.

All defects and faults in the diesel engine must be examined as described in the separate engine operating instructions.

During the warranty period, malfunctions must be dealt with by the responsible **Service Agent** or a specialist workshop.

8.1.2 Lowering the work equipment when the engine has shut down

If the diesel engine shuts down, lower the work equipment by means of the four-way control levers (see chapter 5.1.1 "Operation of work equipment") using the available pilot pressure. The ignition must be switched on.

8.1.3 Malfunctions in central electric system

The fuse protection of the electric circuits and relays are located in the central electric system (96/1) which is in the service section.

If there are malfunctions, check fuses. If fuses are not defective, contact Customer Service. Assignment of fuses see appendix, chapter 9.

8.1.4 Malfunctions in magnet system

If there are malfunctions in the magnet system, check the fuses in the switch box. The switch box of the magnet system (97/1) is located below the hood, front right-hand side.

Assignment of fuses see appendix, chapter 9. If fuses are not defective, contact Customer Service.

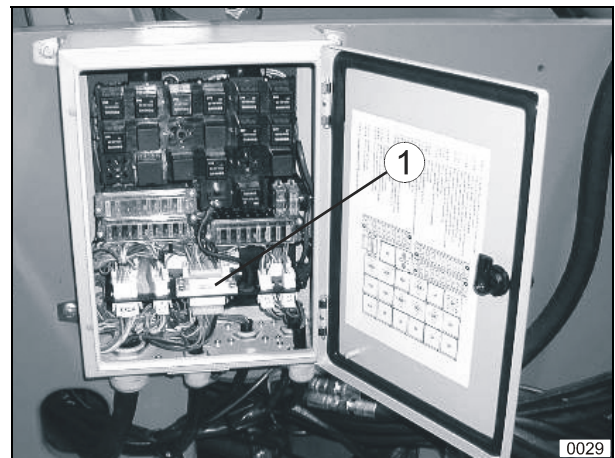


Fig. 96 Central electric system

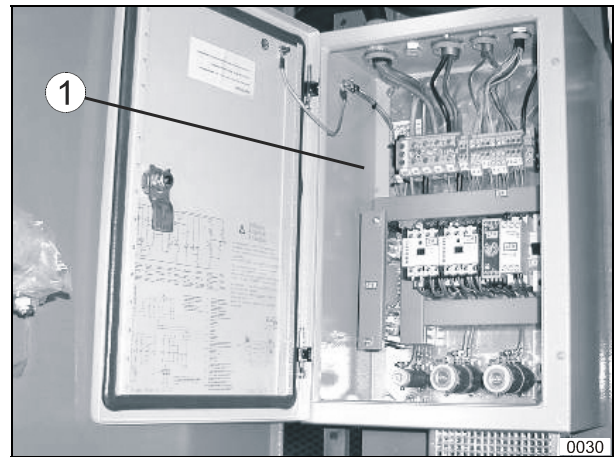


Fig. 97 Switch box of the magnet system

8 TROUBLE-SHOOTING

8.1.5 Malfunctions in the CEB-control

If malfunctions occur in the system of the CEB-control, the warning lamp (98/49) lights up. On the electronic box of the CEB-control (99/1) there is a fault display emitting a trouble code in the form of LEDs (light-emitting diodes) (1 – 8). Please inform your Service Agent about this trouble code.

Whenever the ignition is switched on, a system check takes place. All 8 diodes light up for 2 seconds; diodes 1, 2 and 4 light up for another 10 seconds. When the system is trouble-free, all diodes must be off after this period of time with the engine running.

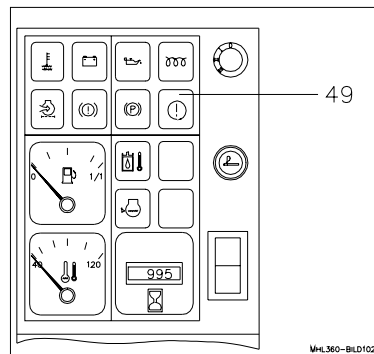


Fig. 98 Warning lamp

8.1.5.1 Disconnection of the CEB-control

In order to ensure that the engine continues to operate in the event of control malfunctions, the control can be disconnected. **During this emergency service, the machine's use is limited.**



It is essential that the following activities are performed in the given sequence.

