BOMAG
FAYAT GROUP

OPERATING INSTRUCTION
MAINTENANCE INSTRUCTION
BMP 8500

S/N 101 720 21 1001>

ORIGINAL OPERATING INSTRUCTIONS

008 212 57 EN © 10/2025

⚠ **WARNING:** Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go to www.P65warnings.ca.gov/diesel.

⚠ **WARNING:** Crude oil, gasoline, diesel fuel and other petroleum products can expose you to chemicals including toluene and benzene, which are known to the State of California to cause cancer and birth defects or other reproductive harm.
These exposures can occur in and around oil fields, refineries, chemical plants, transport and storage operations such as pipelines, marine terminals, tank trucks and other facilities and equipment.

For more information go to www.P65Warnings.ca.gov/petroleum.

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1 Introduction

1.1 Foreword

BOMAG manufactures machines for earth, asphalt and refuse compaction, stabilizers/recyclers as well as planers and pavers.

BOMAG's extensive experience as well as state-of-the-art production and test methods and high quality requirements guarantee maximum reliability of your machine.

These operating and maintenance instructions are part of your machine.

They provide necessary information to operate your machine safely and properly.

They also contain information on required operating, maintenance and repair measures.

Carefully read the operating and maintenance instructions before taking your machine into operation.

Please observe the safety regulations strictly and follow all instructions to ensure safe operation.

If you are not yet acquainted with the indicators and control elements on this machine, you should thoroughly read the corresponding chapter ↬ *Chapter 4 'Indicators and control elements' on page 57*.

The description of the individual operating steps including the notes on safety to be followed can be found in chapter "Operation" ↬ *Chapter 6 'Operation' on page 81*.

Before every start up, carry out all required visual inspections and function tests ↬ *Chapter 5 'Checks prior to start up' on page 73*.

Ensure the compliance with the specified operating, maintenance and repair measures to maintain the functional safety of your machine.

A description of all necessary maintenance work, maintenance intervals as well as information on fuels and lubricants can be found in the chapter "Maintenance" ↬ *Chapter 8 'Maintenance' on page 119*.

Do not service or repair your machine by yourself to avoid harming persons or damaging material or environment.

The machine must only be serviced and repaired by qualified and authorised personnel.

Contact our customer service to carry out the required maintenance work or necessary repairs.

In case of operating errors, inadequate maintenance or the use of unapproved fuels and lubricants all warranty claims will become null and void.

For your own personal safety you should only use original parts from BOMAG.

For your machine we offer service kits to make maintenance easier.

In the course of technical development, we reserve the right to technical modifications without prior notification.

These operating and maintenance instructions are also available in other languages.

Apart from that, you can also order the spare parts catalogue against the serial number of your machine.

The above notes do not constitute an extension of the warranty and liability conditions specified in the general sales and delivery conditions of BOMAG GmbH.

We wish you successful work with your BOMAG machine.

1.2 Type plates

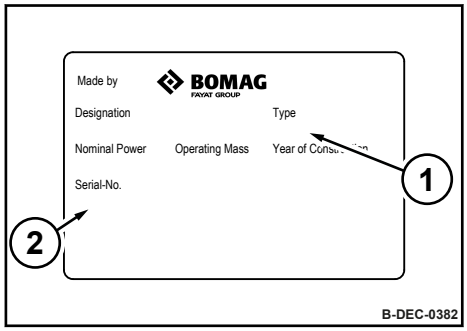


Fig. 1: Machine type plate (example)

Please enter here:	
Machine type (1):	
Serial number (2):	

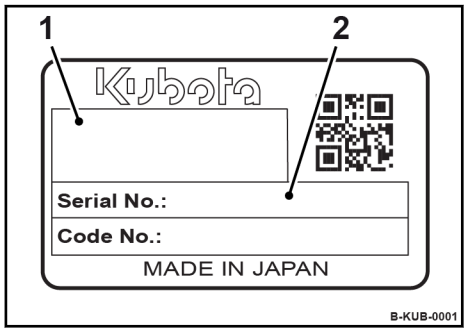


Fig. 2: Engine type plate (example)

Please enter here:	
Engine type (Fig. 1)	
Engine number (2):	

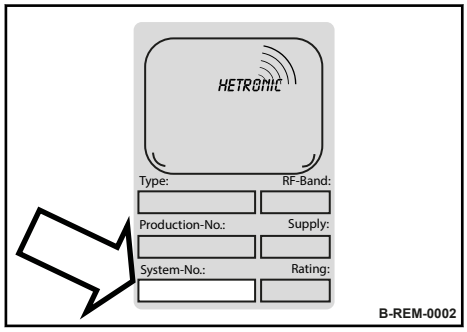


Fig. 3: Type plate of remote control/ receiver (example)

Please enter system numbers here:	
Remote control:	
Recipient:	

Telematic type plate

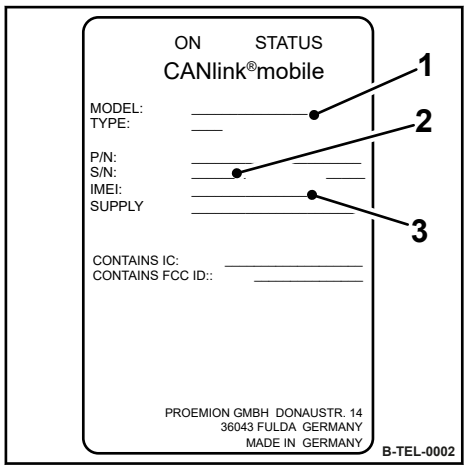
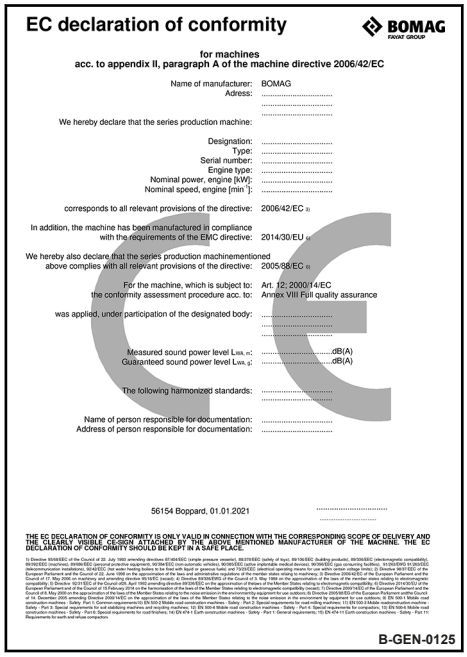


Fig. 4: Example

Please enter here:	
1	Model/type:
2	Serial number (S/N):
3	IMEI:

1.3 CE marking and declaration of conformity



EC declaration of conformity

BOMAG FAYAT GROUP

for machines
acc. to appendix II, paragraph A of the machine directive 2006/42/EC

Name of manufacturer: BOMAG
Adress: .....
.....
.....

We hereby declare that the series production machine:

Designation: .....
Type: .....
Serial number: .....
Engine type: .....
Nominal power, engine [kW]: .....
Nominal speed, engine [min⁻¹]: .....

corresponds to all relevant provisions of the directive: 2006/42/EC 3)

In addition, the machine has been manufactured in compliance with the requirements of the EMC directive: 2014/30/EU 5)

We hereby also declare that the series production machinementioned above complies with all relevant provisions of the directive: 2005/88/EC 6)

For the machine, which is subject to: Art. 12, 2000/14/EC
the conformity assessment procedure acc. to: Annex VIII Full quality assurance

was applied, under participation of the designated body: .....
.....
.....
.....

Measured sound power level $L_{WA,m}$: .....dB(A)
Guaranteed sound power level $L_{WA,g}$: .....dB(A)

The following harmonized standards: .....
.....

Name of person responsible for documentation: .....
Address of person responsible for documentation: .....

56154 Boppard, 01.01.2021 .....
.....

THE EC DECLARATION OF CONFORMITY IS ONLY VALID IN CONNECTION WITH THE CORRESPONDING SCOPE OF DELIVERY AND THE CLEARLY VISIBLE CE-SIGN ATTACHED BY THE ABOVE MENTIONED MANUFACTURER OF THE MACHINE. THE EC DECLARATION OF CONFORMITY SHOULD BE KEPT IN A SAFE PLACE.

1) Directive 89/686/EEC of the Council of 22. July 1993 amending directives 87/404/EEC (simple pressure vessels), 88/378/EEC (safety of toys), 89/106/EEC (building products), 89/336/EEC (electromagnetic compatibility), 89/392/EEC (machinery), 89/398/EEC (foodstuffs), 89/686/EEC (personal protective equipment), 90/384/EEC (non-automatic weighing instruments), 90/396/EEC (appliances burning gaseous fuels), 91/263/EEC (telecommunication installations), 92/42/EEC (hot water heating boilers to be fired with liquid or gaseous fuels) and 73/23/EEC (electrical operating means for use within certain voltage limits) 2) Directive 98/37/EEC of the European Parliament and the Council of 22. June 1998 on the approximation of the laws and administrative regulations of the member states relating to machinery. 3) Directive 2006/42/EC of the European Parliament and the Council of 17. May 2006 on machinery, and amending directive 95/16/EC (recast) 4) Directive 2004/108/EC of the European Parliament and the Council of 15. December 2004 on electromagnetic compatibility. 5) Directive 93/21/EEC of the Council of 20. April 1993 amending directive 89/336/EEC on the approximation of thelaws of the Member States relating to electromagnetic compatibility. 6) Directive 2014/30/EU of the European Parliament and the Council of 15 February 2014 on the harmonization of the laws of the Member States relating to electromagnetic compatibility (recast). 7) Directive 2000/14/EC of the European Parliament and the Council of 8. May 2000 on the approximation of the laws of the Member States relating to the noise emission in the environment by equipment for use outdoors. 8) Directive 2005/88/EG of the European Parliament andthe Council of 14. December 2005 amending Directive 2000/14/EC on the approximation of the laws of the Member States relating to the noise emission in the environment by equipment for use outdoors. 9) EN 500-1 Mobile road construction machines - Safety - Part 1: Common requirements. 10) EN 500-2 Mobile road construction machines - Safety - Part 2: Special requirements for tractors. 11) EN 500-3 Mobile road construction machines - Safety - Part 3: Special requirements for soil stabilizing machines and recycling machines. 12) EN 500-4 Mobile road construction machines - Safety - Part 4: Special requirements for compactors. 13) EN 500-6 Mobile road construction machines - Safety - Part 6: Special requirements for road finishers. 14) EN 474-1 Earth construction machines - Safety - Part 1: General requirements; 15) EN 474-11 Earth construction machines - Safety - Part 11: Requirements for earth and refuse compactors

B-GEN-0125

Fig. 5

Applies to machines marketed in the EU/EEC/ EFTA.

This machine has a CE marking.

This marking confirms that the machine complies with the standards and regulations in force at the time it was placed on the market.

Included with the machine is a Declaration of Conformity that specifies the applicable regulations and supplements, as well as harmonized standards and other applicable provisions.

Unauthorised modifications or supplements to the machine may compromise safety in an unacceptable manner and invalidate the EC Declaration of Conformity.

The EC declaration of conformity must be kept in a safe place and made available to the competent authorities.

2 Technical data

Dimensions

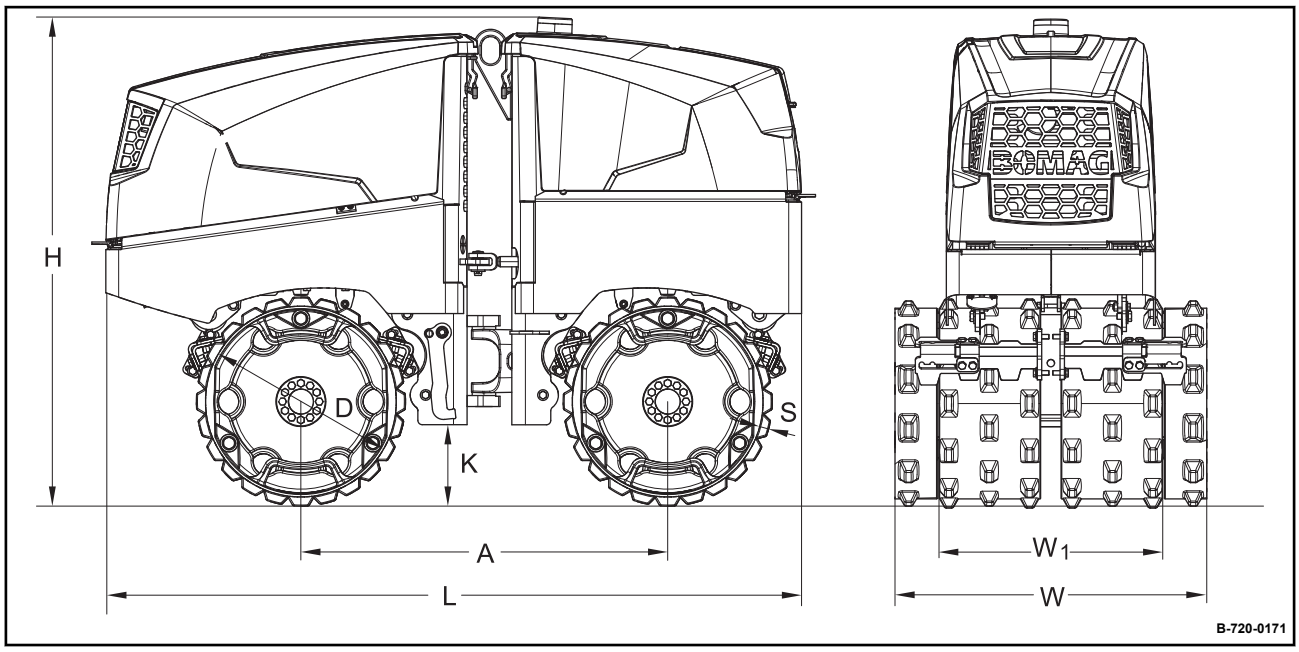


Fig. 6

A	D	H	K	L	S	W	W_1
1000 (39)	520 (20.5)	1333 (53)	197 (7.8)	1897 (75)	16 (0.6)	850 (33.5)	610 (24)
Dimensions in millimetres (Dimensions in inch)							

Weights		
Operating weight	1480 (3263)	kg (lbs)
Basic weight	1470 (3241)	kg (lbs)
Average axle load	740 (1631)	kg (lbs)
Smooth drum *(optional equipment)*	- 45 (- 99)	kg (lbs)
Drum extension *(optional equipment)*	+ 115 (+ 254)	kg (lbs)

Travel characteristics		
Travel speed (1) forward/reverse	1.2 (0.7)	km/h (mph)
Travel speed (2) forward/reverse	3.1 (1.9)	km/h (mph)
Max. gradeability without/with vibration (soil and weather dependent)	55/45	%

Drive		
Engine manufacturer	Kubota	
Type	D1005	
Cooling system	Water	
Number of cylinders	3	
Rated power ISO 3046	14.5	kW
Rated speed	2600	min^{-1}
Idle speed	1200	min^{-1}
Drive system	hydrostatic	
Driven drum	4	

Brakes		
Service brake	hydrostatic	
Parking brake	hydro-mechanical	

Steering		
Type of steering	Articulated joint	
Steering operation	hydrostatic	

Exciter system		
Vibrating drum	front + rear	
Drive system	hydraulic	
Frequency	42 (2520)	Hz (vpm)
Amplitude 1/2 standard drum	1.16/0.6 (0.046/0.023)	mm (in)

Technical data

Exciter system		
Amplitude 1/2 smooth drum (optional equipment)	1.59/0.86 (0.063/0.034)	mm (in)
Centrifugal force 1/2	72/36 (16186/8093)	kN (lbf)

Filling capacities		
Fuel (diesel)	24 (6)	l (gal us)

Safety field control		
Size of the safety field in front of/behind the machine	1.2 (1.3)	m (yd)
Voltage	8 – 30	V
Current consumption at 12 V	1.5	A
IP rating	IP 55	
Safety field frequency	125	kHz
Frequency range (ISM band)	2,402 – 2,480	GHz
RF duty cycle (in radio mode)	0.8	%

Safety field antenna		
IP rating	IP 55	

Transponder in remote control		
Voltage (cable operation)	9 – 30	V
Voltage (battery operation)	3.6	V
Frequency range	2,402 – 2,480	GHz
RF duty cycle (in radio mode)	0.8	%

Remote control transmitter		
Frequency band (ISM band)	2.4	GHz
Frequency range (ISM band)	2,401 – 2,482	GHz

Remote control receiver		
Frequency band (ISM band)	2.4	GHz
Frequency range (ISM band)	2,401 – 2,482	GHz

Transmitter battery		
Voltage	3.7	V
Capacity	3.4	Ah

Charger 12V DC *(optional equipment)*		
Operating voltage	10 – 30	V (DC)

Charger 100 – 230V AC *(optional equipment)*		
Operating voltage	110/230	V (AC)

2.1 Noise data

The following noise and vibration data were determined in accordance with the following guidelines under equipment specific conditions and by using harmonized standards:

- EU Machine Directive edition 2006/42/EU
- Noise Emission Directive 2000/14/EU, Noise Protection Directive 2003/10/EU

During operation these values may vary because of the prevailing operating conditions.

Sound pressure level at the operator's stand

L_{pA} = 78 dB(A), determined acc. to ISO 11201 and EN 474.

WARNING!

Loss of hearing caused by too high noise burdens!

– Wear your personal protective equipment (ear protection).

Guaranteed sound power level

L_{WA} = 109 dB(A), determined acc. to ISO 3744 and EN 474.

Technical data – Noise data

3 Concerning your safety

3.1 Basic prerequisites

3.1.1 General

This machine has been built in compliance with the latest technical standard and complies with the applicable regulations and technical rules.

However, dangers for persons and property may arise from this machine, if:

- it is used for purposes other than the ones it is intended for,
- it is operated by untrained personnel,
- it is changed or converted in an unprofessional way,
- the safety instructions are not observed.

Each person involved in the operation, maintenance and repair of the machine must therefore read and comply with these safety regulations. If necessary, the operating company must obtain the relevant signatures as confirmation.

Furthermore, the following obviously also applies:

- applicable accident prevention instructions,
- generally accepted safety and road traffic regulations,
- country/state specific safety regulations.

It is the duty of the operator to be acquainted with the safety regulations and to apply these accordingly. This also applies for local regulations and regulations concerning different types of handling activities. Should the recommendations in these instructions be different from the regulations valid in your country, you must comply with the safety regulations valid in your country.

3.1.2 Explanation of signal words used

DANGER!

Danger to life if failing to comply!

Sections marked accordingly indicate an extremely dangerous situation that could lead to fatal or severe injuries, if this warning is disregarded.

WARNING!

Danger to life or danger of severe injuries if failing to comply!

Sections marked accordingly indicate a dangerous situation that could lead to fatal or severe injuries, if this warning is disregarded.

CAUTION!

Danger of injury if failing to comply!

Sections marked accordingly indicate a dangerous situation that could lead to fatal or severe injuries, if this warning is disregarded.

NOTICE!

Danger of material damage if failing to comply!

Sections marked accordingly indicate possible dangers for machines or components.

Sections marked accordingly indicate technical information or notes on using the machine or its components.

ENVIRONMENT!

Environmental damage if failing to comply!

Paragraphs marked accordingly indicate practices for safe and environment-friendly disposal of fuels and lubricants as well as replacement parts.

3.1.3 Personal protective equipment

Depending on the work to be carried out, personal protective equipment is required (to be provided by the operating company):

	Working clothes	Tight fitting work clothes with low tear resistance, tight fitting sleeves and no projecting parts prevent the wearer from being caught in moving machine parts.
	Safety shoes	They protect against heavy falling parts and slipping on slippery ground.
	Protective gloves	They protect the hands against scrapes, punctures or deeper injuries, irritating and caustic substances and burns.

	Safety goggles	They protect the eyes against airborne particles and squirting fluids.
	Face protection	This protects the face against airborne particles and squirting fluids.
	Hard hat	This protects the head against falling parts and injuries.
	Hearing protection	This protects against extreme noise.
	Fine dust mask	For protection against particulate pollutants.
	Respiratory protection	This protects the airways against substances or particles.

3.1.4 Intended use

This machine is intended for commercial use only.

The machine must only be used for:

- Compaction of cohesive soils in trench construction
- Construction backfills
- Earthwork in sewer and pipeline construction
- Earthwork in railway and dam construction
- Earthwork in landfill construction
- Substructure and foundation works

The operator’s position is behind the machine.

When operating the machine from the opposite side, there is a discrepancy between the actuation of the control devices for the travel movements and the respective control movement of the machine.

The remote control must be carried in front of the body, as intended.

Intended use also includes compliance with the specified operating, maintenance and repair measures.

3.1.5 Improper use

Dangers may arise with the machine if it is used other than for its intended purpose.

Any hazard caused by improper use is the sole responsibility of the operating company or driver/operator, the manufacturer cannot be held liable.

Examples of improper use are:

- Work with vibration on hard concrete, cured bitumen layers or extremely frozen ground.
- Driving on liquid/soft concrete.
- Driving on subsoil with too low load bearing capacity.
- Driving on slippery subsoil (e.g. ice and snow).
- Driving over edges that are too high (e.g. kerbs, verges, trenches, pot holes).
- Using the machine for towing.
- Operating the machine without visual contact.

The transport of persons is prohibited.

Starting and operating the machine in a potentially explosive environment or underground is prohibited, as the machine does not comply with ATEX requirements, among other things.

3.1.6 Estimated service life of the machine

If the following general conditions are met, the service life of the machine is usually in the range of several thousand operating hours:

- Regular safety inspections by an expert / qualified person
- Performance of the prescribed maintenance work within the specified time
- Immediate performance of necessary repair work
- Exclusive use of original spare parts

3.2 Definition of responsible persons

3.2.1 Operating company

The operating company is the natural or juridical person who uses the machine or in who's name the machine is used.

The operating company must make sure that the machine is only used for the purpose it is intended for and in strict compliance with the safety regulations mentioned in these operating and maintenance instructions.

The operating company must determine and assess the danger in its company. It must then take appropriate action to ensure health and safety at work for its employees and point out any remaining dangers.

The operating company must determine whether there are special operational hazards such as a toxic atmosphere or limiting soil conditions. Such conditions require special, additional measures to remove or reduce the hazard.

The operating company must make sure that all users read and understand the information concerning safety.

The operating company is responsible for the planning and professional execution of regular safety inspections.

3.2.2 Expert / qualified person

An expert / qualified person is a person who, based on his/her professional education and experience, has profound knowledge in the field of construction equipment and the machine in question in particular.

This person is acquainted with the applicable governmental industrial safety regulations, accident prevention instructions, guidelines and generally acknowledged technical rules and regulations (standards, directives, technical rules of other member states of the European Union or other contractual states concerning the agreement about the European Economic Area) in as far as is necessary to be able to judge the safe condition of this machine.

3.2.3 Driver / operator

This machine must only be operated by trained, instructed persons entrusted by the operating company aged 18 or more.

Observe your local laws and regulations.

Rights, obligations and rules of conduct for driver or operator:

The driver or operator must:

- be instructed about his rights and obligations,
- wear protective equipment as appropriate for the application,
- have read and understood the operating instructions,

- have made himself familiar with the operation of the machine,
- be physically and psychologically able to drive and operate the machine.

Persons under the influence of alcohol, medication or drugs are not allowed to operate, service or repair the machine.

Maintenance and repair work requires specific knowledge and must therefore only be performed by trained specialists.

3.3 Basic safety regulations for safe operation

3.3.1 Remaining dangers, remaining risks

Despite careful work and compliance with standards and regulations it cannot be ruled out that further dangers may arise when working with and handling the machine.

Both the machine as well as all other system components comply with the currently valid safety regulations. Nevertheless, remaining risks cannot be ruled out completely, even when using the machine for the purpose it is intended for and following all information given in the operating instructions.

A remaining risk can also not be excluded beyond the actual danger zone of the machine. Persons remaining in this area must pay particular attention to the machine, so that they can react immediately in case of a possible malfunction, an incident or failure etc.

All persons remaining in the area of the machine must be informed about the dangers that arise from the operation of the machine.

3.3.2 Medical auxiliary devices

Medical auxiliary devices, e.g. Pacemakers, insulin pumps or hearing aids, can be impaired in their function by electromagnetic interference when the machine is in operation.

Only use auxiliary equipment that is adequately shielded against electromagnetic interference.

3.3.3 Regular safety inspections

Have the machine inspected by an expert / qualified person as required for the conditions the machine is working under, but at least once every year.

3.3.4 Modifications and alterations to the machine

Unauthorized changes to the machine are prohibited for safety reasons.

Original parts and accessories have been specially designed for this machine.

We wish to make explicitly clear that we have not tested or approved any parts or accessories not supplied by us.

The installation and/or use of such products may have an adverse effect on the active and/or passive safety.

3.3.5 Damage, defects, misuse of safety devices

Machines which are not safe to operate or in traffic must be immediately taken out of service and shall not be used, until these deficiencies have been properly rectified.

Safety installations and switches must neither be removed nor must they be made ineffective.

3.3.6 Telematic

If the machine is equipped with Telematic *(optional equipment)* , various points must be observed:

- The machine must not be operated in the vicinity of safety-critical infrastructure if it could be negatively affected by the emitted interference of radio equipment.
- If transport of the machine by air freight is planned, the power supply to the machine must be disconnected beforehand.
- The power supply to the machine must also be disconnected if local regulations in sensitive areas require this.
- Repairs to the machine are not permitted. The machine may only be repaired by the manufacturer. Inform our Customer Service Department.

The operation of radio equipment is regulated by national laws and regulations. To find out which requirements apply, please contact: *info@bomag.com*.

3.4 Handling fuels and lubricants

3.4.1 Preliminary remarks

The operating company must ensure that all professional users have read and follow the corresponding safety data sheets for the individual fuels and lubricants.

Safety data sheets provide valuable information about the following characteristics:

- name of substance
- possible dangers
- composition / information on constituents
- first-aid measures
- fire fighting measures
- measures in case of accidental release
- handling and storage
- limitation and monitoring of exposure / personal protective equipment
- physical and chemical properties
- stability and reactivity
- toxicological data
- environmental data
- notes on waste disposal
- information on transport
- legislation
- other data

3.4.2 Safety regulations and environmental protection regulations for handling diesel fuel

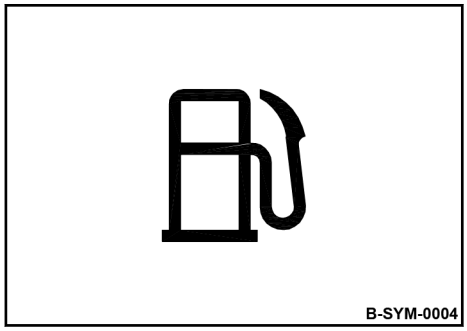


Fig. 7

WARNING!

Danger of burning by ignited diesel fuel!

– Do not allow diesel fuel to come into contact with hot components.
– Smoking and open fire are prohibited!
– Wear your personal protective equipment (protective gloves, protective clothing).

CAUTION!

Health hazard caused by contact with diesel fuel!

– Wear your personal protective equipment (protective gloves, protective clothing).
– Do not inhale any fuel fumes.
– Avoid contact.

CAUTION!

Danger of slipping on spilled diesel fuel!

– Immediately bind spilled diesel fuel with an oil-binding agent.

ENVIRONMENT!

Diesel fuel is an environmentally hazardous substance!

– Always keep diesel fuel in proper containers.
– Immediately bind spilled diesel fuel with an oil-binding agent and dispose of properly.
– Dispose of diesel fuel and fuel filters according to regulations.

3.4.3 Safety regulations and environmental protection regulations for handling oil

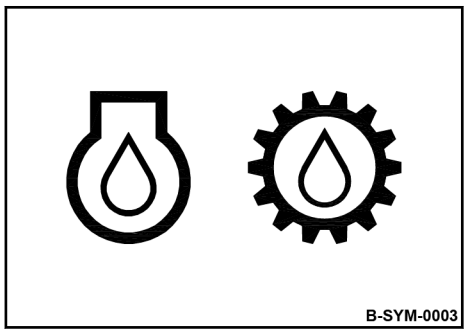


Fig. 8

WARNING!

Danger of burning by ignited oil!

– Do not allow oil to come into contact with hot components.
– Smoking and open fire are prohibited!
– Wear your personal protective equipment (protective gloves, protective clothing).

CAUTION!

Health hazard caused by contact with oil!

– Wear your personal protective equipment (protective gloves, protective clothing).
– Do not inhale any oil vapours.
– Avoid contact.

CAUTION!

Danger of slipping on spilled oil!

– Immediately bind spilled oil with an oil-binding agent.

ENVIRONMENT!

Oil is an environmentally hazardous substance!

– Always keep oil in proper containers.
– Immediately bind spilled oil with an oil-binding agent.
– Dispose of oil and oil filter according to regulations.

3.4.4 Safety regulations and environmental protection regulations for handling hydraulic oil

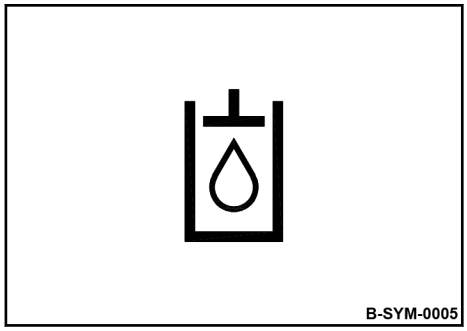


Fig. 9

WARNING!

Danger of injury caused by escaping pressure fluid!

– Always depressurize the hydraulic system before starting work in the hydraulic system.
– Wear your personal protective equipment (protective gloves, protective clothing, goggles).

Should hydraulic fluid penetrate the skin, seek medical assistance immediately.

WARNING!

Danger of burning by ignited hydraulic oil!

– Do not allow hydraulic oil to come into contact with hot components.
– Smoking and open fire are prohibited!
– Wear your personal protective equipment (protective gloves, protective clothing).

CAUTION!

Health hazard caused by contact with hydraulic oil!

– Wear your personal protective equipment (protective gloves, protective clothing).
– Do not inhale any oil vapours.
– Avoid contact.

CAUTION!

Danger of slipping on spilled oil!

– Immediately bind spilled oil with an oil-binding agent.

ENVIRONMENT!

Oil is an environmentally hazardous substance!

– Always keep oil in proper containers.
– Immediately bind spilled oil with an oil-binding agent.
– Dispose of oil and oil filter according to regulations.

3.4.5 Safety regulations and environmental protection regulations for handling coolants

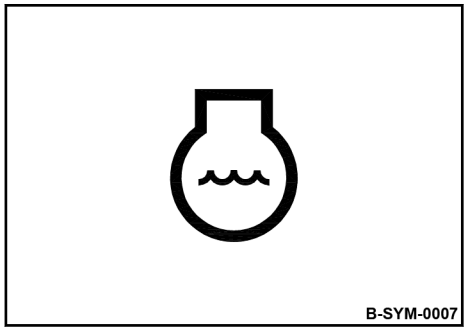


Fig. 10

WARNING!

Danger of scalding by hot fluid!

– Open the compensation tank only when the engine is cold.
– Wear your personal protective equipment (protective gloves, protective clothing, goggles).

CAUTION!

Health hazard caused by contact with coolant and coolant additives!

– Wear your personal protective equipment (protective gloves, protective clothing).
– Do not inhale any fumes.
– Avoid contact.

CAUTION!

Danger of slipping on spilled coolant!

– Immediately bind spilled coolant with an oil-binding agent.

ENVIRONMENT!

Coolant is an environmentally hazardous substance!

– Always keep coolant and coolant additives in proper containers.
– Immediately bind spilled coolant with an oil-binding agent and dispose of it according to regulations.
– Dispose of coolant according to regulations.

3.4.6 Safety and environmental protection regulations for handling batteries

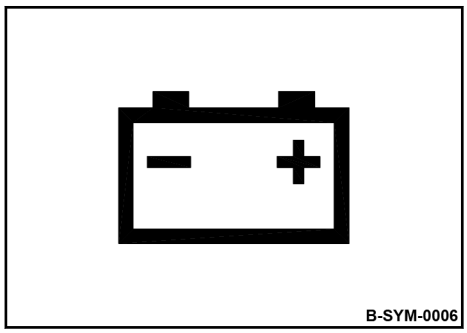


Fig. 11

WARNING!

Danger of cauterization with acid!

– Do not tilt the battery.
– Do not open the battery.
– Immediately bind spilled battery acid with a suitable binding agent and dispose of it in an environmentally friendly way.
– Wear your personal protective equipment (protective gloves, protective clothing, goggles).

Rinse acid off clothes, skin or eyes immediately with lots of clean water.

Immediately call for medical advice in case of cauterization.

WARNING!

Danger of injury caused by exploding gas mixture!

– No open fire, do not smoke.
– Do not mix up the battery terminals and never short-circuit them. Observe the markings on the battery!
– Avoid sparking.
– Wear your personal protective equipment (protective gloves, protective clothing, goggles).

ENVIRONMENT!

Batteries contain environmentally hazardous substances!

– Dispose of battery and spilled battery acid in an environmentally friendly way.

3.5 Loading/transporting the machine

Use only stable loading ramps of sufficient load bearing capacity.

Loading ramps and transport vehicle must be free of grease, oil, snow and ice.

The ramp inclination must be less than the gradeability of the machine.

Make sure that persons are not endangered by the machine tipping or sliding.

Secure the machine with the articulation lock after driving it onto the transport vehicle or prior to lifting.

Do not use lifting points that are damaged or impaired in any way.

Always use appropriate lifting tackle at the lifting points.

Use lifting tackle only in the specified loading direction.

Lifting tackle must not be damaged by machine parts.

Secure the machine on the transport vehicle against rolling, slipping and turning over.

Loads may only be attached and hoisted by an expert/qualified person.

Only use lifting and lashing tackle with sufficient load bearing capacity for the weight to be loaded.

Fasten the lifting gear only at the specified lifting points.

Danger to the life of persons if they step or stand under a suspended load.

When lifting the machine, make sure the load does not move in an uncontrolled way. If necessary, hold the load steady with guide ropes.

After the transport loosen the articulation lock again, as otherwise the machine would not be steerable.

3.6 Starting up the machine

3.6.1 Prior to commissioning

Only use machines which have been serviced at regular intervals.

Become acquainted with the equipment, the indicators and control elements, the working principle of the machine and the working area.

Wear personal protective equipment.

Do not take any loose objects with you or fasten them to the machine.

Before start-up, check whether:

- persons or obstructions are beside or under the machine;
- the machine is free of oily and combustible materials;
- all safety elements are in place;
- all maintenance flaps and doors are closed and locked.

Before commissioning, carry out all required visual inspections and function tests.

If the tests reveal damage or other defects, the machine must not be operated until these have been rectified.

Do not operate the machine with defective indicators and control elements.

3.6.2 Starting the engine

Before starting and moving the machine, make sure that there is nobody in the danger zone.

The operator’s position is behind the machine.

The machine must only be started and operated from the operator’s position.

The remote control must be carried in front of the body, as intended.

To start, set all control levers to “neutral position”.

Do not use any starting aids like start pilot or ether.

The machine must not be operated with damaged, missing or non-functional safety devices.

After starting, check all display instruments.

Do not inhale exhaust fumes, because they contain toxic substances, which could cause damage to health, unconsciousness or even death.

For operation in closed or partly closed rooms ensure adequate ventilation.

3.6.3 Starting the engine externally

A wrong connection will cause severe damage in the electric system.

Do not start the engine by shorting the electric terminals on the starter motor, because the machine may start to drive immediately.

3.7 Operation with radio remote control

The machine must only be operated within the operator’s field of vision.

In case of radio interferences, watch the fault code display and switch to cable remote control, if necessary.

Shut down defective radio remote controls immediately. Actuate the emergency stop. Switch off the main battery switch. Disconnect the connecting cable on the receiver from the machine socket.

The radio remote control must only be repaired by the manufacturer or specialists authorised by the manufacturer.

The radio remote control must never be left unattended.

3.8 Driving the machine; working operation

3.8.1 Persons in the danger zone

Before taking up work, also after breaks, you should always convince yourself that the danger zone is free of persons or obstructions, especially when driving in reverse.

Give warning signals, if necessary. Stop work immediately if persons remain in the danger zone, despite the warning.

3.8.2 Driving the machine

Only drive on load-bearing surfaces.

In case of unusual noises and development of smoke perform troubleshooting to determine the cause and have the fault corrected.

Match the speed to the working conditions.

Always keep a safe distance to excavation pit borders, embankments and edges.

Refrain from any work that could adversely affect the stability of the machine.

3.8.3 Driving up and down slopes

Do not drive on gradients or slopes exceeding the maximum gradeability of the machine ↬ *Chapter 2 ‘Technical data’ on page 15*.

Drive extremely carefully on gradients and always directly up or down the slope.

Soil conditions and weather influences impair the gradeability of the machine.

Wet and loose soil considerably reduces traction of the machine on inclinations and slopes. Greater danger of accidents!

Switch off the engine when stopping on uphill and downhill gradients to prevent the machine from moving.

3.8.4 Cross slope

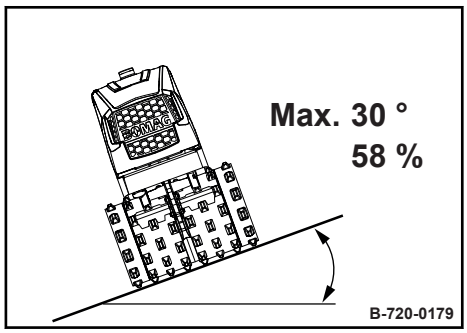


Fig. 12

The tipping angle was measured on level, hard ground with the machine stopped and without steering.

