Form No.

909879

418T Wheel Loader

OPERATOR'S MANUAL

GEHL®

GEHL CONSTRUCTION

WARRANTY

GEHL CONSTRUCTION DIVISION of the GEHL COMPANY, hereinafter referred to as Gehl, warrants new Gehl construction equipment to the Original Retail Purchaser to be free from defects in material and workmanship for a period of twelve (12) months from the Warranty Start Date:

GEHL CONSTRUCTION WARRANTY INCLUDES:

Genuine Gehl parts and labor costs required to repair or replace equipment at the selling dealer's business location.

GEHL MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED (INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE), EXCEPT AS EXPRESSLY STATED IN THIS WARRANTY STATEMENT.

GEHL WARRANTY SERVICE DOES NOT INCLUDE:

1. Transportation to selling dealer's business location or, at the option of the Original Retail Purchaser, the cost of a service call.
2. Used equipment.
3. Components covered by their own non-Gehl warranties, such as tires, trade accessories and engines.
4. Normal maintenance service and expendable, high wear items.
5. Repairs or adjustments caused by: improper use; failure to follow recommended maintenance procedures; use of unauthorized attachments; accident or other casualty.
6. Liability for incidental or consequential damages of any type, including, but not limited to lost profits or expenses of acquiring replacement equipment.

No agent, employee or representative of Gehl has any authority to bind Gehl to any warranty except as specifically set forth herein. Any of these limitations excluded by local law shall be deemed deleted from this warranty; all other terms will continue to apply.

The complete documentation consists of:

Description	Part number
Operator's Manual	909879
Operator's Manual (Engine)	
Spare parts catalogue	909880

Legend

Edition	Issued
A	September 2002

The cover features the machine with possible optional equipment.

Gehl Company
P.O.Box 179
West Bend, WI 53095 U.S.A.

Document: 909879
Part no.: 909879
Edition: A

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Section 1

Introduction

1 Introduction

1.1 Notes on this operator's manual

This operator's manual contains important information on how to work safely, correctly and economically with the wheel loader model 418T. Therefore, it aims not only at new operators, but it is also a reference for experienced ones. It helps to avoid dangerous situations, and reduce repair costs and downtimes. Furthermore, the reliability and the service life of the machine will be increased by following the instructions in the operator's manual. This is why the operator's manual **must** always be kept in the machine.

Your own safety, as well as the safety of others, depends to a great extent on how the machine is moved and operated. Therefore, carefully read and understand this operator's manual prior to the first use. This operator's manual will help to familiarize yourself more easily with the machine, thereby enabling you to use it more safely and efficiently.

General safety instructions are given in Part 2 of this operator's manual. Carefully read and understand them prior to the first drive. As a rule, keep the following in mind:

Careful and prudent working is the best way to avoid accidents!

Special safety instructions with direct reference to service, function and operator's of the machine are given before the procedure to follow in the respective chapters. These safety instructions must always be observed and followed.

Operational safety and readiness of the machine do not only depend on your skill, but also on maintenance and service of the machine. This is why regular maintenance and service work is absolutely necessary. Extensive maintenance and repair work should always be carried out by an expert with appropriate training. Insist on using original service parts when performing maintenance and repair work. This ensures operational safety and readiness of your machine, and maintains its value.

Your dealer will be pleased to answer any further questions regarding the machine or the operator's manual.

Abbreviations/symbols

- This symbol stands for a list
  - This symbol stands for the subdivision of an enumeration or an activity. Follow the steps in the recommended sequence.

☞ *This symbol requires you to carry out the activity described.*

➥ Description of the effects or results of an activity.

n.s. = not shown

SO = option

Stated whenever controls or other components of the machine are installed as an option.

 This symbol shows the direction of travel – for better orientation in figures and graphics.

1.2 Machine: Overview

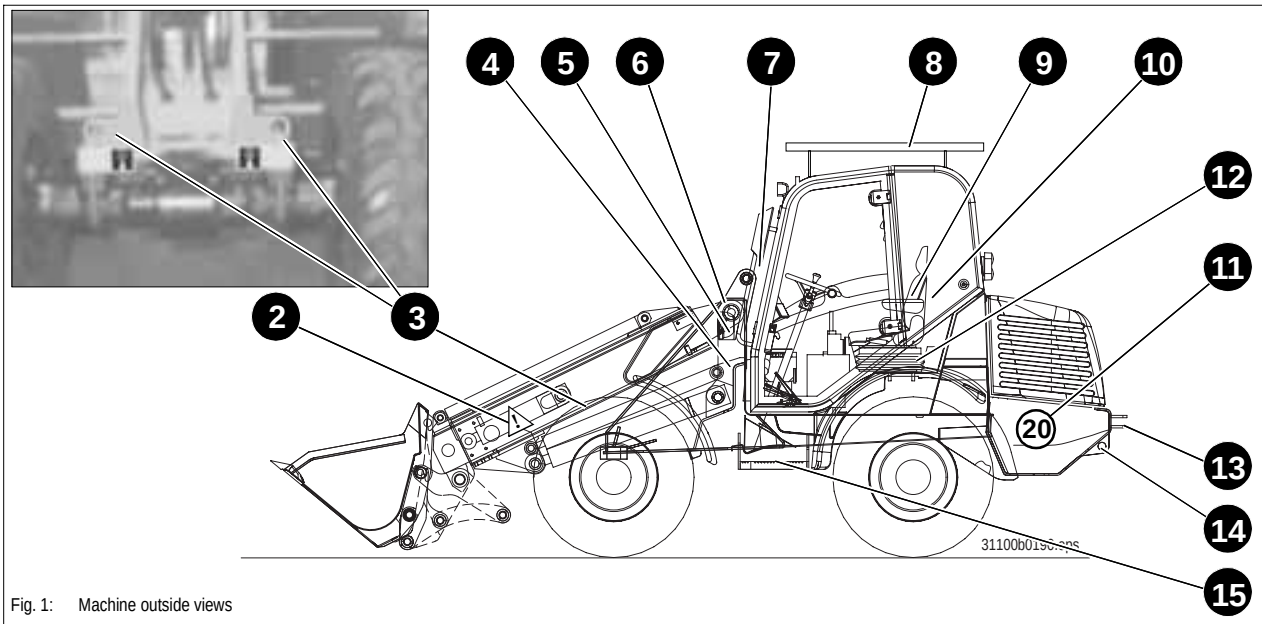
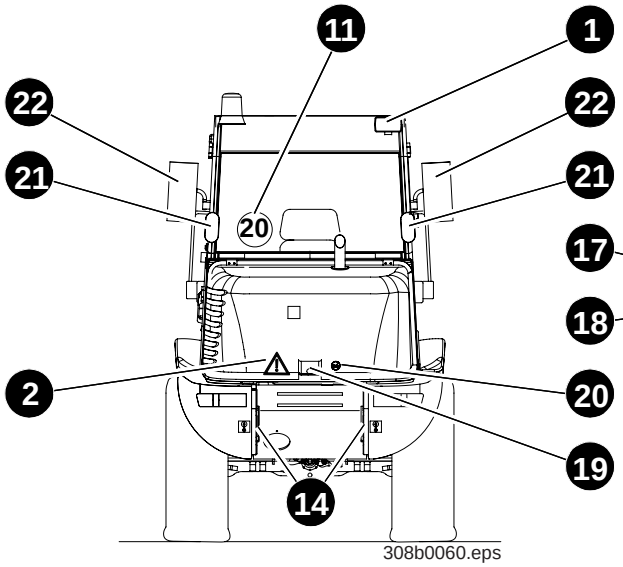
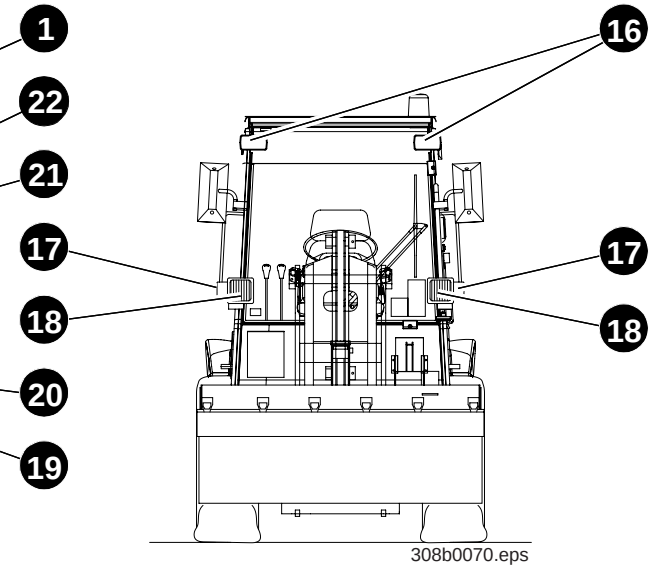


Fig. 1: Machine outside views





1 Working light (option)
2 Danger label
3 Front eye hooks – lifting and strapping down the machine
4 Wheel chock
5 Horn
6 Mark – telescopic unit position for long-haul travel
7 Access handle
8 Protective FOPS screen
9 Noise emission label
10 EC sign
11 Maximum driving speed label
12 Fuel filler inlet
13 Drawbar pin
14 Rear eye hooks – lifting and strapping down the machine
15 Step
16 Working light (option)
17 Turn indicator
18 Headlights
19 Engine cover lock
20 Label – "Do not open engine cover before engine is at a standstill!"

Do not touch any moving or turning parts!

21 Brake light, rear light, turn indicator
22 Rearview mirror

1.3 Brief description

The wheel loader model 418T is a self-propelled work machine.
This machine is a versatile and powerful helper for moving earth, gravel and debris on construction sites and elsewhere. The wide range of attachments accounts for the numerous applications of the machine: as a fork lift, a snow plow, a spreader for sand, salt etc., a sweeper or a tree replanter. See part *1.4 Applications* for further applications. Fit the machine with the respective safety devices when using it as a lifting machine (see “Applications with lifting accessories” in Part 2 Safety Instructions).

The main components of the wheel loader model 418T are:

- ROPS tested operator’s cab
- Water-cooled four cylinder PERKINS diesel engine, 58 hp (43.1 kW) at 2400 rpm (as per DIN ISO 9249)
- Sturdy steel sheet frame in torsion-resistant box-type design
- Hydrostatic drive with electronic control, inching; 12 mph (20 km/h) max. speed
- Hydrostatic four-wheel steering with emergency steering features
- Front and rear planetary axles, rear axle with oscillation
- Service brake (mechanical or hydrostatic), mechanical disk-type parking brake
- Telescopic unit with safe load indicator

Hydrostatic drive

The diesel engine drives a hydraulic pump, whose oil flow is sent to a hydraulic motor connected to the rear axle. The force of the hydraulic motor is transmitted to the rear axle via the transfer gearbox. At the same time, the front axle is driven by the cardan shaft, ensuring permanent four wheel drive.

Work hydraulics and hydrostatic four-wheel steering

The diesel engine also drives the joint gear pump for work hydraulics and hydrostatic four-wheel steering. The oil flow of this pump depends on the diesel engine speed only.

When the machine is in operation, the entire diesel engine output can be transmitted to the gear pump for work hydraulics and steering. This is made possible by the so-called inching which responds as soon as the inching brake is used, reducing or cutting off power input of the drive. Therefore, engine output is fully available for the telescopic unit by pressing the accelerator pedal and the inching brake pedal at the same time.

Cooling system

A combined oil/water cooler (for the diesel engine and the hydraulic oil) is located at the rear of the machine. The warning lights in the instrument panel **17** ensure constant monitoring of the coolant and hydraulic oil temperature. In addition, an audible signal sounds in the machine cab as soon as there is danger of coolant or hydraulic oil overheating and in case of low engine oil pressure.

1.4 Applications

The attachments will determine where and how the machine can be used.

The following table gives an overview of the possible attachments.

Description and Model		Model No.	Use
Standard bucket w/ teeth – normal material	**418T**	810136	Loosening, picking up, transporting and loading loose or solid material (material density ≤ 2700 lbs/yd³ (18 kg/m³))
Pallet forks	**418T**	810135	Picking up and transporting pallets per load diagram

1.5 Regulations

Driving license

Earth moving machinery should be driven on public roads only if the driver has a drivers license.

Get informed on and follow the legal regulations of your country.

Equipment

The highway regulations of your state/province may require you to equip your machine with:

- Slow-Moving Vehicle (SMV) emblem
- warning lights

Become informed on and follow the local highway regulations.

Gehl will send you the original copy of this Declaration of Manufacturer at your request. Please state name of product, model and identification number (see type label of the attachment).

1.6 Machine data

The following data provide a detailed description of your machine. Please supply your dealer with these data for all correspondence or telephone inquiries.

Please read the data valid for your machine off the serial number plates, and enter this data in the list. They will immediately be at hand for all inquiries or service parts orders.

Machine model: .....

Date of registration: .....

Service hours/kilometer reading: .....

Serial number: .....

Cab number: .....

Engine no.: .....

Variable displacement pump model – identification no.: .....

Variable displacement motor model – identification no.: .....

Front axle no.: .....

Rear axle no.: .....

Cab no.: .....

Optional attachments: .....

Your local dealer:

- Address:

- Telephone:

1.7 Type labels and component numbers

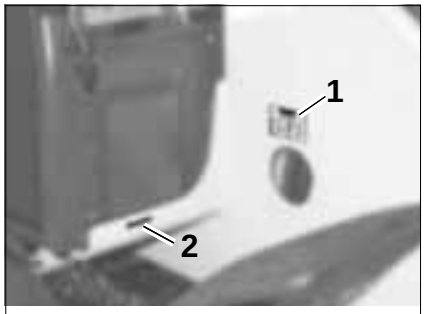


Fig. 2: Type label: location

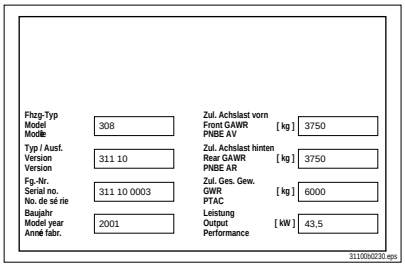


Fig. 3: Type label model 418T

Type label

The type label (Fig. 3) is located at the front right of the machine frame (Fig. 2/1)

Serial number

The serial number is stamped on the machine frame (Fig. 2/2). It is also stamped on the type label (Fig.3)

Example for wheel loader model 418T:

418T 0005

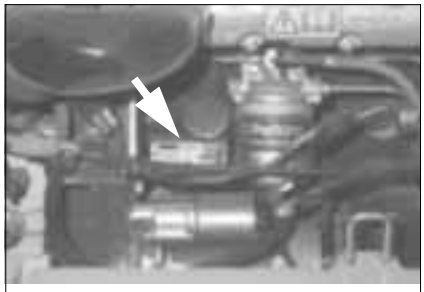


Fig. 4: Diesel engine number

Engine number

The engine number is located on the label at the front of the engine block (arrow, Fig. 4)

Example:

073 305

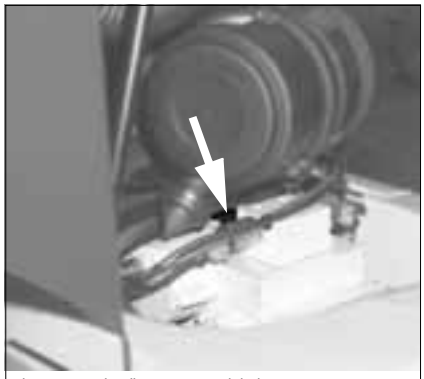


Fig. 5: Hydraulic pump: type label

Number of hydraulic pump

The type label (arrow, Fig. 5) is located on the pump, below the air filter

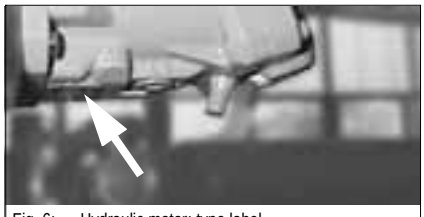


Fig. 6: Hydraulic motor: type label

Hydraulic motor number

The type label (arrow, Fig. 6) is located on the lower side of the hydraulic motor, above the cardan shaft

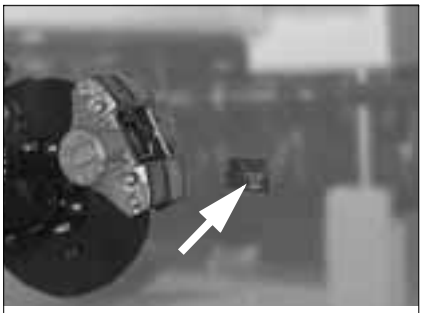


Fig. 7: Type label on the front axle

Front/rear axle number

The axle number is located on the type label, on the right side of each axle (arrow, Fig. 7)

1.8 Safety signs and symbols

The following explains signs and symbols that do not contain explanatory text.

...on the outside of the machine

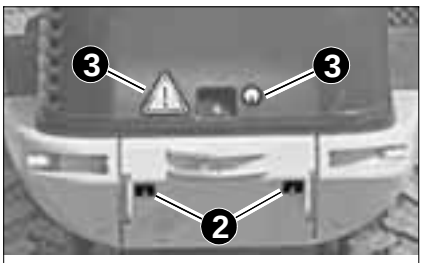


Fig. 8: Decals at the rear

308b0360.eps

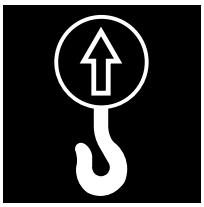
Fig. 9: Danger sign

Meaning

General indication of danger:
This sign (Fig. 9) warns persons standing or working near the machine of increased danger around the machine.

Location

Front left and right of machine frame, and at rear of machine (Fig. 8/3)



308b0680.eps

Fig. 10: Decal: eye hooks

Meaning

Eye hooks/limit (Fig. 10)stops on the machine. The eye hooks are used for lifting or strapping down the machine.

Location

At the rear of the counterweight (Fig. 8/2), as well as
at the front above the front axle, left and right on the frame

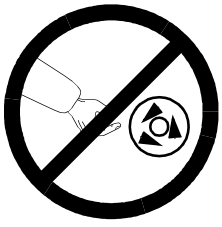


Fig. 11: Prohibitory sign

Meaning

1 (Fig. 11) Do not open engine cover before engine is stopped!

2 (Fig. 11)Do not touch any moving or turning parts!

Location

At the rear on the engine cover (Fig. 8/1), as well as on the engine block.

Fig. 12: Please refer to operator's manual

Meaning

Read and observe the operator's manual before carrying out maintenance work!

Location

On the engine block (Fig. 12)

...inside the operator's compartment

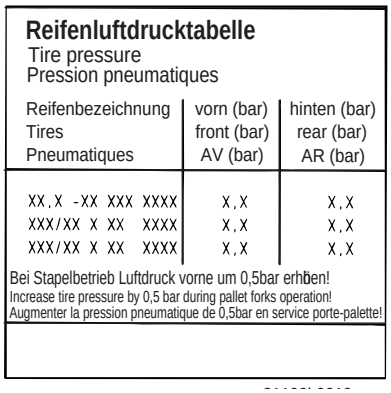
Fig. 13: Cab inspection label

Meaning

Cab type label (Fig. 13)

Location

On left side of B-column



Reifenluftdrucktabelle
Tire pressure
Pression pneumatiques

Reifenbezeichnung Tires Pneumatiques	vorn (bar) front (bar) AV (bar)	hinten (bar) rear (bar) AR (bar)
XX.X -XX XXX XXXX	X,X	X,X
XXX/XX X XX XXXX	X,X	X,X
XXX/XX X XX XXXX	X,X	X,X

Bei Stapelbetrieb Luftdruck vorne um 0,5bar erhöhen!
Increase tire pressure by 0,5 bar during pallet forks operation!
Augmenter la pression pneumatique de 0,5bar en service porte-palette!

Fig. 14: Tyre inflation pressure table model 311 00

Meaning

Tire inflation pressure table (Fig. 14)
List of authorized types of tires with prescribed tire inflation pressure

Location

Inside the cab, on left side of front window

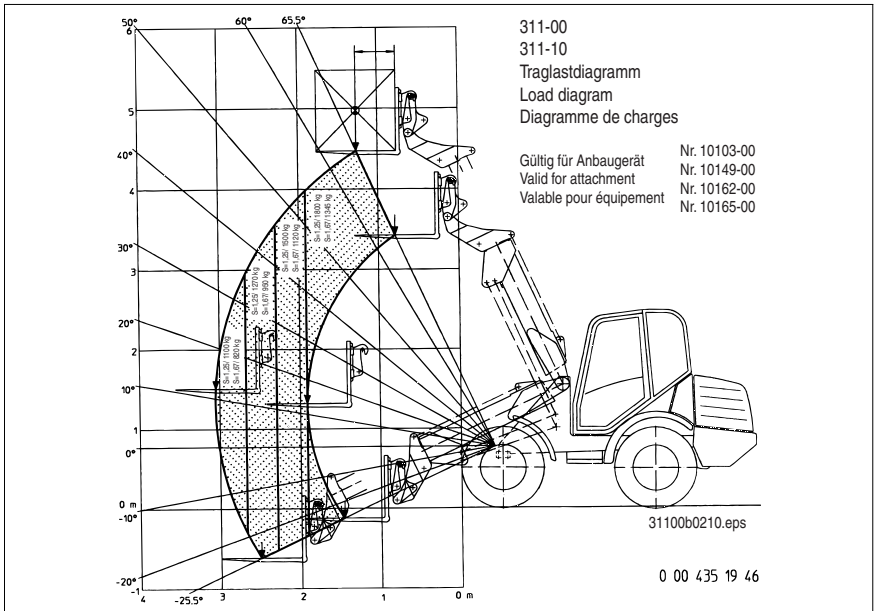


Fig. 15: Load diagram

Meaning

Load diagram (Fig. 15 for operation with pallet forks (fork arms):
The framed numbers indicate the maximum authorized load on the fork arms for industrial (S=1.25) and off-road (S=1.67) applications respectively. The maximum load varies according to the horizontal and vertical distance of the load center, in the diagram depicted on the fork arms with a distance of 500 mm to the rear of the fork arms. The telescopic unit with fork arms moves within the dotted range.

Reading example for attachment no. 810135:

Off-road application → safety factor S=1.67
Distance of load to rear of fork arms = 20 inches (500 mm)

Height of fork arm above tire contact area = 61 inches (1.56 m)

Distance to tire front = 132 inches (3.36 m)

Maximum load is 2061 lbs (935 kg)!

Section 2

Safety instructions

2 Safety instructions

2.1 Identification of warnings and dangers

Important indications regarding the safety of the operating personnel and the machine are indicated in this operator's manual with the following terms and symbols:

DANGER!/WARNING!/CAUTION!

Failure to observe the instructions identified by this symbol may result in personal injury or death for the operator or other persons.

☞ *Measures for avoiding danger*

IMPORTANT

Failure to observe the instructions identified by this symbol may result in damage to the machine.

☞ *Measures for avoiding danger for the machine*

NOTE:

This symbol identifies instructions for a more efficient and economical use of the machine.

Environment!

Failure to observe the instructions identified by this symbol may result in damage to the environment.
The environment is in danger if environmentally hazardous material (e.g. waste oil) is not subject to proper use or disposal.

2.2 Designated uses

- The machine is intended for:
  - Moving earth, gravel, coarse gravel or ballast and rubble as well as
  - Working with the attachment mentioned in the present operator's manual

  Every other application is regarded as not designated for the use of the machine. Gehl will not be liable for damage resulting from use other than mentioned above. The user alone will bear the risk.
  Designated use also includes observing the instructions in the operator's manual and observing the conditions of maintenance and service
- Observe the pertinent regulations relevant to accident prevention, other generally acknowledged regulations regarding safety and occupational medicine, as well as the regulations and standards relevant to motor machines and traffic. The manufacturer is not liable for damage resulting from the failure to observe these regulations
- The safety of the machine can be negatively affected by carrying out machine modifications without proper authority and by using spare parts, equipment, attachments and optional equipment which have not been checked and approved by the manufacturer. The manufacturer will not be liable for damage resulting from this
- The manufacturer will not be liable for personal injury and/or damage to property caused by failure to observe the safety instructions and the operator's manual, and by the failure to exercise due care when:
  - Handling
  - Operating
  - Servicing and carrying out maintenance work
  - Repairing

  the machine. This is also applicable in those cases in which special attention has not been drawn to the duty to exercise due care, in the safety instructions as well as in the operator's and maintenance manuals (machine/engine).

  Read and understand the operator's manual before starting, servicing or repairing the machine. Observe the safety instructions!
- The machine may not be used for transport jobs on public roads
- In applications with lifting accessories, the machine is to be used according to its designated use only if the required safety devices are installed and functional

2.3 General conduct and safety instructions

Organizational measures

- The machine has been designed and built in accordance with current standards and the recognized safety regulations. Nevertheless, its use may constitute a risk to life and limb of the user or of third parties, or cause damage to the machine and to other material property if it is not used properly.
- The machine must only be used in mechanically good condition in accordance with its designated use(s) and the instructions set out in the operator's manual, and only by safety-conscious persons who are fully aware of the risks involved in operating the machine. Any malfunctions, especially those affecting the safety of the machine, must therefore be corrected immediately!
  Basic rule:
  Before starting the machine, inspect the machine for safety in work and road operation!
- Careful and prudent operation is the best way to avoid accidents!
- The operating instructions must always be available, and must therefore be kept in the storage compartment provided for in the cab.
  Immediately complete or replace an incomplete or illegible operator's manual.
- In addition to the operating instructions, observe and instruct the operator in all applicable legal and mandatory regulations relevant to accident prevention and environmental protection.
  These compulsory regulations may also deal with the handling of hazardous substances, issuing and/or wearing of personal protective equipment, or traffic regulations.
- With regard to specific operational features, e.g. those relevant to job organization, work sequences or the persons doing the work, supplement the operator's manual by corresponding instructions, including those relevant to supervising and reporting duties.
- Persons who with work on the machine must have read and understood the operator's manual and in particular, Section 2 "Safety Instructions" before beginning work. This applies especially to persons working only occasionally on the machine, e.g. set-up or maintenance.
- The user/owner must check – at least from time to time – whether the persons doing operation or maintenance of the machine are working in compliance with the operator's manual and are aware of risks and safety factors.
- The user/owner commits himself to operate and keep the machine in a good operating condition, and, if necessary or required by law, to require the operating or servicing persons to wear protective clothing etc.
- In the event of safety-relevant modifications or changes on the machine or of its behavior, stop the machine immediately and report the malfunction to the competent authority/person.
  Safety-related damage or malfunctions of the machine must be corrected immediately.
- Never make any modifications, additions or conversions to the machine and its superstructure (cab, telescopic unit etc.), as well as to the attachments, which might affect safety without the approval of the manuufacturer! This also applies to the installation and the adjustment of safety devices and valves, as well as to welding work on load-bearing elements.
- Service parts must comply with the technical requirements specified by the manuufacturer. Original service parts from the manuufacturer can be relied to do so.
- Replace hydraulic hoses within stipulated and appropriate intervals even if no safety-related defects have been detected.

- Before working on or with the machine, take off jewelry, such as rings, wristwatches, bracelets, etc., and tie back long hair, and do not wear loose-fitting garments, such as unbuttoned or unzipped jackets, ties or scarves.
  Injury may result from being caught up in the machinery or from rings catching on moving parts!
- Keep the machine clean. This reduces:
  - Fire hazard, e.g. due to oil-soaked rags lying around
  - Danger of injury, e.g. due to dirt or debris on the steps, and
  - Danger of accident e.g. due to dirt or debris on the brake or accelerator pedal!
- Observe all safety, warning and information signs and decals on the machine.
- Adhere to prescribed intervals or those specified in the operator's manual for routine checks/inspections and maintenance work!
- For service, inspection, maintenance or repair work, tools and workshop equipment adapted to the task involved are absolutely indispensable.

Selection and qualification of personnel, basic responsibilities

- Any work on or with the machine must be performed by reliable personnel only. Do not let unauthorized persons drive or work with the machine! Observe statutory minimum age limits!
- Employ only trained or instructed staff on the machine, and set out clearly and unequivocally the individual responsibilities of the personnel for operation, set-up, maintenance and repair!
- Define the machine operator's responsibilities – including observing traffic regulations. Give the operator the authority to refuse instructions by third parties that are contrary to safety.
- Do not allow persons to be trained or instructed, or persons taking part in a general training course, to work on or with the machine without being supervised by an experienced person!
- Work on the electrical system and equipment, on the chassis and onthe steering and brake systems may be carried out only by skilled personnel who has been specially trained for such work.
  Work on the hydraulic system of the machine must be carried out only by personnel with special knowledge and experience of hydraulic equipment!
- Seal off the area of danger should it not be possible to keep a safe distance.
  Stop work if persons do not leave the area of danger in spite of warning! Keep out of the area of danger!

  Area of danger:
  The area of danger is the area in which persons are in danger due to the movements of the
  - Machine
  - Work equipment
  - Additional equipment, or
  - Material

  This also includes the area affected by falling material, equipment, or by parts that are thrown.

2.4 Safety instructions regarding operation

Normal operation

- Before beginning work, familiarize yourself with the surroundings and circumstances of the work site. These are, e.g., obstacles in the working and travelling area, the soil bearing capacity and any necessary barriers separating the work site from public roads.
- Take the necessary precautions to ensure that the machine is used only when in a safe and reliable condition!
- Operate the machine only if all protective and safety-related devices, e.g., removable safety-devices, soundproofing elements and mufflers etc., are in place and fully functional!
- Check the machine at least once daily/per working shift for visible damage and defects. Report any changes (such as changes in the machine's working behavior) to the competent organization/person immediately! If necessary, stop the machine immediately and lock it!
- In the event of malfunctions, stop the machine immediately and lock it! Have any defects corrected immediately!
- Start and operate the machine from the operator's seat only!
- Carry out start-up and shut-down procedures in accordance with the operator's manual, and observe the warning lights!
- Before putting the machine/attachment into operation (start-up/moving), make sure nobody is at risk!
- Before driving the machine, and also after stopping work, check whether the brakes, steering, signalling and light systems are functional!
- Before moving the machine always check whether the supplementary equipment and the attachments have been safely stowed away or attached!
- When driving on public roads, observe the traffic regulations and, if necessary, make sure beforehand that the machine is in compliance with these regulations!
- In conditions of poor visibility and after dark always switch on the lights!
- **No lifting, lowering or carrying of persons in the work equipment/attachments!**
- **No mounting of a man basket or personal work platform!**
- When crossing underpasses, bridges and tunnels, or when passing under overhead lines, always make sure there is sufficient clearance!
- Always keep at a safe distance from the edges of excavations and slopes!
- When working in buildings or in enclosed areas, look out for the
  - Height of the ceiling/clearances
  - Width of the entrances and
  - Maximum load of ceilings and floors

  Provide for sufficient room ventilation – danger of poisoning!

- Avoid any operation that might be a risk to stability!
- During operation on slopes, drive or work uphill or downhill. If driving across a slope cannot be avoided, bear in mind the stability limit of the machine!
  Always keep the attachments/work tool close to the ground. This also applies when driving downhill!
  When driving or working across a slope, the load must be on the uphill side of the machine.
- On sloping terrain always adapt your driving speed to the prevailing ground conditions. Never change to a lower gear on a slope, but always before reaching it!
- Before leaving the machine
  - Lower the work tool/attachments to the ground
- Before leaving the operator seat, always secure the machine against inadvertent movement and unauthorized use!
- Before starting work, check whether
  - All safety devices are properly installed and functional
  - Slow Moving Vehicle (SMV) emblem installed as needed
  - Warning lights installed as needed, and
  - A First-aid kit is on hand
- Before moving the machine or before starting work:
  - Make sure visibility is sufficient (do not forget rearview mirrors!)
  - Adjust correct seat position (brake pedal must be depressed to the limit). Never adjust the operator seat when driving or working!
  - Fasten your seat belt
  - Inspect the immediate area (children!). In the work area the operator is responsible for third parties!
- Caution when handling fuel – increased danger of fire!

  Make sure fuel does not come into contact with hot parts!Stop the engine during refuelling! Do not smoke during refuelling, and avoid fire and sparks!
- Never get on or off a moving machine! Never jump off the machine!
- If the lights of the machine are not sufficient for the safe execution of certain work processes, provide additional lighting of the work area.
- Installed rear work lights must not be switched on for travel on public roads. They can be switched on in work operation if users of public roads are not dazzled.
- Hydrostatic four-wheel steering takes time getting used to. Therefore, adjust the driving speed to your abilities and the circumstances. Selection and change steering mode of machine at standstill only!

WARNING!

Exposure to crystalline silica (found in sand, soil and rocks) has been associated with silicosis, a debilitating and often fatal lung disease. A Hazard Review (Pub. No. 2002-129) by the U.S. National Institute for Occupational Safety and Health (NIOSH) indicates a significant risk (at least 1 in 100) of chronic silicosis for workers exposed to inhaled crystalline silica over a working lifetime. NIOSH recommends an exposure limit of 0.05 mg/m^3 as a time-weighted average for up to a 10-hr workday during a 40-hr workweek. NIOSH also recommends substituting less hazardous materials when feasible, using respiratory protection, and regular medical examinations for exposed workers.

Applications with lifting accessories

Definition:

Applications with lifting accessories are understood as procedures involving the lifting, transporting and lowering of loads with help of slings and load-securing devices (e.g. ropes, chains). In doing so, the help of persons is necessary for securing and detaching the load. This applies, for example, to lifting and lowering of pipes, shaft rings or containers.

- The machine may be used for applications with lifting accessories only if the prescribed safety devices are in place and functional.
  These are, e.g.:
  - Accessories for slinging and securing a lifting attachment (load hook)
  - Load diagrams
- The load must be secured so as to prevent it from falling or slipping.
- Persons guiding the load or securing it must stay in visual contact with the machine operator.
- The machine operator must guide the load as near as possible to the ground, and avoid any oscillating or swinging movements.
- The machine may be moved with a raised load only if the path of the machine is level.
- The persons attaching or securing loads may approach the boom from the side only, and only after the machine operator has given permission. The machine operator may give his permission only after the machine is at a standstill and the tool/attachment is not moving.
- Do not use any damaged lifting attachments or such lifting accessories (ropes, chains) that are not sufficiently sized. Always wear protective gloves when working with lifting accessories.

Trailers and attachments

- It is not permitted to use a trailer with the towing device of the machine!
- Attachments and counterweights affect handling, as well as the steering and brake capability of the machine!
- Fit the attachments with the specially required devices only!
- Before uncoupling or coupling hydraulic lines (hydraulic quick couplers):
  - Turn off the engine, and
  - Relieve the oil pressure in the hydraulic system by moving the control levers of the hydraulic control units back and forth a couple times.
- Coupling of attachments requires special care!
- Secure the attachments against inadvertent movement!
- Operate the machine only if all safety devices are installed and are functional, and if all brake, light and hydraulic connections are connected!
- If optional equipment is installed, all additionally required light installations, warning lights, etc., must be provided for and functional.
- Mount the attachments only if the engine is stopped and the drive system is switched off.
- Relievepressure in the hydraulic system before connecting or disconnecting hydraulic lines.
- Especially when driving or working with machines with a quick hitch facility for the attachments, be sure that the attachment is securely locked in the quick hitch facility. The lock pin must be visible on both sides of the bores on the attachment. Check before starting work.
- Prior to connecting attachments to the loader, secure the control lever of the hydraulic control against unintentional movement.
- Be careful when connecting attachments to the loadert: because of the danger of personal injury due to crushing and shearing. Be sure nobody is between the machine and the equipment without securing the machine and the attachment against movement.

Transport

- The machine must be towed, loaded and transported only in accordance with the operator's manual!
- For towing the machine observe the prescribed transport position, speed and procedure.
- Use only appropriate means of transport, and use lifting gear of adequate capacity!
- Safely secure the machine on the transport machine! Use suitable mounting points and load-securing devices.
- The start up procedure must be strictly in accordance with the operator's manual!

2.5 Safety instructions for service and maintenance

- Avoid any unsafe operational mode!
- Observe the adjusting, maintenance and inspection activities and service intervals set out in the operator's manual, including information on the replacement of parts/partial equipment.
  These activities may be performed by skilled personnel only.
- The machine may not be serviced, repaired or test-driven by unauthorized personnel.
- Inform operating personnel before beginning special operations and maintenance work! Appoint a person to supervise the activities!
- In any work concerning the operation, conversion or adjustment of the machine and its safety devices, or any work related to maintenance, inspection and repair, observe the start-up and shut-down procedures set out in the operator's manual, and the information on maintenance work.
- If required, secure the maintenance area appropriately!
- Prior to performing service, maintenance and repair work, attach a warning label, such as "Repair work – do not start machine!", to the ignition lock/steering wheel or to the control elements.
  Remove the ignition key!
- Perform service, maintenance and repair work only if:
  - machine is positioned on firm and level ground
  - Transmission control lever is in neutral position
  - Parking brake is applied
  - All hydraulically movable attachments and working equipment have been lowered to the ground
  - Engine is stopped
  - Ignition key is removed, and
  - machine has been secured against unintentional movement
- If maintenance or repair is required with the engine running:
  - Only work in groups of two
  - Both persons must be authorized to operate the machine
  - One person must be seated on the operator seat and maintain visual contact with the other person
  - Observe the specific safety instructions in the respective work manual
  - Keep a safe distance from all rotating and moving parts, e.g. fan blades, V-belt drives, PTO shaft drives, fans, etc.
- Prior to performing assembly work on the machine, be sure no movable parts will roll away or start moving.
- To avoid the risk of accidents, individual parts and large assemblies being moved for replacement purposes must be carefully attached and secured to lifting tackle.
  Use only suitable lifting gear and suspension systems in a good condition with adequate lifting capacity!
  Never work or stand under suspended loads!