- Set the engine speed control lever to minimum speed (forward).
- Switch off the engine and the ignition.
- Reduce pilot pressure (see chapter 7.1.2).
- Switch off the CEB-control by pressing the switch next to the electronic box (99/1); the indicator lamp in the switch and the lamp (98/49) lights up (with ignition switched on).
- Remove the guard above the injection pump adjusting cylinder.
- Position the ball valve (100/1) for the injection pump adjusting cylinder horizontally.
- Unhinge the adjusting cylinder (101/1).
- Remove the screw (101/3) from the side drill hole of the locking element.
- Move the speed adjusting cylinder (101/2) until the screw (101/3) can be screwed in the thread on the face side (101/4).
- Start the engine.

The engine now runs at full throttle with performance restricted.

8.1.5.2 Re-activating the CEB-control

Once the malfunctions in the CEB-control have been remedied, the deactivation must be undone and the CEB-control re-activated.



It is essential that the following activities are performed in the given sequence.

- Stop the engine and switch off the ignition.
- Remove the screw (101/3) from the thread on the face side (101/4) of the speed adjusting device (101/2).
- Re-fit the adjusting cylinder (101/1).
- Screw back in the screw (101/3) into the side drill hole of the locking element.
- Position the ball valve (100/1) for the injection pump adjusting cylinder vertically.
- Re-fit the guard above the injection pump adjusting cylinder.
- Switch on the CEB-control by pressing the switch next to the electronic box (99/1); the indicator lamp in the switch and the lamp (98/49) does not light up (when the ignition is switched on).
- Start the engine.

The system is trouble-free when the diodes in the display of the electronic box go out after approx. 12 seconds (following the system check).