The specified angle must not be exceeded.

With loose soil, acceleration/deceleration, running vibration, steering or attached accessories the tipping angle may be considerably lower.

Driving across slopes should therefore be strictly avoided, because of the high risk of tipping over and the related risk of severe or even fatal accidents.

For machines with a drum width of 1 metre and less there is an increased risk of tipping over when driving near edges (e.g. kerbs, verges, trenches, potholes).

3.8.5 Working with vibration

When compacting with vibration you must always check the effect of the vibration on nearby buildings and underground supply lines (gas, water, sewage, electric power). If necessary stop compacting with vibration.

Do not activate the vibration on hard (frozen, concrete) ground. Components may get damaged.

3.8.6 Parking the machine

Park the machine on horizontal, level, firm ground.

Before leaving the machine:

- shift all control levers to “neutral position”, “off” or “0”;
- switch off the engine and remove the ignition key;
- remove the main battery switch;
- secure the machine against unauthorised use.

Mark machines, which could be in the way, with a clearly visible sign.

When parking on ascents or descents use appropriate means to secure the machine against rolling.

3.9 Refuelling

Do not inhale any fuel fumes.

Refuel only with the engine shut down.

Do not refuel in closed rooms.

No open fire, do not smoke.

Static charges may be generated in the fuel as it passes through the filling system. The discharge of these charges in the presence of combustible vapours can cause fire or an explosion.

Ultra-low sulphur diesel fuel poses a higher risk of combustion caused by the static charging than diesel fuel with a higher sulphur content.

You should therefore always make sure that the filling system is properly grounded and that there is equipotential bonding to the machine. If necessary use a connecting cable between filling system and vehicle ground.

Apply measures against electrostatic charging.

Monitor the entire refuelling process.

Do not spill any fuel. Collect leaking fuel, do not let it seep into the ground.

Wipe off spilled fuel. Keep dirt and water away from the fuel.

A leaking fuel tank can cause an explosion. Ensure tight fit of the tank cap; if necessary, replace immediately.

3.10 Emergency procedures

3.10.1 Actuating the emergency stop switch

In events of emergency and in case of danger actuate the emergency stop switch immediately.

The machine is braked immediately; the engine is shut down.

Restart the machine only after the danger that caused the actuation of the emergency stop switch has been eliminated.

3.10.2 Disconnecting the battery

In event of emergency, e.g. in case of a cable fire, disconnect the battery from the vehicle network.

Turn off and pull out the main battery switch or lift off the battery pole to do so.

3.10.3 Recovering the machine

The machine can be recovered by lifting it out of the danger zone.

Loads may only be attached and hoisted by an expert/qualified person.

Before lifting the machine, lock it with the articulation lock.

Do not use lifting points that are damaged or impaired in any way.

Use only lifting and lashing tackle with sufficient load bearing capacity.

Fasten the lifting gear only at the specified lifting points.

Always use appropriate lifting and lashing tackle at the lifting points.

Use lifting tackle only in the specified loading direction.

Lifting tackle must not be damaged by machine parts.

Danger to the life of persons if they step or stand under a suspended load.

When lifting the machine, make sure the load does not move in an uncontrolled way. If necessary, hold the load steady with guide ropes.

3.11 Maintenance work

3.11.1 Preliminary remarks

Always carry out the prescribed maintenance work and maintenance measures on time in order to maintain the safety, operational readiness and long service life of the machine.

The machine must only be serviced by qualified personnel authorised by the operating company.

3.11.2 Working on hydraulic lines

Before the hydraulic system can be depressurized, machine parts with hydraulic movement must be safely set down or secured to prevent them from falling.

Relieve hydraulic pressures before working on hydraulic lines. Hydraulic oil escaping under pressure can penetrate the skin and cause severe injury. Immediately call for medical assistance if injured by hydraulic oil.

Do not step in front of or behind the machine when performing adjustment work in the hydraulic system.

Do not change the setting of pressure relief valves.

Drain the hydraulic oil at operating temperature – danger of scalding!

Any hydraulic oil must be collected and disposed of in an environmentally friendly way.

Always collect and dispose of hydraulic oils separately.

Do not start the engine after draining off the hydraulic oil. Once all work is completed (with the system still depressurized!) check all connections and fittings for leaks.

Hydraulic hoses must be visually inspected at regular intervals.

Do not mix up hoses by mistake.

Only genuine replacement hydraulic hoses ensure that the correct hose type (pressure range) is used at the right location.

3.11.3 Working on the engine

Do not work on the fuel system while the engine is running. Danger to life due to high pressures!

Wait until the engine has stopped, then wait approx. another 15 minutes.

Keep out of the danger zone during the initial test run.

In case of leaks return to the workshop immediately.

Drain the engine oil at operating temperature. Danger of scalding!

Wipe off spilled oil, collect leaking oil and dispose of it in an environmentally friendly way.

Store used filters and other oil contaminated materials in a separate, specially marked container and dispose of them in an environmentally friendly way.

The settings for idle speed and highest speed must not be changed, since this would affect the exhaust gas values and cause damage to engine and power train.

Engine and exhaust system work at high temperatures. Keep combustible materials away and do not touch any hot surfaces.

Check and change coolant only when the engine is cold. Collect coolant and dispose of it in an environmentally friendly way.

3.11.4 Working on electrical system components

Before starting to work on electric components of the machine disconnect the battery minus cable and cover the battery with insulating material.

Do not use fuses with higher ampere ratings and do not bridge fuses.

Only disconnect or connect wiring harness plugs from electronic control units when the ignition is switched off.

Replace damaged parts immediately. Damaged cables can result in injuries and fires.

3.11.5 Working on the battery

Before starting work on batteries, switch off the ignition and all electrical consumers and disconnect the battery minus cable.

Avoid sparks when handling batteries.

When working on batteries, smoking and open fire are prohibited!

Connection cables of the battery must not touch or rub against machine parts.

Replace damaged, frozen or thawed batteries immediately.

Do not tilt or open batteries.

Bind spilled battery acid with a suitable binding agent and dispose of it in an environmentally friendly way.

3.11.6 Cleaning work

Do not perform cleaning work while the motor is running.

Allow the engine to cool down before starting cleaning work on engine and exhaust system.

Never use gasoline or other easily inflammable substances for cleaning.

When cleaning with a high pressure cleaner, do not subject electrical parts and insulation material to the direct jet of water, or cover them beforehand.

Do not guide the water jet into the exhaust pipe and into the air filter.

3.11.7 Measures for longer shut-down periods

If the machine is taken out of operation for a longer period of time, various conditions must be met and maintenance work must be carried out both before and after shut-down ↳ *Chapter 8.13.7 'Measures prior to extended shut-down period' on page 162*.

It is not necessary to define a maximum storage period if these measures have been performed.

3.11.8 After maintenance work

Reassemble all guards and protective devices.

Close all maintenance flaps and maintenance doors again.

3.12 Repair

Identify a defective machine with a warning sign.

Only operate the machine after it has been repaired.

Repairs must only be performed by an expert/qualified person.

When replacing safety relevant components, only original spare parts must be used.

3.13 Signage

Keep stickers and signage in good and legible condition and comply with their meaning.

Replace damaged and illegible stickers or signage immediately.

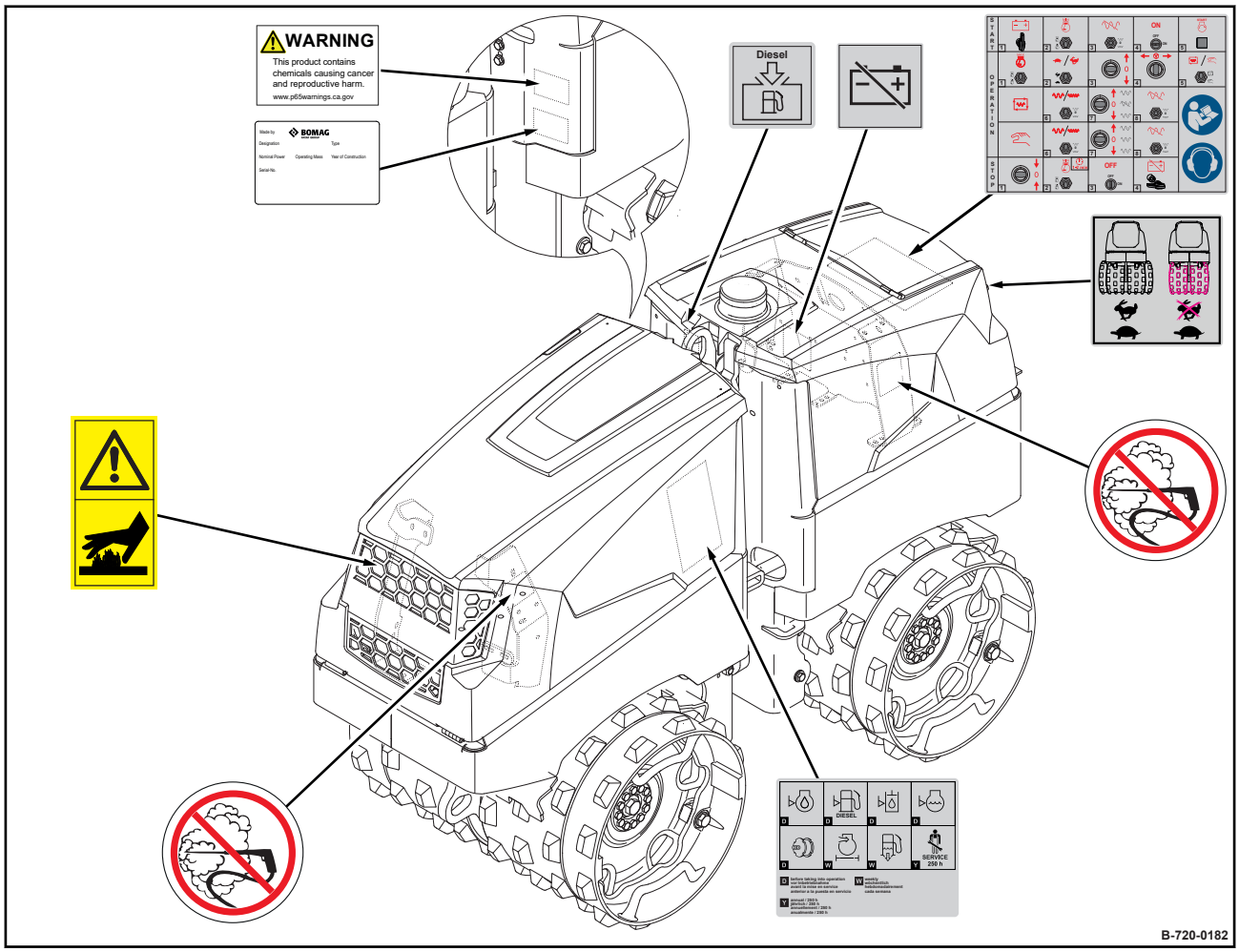

WARNING
This product contains chemicals causing cancer and reproductive harm.
www.p65warnings.ca.gov
Diesel
B-720-0182

Fig. 13

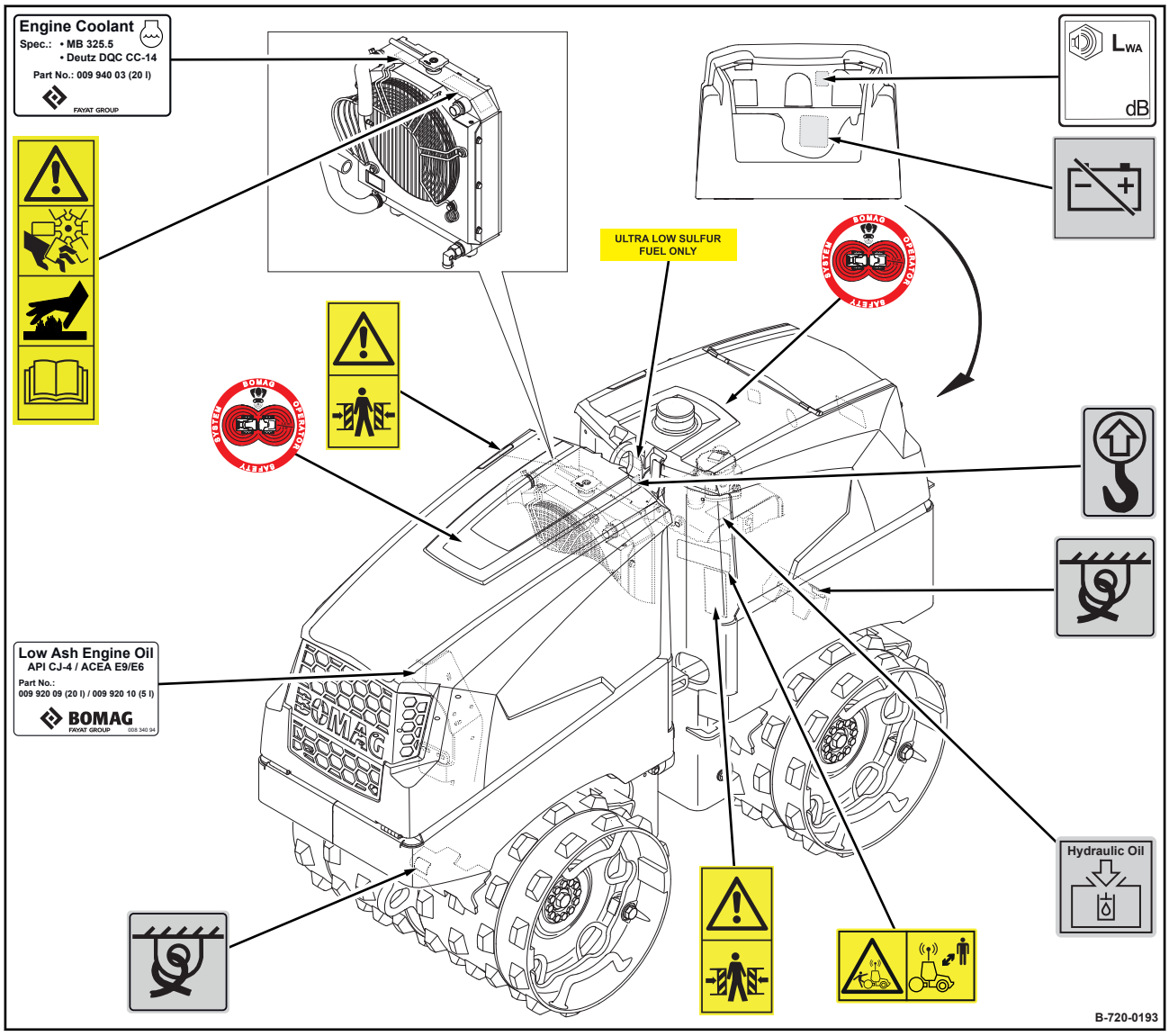


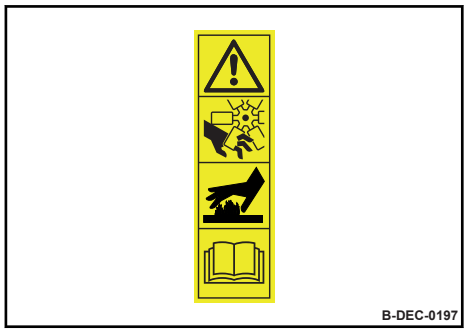
Fig. 14

Warning sticker - Hot surface

Fig. 15

Warning sticker – California Proposition 65

Fig. 16

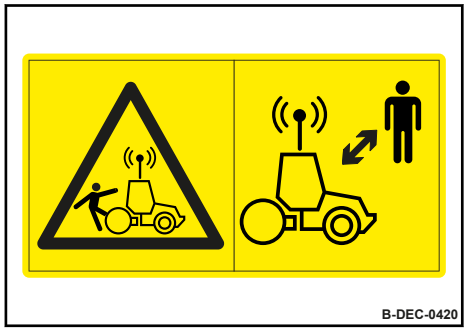


Warning sticker - Danger of being pulled in by cooling fan, and hot surface Follow operating instructions

Fig. 17

Warning sticker - Danger of crushing

Fig. 18

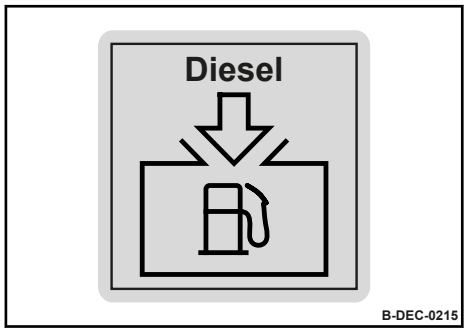


Warning sign - radio operation

Fig. 19

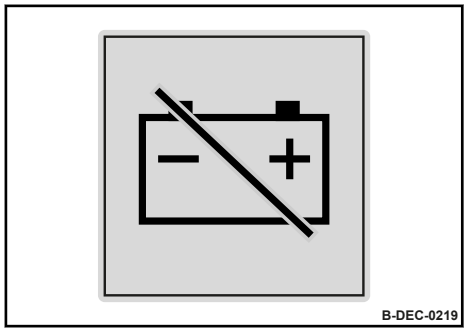
Prohibition sticker - High pressure cleaning

Fig. 20



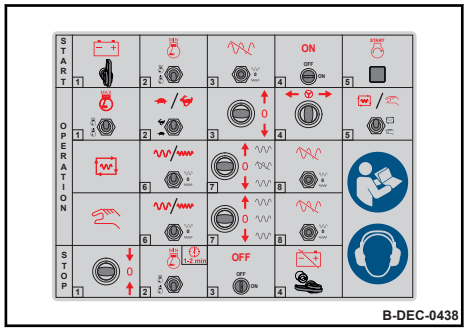
Information sticker - Filler opening for diesel

Fig. 21



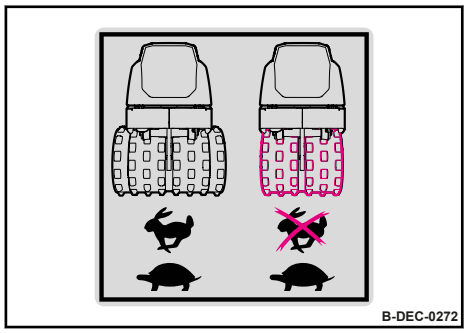
Information sticker - Disconnecting the battery

Fig. 22



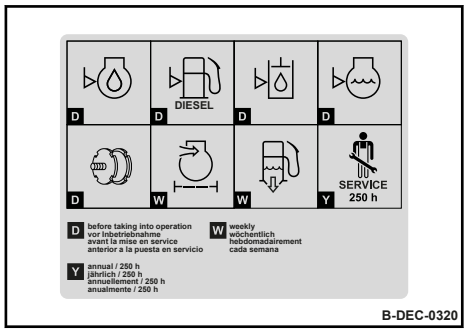
- Brief operating instructions
- Instruction sticker - Observe operating instructions
- Instruction sticker - Wear ear protection

Fig. 23



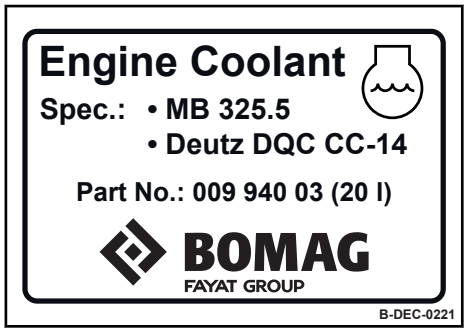
Information sticker - Low travel speed range

Fig. 24



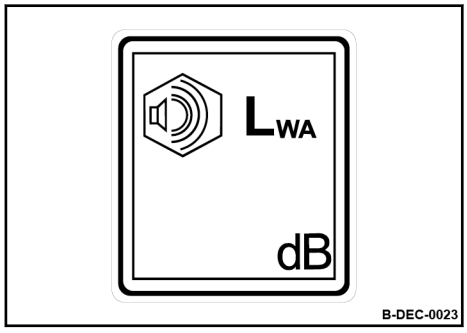
Maintenance sticker

Fig. 25



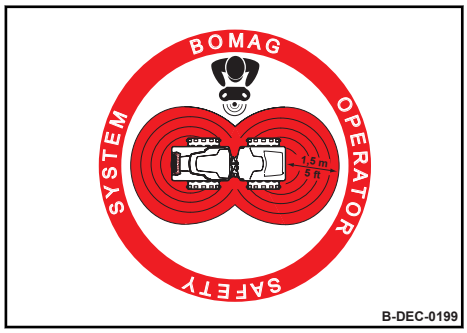
Information sticker - Coolant

Fig. 26



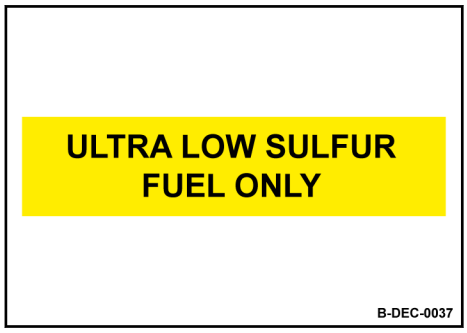
Information sticker - Guaranteed sound capacity level

Fig. 27



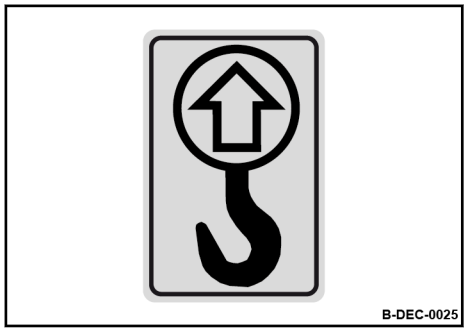
Information sticker - BOSS safety field

Fig. 28



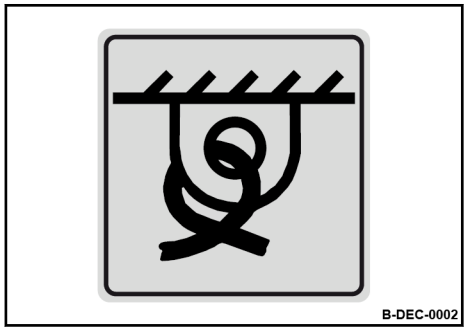
Information sticker - Ultra-low sulphur fuel

Fig. 29



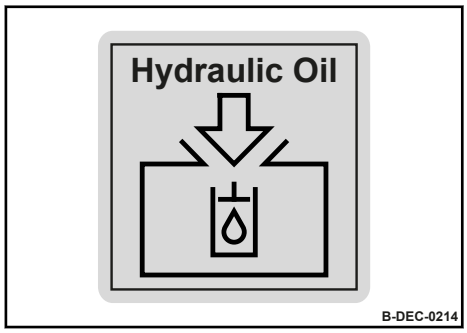
Information sticker - Lifting point

Fig. 30



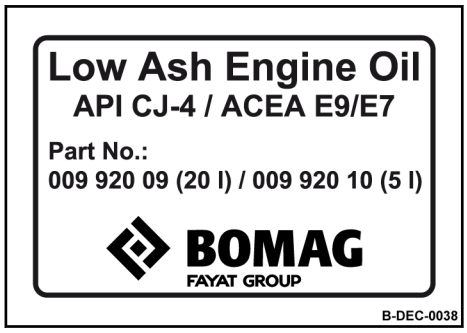
Information sticker - Lashing point

Fig. 31



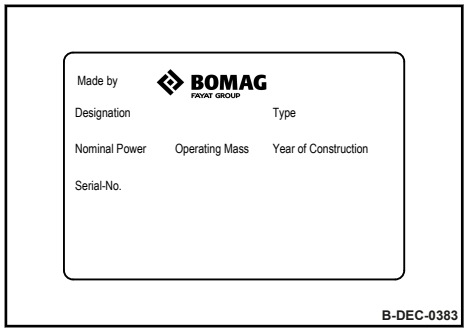
Information sticker - Filler opening for hydraulic oil

Fig. 32



Information sticker - Low ash engine oil

Fig. 33



Machine type plate (example)

Fig. 34

3.14 Safety components

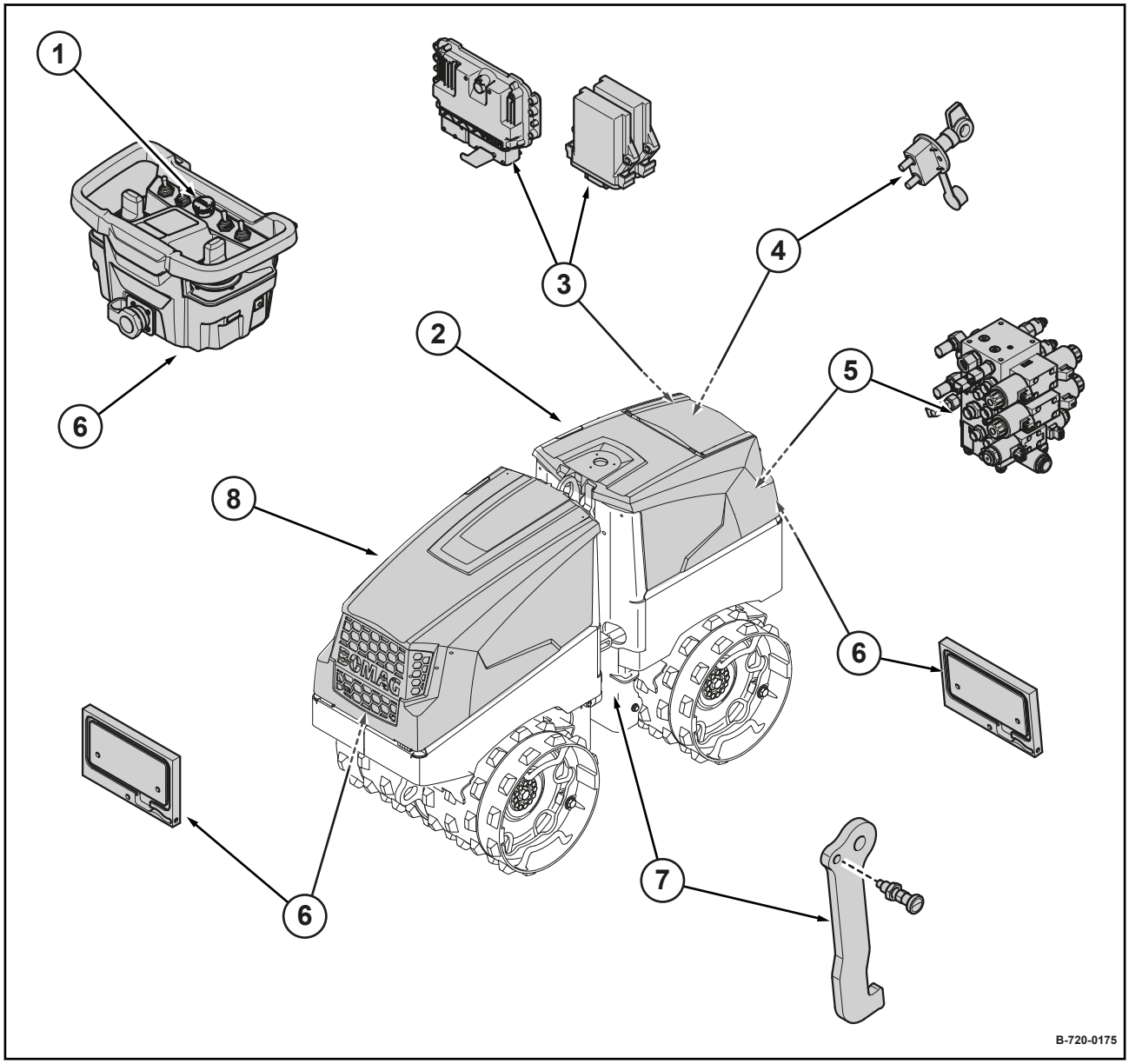


Fig. 35

1 Emergency stop switch
2 Protection hood
3 Control system
4 Main battery switch
5 Pressure limiting valve
6 Protective features for the detection of persons
7 Articulation lock
8 Engine hood

4 Indicators and control elements

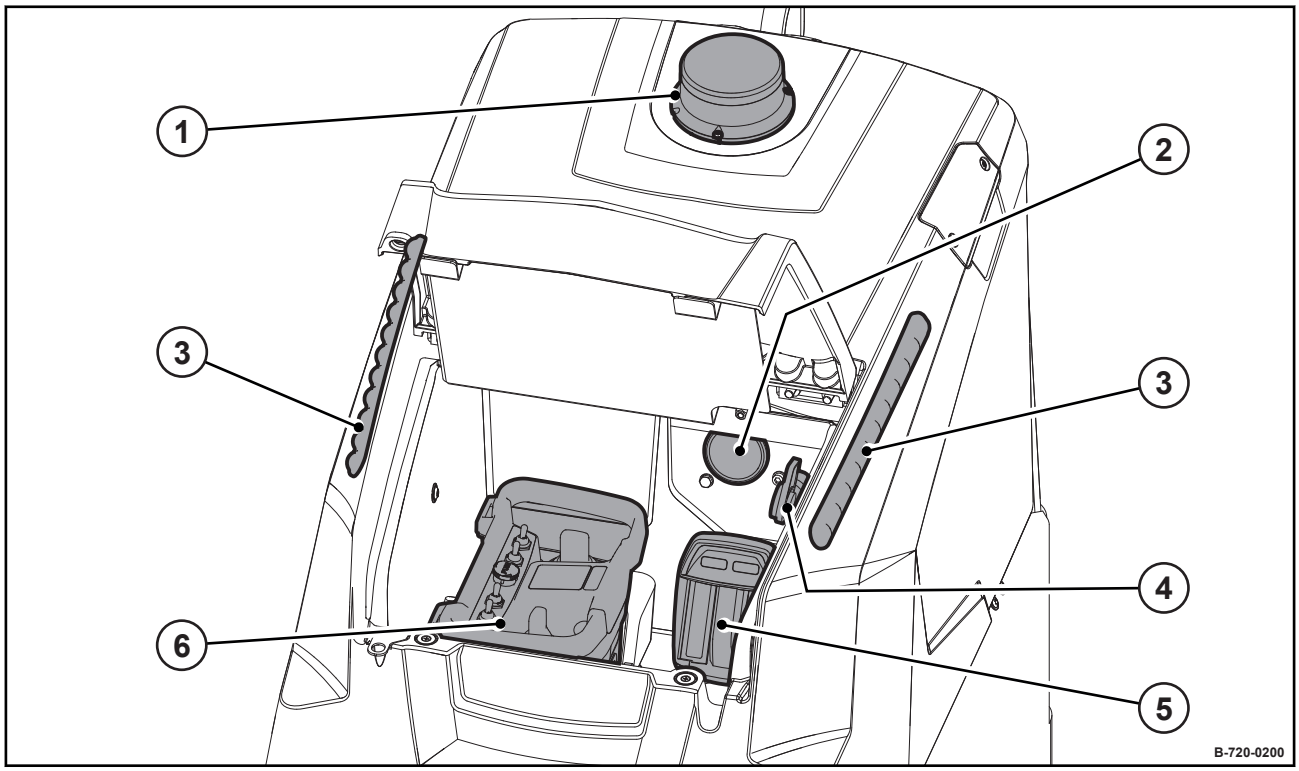


Fig. 36

1 Flashing beacon
2 Display module
3 ECONOMIZER display *(optional equipment)*
4 Main battery switch
5 Battery charger *(optional equipment)*
6 Remote control

4.1 Flashing beacon

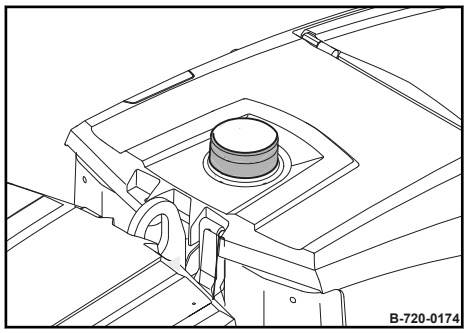


Fig. 37

Ignition on.	Flashing beacon lights up.
Ignition is off.	Flashing beacon goes out.

4.2 Display module

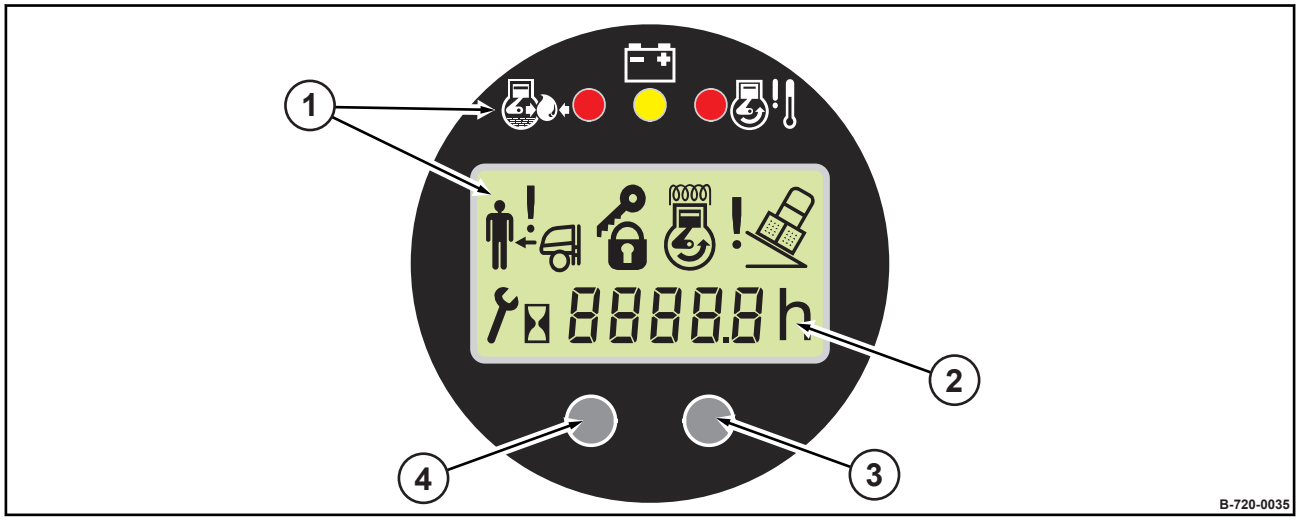


Fig. 38

1 Control and warning lights
2 Display field for operating hours and fault codes
3 Function key F2
4 Function key F1

Control lights and warning lights

	Designation	Note
	Engine oil pressure	Engine oil pressure is too low. The engine will be shut down after a short while. Check the engine oil level; if necessary, repair the engine.
	Charge control light	Battery is not charging. Check the belt drive; if necessary, repair the generator.
	Coolant temperature	Coolant temperature too high. Run the engine at idle speed or, if necessary, shut it down and clean the radiator; if necessary, repair the engine.
	Safety system	Operator with remote control in the safety field. The machine stops immediately. To continue leave the machine's safety field or move the machine in the opposite direction.
	Preheating	Preheating the engine before starting.
	Tipping angle	**Lights up yellow:** ■ Tipping angle of the machine laterally or in the direction of travel ≥ 20°. **Lights up red:** ■ Tipping angle of the machine laterally ≥ 45°, or ■ Tipping angle of the machine in the direction of travel ≥ 60°. ■ The engine is shut down. To continue restart the engine and move the machine carefully out of the danger zone.

4.3 ECONOMIZER display

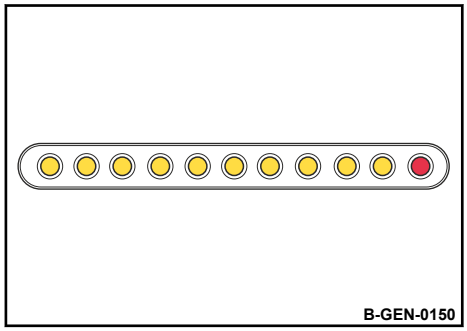


Fig. 39

The ECONOMIZER indicates the compaction status of the subsoil.

Description of display possibilities ↳ Chapter 6.5 ‘ECONOMIZER’ on page 101.

Optional equipment

4.4 Main battery switch

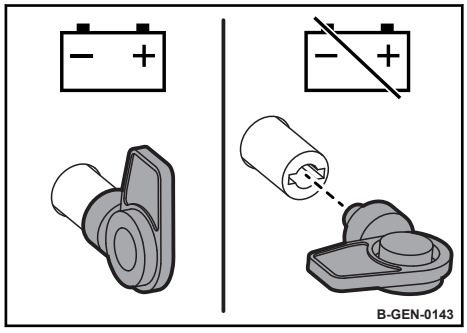


Fig. 40

Position “On”	Main battery switch locked. Normal position, operation.
Turn anticlockwise	Main battery switch can be pulled out. Disconnects the batteries from the on-board electrics, e.g. to prevent unauthorised use. Individual control units may still be connected to the on-board electrics despite the main battery switch being pulled out.

NOTICE!

Danger of damage to the electronic system!

– Use the main battery switch to shut down the engine only in events of emergency.

4.5 Battery charger display

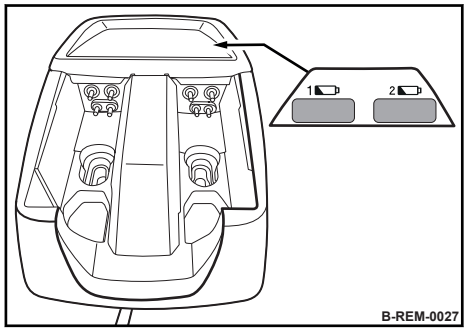


Fig. 41

Prerequisites:
Battery is inserted correctly in the charger.

