

# Operating Instructions

 **TEREX** | SCHAEFF

## Wheel Loader SKL 853

AUSGABE • EDITION

5.97

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SCHAEFF-TEREX GMBH&CO KG • D-74595 LANGENBURG

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*Spare Parts List no.*      6 463 622 015

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# 1 Introduction

## 1.1 General

You decided to buy a **Schaeff Wheel loader SKL 853**.

The confidence placed in this model will be rewarded by the efficient and economical performance of the machine.

These operating instructions contain all information necessary for the correct use of the machine.

Please read them carefully before putting the machine into operation and make sure that they are kept at hand at all times.

Should you need further explanations or should anything be unclear, please contact your dealer immediately.

Special equipment and attachments are not included in these operating instructions.

We reserve the right to make improvements on the machine within the scope of impending technical developments, without incurring any obligation to change these operating instructions.

**Please state the vehicle type and the machine identity number (1/1) when making enquiries or orders, and in all written correspondence.**

### **Note**

Any modifications of **Schaeff** products and their equipment using extras and work attachments which are not included in our product range require our written approval. If our approval is not sought, our warranty expires, as does our product liability for any resulting consequential damages.

### **Note**

The vehicle identity number of the machine is stamped on the identification plate located on the uppercarriage, on the front right-hand side.

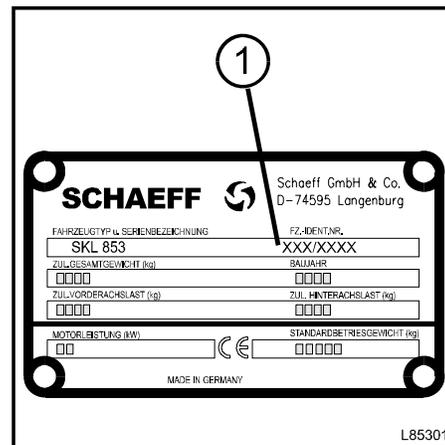


Fig. 1-Identification plate

## 1.2 Warranty and Maintenance

The warranty period covers 1,000 operating hours, not exceeding a maximum of twelve months, whichever comes first, beginning with the day the machine is handed over or put into operation.

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

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

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

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

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

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

### 1.3 Notes on using the instruction book References to pictures and items

The references to pictures and items contained in the text, such as "Figure 12/4" mean figure 12, item 4 (Bild = Figure).

The figures shown in this list partly contain additional equipment.

### Attention

This danger symbol is used when inexact compliance or non-compliance with operating instructions, specified work procedures, etc. may lead to injury or fatal accidents.

### Note

This symbol is employed when inexact compliance or non-compliance with operating instructions, specified work procedures, etc. may lead to damage to the machine. This symbol is also used for information which is of particular importance to the user of the machine.

### Pictograms

The following table explains the pictograms which may be attached to your machine.

 battery charge control	 pre-glow	 engine oil pressure	 engine oil temperature
 coolant temperature	 air filter	 heating ventilation	
 high beam control	 working flood light	 flasher left/right	 warning light system
 windshield wiper/washer system	 fuel	 horn	 parking brake
 floating position	 switch working hydraulics	 not locked	 locked
 travel forward - travel reverse	 slow	 fast	

PIKTOSKLneue

## **2 Safety and prevention of accidents**

### **2.1 Introductory remarks**

Before putting the earth-moving machine into operation, read these operating instructions carefully and strictly observe the indicated references for safe operation.

National safety regulations - e.g. the Accident Prevention Regulations, "Earth-Moving Machinery" (VBG 40) and "Vehicles" (VBG 12) in the Federal Republic of Germany - must also be complied with when operating the earth-moving machine.

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

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

### **2.2 Proper use**

The earth-moving machine with standard loading bucket equipment is intended solely for work which is suitable for the function of the machine and its work implements.

Such work involves loosening, taking up, transporting and dumping soil, rock or other materials as well as loading these materials on trucks, conveyor belts or other means of transport.

The assembly of special work implements such as clamshell grab, hydraulic hammer, etc. allows the machine to perform above mentioned work.

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

Compliance with the operating and maintenance instructions, the performance of maintenance work as specified and adherence to replacement intervals all form part of the concept of proper use.

## 2.3 General safety notes

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

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

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

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

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

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

Safety devices on earth-moving machines must not be deactivated or removed.

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

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

A check must be carried out to ensure that the first aid box is at hand and that its contents comply with regulations.

Personnel must be aware of the location and method of operation of the fire extinguishers on the earth-moving machine as well as on-site fire-warning and fire-fighting equipment.

Loose parts such as tools or other accessories must be secured to the earth-moving machine.

Open doors, windows, covers, flaps, etc. must be closed or secured so that they cannot slam shut.

Earth-moving machines may only be independently operated and serviced by persons who

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

All such persons must be of the legal minimum age.

They must be designated by the plant operator to operate or service the earth-moving machine.

Operating equipment may only be operated from the driver's seat.