- The fastening of loads and the instructing of lift operators must be done by experienced persons only!
  The person giving the instructions to the operator must be within sight or sound of him.
- For overhead assembly work, always use specially designed or otherwise safety-oriented ladders and work platforms.
  Never use machine parts or attachments/superstructures as a climbing aid!
  Wear a safety harness when carrying out maintenance work at greater heights!
  Keep all handles, steps, handrails, platforms, landings and ladders free from dirt, snow and ice!
- Clean the machine, especially connections and threaded unions, of any traces of oil, fuel or preservatives before carrying out maintenance/repair work!
  Do not use aggressive detergents!
  Use lint-free cleaning rags!
- Before cleaning the machine with water, steam cleaning (high-pressure cleaning) or using detergents, cover or tape up all openings that– for safety and functional reasons – must be protected against water, steam or detergents. Special care must be taken with the electrical system.
- After cleaning, remove all covers and tapes applied for that purpose!
- After cleaning, examine all fuel, lubricant and hydraulic oil lines for leaks, chafe marks and damage!
  Any defects found must be corrected without delay!
- Tighten any screw connections that have been loosened during maintenance and repair!
- Any safety devices removed for set-up, maintenance or repair purposes must be refitted and checked upon completion of the maintenance and repair work.
- Ensure that all fluids and replaced parts are disposed of safely and with minimum environmental impact!
- Do not use the work tools as lifting platforms for persons!
- Before working on a machine parts/attachments move and cause injury (bruising, cutting), always ensure safe blocking/support of these components.
- Perform maintenance and repair work beneath a raised machine, work tool/attachments or additional equipment only if a safe and secure support has been provided (The use of hydraulic cylinders, jacks, etc. does not sufficiently secure raised machines or equipment/attachments).
- Avoid contact with hot parts, such as the engine block or the exhaust system during the operation of the machine and for some time afterwards – danger of burns!
- Retainer pins can fly out or splinter when struck with force – be careful to avoid personal injury!
- Do not use starting fluid (ether)! This especially applies to those cases in which a heater plug (intake-air preheating) is used at the same time – because of the danger of explosions!
- Use special care when working on the fuel system – because of the increased danger of fire!

2.6 Warning of special hazards

Electrical hazards

- Use only original fuses with the specified current rating!
  Turn off the machine immediately and correct the malfunction if trouble occurs in the electrical system!
- When working with the machine, maintain a safe distance from overhead electric lines! If work is to be carried out close to overhead lines, the equipment/attachments must be kept well away from them. Learn the prescribed safety distances!
- If your machine comes into contact with an electrical wire:
  - Do not leave the machine
  - Drive the machine out of the area of danger, if possible
  - Warn others against approaching and touching the machine
  - Have the electrified wire de-energized
  - Do not leave the machine until the electrified wire has been safely de-energized!
- Work on the electrical system may only be performed by a skilled technician, in accordance with the applicable electrical system repair procedures.
- Inspect and check the electrical system of the machine at regular intervals. Defects such as loose connections or burned cables must be corrected immediately.
- Observe the operating voltage of the machine!
- Always remove the ground strap from the battery when working on the electrical system or when performing welding work!
- Starting with a battery jump cable can be dangerous if performed improperly. Observe the safety instructions regarding the battery!

Gas, dust, steam, smoke

- Operate the machine only in adequately ventilated locations! Before starting internal combustion engines in enclosed locations, make sure that there is sufficient ventilation!
- Carry out welding, flame-cutting and grinding work on the machine only if it has been expressly authorized, because there may be a risk of explosion or fire.
- Before carrying out welding, flame-cutting and grinding work, clean the machine and its surroundings from dust and other flammable substances, and be sure that the premises are adequately ventilated – because of the danger of explosions!

Hydraulic equipment

- Work on the hydraulic equipment of the machine may be done only by persons having knowledge and experience in hydraulic systems!
- Check all lines, hoses and connections regularly for leaks and damage! Repair any damage and leaks immediately! Leaking oil may cause injury and fire.
- In accordance with the operator's manual/instructions for the assembly, relieve the pressure in all system sections and pressure pipes (hydraulic system,) to be opened before doing any repair work!
- Hydraulic lines must be routed and fitted properly. Ensure that no connections are interchanged. The fittings, lengths and quality of the hoses must comply with the design specifications.

Noise

- Wear hearing protection if necessary!

Oil, grease and other chemical substances

- When handling oil, grease and other chemical substances (e.g., battery electrolyte — sulfuric acid), observe the product-related safety regulations (material safety data sheet MSDS)!
- Be careful when handling fluids, because of the risk of burning or scalding!

Battery

When handling the battery, observe the specific safety instructions to avoid injury. Batteries contain sulfuric acid.

- Especially when charging batteries, as well as during normal operation, a hydrogen-air mixture is formed in the cells which has a danger of explosion!
- In the case of a frozen battery or of an insufficient electrolyte level, do not try start-up with jumper cables. The battery can burst or explode.

Tires

- Repair work on tires and rims may be carried out by skilled personal or by an authorized workshop only!
- Damaged tires and/or wrong tire pressure reduce the operational safety of the machine. Therefore conduct regular checks of the tires for
  - Prescribed tire pressure and
  - Damage
- Do not inflate tires with inflammable gas – danger of explosion!
- Conduct regular checks of the wheel nuts for tightness, at least every 600 service hours. After changing tires check the wheel nuts after 10 service hours – tighten if necessary!

Section 3

Operation

3 Operation

This chapter describing the controls contains information on the function and the use of the individual warning lights and controls in the operator cab.

The pages listed in the table refer to the description of the corresponding controls.

The identification of the controls with a combination of digits or a combination of digits and letters, e.g. 40/**18** or 40/**A**, means: Figure no. 40/control element no. 18 or position **A** in figure no. 40.

A figure carries no number when it is placed to the left of the text.

Unfold pages 3-2 and 3-4 for a better overview.

The symbols used in the description have the following meanings:

- This symbol stands for a list
  - This symbol stands for the subdivision of an enumeration or an activity. Follow the steps in the recommended sequence

☞ *This symbol requires you to carry out the activity described*

➥ Description of the effects or results of an activity

n. s. = not shown

SO = option

Stated whenever controls or other components of the machine are installed as an option.

Overview: see overleaf

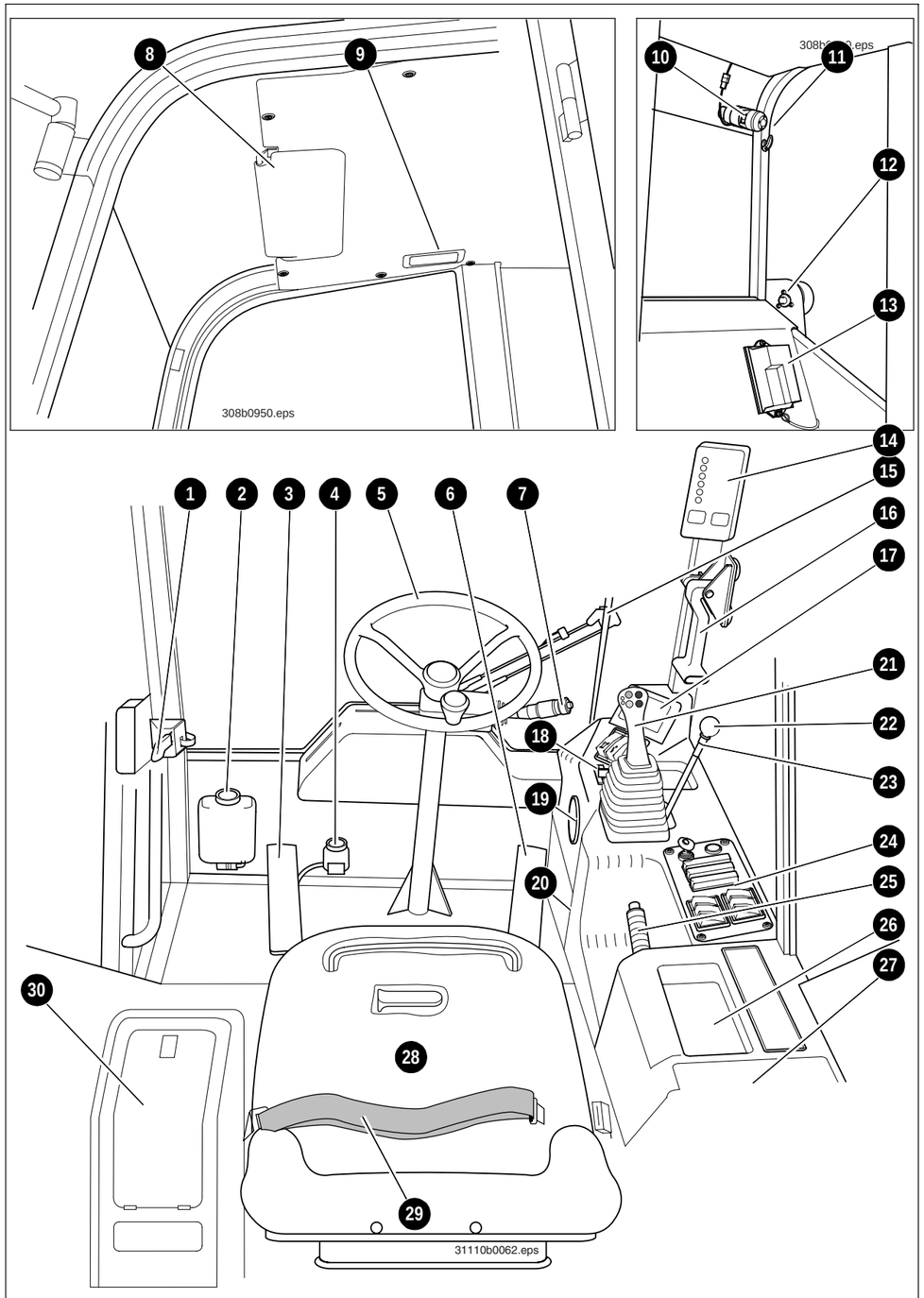


Fig. 16: Cab: overview

3.1 Overview of cab

Ref. no.	Description	For more information see page
1	Door lock	3-35
2	Washer fluid tank	3-30
3	Brake inching pedal	3-9
4	Brake fluid tank	3-6, 5-27, 5-39
5	Hydrostatic steering	3-21
6	Accelerator pedal	3-9
7	Multifunctional lever	3-4,3-11
8	Sun visor	
9	Interior light	3-27
10	Rear wiper – rocker switch	3-30
11	Hook	
12	Door holder left and right	3-35
13	Drive electronics	3-9,
14	Electronic load indicator	3-43
15	Front wiper	3-30
16	Side window, locking	3-35
17	Control panel	3-4, 3-13
18	Heater control	3-29
19	Control flap for fan	3-29
20	Cab type label	1-7
21	Control lever – telescopic	3-4, 3-45
22	Control lever – 3rd control circuit/ attachment	3-46
23	Lock for control lever **22**	3-45
24	Side console	3-4
25	Parking brake	3-10
26	Small storage compartment	
27	Large storage compartment	
28	Operator's seat	3-31
29	Seat belt	3-33
30	Tool kit	

Overview: see overleaf

Overview: see overleaf

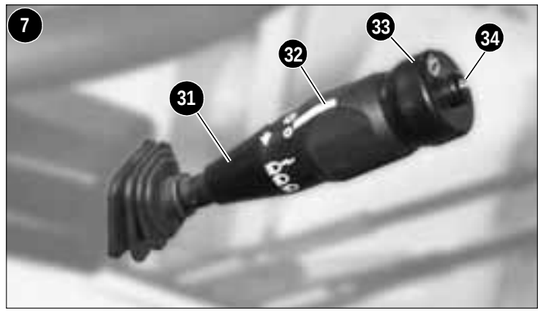


Fig. 17: Multifunctional lever

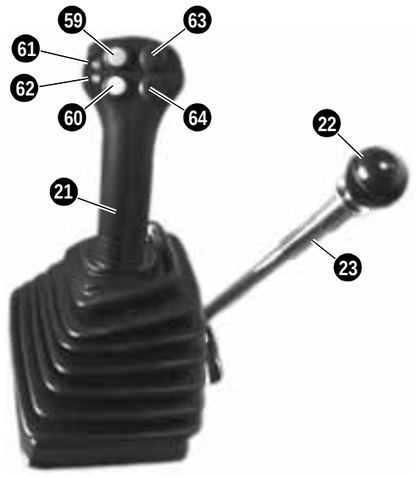


Fig. 18: Control lever

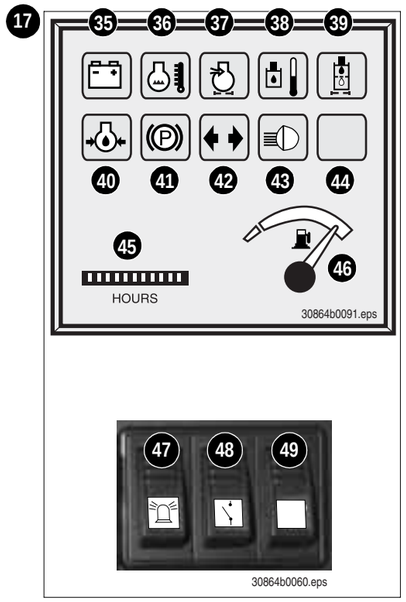


Fig. 19: Control panel

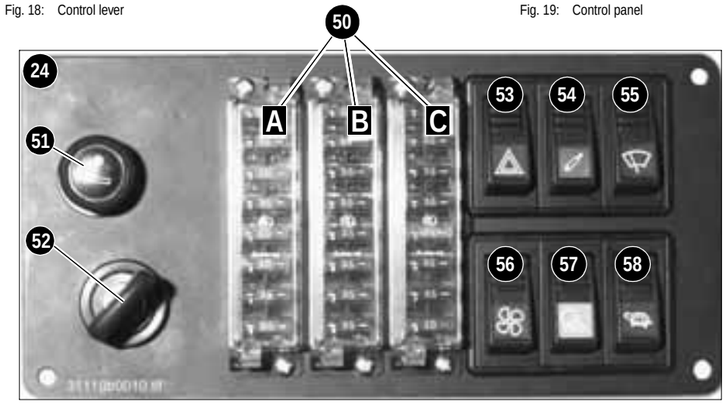


Fig. 20: Side console

3.2 Overview: Multifunctional lever and consoles

3.3 Placing into service

3.3.1 Safety instructions

- Only use the steps and handles provided when entering and leaving the cab
- Never use the controls or movable lines and cables as handles
- Never jump on or off a moving machine
- Refer to the corresponding load diagrams for the loader unit pallet forks

3.3.2 Placing the machine into service for the first time

Important information

- The machine may be placed into service by authorized personnel only
- The operating personnel must have read and understood this operator's manual before placing the machine into service
- The machine may only be used in good condition in accordance with its designated use and the instructions set out in the operator's manual, and only by persons who are fully aware of the risks involved in operating the machine
- Go through the "Start-up" checklist in the following section

Running-in period

Operate the machine carefully during its first 100 operating hours.

The future performance and service life of the machine are heavily dependent on the observance of the following recommendations during the running-in period.

- Do not overload the machine, but at the same time do not drive too cautiously either, as the machine will never reach the proper operating temperature
- Do not run the engine at high speeds for extended periods
- Increase the load gradually while varying the engine speed
- Strictly observe the maintenance schedules in the Annex

3.3.3 Checklists

The check lists below are intended to assist you in checking and monitoring the machine before, during and after operation.

These check lists cannot claim to be exhaustive; they are merely intended as an aid for you in fulfilling your duties as a conscientious operator.

The checking and monitoring jobs listed below are described in greater detail in subsequent sections.

If the answer to one of the following questions is NO, first rectify the cause of the fault before commencing or continuing work.

Start-up checklist

Check the following points before taking the machine into service or starting the engine:

No.	Question	✔
1	Sufficient fuel in the tank? (➠ 5-1)	
2	Coolant level OK? (➠ 5-10)	
3	Engine oil level in order? (➠ 5-7)	
4	Oil level in hydraulic oil tank in order? (➠ 5-16)	
5	Brake fluid level OK? (➠ 5-27)	
6	Water level in windscreen washer tank in order? (➠ 3-30)	
7	Telescopic linkage lubricated? (➠ 5-28)	
8	Tire condition OK? (➠ 5-30)	
9	Lights, signals, indicators, and warning lights OK? (➠ 3-27, 3-28, 3-13)	
10	Windows, mirrors, lights and steps clean?	
11	Is the attachment on the telescopic correctly connected? (➠ 3-48)	
12	Is the engine cover firmly locked? (➠ 3-38)	
13	Especially after cleaning, maintenance or repair work: Rags, tools and other loose objects removed?	
14	Approved SMV emblem, hazard warning lights in the machine? (➠ 1-5)	
15	Seat position and rearview mirror correctly adjusted? (➠ 3-16)	
16	Seat belt fastened? (➠ 3-33)	

Operation checklist

After starting the engine and during operation, check and observe the following points:

No.	Question	✔
1	Warning Lights for engine oil pressure, coolant level and alternator gone out? (➠ 3-13)	
2	Braking effect sufficient? (➠ 3-21)	
3	Temperature indicator for engine coolant in normal range? (➠ 3-13)	
4	Is the steering working properly? (➠ 3-21)	
5	Is anyone dangerously close to the machine? (➠ 2-7)	
6	Safe load indicator tested and OK? (➠ 3-44)	
When travelling on public roads, particular attention should be paid to the following points:		
7	Telescopic unit completely retracted? (➠ 3-53)	
8	Bucket and attachments in transport position? (➠ 3-20)	
9	Transport locks installed? (➠ 3-20)	
10	Control lever for lift and tilt hydraulics of the telescopic locked? (➠ 3-20)	

Parking checklist

Check and observe the following points when parking the machine:

No.	Question	✔
1	Attachments on the telescopic unit lowered to the ground? (➠ 3-26, 3-45)	
2	Parking brake applied? (➠ 3-10)	
3	Machine cab locked (especially if the machine cannot be supervised)? (➠ 3-35)	
When parking on public roads:		
4	Machine adequately secured? (➠ 3-26)	
When parking on uphill and downhill gradients:		
5	Machine additionally secured with chocks under the wheels to prevent it from rolling away? (➠ 3-26)	

3.4 Driving the machine

3.4.1 Overview of controls:

Preheating start switch [52]

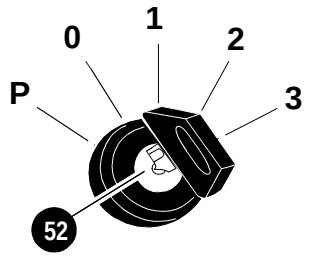


Fig. 21: Preheating start switch

NOTE:

The engine will start only if parking brake 16/**25** is applied.

Position	Function	Power consumer
P	No function	None
0	Inserting or removing ignition key	None
1	ON/drive position	➥ All functions are operational ➥ Warning Light 19/**41** comes on if parking brake 16/**25** is applied
2	Preheating engine (with cold starting at < 0 °C: 10 – 15 seconds)	
3	Start the engine	➥ Starter is actuated ➥ Warning Lights must go out

Driving direction selector switch

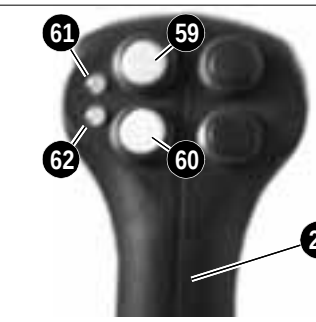


Fig. 22: Driving direction selector switch

Function

- Selection of driving direction/neutral position of drive

☞ *Selection of driving direction/neutral position:*

Function	Operation	Effect
• **Forward**	☞ *Press green tip switch **59***	➥ Green LED **61** comes on
• **Reverse**	☞ *Press yellow tip switch **60***	➥ Yellow LED **62** comes on
• **Neutral position**	☞ *Press both tip switches at the same time*	➥ Both LEDs go out

NOTE:

The joystick is in neutral when you start the engine. Neutral is selected when you apply the parking brake or turn off the engine. Driving direction can be selected only after releasing the parking brake!

Drive range selector [58]

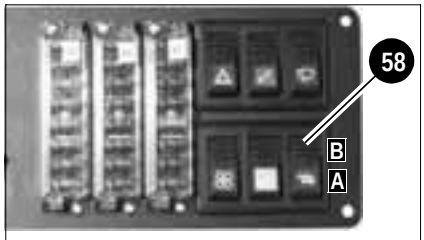


Fig. 23: Drive range switch

Function

- Selection of drive range with rocker switch **58**

Drive range	Rocker switch 58	Recommended for:
• **Low 0 – 3 mph (0 – 5 km/h)**	☞ *Press rocker switch **58** in **A** (below)*	Heavy work
• **High 0 – 12 mph (0 – 20 km/h)**	☞ *Press rocker switch **58** in **B** (above)*	Long-haul transport, road travel

Accelerator pedal [6]

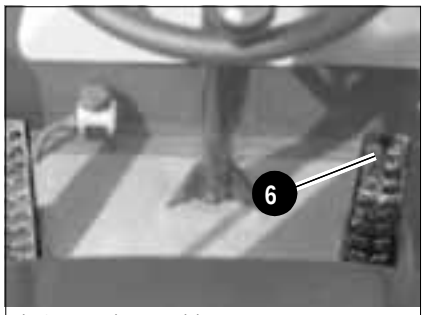


Fig. 24: Accelerator pedal

The accelerator pedal **6** controls the drive speed as follows:

- Press pedal ➥ Drive speed is increased
- Release pedal slowly ➥ Drive speed is reduced
- Release pedal fully ➥ Hydrostatic braking

Brake inching pedal [3]

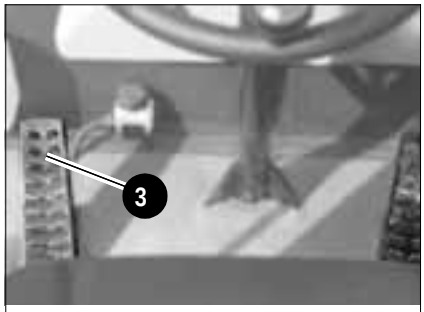


Fig. 25: Brake inching pedal

Function

- To brake the machine irrespective of the braking effect of the drive and the position of the accelerator pedal **6**
- In the inching range of the brake pedal (pedal pressed in lightly), the pedal can be used like a car's clutch. The drive system is supplied with less hydraulic oil, which means the entire engine output is available to the work hydraulics. This allows the loader to raise more rapidly

Braking

☞ *Press the brake inching pedal **3** down with force*

Inching

☞ *Press the brake inching pedal **3** down lightly*

Parking brake [25]

Function

NOTE:

A driving interlock prevents the machine from driving with the parking brake applied.
The forward/reverse driving direction can be selected via tip switches 1859/ and 18/**60** and only if the parking brake is released. Applying the parking brake automatically interrupts forward/reverse driving direction, which is set to neutral (LEDs on joystick goes out).

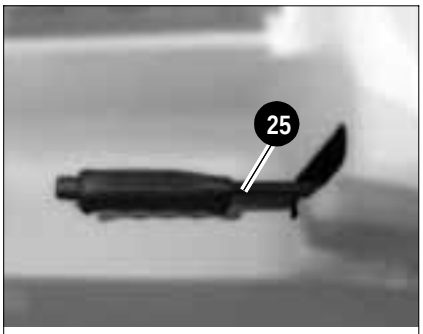


Fig. 26: Parking brake

- Prevents the machine rolling away
- Emergency brake in case of service brake breakdown

WARNING!

Use the parking brake **25** instead of the service brake only in an emergency , i.e. in case of a breakdown of the service brake. The brake lights do not light up, and the machine stops abruptly, which can be hazardous

☞ *In normal operation, only use brake inching pedal* 16/***3*** *as a service brake*

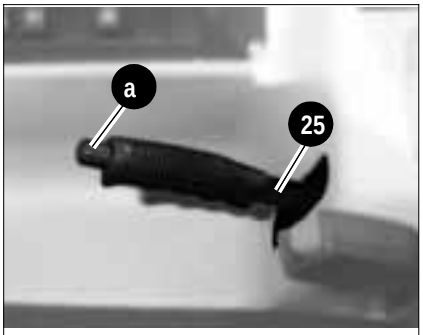


Fig. 27: Applying and releasing the parking brake

To prevent the machine rolling away

☞ *Pull up lever **25** to the last notch*

➥ Warning Light 19/**41** comes on

To release the parking brake

☞ *Pull up lever **25** slightly*

☞ *Depress button **a***

☞ *Move lever **25** all the way down*

To use the parking brake as emergency brake when driving the machine

WARNING!

Operating the parking brake **25** when driving causes the machine drive to disengage. This causes sudden deceleration at full speed, which can be hazardous.

☞ *Use the parking brake **25** as service brake only in case of emergency*

☞ *Before using the parking brake **25** reduce driving speed if possible*

☞ *Pull up lever **25***

Multifunctional lever [7]

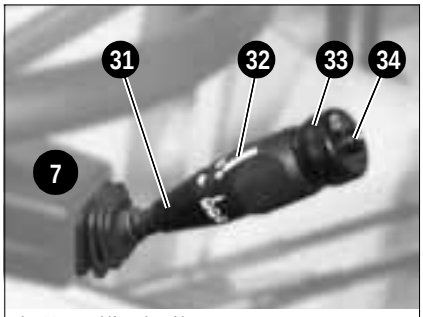


Fig. 28: Multifunctional lever

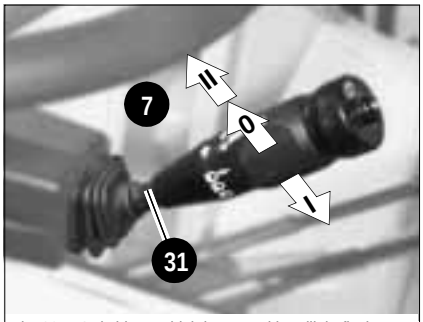


Fig. 29: Switching on high beam and headlight flasher

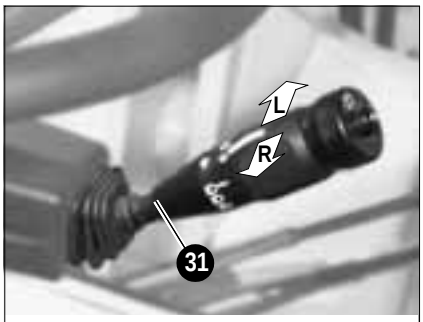


Fig. 30: Turn indicators

Function

- Switch on the turn indicators with lever **31**
- Switch high beam on and off with lever **31**
- Flash headlight flasher with lever **31**
- Switch lights (parking light and low beam) on and off with rotary switch **32**
- Switch on front window washer pump with tip switch **33**
- Sound horn with tip switch **34**

Switches on high beam and headlight flasher with lever 31

Lever 31	Effect
☞ *Central position **0***	➥ High beam and headlight flasher **OFF** ➥ Low beam **ON**
☞ *Lower position **I***	➥ High beam **ON** if low beam is switched on with rotary switch **32**. Warning Light **43** comes on
☞ *Raise to position **II** and hold in this position*	➥ Headlight flasher **ON**, warning light **43** comes on

Turn indication with lever 31

Lever 31	Effect
☞ *Pull upward*	➥ Left turn indicators actuated, warning light **42** flashes
☞ *In center position*	➥ None
☞ *Pull backward*	➥ Right turn indicators actuated, warning light **42** flashes

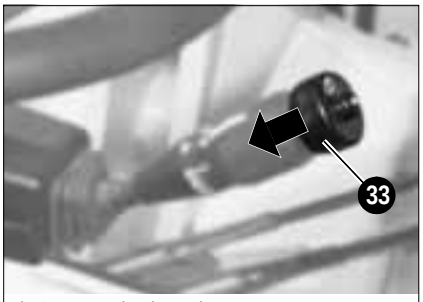


Fig. 31: Actuating the washer pump

Actuate washer pump with tip switch 33

Tip switch 33	Effect
☞ *Slide to the left and hold*	➥ Washer pump **ON**
☞ *Release*	➥ Washer pump **OFF**

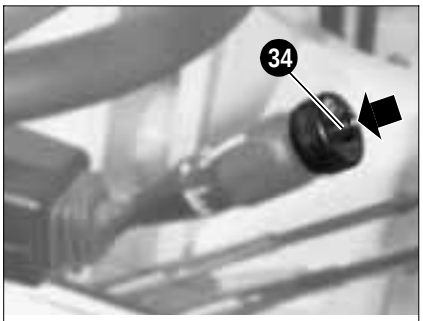


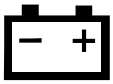
Fig. 32: Actuating the horn

Sound horn with tip switch 34

Tip switch 34	Effect
☞ *Press*	➥ Horn **ON**
☞ *Release*	➥ Horn **OFF**

3.4.2 Warning Lights: overview

Unfold page 3-4 for a better overview!



35 Warning Light (red) – alternator charge function

The warning light comes on when the ignition is turned on and goes out as soon as the engine is running.

The V-belt for the alternator, or the charging circuit of the alternator is faulty if the warning light comes on with the engine running. The battery is not charged any more *(➠ page 5-15*.

Important!

The coolant pump no longer runs if the V-belt is faulty.
Possibility of engine overheating or breakdown!
If warning light 19**35** comes on with the engine running:

☞ *Switch off the engine immediately and repair or have the cause repaired*

36 Warning Light (red) – coolant temperature

Comes on if coolant temperature is too high. A buzzer sounds at the same time. The warning light and the buzzer go out as soon as the coolant temperature is back in the acceptable range.

WARNING!

Never open the coolant tank and never drain coolant if the engine is warm, because the cooling system is under high pressure –

Danger of burns!

☞ *Wait at least 10 minutes after turning off the engine!*

☞ *Wear protective gloves and clothing*

☞ *Always start by actuating the safety valve in the cap of the expansion tank. To do this: Turn the cap to the first notch and allow the pressure to escape*

Important!

Possibility of engine breakdown if warning light 19/**36** comes on with the engine running!

☞ *After extreme work load:*
Let the engine run at idle until the warning light goes out

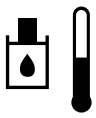
☞ *After normal workload or if the warning light does not go out as described above:*
Turn off the engine immediately

☞ *Check and correct the coolant level (➠ page 5-10)*

37 Warning Light (yellow) – air filter

Indicates air filter contamination. In this case:

☞ *Clean or replace the air filter (➠ page 5-13)*



38 Warning Light (red) – hydraulic oil temperature

Comes on if hydraulic oil temperature is too high.

Important!

Possibility of hydraulic damage as soon as warning light 19/**38** comes on!

☞ *Reduce the load on the work and drive hydraulics. To do this:*

- *Stop the machine in a suitable place*
- *Move control lever 16/**21** of the loader to neutral position*
- *Set drive switch to neutral – see Driving direction selector switch on page 3-8*
- *Run the engine at increased speeds until warning light* 19/**38** *goes out*

39 Warning Light (red) – hydraulic oil filter

Indicates an unacceptably high pressure in the hydraulic return line to the tank. In this case:

☞ *Replace the hydraulic oil return filter (➠ page 5-20)*

In cold weather warning light 19/**39** may come on immediately when the engine is started. This is due to increased oil viscosity. In this case:

☞ *Let the engine run at idling speed for about 2 minutes*

40 Warning Light (red) – engine oil pressure

Comes on if the engine oil pressure is too low. In this case:

☞ *Stop the machine*

☞ *Turn off the engine immediately and check the oil level (➠ page 5-7)*

The warning light comes on when the ignition is turned on and goes out as soon as the engine is running.

41 Warning Light (red) – parking brake

Comes on when parking brake lever 16/**25** is applied.

The electric driving interlock prevents driving the machine with the parking brake applied.

42 Warning Light (green) – right/left turn indicator

Flashes intermittently when the turn indicators are used (lever 17/**31**)

43 Warning Light (blue) – high beam

Comes on if high beam is switched on, or during headlight flashing

44 Not assigned

45 Hourmeter

Counts the engine service hours with the engine running

46 Fuel level gauge

3.4.3 Before starting the engine

☞ *Run through the "Start-up" checklist on page 3-6*

☞ *Adjust seat position and rearview mirror*

CAUTION!

All controls must be within easy reach. You must be able to move the brake and accelerator pedals to their limit positions!

☞ *Fastening the seat belt*

☞ *Be sure that:*
- *– Parking brake 16/**25** is applied; and*
- *– Control lever 16/**21** and 16/**22** are in neutral*

3.4.4 Starting the engine

General

- The engine will start only if parking brake 16/**25** is applied
- The starter cannot be operated if the engine is already running (start repeat interlock)
- Do not run the starter for more than 10 seconds
- Wait for about 1 minute to let the battery recover before trying again
- The engine cannot be started by towing the machine, because there is no driving connection between the engine and gearbox when the engine is off

Procedure

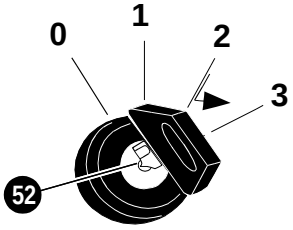


Fig. 33: Preheating start switch

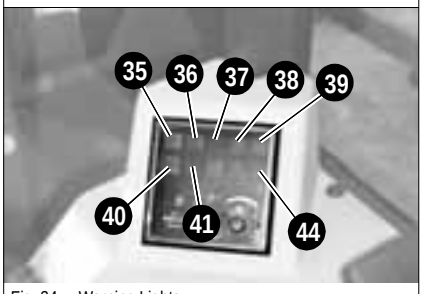


Fig. 34: Warning Lights

☞ *After you have completed the starting preparations in accordance with 3.4.3 Before starting the engine*

- Insert the ignition key into the preheating start switch 33/52
- Turn the ignition key to position "**1**"
- Check whether the following warning lights come on:
  - Warning Light **40** for engine oil pressure
  - Warning Light **35** for alternator charge function
  - Warning Light **41** if the parking brake is applied
  - During the warning light check, warning lights **36**, **37**, **38** and **39** must come on as well, and the warning buzzer must sound
- Replace defective warning lights immediately
- Press the accelerator pedal 16/**6** through about a quarter of its travel
- Turn the ignition key to position "**3**" and hold it in this position until the engine starts
- Release the ignition key

When the engine has started ...

☞ *Check that the following warning lights have gone out:*

- Warning Light 34/**35**
- Warning Light 34/**40**
- Warning Lights 34/**36**, **37**, **38** and **39**

☞ *Run the engine warm*

Starting at temperatures below 32 °F (0 °C)

☞ *Starting at temperatures below 32 °F (0 °C):*

- Turn the ignition key to position 2 and hold it in this position for about 15 seconds
- Press the accelerator pedal 16/**6** all the way down
- Turn the ignition key to position "**3**" and hold it in this position until the engine starts
- Release the ignition key

When the engine runs smoothly (increased engine speed):

- Release accelerator pedal 16/**6**

NOTE:

In general, a battery delivers less energy in cold conditions. As a result, you must be sure the battery is always well charged.

... for a cold start at outside temperatures below 32 °F (0 °C):

☞ *Let the engine run at increased idling speed for about 1 minute*

☞ *Do not exceed the average engine speed for 10 minutes, however drive and work hydraulics may be started gently. Do not extend or retract the hydraulic cylinders to the limits if possible*

☞ *Increase the diesel engine speed and hydraulic forces gradually*

... for a cold start at outside temperatures below 50 °F (10 °C):

☞ *Increase the engine speed slowly*

☞ *Do not run the engine at full load for the first 10 minutes*

Engine preheater (option)

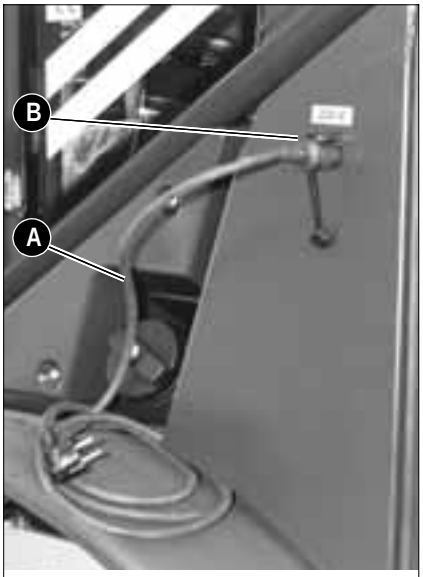


Fig. 35: Engine preheater (option)

This equipment is for cold-starting at temperatures below 29 °F (–5°C).

The following “engine preheater” versions are available for the machine:

– Engine coolant preheater (option)

– Hydraulic oil preheater (option)

– Coolant preheater (option) and hydraulic oil preheater (option)

The operation of the different versions is the same.

Heating elements in the engine block and/or in the hydraulic oil tank warm up the engine coolant circuit and/or the hydraulic oil according to the gravity principle (warm fluid rises and is replaced by cold fluid). The coolant or the oil can only be thoroughly warmed up to service temperature if the engine preheater is connected over a longer period of time – preferably over night.

Connecting the engine preheater (option)

☞ *Connect the* engine preheater *as follows:*

- Park the machine near a 220 V socket
- First connect special cable **A** to machine socket **B** on the service panel on the left side of the machine, then
- Insert the plug into the 220 V socket

☞ *Before starting the engine:*

- Pull out the plug from the 220 V socket
- Unplug special cable **A** from machine socket **B**

NOTE:

The engine preheater (option) reduces engine emissions during the warm-up phase by up to 50%, saving fuel at the same time.

Jump-starting the engine

Safety instructions

- Never jump-start the engine if the battery of the machine is frozen because of the risk of explosion!
- The machine must not touch the jump-starting machine when connected with jumper cables because of the risk of sparking!
- The external power source must deliver a rated voltage of 12 V; higher supply voltages will damage the electrical system of the machine!
- Use only jumper cables that are in good condition!
- The jumper cable connected to the positive (**+**) terminal of the starting battery must never contact metal machine parts because of the risk of short a circuit!
- Route the jumper cables so they cannot catch on rotating components in the engine compartment!