LED	Description
Flashes green	Battery is charging.
Lights up green	Battery is fully charged.
Lights up red	Charging process cancelled, temperature is outside the permissible range (0°C – 45°C). ■ Disconnect the charger from the power source. ■ Take appropriate measures (e.g. allow the battery to cool down, place the charger in a frost-free area). ■ Continue charging
Flashes red	Charging process cancelled. ■ Disconnect the charger from the power source. ■ Inform our Customer Service Department.

The charger is available in the following versions:

– *Installed in the machine, power supply via battery.*
– *External charger, for connecting to a mains socket.*
– *External charger, for connecting to a 12 V DIN socket.*

Optional equipment

4.6 Remote control

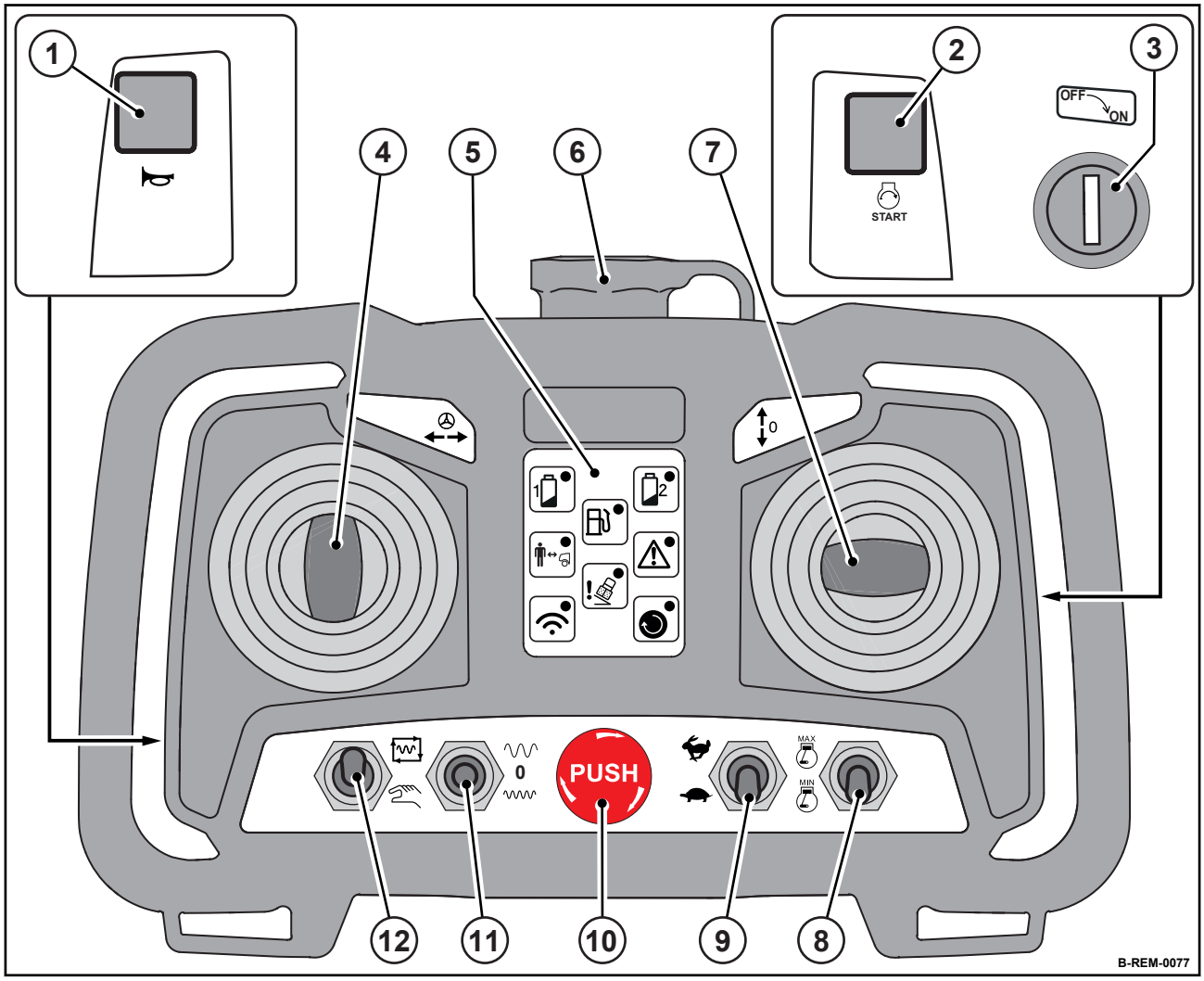
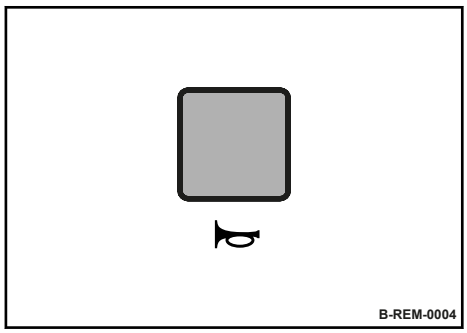


Fig. 42

1 Push button for warning horn
2 Push button for engine start
3 Ignition switch
4 Steering lever
5 Control lights and warning lights
6 Cable control connection
7 Travel lever
8 Engine speed toggle switch
9 Toggle switch for travel ranges
10 Emergency stop switch
11 Vibration toggle switch
12 Toggle switch for vibration mode

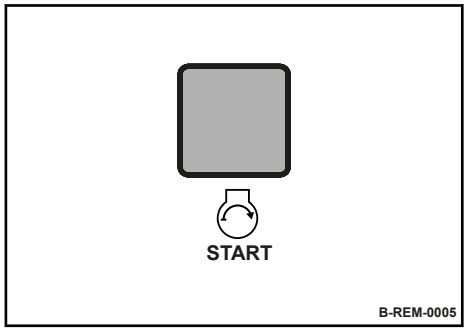
4.6.1 Push button for warning horn



Press	Warning horn sounds

Fig. 43

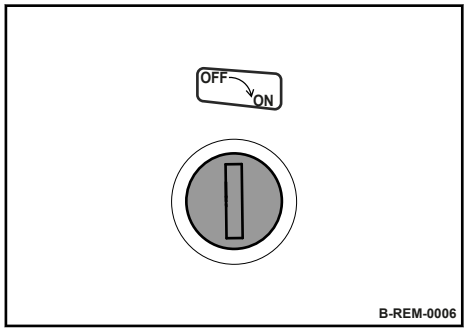
4.6.2 Push button for engine start



Press	The engine starts. Prerequisites: Ignition switch in position “ON".

Fig. 44

4.6.3 Ignition switch



Position “OFF”	Engine off, ignition off, key removable.
Position “ON”	Ignition on, engine can be started.

Fig. 45

4.6.4 Steering lever

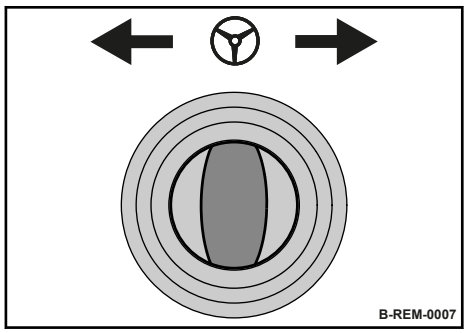


Fig. 46

Shift to the left	Machine steers to the left.
Shift to the right	Machine steers to the right.

4.6.5 Control lights and warning lights

Fig. 47

	Designation	Note
	Control light, battery 1	Charge level of battery 1 / battery 2: ■ Green: approx. 70% – 100%. ■ Orange: approx. 40% – 70%. ■ Red: approx. 0% – 40%. If the charge level drops further, the warning buzzer sounds. Replace the battery or switch to cable operation. Flashes green: ■ Battery is charging.
	Control light, battery 2	
	Fuel level warning light	Fuel filling level indicator: ■ Green: Filling level sufficient. ■ Red: Filling level low. Only when the filling level sensor for fuel is installed *(optional equipment)*.
	Safety device warning light	Operator with remote control in the safety field. The machine stops immediately. ■ Leave the machine's safety field or move the machine in the opposite direction.

Indicators and control elements – Remote control

	Designation	Note
	General warning light	Lights up yellow: ■ Fault in the engine control unit. Flashes yellow: ■ Fault in the engine control unit. ■ Machine functions may be restricted. ■ Take note of the fault codes and inform our Customer Service Department. Flashes red: ■ Serious malfunction in the machine control unit. ■ The engine is shut down. ■ Contact our Customer Service immediately.
	Tipping angle warning light	Tipping angle of the machine laterally or in the direction of travel ≥ 20°. The engine is shut down, if: ■ Tipping angle of the machine laterally ≥ 45°, or ■ Tipping angle of the machine in the direction of travel ≥ 60°.
	Radio operation control light	Lights up green: ■ Radio operation with max. signal strength. Lights up yellow: ■ Radio operation with a weakened signal strength. Flashes red: ■ Machine out of range. ■ No radio operation possible.
	Control light for emergency stop switch	Flashes yellow: ■ Emergency stop switch (remote control) actuated. Lights up red: ■ Emergency stop was triggered by the machine control unit.

4.6.6 Cable control connection

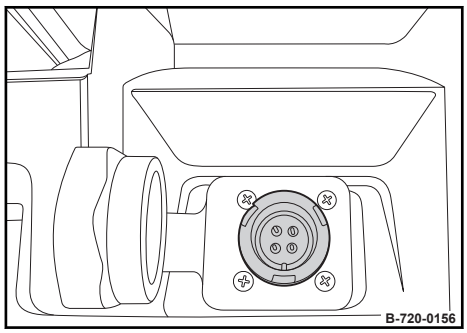
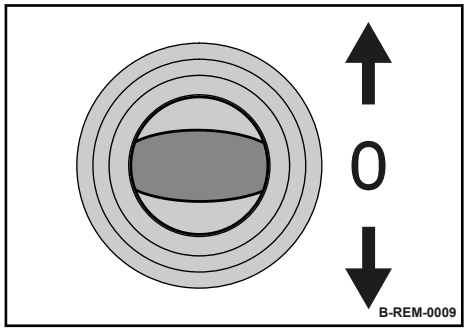


Fig. 48

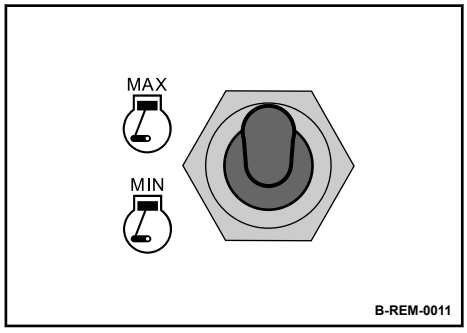
4.6.7 Travel lever



Shift forward	Forward travel.
Pull back	Reverse travel.

Fig. 49

4.6.8 Engine speed toggle switch

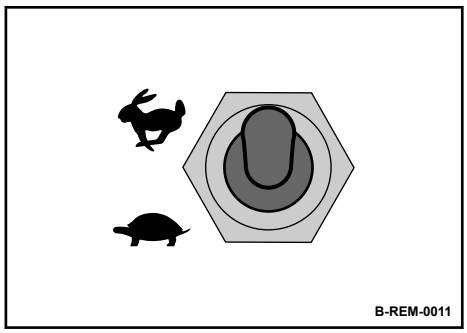


Position “MAX”	Full load position.
Position “MIN”	Idle speed position.

If the remote control isn’t operated within approx. 10 seconds when the machine is in the "MAX" position, the system switches to idle (with activated ECO mode).

Fig. 50

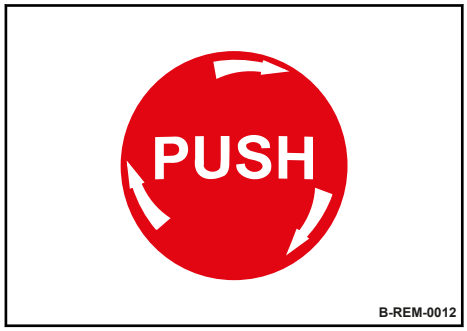
4.6.9 Toggle switch for travel ranges



“Rabbit” position	Travel speed range 2 (fast) Vibration off.
“Turtle” position	Travel speed range 1 (slow)

Fig. 51

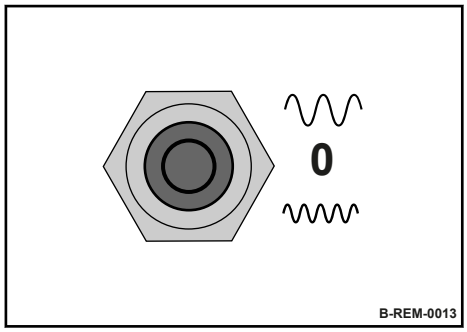
4.6.10 Emergency stop switch



Press	In emergency situations and in case of danger, actuate the emergency stop switch immediately by pressing it down fully. It automatically locks in end position. The machine will be braked immediately. The engine is shut down.
switch off/unlock	Turn the emergency stop switch clockwise and let it go.

Fig. 52

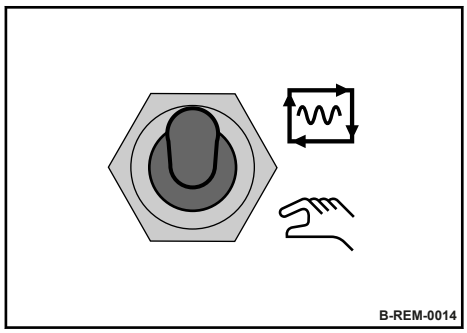
4.6.11 Vibration toggle switch



Position “Front”	High amplitude
“Middle” position	Vibration off
Position “Rear”	Low amplitude

Fig. 53

4.6.12 Toggle switch for vibration mode



Position “Front”	Automatic operation. Vibration is automatically switched on or off when the travel speed exceeds or falls below a certain value.
Position “Rear”	Manual operation. Vibration is switched on or off using the vibration toggle switch.

Fig. 54

Indicators and control elements – Remote control

5 Checks prior to start up

5.1 Notes on safety

If the following tests reveal damages or other defects, the machine must not be operated, until these deficiencies have been corrected.

Do not operate the machine with defective indicators and control elements.

Safety installations must not be removed or made ineffective.

Do not change any fixed settings.

WARNING!

Health hazard caused by fuels and lubricants!

– Safety regulations and environmental protection regulations must be followed when handling fuels and lubricants *Chapter 3.4 'Handling fuels and lubricants' on page 30*.

WARNING!

Danger of injury caused by rotating parts!

– Before starting work on the machine make sure that the engine can not be started.

1. Park the machine safely *Chapter 6.6 'Parking the machine in secured condition' on page 102*.
2. Open the protective hoods and secure them.
3. Close the protective hoods after work is completed.

5.2 Visual inspections and function tests

1. Check the condition of the hydraulic oil tank and hydraulic oil lines and check for leaks.
2. Check the condition of the fuel tank and fuel lines and for leaks.
3. Check the cooling system for contamination, damage and leaks.
4. Check the bolted connections are tight and secure.
5. Check the engine and exhaust system for leaks.
6. Check belt drive for damage.
7. Check the machine and remote control for contamination and damage.

5.3 Daily maintenance

5.3.1 Checking the engine oil level

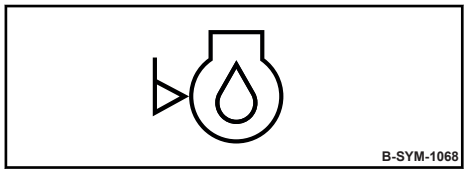


Fig. 55

NOTICE!

Danger of engine damage!

– If the engine is warm, shut it down and check the oil level after five minutes. With a cold engine the oil level can be checked immediately.
– Use only oil of the permitted specification
↳ *Chapter 8.3.1 ‘Engine oil’ on page 123*.

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves

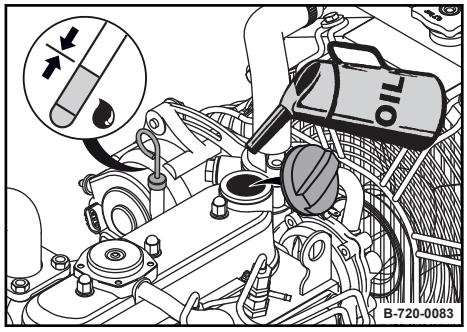


Fig. 56

1. Clean the area around the oil dipstick.

2. Pull the dipstick out, wipe it off with a lint-free, clean cloth and reinsert it to the end stop.

3. Pull the dipstick out again.

⇨ The oil level must be between the “MIN” and “MAX” marks.

4. For topping up, clean the area around the filling port.

5. Unscrew the cap and fill with engine oil up to the “MAX” mark.

6. Insert the dipstick.

7. Close the cap.

5.3.2 Checking the fuel level; topping up fuel

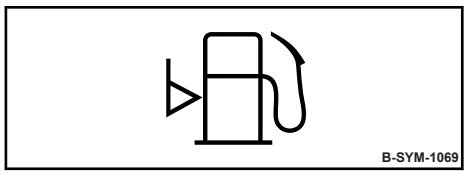


Fig. 57

NOTICE!

Danger of engine damage!

- Never run the fuel tank empty, as otherwise the fuel system needs to be bled.
- Monitor the entire refuelling process.
- Contaminated fuel can cause malfunction or even damage of the engine. If necessary, fill in fuel through a screen filter.
- Use only fuel of the permitted specification
  ↳ *Chapter 8.3.2 'Fuel' on page 124*.

1. Check the filling level in the fuel tank.
2. Refuel if required, but only after shutting down the engine first.

Refuelling

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves

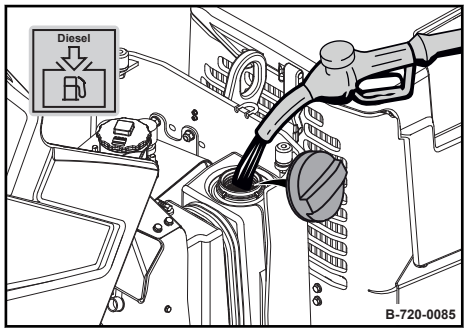


Fig. 58

1. Clean the area around the filling port.
2. Unscrew the cap and fill with fuel.
3. Close the cap.

5.3.3 Checking the hydraulic oil level

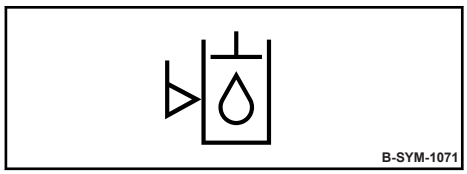


Fig. 59

NOTICE!

Components may get damaged!

- Check the hydraulic oil level at room temperature (approx. 20 °C (68 °F)).
- If, during the daily inspection of the oil level the hydraulic oil level is found to have dropped, check all lines, hoses and components for leaks.
- Use only oil of the permitted specification
  ↳ *Chapter 8.3.5 'Hydraulic oil' on page 126*.

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves

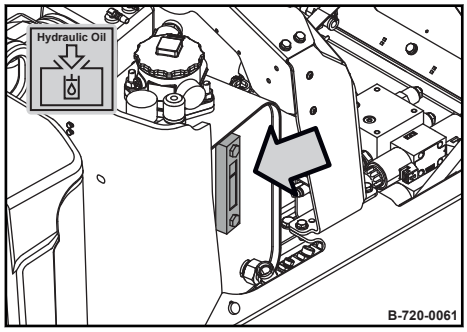


Fig. 60

1. Check the oil level in the inspection glass.

Normal level	Approx. 3 cm (1.2 in) below the top edge of the sight glass
Minimum level	Approx. middle of inspection glass

2. For topping up, clean the area around the filling port.
3. Remove the cap and fill with hydraulic oil.
4. Close the cap.

In case of a leakage in the area of the drum, hydraulic oil may enter the travel system housing or the exciter shaft housing.

5. Check the travel system housing or exciter shaft housing
   ↳ *Chapter 10.3 'Hydraulic oil leakage' on page 177*.

5.3.4 Checking the coolant level

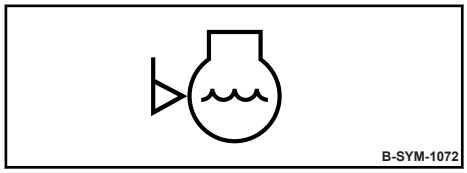


Fig. 61

NOTICE!

Danger of engine damage!

- If, during the daily inspection the coolant level is found to have dropped, check all lines, hoses and engine for leaks.
- Do not use radiator sealant to seal leaks.
- Use only coolant of the permitted specification
  ↳ *Chapter 8.3.3 'Coolant' on page 125*.

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves
- Safety goggles

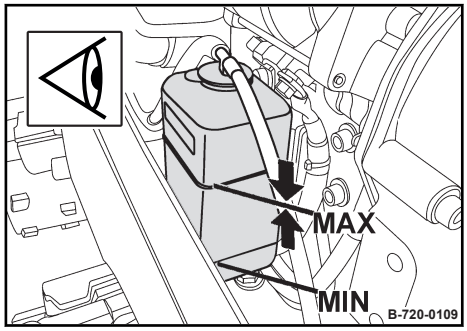


Fig. 62

1. Check the coolant level in the compensation tank.
   ⇨ The coolant level must be between the “MIN” and “MAX” marks.

WARNING!
Danger of scalding by hot fluid!
– Open the compensation tank only when the engine is cold.
– Wear your personal protective equipment (protective gloves, protective clothing, goggles).

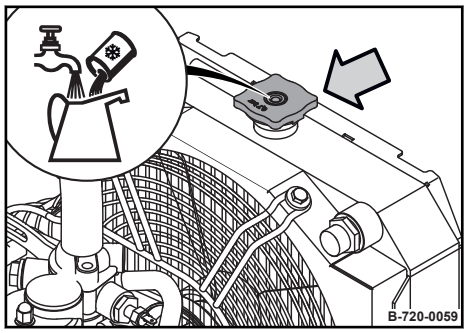


Fig. 63

2. For topping up, clean the area around the filling port.
3. Unscrew the cap and fill with coolant up to the “MAX” mark.
4. Close the cap.

5.3.5 Checking the rubber buffers

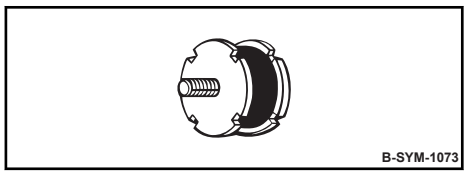


Fig. 64

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves

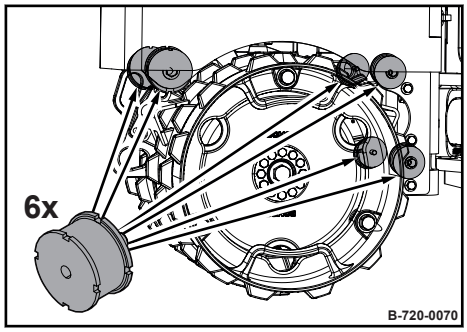


Fig. 65

1. Check the six rubber buffers on both the front and rear axle are tight and secure, and check for cracks and tears.

2. Replace damaged rubber buffers immediately.

6 Operation

6.1 Preliminary remarks

The machine is operated by remote control.

This can be done in the following operating modes:

- Cable operation
- Radio operation

In both operating modes, the remote control functions are the same.

However, for radio operation special operating instructions and performance tests have to be taken into account.

6.1.1 BOSS safety system

BOSS: BOMAG OPERATOR SAFETY SYSTEM

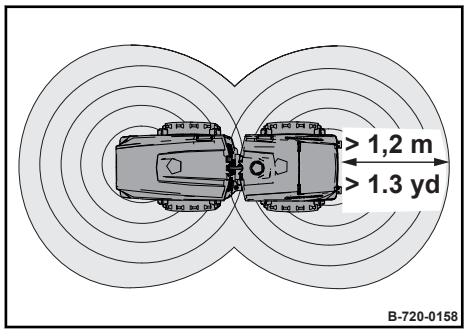


Fig. 66

The BOSS safety system protects the operator in close proximity to the machine. For this purpose, the machine is surrounded by two spherical electromagnetic safety fields.

The safety fields only protect the operator with the remote control associated with the machine (same system numbers). Other persons or unrelated remote controls or objects in the danger zone are not protected.

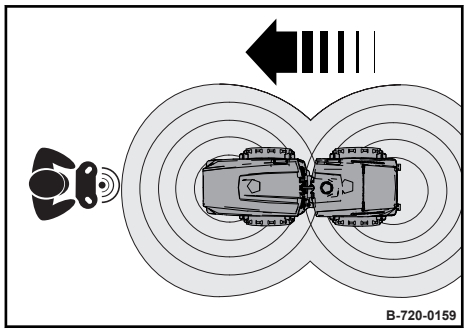


Fig. 67

If the machine moves directly towards the operator, the machine stops immediately when the front protective field is entered. To continue driving, the safety field must be left or the machine moved in the opposite direction of travel.

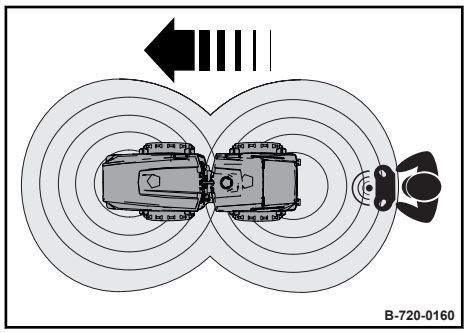


Fig. 68

If the machine moves away from the operator, the operator can enter the rear safety field a short distance before the machine is stopped. To continue driving the safety field must be left.

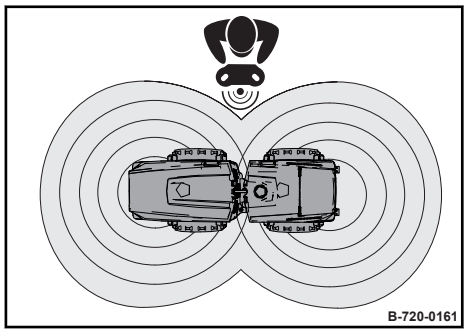


Fig. 69

If the operator is in the middle between the machine halves in both safety fields, both travel directions of the machine are blocked.

The operator must be familiar with the size of the safety fields and check the function of the safety device at each start-up ↬ *Chapter 6.2.3 ‘Checking the BOSS safety system’ on page 91*.

6.1.2 Notes on radio operation

6.1.2.1 Remote disconnection

If the machine is out of range of the remote control, the machine stops and the engine is switched off.

To continue travelling reduce the distance and restart the engine ↬ *Chapter 6.2.4 ‘Starting the engine’ on page 92*.

6.1.2.2 Radio interference

If the radio connection between the remote control and the machine is interrupted or disturbed, the machine stops and the engine is switched off.

To continue travelling move into the radio transmission range of the machine and restart the engine ↬ *Chapter 6.2.4 ‘Starting the engine’ on page 92*.

6.1.2.3 Decrease in battery voltage

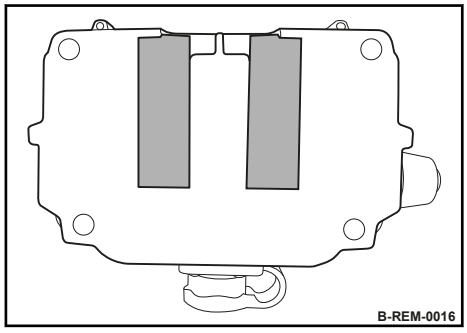


Fig. 70

The remote control has two separate slots for the batteries.

At least one charged battery must be inserted. The second battery can be charged in a charger.

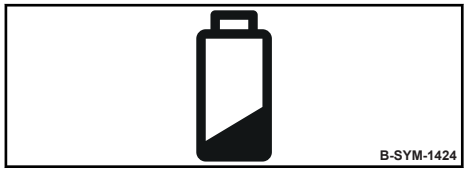


Fig. 71

The respective battery control light shows the charging status:

- Green: approx. 70% – 100%.
- Orange: approx. 40% – 70%.
- Red: approx. 0% – 40%.

If the battery voltage drops further, the warning buzzer also sounds.

If the remote control battery is empty, the machine stops and the engine is switched off.

1. Drive the machine to a safe place in good time and stop.

2. Remove the safety cap (1) and connect the cable (2) to the remote control.

⇨ The battery starts charging.

⇨ The control of the machine automatically switches to cable operation.

3. If the engine is off, restart the engine ↬ *Chapter 6.2.4 ‘Starting the engine’ on page 92*.

4. Continue to operate the machine in cable mode.

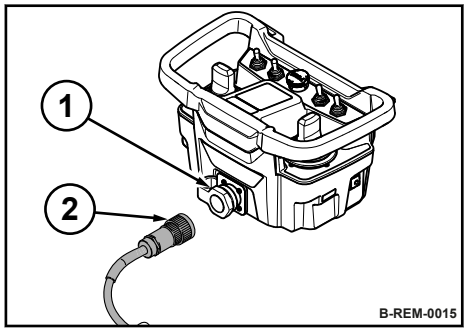


Fig. 72

6.2 Starting up the machine

6.2.1 Preparing the remote control for operation

Prerequisites:

Remote control matches the machine.

- If necessary, teach in the remote control and the safety field system ↳ *Chapter 9.2 'Teaching the remote control and the BOSS safety field system' on page 169*.

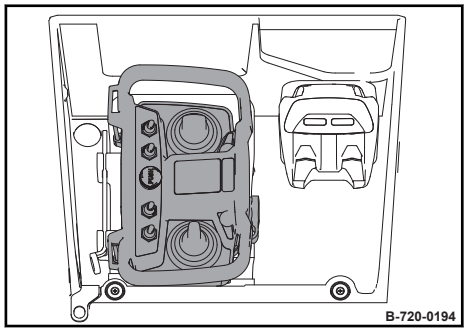


Fig. 73

1. Open the flap and take the remote control out of the holding fixture.

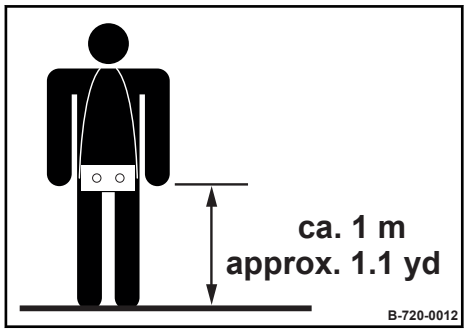


Fig. 74

2. Strap on the remote control and hold in front of your body.

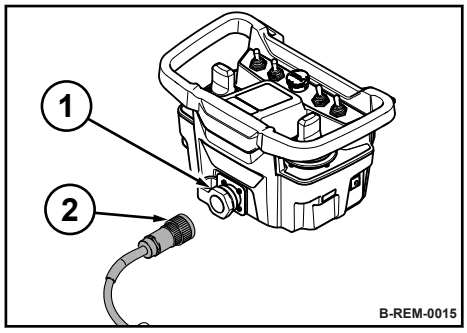


Fig. 75

3. During cable operation, remove the safety cap (1) and connect the cable (2) to the remote control.

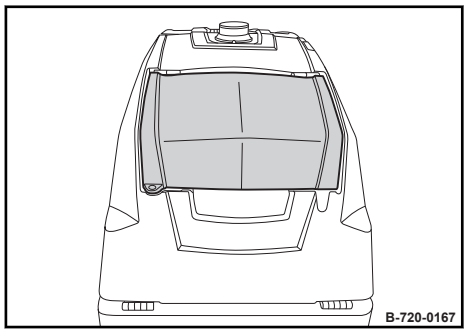


Fig. 76

4. Close the flap.

6.2.2 Checking the remote control

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves
- Hearing protection

Prerequisites:

Main battery switch is switched on.

Emergency stop switch unlocked.

Remote control matches the machine.

- If necessary, teach in the remote control and the safety field system *Chapter 9.2 'Teaching the remote control and the BOSS safety field system' on page 169*.

Preparations

1. Prepare the remote control *Chapter 6.2.1 'Preparing the remote control for operation' on page 86*.
2. Switch the toggle switch for engine speed to "MIN" position.

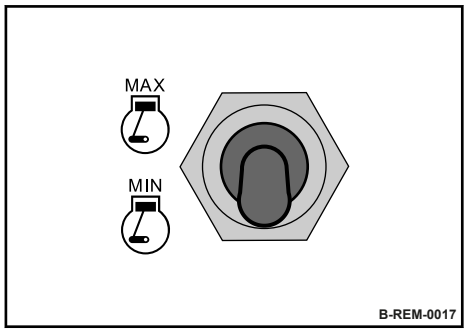


Fig. 77

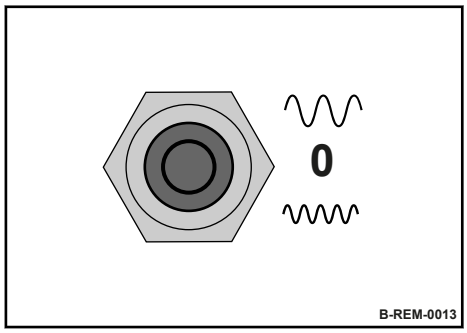


Fig. 78

3. Set the vibration toggle switch to "middle" position.

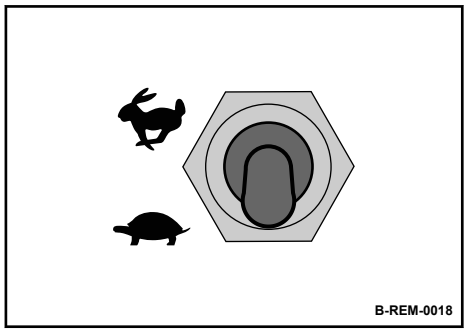


Fig. 79

4. Switch the toggle switch for travel speed ranges to the “Turtle” position.

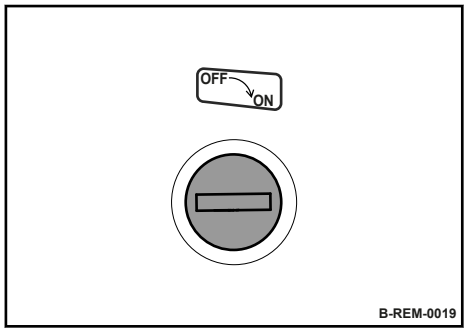


Fig. 80

5. Turn the ignition switch to position “ON”.

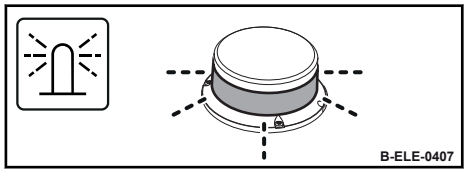


Fig. 81

⇨ The flashing beacon lights up.

Checking the remote control

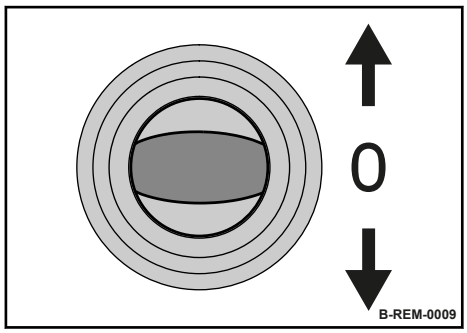


Fig. 82

6. Shift the travel lever forwards or backwards and hold in place.

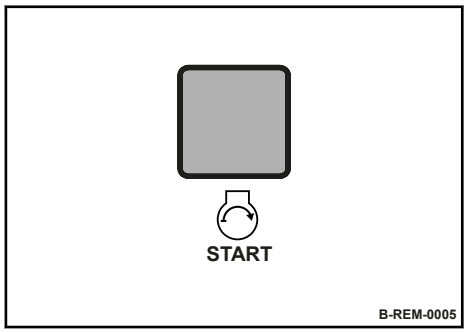


Fig. 83

7. Press the engine start push button.

⇨ The engine should not start.

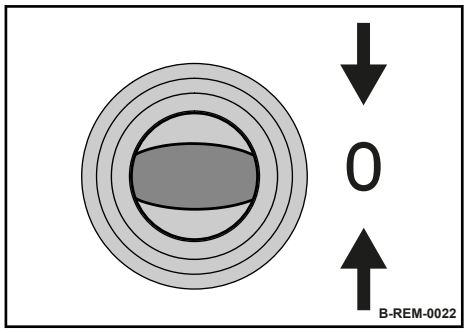


Fig. 84

8. Release the travel lever and check that it returns to the neutral position on its own.

The automatic return to neutral position can be impaired by dirt (e.g. mortar, concrete residues).

9. If necessary, clean the travel lever with a clean cloth or brush.

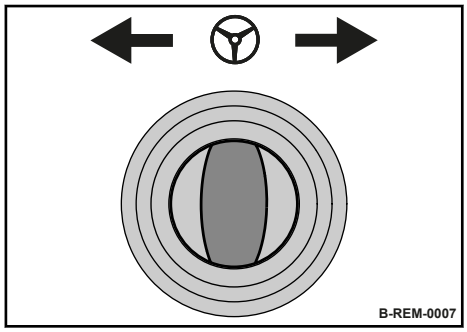


Fig. 85

10. Shift the steering lever to the left or right and hold in place.

11. Press the start button again.

⇨ The engine should not start.

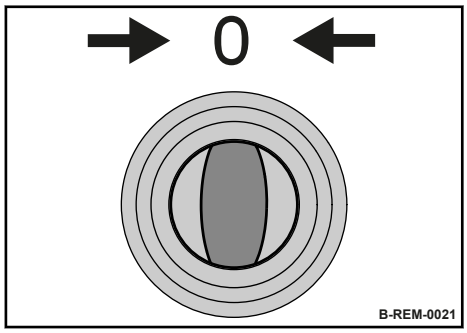


Fig. 86

12. Release the steering lever and check that it returns to the neutral position on its own.

    The automatic return to neutral position can be impaired by dirt (e.g. mortar, concrete residues).