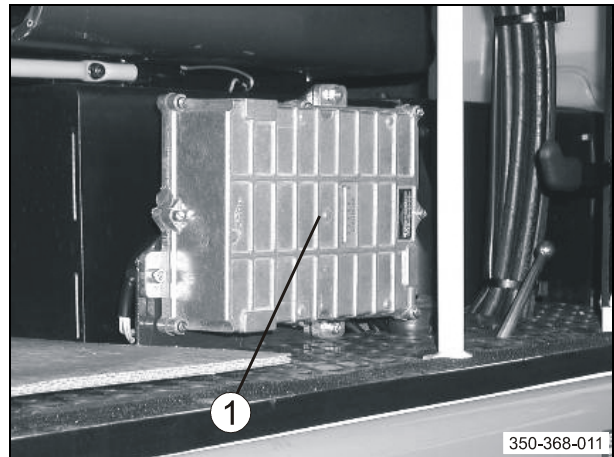


Fig. 99 Electronic box

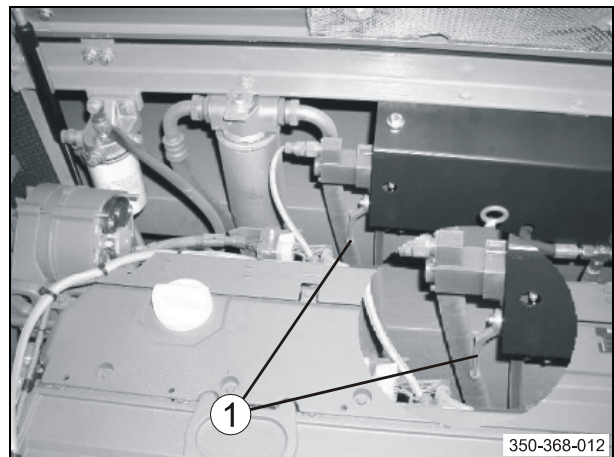


Fig. 100 Ball valve

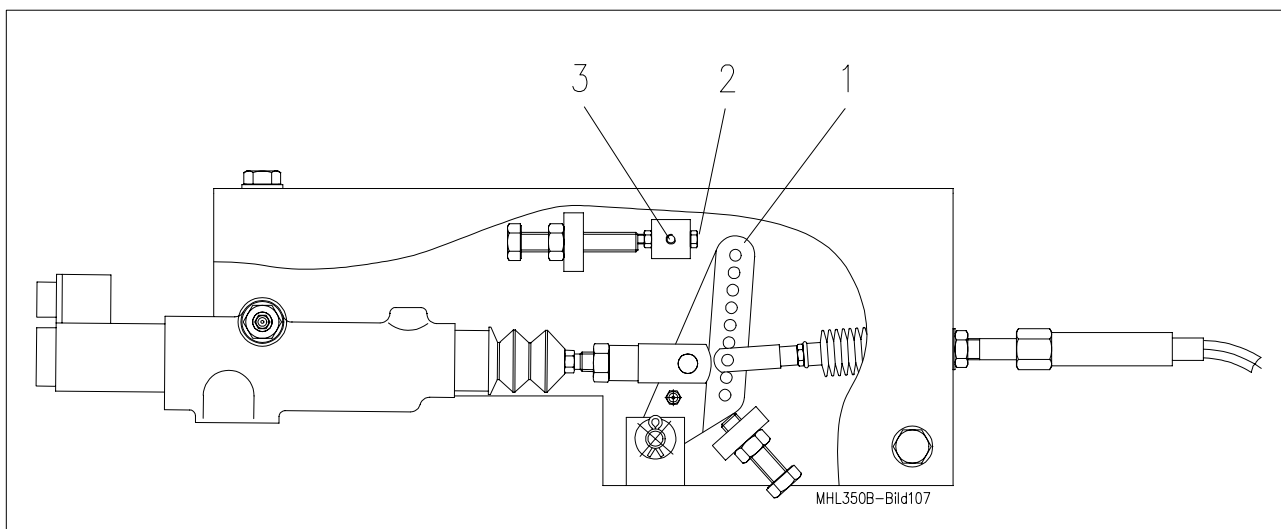


Fig. 101 Speed adjustment

8 TROUBLE-SHOOTING

Fault	Possible cause	Remedy
No steering		
1	Oil supply to hydraulic pump interrupted	Check and repair suction line
2	Hydraulic pump defective	Remedy fault (specialist)
3	Steering control unit defective	Remedy fault (specialist)
4	Priority valve defective	Remedy fault (specialist)
5	Steering cylinders defective	Repair, replace
No brake pressure		
1	Oil supply to pump interrupted	Check and repair suction line
2	Hydraulic pump defective	Remedy fault (specialist)
3	Shut-off valve defective	Remedy fault (specialist)
Insufficient braking power		
1	Foot-brake valve defective	Remedy fault (specialist)
2	Oil loss in brake system	Check and repair
3	Discontinuous buzzing tone	Malfunction in service brake system. Lowest brake pressure range of 90 bar not reached. Check and repair
Parking brake cannot be released		
1	No brake pressure	Check oil supply to pump and shut-off valve, repair or replace
2	Disc brake is sticking	Check and repair
3	Parking brake valve defective	Check and repair or replace
4	Oil loss in parking brake system	Check and repair
Hydraulic oil exceeds max. permissible temperature		
1	Thermostat defective	Replace
2	Oil level too low	Top up oil to mark on sight glass
3	Dirt in radiator	Clean
Sluggish acceleration and deceleration, too little propulsive power		
1	Insufficient engine power	Check fuel supply (filters)
2	One of the brakes is sticking	Check, remedy fault
3	Oil loss in rotary transmission	Remedy fault (specialist)
4	Air filter clogged	Clean or replace