Proceed as follows:

- Drive the jump-starting machine close enough to the machine so that the jumper cables can reach to connect the two batteries.
- Start the engine of the jump-starting machine.
- First connect one end of the red jumper cable (**+**) to the (**+**) terminal of the discharged battery, then clip the other end to the (**+**) terminal of the starting battery.
- Connect one end of the black jumper cable (**–**) to the (**–**) terminal of the starting battery.
- Clip the other end of the black jumper cable (**–**) onto a solid metal component connected to the engine block or onto the engine block itself. Do not connect it to the negative terminal of the discharged battery, because explosive gas from the battery may ignite if sparks occur!
- Start the engine of the machine with the discharged battery

Once the engine has started:

☞ *With the engine running, disconnect the jumper cables in exactly the reverse sequence (first remove (–) terminal, then (+) terminal) – this prevents sparking in the vicinity of the battery!*

3.4.5 Before driving the machine

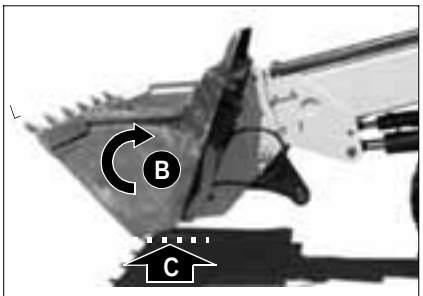


Fig. 36: Driving on public roads

Before driving the machine:

- Check the function of:
  - Brakes
  - Steering and
  - Lighting
- Dump out the bucket

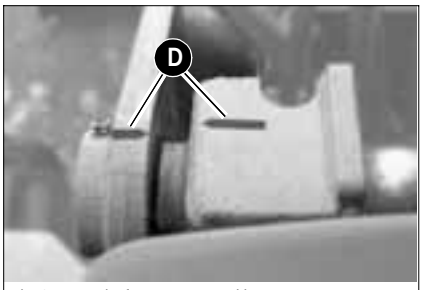


Fig. 37: Marks for transport position

- Adjust the bucket to transport position. To do this:
  - Retract the telescopic unit completely
  - Tilt the front bucket to the rear (36/**B**) and
  - Raise the telescopic unit so that both red marks **D** on the lift frame and the bulkhead are aligned

NOTE:

In transport position, two red marks **D** on the lift frame and on the bulkhead are aligned (figure 37). These markings are visible from the operator's cab.

With both marks **D** aligned, transport ground clearance amounts to at least 9 inches (230 mm) (36/**C**), with standard bucket and standard tires (12.5-20).

Fig. 38: Securing the control lever for the telescopic unit

- Secure the control lever for the telescopic unit **21** against unintentional operation. To do this:
  Push control lever **21** down in neutral position
  ➥The control lever is locked in this position, it cannot be moved

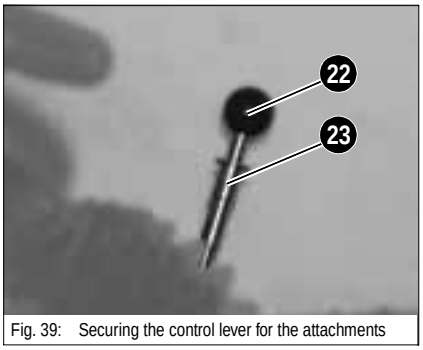


Fig. 39: Securing the control lever for the attachments

- Secure the control lever for the 3rd control circuit/attachments **22** against unintentional operation. To do this:
  - Turn safety sleeve **23** clockwise until it is pulled down by spring action.
  - Let control lever **22** lock into place in central position.

  ➥The control lever is locked in this position and cannot be moved. The lock can only be released by lifting the safety sleeve

Inspection of important functional units

Steering

NOTE:

The steering system is only operational when the engine is running!
In the event of a failure of the diesel engine or of the hydraulic steering pump (e.g. failure of the pump drive), the machine can still be steered (emergency steering feature).

WARNING!

In case of failure of steering pump or drive:
Turning the steering wheel requires great effort! Take this into account especially when towing the machine!

☞ *Adapt towing speed to the altered steering behavior!*

☞ *Use a towing rod!*

☞ *Functional check: Move the steering wheel to the left and right*

Wheel synchronization position

Important!

Carefully steering the front and rear wheels to their limits automatically synchronizes the steering system of the machine.

If you notice from the driving characteristics of the machine that the wheels of both axles are not running in exactly the correct track:

☞ *Drive at low speed, turning the steering wheel slowly to the left and right to the limit, and try to keep on turning the steering wheel briefly in both final positions*

☞ *Slowly turn back the steering wheel to straight-ahead position*

☞ *Contact your dealer if this does not synchronize the wheels*

Service brake

WARNING!

The brake lights at the rear of the machine do not light up when the

- Parking brake is applied
- Machine is braked with its hydrostatic braking effect

☞ *When driving on public roads and during work operation, especially for abrupt brake maneuvers, use the brake inching pedal 16/**3** to brake the machine. Only this causes the brake lights to light up.*

Dirt accumulation in the area of the brake pedal can result in brake malfunctions –

☞ *Keep the brake inching pedal 16/**3** clean!*

☞ *Check the service brake action as follows:*

- Before driving machine, press down the brake inching pedal 16/**3** to check whether
  - After a maximum of half the pedal travel there is a firm resistance to be felt
  - Brake lights come on if the brake pedal is pressed down
- After moving machine, check in the rear view mirror that no one will be hindered by a brake maneuver
- Check the brake action at low speed

3.4.6 Driving

NOTE:

The machine can be moved only after releasing parking brake 16/**25**.

☞ *After starting the engine, proceed as follows:*

- Select driving direction with tip switch 18/**59** or 18/**60**
- Release parking brake 16/**25**

  ➥Warning Light 19/**41** goes out
- Gradually depress accelerator pedal 16/**6**

  ➥Machine moves off
- Test the brakes at low speed

3.4.7 Drive ranges

The machine has 2 drive ranges.

Selecting drive range

☞ *Stop the machine with brake inching pedal* 16/**3**

☞ *Press both tip switches* 18/**59** *and* 18/**60** *at the same time*

☞ *Selection of drive range with rocker switch* **58**

WARNING!

Do not switch from high to low drive range at full speed –

➥ Machine drive system also may be damaged!

☞ *Switch drive ranges with the machine driving at low speed only*

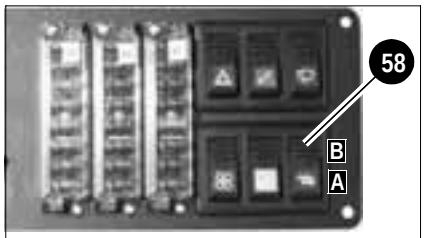


Fig. 40: Selection of drive range with rocker switch

Drive range	Rocker switch 58	Recommended for:
• **Low** **3 mph** **0 – 5 km/h**	☞ *Press rocker switch* ***58*** *in* ***A*** *(below)*	Especially for short loading/unloading cycles, truck loading, e.g., onto a lorry, and for work requiring precise speed adjustment, e.g. rotary broom applications
• **High** **12mph** **0 – 20 km/h**	☞ *Press rocker switch* ***58*** *in* ***B*** *(above)*	Long-haul transport, road travel

Changing direction

WARNING!

Changing direction at high speed and high engine speeds causes the machine to stop abruptly –

➥ Machine drive system also may be damaged!

☞ *Switch direction only when machine us stopped.*

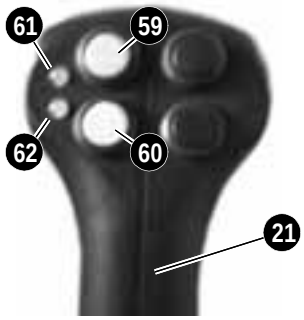


Fig. 41: Driving direction selector switch

☞ *Stop the machine. Take your foot off accelerator pedal 16/**6***

☞ *Select new driving direction as follows:*

Function	Operation	Effect
• **Forward**	☞ *Press the green tip switch **59***	➥ Green LED **61** comes on
• **Reverse**	☞ *Press yellow tip switch **60***	➥ Yellow LED **62** comes on
• **Neutral position**	☞ *Press both tip switches at the same time*	➥ Both LEDs go out

NOTE:

The joystick is in neutral when you start the engine. Neutral is selected after applying parking brake 16/**25** or switching off the engine. Driving direction can be selected only after releasing the parking brake!

Backup alarm (option)

DANGER!

When backing up with the machine:

Accident hazard!

☞ *Make sure that nobody is within the area of danger of the machine when changing the driving direction!*

☞ *Do not rely exclusively on the backup warning system (option)!*

Fig. 42: Backup alarm (option)

The backup alarm **A**, is fitted to the rear top left of the cab. The alarm sounds when shifting into reverse. The sound level is:
103 dB (A) at a distance of 40 inches (1 m), and at a frequency of 2800 Hz.

3.4.8 Differential lock

NOTE:

A differential lock neutralizes the compensating effect of the differential, i.e. traction is distributed evenly to the front and rear wheels. Both the front and rear axles of the machine are fitted with self-locking differentials. The locking value is 40% for each axle. The differentials are locked automatically. The differential lock cannot be engaged or disengaged by the operator! If a wheel loses contact with the ground, the differential lock on the respective axle is no longer effective!

3.4.9 Stopping the machine

☞ *Proceed as follows:*

- Throttle back the engine: Take your foot off accelerator pedal 16/**6**
- Stop the machine with service brake 16/**3**
- Move drive lever to neutral – see *Driving direction selector switch* on page 3-8
- Apply the parking brake. To do this:
  Pull up lever 16/**25** to the last notch
  ➥Warning Light 19/**41** comes on

3.4.10 Parking the machine

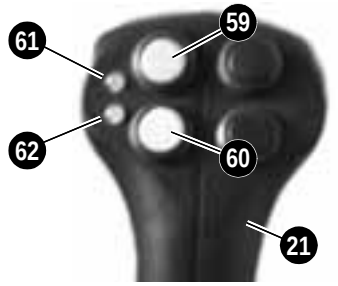


Fig. 43: Move the drive switch to neutral

WARNING!

Machines parked on slopes may roll away.

☞ *Use the parking brake to park the machine safely and to prevent it rolling away!*
See Section 3.4.9 „Stopping the machine"

☞ *Additionally secure the machine by placing chocks under the downhill sides of the wheels!*

Do not park the machine with the load lifted or the telescopic unit extended –

Accident hazard!

☞ *Before leaving the cab, retract the telescopic unit completely and lower the load to the ground!*

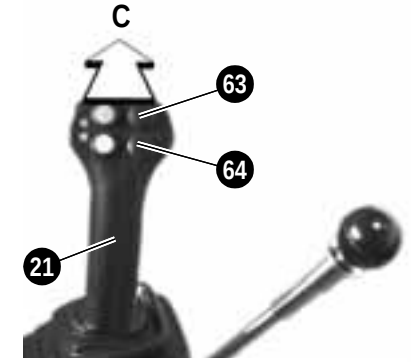


Fig. 44: Retracting and lowering the telescopic unit

☞ *Proceed as follows:*

- Stop the machine
- Move drive switch to neutral. To do this:
  Press down switches **59** and **60** at the same time (both LEDs **61 and 62** go out)
- Apply the parking brake permanently – see *Section 3.4.9 „Stopping the machine"*
- Retract the telescopic unit. To do this:
  Press tip switch **64** until the telescopic unit is completely retracted
- Lower the telescopic unit. To do this:
  Push control lever **21** forward, out of neutral (**C**)

After operation at full power:

- Allow the engine to idle and without load for a while so that the temperature can stabilize
- Cut off the engine. To do this:
  Turn the ignition key to position "**0**"
- Remove the ignition key
- Lock the doors of the operator's compartment after leaving the cab

On uphill and downhill gradients:

- Additionally secure the machine by placing chocks under the downhill sides of the wheels!

3.4.11 Light system

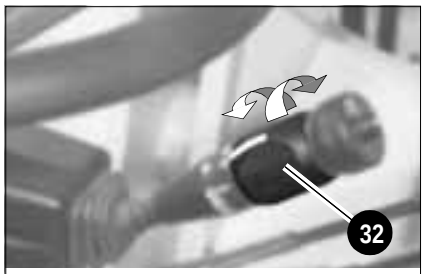


Fig. 45: Light system: switches

Parking lights		
ON	☞ *Turn rotary switch **32** to position **I***	➥ Warning Light 19/**43 comes on with high beam switched on**
OFF	☞ *Turn rotary switch **32** to position **0***	➥ High beam and warning light 19/**43** go out

Low beam		
ON	☞ *Turn rotary switch **32** to position **II***	➥ Warning Light 19/**43 comes on with high beam switched on**
OFF	☞ *Turn rotary switch **32** to position **0***	➥ High beam and warning light 19/**43** go out

NOTE:

Only the parking light stays lit if the ignition is switched off (with low beam switched on) – key in preheating start switch 20/**52** in position **0**!

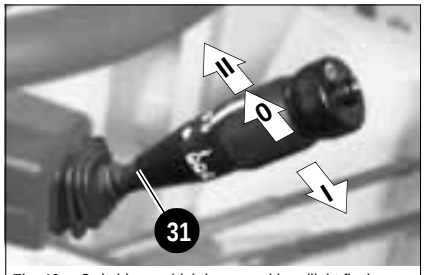


Fig. 46: Switching on high beam and headlight flasher

High beam		
ON	☞ *With low beam switched on, move lever downward until it locks in position **I***	➥ Warning Light 19/**43** comes on
OFF	☞ *Move lever **31** up to position **0***	➥ High beam and warning light 19/**43** go out

Headlight flasher		
ON	☞ *Push lever **31** up to position **II***	➥ Warning Light 19/**43** comes on

WARNING!

The working lights may temporarily blind motorists on public roads.

☞ *Do not use the working lights for travel on public roads, and in work operation only if no other persons are temporarily blind!*

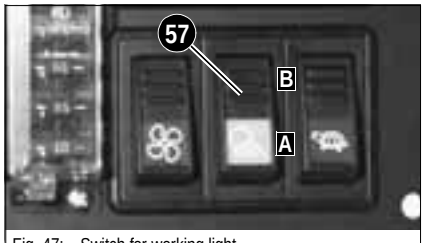


Fig. 47: Switch for working light

Working light (option)		
ON	☞ *Press rocker switch **57** downwards in **A** (down)*	➥ Warning Light in rocker switch ***57*** comes on
OFF	☞ *Press rocker switch **57** downwards in **B** (above)*	➥ Warning Light in rocker switch ***57*** goes out

Interior light	
ON	☞ *Press interior light 16/**9***
OFF	☞ *Press interior light 16/**9** down a second time*

3.4.12 Signalling system

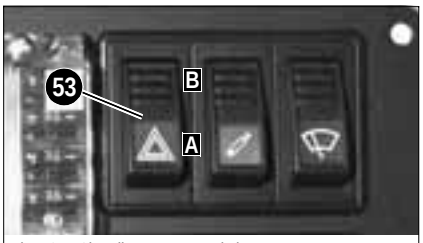


Fig. 48: Signaling system: switches

Hazard warning system		
ON	☞ *Press rocker switch **53** downwards in **A** (down)*	➥ Warning Light in rocker switch **53** flashes
OFF	☞ *Press rocker switch **53** downwards in **B** (above)*	➥ Warning Light in rocker switch **53** goes out

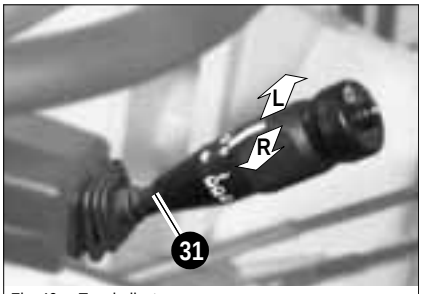


Fig. 49: Turn indicators

Turn indicators		
LEFT	☞ *Push lever **31** forward*	➥ Warning Light 19/**42** flashes
RIGHT	☞ *Pull lever **31** to the rear*	➥ Warning Light 19/**42** goes out

Important!

The turn indicator system is not functioning properly if warning light 19/**42** flashes about twice as fast as normally!

☞ *Check the front and rear indicators immediately*

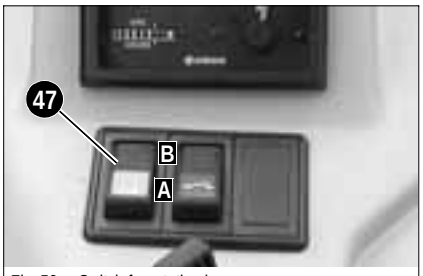


Fig. 50: Switch for rotating beacon

Rotating beacon (option)		
ON	☞ *Press rocker switch **47** in **A** (below)*	➥ Warning Light in rocker switch **47** flashes
OFF	☞ *Press rocker switch **47** in **B** (above)*	➥ Warning Light in rocker switch **47** goes out

3.4.13 Cab heating and ventilation

The heater of the machine can be set to two operating conditions:

- Ventilation
- Heating

The flow of air is directed to the windscreen via a defroster vent and to the operator compartment via a foot vent 16/**19**.

The foot vent can be closed and directed separately.

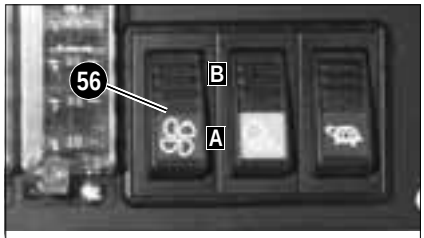


Fig. 51: Fan switch

Ventilation, fresh air	
1st fan level	☞ *Press rocker switch **56** down in **A** (below) by one step*
2nd fan level	☞ *Press rocker switch **56** down in **A** (below) by two steps*
Fan OFF	☞ *Press rocker switch **56** all the way down in **B** (above)*

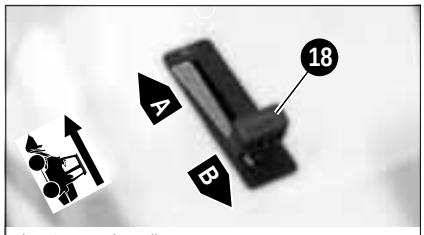


Fig. 52: Heating adjustment

Heating	
Colder	☞ *Slide lever **18** to position **B***
Warmer	☞ *Slide lever **18** to position **A***

3.4.14 Window wash system

Fig. 53: Front wiper: switch

Front wiper	
ON	☞ *Press rocker switch **55** in **A** (below)*
OFF	☞ *Press rocker switch **55** in **B** (above)*

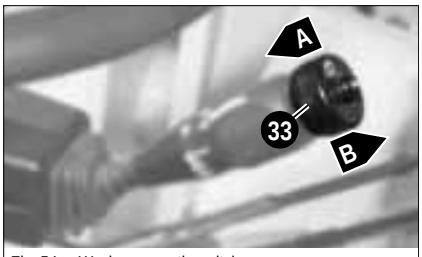


Fig. 54: Washer pump tip switch

Washer pump for front and rear window	
ON	☞ *Press tip switch **33** to position **A***
OFF	☞ *Release tip switch **33** (**B**)*

Fig. 55: Rear wiper: rocker switch

Rear wiper	
ON	☞ *Press rocker switch **10** to position **I***
OFF	☞ *Press rocker switch **10** to position **0***

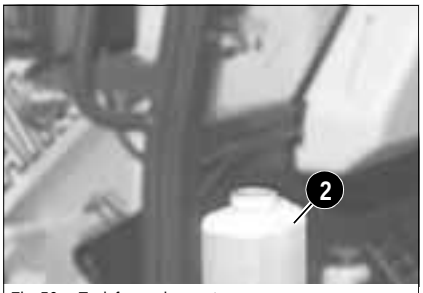


Fig. 56: Tank for washer system

Tank for washer system 2

NOTE:

Fill with clean tap water only! Add a suitable cleaning agent if required. In winter: Add antifreeze for washer systems to the water. Refer to the instructions for using the antifreeze, which give information about concentrations.

3.4.15 Seat adjustment

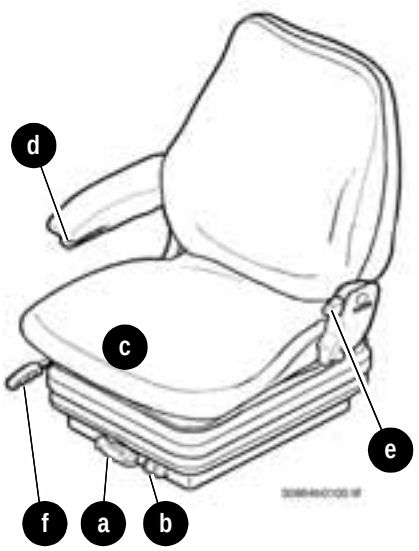


Fig. 57: Seat adjustment

WARNING!

Never change the seat position when driving or working to avoid and accident.

☞ *Adjust the seat before moving the machine*

The seat can be set to the following positions:

- Weight setting **a** with weight indicator **b**
- Height setting **c**
- Armrest angle **d**
- Backrest setting (depending on version) **e**
- Fore-and-aft setting **f**

Weight setting

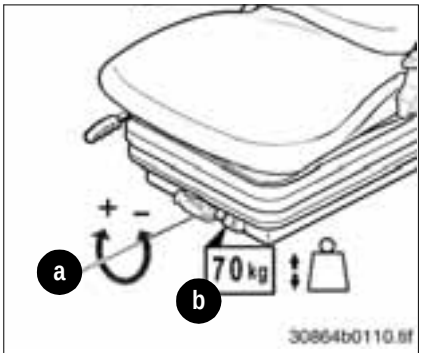


Fig. 58: Weight adjustment

Important!

Adjust the seat suspension correctly to ensure comfort. Use lever **a** to adjust the seat suspension to the operator's weight. The weight indicator **b** shows the set operator weight in kg.

☞ *Sit down on the operator's seat*

To adjust to a higher operator weight:

☞ *Turn lever **a** clockwise*

To adjust to a lower operator weight:

☞ *Turn lever **a** counterclockwise*

Height setting

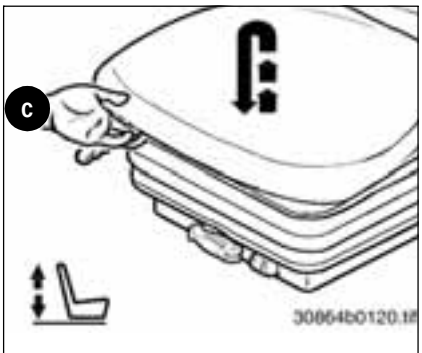


Fig. 59: Height setting

Upwards:

☞ *Raise seat as required until it engages with an audible click*

Downwards:

☞ *Raise seat as far as possible and*

☞ *Lower seat to bottom position*

Armrest setting

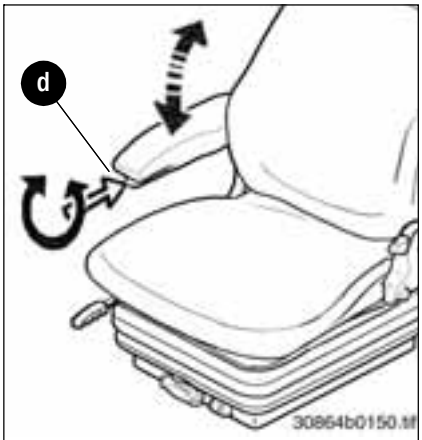


Fig. 60: Armrest setting

The armrest can be folded back as required. Set the armrest as follows:

Upwards:

☞ *Turn handwheel **d** clockwise as required*

Downwards:

☞ *Turn handwheel **d** counterclockwise as required*

Backrest setting

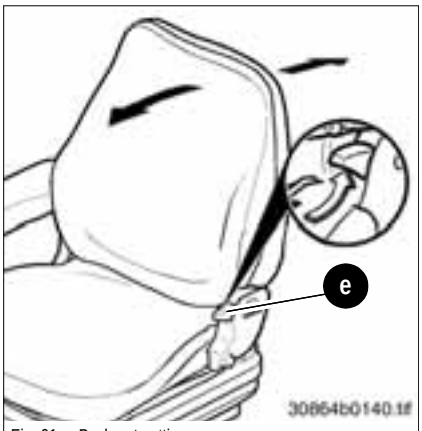


Fig. 61: Backrest setting

☞ *Sit down on the operator's seat*

☞ *Pull lever **e** upwards and at the same time*

☞ *Lean back to push the backrest into the required position*

☞ *Let lever **e** lock into place*

Fore-and-aft setting

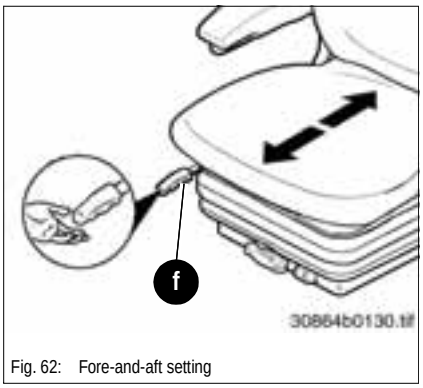


Fig. 62: Fore-and-aft setting

☞ *Sit down on the operator's seat*

☞ *Pull lever **f** upwards and at the same time*

☞ *Move the operator's seat forward or backward*

3.4.16 Seat belt

WARNING!

Do not operate machine with the seat belt unbuckled to avoid personal injury.

☞ *Buckle up before moving or using the machine!*

- Seat belt must not be twisted!
- Seat belt must run over the hips – not over stomach – and must always be applied tightly!
- Do not place seat belt over hard edged or fragile items (tools, glasses, pen) carried inside your clothes!
- Never buckle up 2 persons (children!) with a single seat belt!
- Check seat belts regularly. Have damaged parts immediately replaced!
- Always keep seat belt clean, as dirt may impair proper functioning!
- Seat belt buckle must not be obstructed otherwise the buckle latch cannot lock into place!

WARNING!

After an accident the belt strap may be stretched, and is no longer serviceable. In an accident, the seat belt will not provide adequate protection!

☞ *Replace the seat belt after an accident*

☞ *Have fastening points and seat fixture checked for loading capacity!*

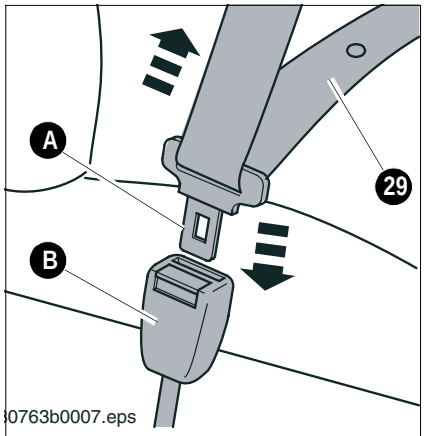


Fig. 63: Fastening the seat belt

The seat belt **29** is designed for the driver's safety during work on construction sites and during road travel.

To fasten seat belt 29

☞ *Before starting, fasten seat belt* **29** *as follows:*

- Hold belt on the buckle latch **A** and run it slowly and steadily over the hips to the buckle **B**
- Insert buckle latch **A** into the buckle **B** until it engages audibly (**pull test**)
- Tighten seat belt by pulling at its end

  ➥The seat belt must always be tightly in place over the hips!

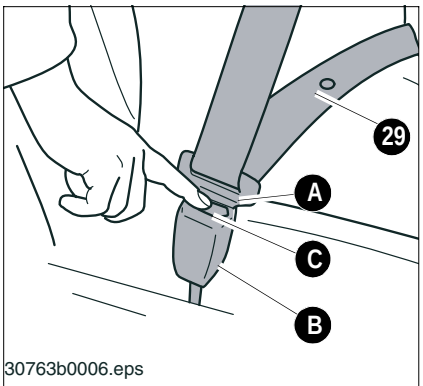


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Fig. 64: To unfasten seat belt

To unfasten seat belt 29:

☞ *Unfasten seat belt* **29** *as follows:*

- Hold the seat belt
- Press red button **C** on the buckle **B**

  ➥The latch **A** is released from the buckle **B** by spring pressure
- Slowly return the seat belt the retractor (option)

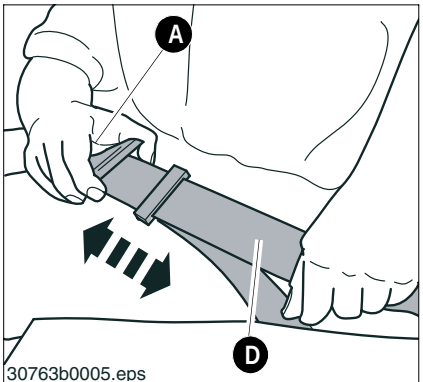

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Fig. 65: Longer/shorter seat belt setting

Longer/shorter lap belt setting 29:

☞ *Lengthen the lap belt as follows:*

- Hold the buckle latch at a right angle to the seat belt and pull the seat belt to the required length – see Fig. 65

☞ *To shorten the lap belt, just pull on the free end* ***D*** *of the belt – see Fig. 65*

NOTE:

When pulled slowly, the automatic seat belt (option) offers full freedom of movement. It locks however during abrupt braking.
The automatic seat belt (option) may also lock when passing through potholes or uneven terrain.

3.4.17 Driver's door and side window

Driver's door

Access to/exit from the cab is possible through the driver's door (left). In case of emergency however, the side window on the right may be used as emergency exit.

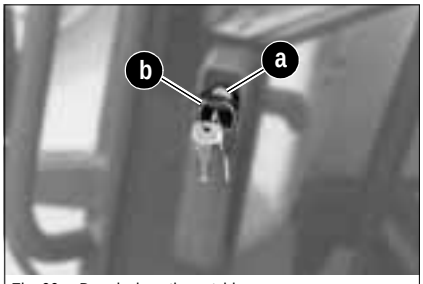


Fig. 66: Door lock on the outside

Opening from outside:

- Press door button **a**

Lock door:

- Turn ignition key **b** in door lock to the right

Unlock door:

- Turn ignition key **b** in door lock to the left

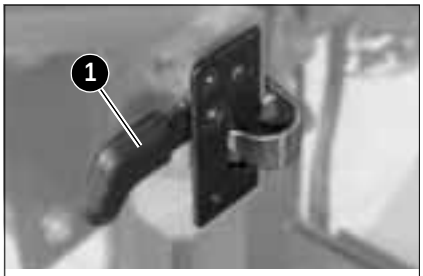


Fig. 67: Door lock on the inside

Opening from inside:

- Pull lever **1** up

Driver's door in "open" position with the door arrester

☞ *Press the operator's door against the door holder 16/**12** until it engages*

NOTE:

Grease the door holder at regular intervals (min. every 600 service hours)!

Unlocking the door arrester

☞ *Press the release button in the cab (16/**12**)*

➥ Door is released by spring action

Side window

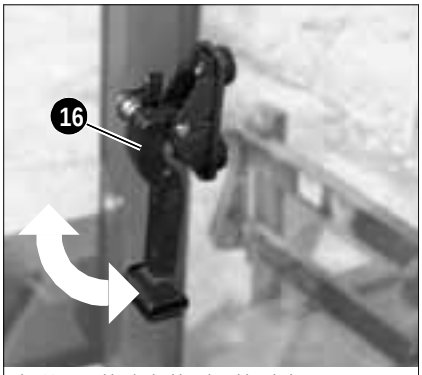


Fig. 68: Locking/unlocking the side window

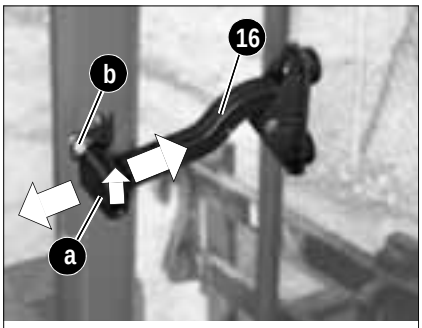


Fig. 69: Opening the hinged side window

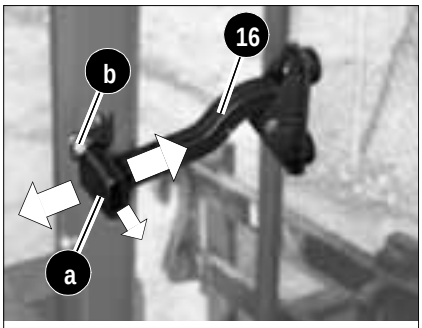


Fig. 70: Fully opening the side window

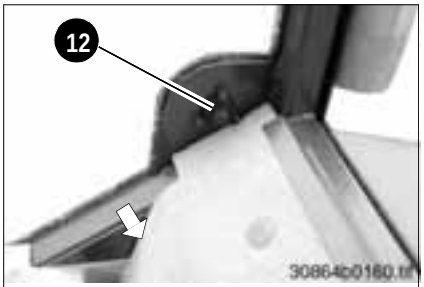


Fig. 71: Fully opening the side window

Normal operation

Lock

- Turn lever **16** downward

Unlock

- Turn lever **16** upward

Opening the hinged side window

- Turn lever **16** upward
- Push lever **16** horizontally towards the outside
- To fix the window in its limit position:
  Push the end of lever **a** downward in guide **b**

Fully opening the side window

☞ *Turn lever* **16** *upward*

☞ *Push lever* **16** *horizontally towards the outside*

☞ *Fully open the window as follows:*
Pull the end of lever ***a*** *to the rear, out of guide* ***b***

Side window in "open" position with door holder 16/**12**

☞ *Open the side window completely and push against door holder 16/**12** until the door locks into place*

NOTE:

Grease the door holder at regular intervals (min. every 600 service hours)!

Unlocking the door holder 16/12

☞ *Press button 16/**12** in the cab at the right or actuate the lever outside the machine*

➥ Side window is released by spring action

Emergency exit

In case of emergency, the side window may be used as access to/exit from the cab.

WARNING!

To avoid personal injury, do not use the side window as an access or exit except in case of an emergency. The right side of the machine does not have footholds or handles that ensure a safe access/exit. Moreover, the side window cannot be held in “open” position if locking lever 69/**16** is lifted out of guide 69/**b** –

Danger of personal injury!

☞ *Do not use the side window as access or exit except in case of emergency!*

☞ *Before taking up normal operation again, be sure that the end of lever 69/**a** is engaged in guide 69/**b***

☞ *To open the side window completely:*

- Push end of lever 69/**a** upwards in guide 69/**b**
- Pull end of lever 69/**a** gently out of guide 69/**b**

3.4.18 Other controls

Fuel tank

Fig. 72: Filler cap lock

Unlocking:

- Turn the key to the right

Closing:

- Turn the key to the left

Engine cover

Fig. 73: Engine cover lock

The engine cover can only be opened by key.

Unlocking:

- Turn the key to the right
- Pull the engine cover upwards

Closing:

- Press the engine cover firmly down
- Turn the key to the left and remove it from the lock

3.4.19 Towing and transporting the machine

Safety instructions

- The machine may only be towed using suitable towing equipment (towing bar or cable) and suitable towing facilities, such as a towing coupling, hooks and eyes!
- Drive off slowly! Be sure no one is dangerously close to the towing bar.
- The machine may only be towed with a cable if the service brakes and steering are fully operational!

When loading and transporting the machine:

- The transport machine must be of adequate size – refer to section *Specifications* for the dimensions of the machine!
- Remove any mud, snow or ice from the tyres so that the machine can safely be driven onto the ramps
- Secure the machine against unintentional movement!
- Before transporting the machine through heavy rain: Close the outlet of the exhaust silencer with a simple cap or suitable adhesive tape

Towing

WARNING!

Turning the steering wheel requires greater effort if the diesel engine breaks down. Take this into account, especially when towing the machine!

☞ *Use a towing rod!*

Important!

The hydrostatic drive may be damaged if the machine is towed in this condition!

☞ *Switch off the engine!*

☞ *Short-circuit the hydraulic circuit before towing (see below)*

☞ *Do not tow the machine for more than 100 yards (100 meters) and do not tow it faster than 2-3 mph (3 – 4 km/h)!*

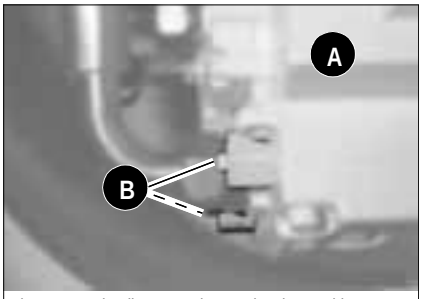


Fig. 74: Hydraulic pump when towing the machine

☞ *Tow the machine as follows:*

- Move drive lever to neutral – see *Driving direction selector switch* on page 3-8
- Apply the parking brake (➠ page 3-10)
- Switch off the engine
- Attach an adequately sized towing rod to the towing facilities

☞ *Change over the valves on hydraulic pump **A**. To do this:*

- Depress buttons **B**

NOTE:

The HP valve changeover is automatically reversed when the machine is placed back into service, as soon as the engine is started.

Loading and transporting the machine:

WARNING!

To avoid injury, the machine must be loaded and transported properly:

☞ *It is essential that you read the safety instructions at the beginning of this chapter and follow them!*

☞ *Load as follows:*

- Secure the transport machine with chocks to prevent it from rolling
- Attach the ramps so that the access angle is as small as possible, and ensure that they cannot slip
- Ensure that the loading area is clear and access to it is not obstructed.
- Ensure that the ramps and the wheels of the wheel loader are free of oil, grease and ice
- Start the engine of the wheel loader
- Raise the front bucket enough so that it will not touch the ramps
- Carefully drive the wheel loader onto the transport machine
- Move drive lever to neutral – see *Driving direction selector switch* on page 3-8
- Apply the parking brake of the wheel loader
- Lower the bucket to the loading area with the telescopic unit retracted
- Ensure that the authorized maximum height is not exceeded
- Cut off the engine of the wheel loader
- Secure all tyres of the wheel loader with chocks in front of, behind and at the sides of each wheel
- Securely lash the wheel loader onto the loading area using straps and chains of adequate size at the lashing points provided – see section 1.2 *Machine: Overview* on page 1-2
- Before transporting the machine through heavy rain:
  Close the outlet of the exhaust silencer with a simple cap or suitable adhesive tape
- Make certain that the driver of the transport machine knows the overall height of his machine before departure!

3.5 Working with the machine

3.5.1 General safety instructions

- Never lower the extended telescopic unit from a high position, because of the chance of tipping! Retract the telescopic unit before lowering it!
- Exercise extreme caution in off-road operation:
  Work on solid ground whenever possible!
- Never drive up to the edge of a pit from outside, because of the chance of cave-in!
- Never undermine the foundations of walls, because of the chance of collapse!
- Operation of the machine by unauthorized persons is prohibited!
- When excavating, look out for high-voltage cables, underground cables, gas and water pipes!
- When using lifting accessories such as pallet forks, comply with the load diagrams for this machine
- The hydraulic system of the machine remains pressurized even when the engine is not running! Relieve the pressure in the sections of the system and hydraulic lines that are to be opened before starting setup or repair work, e.g. fitting/removing an attachment with hydraulic functions – see *Section 3.5.6 „Relieving pressure the quick couplers on the telescopic unit"*

3.5.2 Load diagram

Observe the relevant load diagram when using pallet forks with fork arms on the telescopic. This diagram specifies maximum load on the fork arms – see section 1.8 *Safety signs and symbols* on page 1-8. The maximum load varies according to the distance from the load center.