13. If necessary, clean the steering lever with a clean cloth or brush.
14. Start the engine *Chapter 6.2.4 'Starting the engine' on page 92*.

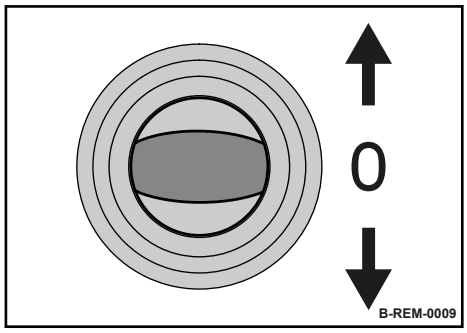


Fig. 87

15. Before starting to drive make sure that the driving area is absolutely safe.
16. Move the travel lever slowly forwards or backwards.
    ⇨ Make sure the machine travels in the chosen direction.
17. Release the travel lever.
    ⇨ Make sure the machine brakes until it comes to a standstill.

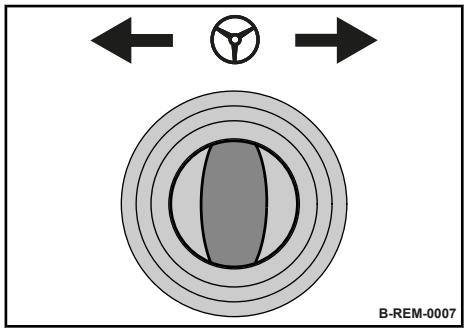


Fig. 88

18. Shift the steering lever to the left or right.
    ⇨ Make sure the machine steers in the chosen direction.
19. Release the steering lever.
    ⇨ Steering remains in the actuated position.

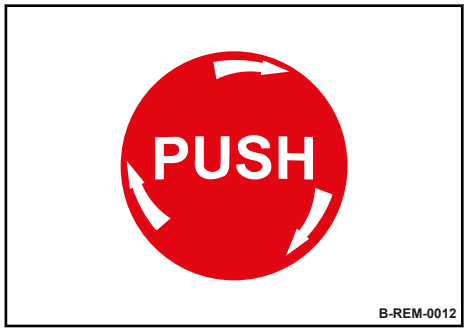


Fig. 89

20. Actuate the emergency stop switch.
    ⇨ Make sure the machine stops and the engine is shut down.
21. If necessary, switch off the engine manually *Chapter 10.2 'Switching off the engine manually' on page 176*.
22. If this does not work correctly, shut down the remote control and notify our Customer Service Department.
23. Only operate the machine again after it has been repaired.

6.2.3 Checking the BOSS safety system

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves
- Hearing protection

Prerequisites:

Remote control matches the machine.

- If necessary, teach in the remote control and the safety field system *Chapter 9.2 'Teaching the remote control and the BOSS safety field system' on page 169*.

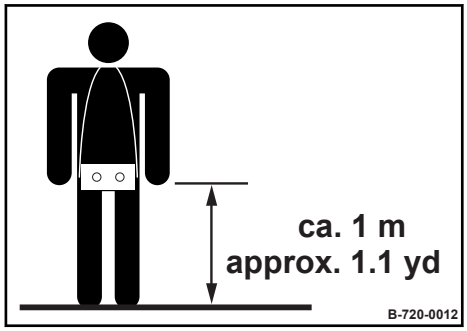


Fig. 90

1. Strap on the remote control and hold in front of your body.

   To check the safety device make sure the distance from the remote control to the floor is 1 m (1.1 yd).

2. Start the engine *Chapter 6.2.4 'Starting the engine' on page 92*.

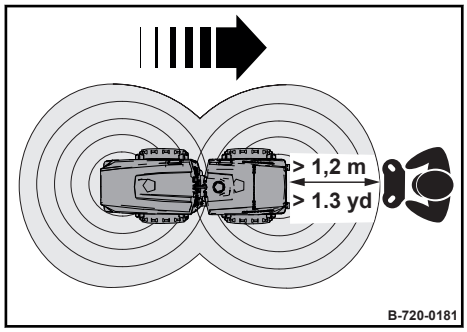


Fig. 91

3. Walk behind the machine with the remote control.
4. Let the machine travel towards you slowly until it stops.
5. Measure the distance between the machine and the remote control housing.

Nominal value	> 1.2 m (1.3 yd)

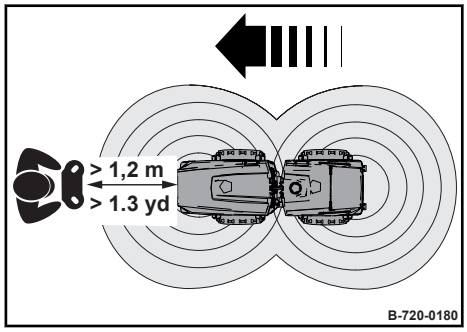


Fig. 92

6. Repeat the measurement of the safety field in front of the machine.
7. If the distance behind or in front of the machine is too small, check the safety device and have it repaired.

6.2.4 Starting the engine

WARNING!

Loss of hearing caused by too high noise burdens!

– Wear your personal protective equipment (ear protection).

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves
- Hearing protection

Prerequisites:
Main battery switch is switched on.
Emergency stop switch unlocked.
The travel lever and steering lever are in neutral position.

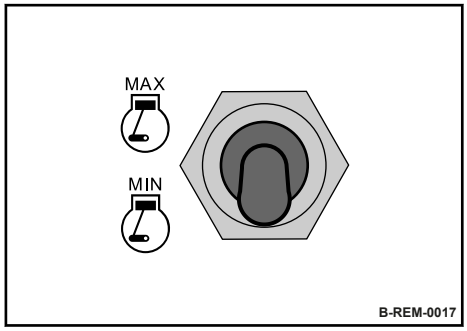


Fig. 93

1. Switch the toggle switch for engine speed to "MIN" position.

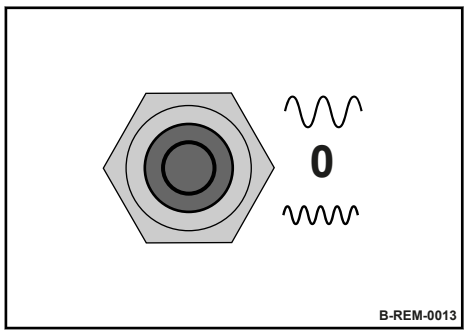


Fig. 94

2. Set the vibration toggle switch to "middle" position.

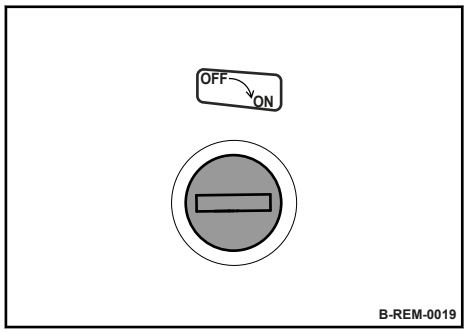


Fig. 95

3. Turn the ignition switch to position “ON”.

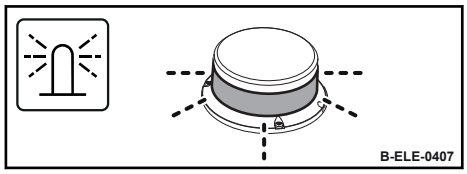


Fig. 96

⇨ The flashing beacon lights up.

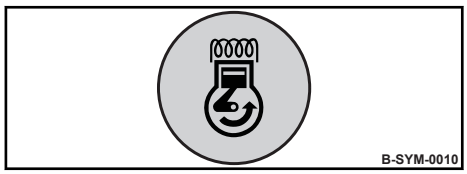


Fig. 97

The preheating control light on the display module lights up.

The machine type code is displayed on the display module screen for approx. 3 s.

A buzzer signal sounds on the remote control as soon as the remote control is ready for operation.

If the buzzer does not sound, there is a fault in the remote control or the rechargeable battery is empty (for radio remote control).

4. With cold outside temperatures, wait up to 10 seconds before starting (pre-warming).

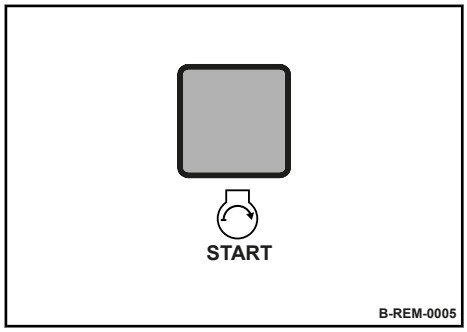


Fig. 98

5. Press the engine start push button.

⇨ The starter cranks the engine.

NOTICE!

Danger of engine damage!

– Warm up engine for a short while before starting work. Do not operate the engine immediately under full load.

6.3 Travel mode

6.3.1 Preliminary remarks and safety notes

Driving up and down slopes

DANGER!

Danger to life caused by the machine turning over!

– Never drive across a slope.
– Always drive straight up or down a slope.

Do not drive on gradients exceeding the maximum gradeability of the machine *Chapter 2 'Technical data' on page 15*.

Soil conditions and weather influences impair the gradeability of the machine.

Wet and loose soil considerably reduces traction of the machine on inclinations and slopes. Greater danger of accidents!

Switch off the engine when stopping on uphill and downhill gradients to prevent the machine from moving.

Driving without drum extensions

WARNING!

Danger of injury caused by the machine turning over!

– Without the drum extensions, drive only in the slow travel speed range (turtle).

With the drum extensions removed, the footprint of the machine is smaller.

This increases the risk of the machine tipping over at higher speeds.

For this reason, driving without drum extensions is only permitted in the slow travel speed range (turtle).

6.3.2 Driving the machine

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves
- Hearing protection

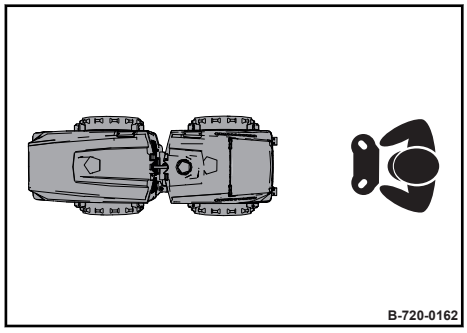


Fig. 99

1. Take up the operator position behind the machine.

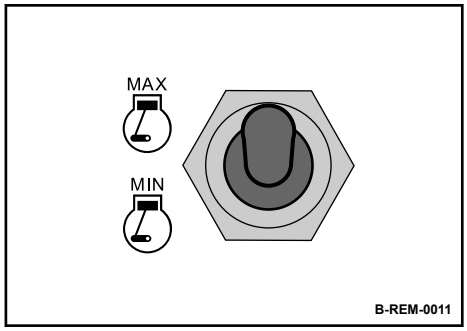


Fig. 100

2. Switch the toggle switch for engine speed to "MAX” position.

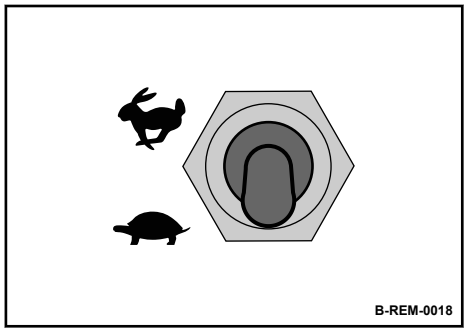


Fig. 101

3. Use the toggle switch for travel speed ranges to select the required travel speed range.

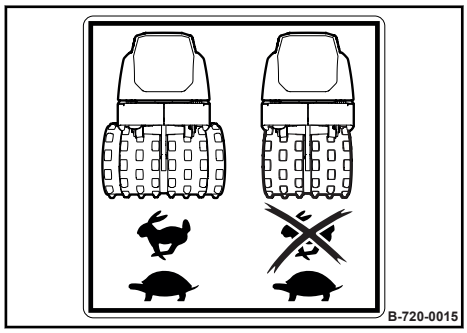


Fig. 102

4. With the drum extensions removed, switch the toggle switch for travel speed range to the "Turtle" position (travel speed range 1).
5. Before starting to drive make sure that the driving area is absolutely safe.

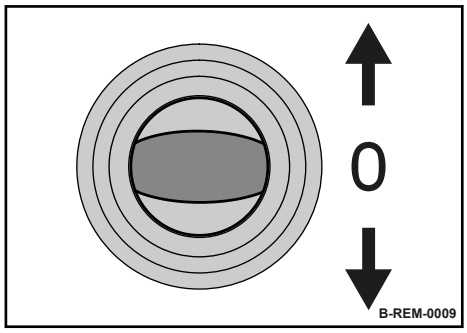


Fig. 103

6. Move the travel lever forwards or backwards.
   ⇨ The machine travels in the corresponding travel direction.

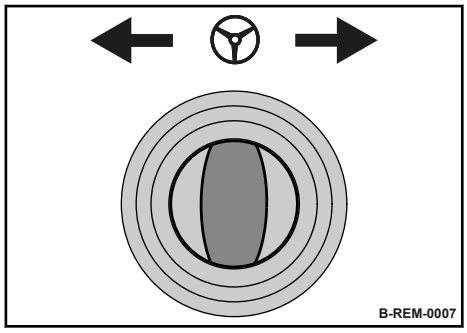


Fig. 104

7. Shift the steering lever to the left or right.
   ⇨ The machine steers in the corresponding direction.

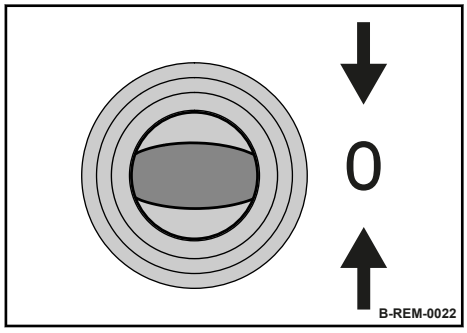


Fig. 105

8. Set the travel lever to “Middle” position to stop the machine.
   ⇨ The machine decelerates to a standstill.

6.4 Working with vibration

6.4.1 Preliminary remarks and safety notes

NOTICE!

Possible damage to neighbouring buildings!

– When compacting with vibration you must always check the effect of the vibration on nearby buildings and underground supply lines (gas, water, sewage, electric power).
– If necessary stop compacting with vibration.

NOTICE!

Machine parts may get damaged!

– Do not activate the vibration on hard (frozen, concrete) ground.

Vibration at standstill causes transverse marks:

- Switch the vibration on in manual mode only after shifting the travel lever in the desired travel direction.
- Switch the vibration off before stopping the machine.

In automatic operation mode, vibration is automatically activated when the machine starts moving. When it stops, the vibration switches off automatically.

This avoids the formation of transverse marks caused by vibration with the machine at standstill.

When switching on, switching off or changing the vibration mode, metallic noises occur.

6.4.2 Automatic operation

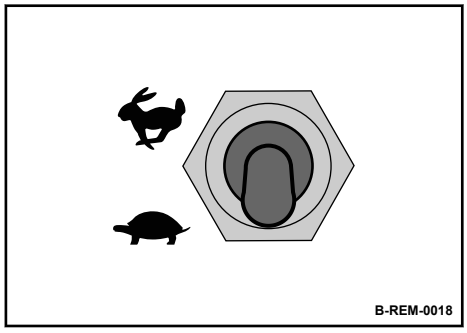


Fig. 106

1. Switch the toggle switch for travel speed ranges to the “Turtle” position.

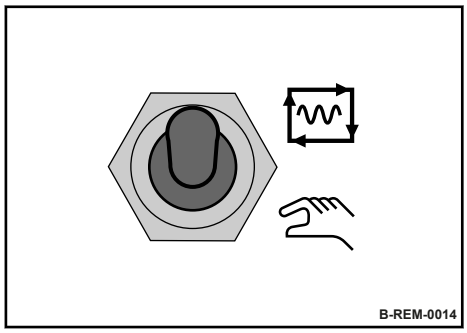


Fig. 107

2. Switch the toggle switch for vibration mode to the "Front" position.

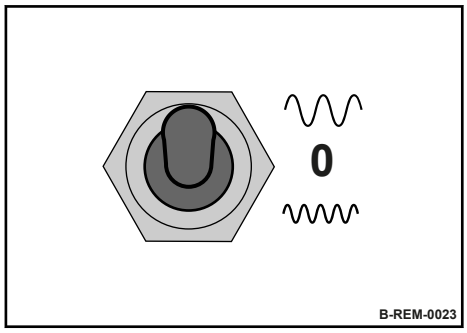


Fig. 108

3. Use the toggle switch for vibration to pre-select the required amplitude.

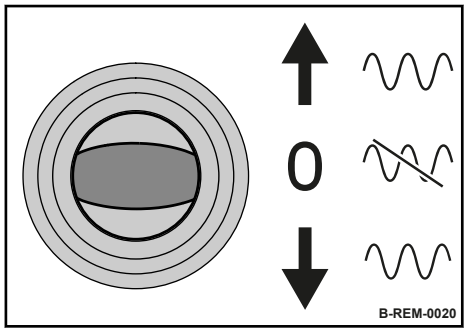


Fig. 109

4. Move the travel lever forwards or backwards.

⇨ The machine travels in the required travel direction and the vibration is switched on.

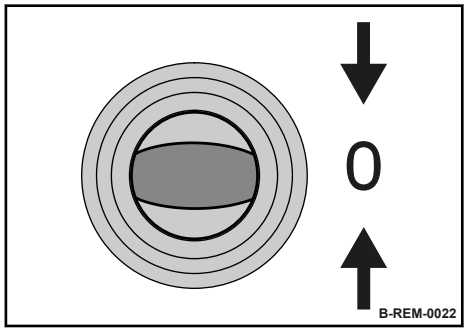


Fig. 110

5. To switch off vibration, move the travel lever to the “Middle” position.

⇨ The vibration is switched off and the machine brakes until it comes to a halt.

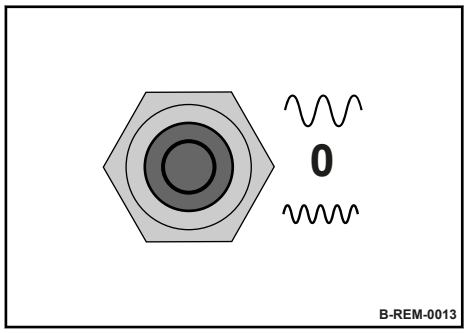


Fig. 111

6. After finishing work, switch the toggle switch for vibration to the “middle” position.

6.4.3 Manual operation

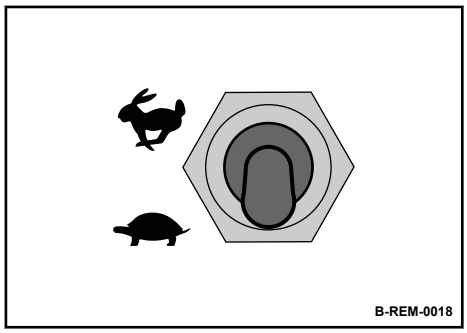


Fig. 112

1. Switch the toggle switch for travel speed ranges to the “Turtle” position.

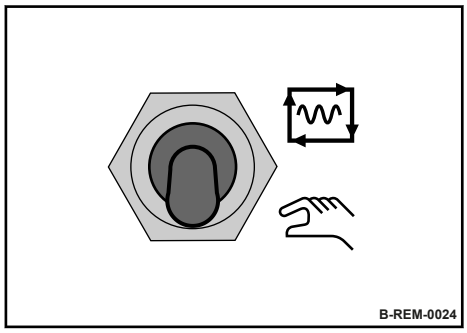


Fig. 113

2. Switch the toggle switch for vibration mode to the “Rear” position.

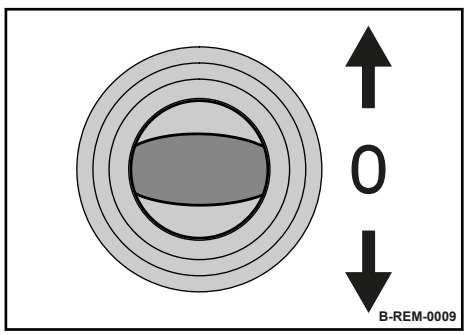


Fig. 114

3. Shift the travel lever slowly in the desired travel direction.

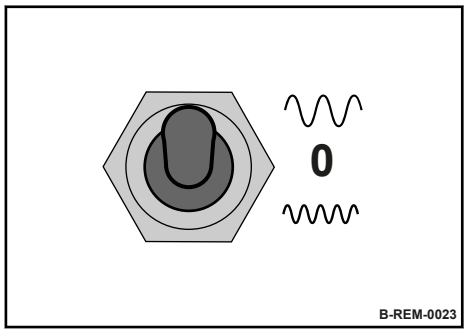


Fig. 115

4.

NOTICE!

Vibration at standstill causes transverse marks!

– Do not switch on vibration with the machine at standstill.

Use the toggle switch for vibration to switch on the vibration at the required amplitude.

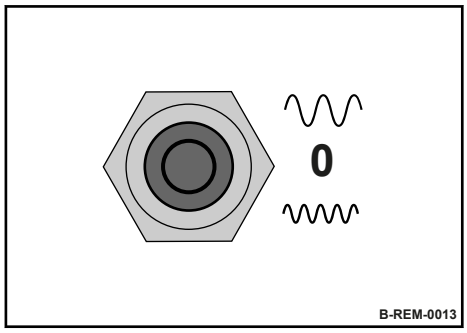


Fig. 116

5. To switch vibration off switch the toggle switch for vibration to the “middle" position.

6.5 ECONOMIZER

The ECONOMIZER informs the driver about the compaction status of the subsoil and enables the detection and selected re-compaction of weak spots.

An acceleration transducer measures the reaction of the subsoil on the vibrating drum.

Start process

The ECONOMIZER is automatically started by switching the ignition on.

The ECONOMIZER first of all runs an LED-test. The LEDs light up one after the other, starting with LED (1). Once all LEDs are on, the display goes out again in single steps.

Measuring operation

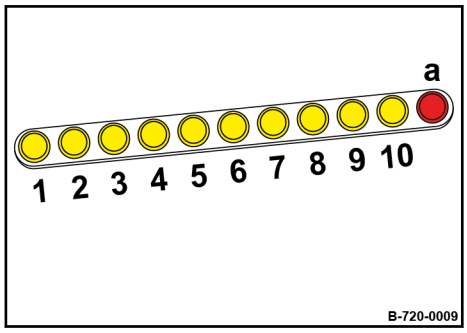


Fig. 117

With the vibration switched on, the measuring value is displayed by the LED-display (1-10).

If the displayed value does not increase any further with unchanged amplitude, no further compaction can be achieved with the chosen amplitude.

The maximum display value (10) is not always reached.

Due to fluctuations in the measuring value, the displayed value can vary up/down during a pass.

The average of the display reading during the last pass is decisive.

The status display (a):

- flashes if the drum is in jump operation.
- flashes or lights in case of malfunctions *Chapter 10.9 'Trouble shooting ECONOMIZER' on page 188*.

Comparability of measuring values

In order to achieve the desired compaction condition of the subsoil, one must always perform a suitable reference measurement before compaction is started.

The reference measurement is used to determine which display value of the ECONOMIZER corresponds with the measuring value for soil stiffness.

Display values measured with different amplitudes can only be compared with each other via a reference measurement.

6.6 Parking the machine in secured condition

1. Switch the vibration off.
2. Drive the machine onto horizontal, level, firm ground.
3. Set the travel lever to “Middle” position to stop the machine.

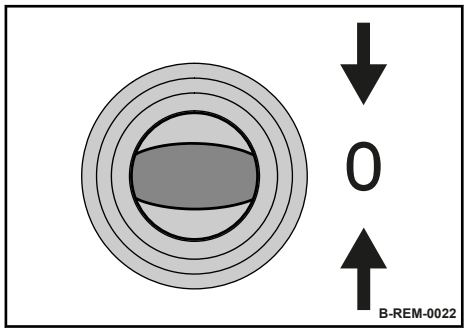


Fig. 118

NOTICE!

Danger of engine damage!

– Do not shut down the engine all of a sudden from full load speed, but let it idle for about two minutes.

4. Turn the ignition key to position “OFF” and pull it out.

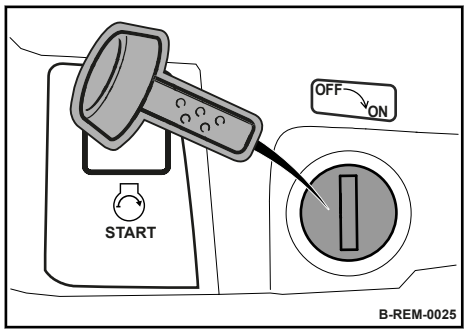


Fig. 119

⇨ The flashing beacon goes out.

5. Open the flap.

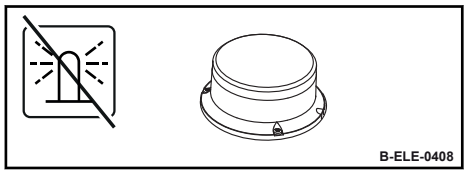


Fig. 120

6. Turn the main battery switch anticlockwise and pull it out.

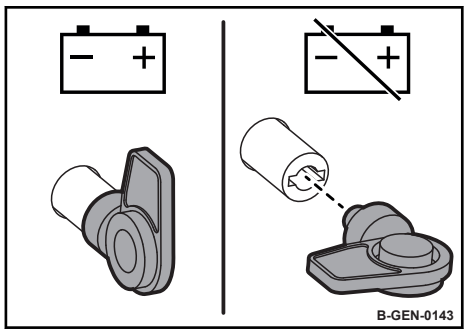


Fig. 121

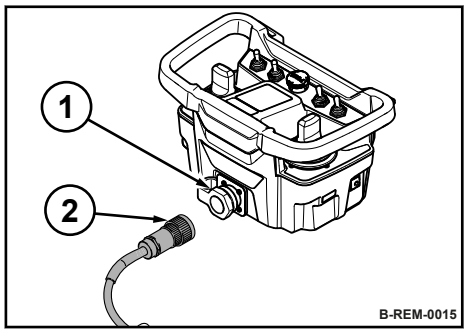


Fig. 122

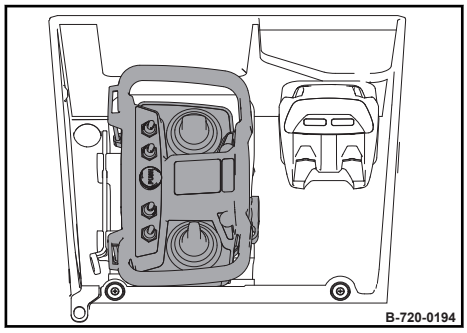


Fig. 123

1. During cable operation, remove the cable (2) and close the protective cap (1).

2.

NOTICE!

Remote control may be damaged by water ingress!

– Do not cleaning the remote control with water jets.

After work, clean the remote control with a clean cloth or brush.

3. Check the battery status, recharge the battery if necessary ↳ *Chapter 6.7 'Changing / charging the battery' on page 104*.

4. Place the remote control in the holding fixture and close the flap.

6.7 Changing / charging the battery

6.7.1 Preliminary remarks and safety notes

The remote control battery can be charged in different ways:

- Charge the battery in the machine via cable.
- Charge the battery in the built-in battery charger *(optional equipment)*.
- Charge the battery in the external battery charger *(optional equipment)*.

Use only BOMAG approved chargers to charge the battery.

If the battery is to be charged by cable, check that the plug and socket are undamaged before connecting.

Before charging the batteries in the charger, check the charger, cable and batteries for damage.

If damage is detected, do not charge the battery!

Do not bring the battery and chargers into contact with water.

Keep the battery clean and dry. Remove dirt or moisture with a dry, clean cloth.

Avoid fire, heat, flying sparks and direct sunlight.

Do not subject the battery to mechanical pressure.

Damage can lead to short circuit, overheating and exothermic chemical reactions.

6.7.2 Changing the battery

Two batteries can be inserted into the remote control.

One charged battery is sufficient for operation.

This allows the second battery to be charged with an external charger.

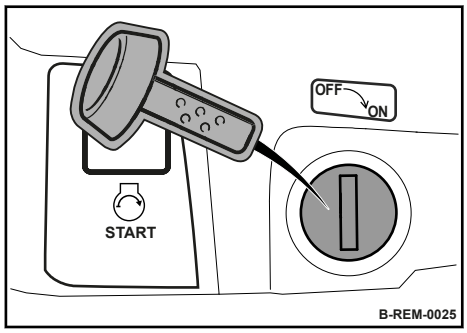


Fig. 124

1. Turn the ignition key to position “OFF” and pull it out.

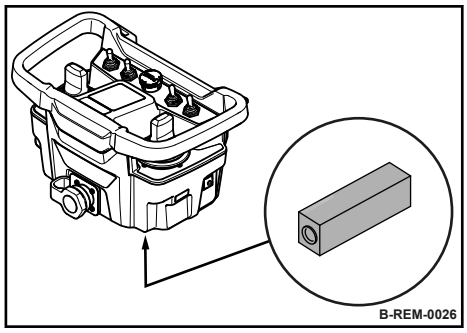


Fig. 125

2. Push the battery forward and pull it downwards.

3. Insert the charged battery and click it into place.

6.7.3 Charging the battery with a cable connection

Prerequisites:

Main battery is switched on.

During cable operation, the batteries inserted into the remote control are automatically charged.

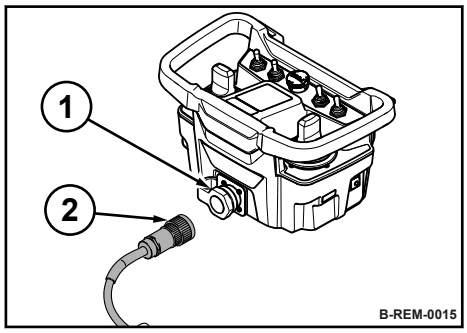


Fig. 126

1. Remove the safety cap (1) and connect the cable (2) to the remote control.

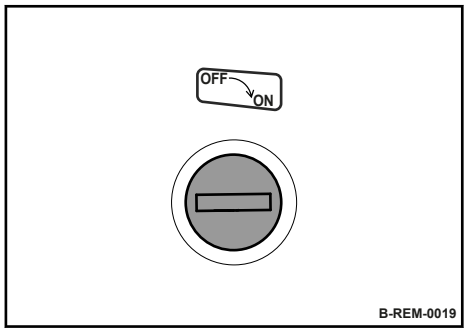


Fig. 127

2. Turn the ignition switch to position “ON”.

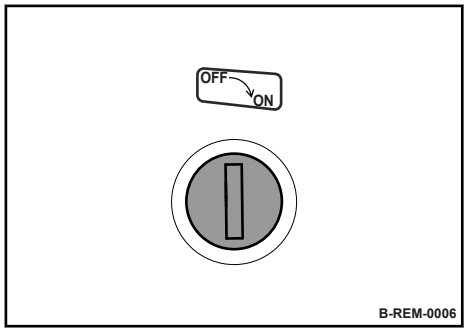


Fig. 128

3. Turn the ignition switch to position “OFF”.

⇨ The corresponding charger control light flashes green as long as the battery is charging.

6.7.4 Charging the battery in the machine

Prerequisites:
Main battery is switched on.
Charging temperature range 0 – 45 °C (32 – 113 °F)

Batteries inserted in the machine's charger are charged via the machine’s battery.

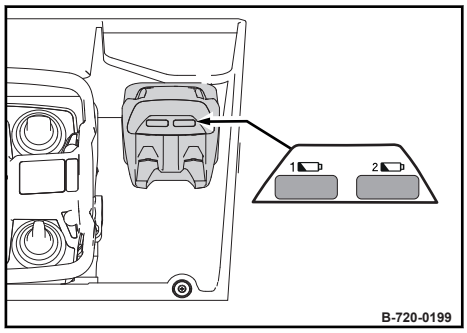


Fig. 129

1. Insert the battery into the charger.
   - ⇨ The LED flashes green: Battery is charging.
   - ⇨ The LED lights up green: Battery is fully charged.

6.7.5 Charging the battery with an external battery charger

Prerequisites:
Charging temperature range 0 – 45 °C (32 – 113 °F)

1. Observe the operating instructions for the charger.
2. Connect the charger to the power supply.
3. Insert the battery into the charger.
   - ⇨ The LED flashes green: Battery is charging.
   - ⇨ The LED lights up green: Battery is fully charged.

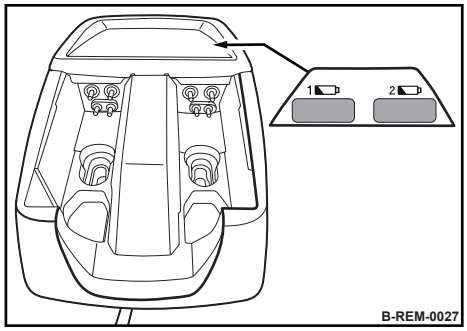


Fig. 130

6.8 Emergency procedures

6.8.1 Actuating the emergency stop switch

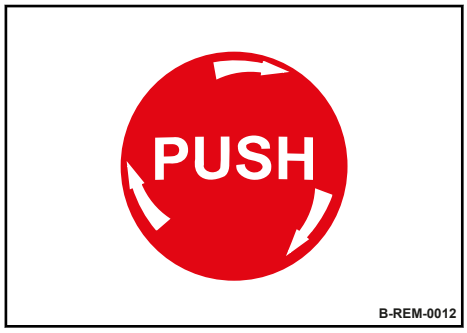


Fig. 131

1. In events of emergency and in case of danger actuate the emergency stop switch immediately.

   ⇨ The engine is shut down and the parking brake is closed.

6.8.2 Disconnecting the battery

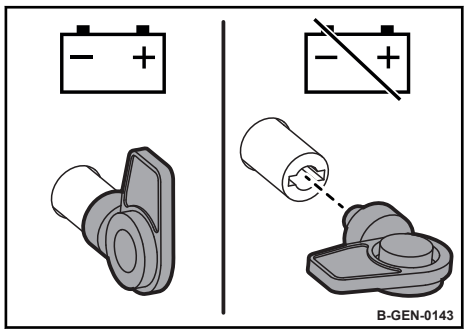


Fig. 132

1. In events of emergency, e.g. in case of a cable fire, disconnect the battery from the vehicle's electric system. For this purpose turn the main battery switch anticlockwise and pull it out or pull the battery terminal off the battery.

6.8.3 Recovering the machine

The machine cannot be towed.

If the machine cannot be driven, it must be salvaged ↬ *Chapter 7.5 'Loading by crane' on page 117*.