Fault	Possible cause	Remedy
5	1 st /2 nd gear does not shift	Check power supply and solenoid valve, repair, replace
6	Fault in brake actuation	Check, adjust
7	High pressure too low	Check high pressure, replace or re-adjust HP valves if necessary.
8	Pump does not travel fully	Check, re-adjust (specialist)
9	Internal damage to variable displacement pump or motor	Replace units (specialist)
Transmission works in one direction only		
1	Power supply to solenoid valve interrupted, gets stuck or is defective	Check and repair, replace if necessary (incl. negative connection)
Transmission works in neither direction		
1	Too little hydraulic oil in tank	Top up to mark on sight glass
2	Solenoid valve defective	Check and repair or replace
3	Power supply to solenoid valve interrupted	Check and repair
4	No pilot pressure	Measure pressure and detect fault
5	Internal damage to pump or motor	Replace complete unit (specialist)
6	Mechanical connection to axle interrupted	Check, repair
Loading machine equipment does not function		
1	Left-hand armrest raised or microswitch defective	Check and repair or replace if necessary
2	Oil supply to hydraulic pump interrupted	Check lines
3	Hydraulic pump has failed	Get hydraulic pump checked by a specialist, replace complete pump if necessary
4	Maintenance steps folded down	Fold up maintenance steps
5	Main pressure relief valve has failed	Check main pressure relief valve and replace complete valve if necessary (by specialist)

8 TROUBLE-SHOOTING

Fault	Possible cause	Remedy
Machine is working too slowly, system gets too hot		
1	Main pressure relief valve set too low or is faulty	Reset main pressure relief valve, replace if necessary (by specialist)
2	Hydraulic pump has impermissible degree of wear	Replace hydraulic pump
3	Incorrect hydraulic oil	Hydraulic oil must be of the recommended quality
4	Air in hydraulic system	Vent the pilot control. Tighten connections with engine off and system relieved of pressure.
5	Fine-Mode not set to 0	Check if Fine-Mode is set to 0; set to 0 if required
Hydraulic cylinders are weakening		
1	Sleeve sets in hydraulic cylinders are worn	Replace sleeve sets
2	Faulty secondary valves	Check secondary valves, replace if necessary.
Slewing motion of the uppercarriage cannot be stopped		
1	Defective slewing brake	Re-seal foot brake pedal, replace discs
2	Faulty secondary valves	Reset secondary valves, replace if necessary.
Trouble in the magnet device		
1	In the event of malfunctions in the magnet device, e.g. no magnetizing function or no de-magnetizing function	Remedy fault (by specialist)

Fault	Possible cause	Remedy
Problems in the electrics		
1	Outside and/or interior light does not come on	Check cables, connections, bulbs and fuses.
2	Windshield wiper does not work	Check cables, connections and fuses. Examine windshield wiper for mechanical damage. Corrosion on contacts between windshield and cab. Replace complete wiper if necessary.
3	Horn does not work	Check cables, connections and fuses. Replace complete horn and get cause of failure investigated by a specialist.
4	Warning/indicating elements are imprecise	Get the source of the problem determined and remedied by a specialist.
5	Starting system does not work satisfactorily	Check charge capacity of battery. Test starter functions. Check connection and condition of power and battery ground cables. Get function of ignition lock checked, replace if necessary.
Work attachments		
1	Grab does not open or close or opens and closes too slowly	Check quick coupling, replace if required
2	Grab fails to rotate	Check quick coupling and electrical connection between micro switch and solenoid valve

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Table of daily / weekly maintenance tasks

Assignment of fuses

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Daily tasks**Inspection and maintenance tasks to be performed by service personnel**