NOTE:

The load diagrams on the front window are valid only for applications with pallet forks. Observe the specific load diagrams of other attachments used, e.g. rotary jib boom!

3.5.3 Safe load indicator

WARNING!

The safe load indicator has been adjusted for industrial application (S=1.25). Do not rely on the safe load indicator when working off-road.

☞ *Work in rough terrain with even more care than usual! Adapt your drive speed and loads to the terrain. Refer to the load diagram for the maximum authorized loads!*

A defective safe load indicator or working at more than 100% of the safe work load may cause the machine to tilt and may result in an accident.

☞ *Check the safe load indicator daily!*

☞ *A flashing indicator and an audible signal warn of loads exceeding 100%. The operator must reduce the load below the 100% limit by retracting the telescopic unit!*

Your machine is equipped with an electronic load indicator **14** which continuously monitors the weight variations on the rear axle during operation.
Visible and audible signals warn the operator of critical loads on the telescopic unit which might cause the machine to tilt to the front.
Critical side loads however are not monitored, i.e. the operator is not warned in this case!

The LEDs **a**, **b** and **c** indicate the load effective on the telescopic unit – in percent of the **safe work load.**

Overview

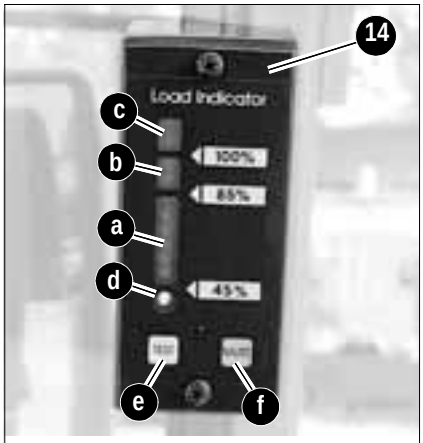


Fig. 75: Electronic load indicator

a 6 green LEDs – indication of loads between 45% and 85% of **the safe work load**

b 2 yellow LEDs – indication of loads up to 100% of **the safe work load**

c 2 red LEDs – indication of loads up to 110% of **the safe work load**

d Green LEDs to signal readiness

e Tip switch for checking the system

f Tip switch for adjusting the volume of the audible signal

What to do if...

- Green LED **d** comes on?

  ➥**OK**; load indicator is ready
- Green LEDs **a** (1-6) come on?

  ➥**OK**; the load is between **45%** and **90%** of **the safe work load**
- Yellow LEDs **b** (7-8) come on in addition?

  ➥Work with caution; the load is between **85%** and **100%** of the **safe work load**
- Green **a** and yellow LEDs **b** are flashing, the acoustic signal is given?

  ➥**Work with extreme caution! 100%** of the **safe work load** is reached corresponding to the load diagram
- Red LEDs **c** come on?

  ➥**OVERTURNING HAZARD!** Reduce the load immediately by retracting the telescopic unit! The load is between **100%** and **110%** of the **safe work load!**
- The complete indicator is flashing, the acoustic signal is given, although the TEST tip switch has not been activated?

  ➥The load indicator is defective. Have it immediately checked and repaired by an expert!

Functional check

NOTE:

The check may be performed at any time, even during operation.

☞ *Proceed as follows:*

- Press TEST tip switch **e**

All LEDs are flashing and the acoustic signal is given:

➥In working order

Acoustic signal sounds uninterruptedly for 10 seconds, then 2 red and 1, 2 or 3 green LEDs come on in addition:

➥System error; have the safe load indicator immediately be checked and repaired by an expert!

Adjusting signal volume

☞ *Proceed as follows:*

- Press TEST tip switch **e**

While the acoustic signal is given:

- Press the MUTE tip switch **f** until the desired volume is set

3.5.4 Control valve for the telescopic unit: overview

Control lever for hydraulics of lift and tilt cylinder of telescopic unit

WARNING!

Unintentional operation of the control lever 76/21 may cause an accident when driving on public roads

☞ *Lock the control lever – see Before driving the machine on page 3-20*

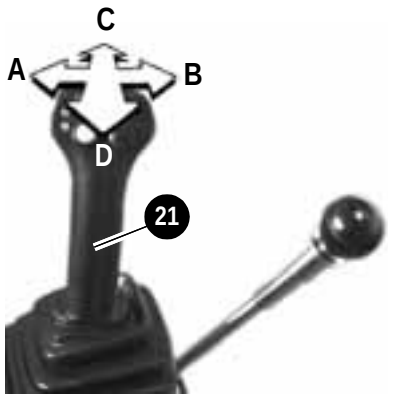


Fig. 76: Telescopic unit: control lever

Position	Symbol	Lever 21	Function
• **A**		☞ *To the left*	➥ Roll back attachment
• **B**		☞ *To the right*	➥ Tilt out attachment
• **C**		☞ *Forward*	➥ Lowers the lift arm
• **D**		☞ *Backward*	➥ Raises the lift arm

Fig. 77: Securing the control lever for driving on public roads

Securing the control lever for driving on public roads

To engage:

☞ *Follow the instructions given in Section 3.4.5 „Before driving the machine"*

☞ *Push control lever **21** down in neutral position*

➥The control lever is locked in this position, it cannot be moved

Disengaging the lock:

☞ *Pull lever **21** up*

Control lever for attachments and 3rd control circuit

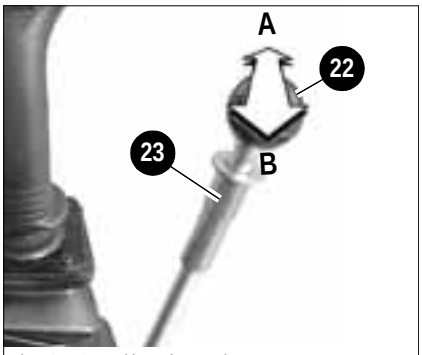


Fig. 78: Control lever for attachments

Position	Lever 22	Function
A	☞ *Forward*	➥ Unlocks quick hitch facility **Attachment with hydraulic function:** ➥ E.g. opens the multipurpose bucket
B	☞ *Backward*	➥ Locks quick hitch facility **Attachment with hydraulic function:** ➥ E.g. closes the multipurpose bucket

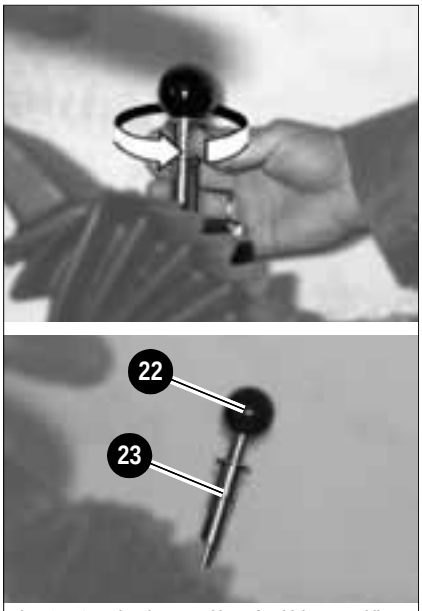


Fig. 79: Securing the control lever for driving on public roads

Lock for driving on public roads

To engage:

☞ *Turn lock sleeve **23** until it is pulled down*

➥Lever **22** is locked

To open permanently:

☞ *Pull lock sleeve **23** up to the limit and turn it until it stays in the top position*

➥Lever **22** can be moved forward and backward

To open briefly:

☞ *Pull lock sleeve **23** up to the limit and hold it in this position*

➥As long as lock sleeve **23** is being pulled upward, lever **22** can be moved.

3.5.5 Lowering the telescopic unit with the engine switched off

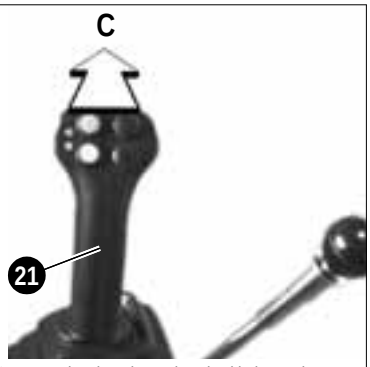


Fig. 80: Lowering the telescopic unit with the engine switched off

☞ *Proceed as follows:*

- Make sure that no-one is dangerously close to the telescopic unit
- Push control lever **21** forward (**C**), until the telescopic unit is fully lowered
- Return control lever **21** to neutral

3.5.6 Relieving pressure the quick couplers on the telescopic unit

NOTE:

The hydraulic system of the 3rd control circuit/attachment is still pressurized even when the engine is not running! The hydraulic quick couplers can be released, however they cannot be re-attached because the pressure in the hydraulic lines is too high. Therefore:

☞ *Depressurize sections of the system and hydraulic lines which are to be opened before starting setup or repair work, e.g. fitting/removing an attachment!*

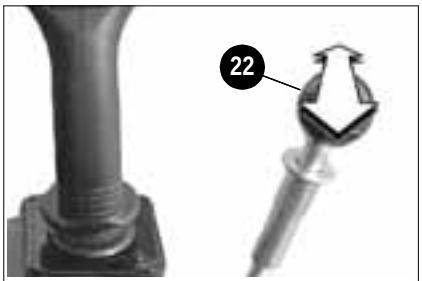


Fig. 81: Depressurizing hydraulic lines

☞ *Depressurize as follows:*

- Apply parking brake 16/**25** – see *Parking brake [25]* on page 3-10
- Switch off the engine
- Move lever **22** forward and backward several times

  ➥Hydraulic pressure is released

3.5.7 Installing an attachment

Installing an attachment on the telescopic unit is described below for the standard bucket! If you are fitting or removing attachments with hydraulic functions – e.g. multipurpose or side dump bucket – you must follow the special information given in the operator's manual of the corresponding attachment.

Fitting attachments onto the quick hitch facility

WARNING!

The attachment must always be safely locked onto the quick hitch facility to avoid accidents.

☞ *Before starting work, be sure that the attachment is securely locked onto the quick hitch facility by means of the lock cylinder. You must be able to see the lock pins on both sides of the mounting holes.*

☞ *Proceed as follows:*

- Drive the machine up to the attachment
- Tilt the quick hitch facility all the way forward. To do this:
  Push lever **21** to the right (**B**)
- Adjust the height of the pin shanks L of the quick hitch facility so that they are under the catch hooks **K** of the attachment. To do this:

Telescopic unit	Lever 21
• Lower	☞ *Push forward (**C**)*
or	
• Lift	☞ *Pull backward (**D**)*

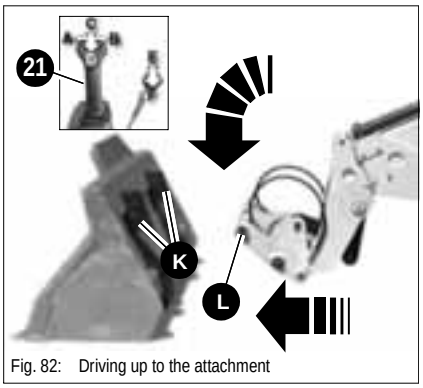


Fig. 82: Driving up to the attachment

- Drive forward until the pin shanks **L** of the quick hitch facility are directly beneath the catch hooks of the attachment **K**

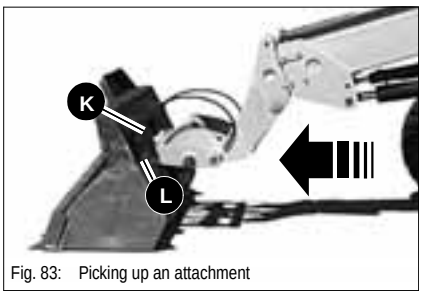


Fig. 83: Picking up an attachment

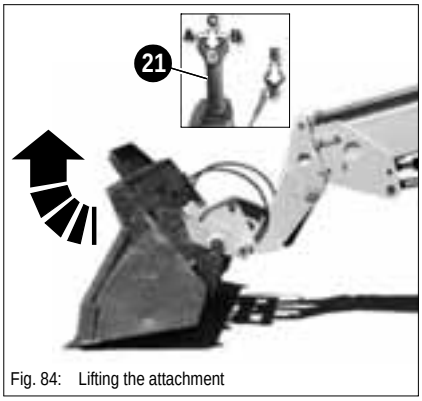


Fig. 84: Lifting the attachment

- Raise loader linkage ( ). To do this:
  Pull lever **21** backward (**D**) and
- Tilt in the quick hitch facility ( ). To do this:
  Push lever **21** to the left (**A**)

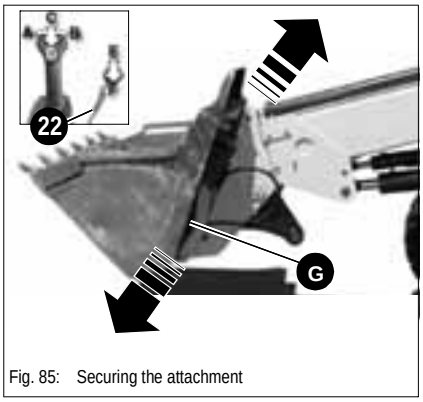


Fig. 85: Securing the attachment

- Secure the attachment with the lock pin of the quick hitch facility. To do this:
  Pull lever **22** backward (**F**)
  ➥Lock pin **G** engages in the mounting bores of the attachment
- Make sure that the tool/attachment is securely locked onto the quick hitch facility!

NOTE:

You must be able to see catch bolt **G** on **both sides** of the mounting bores on the attachment, as in figure 86/**G**.

Fig. 86: Checking the lock pins

Attachments with hydraulic function:

- Switch off the engine
- Attach the hydraulic and, if used, electrical connections for the attachment in accordance with its operator's manual

Connection of electrically operated attachments (option)

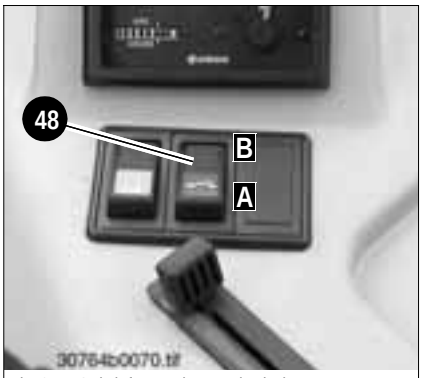


Fig. 87: Switch for attachments (option)

The machine can be equipped with a 4 pole front socket (option). With rocker switch **48**, the power supply for electrically operated front attachments, e.g. a spray water pump for a rotary broom, can be permanently switched ON and OFF.

Power supply for front attachments (option)		
ON	☞ *Press rocker switch **48** in position **A** (down)*	➥ The power supply at the front socket is switched on ➥ Warning Light in switch comes on
OFF	☞ *Press rocker switch **48** in position **B** (above)*	➥ Power supply is interrupted ➥ Warning Light goes out

Taking an attachment off the quick hitch facility

WARNING!

To avoid injury, the attachment must be placed on the ground so that it will not fall over when removed

☞ *Position the attachment so that after removal it will stand safely and will not tip over.*

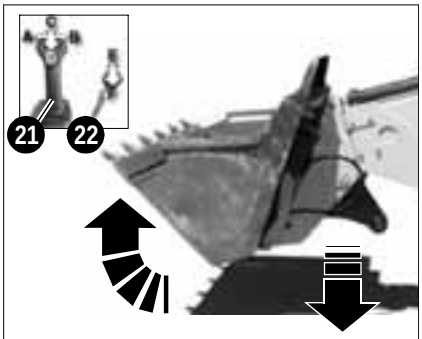


Fig. 88: Lowering and tilting in the attachment

☞ *Take the attachment off the quick hitch facility as follows:*

- Drive the machine with empty attachment up to the storage location.
- Roll back the quick hitch facility ( ). To do this:
  Push lever **21** to the left (**A**)
- Lower the loader ( ) until the attachment is about 2 – 4 in (5-10 cm) above the ground. To do this:
  Push lever **21** forward (**C**)

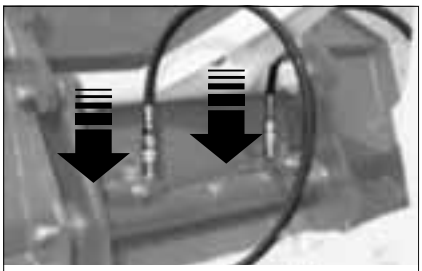


Fig. 89: Changing round the hydraulic connections

Attachments with hydraulic function:

- Switch off the engine
- Change round the hydraulic connections (figure 89) from the attachment to the lock cylinder, in accordance with the operator's manual of the attachment

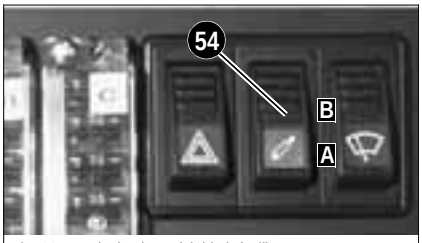


Fig. 90: Unlocks the quick hitch facility

- Release the lock on the quick hitch facility. To do this:
  Keep tip switch **54** in position **A** depressed and simultaneously
- Retrack the lock pin of the quick hitch facility. To do this:
  Push lever forward 88/**22** forward (88/**E**)

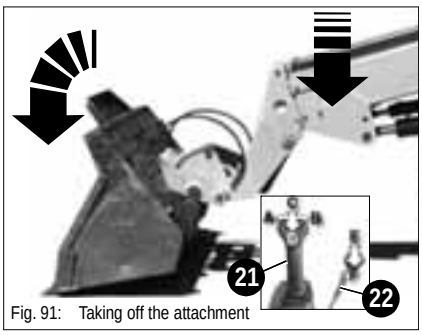


Fig. 91: Taking off the attachment

- Tilt quick hitch facility slightly forward ( ). To do this:
  Push lever **21** to the right (**B**)
- Lower the bucket fully ( ). To do this:
  Push lever **21** forward (**C**)

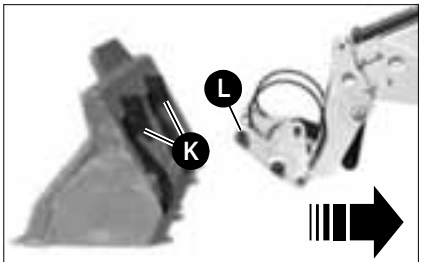


Fig. 92: Reversing from the attachment

As soon as the pin shanks **L** of the quick hitch facility are beneath the catch hooks **K** of the attachment:

- Reverse away from the attachment

3.5.8 Connecting pressurized quick couplers

WARNING!

To avoid injury, use extra care when connecting pressurized quick couplers.

☞ *Depressurize sections of the system and hydraulic lines that are to be opened before starting setup or repair work, e.g. fitting/removing an attachment!*
see Relieving pressure the quick couplers on the telescopic unit on page 3-47.

☞ *Never connect pressurized quick couplers by force*

NOTE:

Oil temperature and pressure in the cylinder can rise if an attachment (e.g. side dump bucket or multipurpose bucket) or the quick hitch facility is exposed to the sun for a long period of time, without being connected to the machine. This pressure cannot be lowered by means of depressurization (as described in *section 3 "Relieving pressure the quick couplers on the telescopic unit"* on page 3-47 *)*.

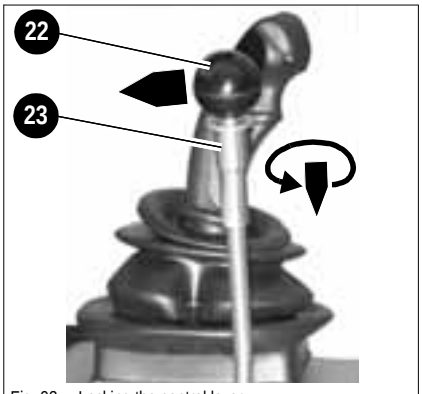


Fig. 93: Locking the control lever

The following describes how to connect a pressurized quick hitch facility. Proceed accordingly for connection of pressurized attachments.

Connect pressurized quick couplers as follows:

☞ *Fit the attachment onto the quick hitch facility (pressurized attachment), or remove the hydraulic lines from the attachment (pressurized quick hitch facility)*

☞ *Switch off the engine*

☞ *Depressurize as described in section 3 "Relieving pressure the quick couplers on the telescopic unit" on page 3-47*

☞ *Pull lever **22** backward and lock it. To do this:*

- Turn lock sleeve ***23*** until it is pulled down

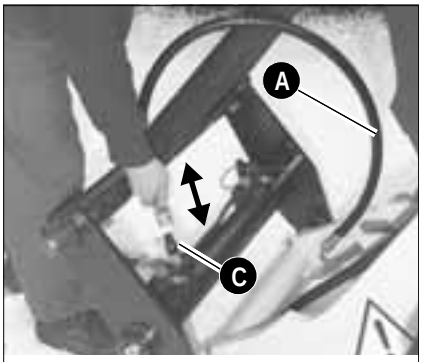


Fig. 94: Depressurization

☞ *Connect hydraulic line **A** (on the right) on the machine, to blue plug **C** of the quick hitch facility (on the left, crosswise!)*

☞ *Remove hydraulic line **A** again*

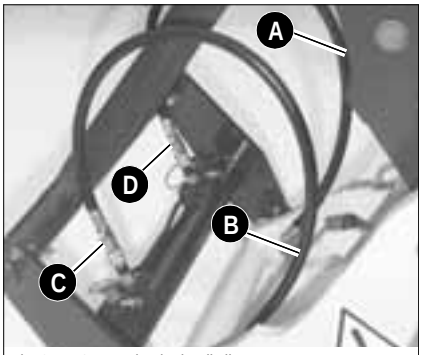


Fig. 95: Connecting hydraulic lines

☞ *Connect hydraulic line **A** to blue plug **D** of the quick hitch facility (on the right)*

☞ *Connect hydraulic line **B** to red plug **C** of the quick hitch facility (on the left)*

Fig. 96: Releasing the lock

☞ *Release lock of lever **22***

☞ *Return lever **22** back to neutral*

☞ *Lock the attachment – see section 3.5.7 Installing an attachment on page 3-48*

3.5.9 Operation of the telescopic unit

WARNING!

A defective safe load indicator or working at more than 100% of the safe work load may cause the machine to tilt and may result in an accident.

☞ *Check the safe load indicator daily!*

☞ *A flashing indicator and an audible signal warn of loads exceeding 100%. The operator must reduce the load below the 100% limit by retracting the telescopic unit!*

Lift

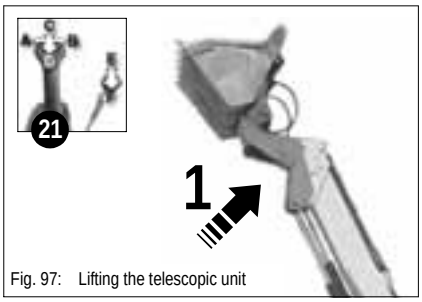


Fig. 97: Lifting the telescopic unit

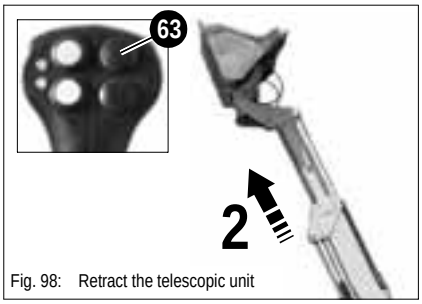


Fig. 98: Retract the telescopic unit

☞ *Proceed as follows:*

- Raise the retracted telescopic unit to the required height. To do this:
  Pull lever **21** backward (**D**)

- Extend the telescopic unit. To do this:
  Press the tip switch **63** and hold in this position until the telescopic unit is extended to the required length

Lower

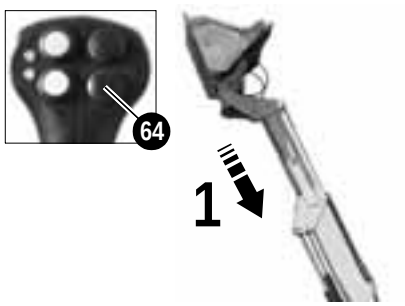


Fig. 99: Retract the telescopic unit

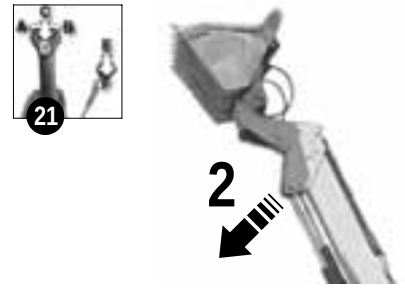


Fig. 100: Lowering the telescopic unit

☞ *Proceed as follows:*

- Retract the telescopic unit. To do this:
  Press tip switch **64** until the telescopic unit is completely retracted

- Lower the retracted telescopic unit. To do this:
  Push lever **21** forward (**C**)

3.5.10 Safety device “Hose burst valve“

NOTE:

When working with lifting gear and certain attachments, the hydraulic cylinder of the telescopic unit must be equipped with “hose burst valves” – see *Applications with lifting accessories* on page 2-7.
They prevent the telescopic unit from suddenly lowering or dumping out when a hose or pipe bursts.

WARNING!

Damage to the hydraulic system leads to activation of the “hose burst valve and may result in an accident–

☞ *Unlock the emergency lowering of the hose burst valve only in an emergency.*

☞ *Have damage to the hydraulic system and to the hose burst valve immediately repaired and checked by trained personnel*

In the event of damage to the hydraulic system:

☞ *Immediately stop the machine*

☞ *Apply the parking brake*

☞ *First retract the push-out cylinder if possible*

☞ *Switch off the engine*

☞ *Remove the ignition key*

☞ *Block the machine*

Environment!

Collect the drained hydraulic oil in a suitable container. Dispose of drained hydraulic oil in an ecologically safe method!
Always contact the relevant authorities or commercial establishments in charge of oil disposal before disposing of biodegradable oil.

☞ *Collect the drained oil and dispose of it in an ecologically safe method!*

WARNING!

Emergency lowering of telescopic unit may result in an accident.

☞ *First retract the push-out cylinder if possible!*

☞ *Keep clear of the hazard zone under the telescopic unit, always approach from the sides!*

☞ *Do not actuate the emergency lowering of the lift cylinder from the front, but through the lateral bore in the frame!*

☞ *Always actuate emergency lowering with extreme care*

Emergency lowering on the lift cylinder

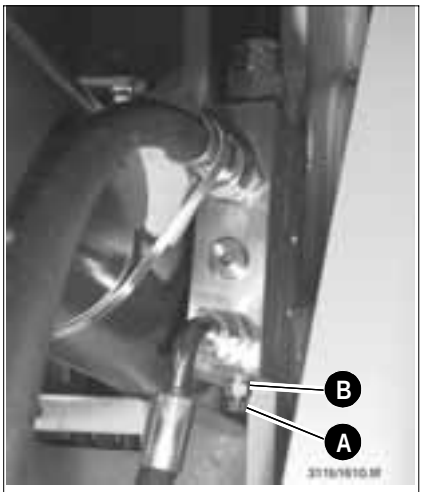


Fig. 101: Hose burst valve for lift cylinder (option)

☞ *Actuate the emergency lowering on the lift cylinder as follows:*

- **First carefully retract the push-out cylinder**
- Remove locknut **A**
- Carefully turn out screw **B** by 1 to 2 turns until the telescopic unit starts lowering
- Collect the drained oil and dispose of it by an ecologically safe method!
- Carefully lower the telescopic unit to transport position
- Tighten screw **B** again, countering it with locknut **A**
- Drive the machine out of the hazard zone with the bucket lowered

☞ *Have the setting of the hose burst valve checked by a specialist. Have the hose burst valve replaced if necessary*

Emergency lowering on the push-out cylinder

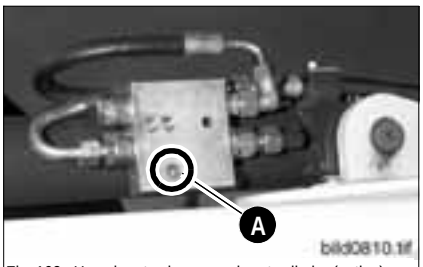


Fig. 102: Hose burst valve on push-out cylinder (option)

☞ *Actuate the emergency lowering on the push-out cylinder as follows:*

- **Do not retract the lift cylinder!**
- Carefully turn out screw **A** by about 1/2 turn until the telescopic unit starts retracting
- Carefully retract the telescopic unit against the limit stop
- Firmly retighten screw **A**
- Carefully lower the telescopic unit with the lift cylinder into transport position
- Drive the machine out of the hazard zone with the bucket lowered

☞ *Have the setting of the hose burst valve checked by a specialist. Have the hose burst valve replaced if necessary*

Emergency lowering on the tilt cylinder

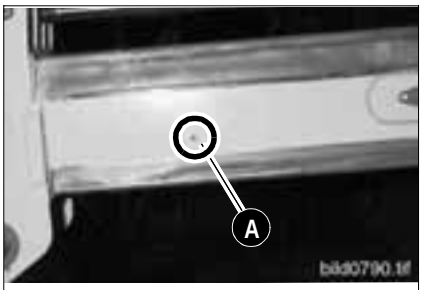


Fig. 103: Hose burst valve on tilt cylinder (option)

☞ *Actuate the emergency lowering on the tilt cylinder as follows:*

- **First carefully retract the push-out cylinder**
- **Carefully lower the telescopic unit to transport position**
- Carefully extend the push-out cylinder until the bore on the left side of the telescopic unit can be accessed
- Carefully turn out screw **A** by about 1/2 turn until the attachment starts dumping
- Retighten screw **A**
- Drive the machine out of the hazard zone with the bucket lowered

☞ *Have the setting of the hose burst valve checked by a specialist. Have the hose burst valve replaced if necessary*

3.5.11 Working with standard bucket and pallet forks

Standard bucket

The following section describes work operations with the machine equipped with the standard bucket.

The standard bucket is mainly used for digging earth, and for loosening, lifting, transporting and loading loose or solid materials.

Checking the tilt position of the bucket

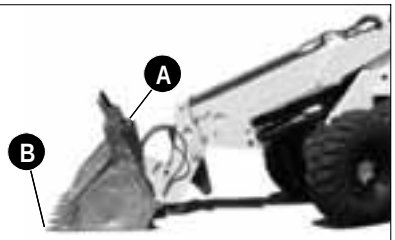


Fig. 104: Tilt position of the bucket

NOTE:

Angle of red marking **A** on top of the bucket is the same as the angle of the cutting blade **B**.

Checking the transport position of the bucket

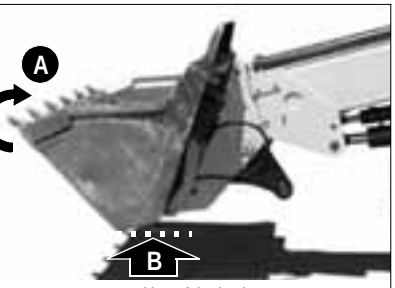


Fig. 105: Transport position of the bucket

NOTE:

The bucket is in transport position when the

- Telescopic unit is fully retracted and
- Bucket is rolled back in completely (**A**) and
- Marks **C** on the lift frame and the machine frame are lined up (figure 106)

With both marks **C** aligned, transport ground clearance will be at least 10 in (230 mm). (105/**B**), with standard bucket (810136) and standard tires (12.5-20).

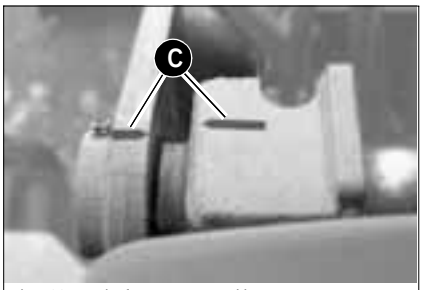


Fig. 106: Marks for transport position

Transporting with a full bucket

WARNING!

It is hazardous to transport full buckets in the raised position. Be especially careful when turning or driving on slopes. The lower the bucket and the center of gravity, the less chance there is of tipping over.

☞ *To avoid accidents:*

- Completely retract the telescopic unit
- Roll back the bucket all the way
- Raise the bucket to the transport position

☞ *Proceed as follows:*

- Completely retract the telescopic unit
- Roll back the bucket all the way (105/**A**)
- Lower or raise the telescopic unit to transport position (105/**B**)

Loading loose material

WARNING!

Do not load or push material with the telescopic unit extended as this may result in an accident.

☞ *Completely retract the telescopic unit for loading or pushing material!*

☞ *Proceed as follows:*

- Completely retract the telescopic unit
- Select low drive range
- Align the blade parallel with the ground (**A**) – see also "Checking the tilt position of the bucket"
- Lower the bucket to the ground (**B**). To do this:
  Push lever **21** forward (**C**)

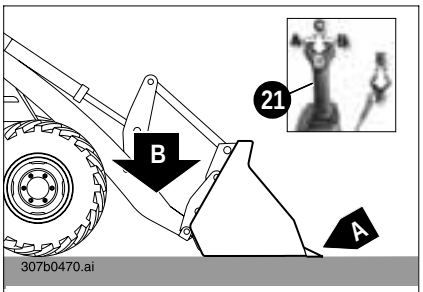


Fig. 107: Horizontal lowering of the telescopic unit

- Drive forward into the material (108/A)

When the engine speed decreases:

- Raise the bucket slightly **B**). To do this:
  Pull lever **21** backward (**D**)

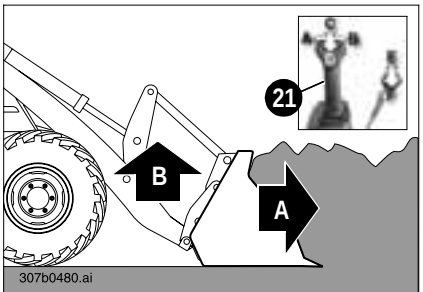


Fig. 108: Driving into the material

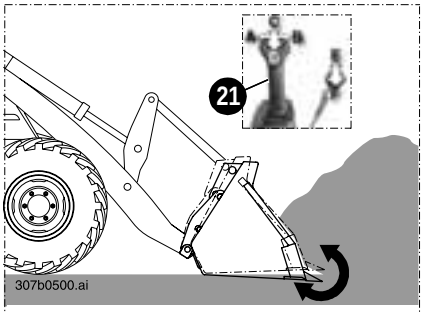


Fig. 109: Loading, if the material is hard to penetrate

If the material is hard to penetrate:

☞ *Proceed the same as for loading loose material, but in addition:*

- Tilt the bucket gently in and out. To do this:
  Move lever **21** to the left and right (**A** and **B**)

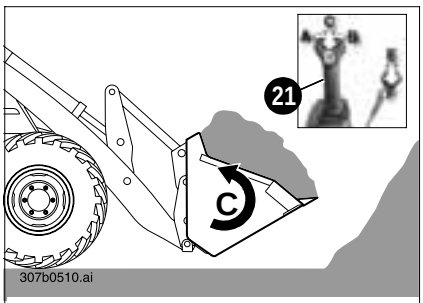


Fig. 110: Roll back in the bucket

Ending loading:

☞ *Proceed as follows:*

- Roll back in bucket (**C**). To do this:
  Push lever **21** to the left (**A**)
- Reduce engine speed

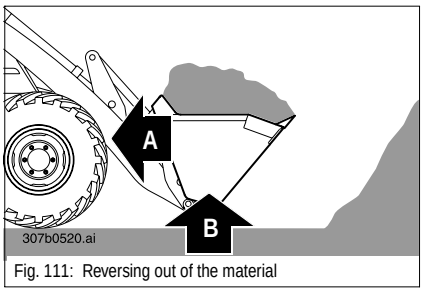


Fig. 111: Reversing out of the material

- Reverse out of the material (**A**)
- Raise the bucket to transport position (**B**)

Removing material/digging in soft soil

WARNING!

Do not undermine foundations or walls because of the chance of collapse!

☞ *Never undermine foundations or walls!*

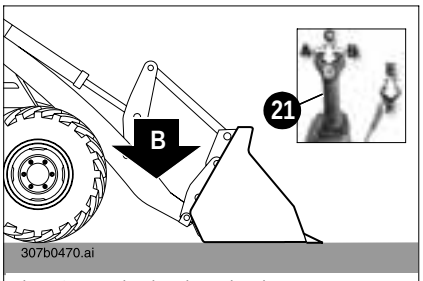


Fig. 112: Lowering the telescopic unit

☞ *Proceed as follows:*

- Completely retract the telescopic unit
- Select low drive range
- Place bucket to the ground (**B**). To do this:
  Push lever **21** forward (**C**)

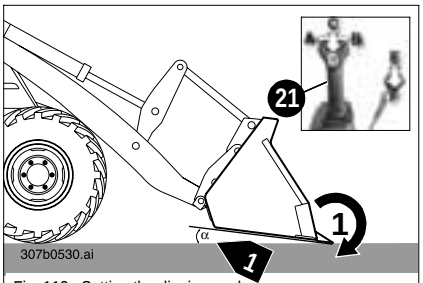


Fig. 113: Setting the digging angle

- Set digging angle α (113/**1**). To do this:
  Push lever **21** to the right (**B**)

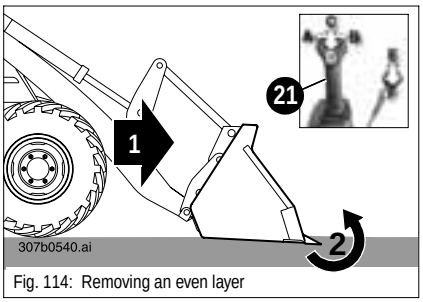


Fig. 114: Removing an even layer

- Drive the machine forward (114/**1**)

Once the bucket has penetrated the soil:

- Set digging angle α slightly flatter (114/**2**). To do this:
  Push lever **21** to the left (**A**), so that:
  - Layer being removed is as even as possible and
  - To reduce wheel spin
- Proceed the same as for loading loose material

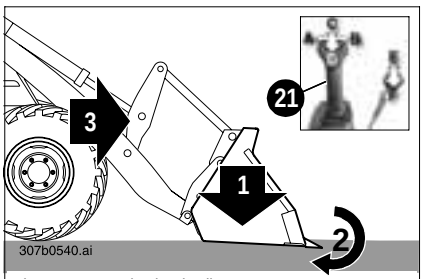


Fig. 115: Removing hard soil

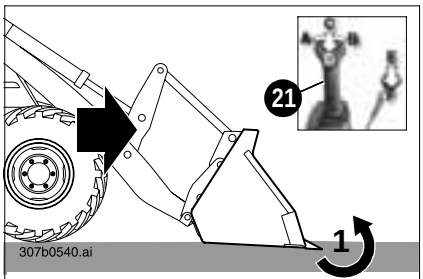


Fig. 116: Setting the digging angle flatter

Removing material/digging in hard soil

Proceed as follows:

- Completely retract the telescopic unit
- Select low drive range
- Lower bucket to the ground (115/**1**). To do this:
  Push lever **21** forward (**C**)
- Set digging angle α slightly flatter (115/**2**) than for digging in soft soil. To do this:
  Push lever **21** to the left (**A**)
- Drive the machine forward (115/**3**) and
- Press the bucket downward slightly. To do this:
  Push lever **21** slightly forward (**C**)

Once the bucket has penetrated the soil:

- Set digging angle α slightly flatter (116/**1**). To do this:
  Push lever **21** to the left (**A**), so that:
  - Layer being removed is as even as possible and
  - To reduce wheel spin
- Push lever **21** to the left (**A**), or move it alternately to the left and right (**A** and **B**), to loosen the material
- Proceed the same as for loading material that is hard to penetrate

Loading heaped material (non-compacted material)

WARNING!