7 Loading / transporting the machine

7.1 Loading information

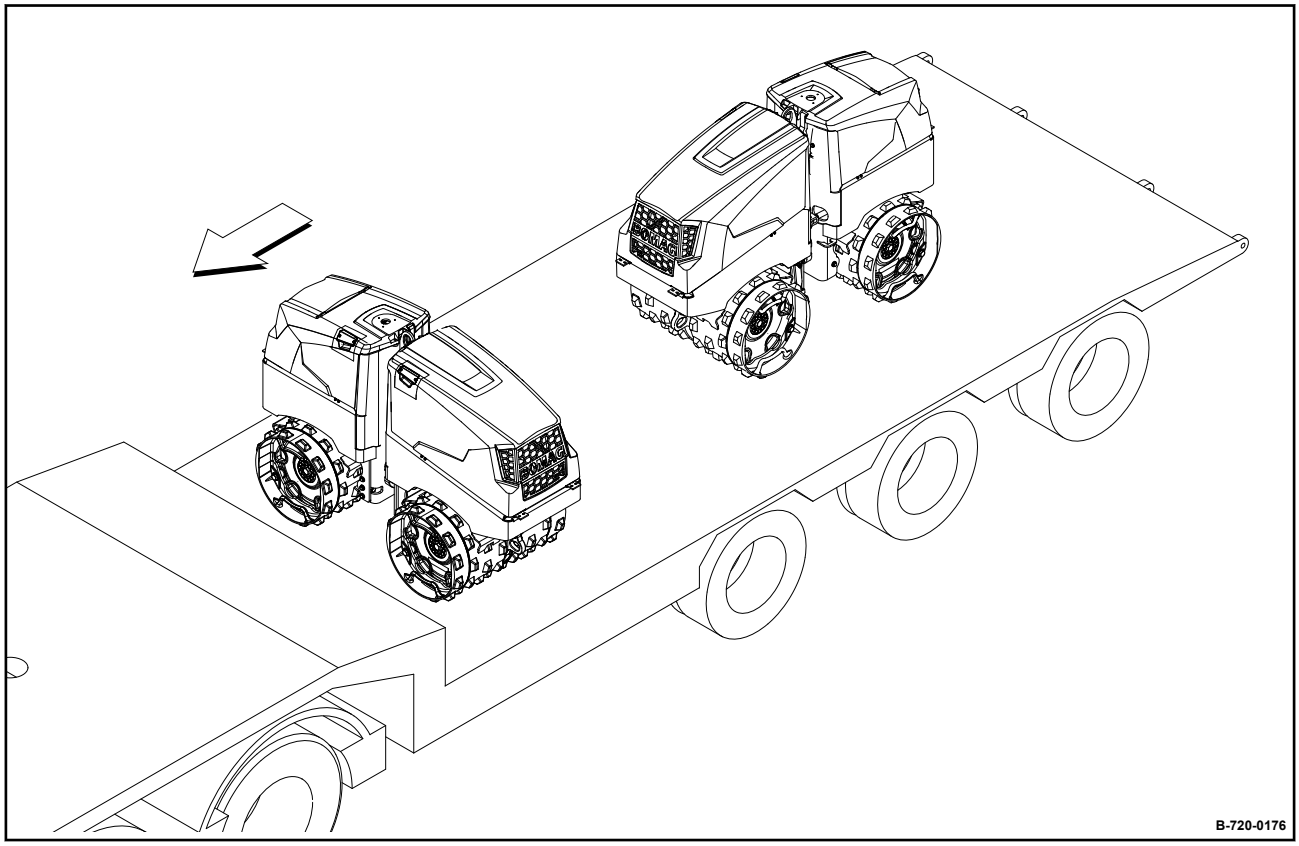


Fig. 133: Transport position

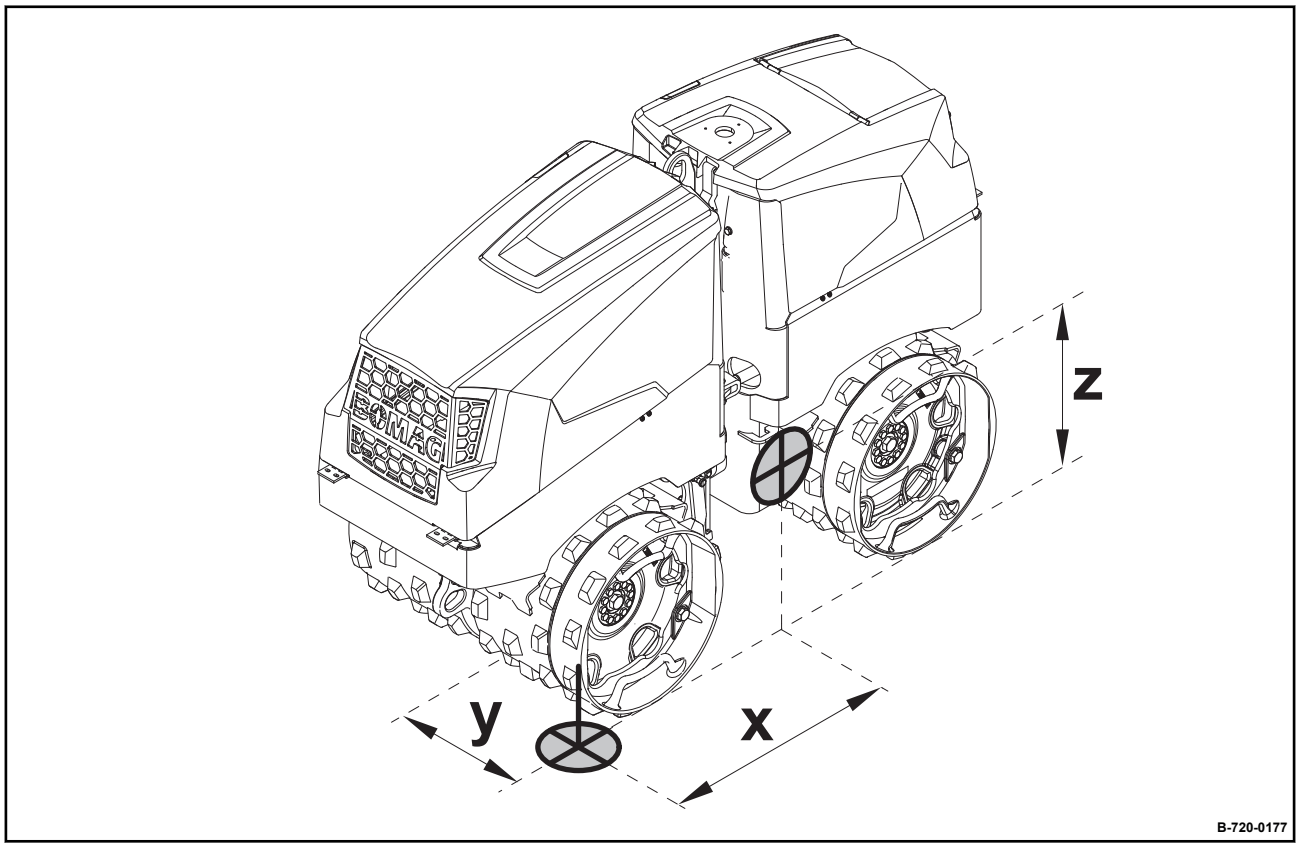


Fig. 134: Information about the centre of gravity

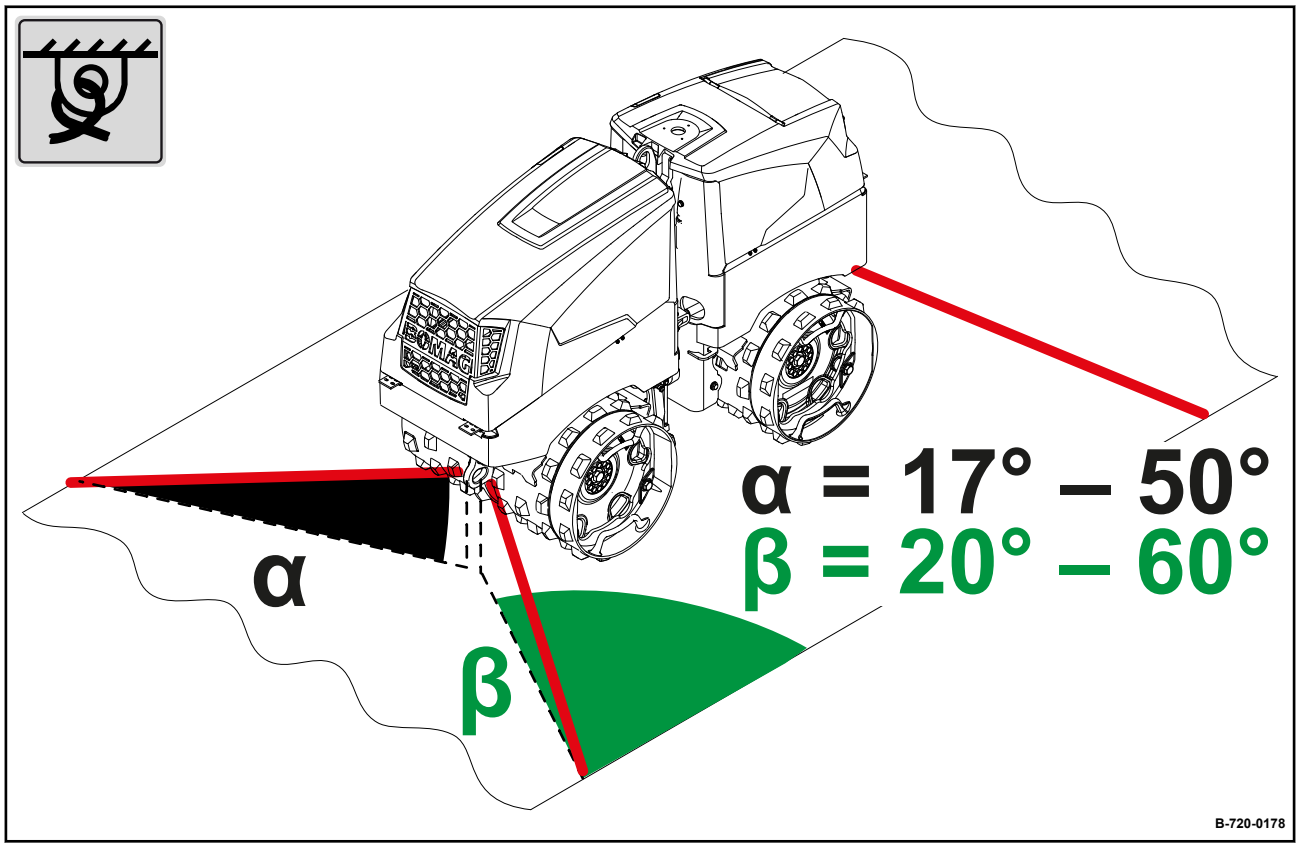


Fig. 135: Lashing situation I

Lashing force (metal / wood; μ = 0.2)	2000 daN
Lashing force (metal / non-slip material; μ = 0.6)	500 daN

Machine parameters	
Machine mass	1.595 t
Reference point for determining the centre of gravity	Front edge of drum, front left
Centre-of-gravity position (x / y / z)	791 mm / 425 mm / 465 mm

Interface parameters (lashing variant I)	
Type of contact	Metal / wood
Coefficient of sliding friction μ	0.2
Vertical lashing angle α	17 – 50 °
Longitudinal horizontal angle β	20 – 60 °

Lashing point specifications on the load (lashing variant I)	
Lashing force	≥ 2000 daN
Number of the lashing points	4

Lashing point specifications on the transport vehicle	
Lashing force	≥ 2000 daN
Number of the lashing points	4

Load securing equipment (lashing variant I)				
Chock blocking	No	Quantity:	0	Other information:
Further blocking types				
Lashing force (lashing gear)	≥ 2000 daN	Quantity:	4	Other information:
Recommended lashing gear	Lashing strap / diagonal lashing			
Connection parts to the lashing point	None			

7.2 Preparation for transport

1. Remove all loose objects from the machine or fasten them properly.
2. Close and lock all protective hoods and flaps.

7.3 Loading the machine

Use only stable loading ramps of sufficient load bearing capacity.

Loading ramps and transport vehicle must be free of grease, oil, snow and ice.

The ramp inclination must be less than the gradeability of the machine.

Before driving onto or off a transport vehicle, the operator must ensure that nobody is in the danger zone.

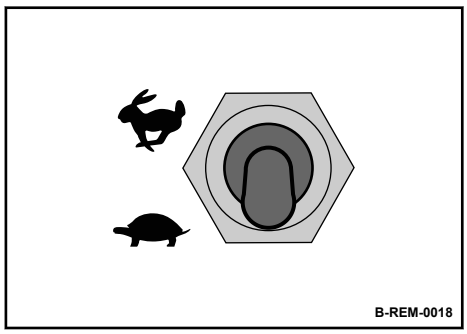


Fig. 136

1. Starting the engine ↳ *Chapter 6.2.4 ‘Starting the engine’ on page 92*
2. Switch the toggle switch for travel speed ranges to the “Turtle” position.
3. **DANGER!**
   Danger to life caused by the machine slipping or turning over!
   – Make sure that no persons are in the danger zone.

   Drive the machine carefully onto the transport vehicle.
4. Observe the centre of gravity.
5. Switch off the engine and remove the ignition key.
6. Engage the articulation lock ↳ *Chapter 8.2.2.1 ‘Engaging the articulation lock’ on page 121*.

7.4 Lashing the machine to the transport vehicle

Do not use lashing points that are damaged or impaired in any way.

Always use appropriate lashing tackle at the lashing points.

Use lashing tackle only in the specified loading direction.

Lashing tackle must not be damaged by machine parts.

1. Fasten the lashing tackle at the marked lashing points.
2. Lash the machine securely to the transport vehicle.
3. Secure the lashing tackle.

7.5 Loading by crane

Loads must only be attached and hoisted by an expert / capable person.

Do not use damaged or in any other way impaired lashing points.

Use only lifting gear and lifting tackle with sufficient load bearing capacity for the weight to be loaded. Minimum load bearing capacity of lifting gear: see max. operating weight *Chapter 2 'Technical data' on page 15*.

Always use appropriate lifting and lashing means on the lifting and lashing points.

Use lifting and lashing gear only in the prescribed direction of load application.

Lifting tackle must not be damaged by machine components.

When lifting the machine avoid uncontrolled movements of the load. If necessary hold the load with guide ropes.

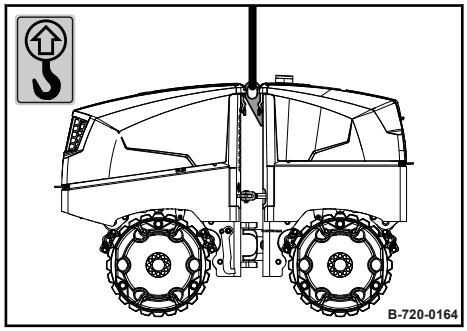


Fig. 137

1. Switch off the engine and remove the ignition key.
2. Engage the articulation lock *Chapter 8.2.2.1 'Engaging the articulation lock' on page 121*.
3. Attach the lifting tackle to the central lifting point.
4. **DANGER!**

   Danger to life caused by suspended loads!

   – Do not step or stand under suspended loads.

   Lift the machine carefully and set down again at the intended location.

7.6 After transportation

Use only stable loading ramps of sufficient load bearing capacity.

Loading ramps and transport vehicle must be free of grease, oil, snow and ice.

The ramp inclination must be less than the gradeability of the machine.

Before driving onto or off a transport vehicle, the operator must ensure that nobody is in the danger zone.

1. Loosen the articulation lock ↳ *Chapter 8.2.2.2 ‘Disengaging the articulation lock’ on page 122*.
2. Starting the engine ↳ *Chapter 6.2.4 ‘Starting the engine’ on page 92*
3. Switch the toggle switch for travel speed ranges to the “Turtle” position.
4. **DANGER!**

   Danger to life caused by the machine slipping or turning over!

   – Make sure that no persons are in the danger zone.

   Drive the machine carefully off the transport vehicle.

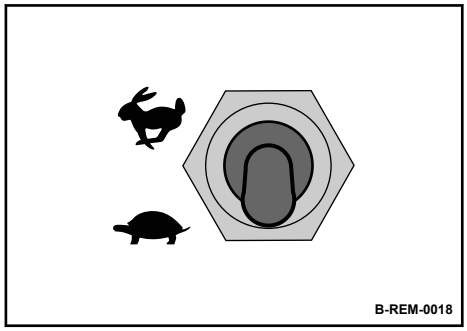


Fig. 138

8 Maintenance

8.1 Preliminary remarks and safety notes

DANGER!

Danger to life caused by an operationally unsafe machine!

– The machine must only be serviced by qualified and authorized personnel.
– Follow the safety regulations for maintenance work *Chapter 3.11 'Maintenance work' on page 44*.

WARNING!

Health hazard caused by fuels and lubricants!

– Safety regulations and environmental protection regulations must be followed when handling fuels and lubricants *Chapter 3.4 'Handling fuels and lubricants' on page 30*.

Wear your personal protective equipment.

Do not touch hot components.

Park the machine on horizontal, level, firm ground.

Perform maintenance work only with the engine shut down.

Make sure that the engine cannot be accidentally started during maintenance work.

Thoroughly clean the machine and engine before starting maintenance work.

Depressurize hydraulic lines before working on them.

Always attach the articulation lock when working in the area of the articulated joint.

Do not leave any tools or other objects that could cause damage in or on the machine.

After maintenance work has been completed, dispose of fuels and lubricants, filters, sealing elements and cleaning cloths in line with environmental regulations.

After maintenance work is completed reinstall all protective devices.

Close all maintenance flaps and doors after maintenance work has been completed.

The terms right/left are always in relation to the travel direction.

8.2 Preparations/concluding work

Certain maintenance tasks require preparations and concluding activities.

This includes e.g. opening and closing maintenance flaps and maintenance doors as well as securing certain components.

After this work close all maintenance flaps and doors again and return all components to their operating condition.

8.2.1 Opening the protection hoods

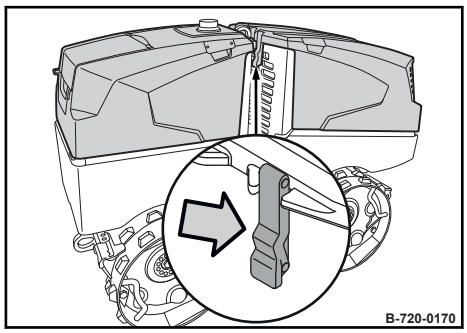


Fig. 139

1. Open the locks and fold the protective hoods forwards or backwards.

The protective hoods are secured against unintentional tipping over by a safety strap and cannot be completely folded open.

8.2.2 Engaging/releasing the articulation lock

8.2.2.1 Engaging the articulation lock

WARNING!

Danger of crushing by the articulating machine!

– Do not step into the articulation area of the machine while the engine is running.

1. Move the steering to middle position and stop the machine.
2. Switch off the engine and remove the ignition key.
3. Remove the locking bolt and swivel the articulation lock into the eyelet.
4. Let the locking bolt click into place.

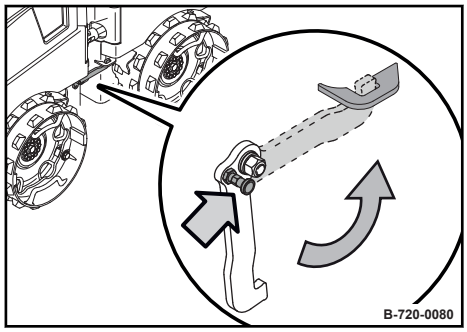


Fig. 140

8.2.2.2 Disengaging the articulation lock

WARNING!

Danger of crushing by the articulating machine!

– Do not step into the articulation area of the machine while the engine is running.

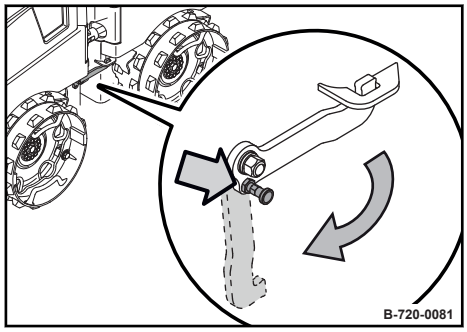


Fig. 141

1. Remove the locking bolt and the articulation lock from the eyelet and swivel back into place in the holding fixture.
2. Let the locking bolt click into place.

8.3 Fuels and lubricants

8.3.1 Engine oil

8.3.1.1 Oil quality

The following engine oil specifications are permitted:

- Engine oils according to API classification CF, CF-4, CG-4, CH-4 and CI-4

For operation of an engine with high sulphur fuels we recommend using an engine oil of API classification CF or higher with a total base number of at least 10.

Avoid mixing engine oils.

In North America, use only low-ash engine oils.

8.3.1.2 Oil viscosity

Since engine oil changes its viscosity with the temperature, the ambient temperature at the operating location of the engine is of utmost importance when choosing the viscosity class (SAE-class).

The temperature data of the SAE-class always refer to fresh oils. The engine oil ages during travel operation because of soot and fuel residues. This adversely affects the properties of the engine oil, especially at low ambient temperatures.

Optimal operating conditions can be achieved by using the following oil viscosity chart as a reference:

Ambient temperature	Oil viscosity
higher than 25 °C (77 °F)	SAE 10W-30 SAE 10W-40 SAE 15W-40
-10 °C to 25 °C (14 °F to 77 °F)	SAE 10W-30 SAE 10W-40 SAE 15W-40
below - 10 °C (14 °F)	SAE 10W-30 SAE 10W-40

8.3.1.3 Oil change intervals

If the oil change intervals are not reached over a period of one year, the oil change should be performed at least 1 x per year, irrespective of the operating hours reached.

If the sulphur content in the fuel is higher than 0.5 %, the oil change intervals must be halved.

8.3.2 Fuel

8.3.2.1 Fuel quality

We recommend using diesel fuel with a sulphur content of less than 0.1 %.

If diesel fuel with a high sulphur content of 0.5 % to 1.0 % is used, the oil change intervals must be halved.

Fuels with a sulphur content of more than 1.0 % are not permitted.

In order to fulfil national emission regulations, the legally required fuels must be used (e.g. sulphur content).

The use of ultra-low sulphur diesel fuel is mandatory for engines that are operated within the EPA's scope (ASTM D975 Grade-No. 1-D S15 and 2-D S15).

(EPA: United States Environmental Protection Agency)

The recommended cetane rating is 45. A cetane rating above 50 is preferable, especially at outside temperatures below -20 °C (-4 °F) and when operating at altitudes above 1500 m (4921 ft).

The following fuel specifications are recommended:

- EN 590
- ASTM D975 Grade-No. 1-D and 2-D
- EN 15940 (not applicable for North America)

8.3.2.2 Winter fuel

For winter operation use only winter diesel fuel, to avoid clogging because of paraffin separation.

At very low temperatures disturbing paraffin separation can also be expected when using winter diesel fuel.

Diesel fuels suitable for temperatures down to -44 °C (-47 °F) are available for Arctic climates.

NOTICE!

Danger of engine damage!

– The admixture of petroleum and the addition of “flow enhancing additives” (fuel additives) is not permitted.

8.3.2.3 Storage

Even traces of zinc, lead and copper can cause deposits in the injection nozzles, especially in modern Common-Rail injection systems.

Zinc and lead coatings in refuelling systems and fuel lines are not permitted.

Copper containing materials (copper lines, brass items) should be avoided, because they can cause catalytic reactions in the fuel with subsequent depositing in the injection system.

8.3.3 Coolant

Always use a mixture of anti-freeze agent and clean, dehardened water with a mixing ratio of 1:1.

Under particularly extreme temperature conditions you should consult our customer service concerning the anti-freeze agent to be used.

There are various types of anti-freeze agents available. For this engine you should use ethylene glycol.

Before filling in the coolant mixed with anti-freeze agent the radiator must be flushed with clean water. This procedure should be repeated two to three times to clean the inside of radiator and engine block.

NOTICE!

Danger of engine damage!

– Do not mix different coolants and additives of any other kind.

Mixing the coolant:

- Prepare a mixture of 50% anti-freeze agent and 50% low mineral, clean water.
- Stir well before filling it into the radiator.
- The method of mixing water and anti-freeze depends on the brand of the anti-freeze agent (see standard SAE J1034 and also standard SAE J814c).

Add anti-freeze agent:

- If the coolant level drops because of evaporation,only clean water is to be used for topping up.
- In case of leakages you must always fill in anti-freeze agents of the same brand and the same mixing ratio.

Do not use any radiator cleaning agent after the anti-freeze agent has been mixed in. The anti-freeze agent also contains a corrosion protection agent. If this mixes with cleaning agent it may cause the development of sludge, which could damage the cooling system.

Anti-freeze concentration	Freezing point
50 %	-37 °C (-35 °F)

8.3.4 Oil for exciter shaft housing

Use only engine oils according to the following specifications:

- API CG-4 / SJ or higher quality

Avoid mixing engine oils.

NOTICE!

Components may get damaged!

– Do not use low-ash engine oils for the exciter shaft housing.

8.3.5 Hydraulic oil

8.3.5.1 Mineral oil based hydraulic oil

The hydraulic system is operated with hydraulic oil HV 46 (ISO) with a kinematic viscosity of 46 mm^2/s at 40 °C (104 °F) and 8 mm^2/s at 100 °C (212 °F).

When refilling or changing oil, use only hydraulic oil type HVLP according to DIN 51524, part 3, or hydraulic oil type HV according to ISO 6743/4.

The viscosity index must be at least 150 (observe information of manufacturer).

8.3.5.2 Bio-degradable hydraulic oil

The hydraulic system can also be operated with a synthetic ester based biodegradable hydraulic oil.

This biologically degradable hydraulic oil
Shell PANOLIN S4 HLP Synth 46 or Plantohyd 46 S meets all requirements of a mineral oil-based hydraulic oil complying with DIN 51524.

In hydraulic systems filled with biodegradable hydraulic oil, always use the same oil to top up and do not mix oil types.

When changing from mineral oil based hydraulic oil to an ester-based, biodegradable hydraulic oil, you should consult the lubrication oil service of the oil manufacturer, or our Customer Service for details.

NOTICE!

Danger of damage to the hydraulic system!

– After the changeover check the hydraulic oil filters increasingly for contamination.
– Have regular oil analyses performed regarding the water content and mineral oil.
– Replace the hydraulic oil filter at the latest after 500 operating hours.

8.4 List of fuels and lubricants

Assembly group	Fuel or lubricant		Spare parts number	Filling quantity
	Summer	Winter		Observe the level mark!
Engine oil	SAE 10W-40 Specification: *Chapter 8.3.1 'Engine oil' on page 123* In North America, use only low-ash engine oils!		009 920 06 20 l	4.7 l (1.2 gal us)
	SAE 10W-30			
	SAE 15W-40		009 920 11 20 l	
	SAE 30			
Fuel	Diesel	Winter diesel fuel		24 l (6 gal us)
	Specification: *Chapter 8.3.2 'Fuel' on page 124*			
Coolant	Mixture of water and anti-freeze agent Specification: *Chapter 8.3.3 'Coolant' on page 125*		009 940 03 20 l	4.0 l (1.1 gal us)
Hydraulic system	Hydraulic oil (ISO), HVLP 46 Specification: *Chapter 8.3.5.1 'Mineral oil based hydraulic oil' on page 126*		009 930 09 20 l	17 l (4.5 gal us)
	or ester based biodegradable hydraulic oil Specification: *Chapter 8.3.5.2 'Bio-degradable hydraulic oil' on page 126*			
Exciter shaft housing	Engine oil SAE 15W-40 Specification: *Chapter 8.3.4 'Oil for exciter shaft housing' on page 126*		009 920 11 20 l	2 x 1.7 l (0.5 gal us)

8.5 Running-in instructions

8.5.1 General information

When commissioning new machines, the running-in instructions listed in this chapter must be carried out after the specified operating hours.

The maintenance work listed must be carried out in addition to the regular maintenance intervals.

NOTICE!

Danger of engine damage!

– Up to approx. 250 operating hours check the engine oil level twice every day.

Depending on the load the engine is subjected to, the oil consumption will drop to the normal level after approx. 100 to 250 operating hours.

8.5.2 After the first 50 operating hours

1. Change the engine oil and oil filter cartridge *Chapter 8.8.1 'Change engine oil and oil filter cartridge' on page 135*.
2. Check the engine for leaks.
3. Tighten all bolted connections on air intake, exhaust, oil sump and engine mounts.
4. Retighten the bolted connections on the machine.
5. Check the central screw of the drive hubs; retighten if necessary *Chapter 8.13.5 'Checking the central screw of the drive hub' on page 159*.

8.5.3 After the first 250 operating hours

1. Change the engine oil and oil filter cartridge *Chapter 8.8.1 'Change engine oil and oil filter cartridge' on page 135*.
2. Check the central screw of the drive hubs; retighten if necessary *Chapter 8.13.5 'Checking the central screw of the drive hub' on page 159*.

8.6 Maintenance Table

Maintenance – Maintenance Table

8.7 Weekly

8.7.1 Air filter maintenance

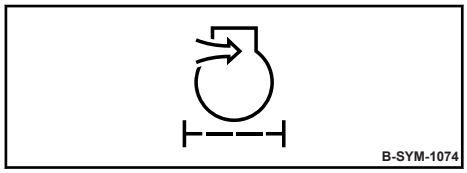


Fig. 142

NOTICE!

Danger of engine damage!

- Do not start the engine after having removed the air filter.
- If necessary, the air filter may be cleaned up to six times.
- Cleaning does not make sense if the air filter element is covered with a sooty deposit.
- Do not use gasoline or hot fluids to clean the filter element.
- After cleaning, the air filter must be inspected for damage using a torch.
- Do not continue to use a damaged air filter element. If in doubt use a new air filter.

Protective equipment:

- Working clothes
- Safety shoes
- Protective gloves
- Fine dust mask
- Safety goggles

1. Park the machine safely *Chapter 6.6 'Parking the machine in secured condition' on page 102*.

2. Allow the engine to cool down.

Checking the maintenance indicator

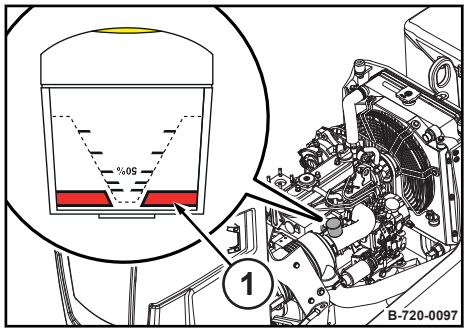


Fig. 143

3. Check the air filter maintenance indicator.

If the yellow pin has reached the red area (1) service the air filter.

Air filter maintenance

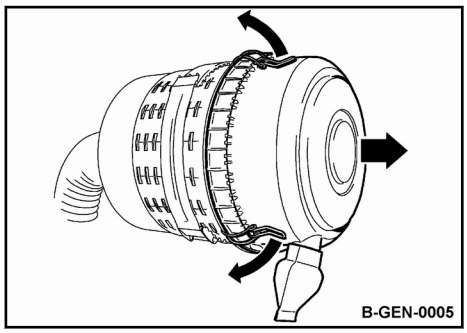


Fig. 144

4. Release the snap bow and take off the cover.
5. Clean the cover and dust discharge valve.

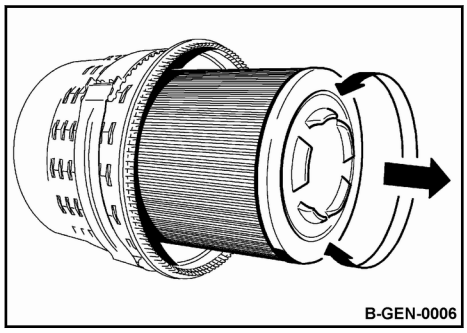


Fig. 145

6. Pull out the air filter with light turning movements.
7. Thoroughly clean the filter housing and sealing faces.
8. Clean the inside of the drain pipe in the filter housing thoroughly.

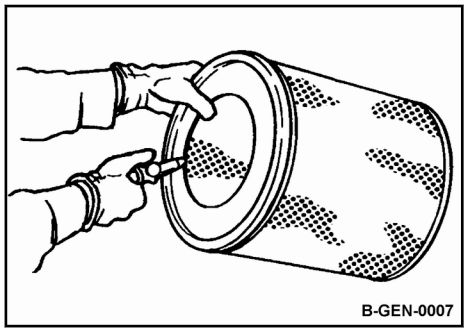


Fig. 146

9.

CAUTION!

Danger of eye injuries caused by particles flying around!

– Wear your personal protective equipment (protective gloves, protective clothing, goggles).

CAUTION!

Danger due to fine dust pollution!

– Wear a fine dust mask.

Blow the air filter out with dry compressed air (max. 2.1 bar (30 psi)) from inside to outside by moving the gun up and down inside the element, until it is free of dust.

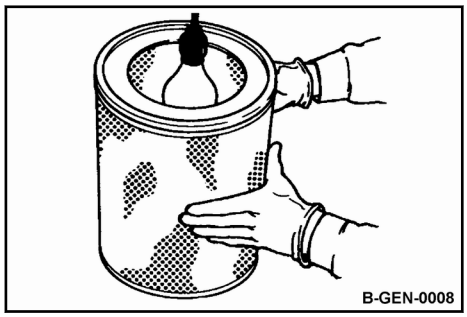


Fig. 147

10. Examine the air filter with a torch for cracks and holes in the paper bellows.
11. Replace the air filter if it is damaged.

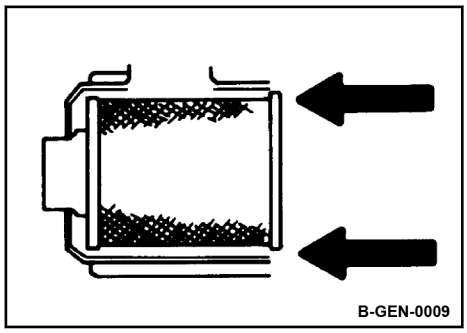


Fig. 148

12. Slide the air filter carefully into the housing.

NOTICE!

Danger of engine damage!

– The dust discharge valve must point vertically downwards.
– Make sure that the cover locks engage correctly.

13. Reinstall the cover.

Resetting the maintenance indicator

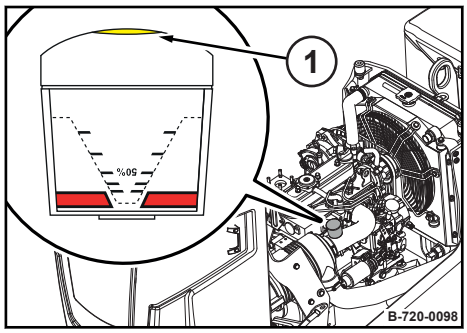


Fig. 149

14. After maintenance has been completed, press the button (1) on the maintenance indicator.

    ⇨ The maintenance indicator is reset.

8.7.2 Checking and cleaning the water separator

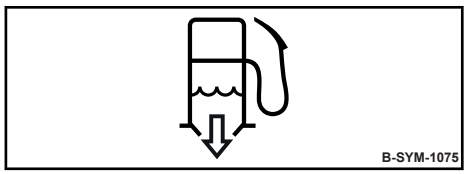


Fig. 150

The service intervals for the water separator depend on the water content in the fuel and can therefore not be determined precisely.

After taking the engine into operation you should check for signs of water and dirt initially every day.

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves

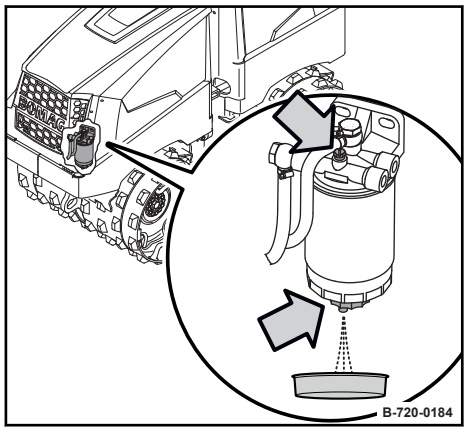


Fig. 151

1. Park the machine safely *Chapter 6.6 'Parking the machine in secured condition' on page 102*.
2. Loosen the bleed screw by a few turns.
3. Loosen the drain plug and drain the fluid until pure diesel fuel starts to run out.
4. Collect escaping fluids.
5. Screw the drain plug back in tightly. Check for leaks; if necessary, use a new seal ring.
6. Bleed the fuel system *Chapter 8.8.6.2 'Bleeding the fuel system' on page 143*.
7. Retighten the bleed screw. Check for leaks; if necessary, use a new seal ring.
8. Dispose of collected fluid in line with environmental regulations.

8.8 Annually / every 250 operating hours

8.8.1 Change engine oil and oil filter cartridge

Perform this maintenance work at the latest after one year.

NOTICE!

Danger of engine damage!

– Change the oil only with the engine at operating temperature.
– Use only oil of the permitted specification ↳ *Chapter 8.3.1 'Engine oil' on page 123*.
– Filling quantity: ↳ *Chapter 8.4 'List of fuels and lubricants' on page 127*

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves

1. Park the machine safely ↳ *Chapter 6.6 'Parking the machine in secured condition' on page 102*.

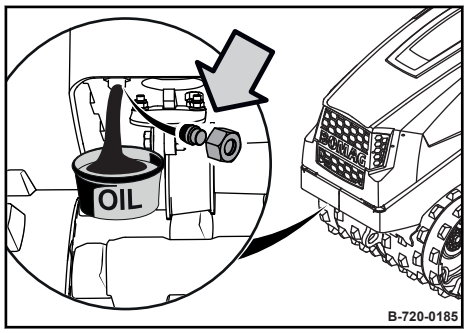


Fig. 152

2. **WARNING!**

   Danger of burning on hot components!

   – Wear your personal protective equipment (protective gloves, protective clothing).
   – Avoid touching hot components.

   Unscrew the drain plug and collect any oil running out.
3. Screw the drain plug back in tightly.

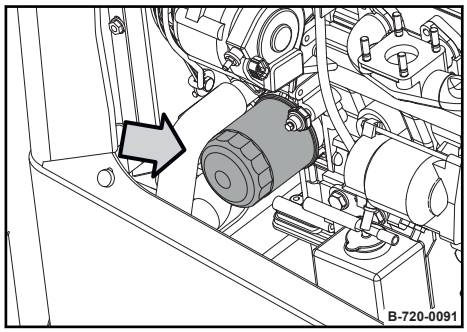


Fig. 153

4. Thoroughly clean the outside of the oil filter cartridge.
5. Unscrew the oil filter cartridge using an appropriate strap wrench.
6. Remove any dirt from the sealing face of the filter carrier.
7. Thinly apply oil to the rubber seal of the new oil filter cartridge.
8. Screw on the oil filter cartridge and tighten by hand.

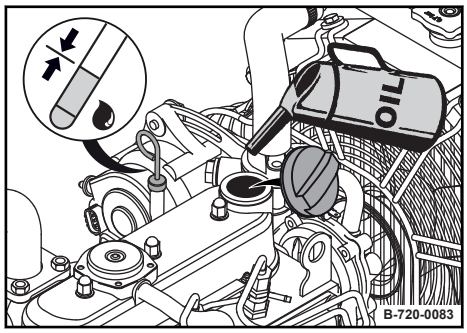


Fig. 154

9. Clean the area around the filling port and the oil dipstick.
10. Remove the cap and fill in fresh engine oil.
11. Close the cap.
12. After a short test run check the oil level on the oil dipstick, if necessary top up to the “MAX” mark.
13. Check the oil filter cartridge and drain plug for leaks.
14. Dispose of the oil and filters in line with environmental regulations.

8.8.2 Checking, tensioning the V-belt

8.8.2.1 Checking the V-belt

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves

1. Park the machine safely *Chapter 6.6 ‘Parking the machine in secured condition’ on page 102*.
2. Allow the engine to cool down.
3. Inspect the V-belt visually for damage and cracks.
4. Replace damaged or cracked V-belt *Chapter 8.9.1 ‘Replacing the V-belt’ on page 146*.
5. Check the V-belt tension.
   ⇨ **Compression measurement:** approx. 7 to 9 mm (0.28 to 0.35 in).
6. If necessary, retighten the V-belt.