Area	Criterion	Test method	Test interval	Measure
Hydraulic oil tank	Oil level	Visual inspection	Daily	Top up oil as required
Engine	Oil level	Visual inspection	Daily	Top up oil as required
Cooling system	Coolant level	Visual inspection	Daily	Top up coolant as required
Fuel tank	Fuel level	Visual inspection via fuel gauge	Daily	Fill in fuel as required
Hydraulic system	Tightness	Visual check	Daily	Tighten couplings, replace hoses and lines, replace leaky hydraulic components
Machine as a whole	Damage, missing equipment	Visual inspection	Daily	Get repaired, replace equipment
Lighting, warning and indicator lamps	Defective bulbs	Function test, visual inspection	Daily	Replace bulbs as required
Operator controls	Ease of operation	Function test	Daily	Get operator controls replaced
Manual lubricating points	Impurities in lubricant	—	Daily	Grease according to lubrication plan, pages 7.8 – 7.12

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Weekly tasks

Area	Criterion	Test method	Test interval	Measure
Water separator	Dirt and water level	Visual inspection	Weekly	Drain as required
Cooling system	Cleanness of cooling fins	Visual inspection	Weekly	Clean as required
Air conditioning (optional)	Coolant level, tightness and function	Visual inspection using sight glass and function test	Weekly	Get repaired if necessary
Swing assembly	Fastening of hydraulic motor, transmission, ring gear	Check torque using torque wrench	Weekly	Tighten bolts
Wheels	Tightness of wheel nuts	Check torque using torque wrench	Weekly	Tighten wheel nuts
Axles, propeller shafts	Tightness of bolts	Check torque using torque wrench	Weekly	Tighten bolts
Engine hood	Function of pneumatic springs	Visual inspection and function test	Weekly	Replace if necessary
Brakes	Function	Function test	Weekly	Get repaired if necessary
Manual lubricating points	Impurities in lubricant	—	Weekly	Grease according to lubrication plan, pages 7.8 – 7.12

Assignment of fuses

Fuse no.	Release current	Terminal designation	Function
F 1	10 A	Terminal 15	Ignition control, engine shut-off, operating hour meter, charge control, coolant level sensor
F 2	7.5 A	Terminal 15	Tank temperature indicator, engine overheating, coolant level indicator, air filter, engine oil pressure, hydraulic oil temperature
F 3	7.5 A	Terminal 15	Brake pressure monitoring, overloading warning device *, hand brake, oscillating axle lock, travel, transmission control (1 st /2 nd gear)
F 4	5 A	Terminal 15	Engine overheat protection, working hydraulics cut-off
F 5	15 A	Terminal 15	Work zone extension, grease lubrication system, cab up/down, instrument light, oil radiator
F 6	10 A	Terminal 15	Grab rotation, bypass, pressure increase
F 7	5 A	Terminal 15	Turn signals
F 8	3 A	Terminal 15	Lower beam control
F 9	20 A	Terminal 15	Wash/wipe systems of both windows, driver's seat, CEB-control trouble indicator lamp
F 10	4 A	Terminal 15	CEB-control
F 11	7.5 A	Terminal 15	Dozer blade *, change-over of work functions *
F 12	10 A	Terminal 15	Individual outriggers *
F 13	15 A	Terminal 15	Reserve Terminal 15 *
F 14	15 A	Terminal 30	Supplementary heating, air heating
F 15	5 A	Terminal 30	Supplementary heating, control unit
F 16	20 A	Terminal 30	Reserve Terminal 30
F 17	10 A	Terminal 30	Hazard warning system
F 18	10 A (or 15 A or 20 A)	Terminal 30	Operating current for additional working floodlight, horn
F 19	10 A	Terminal 30	Parking light, right, working floodlight on box-type boom
F 20	10 A	Terminal 30	Parking light, left, control current for additional working floodlight *, lower beam
F 21	15 A	Terminal 30	Rotating beacon(s) *, radio *, socket 24 V, cigarette lighter, interior lighting
F 22	20 A	Terminal 30	Fan, heating, air conditioning thermostat *
F 23	15 A	Terminal 30	Condenser fan of air conditioning *
F 24	20 A	Terminal 30	Magnet device *
F 33	40 A	Terminal 30	Series fuse F 1 and start-up
F 34	70 A	Terminal 30	Main fuse for Terminal 15

* optional

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