Digging under heaped material can cause it to collapse.

☞ *Never undermine heaped material!*

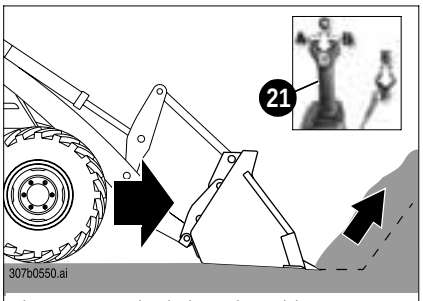


Fig. 117: Penetrating the heaped material

☞ *Proceed as follows:*

- Completely retract the telescopic unit
- Select low drive range
- Set the cutting blade of the bucket parallel to the ground. To do this: Push lever **21** to the left or right (**A** and **B**)
- Lower the telescopic unit horizontal to the ground. To do this: Push lever **21** forward (**C**)
- Drive forward

After penetrating the heaped material:

- Smoothly lift the telescopic unit
- Keep the bucket level

When the telescopic unit stops raising:

- Roll back the bucket (118/**1**)
- Raise the telescopic unit (118/**2**)
- Reverse away from the heaped material (118/**3**)
- Lower the telescopic unit to transport position

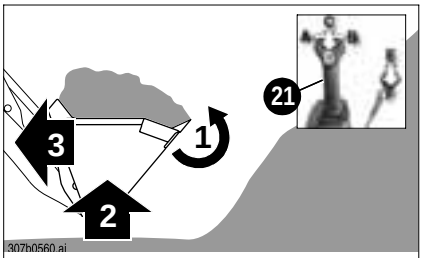


Fig. 118: Reversing away from heaped material

Loading heaped material (compacted material)

Proceed as follows:

- Completely retract the telescopic unit
- Select low drive range
- Proceed as for non-compacted material, however when raising the telescopic unit through the heaped material:
- Roll back the bucket in and out slightly (119/**1**). To do this: Move lever **21** alternately to the left and right (**A** and **B**)

  ➥Material is loosened

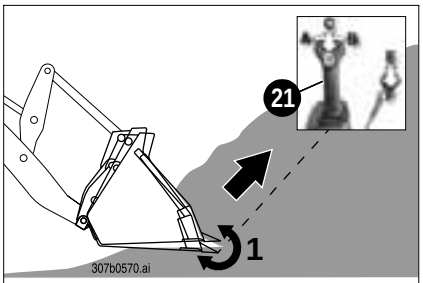


Fig. 119: Heaped compacted material

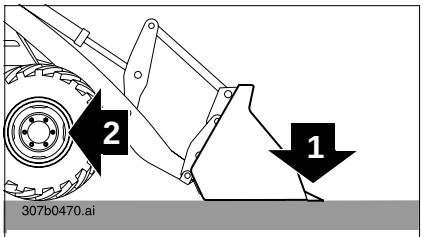


Fig. 120: Grading

Grading

After having finished removing/loading the material:

- Select low drive range
- Lower the telescopic unit to the ground (120/**1**)
- Reverse across the surface to be graded (120/**2**)

Further practical hints for digging

When planning and carrying out digging work, we recommend that you observe the following points:

- Exits from pits should be outside the digging line and should be as level as possible
- Dig by removing adjacent strips if possible
- Make sure you can drive forward when driving out of the digging area with a fully loaded bucket
- Whenever possible, drive in reverse when transporting a full bucket down a steep slope

Loading machines

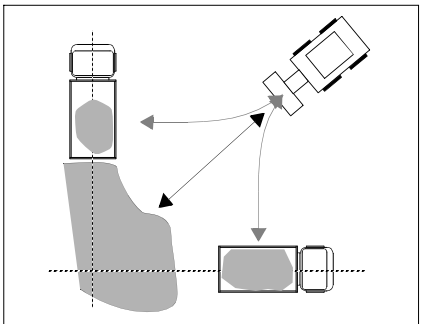


Fig. 121: Loading machines

When loading machines, we recommend to take into account the following:

- Select low drive range
- If possible, the lorry and the working direction of the machine should form an angle of 45° (figure 121)
- Only raise the full bucket to the dumping height when you are driving in a straight line toward the lorry
- With dusty materials:
  If possible dump with the wind behind you to keep the dust away from your eyes, air filters and fans

Freeing the machine

☞ *If your machine gets stuck in the ground:*

- Select low drive range
- Dump out the bucket until the cutting edge is vertical above the ground
- Lower the bucket all the way
- Gradually roll back the bucket
  ➥The machine will be pushed backward
- Reverse slowly
- Repeat this procedure until the wheels reach firm ground
- Reverse the machine away

3.5.12 Working with pallet forks

Safety instructions

- Observe the instructions in Section *3.5.3 „Safe load indicator"* on page 3-43. The driver must be aware of the signals given by the safe load indicator
- Follow the special instructions in the attachment's operator's manual!
- Do not lower the extended telescopic unit from a high fork arm position – always retract the telescopic unit first
- Move as close as possible to the material to be loaded
- Move to the material to be loaded with the wheels aligned straight ahead!
- If possible, load the material with the telescopic unit retracted, as loading with the extended unit may affect the stability of the machine!
- Always work on firm and level ground with sufficient bearing capacity (for a fully loaded machine)!
- Never lift the load with only one fork arm!
- Keep a minimum distance of 6 m between telescopic unit/load and tower lines!
- Before commencing work, make sure that the fork arms on the fork frame are safely locked!
- Do not operate telescopic unit or attachments when driving at high speed!
- Do not leave the machine with the load lifted and the telescopic unit extended!

Approaching the material

☞ *Proceed as follows:*

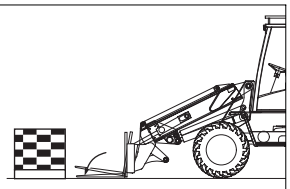


Fig. 122: Position of machine and tines towards the material

- Stop the machine immediately in front of the material
- Apply parking brake 16/**25**
- Set drive switch to neutral – see *Driving direction selector switch* on page 3-8
- Align the fork arms parallel with the ground

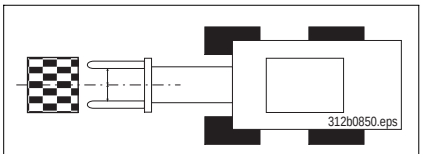


Fig. 123: Check fork spacing

- Check the distance of the fork arms to the center line (dashed line in figure 123) The fork arms must be:
  - At the same distance to the center line
  - As far apart as possible

Loading the material

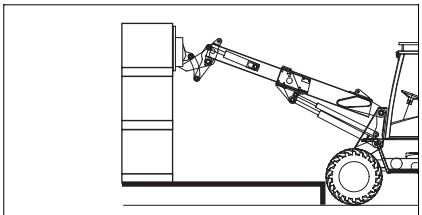


Fig. 124: Load the material

☞ *Proceed as follows:*

- Adjust the height of the fork arms so that the pallet can be correctly loaded
- Move carefully forward until the fork frame is in contact with the material
- Make sure that the pallet is safely loaded on the fork arms
- Apply parking brake 25
- Move drive lever to neutral – see *Driving direction selector switch* on page 3-8

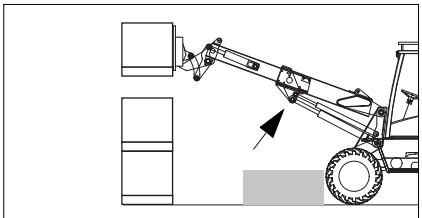


Fig. 125: Lift the telescopic unit (

- Lift the telescopic unit **slowly** and make sure that the limits of load diagram and safe load indicator are not exceeded!
- In case of doubt or danger, lower the load immediately!

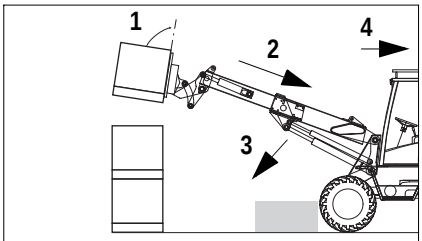


Fig. 126: Move the material to transport position

- Tilt the fork frame backwards (**1**)
- Completely retract the telescopic unit (**2**)
- In transport position, lower the telescopic unit as far as possible (**3**)
- Make sure that nothing/nobody is in the way when reversing
- Engage reverse gear
- Release parking brake 16/**25**

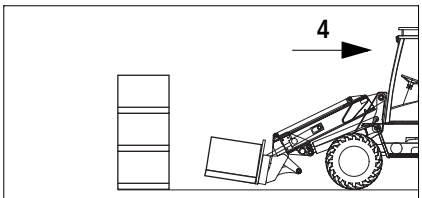


Fig. 127: Reverse from the stack

- Reverse slowly from the stack (**4**)

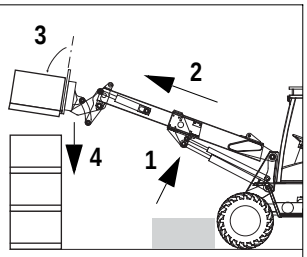


Fig. 128: Lift the telescopic unit

Setting down the material

☞ *Proceed as follows:*

- Move straight ahead to the stack with the telescopic unit retracted and lowered to transport position, and the fork frame slightly tilted back
- Apply parking brake 16/**25**
- Set drive switch to neutral – see *Driving direction selector switch* on page 3-8
- Raise the telescopic unit (**1**)
- Carefully extend the telescopic unit (**2**) until the load is positioned precisely above the stack
- Put the fork arms level again (**3**)
- Lower the telescopic unit **slowly** (**4**), making sure that the preset limits of load diagram and safe load indicator are not exceeded! In case of doubt or danger, stop stacking immediately! To do this:
  - First retract the telescopic unit and then
  - Lower the telescopic unit
- To align the load with the stack, carefully retract/extend the telescopic unit
- Lower the load
- Make sure that the fork arms are free from load and that nothing/nobody is in your way, before reversing from the stack
- Retract the telescopic unit
- Lower the telescopic unit to transport position
- Tilt the fork frame to the back

Section 4

Troubleshooting

4 Troubleshooting

The information given in this section is intended for maintenance personnel when carrying out repair work. It allows for fast and reliable detection of errors and malfunctions so that appropriate measures can be taken for troubleshooting.

The detailed description of repair work is limited to the work that can be carried out by persons without special training.

4.1 Engine trouble

Problem	Possible causes	
	Checked by operator	Checked by workshop
Starter turns too slowly	1, 2, 3, 4	
Engine does not start	5, 6, 7. 8, 9, 10, 12, 13, 14, 15, 17	34, 35, 36, 37. 38, 42, 43, 44
Engine not easy to start	5, 7. 8, 9, 10, 11, 12, 13, 14, 15, 16, 17. 19	34, 36, 37. 38, 40, 42, 43, 44
Insufficient output	8, 9, 10, 11, 12, 13, 16, 17. 18, 19, 20, 21	34, 36, 37. 38, 39, 42, 43, 44, 63
Interrupted engine operation	8, 9, 10, 12, 13, 15, 20, 22	34, 36, 37. 38, 39, 40, 41, 43
High fuel consumption	11, 13, 15, 17. 18, 19, 21, 22	34, 36, 37. 38, 39, 40, 42, 43, 44, 63
Black smoke	11, 13, 15, 17. 19, 21, 22	34, 36, 37. 38, 39, 40, 42, 43, 44, 63
Blue or white smoke	4, 15, 21, 23	36, 37. 38, 39, 42, 44, 45, 52, 58, 62
Oil pressure too low	4, 24, 25, 26	46, 47. 48, 50, 51, 59
Engine knocks	9, 13, 15, 17. 20, 22, 23	36, 37. 40, 42, 44, 46, 52, 53, 60
Irregular engine speeds	7. 8, 9, 10, 11, 12, 13, 15, 16, 18, 20, 22, 23	34, 38, 40, 41, 44, 52, 60
Vibrations	13, 18, 20, 27. 28	34, 38, 39, 40, 41, 44, 52, 54
Oil pressure too high	4. 25	49
Engine temperature too high	11, 13, 15, 19, 27. 29, 30, 32, 65	34, 36, 37. 39, 52, 55, 56, 57
Pressure in crankcase too high	31, 33	39, 42, 44, 45, 52
Compression too low	11, 22	37. 39, 40, 42, 43, 44, 45, 53, 60
Engine starts and stops right after	10, 11, 12	

4.1.1 Possible causes for malfunctions

1 Dead battery
2 Electrical connections are not in order
3 Defective starter
4 Wrong oil grade
5 Starter turns too slowly
6 Fuel tank empty
7 Defective shutoff unit
8 Fuel lines clogged
9 Defective fuel pump
10 Fuel filter fouled
11 Intake system constricted/air filter fouled
12 Air in fuel system
13 Injection nozzles damaged or wrong injection nozzles
14 Incorrect operation of cold starting system
15 Defective cold starting system
16 Bad fuel tank ventilation
17 Wrong fuel grade
18 Limited action of controls for speed regulation
19 Defective/clogged exhaust system
20 Engine temperature too high
21 Engine temperature too low
22 Wrong setting of valve clearance
23 Oil bath air cleaner (if installed) filled with too much oil or oil with wrong grade
24 Engine oil level too low
25 Defective oil pressure sensor
26 Oil filter fouled
27 Defective breather
28 Defective engine suspension or flywheel housing
29 Engine oil level too high
30 Limited circulation of air or coolant through radiator
31 Breather line constricted
32 Coolant level too low
33 Vacuum line leaks or defective vacuum pump
34 Defective fuel injection pump
35 Defective drive of fuel injection pump
36 Incorrect start of delivery of fuel injection pump
37 Incorrect valve timing
38 Compression too low
39 Cylinder-head gasket leaks
40 Blocked valves
41 Wrong injection lines
42 Cylinder bores worn
43 Valve seats leak
44 Piston ring blocked, worn or broken
45 Valve stems and/or guides worn
46 Crankshaft bearing worn or damaged
47 Oil pump worn
48 Pressure relief valve does not close
49 Pressure relief valve does not open
50 Spring in pressure relief valve broken
51 Defective oil suction pipe of oil pump
52 Damaged piston(s)
53 Incorrect projection of piston(s)
54 Flywheel housing or flywheel not correctly aligned
55 Defective thermostat or wrong thermostat
56 Coolant channels constricted
57 Defective coolant pump
58 Damaged valve stem sealing
59 Oil screen fouled
60 Valve spring broken
61 Not assigned
62 Not assigned
63 Intake system leaks
64 Not assigned
65 Drive belt for coolant pump is loose

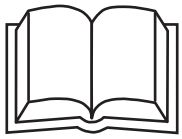
Notes

Section 5

Maintenance

5 Maintenance

5.1 Introduction



Before carrying out service and maintenance work, always read, understand and follow the instructions given in

- Part 2 “SAFETY INSTRUCTIONS” of this operator’s manual
- The operator’s manual for the engine

Daily service and maintenance work, and maintenance work according to maintenance plan A, can be carried out by specially trained operators. All other maintenance work must be carried out by qualified mechanics only.

The intervals for the maintenance work described below are listed in the maintenance plans in the annex.

5.2 Fuel system

5.2.1 Specific safety instructions

- Extreme caution is essential when handling fuel because of the risk of fire!
- Never work on the fuel system if the engine is hot – e.g. for bleeding, changing filters or cleaning the water separator!
- Never perform work on the fuel system near open flames or ignitable sparks!
- Do not smoke when working on the fuel system or when refuelling!
- Before refuelling switch off the engine and remove the ignition key!
- Do not refuel in enclosed areas!
- Wipe away fuel spills immediately!
- Keep the machine clean to reduce the risk of fire!

5.2.2 Refuelling

Fig. 129: Fuel filler inlet

WARNING!

All work involving fuel carries an increased risk of fire and poisoning!

☞ *Do not refuel in enclosed areas*

☞ *Never perform work on the fuel system in the vicinity of naked flames or sparks*

Environment!

Use a suitable container to collect the fuel as it drains and dispose of it in an environmentally friendly manner!

NOTE:

Do not run the fuel tank completely dry. Otherwise, air is drawn into the fuel system. This requires bleeding the fuel system – see section 5.2.6 *Bleeding the fuel system* on page 5-6.

Stationary fuel tanks

General

If possible, only refuel from stationary fuel tanks. Fuel from barrels or cans is usually contaminated.

Even the smallest particles of dirt can cause

- Increased engine wear
- Malfunctions in the fuel system and
- Reduced effectiveness of the fuel filters

Refuelling from barrels

If refuelling from barrels cannot be avoided, note the following points (see figure 130):

- Barrels should neither be rolled nor tilted before refuelling
- Protect the suction pipe opening of the barrel pump with a fine-mesh strainer
- Immerse it down to max. 6 in (15 cm) above the bottom of the barrel
- Only fill the tank using refuelling aids (funnels or filler pipes) with an integral microfilter
- Keep all refuelling containers clean at all times

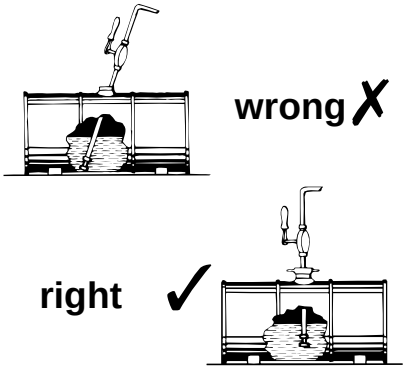


Fig. 130: Refuelling from a barrel

Specification for diesel fuel

Only use high-grade fuels:

Grade	Cetane number	Application
• No. 2-D	Min. 45	For normal temperatures
• No. 1-D		For temperatures below 20°F (6 °C) or for operation above 1640 yd (1500 m) altitude

5.2.3 Cleaning the fuel tank

Environment!

Use a suitable container to collect the fuel as it drains and dispose of it in an environmentally friendly manner!

Deposits of dirt particles and water in the tank cannot be entirely avoided. The fuel tank should therefore be cleaned occasionally, particularly before winter operation.

Clean the fuel tank when the fuel level in the tank is as low as possible!

☞ *Clean the fuel tank as follows:*

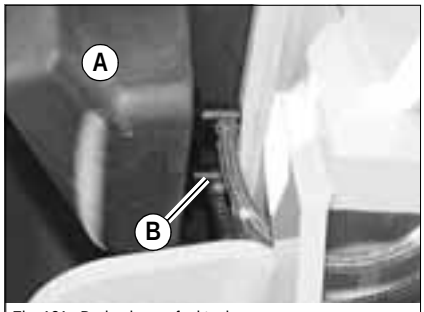


Fig. 131: Drain plug on fuel tank

- Place a drip tray under fuel tank **A**
- Unscrew return connection piece **B**
- Flush out the fuel tank with fuel, several times if necessary
- Screw reflex connection piece **B** back in, to the limit
- Unscrew reflex connection piece **B** again, until the correct position is reached – max. 1 turn!
- Fill the tank
- Check reflex connection piece **B** for leakage

5.2.4 Changing the fuel filter

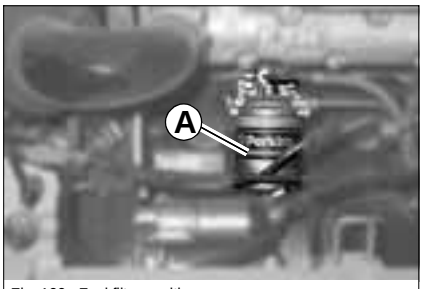


Fig. 132: Fuel filter position

WARNING!

If the fuel, as it drains, comes into contact with hot engine parts or the exhaust system, there is an increased risk of fire.

☞ *Never change the fuel filter if the engine is hot!*

Environment!

Use a suitable container to collect the fuel as it drains and dispose of it in an environmentally friendly manner!

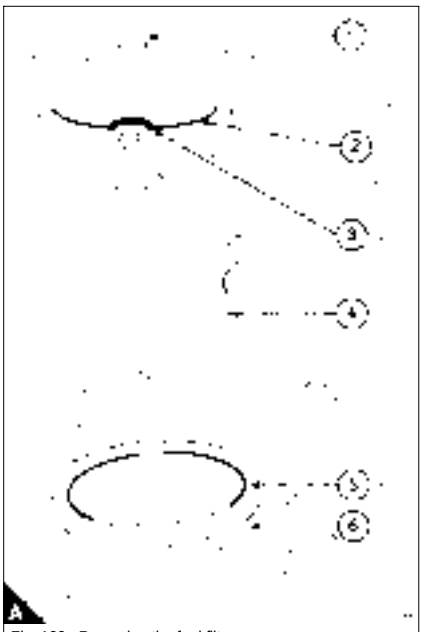


Fig. 133: Removing the fuel filter

☞ *Change fuel filter 132/**C** as follows:*

- Thoroughly clean the outside surfaces of the fuel filter
- Firmly hold lower cover 133/**6** of the filter and unscrew screw 133/**1** on the filter head
- Pull lower cover 133/**6** of the filter downward
- Remove and dispose of filter 133/**4**
- Clean the inside of the filter head and the lower cover
- Replace seals 133/**2** and 133/**5** and O-ring 133/**3** and apply a thin coat of clean fuel
- Hold the lower cover under the new filter and place the filter on the filter head. Ensure correct position of the filter on the O-ring in the filter head
- Place and tighten screw 133/**1**
- Bleed the fuel system – see section 5.2.6 *Bleeding the fuel system* on page 5-6
- Make a test run – and check for tightness!

5.2.5 Cleaning the fuel/water separator

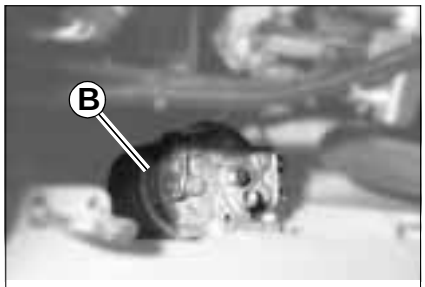


Fig. 134: Position of fuel/water separator

WARNING!

If the fuel, as it drains, comes into contact with hot engine parts or the exhaust system, there is an increased risk of fire

☞ *Never clean the fuel/water separator if the engine is hot!*

☞ *Proceed as follows:*

- Place a drip tray under the fuel/water separator
- Unscrew the drain plug on the lower side
- Drain the water until clean fuel runs out
- Screw in the drain plug on the lower side
- Test run the engine

5.2.6 Bleeding the fuel system

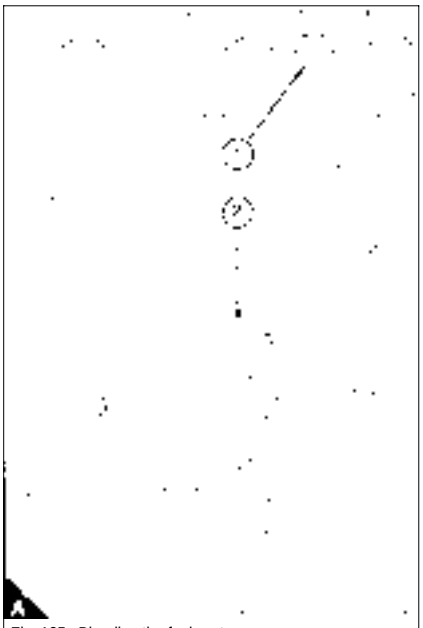


Fig. 135: Bleeding the fuel system

WARNING!

If the fuel, as it drains, comes into contact with hot engine parts or the exhaust system, there is an increased risk of fire

☞ *Never bleed the fuel system if the engine is hot!*

Bleed the fuel system in the following cases:

- After removing and fitting the fuel filter and the fuel lines back on again, or
- After running the fuel tank empty, or
- If the fuel system leaks with the engine running, or
- After running the engine again, after it has been out of service for a long period of time

☞ *Bleed the fuel system as follows:*

- Fill the fuel tank
- Unscrew the vent screw 135/**1** on the side of the fuel injection pump
- Actuate the hand pump lever on the fuel supply pump 135/**2**until the fuel runs out free of air from the bleed opening
- Tighten bleed screw 135/**1**
- Turn the ignition key to the “ON” position (1)
- Turn the starter until the engine starts (15 seconds maximum)

If the engine runs smoothly for a while, and then stops; or if it does not run smoothly:

- Check once again if there is any air in the fuel system

The presence of air in the fuel system is a sign of leakage on the low-pressure side of the fuel system!

- Switch off the engine
- Turn the ignition key to the “OFF” position (0)

5.3 Engine lubrication system

5.3.1 Checking the engine oil level

NOTE:

Check the oil level every 10 service hours or every day.We recommend checking the oil level before starting the engine; after switching off a warm engine, wait at least 5 minutes before checking.

Fig. 136: Checking the oil level

☞ *Check the oil level as follows:*

- Park the machine on level ground
- Switch off the engine!
- Oil dipstick 136/**1**
  - Pull it out and wipe it with a lint-free cloth
  - Push it back in as far as possible
  - Withdraw and
  - Read the oil level
- Top up the oil level if necessary
  (at latest when the oil reaches the MIN mark on the dipstick)

5.3.2 Topping up the engine oil

Important!

Excessive or incorrect engine oil may result in engine damage! For this reason:

☞ *Do not add engine oil above the MAX mark 136/**2** of the oil dipstick*

☞ *Use only the specified engine oil – see section 5.15 Engine fluids and lubricants on page 5-39*

Environment!

Collect the drained engine oil in a suitable container and dispose of it by an ecologically safe method!

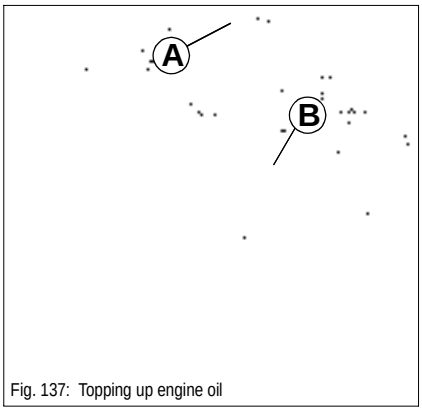


Fig. 137: Topping up engine oil

☞ *Top up the oil level as follows:*

- Clean the area around oil filler cap **A** with a lint-free cloth
- Open cap **A**
- Raise oil dipstick **B** slightly to allow any trapped air to escape
- Add engine oil
- Wait a moment until all the oil has run into the oil sump
- Check the oil level – see section 5.3.1 *Checking the engine oil level* on page 5-7
- Top up if necessary and check the oil level again
- Close oil filler cap **A**
- Push in oil dipstick **B** into the filler inlet as far as it will go
- Completely remove all oil spills from the engine

5.3.3 Changing the engine oil

WARNING!

Use extra caution when draining hot engine oil, because of the risk of burns.

☞ *Wear protective gloves*

☞ *Use suitable tools*

Environment!

Collect the drained engine oil in a suitable container and dispose of it by an ecologically safe method!

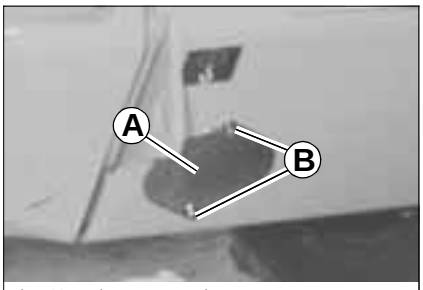


Fig. 138: Maintenance panel

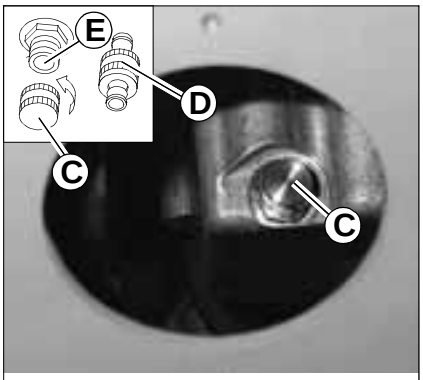


Fig. 139: Engine oil drain plug

☞ *Change the engine oil as follows:*

- Park the machine on level ground
- Let the engine run until reaching operating temperature [oil temperature about 180 °F (80 °C)]
- Switch off the engine
- Remove maintenance panel **A** under the machine rear end. To do this: Release screws **B**
- Place an oil drip tray [with a capacity of about 8 quarts (8 liters)] under the opening
- Unscrew filler cap **C** of oil drain valve **E**
- Unscrew oil drain coupling **D** with a sufficiently long hose, making sure the end of the hose is in the oil drip tray

  ➥Oil drain valve **E** opens and the engine oil drains
- Completely drain the oil
- Unscrew oil drain coupling **D**
- Screw on filler cap **C** of the oil drain valve
- Fit maintenance panel **A**
- Fill with engine oil – see section 5.3.2 *Topping up the engine oil* on page 5-7
- Start the engine and run it at low speed for a short time
- Switch off the engine
- Wait a moment until all the oil has run into the oil sump
- Check the oil level again
- Top up if necessary and check again
- Completely remove all oil spills from the engine

5.3.4 Changing the engine oil filter cartridge

WARNING!

Use extra caution when draining hot engine oil, because of the risk of burns.

☞ *Wear protective gloves*

Environment!

Use a suitable container to collect the engine oil as it drains.
Dispose of used oil and filters in an environmentally friendly manner!

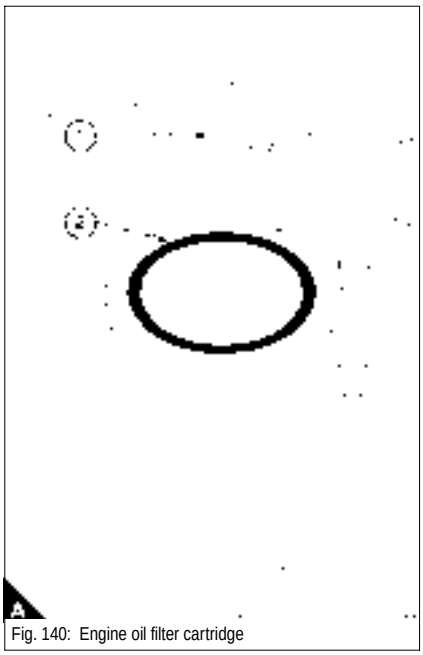


Fig. 140: Engine oil filter cartridge

☞ *Change the filter as follows:*

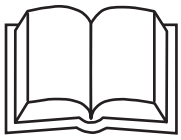
- Stop the engine
- Place a suitable container under the oil filter to collect the oil
- Release and unscrew the oil filter cartridge using a commercially available tool
- Be sure the thread adapter 140/**1** is correctly placed in the filter head
- Clean the inside of the filter head
- Apply a thin coat of fresh engine oil to the rubber seal 140/**2** of the new oil filter cartridge
- Tighten the new filter cartridge by hand until the gasket makes contact
- Tighten the oil filter cartridge by hand with a further half or three-fourths of a revolution
- Make sure the oil level is correct!
- Run the engine for a short time
- Switch off the engine
- Check the seal of the oil filter cartridge and retighten by hand
- Check the oil level and add engine oil if necessary
- Completely remove all oil spills from the engine
- Dispose of the used oil filter in an environmentally friendly manner

5.4 Engine and hydraulics cooling system

The combined oil/water cooler is located in the engine compartment, on the right side of the engine. It cools the diesel engine, and the hydraulic oil of the drive and work hydraulics.

The expansion tank for the coolant is also located in the engine compartment, above the cooler.

5.4.1 Specific safety instructions



- Dirt on the cooling fins reduces the cooler's heat rejection capacity!
  To avoid this:
  - Clean the outside of the cooler at regular intervals. Refer to the maintenance plans in the Annex for the cleaning intervals
  - In dusty or dirty work conditions, clean more frequently than indicated in the maintenance plans
- An insufficient coolant level reduces the heat rejection capacity as well, and can lead to engine damage! Therefore:
  - Check the coolant level at regular intervals. Refer to the maintenance plan in the Annex for the intervals
  - If coolant must be added frequently, check the cooling system for leakages and/or contact your dealer!
  - Never fill in cold water/coolant if the engine is warm!
  - After filling the expansion tank, conduct a test run with the engine and check the coolant level again after switching off the engine
- The use of the wrong coolant can destroy the engine and the cooler. Therefore:
  - Add sufficient antifreeze to the coolant – but never more than 50%. If possible use brand-name antifreeze that have anticorrosion additives
  - Observe the coolant table in section "Specifications"
  - Do not use cooler cleaning compounds if antifreeze has been added to the coolant – otherwise this causes sludge to form, which can damage the engine

Environment!

Use a suitable container to collect the coolant as it drains and dispose of it in an environmentally friendly manner!

5.4.2 Checking the coolant level/topping up the coolant level

NOTE:

Check the coolant level every 10 service hours or daily.We recommend checking the oil level before starting the engine;

Checking the coolant level

WARNING!

Never open the coolant tank and never drain coolant if the engine is warm, because the cooling system is under high pressure and there is a risk of burns

☞ *Wait at least 10 minutes after switching off the engine!*

☞ *Wear protective gloves and clothing*

☞ *Always start by actuating the safety valve in the cap of the expansion tank.*
To do this:
Open the cap to the first notch and allow the pressure to escape

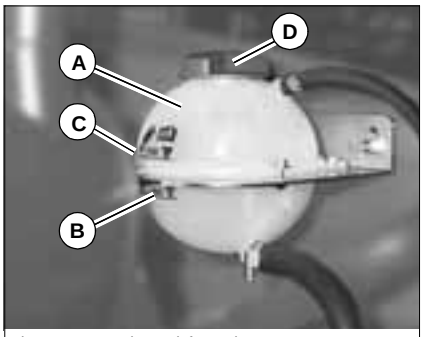


Fig. 141: Expansion tank for coolant

☞ *Proceed as follows:*

- Switch off the engine
- Open the engine cover
- Check the coolant level in the transparent expansion tank **A**

If the coolant level is below MIN mark **B**:

- Add coolant – see Topping up the coolant level

Topping up the coolant level

WARNING!

Never open the coolant tank and never drain coolant if the engine is warm, because the cooling system is under high pressure and there is a risk of burns

☞ *Wait at least 10 minutes after switching off the engine!*

☞ *Wear protective gloves and clothing*

☞ *Always start by actuating the safety valve in the cap of the expansion tank.*
To do this:
Open the cap to the first notch and allow the pressure to escape

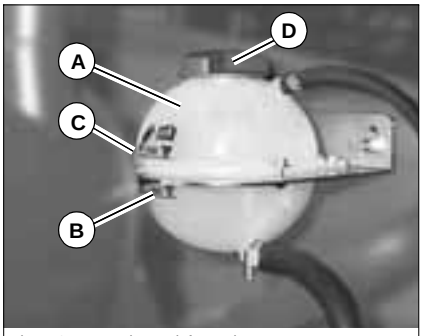


Fig. 142: Expansion tank for coolant

☞ *Proceed as follows:*

After the engine has cooled down:

- Reduce the overpressure in expansion tank **A**. To do this:
  Open filler cap **D** by half a revolution

After releasing the pressure:

- Open filler cap **D** completely
- Fill up coolant up to MAX mark **C**
- Close filler cap **D**

After filling in a large amount of coolant, e.g. first fill:

- Start the engine and let it warm up
- Switch off the engine and let it cool down
- Check the coolant level again
- If necessary, add coolant and repeat the procedure until the coolant level remains constant

5.4.3 Cleaning the cooling fins

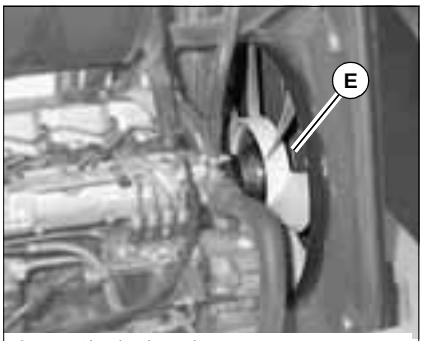


Fig. 143: Cleaning the cooler

☞ *Proceed as follows:*

- Switch off the engine
- Open the engine cover
- Blow compressed air from the engine side to remove dirt from the cooling fins **E.**

5.5 Air filter

Important!

Do not clean the air filter cartridge. The air filter cartridge will be damaged if it is washed or brushed out! Dust on the clean side of the filter causes accelerated engine wear!

☞ *Replace the filter cartridge when the warning light comes on!*

☞ *Never reuse damaged filter cartridges. Replace them if you are unsure!*

☞ *Ensure cleanliness when replacing the filter cartridge!*

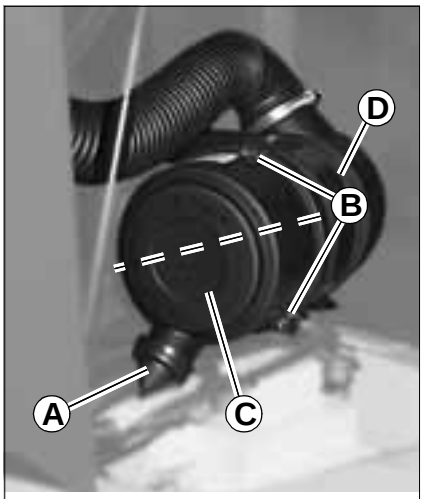


Fig. 144: Air filter

Warning Light 19/**37** on the instrument panel monitors the filter cartridge. The filter cartridge must be replaced:

- If warning light 19/**37** comes on, or
- At the latest after 1200 service hours or once every year.