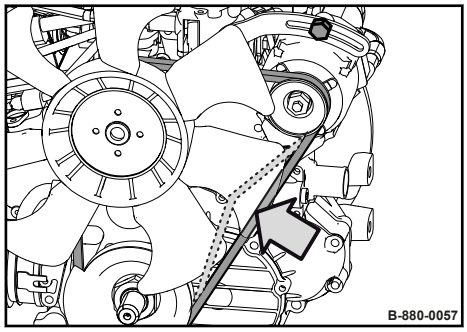


Fig. 155

8.8.2.2 Tightening the V-belt

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves

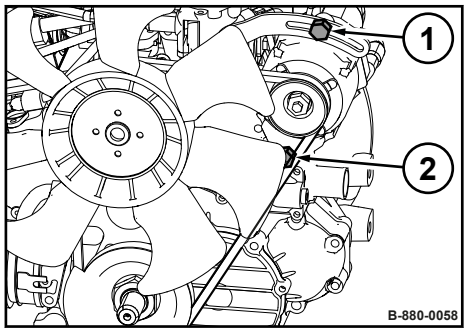


Fig. 156

1. Loosen tensioning screw (1) and screw (2) on the generator.

2. Use a lever to press the generator outward until the V-belt has the correct tension.

3. Retighten the clamping screw (1) and screw (2).

8.8.3 Replacing the air filter

Perform this maintenance work at the latest after one year.

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves

1. Park the machine safely *Chapter 6.6 'Parking the machine in secured condition' on page 102*.
2. Release the snap bow and take off the cover.
3. Clean the cover and dust discharge valve.

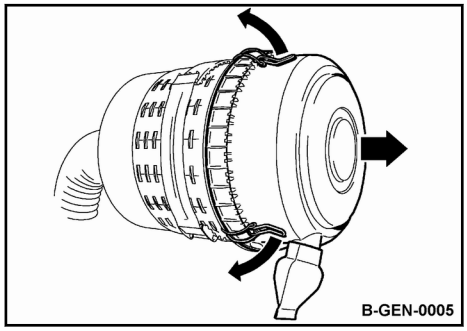


Fig. 157

4. Pull out the air filter with a slight turning motion and replace.
5. Thoroughly clean the filter housing and sealing faces.
6. Clean the inside of the drain pipe in the filter housing thoroughly.

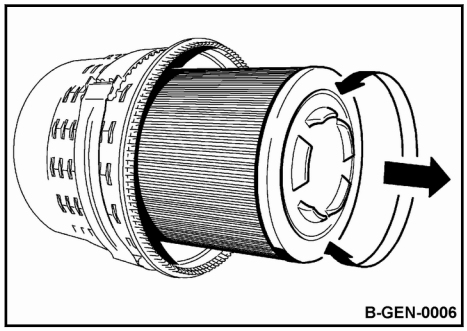


Fig. 158

7. Slide the new air filter carefully into the housing.

NOTICE!

Danger of engine damage!

– The dust discharge valve must point vertically downwards.
– Make sure that the cover locks engage correctly.

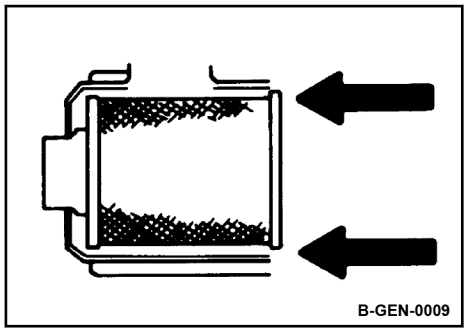


Fig. 159

8. Reinstall the cover.

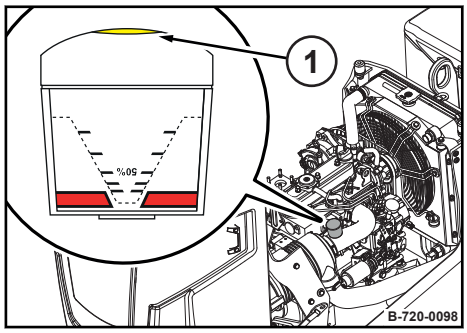


Fig. 160

9. Press the button (1) on the maintenance indicator.

⇨ The maintenance indicator is reset.

8.8.4 Check the air intake lines

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves

1. Park the machine safely *Chapter 6.6 'Parking the machine in secured condition' on page 102*.

2. Allow the engine to cool down.

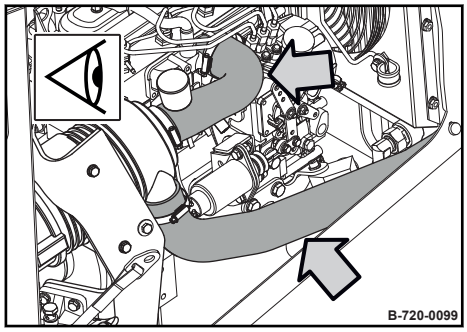


Fig. 161

3. Check the condition and tight fit of all air intake lines and hose clamps.

4. If necessary, replace any damaged air intake lines or hose clamps.

8.8.5 Changing the oil in the exciter housing

Loads may only be lifted by an expert/qualified person.

Do not use lashing points that are damaged or impaired in any way.

Only use lifting and lashing tackle with sufficient load bearing capacity for the weight to be loaded.

Always use appropriate lashing tackle at the lashing points.

Use lashing tackle only in the specified loading direction.

Lashing tackle must not be damaged by machine parts.

When lifting the machine, make sure the load does not move in an uncontrolled way. If necessary, hold the load steady with guide ropes.

Perform this maintenance work at the latest after one year.

NOTICE!

Components may get damaged!

- Only change the oil at operating temperature.
- Only use oil of the permitted specification *Chapter 8.3.4 'Oil for exciter shaft housing' on page 126*.
- Filling quantity: *Chapter 8.4 'List of fuels and lubricants' on page 127*
- Do not use low-ash engine oils for the exciter shaft housing.

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves

1. Park the machine safely *Chapter 6.6 'Parking the machine in secured condition' on page 102*.
2. Engage the articulation lock *Chapter 8.2.2.1 'Engaging the articulation lock' on page 121*.
3. Attach lifting tackle to the front lashing point.
4. Lift the machine at the front and support the front drum.
5. Secure the rear drum with a wheel chock.

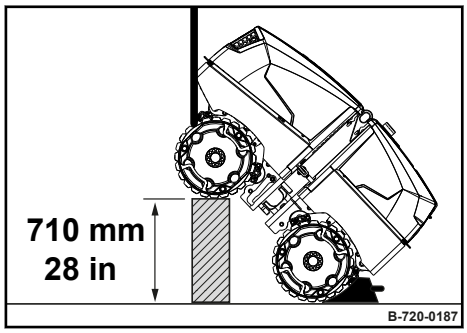


Fig. 162

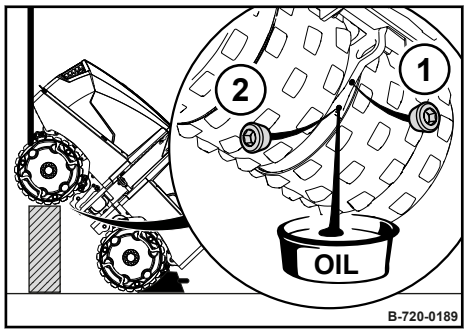


Fig. 163

6. **WARNING!**
Danger of burning on hot components!
– Wear your personal protective equipment (protective gloves, protective clothing).
– Avoid touching hot components.

Clean and remove the bleed screw (1) and drain plug (2) from the front drum.

7. Drain off and collect all oil.

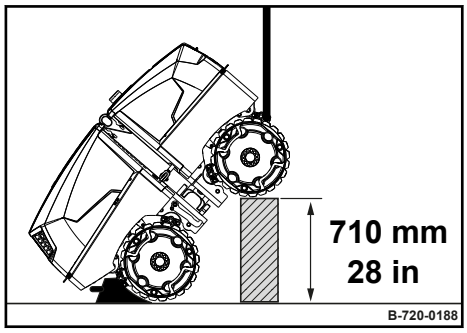


Fig. 164

8. Lower the machine and attach lifting tackle to the rear lashing point.
9. Lift the machine at the rear and support the rear drum.
10. Secure the front drum with a wheel chock.

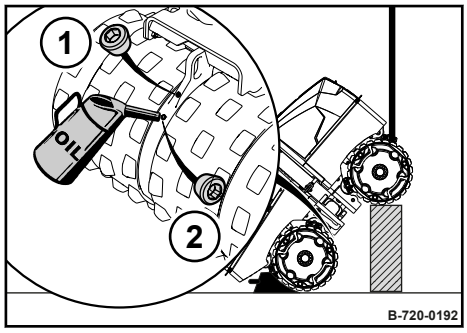


Fig. 165

11. Fill the front drum with oil via the drain opening.
12. Screw the bleed screw (1) and drain plug (2) back in tightly.

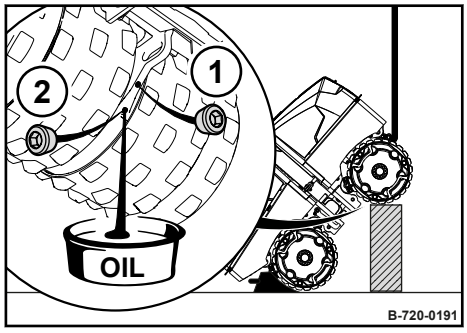


Fig. 166

13. **WARNING!**
Danger of burning on hot components!
– Wear your personal protective equipment (protective gloves, protective clothing).
– Avoid touching hot components.

Clean and remove the bleed screw (1) and drain plug (2) from the rear drum.

14. Drain off and collect all oil.
15. Lift the machine at the front again, support the front drum securely, and secure the rear drum with a wheel chock.

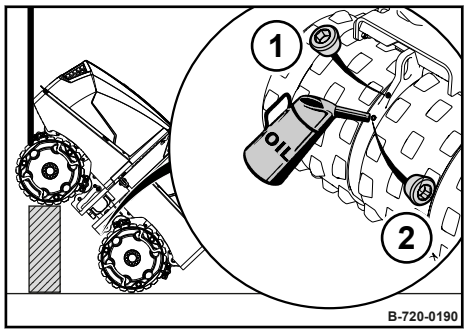


Fig. 167

16. Fill the rear drum with oil via the drain opening.
17. Screw the bleed screw (1) and drain plug (2) back in tightly.
18. Lower the machine.
19. Dispose of oil in an environmentally friendly way.

8.8.6 Replacing the fuel filter; bleeding the fuel system

8.8.6.1 Replace the fuel filter

NOTICE!

Danger of engine damage!

– Ensure strict cleanliness! Thoroughly clean the area around the fuel filters.
– Air in the fuel system causes irregular running of the engine, a drop in engine power, stalls the engine and makes starting impossible.

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves

1. Park the machine safely *Chapter 6.6 'Parking the machine in secured condition' on page 102*.

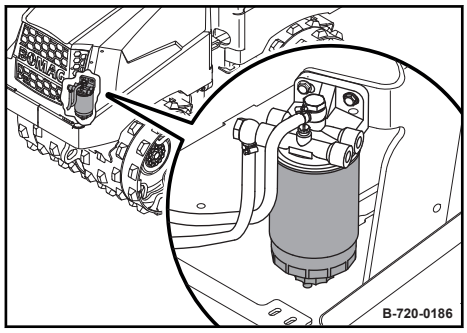


Fig. 168

2. Loosen the fuel filter using a suitable strap wrench and remove.
3. Remove any dirt from the sealing face of the filter carrier.
4.

NOTICE!

Danger of engine damage!

– Never fill filters beforehand, to avoid the entry of dirt into the clean side.

Thinly apply oil to the rubber seal on the new fuel filter.

5. Turn the new filter cartridge on by hand, until the seal contacts, then tighten it hand-tight.
6. Dispose of fuel and fuel filters in line with environmental regulations.
7. Bleed the fuel system *Chapter 8.8.6.2 'Bleeding the fuel system' on page 143*.

8.8.6.2 Bleeding the fuel system

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves

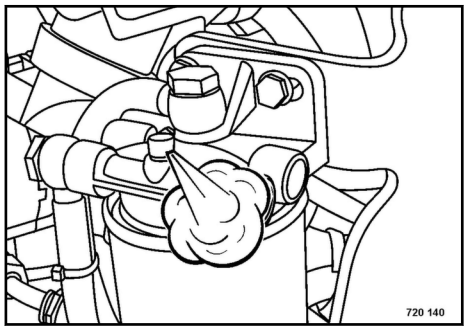


Fig. 169

1. Loosen the bleed screw on the fuel filter 2 to 3 turns.

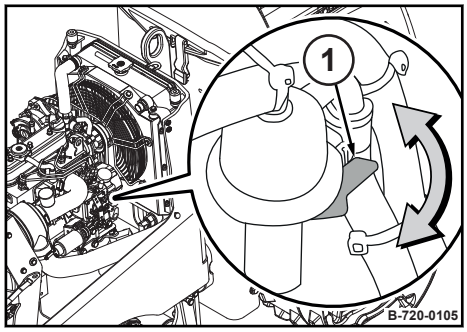


Fig. 170

2. Operate the hand lever (1) on the fuel lift pump until fuel flows out of the loosened bleed screw without air bubbles.

3. Collect the escaping fuel.

4. Tighten the bleeding screw.

5. Start the engine and run it for 5 minutes at idle speed.

6. Check the fuel pre-filter for leaks.

7. Dispose of collected fuel in line with environmental regulations.

8.8.7 Draining the fuel tank sludge

The filling level of the fuel tank should not exceed 5.0 l (1.3 gal US) for draining purposes.

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves

1. Park the machine safely *Chapter 6.6 'Parking the machine in secured condition' on page 102*.
2. Clean the area around the filler opening and remove the cap.
3. Unscrew the drain plug and drain off approx. 5.0 l (1.3 gal US) of fuel.
4. Collect the escaping fuel.
5. Screw the drain plug back on tightly.
6. Fill the fuel tank with clean fuel.
7. Dispose of collected fuel in line with environmental regulations.

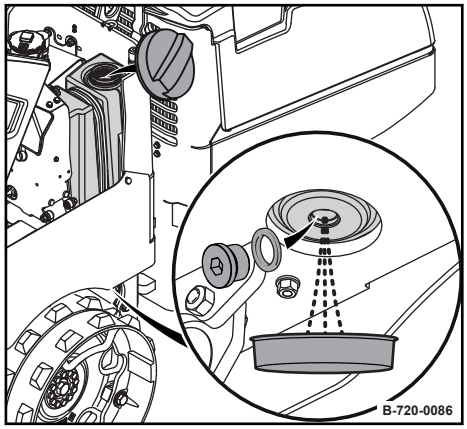


Fig. 171

8.8.8 Checking radiator hoses and hose clamps

Protective equipment:
- Working clothes
- Protective gloves

1. Park the machine in secured condition *Chapter 6.6 'Parking the machine in secured condition' on page 102*.
2. Allow the engine to cool down.
3. Check the condition and tight fit of all fuel lines and hose clamps.
4. If fuel lines or hose clamps are found to be damaged, the corresponding parts must be immediately repaired or replaced by authorized service personnel.

NOTICE!

Danger of engine damage!

– After work on the fuel system bleed the system, perform a test run and check for leaks.

8.8.9 Servicing the battery; checking the main battery shutoff

8.8.9.1 Battery service

Maintenance free batteries also need care. Maintenance free only means that the fluid level does not need to be checked.

Every battery has a self-discharge, which may, if not checked occasionally, even cause damage to the battery as a result of exhaustive discharge.

Exhausted batteries (batteries with formation of sulphate on the plates) are not covered under warranty!

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves
- Safety goggles

1. Park the machine safely *Chapter 6.6 'Parking the machine in secured condition' on page 102*.
2. Remove the battery and clean the battery compartment.
3. Clean the outside of the battery.
4. Clean the battery poles and terminals and grease them with pole grease (Vaseline).
5. Install the battery and check the battery fastening.
6. Check the condition of the vibration insulation mats; replace if necessary.
7. On serviceable batteries check the acid level; if necessary, top up to the filling mark with distilled water.

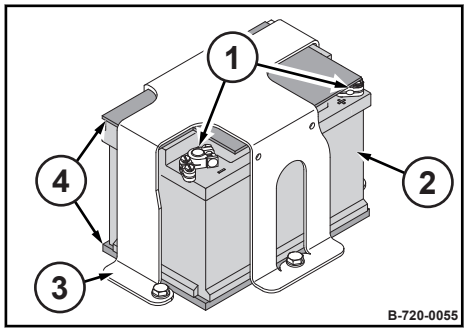


Fig. 172

1 Terminal
2 Battery
3 Battery fastening
4 Vibration insulation mat

8.8.9.2 Checking the main battery switch

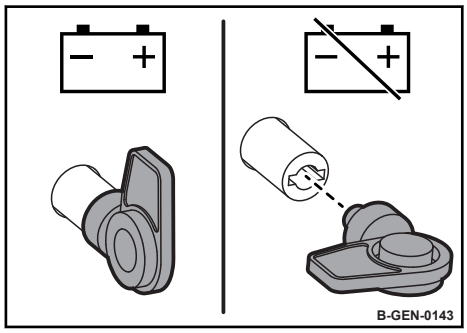


Fig. 173

1. Turn the main battery switch anticlockwise and pull it out.
2. Check by turning the ignition key, whether the battery is disconnected from the electric system of the machine.

8.9 Every 500 operating hours

8.9.1 Replacing the V-belt

Perform this maintenance work at the latest after two years.

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves

1. Park the machine safely *Chapter 6.6 'Parking the machine in secured condition' on page 102*.

2. Allow the engine to cool down.

3. Loosen the tensioning screw (1) and screw (2) on the generator.

4. Press the generator inwards, and release and remove the V-belt.

5. Install the new V-belt.

6. Tension the V-belt to the specified value *Chapter 8.8.2 'Checking, tensioning the V-belt' on page 136*.

7. Retighten the clamping screw and screw.

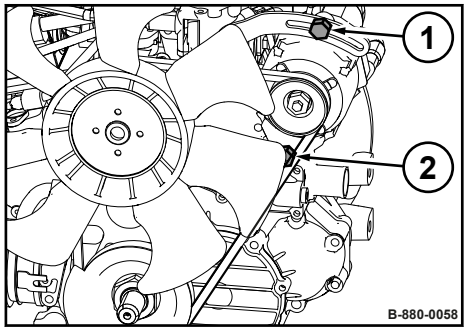


Fig. 174

8.10 Every 1000 operating hours

8.10.1 Adjusting the valve clearance

NOTICE!

Danger of engine damage!

We recommend to have this work carried out by trained personnel or our after sales service.

– Before checking the valve clearance let the engine cool down for at least 30 minutes. The engine oil temperature must be below 80 °C (176 °F).

Valve clearance	
Intake/exhaust valve	0.15 mm to 0.19 mm (0.006 in to 0.007 in)

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves

1. Park the machine safely *Chapter 6.6 'Parking the machine in secured condition' on page 102*.

2. Allow the engine to cool down.

Preparations

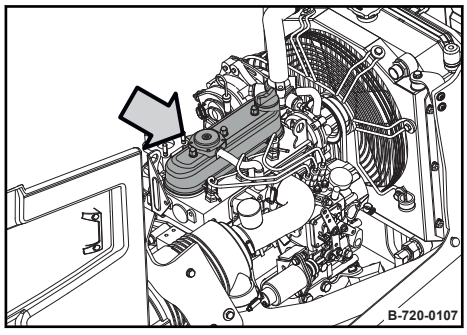


Fig. 175

3. Remove the valve cover.

Checking the valve clearance

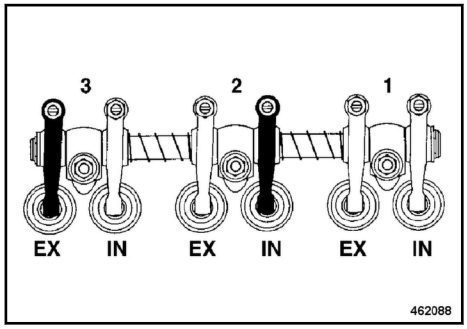


Fig. 176

IN Intake valve
EX Exhaust valve

4. Turn the crankshaft using a V-belt until both valves on cylinder 1 overlap.

Cylinder 1 is on the fan side.

5. Check the valve clearance on the valves marked black; adjust if necessary.

⇨ The feeler gauge must fit through the gap with little resistance.

6. Turn the crankshaft one full turn (360 °) more using the V-belt.

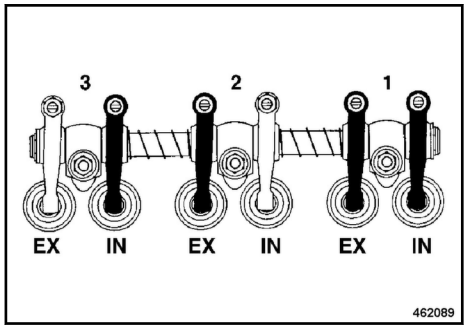


Fig. 177

IN Intake valve
EX Exhaust valve

7. Check the valve clearance on the valves marked black using a feeler gauge; adjust if necessary.

⇨ The feeler gauge must fit through the gap with little resistance.

Adjusting the valve clearance

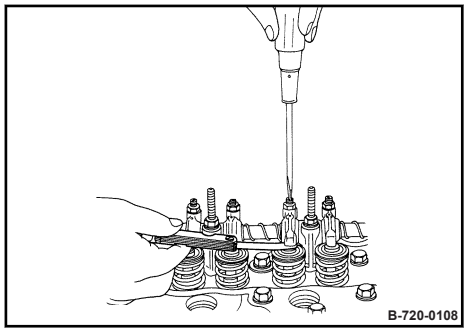


Fig. 178

8. Loosen the counter nut on the rocker arm.

9. Adjust the valve clearance using the adjustment screw.

10. Tighten the counter nut.

Concluding work

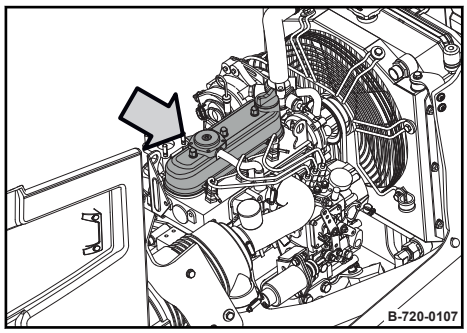


Fig. 179

11. Install the valve cover with a new seal.

12. After a short test run check the valve cover for leaks.

8.11 Every 2000 operating hours

8.11.1 Changing the hydraulic oil and filter

Perform this maintenance work at the latest after two years.

The hydraulic oil and filter also requires changing after major repairs in the hydraulic system.

Always replace the hydraulic oil filter after each hydraulic oil change.

Do not start the engine after draining off the hydraulic oil.

Do not use any detergents to clean the system.

Use only lint-free cleaning cloths for cleaning.

When changing over from mineral oil-based hydraulic oil to an ester-based, biologically degradable hydraulic oil, consult the lubrication service of the respective oil manufacturer, or our Customer Service for details.

NOTICE!

Risk of damage!

- Perform the oil change when the hydraulic oil is warm.
- Use only hydraulic oil of the permitted specification *Chapter 8.3.5 'Hydraulic oil' on page 126*.
- Filling quantity: *Chapter 8.4 'List of fuels and lubricants' on page 127*.

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves

1. Park the machine safely *Chapter 6.6 'Parking the machine in secured condition' on page 102*.

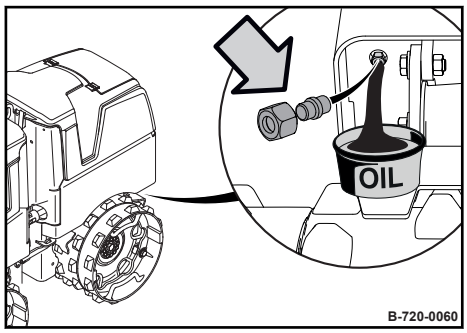


Fig. 180

2. **WARNING!**

   Danger of burning on hot components!

   - Wear your personal protective equipment (protective gloves, protective clothing).
   - Avoid touching hot components.

   Unscrew the drain plug.
3. Drain off and collect all hydraulic oil.
4. Screw the drain plug back in.

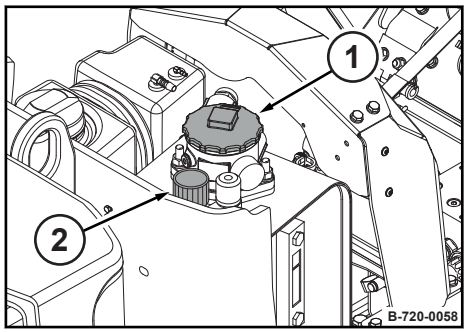


Fig. 181

5. Clean the area round the hydraulic oil tank, cap (1) and breather filter (2).

6. Unscrew the cap and remove with filter element.

7.

We recommend to use our filling and filtering unit with fine filter to fill the system. This ensures finest filtration of the hydraulic oil, prolongs the lifetime of the hydraulic oil filter and protects the hydraulic system.

Fill up with fresh hydraulic oil.

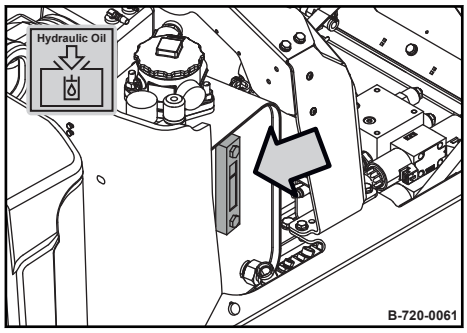


Fig. 182

8. Check the oil level in the inspection glass.

⇨ **Nominal value:** Approx. 3 cm (1.2 in) below the top edge of the inspection glass

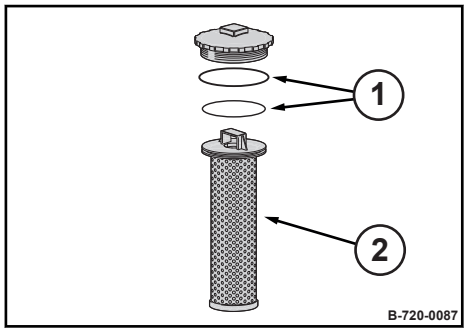


Fig. 183

9. Insert a new filter element (2) and new O-rings (1).

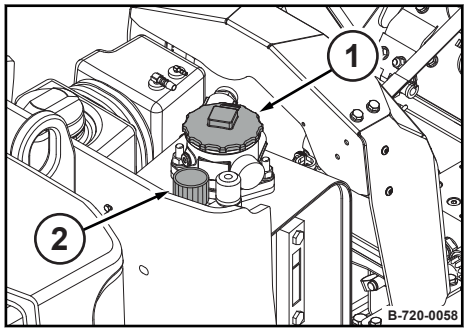


Fig. 184

10. Screw the cap (1) back on.

11. Replace the breather filter (2).

12. After the test run, check the filters for leaks.

13. Dispose of the hydraulic oil and filter in line with environmental regulations.

8.11.2 Changing the coolant

Perform this maintenance work at the latest after two years.

Do not start the engine after draining off the coolant.

In case of lubrication oil entering into the cooling system or if a suspicious turbidity caused by corrosion residues or other suspended matter occurs, the coolant must be drained off and the complete cooling system needs to be cleaned.

Oil can damage the sealing materials used in the cooling system.

If oil has entered, add a cleansing agent in order to remove any residues from the system. Follow the instructions of the manufacturer! If in doubt, consult your Customer Service or the engine manufacturer.

When changing the coolant without any signs of contamination, cleaning the cooling system is not necessary.

NOTICE!

Danger of engine damage!

- Use only coolant of the permitted specification ↳ *Chapter 8.3.3 'Coolant' on page 125*.
- Do not mix different coolants and additives of any other kind.
- Filling quantity: ↳ *Chapter 8.4 'List of fuels and lubricants' on page 127*

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves
- Safety goggles

1. Park the machine safely ↳ *Chapter 6.6 'Parking the machine in secured condition' on page 102*.
2. Allow the engine to cool down.
3. Unscrew the cap.

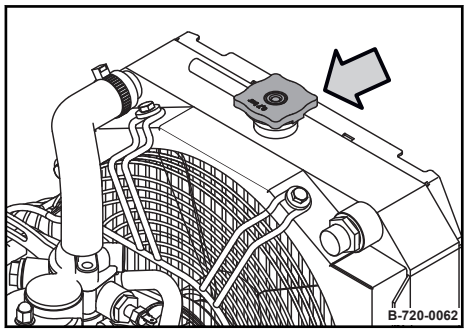


Fig. 185

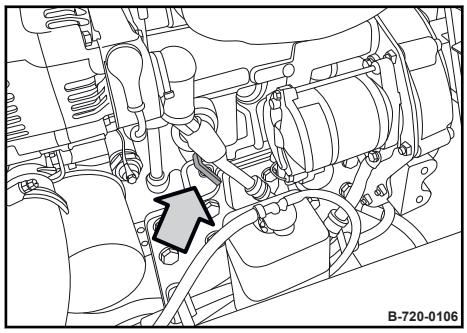


Fig. 186

4. Open the drain valve on the engine.

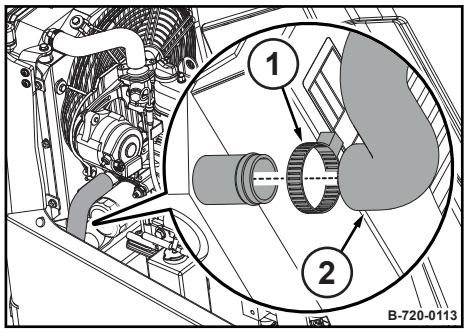


Fig. 187

5. Loosen the hose clamp (1) and pull the hose (2) off the radiator.

6. Drain off the coolant completely and collect it.

7. Close the drain valve again.

8. Push the hose back on again and tighten the hose clamp.

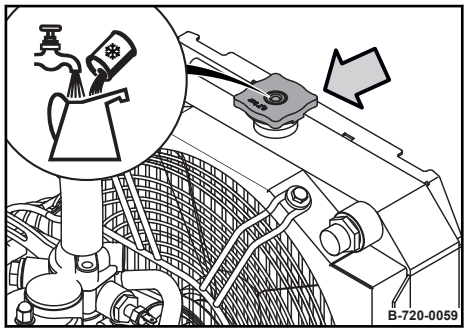


Fig. 188

9. Fill with coolant until the level reaches the bottom edge of the filler neck.

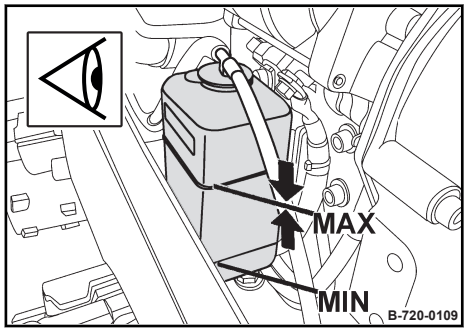


Fig. 189

10. Check the coolant level in the compensation tank.

⇨ The coolant level must be between the “MIN” and “MAX” marks.

11. If necessary, fill with coolant up to the “MAX” mark.

12. Screw the filler cap back on again.

13. Start the engine and run to operating temperature.

14. Let the engine cool down and check the coolant level again; if necessary, top up in the compensation tank.

15. Dispose of coolant in line with environmental regulations.

8.11.3 Replacing hoses

This work must only be performed by authorized service personnel.

Perform this maintenance work at the latest after two years.

The following hoses need to be renewed:

- fuel hoses,
- air intake hoses.

8.11.4 Check the injection valves

This work must only be performed by authorized service personnel.

8.12 Every 3000 operating hours

8.12.1 Checking the fuel injection pump

This work must only be performed by authorized service personnel.

8.13 As required

8.13.1 Checking/adjusting the scrapers

DANGER!
Danger to life caused by machine movements!
– Never step in front of or behind the drums/ wheels while the engine is running.

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves

1. Park the machine safely *Chapter 6.6 'Parking the machine in secured condition' on page 102*.
2. Check the condition of the eight scrapers (four per drum); clean if necessary.
3. Replace worn scrapers.

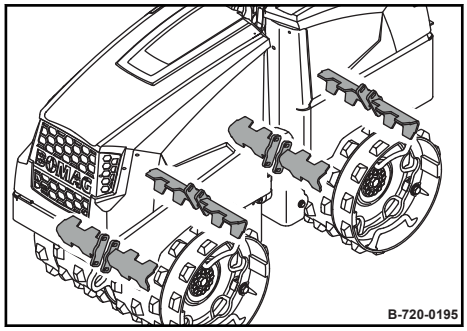


Fig. 190

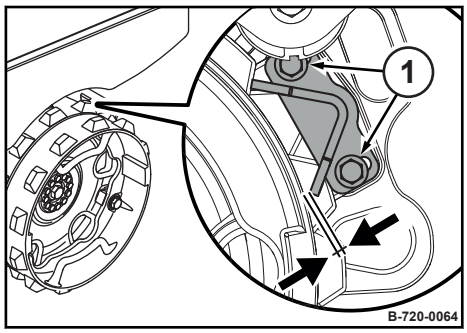


Fig. 191

4. Check the gap between the scrapers and drum.

Nominal value	approx. 5 mm (0.2 in)

5. If necessary, loosen the screws (1) and adjust the gap evenly.
6. Tighten the screws.

8.13.2 Replacing the fuel pre-filter

NOTICE!
Danger of engine damage!
– Ensure strict cleanliness! Thoroughly clean the area around the fuel filters.
– Air in the fuel system causes irregular running of the engine, a drop in engine power, stalls the engine and makes starting impossible.

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves

1. Park the machine safely *Chapter 6.6 'Parking the machine in secured condition' on page 102*.
2. Remove the bolts and washers (2).
3. Open the central electrics (1).

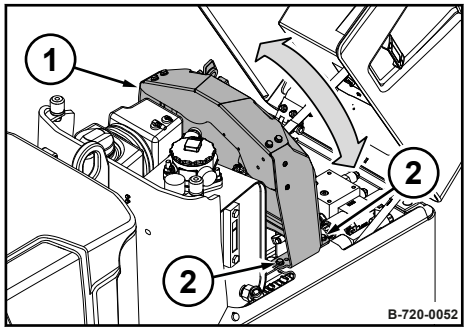


Fig. 192

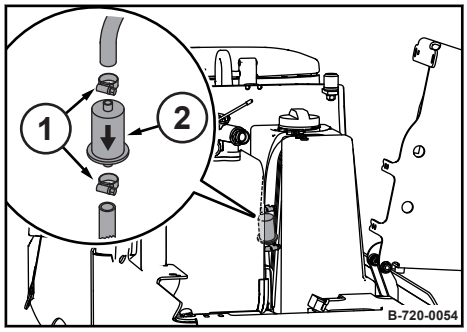


Fig. 193

4. Loosen the hose clamps (1) on the fuel pre-filter (2).
5. Pull the fuel lines off the fuel pre-filter.
6. Install the new fuel pre-filter and observe the flow direction (arrow).
7. Reconnect the fuel hoses with hose clamps.
8. Shut the central electrics and screw it back down.
9. Dispose of fuel and fuel pre-filters in line with environmental regulations.
10. Bleed the fuel system *Chapter 8.8.6.2 'Bleeding the fuel system' on page 143*.

8.13.3 Cleaning the radiator module

NOTICE!

Components may get damaged!

– Do not bend or damage cooling fins.
– Do not clean with high pressure.

1. Park the machine safely *Chapter 6.6 'Parking the machine in secured condition' on page 102*.
2. Allow the engine to cool down.

Cleaning with compressed air

Protective equipment:
- Protective gloves
- Safety goggles

CAUTION!

Danger of eye injuries caused by particles flying around!

– Wear your personal protective equipment (protective gloves, protective clothing, goggles).

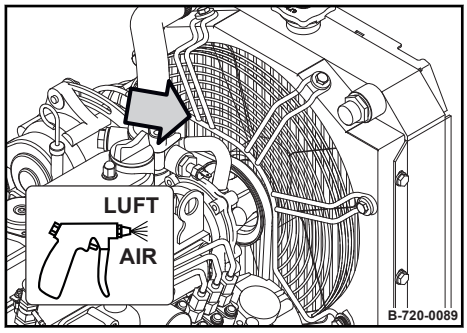


Fig. 194

1. Blow the radiator out with compressed air from inside the engine compartment.
2. Blow the radiator out with compressed air from the outside.

Cleaning with cold cleansing agent

NOTICE!

Electric components can be damaged by water entering into the system!

– Protect electrical equipment such as generator, regulator and starter against the direct water jet.

1. Spray the engine and radiator with a suitable cleaning agent, let it soak in for a while, and then wash off with a strong water jet.
2. Warm up the engine for a while to avoid corrosion.

8.13.4 Cleaning the machine

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves

1. Park the machine safely *Chapter 6.6 'Parking the machine in secured condition' on page 102*.
2. Allow the engine to cool down for at least 30 minutes.

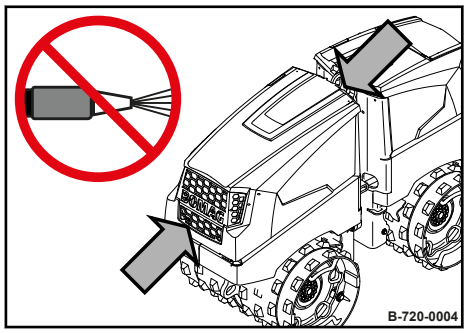


Fig. 195

3.

NOTICE!

Electric components can be damaged by water entering into the system!

– Do not direct the water jet straight into the cooling air openings, air filter, exhaust outlet or electrical equipment.

Clean the machine from the outside with a water jet.