NOTE:

The air filter can be fitted with an optional safety cartridge for **applications in especially dusty environment**. It is not possible to clean the safety cartridge. Replace the safety cartridge every third time maintenance work is carried out!

Important!

The filter cartridge may degrade prematurely when used in acidic air for long periods of time. This risk is present for example in acid production facilities, steel and aluminium mills, chemical plants and other nonferrous-metal plants.

☞ ***Use optional induction system when working in an environment with increased dust (option)***

☞ *Replace the filter cartridge and the* safety cartridge *(option) as per warning light 19/**37**, or after 300 service hours at the latest!*

☞ *Clean dust valve **A** regularly according to the maintenance plan!*

Functional check of the dust valve, every week

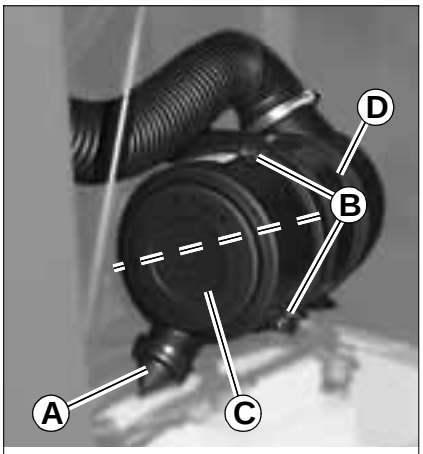


Fig. 145: Air filter

☞ *Proceed as follows:*

- Switch off the engine
- Open the engine cover
- Compress the discharge slot of dust valve **A**
- Remove hardened dust by compressing the upper area of the valve

☞ *Clean the discharge slot if necessary*

Replacing the filter cartridge

Important!

Do not clean the air filter cartridge. The air filter cartridge will be damaged if it is washed or brushed out! Dust on the clean side of the filter causes accelerated engine wear!

☞ *Replace the filter cartridge when the warning light comes on!*

☞ *Never reuse damaged filter cartridges. Replace them if you are unsure!*

☞ *Ensure cleanliness when replacing the filter cartridge!*

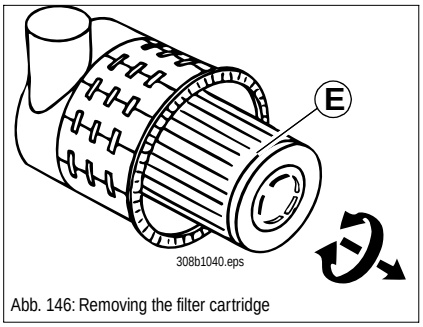


Abb. 146: Removing the filter cartridge

☞ *Replace as follows:*

- Switch off the engine
- Open the engine cover
- Open the three bow clips 145/**B** on the lower housing section 145/**C**
- Remove the lower housing section 145/**C**
- Remove filter cartridge 146/**E** with a slight turning movement

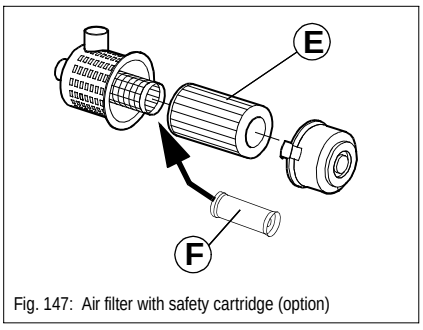


Fig. 147: Air filter with safety cartridge (option)

- Additionally after every 3rd replacement of primary filter cartridge **E**:
  - Remove safety cartridge **F** (option), turning it slightly as you do so
  - Carefully insert the new safety cartridge **F** (option) into the top housing section
- Carefully insert filter cartridge **E** into the upper housing sectiond 145/**D**
- Put the lower housing section 145/**C** back into place and secure with the 3 bow clips 145/**B**

  ➥The filter element is then automatically pressed into the correct position
- Put the lower housing section 144/C back into place and secure with the 3 bow clips 144/B

  ➥The filter element is then automatically pressed into the correct position

5.6 V-belt

WARNING!

To avoid injury, only check or re-tension/replace the V-belt when the engine is switched off.

☞ *Switch off the engine before carrying out maintenance work in the engine compartment!*

Check the V-belt every day or every 10 hours of operation and re-tension it if necessary.

New V-belts should be re-tensioned after about 15 minutes of operating time.

5.6.1 Checking the V-belt tension

☞ *Check as follows:*

- Switch off the engine
- Prevent the machine from rolling away and remove the ignition key
- Open the engine cover
- Carefully inspect the V-belt for damage

If the V-belt is damaged:

☞ Replace V-belt

- Press with your thumb in the middle of the longest section between two pulleys (figure 148) to check whether the V-belt can be deflected, by no more than about 0.4 in (10 mm)
- Re-tension the V-belt if necessary – see Section *5.6.2 „Re-tensioning the V-belt"*

5.6.2 Re-tensioning the V-belt

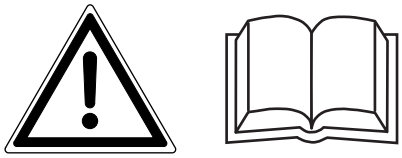
Fig. 148: Checking the V-belt tension

☞ *Re-tension as follows:*

- Switch off the engine
- Prevent the machine from rolling away and remove the ignition key
- Open the engine cover
- Unscrew swivel screws 148/**3** on the alternator and the set screw on adjustment bracket 148/**2**
- Use a suitable tool to move the alternator until the correct V-belt tension is obtained
- Keep the alternator in this position
- Firmly tighten swivel screw 148/**3** on the alternator and the set screw on adjustment bracket 148/**2**
- Check the V-belt tension once again. Check the V-belt tension again after the first 25 service hours if a new V-belt is mounted

5.7 Hydraulic system

5.7.1 Specific safety instructions



- All lines carrying hydraulic oil must be depressurized prior to any maintenance and repair work. To do this:
  - ☞ Lower all hydraulically controlled attachments to the ground
  - ☞ Actuate the control levers of the hydraulic control valves several times
- Apply the parking brake to prevent the machine from rolling away before you carry out service and maintenance work
- Hydraulic oil escaping under high pressure can penetrate the skin and cause serious injuries. Always consult a doctor immediately even if the wound seems insignificant – otherwise serious infections could set in!
- If the hydraulic oil in the level glass is cloudy, this indicates that water or air has entered the hydraulic system. This may cause damage to the hydraulic pump!
  - ☞ Contact your dealer immediately
- Insufficient or incorrect hydraulic oil will result in damage to the hydraulic system! For this reason:
  - Only use authorized oils of the same type – see *Engine fluids and lubricants* on page 5-39
  - Always top up the hydraulic oil before the level gets too low
  - Contact customer service if the hydraulic system filter is contaminated with metal chippings. Otherwise, additional damage may result!

5.7.2 Checking the hydraulic oil level

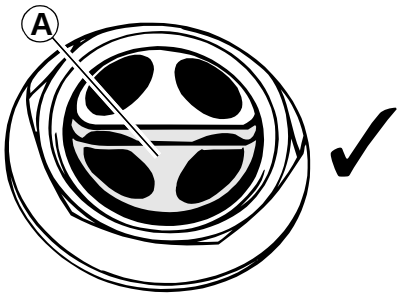


Fig. 149: Oil level sight glass on the hydraulic oil tank

☞ *Proceed as follows:*

- Park the machine on level ground
- Retract all the hydraulic cylyinders
- Switch off the engine

When all the oil has returned to the hydraulic oil tank:

- Open the engine cover
- Check the hydraulic oil level 149/A in the sight glass:

If the oil level is	
• Is visible in the sight glass	OK
• Below the sight glass	☞ *Top up the hydraulic oil*
• Above the sight glass	☞ *Drain the hydraulic oil*

5.7.3 Topping up the hydraulic oil

Do not top up the hydraulic oil unless the engine is switched off.

☞ *Top up as follows:*

- Park the machine on level ground
- Retract all the hydraulic cylinders
- Switch off the engine
- Apply parking brake 16/**25**

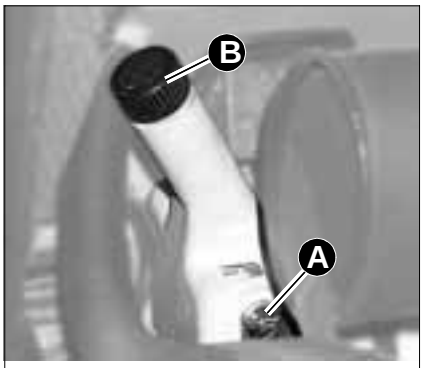


Fig. 150: Hydraulic oil tank

When all the oil has returned to the hydraulic oil tank:

☞ *Open the engine cover*

☞ *Clean the area around breather filter **B** of the hydraulic oil tank with a cloth*

☞ *Open breather filter **B***

With the filter installed:

☞ *Top up the hydraulic oil*

☞ *Check the hydraulic oil level on oil level sight glass **A***

☞ *Top up the hydraulic oil if necessary and check again*

5.7.4 Changing the hydraulic oil

WARNING!

Draining hot hydraulic oil and removing the filter element can be hazardous because of the risk of burns

☞ *Wear protective gloves*

☞ *Fit a sufficiently long hose to the oil drain coupling*

☞ *Proceed as follows:*

- Park the machine on level ground
- Lower the telescopic unit fully. To do this: Push lever 16/**21** forward
- Roll back the bucket all the way. To do this: Push lever 16/**21** to the left
- Switch off the engine and prevent the machine from rolling away
- Open the engine cover
- Remove cover 150/**B** of hydraulic oil tank

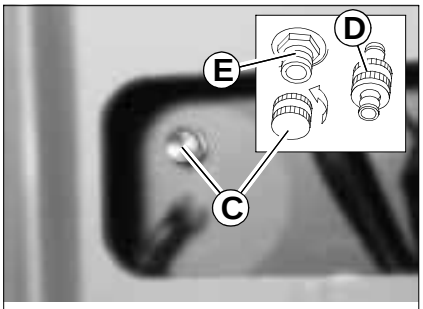


Fig. 151: Oil drain valve with cap

Under the rear end of the machine:

- Place a suitable container to collect the oil as it drains, with a minimum capacity of 15 gallons (55 liters)
- Remove filler cap **C** of the oil drain valve
- Screw oil drain coupling **D** onto the oil drain valve, with a sufficiently long hose, making sure the end of the hose is in the container

  ➥Oil drain valve **E** opens and the oil drains into the container
- Flush out the hydraulic oil tank with a small amount of hydraulic oil
- Remove oil drain coupling **D** on oil drain valve **E**
- Screw on filler cap **C** of the oil drain valve
- Replace the hydraulic oil return filter– see *Hydraulic oil return filter* on page 5-20
- Check the whether the filling screen is intact

Important!

If the hydraulic oil is contaminated, there is a risk of severe damage in the hydraulic system.

☞*Always add hydraulic oil using the filling screen!*

- Fill the system with fresh hydraulic oil up to the middle 149/**A** of the oil level sight glass
- Screw on cover 150/**B** of the hydraulic oil tank
- Start the engine

At a low engine speed:

- Fully extend the lift and tilt cylinders on the telescopic unit
- Turn the steering wheel to the left and right several times, from lock to lock
- Retract all the hydraulic cylinders again
- Switch off the engine
- Check the hydraulic oil level again and top up again if necessary

Important information concerning the use of biodegradable oil

Fig. 152: Label: biodegradable oil

- Use only the biodegradable hydraulic fluids that have been approved by the manufacturer – see *Engine fluids and lubricants* on page 5-39. Always contact the manufacturer for the use of other products. In addition, ask the oil supplier for a written declaration of guarantee. This guarantee is applicable to damage occurring to the hydraulic components, which can be proved to be due to the hydraulic fluid
- The remaining amount of initial hydraulic fluid in the hydraulic system must not exceed 8 % when using another type of biodegradable oil (manufacturer indications)
- Do not top up with mineral oil – the content of mineral oil must not exceed 2 % in order to avoid foaming problems and to ensure biological degradability (hazardous waste!)
- When running the machine with biodegradable oil, the same oil and filter replacement intervals are used as for mineral oil – see maintenance plans in the Annex.
  In addition, take a sample of the hydraulic oil every 600 service hours at the latest, and have it analyzed (order no. for oil sample set: 0 00 440 00 14). Further action depends on the results of the oil analysis
- Drain the condensation water in the hydraulic oil tank every 600 service hours, and in any case before the cold season. The water content should not exceed 0.1 % by weight
- The instructions in this operator's manual concerning environmental protection also for the use of biodegradable oil
- If additional hydraulic attachments are mounted or operated, use the same type of biodegradable oil for these attachments to avoid mixtures in the hydraulic system

Subsequent change from mineral oil to biodegradable oil

☞ *Completely flush the hydraulic components. To do this:*

- Park the machine on level ground when it is at operating temperature
- Retract all the hydraulic cylinders
- Switch off the engine

When all the oil has returned to the hydraulic oil tank:

- Completely drain the hydraulic oil
- Fill the hydraulic system with the new oil type
- Start the engine
- Operate all the components of the hydraulic system, such as cylinders, to "flush" the lines, cylinders and pumps
- Retract all the hydraulic cylinders

When all the oil has returned to the hydraulic oil tank:

- Switch off the engine
- Completely drain the hydraulic oil again
- Replace the hydraulic oil return filter (insert)– see *Hydraulic oil return filter* on page 5-20
- Fill the hydraulic system with fresh oil to the required level
- Check the oil level and top up if necessary

5.7.5 Hydraulic oil return filter

The red warning light 19/**39** on the instrument panel monitors the filter. The filter element must be replaced:

- If warning light 19/**39** comes on when the hydraulic oil is at operating temperature
- At the latest after 1200 service hours or once every year.

In cold weather warning light 19/**39** may come on immediately when the engine is started. This is due to increased oil viscosity. In this case:

☞ *Set engine speed so that the warning light goes out*

☞ *Bear in mind the instructions concerning warmup – see When the engine has started ... on page 3-16*

Changing the filter element

Important!

Contamination may cause severe damage in the hydraulic system!
☞ *Take care to avoid contamination when working!*

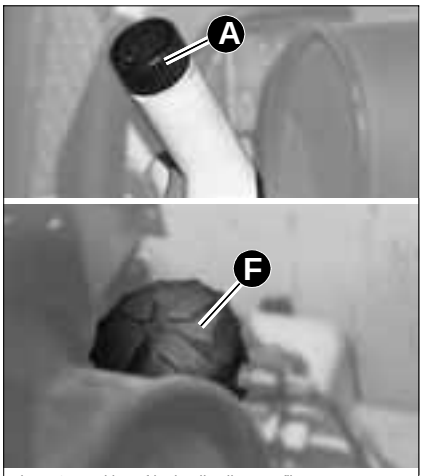


Fig. 153: Position of hydraulic oil return filter

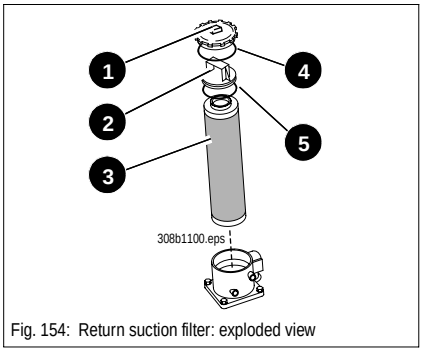


Fig. 154: Return suction filter: exploded view

☞ *Proceed as follows:*

- Switch off the engine
- Open the engine cover
- Open breather **A** on the hydraulic oil tank
- Unscrew caps **F** and 154/**1** of the filter by about 2 turns and wait for the oil level in the filter housing to fall to the level in the tank
- Completely unscrew and remove covers **F** and 154/**1** of the filter
- Pull out the filler pipe 154/**2** with the filter element 154/**3**, turning them slightly
- Pull the filter element 154/**3** off the filler pipe 154/**2** and dispose of the filter element
- Check that the flat gasket 154/**4** on the filter cap 154/**1** and the O-ring 154/**5** on the filler pipe are in good condition
- Fit new O-rings if the old ones are damaged
- Slide the filler pipe 154/**2** onto a new filter element 154/**3** and insert the assembly into the filter
- Tighten caps 153/**F** and 154/**1** by hand [Torque: 15 ft-lbs (20 Nm)]
- Tighten breather filter 153/**A** by hand
- Carry out a test run of the hydraulic system

With the engine switched off:

- Check the filter for leakage

5.7.6 Replacing the breather filter

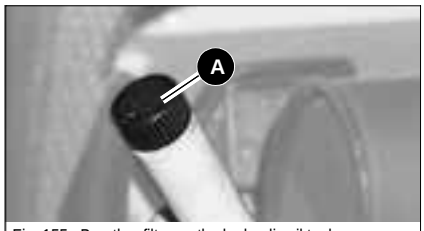


Fig. 155: Breather filter on the hydraulic oil tank

Replace breather **A** for the hydraulic oil tank every 1200 service hours, or at least once a year

☞ *Proceed as follows:*

- Unscrew breather **A**
- Screw in the new breather filter **A**

5.7.7 Hydraulic pressure lines

Specific safety instructions

WARNING!

Use extra caution when checking hydraulic lines, especially when searching for leaks. Hydraulic oil escaping under high pressure can penetrate the skin and cause serious injuries . Always consult a doctor immediately, even if the wound seems insignificant – otherwise serious infections could set in! Never search for leaks with your bare hands, but wear protective gloves! Use paper or wood to check for minor leaks. Never use an unprotected light or naked flame!

☞ *Always observe the following instructions:*

- Retighten leaking fittings and hose connections only when the system is not under pressure; i.e. relieve the pressure before working on pressurized lines!
- Never weld or solder faulty or leaking pressure lines and connections. Replace damage parts with new ones!
- When replacing hose lines, ensure that they are not twisted!

- Leaks and damaged lines must be repaired or replaced as quickly as possible. This not only increases the operating safety of the machine, but also helps to protect the environment

5.8 Gearboxes and axles

Maintenance of these components is limited to checking the oil levels and to changing the oil at prescribed intervals – see maintenance plans in the Annex.

NOTE:

Only use new sealing rings for oil filler and drain plugs. Drain oil only after running the machine for a long period of time!

5.8.1 Rear axle transfer gearbox

Checking the oil level

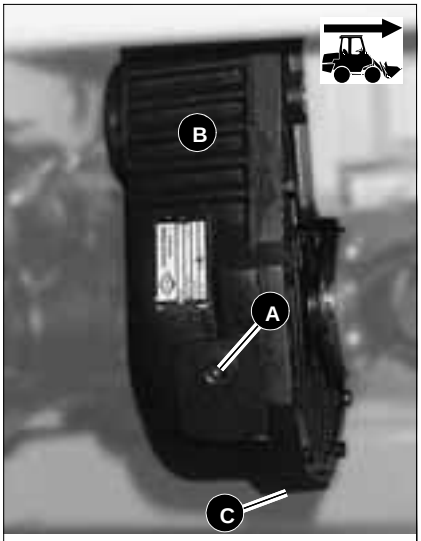


Fig. 156: Rear axle transfer gearbox

☞ *Proceed as follows:*

- Park the machine on level ground when the gearbox is at operating temperature
- Clean and unscrew plug **A** on transfer gearbox **B**

If the oil level is below the opening or if the oil level cannot be seen at all:

- Top up with oil – *see section 5.15 Engine fluids and lubricants* on page 5-39

If the oil level is correct:

- Tighten plug **A** with a new sealing ring to ensure an oil-tight seal

Top up the oil level

☞ *Proceed as follows:*

- Park the machine on level ground when the gearbox is at operating temperature
- Clean and unscrew plug 156/**A** on transfer gearbox 156/**B**
- Fill with oil until it runs out of the filler opening – *see section 5.15 Engine fluids and lubricants* on page 5-39

If the gearbox oil level remains constant:

- Tighten plug 156/**A** with a new sealing ring to ensure an oil-tight seal

Changing the oil

WARNING!

Draining hot hydraulic oil and removing the filter elements can be hazardous because of the risk of burns.

☞ *Wear protective gloves*

☞ *Use suitable tools, e.g. for unscrewing the oil drain plug*

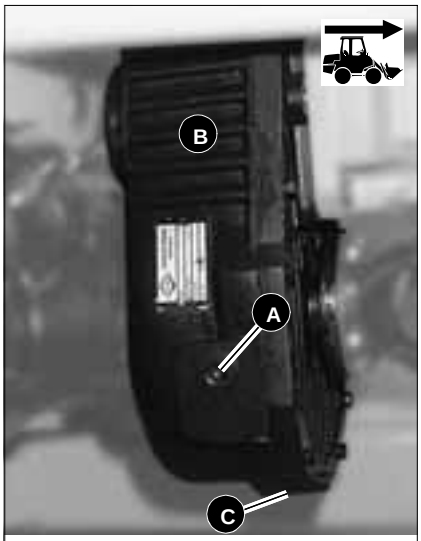


Fig. 157: Rear axle transfer gearbox

☞ *Proceed as follows:*

- Park the machine on level ground when the gearbox is at operating temperature
- Place a sufficiently large container under the transfer gearbox to collect the oil
- Clean and unscrew plug **A** on transfer gearbox **B**
- Unscrew plug **C** on transfer gearbox **B**
- Completely drain the old gearbox oil
- Tighten plug **C** with a new sealing ring to ensure an oil-tight seal
- Fill with oil until it runs out of the filler opening – *see section 5.15 Engine fluids and lubricants* on page 5-39

If the gearbox oil level is sufficient:

- Tighten plug **A** with a new sealing ring to ensure an oil-tight seal

After conducting a test run:

- Check the oil level again after about 5 minutes, and top up if necessary

5.8.2 Front and rear axle differentials

Environment!

Collect the drained gear oil in a suitable container and dispose of it by an ecologically safe method!

NOTE:

Only use new sealing rings for oil filler and drain plugs. Drain oil only after running the machine for a long period of time!

Checking the oil level

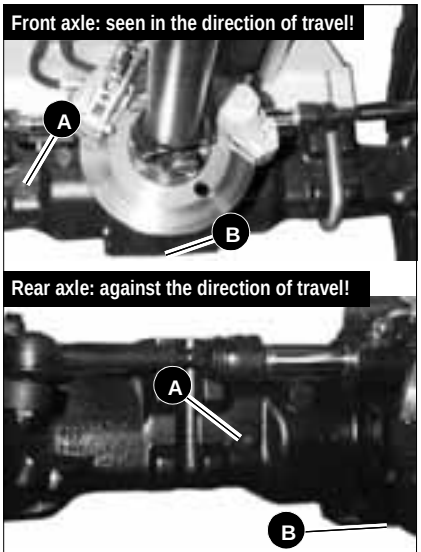


Fig. 158: Checking the oil level on the front and rear axle differentials

☞ *Proceed as follows:*

- Park the machine on level ground
- Clean and unscrew plugs **A**

If the oil level is below the opening or if the oil level cannot be seen at all:

- Top up with oil – *see section 5.15 Engine fluids and lubricants* on page 5-39

If the oil level is correct:

- Tighten plug **A** with a new sealing ring to ensure an oil-tight seal

Top up the oil level

☞ *Proceed as follows:*

- Park the machine on level ground
- Clean and unscrew plug 158/**A**
- Fill with oil until it runs out of the filler opening – *see section 5.15 Engine fluids and lubricants* on page 5-39
- Tighten plug 158/**A** with a new sealing ring to ensure an oil-tight seal

Changing the oil

☞ *Proceed as follows:*

- Park the machine on level ground when it is at operating temperature
- Place a drip tray under plug 158/**B** to collect the oil
- Clean and unscrew plug 158/**A**
- Clean and unscrew plug 158/**B**
- Completely drain the old oil
- Tighten plug 158/**B** with a new sealing ring to ensure an oil-tight seal
- Fill with fresh oil at opening 158/**A** until it runs out of the filler opening – *see section 5.15 Engine fluids and lubricants* on page 5-39
- Tighten plug 158/**A** with a new sealing ring to ensure an oil-tight seal

5.8.3 Front and rear axle planetary drives

NOTE:

Fit new sealing rings! Drain oil only after running the machine for a longer period of time!

Checking the oil level

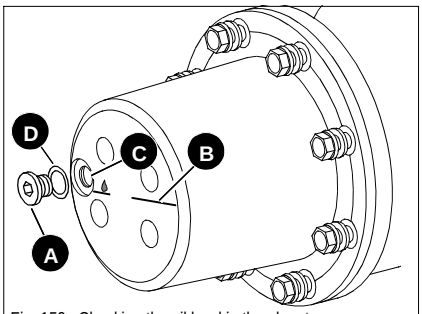


Fig. 159: Checking the oil level in the planetary gear

☞ *Proceed as follows:*

- Park the machine on level ground
- Turn plug **A** and oil level mark **B** to a horizontal position
- Clean and unscrew plug **A**

If the oil level is below opening **C** or if the oil level cannot be seen at all:

- Top up with oil – *see section 5.15 Engine fluids and lubricants* on page 5-39
- Tighten plug **A** with a new sealing ring **A** to ensure an oil-tight seal

Top up the oil level

☞ *Proceed as follows:*

- Park the machine on level ground
- Turn plug 159/**A** and oil level mark 159/**B** to a horizontal position
- Clean and unscrew plug 159/**A**
- Fill with fresh oil up to the oil level mark 159/2 (overflow) – *see section 5.15 Engine fluids and lubricants* on page 5-39
- Tighten plug 159/**A** with a new sealing ring 159/**D** to ensure an oil-tight seal

Changing the oil

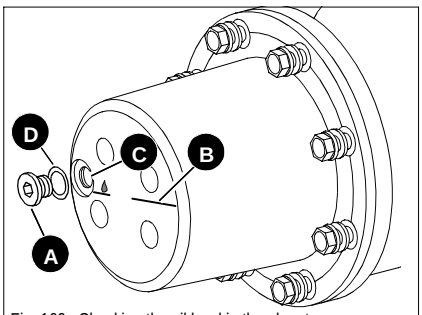


Fig. 160: Checking the oil level in the planetary gear

☞ *Proceed as follows:*

- Park the machine on level ground when it is at operating temperature
- Place a suitable container under plug **A**
- Turn plug **A** to the topmost position
- Clean and unscrew plug **A**

Never raise the machine on one side only for the following work!

- Turn plug **A** to the lowest position
- Completely drain the old oil
- Turn plug **A** and oil level mark **B** to a horizontal position
- Fill with fresh oil up to oil level mark **B** (overflow) – *see section 5.15 Engine fluids and lubricants* on page 5-39
- Tighten plug **A** with a new sealing ring **A** to ensure an oil-tight seal

5.8.4 Lubricating the rear axle oscillation-type bearing

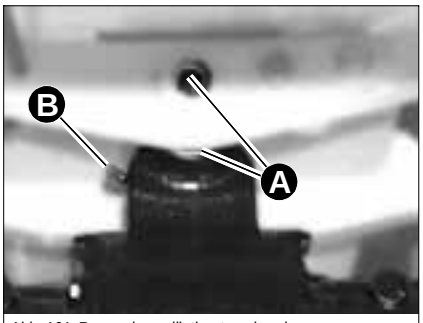


Abb. 161: Rear axle oscillation-type bearing

NOTE:

The oscillation bearing uses “Longlife” lubrication. Lubricate the bearing every 1200 service hours (maintenance plan C).

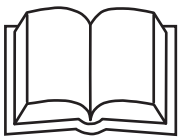
☞ *Grease oscillation-type bearing **A** on grease nipple **B** with lithium based multipurpose grease – see section 5.15 Engine fluids and lubricants on page 5-39*

5.9 Maintenance of the brake system

Environment!

Use a suitable container to collect the brake fluid as it drains and dispose of it in an environmentally friendly manner!

5.9.1 Specific safety instructions



- Brakes are top priority safety components. Incorrect work can cause brake failure. For this reason, all maintenance and repair work performed on the brakes must be carried out by trained personnel. But this does not include the following activities, which must be performed by the driver of the machine:
  - Daily check of the level in the brake-fluid tank
- New brake pads need running in if the optimum braking effect is to be achieved. To run in the brake pads, brake the machine more frequently than usual using the service brakes but avoid full braking!
- Replace damaged brake lines or hoses immediately because of the risk of accidents!

5.9.2 Checking/topping up brake fluid

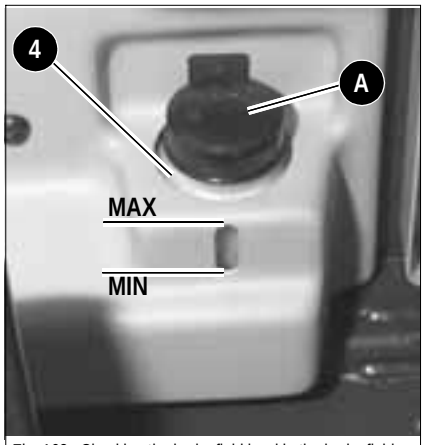


Fig. 162: Checking the brake fluid level in the brake fluid tank

WARNING!

Maintain the brake system properly. The safety of the braking system can be reduced by improper brake fluid quality or incorrect brake fluid level –

☞ *Check the brake fluid in tank* **4** *at regular intervals*

☞ *Top up the brake fluid to the upper edge of the sight glass*

☞ *The brake fluid must comply with the SAE specification – see "Engine fluids and lubricants" on page 5-39*

☞ *Change the brake fluid every two years*

If the fluid level is below the upper edge of the sight glass:

- Open tank cover **A**
- Top up the brake fluid to the upper edge of the sight glass

5.10 Telescopic unit

5.10.1 Lubricating the pivot points of the telescopic unit

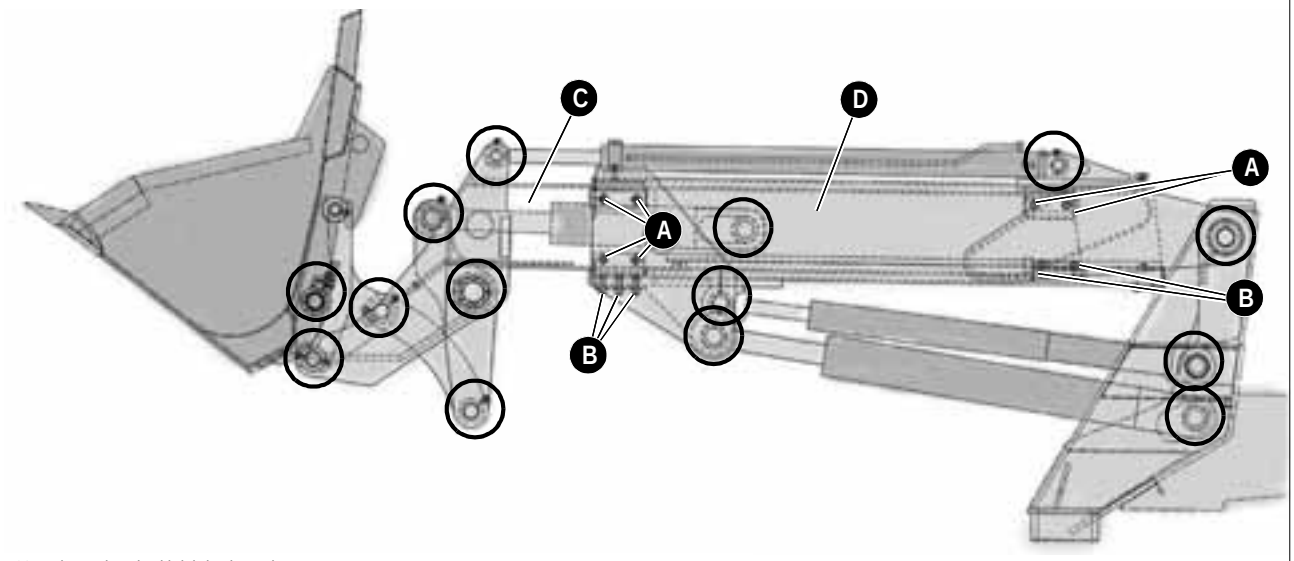


Fig. 163: Telescopic unit with lubrication points

If machine is in uninterrupted use

☞ *Lubricate the grease nipples (circles in figure 163)* ***every 10 service hour*** *(or daily) with grease*

If machine is in occasional use

☞ *Lubricate the grease nipples (circles in figure 163)* ***every 50 service hours*** *(or once a week) with grease*

5.10.2 Lubricating the telescopic unit

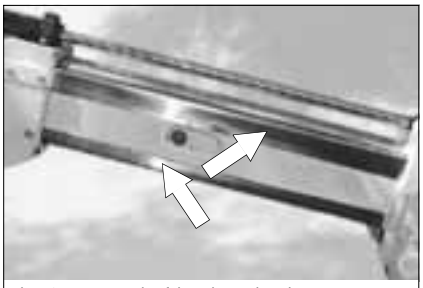


Fig. 164: Wear pads of the telescopic unit

Lubricate the pad tracks at regular intervals.
Recommended lubricant – see section 5.15 *Engine fluids and lubricants* on page 5-39

☞ *Before lubricating:*
Completely extend the telescopic unit

☞ *If machine is in uninterrupted use*

- Grease the pad tracks every 10 hours

☞ *If machine is in occasional use*

- Grease the pad tracks once a week

5.10.3 Adjusting the wear pads

NOTE:

The (green) wear pads are located between the inner 163/**C** and outer boom section 163/**D**.
The wear pads can be readjusted as they wear down – to a minimum thickness of 0.25 in (6 mm) only – by means of set screws 163/**A** and 163/**B**.

Do not overtighten the set screws, otherwise the telescopic unit is impaired and does not work smoothly any longer.

Replace the wear pads upon reaching or falling below a minimum thickness of 0.25 in (6 mm)! In this case please contact your dealer.

☞ *Adjust the wear pads as follows:*

- Extend the telescopic unit by about 20 cm, so that the front wear pads can be easily accessed
- Switch off the engine
- Prop the telescopic unit securely
- Loosen the locknuts at set screws 163/**A** and 163/**B**
- First align the inner boom section 163/**C** horizontally with the outer boom section 163/**D** . To do this:
  Screw in the set screws 163**A** (hexagon socket)

NOTE:

Screw in the set screws until the wear pads touch the pad tracks on the inner boom section. Tighten the set screw by turning it a further 1/4 revolution.

- First align the inner boom section 163/**C** horizontally with the outer boom section 163/**D**. To do this:
  Screw in the set screws 163/**B** (hexagon socket)
- Tighten the lock nuts to secure all set screws 163**A** and **B**

5.11 Tire care

WARNING!

Improper tire repairs constitute are a personal injury hazard!

☞ *All repair work on tires and rims may only be carried out by authorized dealers.*

NOTE:

Regular inspection of the tires

- Improves operating safety
- Increases the service life of the tires
- Reduces machine downtime

Refer to the table in section “Specifications” on page 7-7 for the authorized tire types and the correct tire pressures. This table is also on the label on the front window.

5.11.1 Inspection work

Daily checks

☞ *Carry out the following maintenance work daily:*

- Visual check of the tire condition, especially:
  - Tire pressure
  - Outside and inside damage of tires and rims
  - Wear
- Remove foreign bodies from the tire tread
- Remove traces of oil and grease from the tires

Weekly checks

☞ *Carry out the following maintenance work every week:*

- Check the tread depth of the tires
- Check the tire pressure

5.11.2 Wheel change

WARNING!

Use of wrong tires or wheels can be hazardous.

☞ *Use only the wheels and tires released for your machine – see section 7 "Tires" on page 7-7*

☞ *Check the wheel nuts for tightness after every wheel or tire change*

Important!

The wheels are heavy and can damage the threads on the wheel studs if they are handled incorrectly!

☞ *Use suitable assembly tools, such as covering sleeves for the studs, a jack, etc.*

Removing the wheels

☞ *Proceed as follows:*

- Park the machine on level and firm ground and prevent it from rolling away.
- Slightly loosen the wheel nuts of the tire you want to remove.
- Place a jack under the axle beam, making sure it is well supported.
- Raise the side of the axle from which you want to remove the tire.
- Check that the machine is well supported.
- Completely remove the wheel nuts
- Remove the wheel

Installing the wheels

☞ *Proceed as follows:*

- Place the wheel onto the wheel studs
- Tighten all the wheel nuts part-way
- Lower the raised axle
- Tighten the wheel nuts to the prescribed tightening torque– see section 7.16.2 *Specific tightening torques* on page 7-9

5.12 Heating

The heating system of the machine is equipped with a dust filter, which should be cleaned at regular intervals and replaced once a year, as appropriate.

The heating system is located on the right front of the cab.

5.12.1 Cleaning the dust filter of the heating system

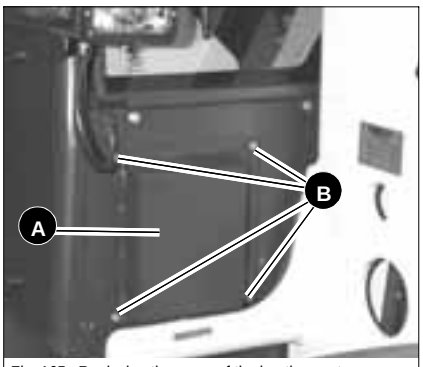


Fig. 165: Replacing the cover of the heating system

A dust filter cleans the air taken in by the heater. Blow compressed air through the filter as often as necessary, but at least once a year. The volume of warm air flowing out of the air vents decreases as filter contamination increases.

☞ *Clean the filter as follows:*

- Remove cover **A** at the front right of the cab as follows:
  - ☞ *Remove screws **B***

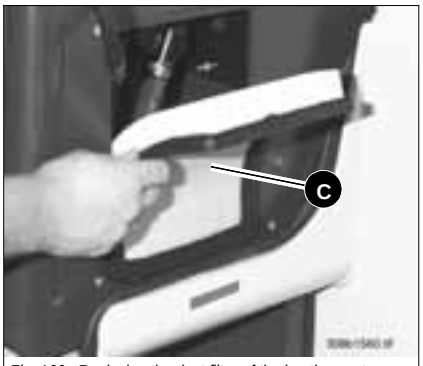
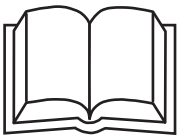


Fig. 166: Replacing the dust filter of the heating system

- Remove dust filter **C**
- Clean or replace dust filter **C**
- Re-insert the cleaned dust filter and install cover **C**

5.13 Electrical system

5.13.1 Specific safety instructions



- The battery contains sulfuric acid! This acid must not be allowed to come into contact with the skin, the eyes, clothing or the machine.

  Therefore when recharging or working near the battery:

  ☞ Always wear goggles and protective clothing with long sleeves

  If acid is spilled:

  ☞ Thoroughly rinse all affected surfaces immediately with plenty of water

  ☞ Thoroughly wash any part of the body touched by the acid immediately with plenty of water and seek medical attention at once!
- During charging in particular, but also during normal battery operation, an oxygen/ hydrogen mixture is formed in the battery cells which has a risk of explosion!
- Do not attempt to jump-start the machine if the battery is frozen or if the acid level is low. The battery may rupture or explode!
- Avoid sparks and unprotected light sources, and refrain from smoking in the vicinity of opened battery cells, because the gas produced during normal battery operation may ignite!
- Use only 12 V power sources. Higher voltages will damage the electrical components
- When connecting the battery, ensure that the poles are not reversed, because sensitive electrical components will be damaged
- Do not interrupt voltage-carrying circuits at the battery terminals, because of the danger of sparking!
- Never place tools or other metal items on the battery, because of the risk of short circuit!
- Disconnect the negative battery terminal before starting repair work on the electrical system
- Dispose of used batteries properly

5.13.2 Service and maintenance work at regular intervals

Before driving the machine

☞ *Check every time before driving the machine:*

- Is the lighting system OK?

Every week

☞ *Check every week:*

- Cable and ground connections
- Chafing on wiring harnesses
- Condition of the battery terminals

5.13.3 Instructions concerning specific components

Cables, bulbs and fuses

- Defective components of the electrical system must always be replaced by authorized technicians, except that bulbs and fuses may be changed by other persons
- When carrying out maintenance work on the electrical system, pay particular attention to ensuring good contact in connections and fuses
- Blown fuses indicate overloading or short circuits. The electrical system must therefore be checked before installing the new fuse
- Only use fuses with the specified capacity (amperage) – see *Electrical system* on page 7-5

Alternator

Always observe the following instructions:

- Only test the engine with the battery connected
- When connecting the battery, ensure that the poles are not reversed
- Always disconnect the battery before carrying out welding work or connecting a quick battery charger
- Replace a defective charge warning light as quickly as possible

Battery

NOTE:

The battery is located in the engine compartment, on the left side.
Even so-called “maintenance-free” batteries must undergo maintenance, because they too consume water.
Always follow the specific safety instructions!

☞ *Observe the following instructions to ensure a long battery service life:*

- Keep the surface of the battery in clean and dry condition
- Check the acid level at regular intervals and if necessary, fill up with demineralized or distilled water. Never fill up with acid!
  Check the regulator voltage of the machine in case of increased loss of water
- Do not use so-called battery improving compounds
- Check the battery charge condition by measuring the acid density.
  (**Exception:** In the case of closed batteries by measuring the off-load voltage)

NOTE:

Recharge the disconnected battery if specific gravity is below 1.21. At this level the battery will freeze only at temperatures below 5 °F (–15 °C).

Checking the battery charge condition

☞ *Check the battery charge condition as follows:*

- Park the machine on level ground
- Switch off the engine
- Open the engine cover

After removing the battery caps:

- Measure the specific gravity with the hydrometer

Instructions for recharging the battery

- Avoid sparks and short circuits
- Remove the battery for recharging. If the battery must recharged in the machine, always disconnect the battery leads under all circumstances
- Unscrew the battery caps (**Exception**: Closed batteries)
- Switch off the battery charger before connecting the battery!
- Charge batteries with direct current only. Connect the positive (+) terminal of the battery to the positive (+) terminal of the battery recharger, and the negative (–) terminal of the battery with the negative (–) terminal of the battery charger
- Recommended charging current: one tenth of the amp hour capacity (e.g., 80 Ah = 8 A charging current)
- Charge closed batteries with regulated battery chargers only
- Make sure acid temperature does not exceed 120 °F (55 °C)during recharging. Stop recharging the battery if the temperature rises any further.
  The battery is fully charged if specific gravityand charging voltage do not rise any further within 2 hours
- Recharging closed batteries takes at least 12 to 16 hours, and is not completed unless off-load voltage is ≥ 12.8 V several hours after recharging
- Check the acid level after recharging and if necessary, fill up with demineralized or distilled water up to the maximum acid level mark or 0.6 inch (15 mm) above the battery plates. Never fill up with acid!
- Do not open closed batteries. Never add water

Instructions for temporary storage of the machine

- Ensure full battery charge (see above)
- If the battery remains in the machine, disconnect the negative (–) terminal
- Check the battery charge condition at regular intervals (see above)

Drive electronics

- Remove the main plug when carrying out welding work, etc.

5.14 General maintenance work

5.14.1 Cleaning

Cleaning the machine is divided into 3 separate areas:

- Inside of the operator compartment
- Exterior of the machine
- Engine compartment

The wrong cleaning equipment and chemicals may impair the operating safety of the machine and affect the health of the person(s) cleaning the machine. It is therefore essential to observe the following instructions.

General instructions for all the areas of the machine

Washing solvents

- Ensure adequate room ventilation
- Wear suitable protective clothing
- Do not use flammable liquids, such as gasoline or diesel fuel

Compressed air

- Work carefully
- Wear goggles and protective clothing
- Do not aim the compressed air at the skin or at other people
- Do not use compressed air for cleaning your clothing

When using a high-pressure cleaner or steam cleaner

- Electrical components and damping materials must be covered and not directly exposed to the jet
- Cover the vent filter on the hydraulic oil tank and the filler caps for fuel, hydraulic oil etc.
- Protect the following components from moisture:
  - Engine
  - Electrical components, e.g., alternator, plug and socket connections etc.
  - Control devices and seals
  - Air filters, etc.

When using volatile and easily flammable anticorrosion chemicals and sprays:

- Ensure adequate room ventilation
- Do not use unprotected lights or open flames
- Do not smoke!

Inside the operator compartment

Important!

Never use high-pressure cleaners, steam cleaners or high-pressure water to clean the inside of the operator compartment. Water under high pressure may
• Penetrate into the electrical systems and cause short circuits and
• Damage seals and disable the controls!

For cleaning the operator compartment, we recommend using the following aids:

- Broom
- Vacuum cleaner
- Damp cloth
- Bristle brush
- Bucket of water

Cleaning your seat belt

- Clean the seat belt (which remains fitted in the machine) only with a mild soap solution; do not use chemical agents, because they may destroy the fabric!

WARNING!

For automatic seat belts (option), soiled belts may impair winding and thereby affect safety. Only wind seat belt when it is dry!

Exterior of the machine

The following articles are generally suitable:

- High-pressure cleaner or
- Steam cleaner

Engine compartment

WARNING!

To avoid injury, clean the engine only when it is stopped.

☞ *Switch off the engine before cleaning*

Important!

When cleaning the engine using a water jet or steam cleaner, do not point the jet directly at electrical measurement sensors such as the oil pressure switch, because otherwise, liquid penetrating such units can lead to corrosion and failure of the measuring function!

5.14.2 Bolted connections

All bolted connections must be checked regularly, even if they are not listed in the maintenance schedules.

Tighten loose connections immediately. Tightening torques can be found in section “Specifications”.

5.14.3 Pivots and hinges

All mechanical pivot points on the machine (e.g. door hinges, joints) and fittings (e.g. door holders) should be lubricated regularly, even if they are not listed in the lubrication plan.

5.15 Engine fluids and lubricants

Component/ application	Engine/machine fluid	SAE grade Specification	Season / temperature	Capacities[1]
Diesel engine	Engine oil[2]	HD-C 5W-30[3]	**-4° F to +86° F (-20° C to +30°C)**	**7.4 quarts (7 litres)[4]**
		HD-C 10W-30	**14° F to +95° F (-10° C to +35°C)**	
		HD-C 10W-40; EO1040B[5]	**14° F to +104° F (-10° C to +40°C)**	
		HD-C 15W-40; EO1540B [5]	**32° F to +104° F (0° C to +40 °C)**	
Rear axle transfer gearbox	Gearbox oil[6]	SAE 80 W-90	Year-round	**1.6 quarts (1.5 litres)**
Planetary drives – left and right front and rear axle				**0.7 quarts (0.7 litres each)**
Differential – front and rear axle		SAE 90 LS		**3.9 quarts (3.7 litres each)**
		SAE 80W-90 + LS concentrate[7]		
Hydraulic oil tank	Engine oil[2]	SAE 5 W/30[3]	**-4° F to +95° F (-20° C to +35°C)**	**About 52.8 quarts (50 litres)**
		SAE 10 W/30	**14° F to +104° F (-10° C to +40°C)**	
		SAE 10 W/40; EO 0540B[5]		
		SAE 15 W/40; EO1540B[5]	**32° F to +104° F (0° C to +40 °C)**	
	ATF	ATF 66 M/ATF 86 (ATF[5])	**14° F to +86° F (-10° C to +30 °C)**	
	Biodegradable oil	AVILUB Syntofluid 46		
		PANOLIN HLP Synth 46		
		FIAT Idraulicar BS 68		
		AGIP Arnica S 68		
Grease nipples	Multipurpose grease	Lithium-saponified brand-name greases MPG-A[5]	Year-round	As required
Wear pads of the telescopic unit	Multipurpose grease		Year-round	As required
Battery terminals	Acid-proof grease	SP-B[5]	Year-round	As required
Mounting of pins, shafts etc.	Special lubricating grease	Optimoly paste "TA"[8]	Year-round	As required
Fuel tank	Diesel fuel	DIN 51 601, min 45 Cetan,		**15.9 gal (60 ltr)**
Brake system	Brake fluid SAE J 1703 DOT 3.4, SP-A[5]			
Radiator	Coolant	Water + antifreeze; SP-C[5]	Year-round	**About 9.0 quarts (8.5 litres)**
Washer system	Cleaning agent	Water + antifreeze		**About 1.3 quarts (1.2 litres)**

1. The capacities indicated are approximative values; the oil level check alone is relevant for the correct oil level
2. MIL-L-2104C; API CD/CE/CF4; CCMC-D4
3. Only with oil preheating
4. **With filter change**
5. Abbreviation for lubricants (Hauptverband der Deutschen Bauindustrie e. V. – German construction engineering association)
6. MIL-L-2105B; API-GL5; ZF TE-ML-0.5
7. Necessary addition of Fuchs LS concentrate: 20 gr/ltr.
8. 250 gr tube: order no.: 0 00 441 32 10

5.16 Maintenance kits

Maintenance kits			
Part number	Description	Qty	Remarks
	Maintenance kit for "1st Inspection"		
0160030030	**Maintenance kit**	1	
	Maintenance kit for Maintenance plan "B"		
0160030130	**Maintenance kit**	1	
	Maintenance kit for Maintenance plan "C"		
0160030230	**Maintenance kit**	1	
	Additional parts for maintenance kits		
0000805188	Air filter	1	(option, not included in the maintenance kit)
0000805573	Filter for heater	1	(not included in maintenance kit)

Section 6

Helpful information for using the service parts list

6 Helpful information for using the service parts list

6.1 Introduction

This operator's manual and a separate service parts list have been handed over to you together with your machine.

Please read this section carefully. It will make it easier for you to carry out your work and find service parts.

The illustrations in the service parts list are not binding for design.
Subject to further development and technical modifications.

6.2 Composition of service parts list

6.2.1 Groups

The service parts list is divided in functional groups.

Groups are identified by numbers (e.g. 01 = engine)

Fig. 167: Title page of a group

6.2.2 Group overview

The service parts list contains the following groups:

Group	Description
01	Engine
08	Fuel system
10	Air filter
15	Cooling system
17	Speed regulation
20	Machine frame
22	Hydrostatic drive
23	Front axle
24	Brake system
26	Rear axle
27	Steering
29	Operator's seat
30	Sheet-metal parts
31	Wheels and tyres
32	Exhaust system
33	Electrical system
34	Cab
36	Hydraulic system
41	Heating and ventilation
41/3	Buckets
41/4	Pallet forks
43	Tools, labels
A	Number index

6.2.3 Figures

Groups consist of one or more figures. They are identified at the upper right by the figure number.
The number before the hyphen identifies the group (e.g. 01).

The reference numbers in the figures identify the individual service parts. The corresponding part numbers are listed in the number index.

The figures are reduced representations of assemblies and component parts, and are not binding for design.
Subject to further development and technical modifications.

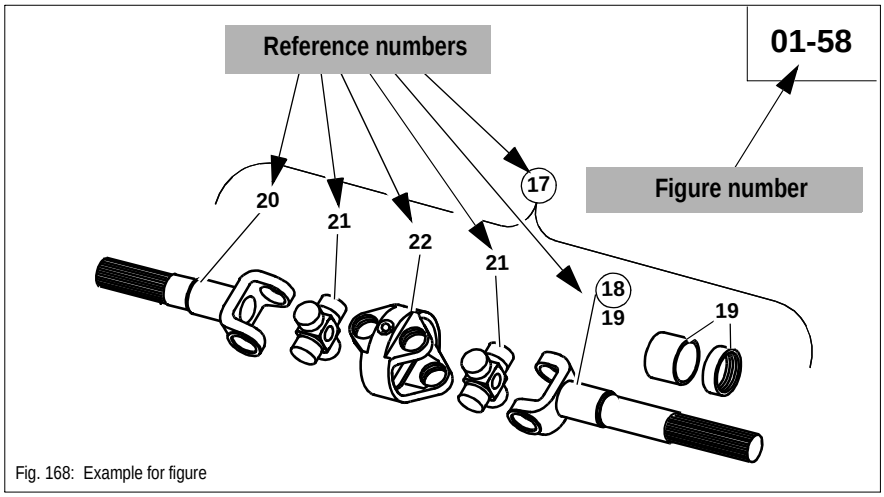


Fig. 168: Example for figure

6.2.4 Number index

The number index is included at the end of the service parts list and contains all part numbers corresponding to the reference numbers in the figures. Part numbers are listed in the order of figures, and of reference number.

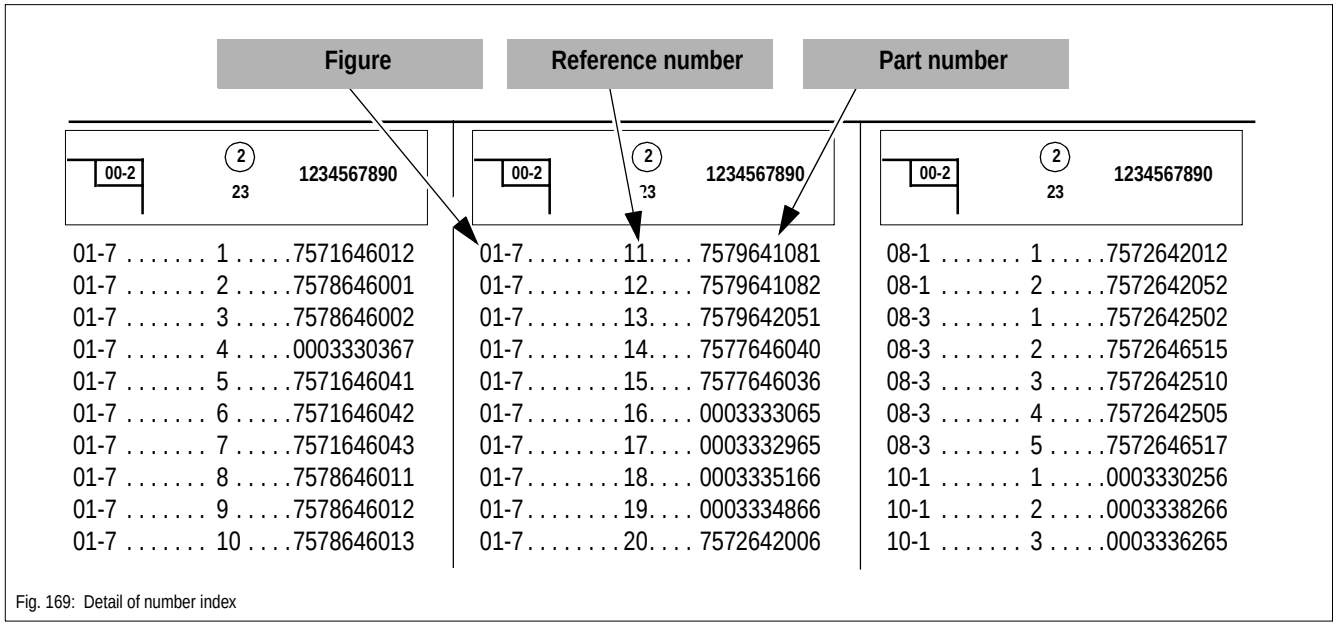


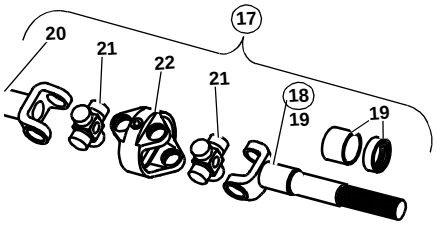
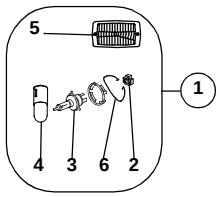
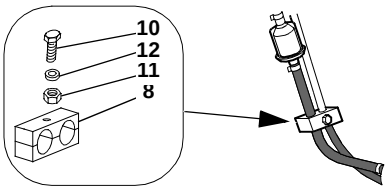
Fig. 169: Detail of number index

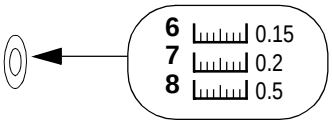
6.3 Symbols and abbreviations

Symbols and abbreviations are used in the figures for clear identification of parts. Combinations of symbols and abbreviations are also used.

6.3.1 Description of symbols

Symbols may have the following meanings:

Symbol	Description
Reference number	
22	Identifies a component part.
17	The circled number identifies an assembly which may consist of several component parts. Assemblies are delivered as finished assemblies, or preassembled with all necessary component parts.
	Component parts can be grouped in brackets or in boxes, or appear below the reference number of the assembly, e.g. reference numbers 18 and 19. A component part can consist of several parts which may be deliverable as a whole only, e.g. reference number 19.
	
	Component parts grouped in a box, without reference number for the assembly, identify details.

Symbol	Description
Validity	
→I	Parts are valid only **up to and including** the **serial number** stated, e.g. up to and including serial number 307 63 0238
→I	Parts are valid only **up to and including** the **identification number** stated for the respective assembly, e.g. up to and including cab number 0237. This can also include other symbols, e.g. axle, engine etc.
I→	Parts are valid only **starting and including** the serial number stated, e.g. starting and including serial number 307 63 0239
I→	Parts are valid only **starting and including** the identification number stated for the respective assembly, e.g. starting and including cab number 0237. This can also include other symbols, e.g. axle, engine etc.
	Symbol for axle
	Symbol for cab
	Symbol for engine
Instructions for assembly	
	Do not remove parts, parts cannot be repaired
	Tighten parts with a torque spanner to the prescribed torque. Use standard torques if no specific torque is stated – see section 7.16.1 *General tightening torques* on page 7-9 and section 7 *"Specific tightening torques"* on page 7-9
⚠	**Safety part!** For reasons of safety, parts may be dismantled or repaired by qualified mechanics only. Otherwise parts must be replaced as a whole!
	Check parts for wear before reassembly, e.g. bearings, rotary shaft lip seals etc.
	Parts are not reuseable and must be replaced during repair work, e.g. sealing elements
	Pay special attention to direction of installation when removing or fitting parts, e.g. rotary shaft lip seals, bearings, bushings etc.
	Use securing means and sealing compounds stated, e.g. Loctite 242
	Measure length/thickness of new part, e.g. shims, edge guards, sealing strips etc. Round up to the full metre for orders by the metre!
	Measure thickness of new part, due to availability in various sizes. State all dimensions in mm (millimetres).
Special symbols	
	Symbol for special version with float position
	Symbol for hydraulic cylinder
	Symbol for sealing kit
	Symbol for tool kit
	Symbol for documentation

6.3.2 Abbreviations

Indication of position

Abbreviations specify position of service part on/in machine in driving direction.

Combinations of abbreviations are also possible, e.g. **HLO** (upper rear left).

Abbreviation	Description
F	Front
H	Rear
L	Left
R	Right
O	Upper
U	Lower
M	Centre
A	Outer
I	Inner

Application

Abbreviations specify use of service part on/in machine.

Abbreviation	Description
BA	Specifies operator's manual
ET	Specifies service parts list
De	German
En	English
Fr	French
MC	Specifies microfiches
SO	Specifies special equipment

6.4 Machine data

Always include the exact machine data in your orders to ensure correct delivery of service parts required.

See section 1 *"Machine data"* on page 1-6 and *"Type labels and component numbers"* on page 1-7 for the relevant machine data.

6.5 Helpful information for ordering service parts

Delivery of service parts cash on delivery.
Damaged samples will be scrapped if no request for return has been forwarded within 4 weeks.

Service parts can be returned only upon agreement with our Service Parts Department.

Return excludes:

Seals, O-rings, sealing kits, electrical parts, special purchases and parts ordered without exact machine data.

6.5.1 Order information

Always include the following information in your orders to ensure correct delivery of service parts:

- **Customer and address**
  e.g. Jason Miller
  High Street 40
  Leighton Buzzard LU5 8RT
- **Delivery address** if not identical with customer's address
  e.g. Construction site: Jeff Mason
  Church Street 41
  High Wycombe HP9 3ER
- **Mode of shipment**
  e.g. United Parcel Service (UPS)
  Shipment will be made at our own discretion if no indications are made
- **Machine description**
  e.g. 418T
- **Model and serial no.** (see type label on machine)
  e.g. 418T, 418T 0239
- **Service parts list and edition** (see service parts list cover)
  e.g. Edition A
- **Figure, reference** (in service parts list)
  e.g. 01-8, reference 15
- **Part number** (in number index in service parts list)
  e.g.: 0000801987
- **Quantity and unit**
  e.g. 1 off
- **For component, identification number** (see type label)
  e.g. engine: Kubota V 1305 – 073248

6.5.2 Address for your service part order

Gehl Company
143 Water Street
West Bend, WI 53095-0179
U.S.A
Telephone: 262-334-9461
Fax: 262-338-7517

Section 7

Specifications

7 Specifications

7.1 Frame

Sturdy steel sheet frame, rubber-mounted engine

7.2 Engine

Engine	
Product	Perkins diesel engine
Model	704-30DI
Design	Vertical, water-cooled 4-stroke diesel engine
No. of cylinders	4
Displacement	180 in^3 (2955 cm^3)
Bore and stroke	3.8 x 3.9 in (97 x 100 mm)
Compression ratio	1 : 17.5
Output (as per ISO 9249)	58 hp (43.1 kW) at 2400 rpm
Max. torque	154.9 lb-ft (210 Nm) at 1600 min-1
Specific minimum fuel consumption	288 g/hp-hr (215 g/kWh)
Fuel injection system	Direct fuel injection
Firing order	1 – 3 – 4 – 2
Starting aid	Glow plug
Max. inclined position (engine no longer supplied with oil):	25 ° in all directions Observe tilting limit of the machine!
Oil pressure	61 lb/in^2 (4.2 bar)
Valve tip clearance	Intake, exhaust valve 0.01 in (0.35 mm), engine at cold temperature respectively
Exhaust emissions values as per	ISO/TR 14396 EC 97/68 level 1 US 40 CFR part 89

7.3 Power train

Variable displacement pump	
Design	Axial piston pump (swash plate design)
Displacement	0 – 2.5 in³/rev (0 – 41 cm³/rev)
Max. operating pressure p	5584 lb/in^2 (385 bar)
Starting RPMs	1050 $^{\pm 50}$
Droop	2250 $^{\pm 50}$
Boost pump (integrated in variable displacement pump)	
Design	Internal gear pump
Displacement	0.7 in³/rev (11 cm³/rev)
Charging/boost pressure	290 lb/in^2 (20 bar)
Control	
Driving direction	Forward – reverse on control lever
Inching	Electrically (potentiometer)
Variable displacement motor	
Design	Axial piston motor (swash plate design)
Capacity	0.9 – 3.7 in³/rev (16 – 60 cm³/rev
Drive speed	0 – 12 mi/h (0 – 20 km/h), forward and reverse
Max. traction force	8543 lbf (38 kN)

7.4 Axles

Front axle (with self-locking differential 40%)	
Design	Rigid steering and drive axle
King-pin inclination	6°
Camber	0°
Positive/negative wheel castor	-
Steering angle	40°
Toe-in	0 in (0 mm)
Track width	54 in (1370 mm)[1]
Rear axle (with 40 % differential lock)	
Design	Steering and drive axle, oscillating
King-pin inclination	6°
Camber	0°
Total oscillation	+/- 8.5 °
Positive/negative wheel castor	–
Steering angle	40°
Toe-in	0 mm
Track width	54 in (1370 mm)[1]

1. With standard tyres 12.5 – 20

7.5 Brakes

Service brake	
Design	Foot-operated, hydraulic disc brake + hydrostat
Mounted in	Front axle, drive (rear axle)
Effect	On both axles via cardan shaft
Brake fluid	See Engine fluids and lubricants
Parking brake	
Design	Manual, mechanical disc brake
Mounted in	Front axle input
Effect	On both axles via cardan shaft

7.6 Steering

Steering	
Design	Hydrostatic four-wheel steering with emergency steering features (closed version)
Steering mode	Four wheel steering
Assemblies	Hydraulic pump, steering unit with flanged priority valve, steering cylinder, automatic synchronization in left and right-hand final positions
Max. pressure of hydraulic lines	2611 lb/in^2 (180 bar)
Hydraulic pump	Gear pump Displacement 1.4 in^3/rev (23 cm^3/rev)

7.7 Work hydraulics

Work hydraulics	
Hydraulic pump	Gear pump
Displacement	1.4 in^3/rev (23 cm^3/rev) = 17 g/min (66 l/min) at 2400 rpm
Control valve	3 sections
Max. service pressure	3046^{+10} lb/in^2(210^{+10} bar)
Secondary pressure limiting	Secondary pressure relief valve for tilt ram: rod side 3481 lb/in^2(240 bar) bottom side 1450 lb/in^2(100 bar) Secondary pressure relief valve for lift ram: bottom side 3481 lb/in^2(240 bar)
Filter	Return suction filter (7.3 lb/in^2 (0.5 bar) initial stress)
Hydraulic oil tank	13.2 gal (50 l)

7.8 Telescopic unit

Telescopic unit with bucket [1, 2]	Telescopic unit	
Bucket capacity heaped as per ISO		1.1 yd³ (0.85 m³)
Tipping load		6557 lb (2974 kg)
Payload		3278 lb (1487 kg)
Lift load at max. height		6173 lb (2800 kg)
Bucket width		69 in (1750 mm)
Length of telescopic extension		45 in (1150 mm)
Dump height with standard bucket	Retracted	118 in (3000 mm)
	Extended	158 in (4000 mm)
Fulcrum height of quick hitch facility		185 in (4690 mm)
Dumping reach	Extended	47in (1205 mm)
Scraping depth		about 2 in (50 mm)
Tilt-back angle		40°
Dump-out angle		40°
Breakout force (lift cylinder)		6744 lbf (30.0 kN)
Breakout force (tilt cylinder)		11015 lbf (49.0 kN)
Fork arms[3] (payloads stated for 20 in (500 mm) load distance)		
Tipping load (ISO 8313)	Retracted	4982 lb (2260 kg)
Payload (ISO 8313)	Extended (S=1.25[4])	2425 lb (1100 kg)
	Extended (S=1.67[5])	1808 in (820 kg)
	Retracted (S=1.25[4])	3968 lb (1800 kg)
	Retracted (S=1.67[5])	2965 lb (1345 kg)
Pallet height	Retracted	136 in (3450 mm)
	Extended	177 in (4500 mm)
Movable payload in transport position (S=1.25[4])		4850 lb (2200 kg)

1. With standard tyres 12.5-20
2. Standard bucket 810136
3. Pallet forks 810135
4. On firm and level ground
5. Off-road

7.9 Electrical system

Alternator	12 V/65 A
Starter	12 V/2.5 kW
Battery	12 V/80 Ah
Socket	E.g. for cigarette lighter; 15 A max.

7.9.1 Fuse boxes in side console

The fuse boxes are located in the side console in the cab.

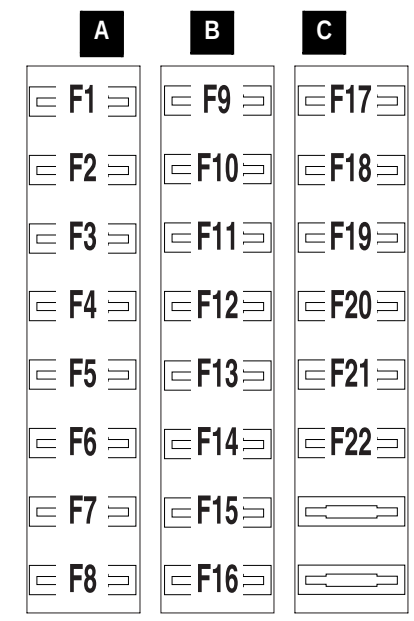
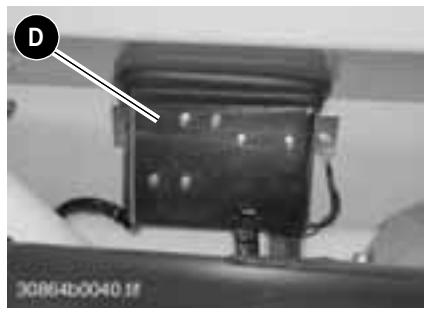


Fig. 170: Fuse assignment in side console

Fuse	Row	Rated current (A)	Protected circuit
F1	A	7.5 A	– Instrument lighting – Brake lights
F2	A	7.5 A	– Horn – Wiper/wash system
F3	A	10 A	– Heater
F4	A	7.5 A	– Cutoff solenoid – Rear wiper
F5	A	10 A	– Front wiper
F6	A	10 A	– Cigarette lighter
F7	A	7.5 A	– Interior lighting – Hazard warning system
F8	A	7.5 A	– Switch lights – Turn indicators
F9	B	10 A	– Drive switch – Drive electronics
F10	B	15 A	– Lights
F11	B	7.5 A	– High beam (right)
F12	B	7.5 A	– High beam (left)
F13	B	7.5 A	– Low beam (right)
F14	B	7.5 A	– Low beam (left)
F15	B	7.5 A	– Parking light (right) – Rear light (right)
F16	B	7.5 A	– Parking light (left) – Rear light (left)
F17	C	10 A	– Air-suspension seat (option)
F18	C	7.5 A	– Telescopic unit
F19	C	7.5 A	– Lock for quick hitch facility (option) – Attachments (option)
F20	C	7.5 A	– Not assigned
F21	C	25 A	– Working light (option)
F22	C	7.5 A	– Rotating beacon (option)
	C	7.5 A	– Not assigned (spare)
	C	10 A	– Not assigned (spare)

7.9.2 Main fuses in engine compartment

The main fuse are located above the hydraulic oil tank, underneath cover **D**.



Fuse	Rated current (A)	Protected circuit
F23	100 A	– Main fuse
F24	100 A	– Main fuse

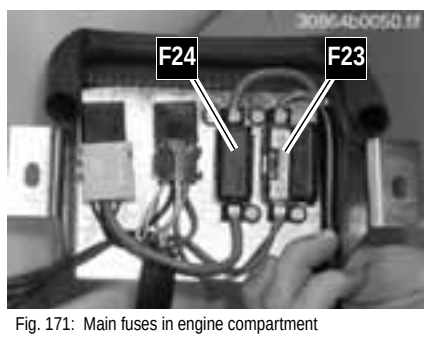
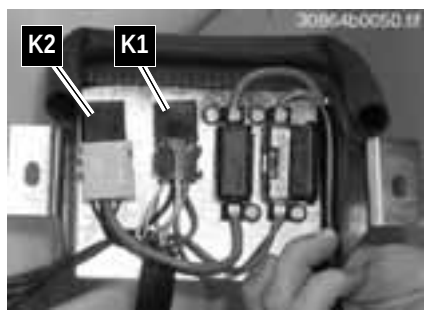
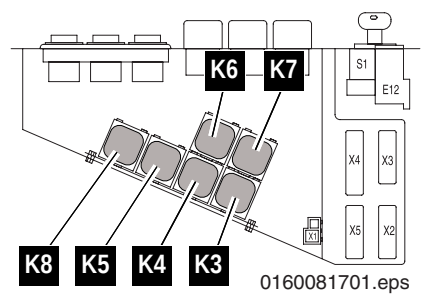


Fig. 171: Main fuses in engine compartment

7.9.3 Relays

Relays K1 and K2 are located above the hydraulic oil tank, underneath cover **D**.
Relays K2 to K9 are located underneath the cover plate on the right side of the cab, in the side console.





Description	Function
K1	Switching relay, cutoff solenoid
K2	Switching relay preheating
K3	Switching relay drive interlock
K4	Switching relay low beam
K5	Switching relay high beam
K6	Switching relay, retract telescopic unit
K7	Switching relay, extend telescopic unit
K8	Hazard light indicator

Fig. 172: Relay assignment

7.10 Tires

Bear in mind the sticker at the front window of the machine!

Tyre size	Tire pressure[1]		Wheel rims	
	Front	Rear	Wheel rim	Wheel offset
12.5-20 MPT 10PR	36 lb/in^2 (2.5 bar)	29 lb/in^2 (2.0 bar)	11 x 20	0 mm
14.5-20 MPT 10PR	29 lb/in^2 (2.0 bar)	25 lb/in^2 (1.7 bar)		
375/75 R 20 136G	36 lb/in^2 (2.5 bar)	29 lb/in^2 (2.0 bar)		
405/70 R 18 141B [2]	44 lb/in^2 (3.0 bar)	36 lb/in^2 (2.5 bar)	13 x 18	0 mm
12.5-20 MPT 10PR	36 lb/in^2 (2.5 bar)	29 lb/in^2 (2.0 bar)	11 x 20	0 mm

1. Increase tyre pressure by 0.5 bar during pallet forks operation!
2. Overall width of machine larger than standard bucket when equipped with these tyres

7.11 Weights

Weights[1]	
Kerb weight	10913 lb (4950 kg)
Front axle load	3968 lb (1800 kg)
Rear axle load	6945 lb (3150 kg)
Gross weight rating	13228 lb (6000 kg)
Front axle weight rating	8267 lb (3750 kg)
Rear axle weight rating	8267 lb (3750 kg)
Max. authorized load for towing facility	None

1. With standard bucket 810136 and standard tyres 12.5-20

7.12 Noise levels

Noise levels	
Sound power level	99 dB (A)
Noise level in the cab	74 dB (A)

Important!

Noise measurement carried out in accordance with EC guidelines 86/662 EEC (dynamic), 79/113 EEC at maximum engine speed. The surface where the measurements were carried out was asphalted.

7.13 Vibration

Effective acceleration value for the upper extremities of the body	< 2.5 $\frac{m}{s^2}$
Effective acceleration value for the body	< 0.5 $\frac{m}{s^2}$

7.14 Dimensions

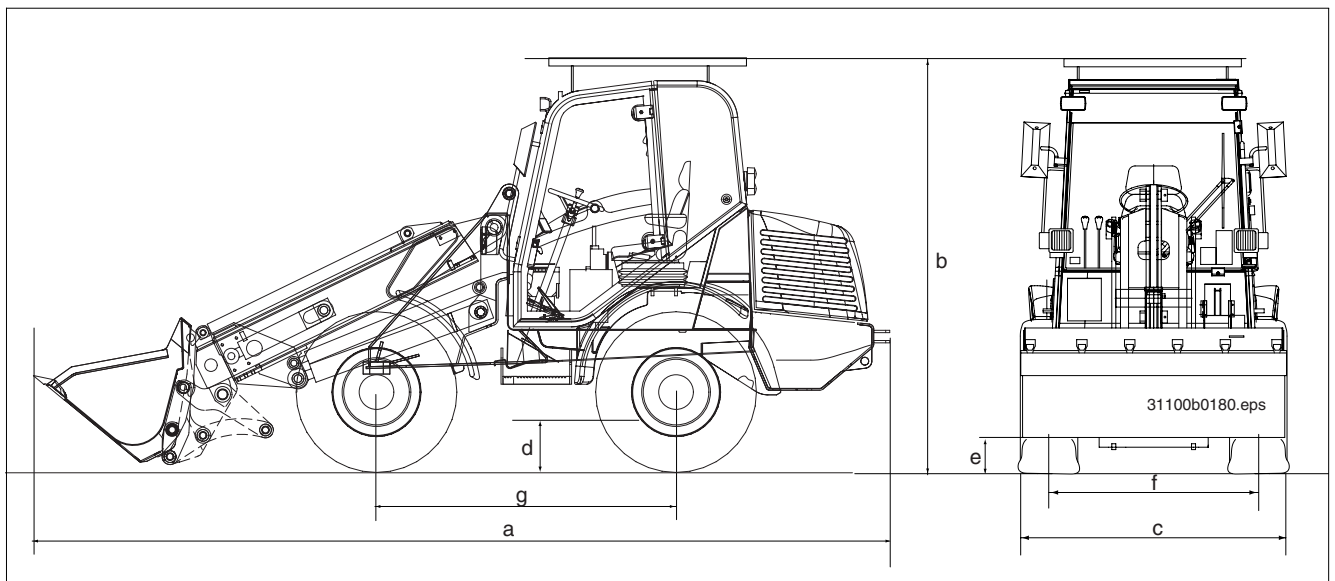


Fig. 173: Machine dimensions

Dimensions[1]	
Overall length **a**	217 in (5500 mm)
Overall height **b** – With FOPS screen – With FOPS screen and rotating beacon (option)	 100 in (2530 mm) 103 in (2610 mm)
Overall width **c**	71 in (1800 mm)
Ground clearance **d** (under rear axle gearbox)	13 in (340 mm)
Transport ground clearance **e** in transport position of telescopic unit	9 in (230 mm)
Front/rear track width **f**	54 in (1370 mm)
Wheelbase **g**	75 in (1910 mm)
Turning radius	156 in (3950 mm)

1. With standard bucket 810136 and standard tyres 12.5 – 20

7.15 Coolant table

Outside temperature	Coolant			
	Water	Anticorrosion agent		Antifreeze agent
up to °C	% by volume	cm³/ltr.	% by volume	% by volume
39 (4)	99	10	1	-
14 (-10)	79			20
-4 (-20)	65			34
-13 (-25)	59			40
-22 (-30)	55			44

7.16 Tightening torques

7.16.1 General tightening torques

Screw dimensions	Tightening torques in Nm[1]		
	8.8	10.9	12.9
M4	2.2 (3)	3.0 (4)	3.7 (5)
M5	4.1 (5.5)	5.9 (8)	7.4 (10)
M6	7.4 (10)	10.3 (14)	11.8 (16)
M8	17.0 (23)	25.0 (34)	29.5 (40)
M10	33.9 (46)	49.4 (67)	58.3 (79)
M12	58.3 (79)	84.8 (115)	99.6 (135)
M14	92.2 (125)	136.4 (185)	162.2 (220)
M16	143.8 (195)	213.9 (290)	250.8 (340)
M18	206.5 (280)	295.0 (400)	346.7 (470)
M20	291.3 (395)	413.0 (560)	486.8 (660)
M22	398.3 (540)	560.5 (760)	656.4 (890)
M24	501.5 (680)	715.4 (970)	848.2 (1150)
M27	737.6 (1000)	1069.5 (1450)	1253.9 (1700)
M30	995.7 (1350)	1438.2 (1950)	1696.4 (2300)

1. Values valid for screws with slightly oiled surfaces.

7.16.2 Specific tightening torques

Description	Tightening torque
Wheel nut	309.8 lb-ft (420 Nm)
Track-rod end (steering cylinder)	118.0 lb-ft (160 Nm)
Piston rod (steering cylinder/track rod)	184.4 lb-ft (250 Nm)
Front axle mounting	442.5 lb-ft (600 Nm)

7.17 Conversion tables

7.17.1 Conversion factors

To convert *to* metric, *multiply* by the factor shown. To convert *from* metric, *divide* by the factor.