4. Warm up the engine for a while to avoid corrosion.

8.13.5 Checking the central screw of the drive hub

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves

1. Park the machine safely *Chapter 6.6 'Parking the machine in secured condition' on page 102*.

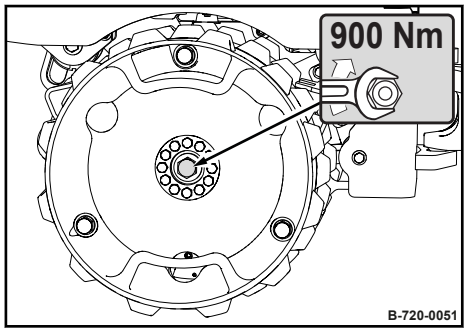


Fig. 196

2. Check the tightening torque of the central screw on all four drive hubs.

Nominal value	900 Nm (664 ft·lbf)

8.13.6 Cleaning the drum drive / drums

How dirty the drum drives and drums are depends on the daily operating conditions; clean frequently if necessary.

However, perform this maintenance work at the latest after one year.

Observe the safety notes for lifting the machine *Chapter 3 'Concerning your safety' on page 21*.

Use lifting tackle which is suitable for the weight of the drums: Approx. 102 kg (225 lbs) each.

Always perform maintenance work on the individual drums one at a time.

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves

Prerequisites:
Adequate space for attaching or removing.
The machine is on level, firm ground.
If necessary, a second person is present to help remove the drums.

1. Park the machine safely *Chapter 6.6 'Parking the machine in secured condition' on page 102*.
2. Engage the articulation lock *Chapter 8.2.2.1 'Engaging the articulation lock' on page 121*.
3. If necessary, remove the drum extension *Chapter 9 'Setting up / refitting' on page 165* and clean it thoroughly.
4. Attach lifting tackle to the front / rear lashing point.
5. Lift the machine up and support it safely.

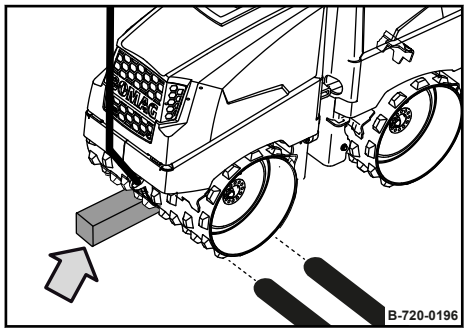


Fig. 197

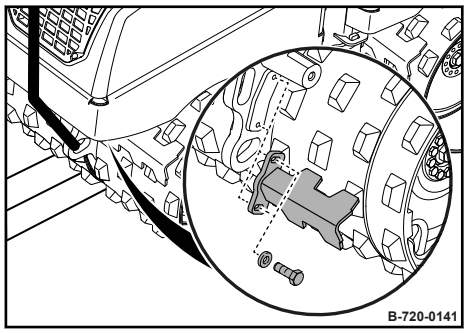


Fig. 198

6. Unscrew the fastening screws and take off the scraper.

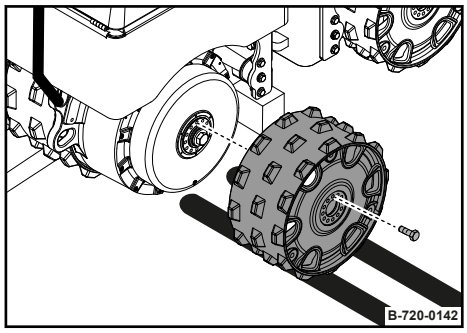


Fig. 199

7. Clean the fastening screws, unscrew them and remove the drum.
8. Clean the drum thoroughly on the inside and outside.
9. Clean the drum drive housing thoroughly.

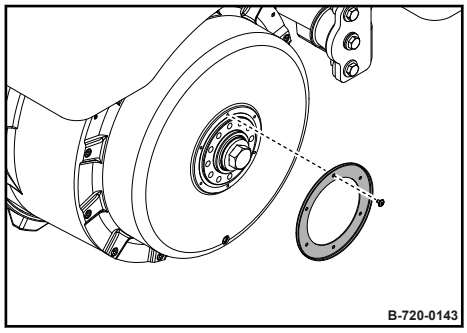


Fig. 200

10. Unscrew the fastening screws and take off the clamping ring.

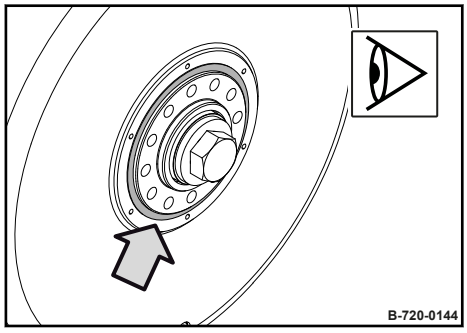


Fig. 201

11. Check the seal ring for wear and damage, change if necessary.
12. Insert and tighten clamping ring with adhesive (e.g. spare part number: 009 780 66).
13. Insert and tighten the fastening screws in the clamping ring with a medium-strength threadlocker (e.g. spare part number: 009 780 06).
14. Fasten the drum.

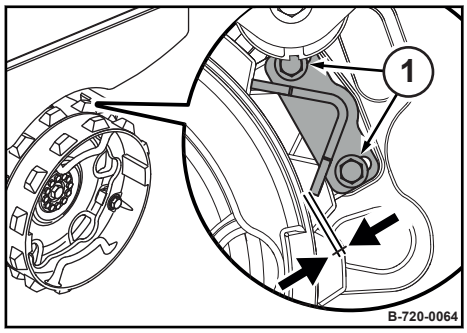


Fig. 202

15. Attach the scraper and insert the fastening screws (1).

16. Set the distance between scraper and drum.

Nominal value	approx. 5 mm (0.2 in)

17. Tighten the fastening screws on the scraper.

18. If necessary, reinstall the drum extension *Chapter 9 'Setting up / refitting' on page 165*.

19. Lower the machine.

20. Repeat the maintenance work for the three other drums one at a time.

21. If necessary, dispose of the seal rings in an environmentally friendly way.

8.13.7 Measures prior to extended shut-down period

8.13.7.1 Measures before shutting down

If the machine is shut down for a longer period of time, e.g. winter season, the following work must be carried out:

1. Clean the machine thoroughly.

2. After shutting down store the machine under cover in a dry and well ventilated room.

3. Grease the bare piston rods of all hydraulic cylinders well and pull them in as far as possible.

4. Spray a thin oil film onto to all lever joints and bearing points without lubrication.

5. Repair damaged paint; preserve bare areas thoroughly with anti-corrosive agent.

6. Clean the water separator.

7. Fill the fuel tank with diesel fuel to prevent the formation of condensation water in the tank.

8. Change engine oil and oil filter if the oil has been changed more than 300 hours ago, or if the oil is older than 12 months.

9. Check the anti-freeze concentration and the coolant level.

10. Disconnect the ground strap from the battery (this avoids self-discharge caused by closed-circuit consuming devices).

8.13.7.2 Servicing the battery during extended downtimes

8.13.7.2.1 Battery service

Protective equipment:
- Working clothes
- Protective gloves
- Safety goggles

1. Remove the terminal covers from the battery.
2. Check the filling level of the electrolyte fluid at the indicator on the sealing plugs.
3. Replace the battery if necessary.

If two batteries are installed in the machine, measure the voltage on each battery separately.

If a voltage difference of >0.1 V is detected, charge both batteries separately.

4. Measure the open-circuit voltage of the battery at least once a month using a suitable measuring instrument.

Reference values	
Voltage ≥12.6 V	Battery charged and frost-proof to approx. -50 °C
Voltage ≈12.3 V	Battery discharged to 50 %
Voltage < 12.1 V	Battery is damaged and needs to be replaced

5. Charge the battery at an open-circuit voltage of <12.25 V ↬ *Chapter 8.13.7.2.2 'Charging the battery' on page 163*.
   ⇨ The open-circuit voltage of the battery occurs approx. ten hours after the last charging process or one hour after the last discharge.

8.13.7.2.2 Charging the battery

Preliminary remarks and safety notes

Only charge batteries in well-ventilated rooms.

Observe the operating instructions for the charger. Do not perform fast charging.

Remove heavily discharged batteries from the machine for charging.

Do not charge batteries at temperatures below 0 °C (32 °F).

Do not charge batteries with an acid level that is too low. Risk of explosion and chemical burns!

Charging the battery

Protective equipment:
- Working clothes
- Protective gloves
- Safety goggles

1. Remove the plugs of the battery.
2. Thoroughly clean the area around the ventilation tube.
3. Connect the switched off charger.

   Observe the operating instructions for the charger.
4. Switch on the charger.
5. Monitor the charging process.

   If the acid temperature is >55 °C or acid is leaking, stop the charging process.
6. As soon as the charge voltage stops rising within two hours, the battery is fully charged.
7. Switch off the charger.
8. Disconnect the charger.

   Observe the operating instructions for the charger.
9. Allow the battery to rest for one hour after charging and before restarting.

8.13.7.3 Measures before restarting

1. Replace the fuel filter.
2. Replace the air filter.
3. Change engine oil and oil filter.
4. Check the coolant level.
5. Check the charge condition of the batteries, recharge if necessary. Check the battery fluid level before and after charging.
6. Connect the ground straps to the batteries.
7. Check the function of the electric system.
8. Check cables, hoses and lines for cracks and leaks.
9. Check the service life of hydraulic hoses and replace if necessary.
10. Start the engine and run it for 15 to 30 minutes with idle speed.
11. While the engine is running keep an eye on the gauges for engine oil pressure and coolant temperature.
12. Check the oil levels.
13. Check the function of electric system, steering and brakes.
14. Clean the machine thoroughly.

9 Setting up / refitting

9.1 Drum extension

9.1.1 Preliminary remarks and safety notes

Prerequisites for attaching and removing the drum extension:

- Adequate space for attaching or removing.
- The machine is on level, firm ground.
- If necessary, a second person is present to help lift the drum extension.

With the drum extensions removed, the footprint of the machine is smaller. This increases the risk of the machine tipping over at higher speeds.

For this reason, driving without drum extensions is only permitted in travel speed range 1 (turtle).

Travel speed range 2 (rabbit) can be activated and deactivated via input codes ↬ *Chapter 12 ‘Appendix’ on page 197*.

9.1.2 Removing the drum extension

Consider the weight of the drum extensions: Approx. 28 kg (62 lbs) each

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves

1. Park the machine safely *Chapter 6.6 'Parking the machine in secured condition' on page 102*.

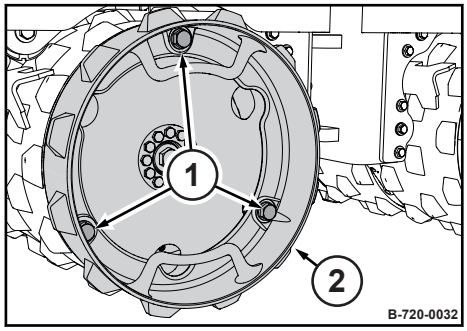


Fig. 203

2. Unscrew the fastening bolts (1).

3. Remove the washers.

4. Remove the drum extension (2).

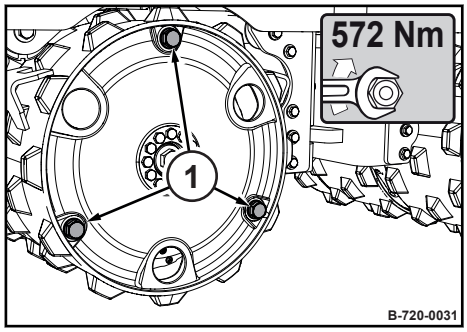


Fig. 204

5. To protect the threads, remount the fastening bolts (1) and washers; tightening torque: 572 Nm (422 ft·lbf).

9.1.3 Attaching the drum extension

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves

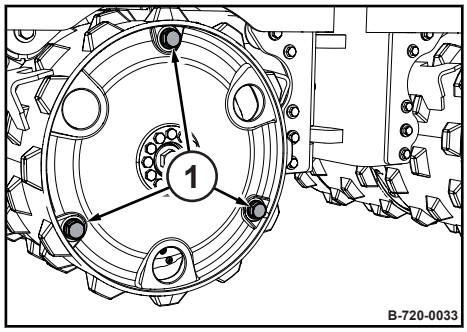


Fig. 205

1. Unscrew the fastening bolts (1) and remove the washers.

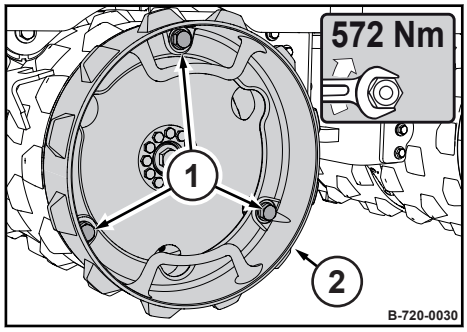


Fig. 206

2. Remount the drum extension (2) with the fastening bolts (1) and washers; tightening torque: 572 Nm (422 ft·lbf).

9.2 Teaching the remote control and the BOSS safety field system

After replacing components in the radio communication system (e.g. radio remote control, radio receiver) or BOSS safety field system (e.g. aerial at the front or back), the radio remote control and the BOSS safety field system will need to be retaught.

Prerequisites:
Main battery switch is switched on.
Emergency stop switch unlocked.

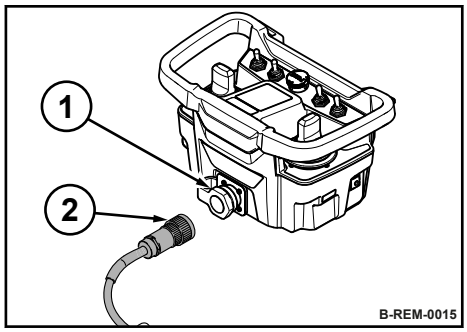


Fig. 207

1. Remove the safety cap (1) and connect the cable (2) to the remote control.
2. Take up position in the safety field at the machine.

   Distance: < 1.2 m (1.3 yd).

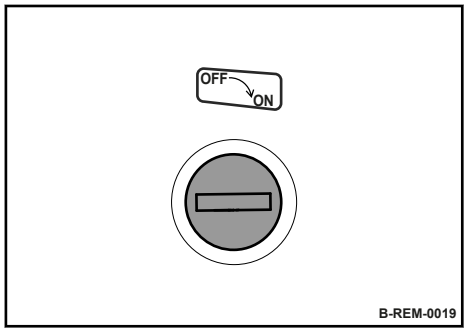


Fig. 208

3. Turn the ignition key to position “ON”.

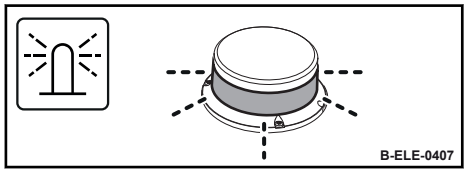


Fig. 209

⇨ The flashing beacon lights up.

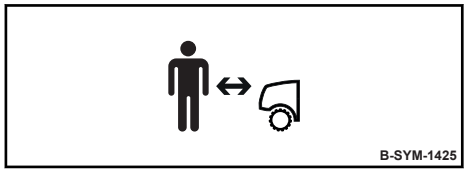


Fig. 210

The safety device warning light lights up.

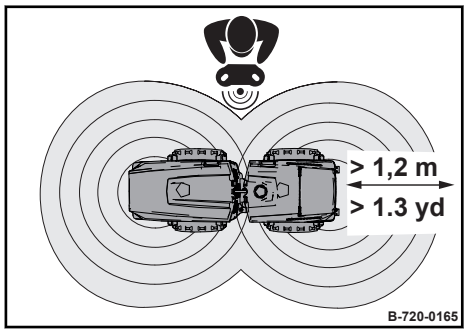


Fig. 211

4. Leave the safety field with the remote control.

Distance: > 1.2 m (1.3 yd).

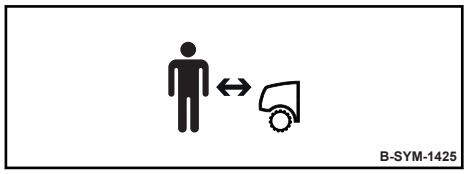


Fig. 212

⇨ The safety system warning light goes out.

The radio remote control and the safety field system have been taught.

The machine is now ready for operation.

10 Troubleshooting

10.1 Starting the engine externally

10.1.1 Starting the engine with a third-party vehicle - 12 volts

Preliminary remarks and safety notes

WARNING!

Danger of injury caused by exploding gas mixture!

- No open fire, do not smoke.
- Do not mix up the battery terminals and never short-circuit them. Observe the markings on the battery!
- Avoid sparking.
- Wear your personal protective equipment (protective gloves, protective clothing, goggles).

NOTICE!

Danger of damage to the electronic system due to short circuit!

- No body contact may exist or be established between two vehicles.
- Never connect or disconnect vehicle batteries when the ignition is switched on or the engine is running.

Plus cable: Colour coding red in most cases.

Minus cable: Colour coding black in most cases.

Only connect batteries with the same nominal voltage and similar capacity (e.g. 88 Ah). Observe the type plates on the batteries!

Do not jump start a damaged, frozen or thawed battery.

Use only undamaged jump leads with a sufficient cross-section and insulated terminal pliers.

Non-insulated parts of the pole clamps must not touch each other under any circumstances. Danger of short circuit!

The jump lead connected to the plus terminal of the starter battery must not come into contact with electrically conducting components. Danger of short circuit!

Connect the jumper lead correctly. Sparks during starting could ignite oxyhydrogen gas escaping from the battery.

Lay the jump leads so that they cannot be caught by rotating parts in the engine compartment.

The battery plugs must be firmly closed.

Do not jump start batteries with an acid level that is too low. Risk of explosion and chemical burns!

Do not lean over the battery. Risk of chemical burns!

Do not reach into the engine compartment while jump starting.

Preparatory measures

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves
- Safety goggles

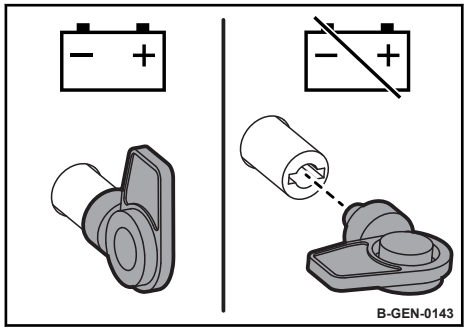


Fig. 213

1. Turn the main battery switch anticlockwise and pull it out.
2. Remove the terminal covers of all batteries.

Connecting the jump lead

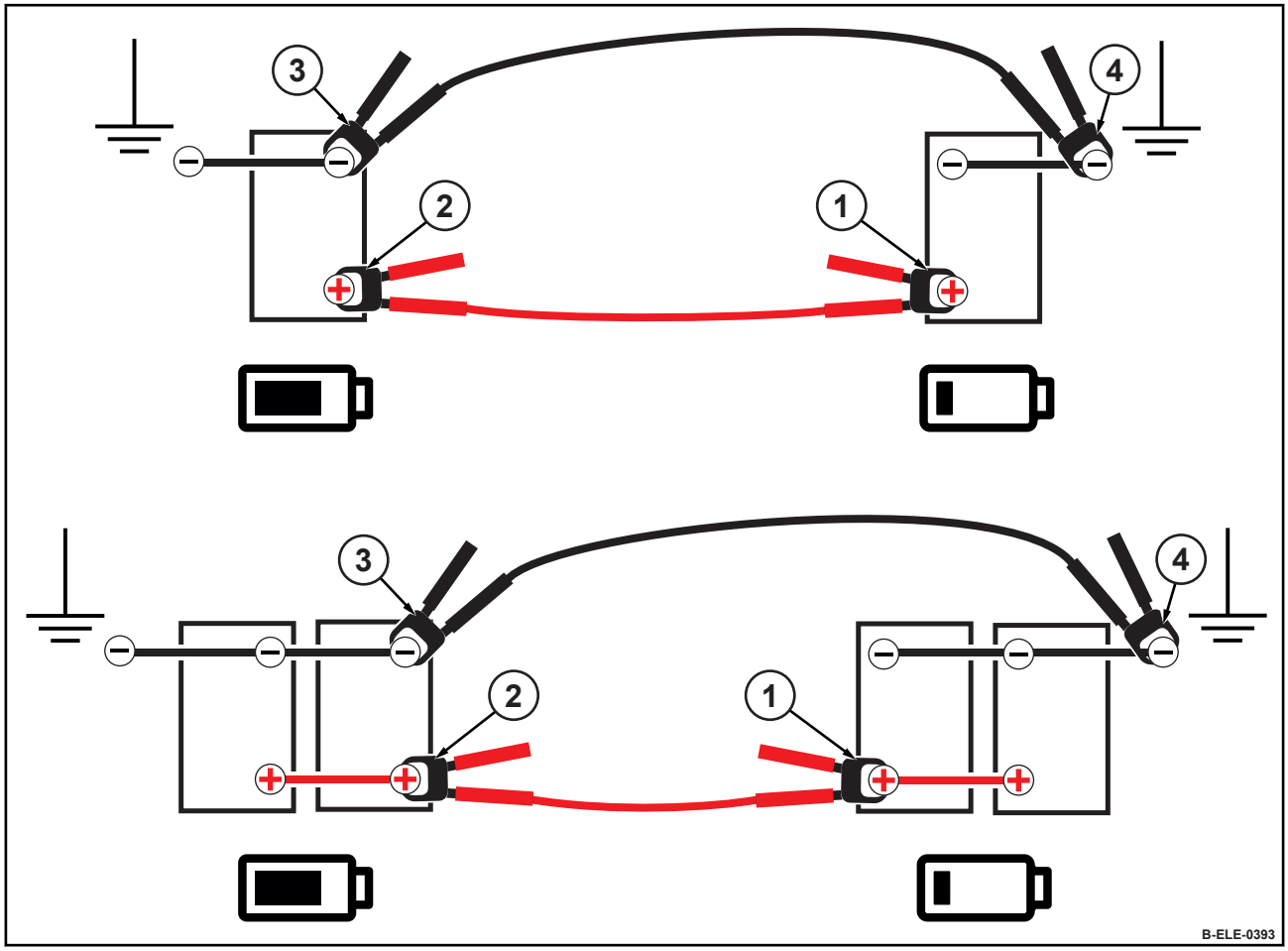


Fig. 214

3. Connect the red jump lead to the plus terminal of the starter battery (1).

4. Connect the other end to the plus terminal of the assisting battery (2).

NOTICE!

The electronics of the third-party vehicle may be damaged!

– In the case of third-party vehicles with a start-stop system or energy recovery (e.g. electric or hybrid drive), connect the black jump lead to an unpainted engine or chassis earth of the third-party vehicle.

5. Connect the black jump lead to the minus terminal of the assisting battery (3).
6. Connect the other end to an unpainted engine or body earth (4) of the machine, as far away from the starter battery as possible.

Start the engine

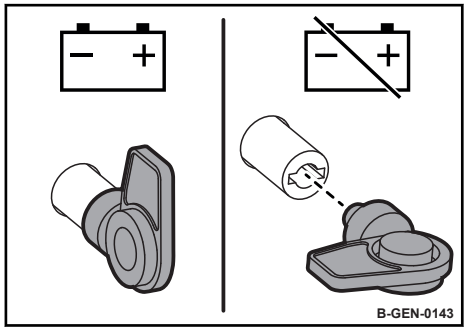


Fig. 215

7. Insert the main battery switch and turn it clockwise.
8. Start the engine of the third-party vehicle.
9. Start the engine of the machine *Chapter 6.2.4 'Starting the engine' on page 92*.
10. Run both motors for some time.

Disconnecting the jump lead

11. First remove the black jump lead from the starter battery and then from the assisting battery.
12. Switch off the engine of the third-party vehicle.
13. Remove the red jump lead.

Concluding work

14. Attach the terminal covers to all batteries.

10.1.2 Starting the engine with a jump starter

Preliminary remarks and safety notes

WARNING!

Danger of injury caused by exploding gas mixture!

- No open fire, do not smoke.
- Do not mix up the battery terminals and never short-circuit them. Observe the markings on the battery!
- Avoid sparking.
- Wear your personal protective equipment (protective gloves, protective clothing, goggles).

Only use a jump starter that fulfils the relevant technical requirements. Observe the technical data of the jump starter and the battery type plate!

Observe the operating instructions for the jump starter.

Do not jump start a damaged, frozen or thawed battery.

The battery plugs must be firmly closed.

Do not jump start batteries with an acid level that is too low. Risk of explosion and chemical burns!

Do not lean over the battery. Risk of chemical burns!

Do not reach into the engine compartment while jump starting.

Starting the engine with a jump starter

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves
- Safety goggles

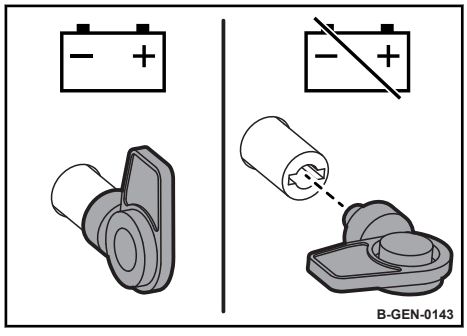


Fig. 216

1. Turn the main battery switch anticlockwise and pull it out.
2. Connect the jump starter and starter battery in accordance with the operating instructions for the jump starter.
3. Insert the main battery switch and turn it clockwise.
4. Start the engine of the machine *Chapter 6.2.4 'Starting the engine' on page 92*.
5. Run the motor for some time.
6. Disconnect the jump starter and starter battery in accordance with the operating instructions for the jump starter.
7. Attach the terminal covers on the battery.

10.2 Switching off the engine manually

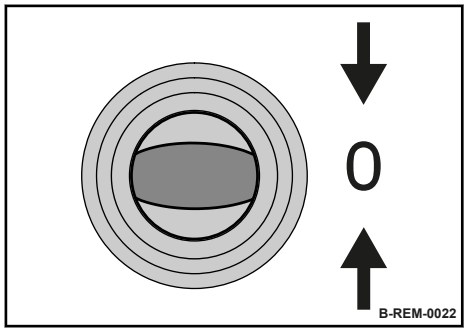


Fig. 217

1. If possible, move the machine onto level, firm ground.
2. Set the travel lever to “Middle” position to stop the machine.

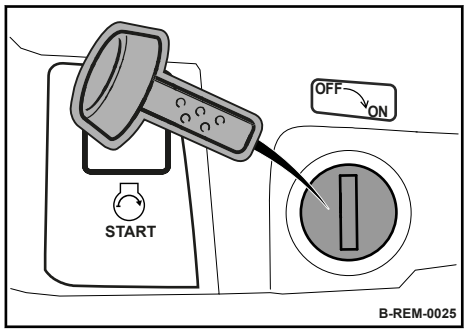


Fig. 218

3. Turn the ignition key to position “OFF” and pull it out.
4. Open the front protective hood.

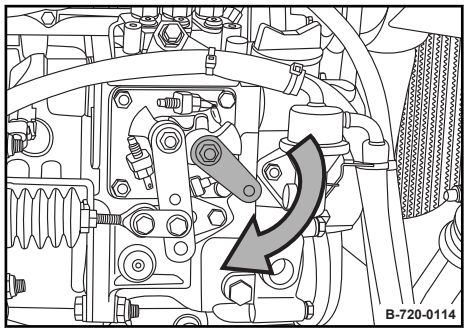


Fig. 219

5. Move the lever on the engine and hold.
   ⇨ The engine is shut down.
6. Close the front protective hood again.
7. Open the flap.

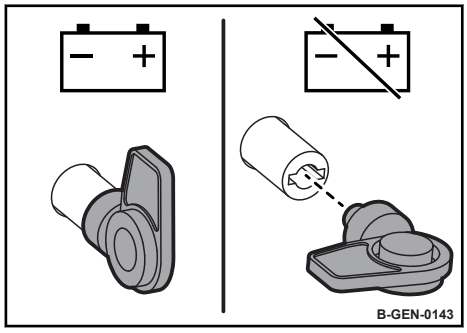


Fig. 220

8. Turn the main battery switch anticlockwise and pull it out.
9. Close the flap again.
10. Shut down the machine and inform our Customer Service Department.
11. Only operate the machine after it has been repaired.

10.3 Hydraulic oil leakage

10.3.1 Preliminary remarks and safety notes

Normally, there is no oil in the travel system housing.

Normally, there is only the intended oil quantity ↳ *Chapter 8.4 'List of fuels and lubricants' on page 127*in the exciter shaft housing.

In case of a leakage in the area of the drum, hydraulic oil may enter the travel system housing or the exciter shaft housing.

As a result, the housings can be under pressure.

10.3.2 Checking the travel system housing and exciter shaft housing

Protective equipment:
- Working clothes
- Safety shoes
- Protective gloves
- Safety goggles

Checking the travel system housing

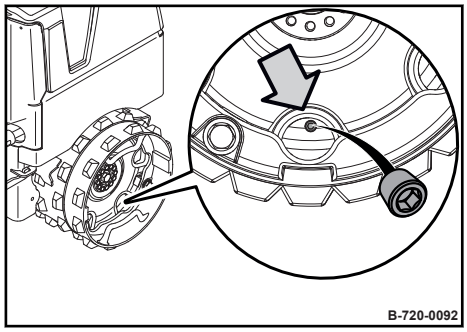


Fig. 221

1. Move the machine onto flat, level ground so that the plug can be reached through the bottom of the drum.
2. Park the machine safely ↳ *Chapter 6.6 'Parking the machine in secured condition' on page 102*.

CAUTION!

Danger of eye injuries caused by particles flying around!

– Wear your personal protective equipment (protective gloves, protective clothing, goggles).

3. Place a cleaning cloth underneath the plug and carefully unscrew the plug.

   ⇨ Normally, there must not be any oil in the travel system housing.
4. If a significant quantity flows out of the inspection bore you should inform our customer service.
5. Screw the plug in again.

Checking the exciter shaft housing

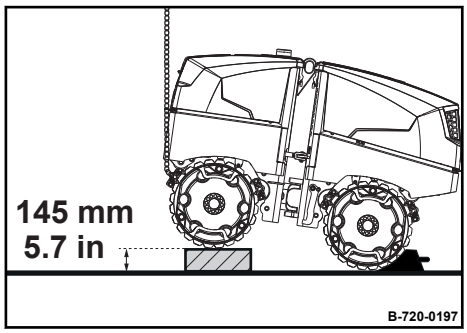


Fig. 222

6. Lift the front or rear of the machine 145 mm (5.7 in), support it securely and secure it with a wheel chock.

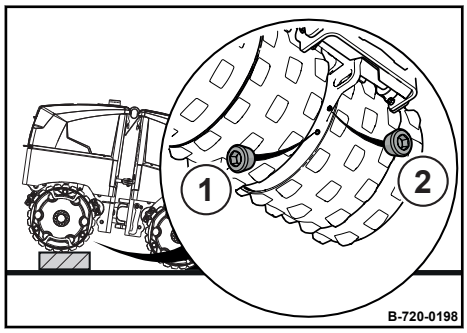


Fig. 223

7. Place a collecting basin under the plug (1, 2).

CAUTION!

Danger of eye injuries caused by particles flying around!

– Wear your personal protective equipment (protective gloves, protective clothing, goggles).

8. Carefully unscrew both plugs; collect any escaping oil.

⇨ The oil level normally just reaches the bottom edge of the drain bore.

9. If a significant quantity flows out of the drain bore, inform our Customer Service.

10. Screw both plugs in again.

11. Lower the machine.

12. If necessary, dispose of the collected oil in line with environmental regulations.

10.4 Fuse assignment

10.4.1 Notes on safety

WARNING!

Danger of injury by fire in the machine!

– Do not use fuses with higher ampere ratings and do not bridge fuses.

10.4.2 Opening/closing the central electrics

Prerequisites:

Main battery switch is switched off.

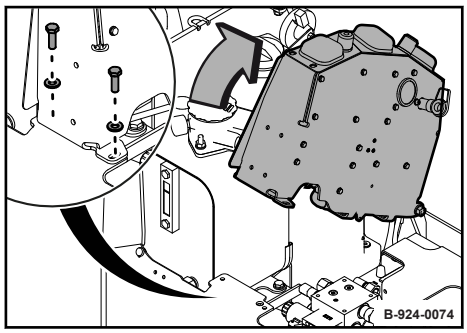


Fig. 224

1. Remove the screws.
2. Open the central electrics.
3. After completing the work, close the central electrics again and fasten the screws.

10.4.3 Central electrics fuse assignment

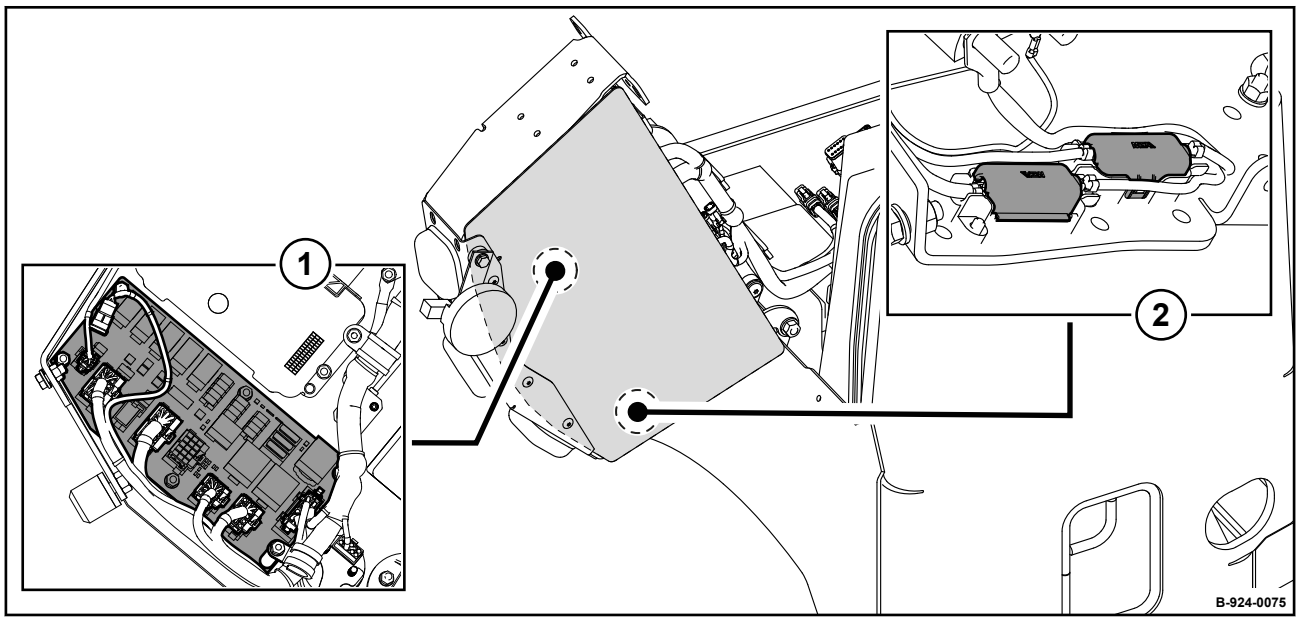


Fig. 225

1 Fuses for power board
2 Main fuses

Fuses for power board

Fuse	Amperage	Designation
F23	7.5 A	Warning horn
F26	5 A	Solenoid valve for travel speed ranges
F41	7.5 A	Flashing beacon
F54	7.5 A	Cable control
F67	20 A	Control unit (potential 30)
F80	5 A	Radio receiver
F91	5 A	Sensors
F105	20 A	Engine speed
F139	7.5 A	Engine shut-down
F157	30 A	Starter
F275	5 A	ECONOMIZER
F337	2 A	Emergency stop
F423	5 A	BOSS safety system
F442	10 A	Battery charger and work lights
F443	2 A	Diagnostics and TELEMATIC (potential 30)
F444	2 A	Diagnostics and TELEMATIC (potential 15)

Main fuses

Fuse	Amperage	Designation
F00	50 A	Main fuse
F48	50 A	Fuse for pre-heating

10.5 Engine malfunctions

Fault	Possible cause	Remedy
Engine does not start	Fuel tank empty	Refuel, bleed the fuel system
	Fuel filter gets clogged in winter due to paraffin separation	Replace the fuel filter; use winter fuel
	Fuel lines leaking	Check all line connections for leaks, tighten the screw connections and bleed the fuel system
	Battery is not charged or not connected	Tighten the connection terminals on the battery, check the line connections
	Starter defective	Have it examined by a specialist
	Emergency stop switch is locked in place	Unlock the emergency stop switch
	Overheating of movable parts due to insufficient lubrication	Check the engine oil level; correct if necessary Check the engine oil filter; replace if necessary Have the lubrication system checked by a specialist
Engine starts with difficulty or runs irregularly at low power	Battery power is too low, connection terminals are loose and oxidised, causing the starter to rotate slowly	Check the battery charge, clean and tighten the connection terminals and coat them with acid-free grease
	Fuel supply is too low, fuel filter is clogged in winter due to paraffin separation	Replace the fuel filter Check all line connections for leaks, tighten the screw connections and bleed the fuel system Use winter fuel in winter
	Engine oil with wrong SAE viscosity class	Changing the engine oil
	Air filter contaminated	Clean; replace if necessary
	Overheating of movable parts due to insufficient lubrication	Check the engine oil level; correct if necessary Check the engine oil filter; replace if necessary Check the lubrication system
The exhaust emits a lot of smoke	Engine oil level too high	Check; drain off if necessary
	Insufficient fuel quality	Use the specified fuel
	Air filter contaminated	Clean; replace if necessary
	Injection valve defective	Have it examined by a specialist
The engine gets too hot; switch off the engine immediately!	The cooling fins of the cooler are heavily contaminated (warning light for coolant temperature lights up)	Clean the cooling fins
	Engine oil level too low	Check, refill if necessary

Fault	Possible cause	Remedy
	Lack of coolant	Check all lines, hoses and engine for condition and leaks Check the coolant level; refill if necessary Do not use radiator sealant to seal leaks
	Anti-freeze concentration too high	Use coolant with prescribed mixing ratio
	Air filter contaminated	Clean; replace if necessary
	Thermostat defective	Check the thermostat, replace it if necessary
	Corroded interior cooler components	Clean the cooler, replace it if necessary
	Lack of cooling air at the cooling air fan	Clear the air intake
	Fan, cooler or cooler lock broken	Have it examined by a specialist
The engine oil pressure is too low (warning light for engine oil pressure)	Engine oil level too low	Check, refill if necessary
	Lubrication system is leaking	Have the lubrication system checked by a specialist
The charge control light lights up during operation, warning buzzer sounds	Generator speed too low	Check the tension of the generator belt; if necessary, replace the belt
	Generator or governor defective	Have it examined by a specialist

10.6 Faults in BOSS safety system

Fault	Possible cause	Remedy
No travel movements; steering is still possible	The operator is inside the safety field with radio remote control	Leave the safety field
	Radio remote control or receiver replaced and safety field system subsequently not taught	Teach the safety field system ↳ *Chapter 9.2 'Teaching the remote control and the BOSS safety field system' on page 169*
	Front or rear safety device aerial not connected properly or defective	Check the plug-in connection of the aerials; replace if necessary
	Distance between machine and radio remote control is too great	Reduce the distance
	Safety device control not connected properly or defective	Check the plug-in connection of the control; replace if necessary
	Radio remote control is defective	Have it examined by a specialist; replace if necessary
	Wiring harness defective	Have it examined by a specialist; replace if necessary

10.7 Remote control faults (radio operation)

Prerequisites:

- Function of the remote control in cable operation without any interference
- No steel rope or metal attachments on the machine (radio connection interference)

Fault	Possible cause	Remedy
Machine does not respond	Aerial defective or wrong one installed	Have it examined by a specialist; replace if necessary
	Receiver not or incorrectly connected	Check the plug-in connection between receiver and machine
	Battery empty or defective	Charge or replace the battery
	Distance between machine and radio remote control is too great	Reduce the distance
	Receiver or radio remote control is defective	Have it examined by a specialist; replace if necessary
Ignition key in position "I", display module operative, but engine cannot be started	Battery empty or defective	Charge or replace the battery
	Receiver or radio remote control is defective	Have it examined by a specialist; replace if necessary
Engine stops for no reason	Battery empty or defective	Charge or replace the battery
	Interference caused by other radio signals	Check close vicinity for other radio signals (e.g. airport, construction crane); if necessary, move machine by means of cable operation
	Aerial defective or wrong one installed	Have it examined by a specialist; replace if necessary
	Distance between machine and radio remote control is too great	Reduce the distance
	Emergency stop switch actuated or defective	Pull out the emergency stop switch Have it examined by a specialist; replace if necessary
	Receiver or radio remote control is defective	Have it examined by a specialist; replace if necessary
	Wiring harness defective	Have it examined by a specialist; replace if necessary

10.8 Remote control faults (cable operation)

Fault	Possible cause	Remedy
Engine stops for no reason	Emergency stop switch actuated or defective	Pull out the emergency stop switch Have it examined by a specialist; replace if necessary
	Fuse F54, F67 or F00 triggered	Check the fuses; replace if necessary Have it examined by a specialist
	Relay K11 is defective	Have it examined by a specialist; replace if necessary
	Cable is defective	Check cable for tight fit Have it examined by a specialist; replace if necessary
	Remote control is defective	Have it examined by a specialist; replace if necessary
	Cross-slope sensor defective	Have it examined by a specialist; replace if necessary
	Control unit is defective	Have it examined by a specialist; replace if necessary
Ignition key in position "I", display module operative, but engine cannot be started	The travel lever or steering lever is not in neutral position	Disengage the travel lever or steering lever and move to neutral position
	Fuse F157 triggered	Check the fuses; replace if necessary Have it examined by a specialist; replace if necessary
	Battery not charged or defective	Check the battery charge; recharge if necessary Replace defective battery
	Cross-slope sensor defective	Have it examined by a specialist; replace if necessary
	Relay K39 is defective	Have it examined by a specialist; replace if necessary
	Cable is defective	Check cable for tight fit Have it examined by a specialist; replace if necessary
	Remote control is defective	Have it examined by a specialist; replace if necessary
	Control unit is defective	Have it examined by a specialist; replace if necessary
No function after starting up engine	Start sequence not observed; engine started before horn sounds	Actuate the warning horn button Shut down the engine manually and restart

Fault	Possible cause	Remedy
	Emergency stop switch actuated or defective	Pull out the emergency stop switch Have it examined by a specialist; replace if necessary
	Remote control is defective	Have it examined by a specialist; replace if necessary
	Cable is defective	Check cable for tight fit Have it examined by a specialist; replace if necessary
	Control unit is defective	Have it examined by a specialist; replace if necessary
"CTO" appears on display module when ignition key in position "I"	Cable is defective	Check cable for tight fit Have it examined by a specialist; replace if necessary
	Control unit is defective	Have it examined by a specialist
Engine does not run to full speed	Engine speed toggle switch not actuated or defective	Have it examined by a specialist; replace if necessary
	Fuse F105 triggered	Check the fuses; replace if necessary Have it examined by a specialist; replace if necessary
	Relay K114 is defective	Have it examined by a specialist; replace if necessary
	Control unit is defective	Have it examined by a specialist; replace if necessary
	Cable is defective	Check cable for tight fit Have it examined by a specialist; replace if necessary

10.9 Trouble shooting ECONOMIZER

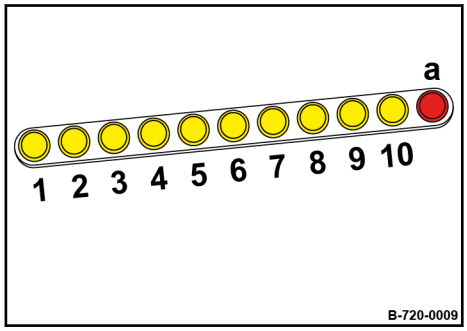


Fig. 226

Fault	Possible cause	Remedy
Status display (a) flashing	Jump operation of the drum on hard ground	
	Vibration frequency and/or engine speed too slow	Make sure the engine reaches maximum speed. Inform our Customer Service.
	Cable breakage	Inform our Customer Service Department
	Sensor has come loose	Inform our Customer Service Department
Status display (a) lights	System error	Restart the ECONOMIZER. Turn the ignition key back to position “0” and then again to position “I”. If the status display (a) still does not light up, inform our Customer Service.
LEDs 5, 6 and 7 are flashing	No calibration value available This value is required to calculate the measuring values.	Inform our Customer Service Department
The displayed measuring values are not plausible	Weak spots may also be located under the layer to be compacted and thus adversely affect compaction of the layers above.	In unfavourable cases, excessively varying material composition can influence the measuring results. On material which is too dry or moist, lower measuring values will be displayed.

10.10 Telematic

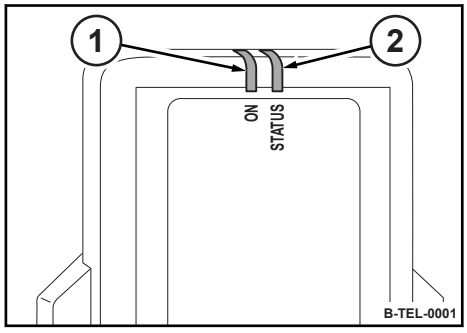


Fig. 227

The ON LED (1) indicates the status of the voltage supply.

The STATUS LED (2) indicates the connection status.

The different colours of the STATUS LED symbolise different levels of urgency, from 4 (low priority) to 1 (high priority). If several errors are present at the same time, the error with the highest priority is displayed.

During normal operation, the STATUS LED flashes from time to time. However, this is not an error condition, but symbolises data traffic.

ON LED		
Colour	**Status**	**Meaning**
-	Off	System switched off.
Green	On	System switched on.
Red	On	System switched on, voltage beyond the tolerance. Battery voltage too low.
Green	Flashing	System in diagnostics mode or update mode.

STATUS LED		
Colour	**Status / priority**	**Meaning**
-	Off / -	System switched off.
Green	On / -	Connection to the server.
Blue	On / 1	No connection to the server.
Orange	On / 2	Faulty connection to the Telematic CAN bus 1.
Red	On / 3	Faulty connection to the Telematic CAN bus 2.
Magenta	On / 4	No location found or no antenna connected.

10.11 Fault code display

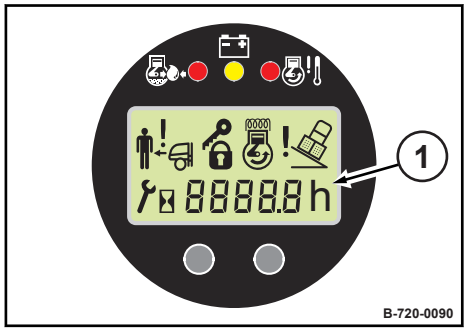


Fig. 228

Faults are displayed on the display module (1) in the form of flashing fault codes. If several faults occur at the same time, these will be indicated by flashing codes, one after the other.

If a fault code is displayed, read out and have the fault rectified by specialists authorised by the operating company. If necessary, contact our Customer Service.

Overview of fault codes *Chapter 12 'Appendix' on page 197*.

10.12 Entering input codes

10.12.1 Starting the input

Codes can be entered via the display unit to show operating states and for troubleshooting.

The codes can be entered via the display module or via the remote control.

Codes can only be entered when the engine is switched off.

Prerequisites:

The engine is switched off.

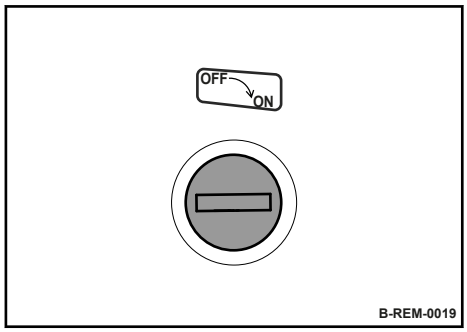


Fig. 229

1. Turn the ignition switch to position “ON”.
2. Wait until the operating hours are shown on the display module.

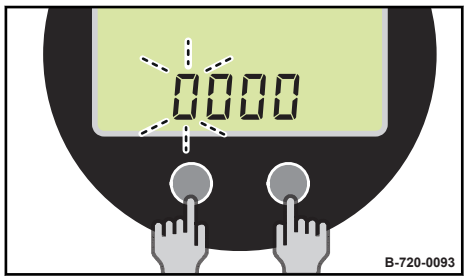


Fig. 230

3. On the display module, press *[function key F1]* and *[function key F2]* at the same time.
   ⇨ The 0000 display appears.
   The first digit flashes.
4. Enter the input codes:
   - Via the display module ↳ *Chapter 10.12.2 ‘Input via the display module’ on page 192*.
   - Via the remote control ↳ *Chapter 10.12.3 ‘Input via remote control’ on page 193*.

10.12.2 Input via the display module

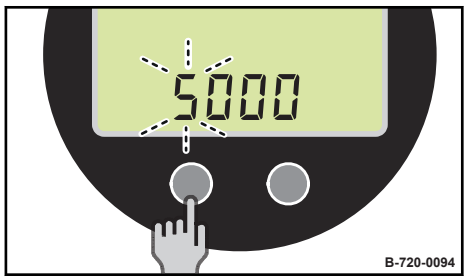


Fig. 231

1. Set the first digit of the input code by pressing *[function key F1]*.

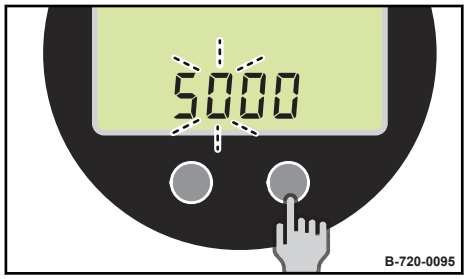


Fig. 232

2. Press *[function key F2]* and move one digit further.
3. Set the other digits of the input code.

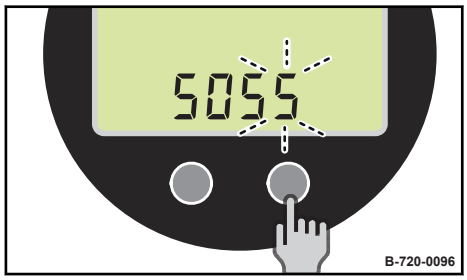


Fig. 233

4. After setting the fourth digit, quit input by pressing *[function key F2]*.

   ⇨ The required function is implemented.

> *Depending on the function (e.g. switching ECO mode off or on), further codes must be entered.*

10.12.3 Input via remote control

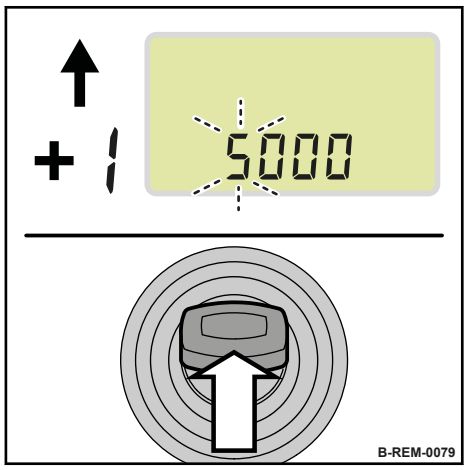


Fig. 234

1. Set the first digit of the input code by pressing the travel lever forwards.

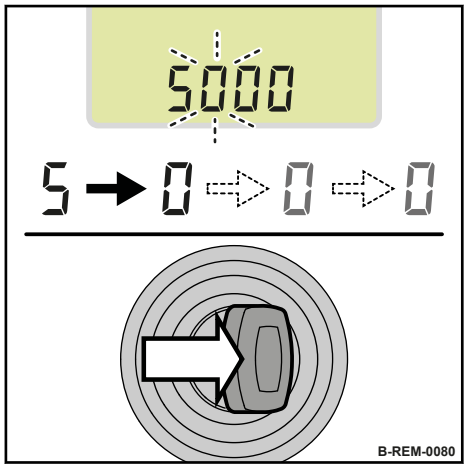


Fig. 235

2. Press the steering lever to the right to move one digit further.
3. Set the other digits of the input code.

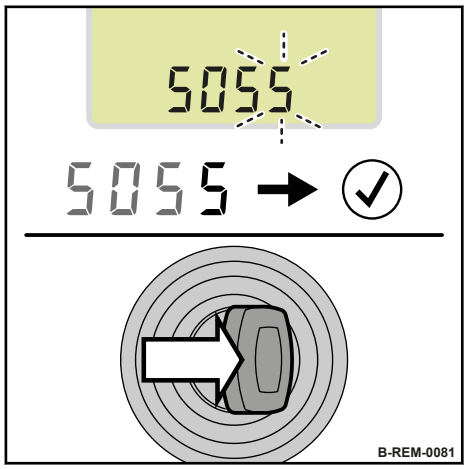


Fig. 236

4. After setting the fourth digit, quit input by pressing the steering lever to the right.

   ⇨ The required function is implemented.

Depending on the function (e.g. switching ECO mode off or on), further codes must be entered.

10.12.4 Quitting the input

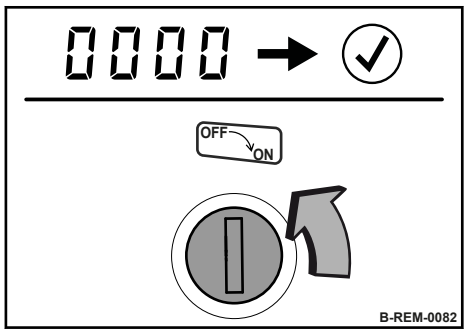


Fig. 237

1. To quit the input, enter the input code `0000` or turn the ignition switch to the “OFF” position.

11 Disposal

11.1 Final shut-down of machine

After the machine has reached the end of its service life, the individual components of the machine must be disposed of properly.

Observe national regulations!

Carry out the following work and have the machine dismantled by a state-approved recycling company.

WARNING!

Health hazard caused by fuels and lubricants!

– Safety regulations and environmental protection regulations must be followed when handling fuels and lubricants ↳ *Chapter 3.4 'Handling fuels and lubricants' on page 30*.

Protective equipment:

- Working clothes
- Safety shoes
- Protective gloves
- Safety goggles

1. Remove the batteries.
2. Empty the fuel tank.
3. Drain the hydraulic oil tank.
4. Drain the coolant from the cooling system and engine.
5. Drain engine oil from the engine and exciter housing.

12 Appendix

12.1 List of fault codes

Travel functions

Fault code	Fault reaction	Fault description	Possible cause
1031	Output is switched off. Function is no longer possible.	**Output for valve of forward travel, Y 16**. A short circuit current flows out of this output. Output was switched off!	Short circuit to ground in the current path. Lines rubbed through. Valve is defective.
1032	Output is switched off. Function is no longer possible.	**Output for valve of forward travel, Y 16**. No or inadequate current flows out of this output.	Wire breakage in the current path. Current path connected to +12 V.
1033	Output is switched off. Function is no longer possible.	**Output for valve of forward travel, Y 16**. Although the output is switched off, voltage is present.	Current path connected to +12 V.
1041	Output is switched off. Function is no longer possible.	**Output for valve of reverse travel, Y 17**. A short circuit current flows out of this output. Output was switched off!	Short circuit to ground in the current path. Lines rubbed through. Valve is defective.
1042	Output is switched off. Function is no longer possible.	**Output for valve of reverse travel, Y 17**. No or inadequate current flows out of this output.	Wire breakage in the current path. Current path connected to +12 V.
1043	Output is switched off. Function is no longer possible.	**Output for valve of reverse travel, Y 17**. Although the output is switched off, voltage is present.	Current path connected to +12 V.
1051	Output is switched off. Function is no longer possible.	**Output for valve of 2. gear, Y 03**. A short circuit current flows out of this output. Output was switched off!	Short circuit to ground in the current path. Lines rubbed through. Valve is defective.
1052	Output is switched off. Function is no longer possible.	**Output for valve of 2. gear, Y 03**. No or inadequate current flows out of this output.	Wire breakage in the current path. Current path connected to +12 V.

Fault code	Fault reaction	Fault description	Possible cause
1053	Output is switched off. The engine only runs at idle speed.	**Output for valve of 2. gear, Y 03**. Although the output is switched off, voltage is present.	Current path connected to +12 V.
1061	Output is switched off. Function is no longer possible.	**Output for brake valve, Y 04**. A short circuit current flows out of this output. Output was switched off!	Short circuit to ground in the current path. Lines rubbed through. Valve is defective.
1062	Output is switched off. Function is no longer possible.	**Output for brake valve, Y 04**. No or inadequate current flows out of this output.	Wire breakage in the current path. Current path connected to +12 V.
1063	Output is switched off. The engine only runs at idle speed.	**Output for brake valve, Y 04**. Although the output is switched off, voltage is present.	Current path connected to +12 V.
1070	Warning. Horn sounds.	**Pressure sensor for travel forward B234.** Implausible condition.	Wire breakage in the current path. Short circuit to ground in the current path. Lines rubbed through. Sensor is defective.
1073	Output is switched off. The engine only runs at idle speed. Horn sounds. Forward travel no longer possible.	**Pressure sensor for travel forward B234.** Implausible pressure ratio in travel circuit forward/reverse.	Leakage in the hydraulic circuit. Wire breakage in the current path. Sensor is defective. Sensor plugged incorrectly.
1074	Warning. Horn sounds.	**Pressure sensor for travel forward B234.** Implausible condition.	Wire breakage in the current path. Short circuit to ground in the current path. Lines rubbed through. Sensor is defective.

Appendix – List of fault codes

Fault code	Fault reaction	Fault description	Possible cause
1075	Warning. Horn sounds.	**Pressure sensor for travel forward B234.** Implausible condition.	Hydraulic oil pressure too high. Perhaps driven against closed brake or the drums are stuck. Current path connected to +12 V.
1080	Warning. Horn sounds.	**Pressure sensor for travel reverse B235.** Implausible condition.	Wire breakage in the current path. Short circuit to ground in the current path. Lines rubbed through. Sensor is defective.
1083	Output is switched off. The engine only runs at idle speed. Horn sounds. Reverse travel no longer possible.	**Pressure sensor for travel reverse B235.** Implausible pressure ratio in travel circuit forward/reverse.	Leakage in the hydraulic circuit. Wire breakage in the current path. Sensor is defective. Sensor plugged incorrectly.
1084	Warning. Horn sounds.	**Pressure sensor for travel reverse B235.** Implausible condition.	Wire breakage in the current path. Short circuit to ground in the current path. Lines rubbed through. Sensor is defective.
1085	Warning. Horn sounds.	**Pressure sensor for travel reverse B235.** Implausible condition.	Hydraulic oil pressure too high. Perhaps driven against closed brake or the drums are stuck. Current path connected to +12 V.
1321	Output is switched off. Function is no longer possible.	**Relay for vibration K4.** Voltage below normal range or short circuit to ground.	Bad connection in wiring harness, connector or central electrics.
1322	Output is switched off. Function is no longer possible.	**Relay for vibration K4.** Current too low or line interruption.	Bad connection in wiring harness, connector or central electrics.

Fault code	Fault reaction	Fault description	Possible cause
1323	Output is switched off. Function is no longer possible.	**Relay for vibration K4.** Voltage above normal range or short circuit to (+) potential.	Bad connection in wiring harness, connector or central electrics.
1325	Output is switched off. Function is no longer possible.	**Vibration valve Y56 (low amplitude.)** Unintentional vibration or incorrect amplitude.	Current path connected to +12 V.
1326	Output is switched off. Function is no longer possible.	**Vibration valve Y57 (high amplitude.)** Unintentional vibration or incorrect amplitude.	Current path connected to +12 V. Short circuit to ground in the current path (pin K87). Lines rubbed through.
1327	Output is switched off. Function is no longer possible.	**Relay for vibration K4.**	Relay defective. Output defective. Lines rubbed through.
1328	Output is switched off. Function is no longer possible.	**Relay for vibration K4.**	Relay defective. Output defective. Lines rubbed through.

Steering

Fault code	Fault reaction	Fault description	Possible cause
2011	Output is switched off. Function is no longer possible.	**Output for valve of steering right, Y 237**. A short circuit current flows out of this output. Output was switched off!	Short circuit to ground in the current path. Lines rubbed through. Valve is defective.
2012	Output is switched off. Function is no longer possible.	**Output for valve of steering right, Y 237**. No or inadequate current flows out of this output.	Wire breakage in the current path. Current path connected to +12 V.
2013	Output is switched off. Function is no longer possible.	**Output for valve of steering right, Y 237**. Although the output is switched off, voltage is present.	Current path connected to +12 V.

Fault code	Fault reaction	Fault description	Possible cause
2021	Output is switched off. Function is no longer possible.	**Output for valve of steering left, Y 238**. A short circuit current flows out of this output. Output was switched off!	Short circuit to ground in the current path. Lines rubbed through. Valve is defective.
2022	Output is switched off. Function is no longer possible.	**Output for valve of steering left, Y 238**. No or inadequate current flows out of this output.	Wire breakage in the current path. Current path connected to +12 V.
2023	Output is switched off. Function is no longer possible.	**Output for valve of steering left, Y 238**. Although the output is switched off, voltage is present.	Current path connected to +12 V.

Remote control

Fault code	Fault reaction	Fault description	Possible cause
2601	Engine is shut down.	**Remote control.** Poor radio connection between remote control and receiver.	Distance to the machine too great. Antenna not plugged on. Radio interference.
2603	Engine is shut down.	**Remote control.** No radio connection between remote control and receiver.	Remote control is defective. Cable disconnected during operation.
2605	Warning.	Implausible condition of the remote control components.	Contamination on remote control. Defective travel/steering lever on remote control. Defective remote control.
2609	Warning.	No function of the LED display.	LED display on the remote control not connected or defective.
2610	Warning.	**Remote control.** Teach-in of the remote control failed.	New remote control taught on the machine. Reconnect the remote control with the cable.

Fault code	Fault reaction	Fault description	Possible cause
2611	Engine is not started. Warning.	**Joystick on remote control active during starting process.**	Travel lever pressed during starting process. Joystick defective.
2612	Engine is not started. Warning.	**Joystick on remote control active during starting process.**	Steering lever pressed during starting process. Joystick defective.

Economizer

Fault code	Fault reaction	Fault description	Possible cause
4010	Module is not initialised.	No machine type set.	Failed to load parameters.
4011	No display function of the LED bar.	No communication to the control unit.	Machine type unknown (no machine type set).
4020	No display function of the LED bar.	Module is not initialised.	Faulty connection. Incorrect setting. Internal fault.
4099	No display function of the LED bar.	No connection to the control unit.	Wire breakage in the current path. Internal fault.

Engine, machine in general

Fault code	Fault reaction	Fault description	Possible cause
5016		**Logic and power module.** Data valid, but below normal operating range - severe infringement of range.	Inform our Customer Service Department.
5017	Machine fails to start.	**Emergency stop active.**	Wire breakage in the current path. Current path connected to +12 V. Current path connected to ground.
5018	Machine fails to start. Engine is shut down.	**Fault in logic and power module.** Data from parameters cannot be loaded.	Inform our Customer Service Department.

Appendix – List of fault codes

Fault code	Fault reaction	Fault description	Possible cause
5020	Warning. Horn sounds.	**Input for engine oil pressure, B 06.** Oil pressure switch delivers the signal “no engine oil pressure”.	The oil pressure switch has measured inadequate oil pressure. The engine may be shut down. Should this message be displayed even though the engine is not running, the following faults should be examined: Current path has short circuit to ground. Engine oil level too low. Engine oil pump is defective. Pressure limiting valve behind engine oil filter soiled. Oil pressure switch is defective.
5021	Engine is shut down because oil pressure is too low.	**Input for engine oil pressure, B 06.** Fault 5020 present longer than 8 seconds. Engine is shut down.	See fault code 5020.
5025	Engine is running. Warning. Horn sounds.	**No rotary speed signal from the generator.**	The governor of generator is defective. Lines rubbed through.
5026	Engine is running. Warning. Horn sounds.	**Generator G02.** Charge control light is active. No D+ signal from the generator.	Generator defective. Current path has short circuit to ground. Lines rubbed through.
5030	Engine is running. Warning. Horn sounds.	**Generator G02.** Charge control light is active.	Lines rubbed through. Generator signal implausible.
5031	Engine is shut down.	Input signals for motor operation are not detected.	Engine stalled. Generator defective. Oil pressure too low. V-belt torn.

Fault code	Fault reaction	Fault description	Possible cause
5040		**Sensor for fuel filling level.** Malfunctioning device or component.	
5041	Output is switched off. Engine is shut down.	**Output holding winding of shut-down solenoid, Y 13.** A short circuit current flows out of this output. Output was switched off!	Short circuit to ground in the current path. Lines rubbed through. Valve is defective.
5042	Output is switched off. Engine is shut down.	**Output holding winding of shut-down solenoid, Y 13.** No or inadequate current flows out of this output.	Wire breakage in the current path. Current path connected to +12 V.
5043	Output is switched off. Engine is shut down.	**Output holding winding of shut-down solenoid, Y 13.** Although the output is switched off, voltage is present.	Current path connected to +12 V.
5050		**Solenoid valve for engine control rod.** Reaction or signal not plausible.	Short circuit to ground in the current path. Lines rubbed through.
5051	Output is switched off. Engine only runs at idle speed.	**Output relay K 114, speed control solenoid.** A short circuit current flows out of this output. Output was switched off!	Short circuit to ground in the current path. Lines rubbed through.
5052	Output is switched off. Engine only runs at idle speed.	**Output holding winding of shut-down solenoid, Y 13.** No or inadequate current flows out of this output.	Wire breakage in the current path. Current path connected to +12 V.
5053	Output is switched off. Engine only runs at idle speed.	**Output relay K 114, speed control solenoid.** Although the output is switched off, voltage is present.	Current path connected to +12 V.
5054	Output X3:09 (K 114) is switched off. Engine only runs at idle speed.	**Input for AUX signal solenoid Y 46.**	Wire breakage in the current path.

Appendix – List of fault codes

Fault code	Fault reaction	Fault description	Possible cause
5060	Warning. Horn sounds.	**Solenoid valve for engine control rod.** Malfunctioning device or component.	Short circuit to ground in the current path. Lines rubbed through.
5061	Output is switched off. No potential 15 in the machine; control is still running. Engine stopped or cannot be started.	**Output relay K 11, changeover of potential 15.** A short circuit current flows out of this output. Output was switched off!	Short circuit to ground in the current path. Lines rubbed through.
5062	Output is switched off. No potential 15 in the machine; control is still running. Engine stopped or cannot be started.	**Output relay K 11, changeover of potential 15.** No or inadequate current flows out of this output.	Wire breakage in the current path. Current path connected to +12 V.
5063	Output is switched off. No potential 15 in the machine; control is still running. Engine stopped or cannot be started.	**Output relay K 11, changeover of potential 15.** Although the output is switched off, voltage is present.	Current path connected to +12 V.
5071	Output is switched off. Engine can no longer start.	**Output relay K 39, starter.** A short circuit current flows out of this output. Output was switched off!	Wire breakage in the current path. Current path connected to ground. Lines rubbed through.
5072	Output is switched off. Engine can no longer start.	**Output relay K 39, starter.** No or inadequate current flows out of this output.	Wire breakage in the current path.
5073	All outputs are switched off. Engine is stopped, the safety relay is switched off.	**Output relay K 39, starter.** Although the output is switched off, voltage is present.	Current path connected to +12 V.
5095	Machine does not start.	**Input for cross-slope sensor B448.** The machine cannot be started. Battery voltage is too low.	Battery voltage < 11 V. Battery deeply discharged or defective.

Fault code	Fault reaction	Fault description	Possible cause
5097	Machine does not start.	**Input for cross-slope sensor B448.** The machine cannot be started, because the input does not receive a signal from the cross-slope sensor.	Wire breakage in the current path. Sensor is defective. The sensor is in actuated state (incorrect installation position).
5098	The diesel engine is shut down.	**Input for cross-slope sensor B448.** The diesel engine is shut down because the input on the control does not receive a signal from the cross-slope sensor.	Wire breakage in the current path. Sensor is defective. The sensor is in actuated state (machine has fallen over). The machine must first be shut down after it has been placed in correct position!
5099	The diesel engine is shut down.	**Input for cross-slope sensor B448.** The diesel engine is shut down because the input on the control does not receive a signal from the cross-slope sensor. Start lock is activated.	The sensor is in actuated state (machine has fallen over). Start lock is activated. Wire breakage in the current path. Sensor is defective.
5100	Warning. Horn sounds.	**Input for coolant temperature sensor, B53.** Coolant temperature is too high.	Coolant level too low. Radiator is defective. Sensor is defective.
5101	Vibration and 2. gear switched off.	**Input for coolant temperature sensor, B53.** Coolant temperature too high over a longer period of time.	Coolant level too low. Radiator is defective. Sensor is defective.
5121	Warning. Horn sounds.	**Output relay K 14, preheating.** A short circuit current flows out of this output. Output was switched off!	Wire breakage in the current path. Current path connected to ground. Lines rubbed through.
5122	Warning. Horn sounds.	**Output relay K 14, preheating.** No or inadequate current flows out of this output.	Wire breakage in the current path.

Fault code	Fault reaction	Fault description	Possible cause
5123	Warning. Horn sounds.	**Output relay K 14, pre-heating.** Although the output is switched off, voltage is present.	Current path connected to +12 V.
5131	Warning. Horn sounds. Work function limited.	**Output relay K 38, starter.** A short circuit current flows out of this output. Output was switched off!	Wire breakage in the current path. Current path connected to ground. Lines rubbed through.
5132	Warning. Horn sounds.	**Output relay K 38, starter.** No or inadequate current flows out of this output.	Wire breakage in the current path.
5133	Warning. Horn sounds.	**Output relay K 38, starter.** Although the output is switched off, voltage is present.	Current path connected to +12 V.
5137	All outputs are switched off. Engine is shut down. Safety relay is switched off.	**Output relay K 38, starter.** Although the output is switched off, voltage is present.	Current path connected to +12 V.

BOSS safety system

Fault code	Fault reaction	Fault description	Possible cause
6010	No travel movement possible. Steering movements only.	**Safety field antenna, front (W12).** Fault in safety field antenna.	Wire breakage in the current path. Front safety field antenna is defective.
6011	No travel movement possible. Steering movements only.	**Safety field antenna, rear (W13).** Fault in safety field antenna.	Wire breakage in the current path. Rear safety field antenna is defective.
6012	No travel movement possible. Steering movements only.	**Transponder.** Fault (no feedback).	Fault in the radio range of the safety system. Transponder of remote control is defective. Spiral cable is defective. Safety field control unit is defective.

Fault code	Fault reaction	Fault description	Possible cause
6013	No travel movement possible. Steering movements only.	**Transponder.** Fault.	Internal fault of the remote control transponder.
6014	No travel movement possible. Steering movements only.	**Safety field control unit (A115).** Fault.	Internal fault in the safety field control unit.
6015	No travel movement possible. Steering movements only.	**Safety field control unit (A115) and transponder.** Fault in bus communication between the safety field control unit and the transponder.	Wire breakage in the current path. RFID module not plugged in.
6017	No travel movement possible. Steering movements only.	No/poor reception quality of safety field control unit.	Transmitter/receiver not paired. Range too large.
6018	No travel movement possible. Steering movements only.	**Safety field control unit (A115) and transponder.** Fault in bus communication between the safety field control unit and the travel control.	Wire breakage in the current path. Internal fault in the safety field control unit.
6023		RFID Service Mode active.	

Parameterization

Fault code	Fault reaction	Fault description	Possible cause
7010	Module is not initialised.	No machine type set.	Module is new. Parameters have been deleted.

12.2 Input codes

Travel functions

Input code	Description of display function	Display values
1055 1057 1056	**Deactivating 2nd gear (travel speed range 2, rabbit).** Enter the three codes in the specified sequence to deactivate travel speed range 2.	
1055 1058 1056	**Activating 2nd gear (travel speed range 2, rabbit).** Enter the three codes in the specified sequence to activate travel speed range 2.	
1059	**Status 2nd gear (travel speed range 2).**	0 = travel speed range 2 off. 1 = travel speed range 2 on.

Engine electrics

Input code	Description of display function	Display values
5035 5037 5036	**Programming to activate the start lock.** Enter the three codes in the specified sequence to activate the start lock after the machine has tipped over.	See service manual.
5035 5038 5036	**Programming to deactivate the start lock.** Enter the three codes in the specified sequence to deactivate the start lock.	See service manual.
5055 5057 5056	**ECO mode off.** Enter the three codes in the specified sequence to deactivate ECO mode permanently.	
5055 5058 5056	**ECO mode on.** Enter the three codes in the specified sequence to activate ECO mode permanently.	
5059	**Display for ECO mode settings.**	0 = ECO mode off. 1 = ECO mode on.

System information

Input code	Description of display function	Display values
0555	**Software version.** Shows the software version number.	3-digit version number.

Operating hour meter

Input code	Description of display function	Display values
7500	**Operating hours counter.** Display of hours.	Rounded operating hours.
7501	**Operating hours counter.** Display of minutes.	Minute digit of the operating hours counter.

12.3 Compliance Statements

1.4 Compliance Statements FCC for USA (Safety Field System and Radio Remote Control System)

Transponder:
Model: BSS255T
FCC ID: QLXBSS255T
Brand: TeraTron

Safety field control:
Model: BSS255R
FCC ID: QLXBSS255R
Brand: TeraTron

Radio Remote Control System:
Model: CSM2400FH Radio Module
FCC ID: LW9-CSM-2400FH
Brand: Hetronic International Inc

BSS255T and BSS255R Compliance Statements FCC

This device complies with part 15 of the FCC Rules.
Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.
Changes or modifications not expressly approved by the party responsible for compliance voids the user's authority to operate this equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
• Reorient or relocate the receiving antenna.
• Increase the separation between the equipment and receiver.
• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
• Consult the dealer or an experienced radio/TV technician for help.
This equipment complies with FCC and IC radiation exposure limits set forth for an uncontrolled environment.
This equipment (BSS255R) should be installed and operated with minimum distance of 20 cm between the radiator and your body.
This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

B-720-0172

Fig. 238

Applies only to the corresponding scope of application.

1.5 Compliance Statements IC for Canada (Safety Field System and Radio Remote Control System)

Transponder:
Model: BSS255T
FCC ID: QLXBSS255T
Brand: TeraTron

Safety field control:
Model: BSS255R
FCC ID: QLXBSS255R
Brand: TeraTron

Radio Remote Control System:
Model: CSM2400FH Radio Module
IC ID: 2119B-CSM2400FH
Brand: Hetronic International Inc

BSS255T and BSS255R Compliance Statements IC

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s).
Operation is subject to the following two conditions:
(1) This device may not cause interference.
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

This equipment complies with FCC and IC radiation exposure limits set forth for an uncontrolled environment. This equipment (BSS255R) should be installed and operated with minimum distance of 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence.
L'exploitation est autorisée aux deux conditions suivantes :
1) L'appareil ne doit pas produire de brouillage;
2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un Environnement non contrôlé.
Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement (BSS255R) et votre corps.
Ce transmetteur ne doit pas être place au même endroit ou utilise simultanément avec un autre transmetteur ou antenne.

B-720-0173

Fig. 239

Applies only to the corresponding scope of application.

12.4 List of special tools

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