						Temperature	
						° C	° F
Miles		–	kilometres	(km)	1.6093	– 30	– 22
Feet	(ft)	–	metres	(m)	0.3048	– 20	– 4
Inches	(in)	–	millimetres	(mm)	25.4	– 10	14
Inches	(in)	–	centimetres	(cm)	2.54	0	32
Cubic feet	(cu ft)	–	cubic metres	(m^3)	0.0283	5	41
Cubic inches	(cu in)	–	cubic centimetres	(cm^3)	16.3871	10	50
Imperial gallons	(Imp gal)	–	litres	(ltr)	4.546	15	59
US gallons	(US gal)	–	litres	(ltr)	3.785	20	68
Miles per hour	(mph)	–	kilometres per hour	(km/hr)	1.6093	30	86
Long tons		–	kilograms	(kg)	1016.05	40	104
Long tons		–	tonnes	(t)	1.0160	50	122
Short tons		–	kilograms	(kg)	907.2	60	140
Short tons		–	tonnes	(t)	0.9072	70	158
Pounds	(lb)	–	kilograms	(kg)	0.4536	80	176
Ounces	(oz)	–	grams	(g)	28.3495	90	194
Pounds/in^2	(psi)	–	bar		0.0689	100	212
Pounds x feet	(lb ft)	–	Newton metre	(Nm)	1.35582	110	230
						120	248

To convert to Fahrenheit, insert the Celsius values in the equation:
1.8 x ... °C + 32°C = ... °F

To convert to Celsius, insert the Fahrenheit values in the equation:
$\frac{5}{9}$ x (... °F – 32 °F) = ... °C

7.17.2 Specific converted values

The following table states the most frequent values occurring in the present operator's manual. For abbreviations and any other values to be converted, please refer to table *7.17.1 Conversion factors*.

Mass					**Length**				
820	kg	–	1807.8	lb	0.35	mm	–	0.014	in
935	kg	–	2061.3	lb	60	mm	–	2.4	in
1100	kg	–	2425	lb	97	mm	–	3.82	in
1345	kg	–	2965.2	lb	230	mm	–	9	in
1487	kg	–	3278.2	lb	1150	mm	–	45.3	in
1800	kg	–	3968	lb	1205	mm	–	47.4	in
2200	kg	–	4850	lb	1290	mm	–	50.8	in
2260	kg	–	4982.4	lb	1370	mm	–	54	in
2800	kg	–	6172.8	lb	1560	mm	–	61.4	in
2974	kg	–	6556.4	lb	1750	mm	–	68.9	in
3150	kg	–	6994.4	lb	1910	mm	–	75.2	in
3750	kg	–	8267	lb	2530	mm	–	99.6	in
Mass					**Length**				
4950	kg	–	10,913	lb	3360	mm	–	132.3	in
5500	kg	–	12.125	lb	3950	mm	–	155.5	in
					4690	mm	–	184.7	in
Volume									
11	cm^3	–	0.67	cu in	0.85	m^3	–	30.03	cu ft
20	cm^3	–	1.22	cu in					
25	cm^3	–	1.53	cu in					
41	cm^3	–	2.5	cu in					
80	cm^3	–	4.88	cu in					
2955	cm^3	–	180.3	cu in					
Acceleration					**Velocity**				
0.5	m/s^2	–	1.6	ft/s^2	4	km/hr	–	2.5	mph
2.5	m/s^2	–	8.2	ft/s^2	20	km/hr	–	12.4	mph
Capacity									
0.7	ltr	–	0.15	Imp gal	8	ltr	–	1.76	Imp gal
			0.18	US gal				2.1	US gal
1.2	ltr	–	0.26	Imp gal	8.5	ltr	–	1.87	Imp gal
			0.32	US gal				2.25	US gal
1.5	ltr	–	0.33	Imp gal	55	ltr	–	12.1	Imp gal
			0.4	US gal				14.5	US gal
3.7	ltr	–	0.81	Imp gal	60	ltr	–	13.2	Imp gal
			0.98	US gal				15.9	US gal
7	ltr	–	1.54	Imp gal	70	ltr	–	15.4	Imp gal
			1.85	US gal				18.5	US gal

Notes

Annex

Proofs of maintenance

After service hours	Maintenance plan	Date	Service hour reading	Company/ signature
	Delivery			
50	A			
100	1st Inspection			
150	A			
200	A			
250	A			
300	A			
350	A			
400	A			
450	A			
500	A			
550	A			
600	B			
650	A			
700	A			
750	A			
800	A			
850	A			
900	A			
950	A			
1000	A			

Proofs of maintenance

After service hours	Maintenance plan	Date	Service hour reading	Company/ signature
1050	A			
1100	A			
1150	A			
1200	C			
1250	A			
1300	A			
1350	A			
1400	A			
1450	A			
1500	A			
1550	A			
1600	A			
1650	A			
1700	A			
1750	A			
1800	B			
1850	A			
1900	A			
1950	A			
2000	A			
2050	A			

Proofs of maintenance

After service hours	Maintenance plan	Date	Service hour reading	Company/ signature
2100	A			
2150	A			
2200	A			
2250	A			
2300	A			
2350	A			
2400	C			
2450	A			
2500	A			
2550	A			
2600	A			
2650	A			
2700	A			
2750	A			
2800	A			
2850	A			
2900	A			
2950	A			
3000	B			
3050	A			
3100	A			

Proofs of maintenance																					
	Company/ signature																				
	Service hour reading																				
	Date																				
	Maintenance plan	A	A	A	B	A	A	A	A	A	A	A	A	A	A	A	C	A	A	A	A	A
	After service hours	5250	5300	5350	5400	5450	5500	5550	5600	5650	5700	5750	5800	5850	5900	5950	6000	6050	6100	6150	6200	6250

Proofs of maintenance																					
	Company/ signature																				
	Service hour reading																				
	Date																				
	Maintenance plan	B	A	A	A	A	A	A	A	A	A	A	A	C	A	A	A	A	A	A	A	A
	After service hours	4200	4250	4300	4350	4400	4450	4500	4550	4600	4650	4700	4750	4800	4850	4900	4950	5000	5050	5100	5150	5200

Proofs of maintenance																					
	Company/ signature																				
	Service hour reading																				
	Date																				
	Maintenance plan	A	A	A	A	A	A	A	A	A	C	A	A	A	A	A	A	A	A	A	A	A
	After service hours	3150	3200	3250	3300	3350	3400	3450	3500	3550	3600	3650	3700	3750	3800	3850	3900	3950	4000	4050	4100	4150

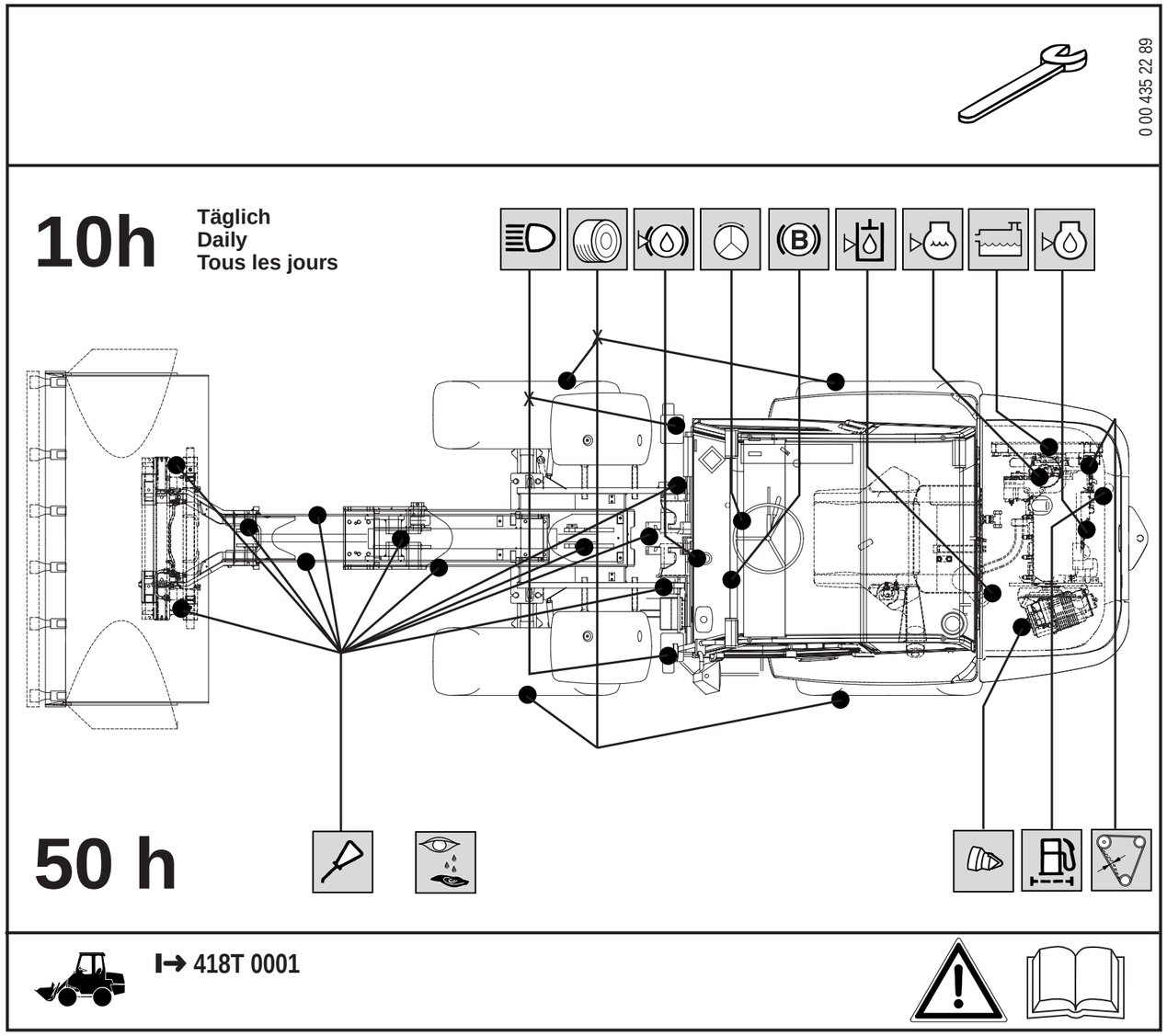
Maintenance plan model 418T (overview)

Work description For service and maintenance work on the diesel engine/attachment, please refer to the operation and maintenance manual of the engine/attachment manufacturer as well.	Maintenance plan/service hours					
	Maintenance work every 10 hours (daily)	Delivery inspection	"A" every 50 hours every week	1st Inspection[1] at 100 hours	"B" every 600 hours[2] 2nd Inspection	"C" every 1200 hours yearly
Oil and filter changes ( ):						
Carry out the following oil and filter changes (check oil levels after test run):						
● Engine oil				●	●	●
● Engine oil filter				●	●	●
● Fuel filter					●	●
● Air filter insert[3]						●
● Gearbox oil in front and rear axle differentials/gearbox				●		●
● Gearbox oil in front and rear axle planetary drives, left and right side				●		●
● Hydraulic oil [4, 5]						●
● Hydraulic oil filter insert [3]				●		●
● Breather – hydraulic oil tank						●
Inspection work ( ):						
Check the following material. Refill if necessary:						
● Engine oil	●	●	●			
● Coolant [6]	●	●	●	●	●	●
● Hydraulic oil [4, 5]	●	●	●	●	●	
● Brake fluid [6]	●	●	●	●	●	●
● Gearbox oil in front and rear axle differentials/gearbox		●			●	
● Gearbox oil in front and rear axle planetary drives, left and right side		●			●	
Check cooler for engine and hydraulic oil for contamination. Clean if necessary[7]	●		●	●	●	●
V-belt: check condition and pre-tension. Retighten or replace if necessary [8]		●	●	●	●	●
Ventilate the crankcase [9]						
Check glow plugs. Replace if necessary					●	●
Check the fuel/water separator. Drain water if necessary			●	●	●	●
Check valve tip clearance (engine timing). Set if necessary				●		●
Battery: Check electrolyte level and charge condition					●	●
Check and set parking brake pads. Replace if necessary					●	●
Check and set service brake pads. Replace if necessary					●	●
Tyre check (damage, air pressure, tread depth)	Visual check	●	●	●	●	●
Heating: Clean dust filter and replace every 1200 service hours if necessary					●	●
Check screws and nuts or screw connections for tightness on the following assemblies/components. Retighten if necessary:						
● Engine and engine suspension				●		●
● Steering system				●		●
● Hydraulic system				●		●
● Telescopic unit (lock pin)				●		●
● Axle mounting, axle suspension				●		●
● Counterweight (attachment)				●		●
● Attachment screws of the cardan shafts				●		●
● Tank attachment (hydraulic oil and fuel tanks)				●		●
● Attachment screws of the cab				●		●
● Wheel nuts				●		●
Electrical system: wire and earthing lead connections, chafing on wiring harness, battery terminals		●	●	●	●	●
Lubrication service ( ):[10]						
Lubricate the following assemblies/components:						
● Rear axle oscillation-type bearing						●
● Telescopic unit – see section 5.10 *Telescopic unit* on page 5-28						
● Wear pads of the telescopic unit	●[11]		●			
● Compensating cylinder bearing	●[11]		●			
● Telescopzylinderlagerung	●[11]		●			
● Lift frame bearing		●	●	●	●	●
● Lift cylinder bearing		●	●	●	●	●
☆ Tilt cylinder bearing		●	●	●	●	●
☆ Tilt rod bearing		●	●	●	●	●
● Tilt lever bearing		●	●	●	●	●
● Quickhitch facility: lock pins		●	●	●	●	●
● Quickhitch facility: bearing on lift frame		●	●	●	●	●
● Hinges, joints and fittings (e.g. door holder)					●	●

Maintenance plan model 418T (overview)

Work description For service and maintenance work on the diesel engine/attachment, please refer to the operation and maintenance manual of the engine/attachment manufacturer as well.		**Maintenance plan/service hours**					
		Maintenance work every 10 hours (daily)	Delivery inspection	"A" every 50 hours every week	1st Inspection[1] at 100 hours	"B" every 600 hours[2] 2nd Inspection	"C" every 1200 hours yearly
Functional check(?):							
Check function of the following assemblies/components. Rectify if necessary:							
● Service and parking brake		●	●	●	●	●	●
● Steering system		●	●	●	●	●	●
● Lighting system		●	●	●	●	●	●
Leakage check ( ):							
Check pipe and flexible lines, as well as screw connections of the following assemblies/components for tightness, leakage and chafings. Rectify if necessary:							
● Air intake line (air filter – engine)			●	●	●	●	●
● Engine lubrication (engine – filter)			●	●	●	●	●
● Fuel lines			●	●	●	●	●
● Cooling system (cooling water and hydraulic oil)			●	●	●	●	●
● Brake system			●	●	●	●	●
● Steering system (flexible lines and cylinder)			●	●	●	●	●
● Hydraulic system/telescopic unit (flexible lines and cylinder) [12]			●	●	●	●	●

1. Work to be carried out once only after the first 100 service hours. Must be carried out by an authorized workshop for warranty claims to be acknowledged
2. Work after the first 600 service hours (2nd Inspection) must be carried out by an authorized workshop for warranty claims to be acknowledged
3. Clean/replace the filter insert as indicated by the warning light in the instrument panel, however replace at least every 12 months or 1200 service hours. When working in an acidic environment, replace the filter every 300 service hours!
4. When using biodegradable oil: Drain the condensation water in the hydraulic oil tank every 600 service hours, in any case before the cold season
5. When using biodegradable oil: Take an oil sample every 600 service hours at the latest, oil sample set 0 00 440 00 14
6. Replace every 2 years
7. Depending on operation and dust conditions, it may be necessary to clean the cooler more frequently
8. Replace under all circumstances every year or every 1200 service hours
9. Every 2 years
10. Lubricate attachment as per manufacturer's instructions!
11. If in uninterrupted use
12. Replace flexible lines every 6 years (UVV, DIN 20066 T5)



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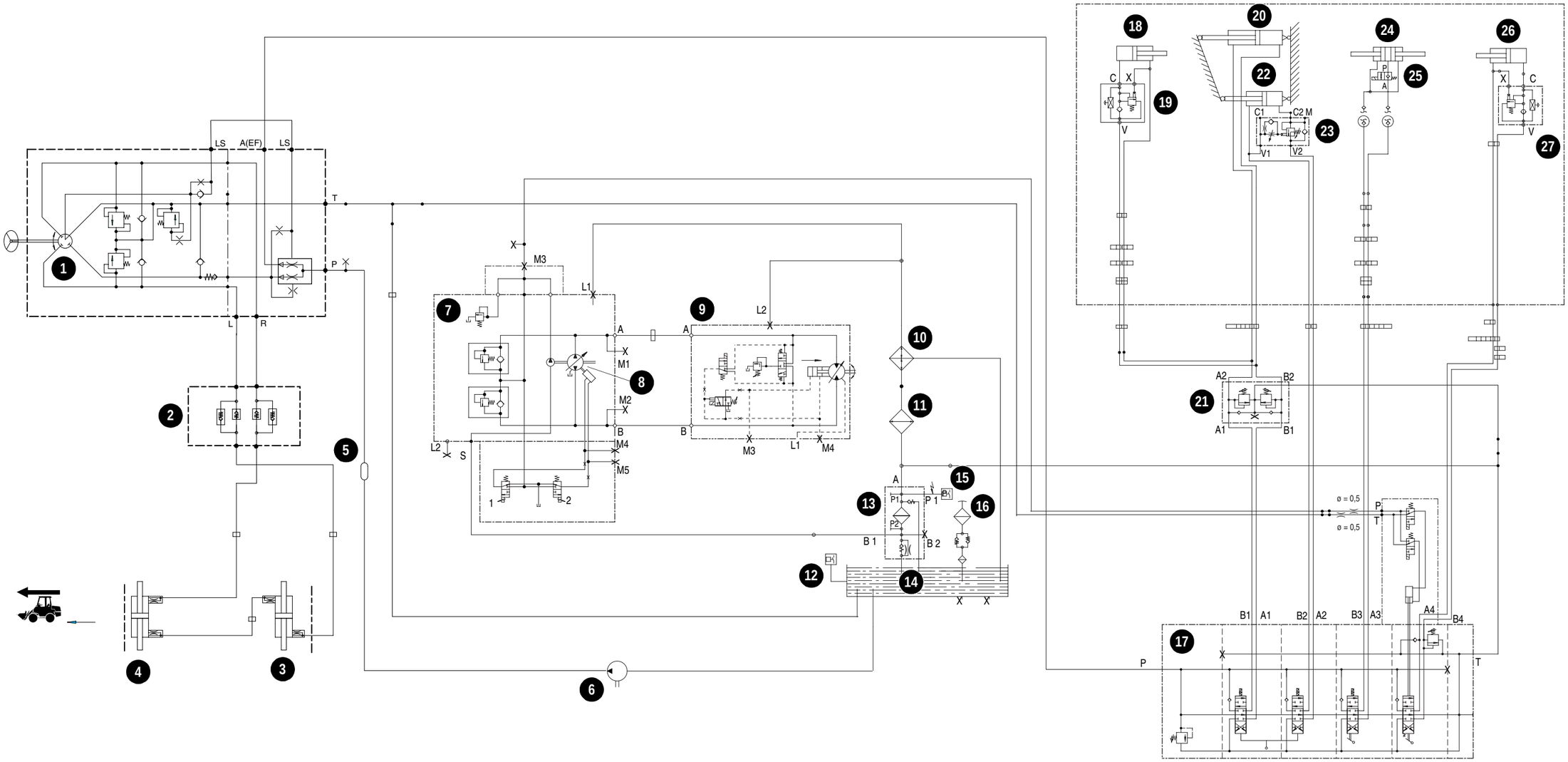
Explanation of symbols used in maintenance plan

Symbol	Description
	Before starting maintenance work, take note of the safety instructions in the operator's manual!
	Before starting maintenance work, take note of the Section "Maintenance" in the operator's manual!
	Carry out a functional check of the light system!
	Check tyres for damage, pressure and tread depth!
	Carry out a functional check of the steering, synchronise the steering!
	Carry out a functional check of the brake system!
	Check brake fluid level. Top up if necessary!
	Check hydraulic oil level. Top up if necessary!
	Check engine oil level. Top up if necessary!
	Check coolant level. Top up if necessary!
	Check cooler for engine and hydraulic oil for contamination. Clean if necessary!
	Clean dust valve on air filter housing!
	Check condition and initial tension of V-belt. Re-tighten or replace if necessary!
	Check the fuel/water separator. Drain water if necessary
	Leakage check: Check for tightness, leakage and chafing: pipes, flexible lines and screw connections. Rectify if necessary!
	Lubrication service: Lubricate the assemblies concerned!

Maintenance plan model 418T (maintenance label)

Legend for hydraulics diagram, model 418T ❙➔418T 0001

Ref. no.	Description
1	Hydrostatic steering V = 4.9 in^3 (80 cm^3) with initial stress p = 145 lb/in^2 (10 bar)
2	Non return valve block 2 x 145 lb/in^2 (10 bar) + 2 x 7.3 lb/in^2(0.5 bar)
3	Rear axle steering cylinder
4	Front axle steering cylinder
5	Muffler
6	Work hydraulics pump V = 1.4 in^3/rev (23 cm^3/rev), Q = 1.6 gal/min (66 l/min)
7	Drive variable displacement pump 5584 lb/in^2(385 bar)
8	Boost pressure pump V = 0.7 in^3/rev (11 cm^3/rev), Q = 6.6 gal/min (25 l/min)
9	Drive variable displacement motor V=3.7 in^3 (60 cm^3)
10	Oil temperature controller
11	Oil cooler 29 lb/in^2 (2.0 bar)
12	Temperature switch 212°F (100°C) +/-3°
13	Return suction filter (initial stress 7.3lb/in^2 (0.5 bar))
14	Hydraulic oil tank Hydraulic oil tank V_{total} = 15.9 gal (60 l), $V_{oil\ level}$ = 13.2 gal (50 l)
15	Pressure switch 29 lb/in^2 (2.0 bar)
16	Vent filter
17	4 fold control valve standard – Main pressure relief valve 3046 lb/in^2 (210 bar) – Secondary pressure relief valve: Push-out cylinder – bottom side 3481 lb/in^2 (240 bar)
18	Tilt cylinder
19	Hose burst valve for tilt cylinder
20	Compensating cylinder
21	Secondary pressure relief valve for tilt cylinder and compensating cylinder rod side 1740 lb/in^2 (120 bar) bottom side 3481 lb/in^2 (240 bar)
22	Lift cylinder
23	Hose burst valve for lift cylinder
24	Control cylinder for quickhitch facility
25	Solenoid valve – quickhitch lock
26	Push-out cylinder
27	Hose burst valve for push-out cylinder



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Hydraulics diagram model 418T

valid from serial no. **418T 0001**

0 26 001 03 25 (12/00)

Ref. no.	Description	Section	Loc.
B1	Fuel level sensor	2	-
B2	Horn	4	+
B3	Buzzer	3	S
B4	Engine speed transmitter	2	*
B5	Backup warning system (option)	5	*
B6	Safe load indicator sensor (option)	6	*
E1	Front parking light (left)	4	+
E2	Front parking light (right)	4	+
E3	High beam, low beam (left)	4	+
E4	High beam, low beam (right)	4	+
E5	Rear light (right)	5	+
E6	Rear light (left)	5	+
E7	Interior light with switch	5	+
E8	Rear working light (right)	5	*
E9	Front left working light (option)	5	*
E10	Front right working light (option)	5	*
E11	Instrument panel lights	3	S
E12	Cigarette lighter (with lighting)	3/4	S
F1 ... F22	Fuses		
F23	Main fuse (power supply)	1	-
F24	Fuse (preheating)	1	-
G1	Alternator with current regulator	1	-
G2	Battery	1	-
H1	Turn indicator (front right)	4	+
H2	Turn indicator (front left)	4	+
H3	Turn indicator (rear right)	5	+
H4	Turn indicator (rear left)	5	+
H5, H6	Brake light	5	+
H7	Rotating beacon (option)	5	*
H8	Warning Light – parking brake	3	S
H9	Warning Light – turn indicator	3	S
H10	Warning Light – high beam	3	S
H11	Not assigned		
H12	Warning Light – engine oil pressure	3	S
H13	Warning Light – hydraulic oil filter	3	S
H14	Warning Light – air filter	3	S
H15	Warning Light – coolant temperature	3	S
H16	Warning Light – hydraulic oil temperature	3	S
H17	Warning Light – alternator charge function	3	S
K1	Starting relay, cutoff solenoid	2	+
K2	Switching relay preheating	4	+
K3	Switching relay drive interlock	3	+
K4	Switching relay low beam	4	+
K5	Switching relay high beam	4	+
K6	Switching relay: retract telescopic unit (option)	6	*
K7	Switching relay: extend telescopic unit (option)	6	*
K8	Hazard light indicator	4	+

Ref. no.	Description	Section	Loc.
K9	Switching relay float position (option)	6	-
M1	Starter	2	*
M2	Front wiper motor (1 speed)	3	+
M3	Fan motor heating (2 speeds)	4	+
M4	Washer pump	4	+
M5	Rear wiper motor with switch	5	+
M6	Fan motor, air-suspension seat (option)	5	*
P1	Hour meter	3	S
P2	Fuel level indicator	3	S
P3	Safe load indicator (option)	6	*
R1..R4	Glow plugs	2	*
R5	Potentiometer (inching pedal)	2	+
R6	Resistor 1 kΩ, ¼ W	2	+
R7	Resistor 1 kΩ, ¼ W	2	+
S1	Preheating start switch	2	S
S2	Hazard warning light switch with warning light	4	S
S3	Switch – front wiper	3	S
S4	Switch – front socket (option)	4	*
S5	Switch – rotating beacon (option)	4	*
S6	Switch – heater fan	4	S
S7	Switch – working light (option)	5	*
S8	Switch – quickhitch lock (option)	6	*
S9	Switch – load stabilizer (option)	6	-
S10	Switch – low drive range	2	*
S11	Temperature switch – hydraulic oil	2	-
S12	Temperature switch – coolant	2	-
S13	Pressure switch – air filter	2	-
S14	Pressure switch – oil return filter	2	-
S15	Oil pressure switch – engine	2	-
S16	Multifunctional lever (on steering column, right)	4	+
S17	Switch – parking brake	5	+
S18	Brake light switch – service brake	5	+
S19	Drive switch – joystick (forward)	2	*
S20	Drive switch – joystick (reverse)	2	*
S21	Tip switch – extend telescopic unit (option)	2	-
S22	Tip switch – retract telescopic unit (option)	2	-
S23	Switch – float position and hose burst valve (option)	6	*
V1 ... V4	Blocking diodes	2	S
V5 ... V12	Blocking diodes	6	*
F13	Blocking diode	5	S
V14 ... V17	Blocking diodes (indicator)	3	S
F18	Blocking diode	6	-
X1	2 pole plug and socket connection	1	+
X2	17 pole plug and socket connection (engine) natural coloured	2	+
X3	17 pole plug and socket connection (front) black	3	+

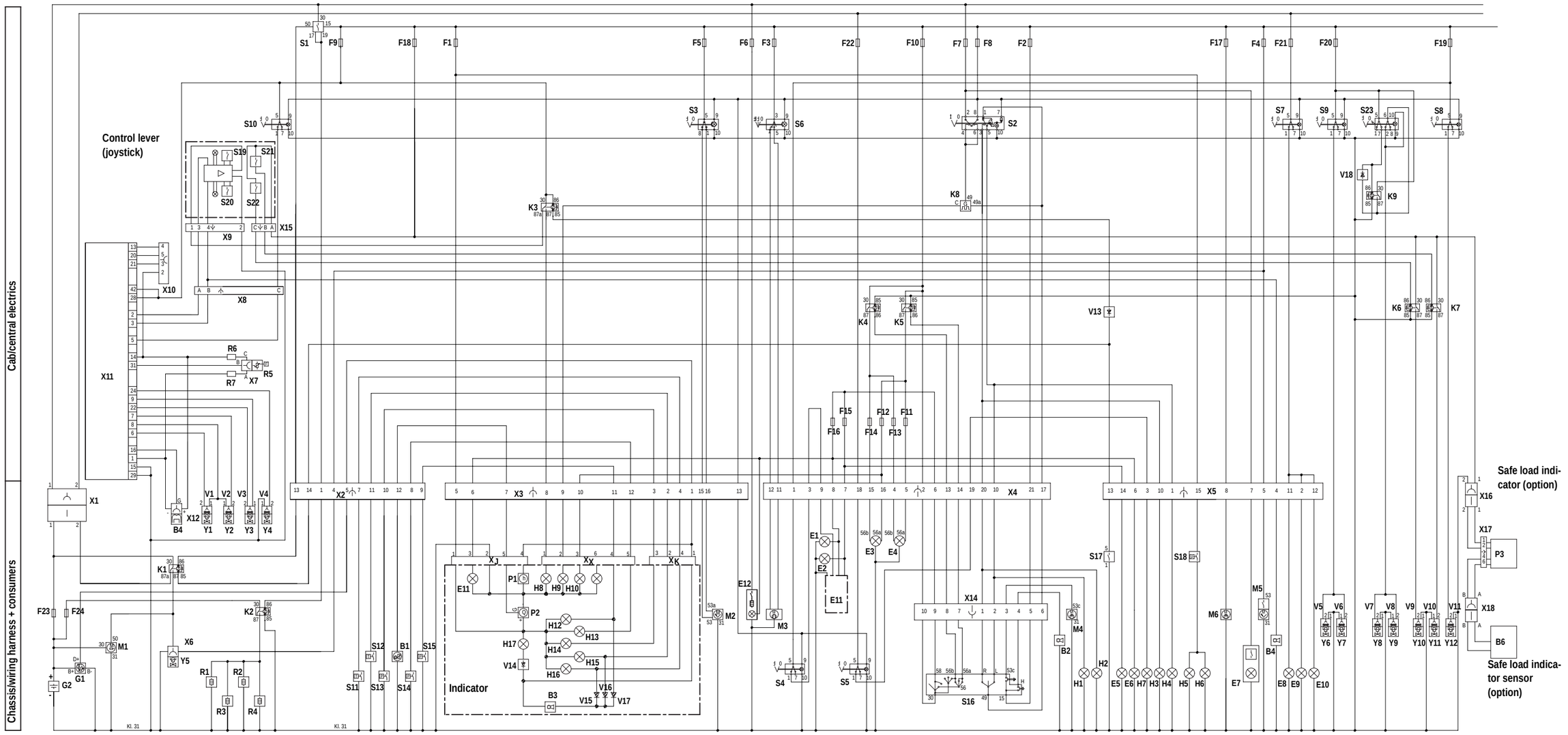
Ref. no.	Description	Section	Loc.
X4	21 pole plug and socket connection (front) natural coloured	4	+
X5	17 pole plug and socket connection (rear) green	5	+
X6	3 pole plug and socket connection (cutoff solenoid)	2	*
X7	3 pole plug and socket connection (inching pedal)	2	+
X8	3 pole plug and socket connection (Susmic central)	2	+
X9	4 pole plug and socket connection (joystick)	2	+
X10	3 pole plug and socket connection (diagnosis)	2	+
X11	42 pole plug and socket connection (Susmic)	2	+
X12	3 pole plug and socket connection (engine speed transmitter)	2	+
X13	Not assigned		
X14	3 pole plug and socket connection (telescopic unit option, joystick)	2	-
X16	2 pole plug and socket connection (red)	6	-
X17	6 pole plug and socket connection	6	-
X18	3 pole plug and socket connection	6	-
XJ	5 pole plug and socket connection (indicator)	3	+
XK	4 pole plug and socket connection (indicator)	3	+
XX	6 pole plug and socket connection (indicator)	3	+
Y1	Solenoid valve – reverse driving	2	*
Y2	Solenoid valve – forward driving	2	*
Y3	Solenoid valve – hydraulic motor (Vg max. connection)	2	*
Y4	Solenoid valve – brake pressure circuit	2	*
Y5	Solenoid valve – cutoff solenoid	2	*
Y6	Solenoid valve – load stabilizer (option)	6	-
Y7	Solenoid valve – load stabilizer (option)	6	-
Y8	Solenoid valve – hose burst valve (option)	6	-
Y9	Solenoid valve – hose burst valve (option)	6	-
Y10	Solenoid valve – retract telescopic unit (option)	6	-
Y11	Solenoid valve – extend telescopic unit (option)	6	-
Y12	Solenoid valve – quickhitch lock (option)	6	-

Fuse sizes

See *Fuse boxes in side console* on page 7-5 and *"Main fuses in engine compartment"* on page 7-6

Explanation of symbols (location in machine)	
+	Cab
S	Side console and indicator
-	Assigned to other assemblies
*	Cabling for option attachments (option)

1. Power supply	2. Starting and drive system, Susmic/engine wiring harness	3. 17 pole plug and socket connection (front wiring harness)	4. 21 pole plug and socket connection (front wiring harness)	5. 17 pole plug and socket connection(roof & rear wire harness	6. Not integrated in wiring harness consumers



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Electrical diagram 418T

valid from serial no. **418T 0001**

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Notes:

TORQUE SPECIFICATIONS

NOTE: *Use these torque values when tightening **GEHL** hardware (excluding: Locknuts and Self-tapping, Thread Forming and Sheet Metal Screws) unless specified otherwise.*

All torque values are in Lb-Ft except those marked with an * which are Lb-In
(For metric torque value Nm, multiply Lb-Ft value by 1.355 or Lb-In value by 0.113)

Unified National Thread	Grade 2		Grade 5		Grade 8	
	Dry	Lubed	Dry	Lubed	Dry	Lubed
8-32	19*	14*	30*	22*	41*	31*
8-36	20*	15*	31*	23*	43*	32*
10-24	27*	21*	43*	32*	60*	45*
10-32	31*	23*	49*	36*	68*	51*
1/4-20	66*	50*	9	75*	12	9
1/4-28	76*	56*	10	86*	14	10
5/16-18	11	9	17	13	25	18
5/16-24	12		19	14		20
3/8-16	20	15	30	23	45	35
3/8-24	23	17	35	25	50	
7/16-14	32	24	50	35	70	55
7/16-20	36	27	55	40	80	60
1/2-13	50	35	75	55	110	80
1/2-20	55	40	90	65	120	90
9/16-12	70	55	110	80	150	110
9/16-18	80	60	120	90	170	130
5/8-11	100	75	150	110	220	170
5/8-18	110	85	180	130	240	180
3/4-10	175	130	260	200	380	280
3/4-16	200	150	300	220	420	320
7/8-9	170	125	430	320	600	460
7/8-14	180	140	470	360	660	500
1-8	250	190	640	480	900	680
1-14	270	210	710	530	1000	740
Metric Course Thread	**Grade 8.8**		**Grade 10.9**		**Grade 12.9**	
	Dry	**Lubed**	**Dry**	**Lubed**	**Dry**	**Lubed**
M6-1	8	6	11	8	13.5	10
M8-1.25	19	14	27	20	32.5	24
M10-1.5	37.5	28	53	39	64	47
M12-1.75	65	48	91.5	67.5	111.5	82
M14-2	103.5	76.5	145.5	108	176.5	131
M16-2	158.5	117.5	223.5	165.5	271	200

⚠ WARNING ⚠

This Operator's Manual is provided for operator use.

DO NOT REMOVE FROM THIS MACHINE.

DO NOT start, operate or work on this machine until you have carefully read and thoroughly understand the contents of this manual.

Failure to follow safety, operating and maintenance instructions could result in serious injury to the operator or bystanders, poor operation, and costly breakdowns.

If you have any questions on proper operation, adjustment or maintenance of this machine, contact your dealer or the Gehl Company Service Department before starting or continuing operation.

GEHL®

Gehl Company 143 Water Street, P.O. Box 179, West Bend, WI 53095-0179 U.S.A.
(www.gehl.com)

909879/AP0902

Printed in U.S.A.