The earth-moving machine may only be ascended and entered using the entrances and surfaces intended for this purpose.

It is the driver's responsibility to ensure that the operator's stand, entrances and other surfaces of the earth-moving machine which have to be stepped on are free of dirt, grease, oil, ice and snow.

## 2.4 Operation

## 2.5 Danger zone

- No one may enter the danger zone of earth-moving machines.
- The danger zone encompasses the area around the earth-moving machine in which persons may be injured by movements of the earth-moving machine during operation, its work implements and attachments, or by swinging out or falling loads, or by falling work equipment.
- The machine operator may only work the earth-moving machine when no one is in the danger zone.
- The machine operator must give a warning signal to persons who may be in danger.
- The machine operator shall stop work with the earth-moving machine if anyone remains in the danger zone despite the warning.
- To ensure no danger of crushing, a sufficient safety distance (min. 0.5 m) must be kept from solid objects, e.g. buildings, excavation slopes, scaffolding, other machines, etc.
- If the above safety distance cannot be maintained, the area between solid objects and the working zone of the earth-moving machine must be blocked off.
- If conditions are such that the machine operator's view of the driving and working zone is restricted, he must be guided or the driving and working zone must be marked by a solid barricade.

The transport of persons on the machine is forbidden.

## 2.7 Stability

- The earth-moving machine must be used, driven and operated in such a manner that its stability against overturning is ensured at all times.
- The machine operator must drive at speeds which are suitable for local conditions.
- The permitted payload of the earth-moving machine must not be exceeded.
- The earth-moving machine must remain at a sufficient distance from the edges of quarries, pits, mounds and slopes to ensure there is no risk of falling.
- Earth-moving machines must be secured so that they cannot roll or slip when in the vicinity of excavations, shafts, ditches, pits and slopes.

## 2.6 Transport of persons

## 2.8 Travel operation

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

The windows must be clean and free of ice.

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

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

Before driving downhill, the appropriate gear for the terrain must be selected and the gear lever must not be moved during downhill travel (normal or crawler gear).

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

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

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

Earth-moving machines may only be driven on the open road when the machine and the driver both have the appropriate licence as required by the national traffic laws of the country in question.

According to the Regulations Authorizing the Use of Vehicles for Road Traffic (StVZO) in Germany, the following equipment must be kept with the machine and provided by the plant operator:

- **warning triangle**
- **hazard lights**
- **first-aid box**

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

## 2.9 Operation

Daily before commencing work and after every change of work attachments, the machine operator must check the correct fastening of the work attachments as well as the correct locking of the quick-mount hitch. Work attachments are to be carefully moved at low height. During this check no one must be in the danger zone of earth-moving machines.

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

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

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

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

## 2.10 Guides

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

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

search ditches must be dug - manually, if need be.

If underground power lines are encountered unexpectedly or they or their protective covers are damaged, the machine operator must discontinue work immediately and notify the supervisor.

## **2.11 Danger of falling objects**

Earth-moving machines may only be used where there is a danger of falling objects when the operator's stand has an overhead guard (FOPS). A front guard must be employed if there is a risk of materials breaking into the cab.

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

Demolition work may only be performed by earth-moving machines where there is no danger to persons. See regulations book „Demolition work“ (ZH 1/614) published by the Tiefbau-Berufsgenossenschaft (the employer's liability insurance association).

## **2.12 Working in the vicinity of underground power lines**

Before commencing excavating work using earth-moving machines, it must be determined whether any underground power lines are present in the intended working zone which may present a danger to persons.

If underground power lines are present, their exact position and course must be determined in consultation with the proprietor or operator of the lines, and the necessary safety precautions decided and implemented.

The course of power lines in the work area must be clearly marked, under supervision, before commencing any excavation work. If the position of lines cannot be determined,

### 2.13 Working in the vicinity of overhead power lines

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

The safety distances specified below must be complied with:

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

In the observation of safety distances, all working movements of earth-moving machines, e.g. positions of the work equipment and the dimensions of attached loads must be taken into consideration. Uneven ground which would cause the earth-moving machine to be inclined and thus nearer to overhead lines must also be taken into account.

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

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

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

### 2.14 Operation in closed rooms

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

### 2.15 Work stoppages

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

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

The driver may not leave the earth-moving machine when the work equipment has not been lowered to the ground or secured.

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

Before leaving the operator stand, the driver must bring all operating equipment into home position, switch off the working hydraulics and apply the brakes.

If the driver is leaving the earth-moving machine unattended, he must first turn off the drive motors and ensure that they cannot be started up by unauthorized persons (e.g. removing ignition keys).

### 2.16 Change of work attachments, maintenance, repair

Earth-moving machines may only be converted, maintained or serviced under the guidance of a suitable person designated by the plant operator and following the manufacturer's operating instructions.

After every change of work attachments, the driver must convince himself that the quick-mount hitch is correctly fastened and locked.

Work on e.g.

- braking,
- steering,
- hydraulic and
- electric systems

of the machine may only be carried out by expert personnel specially trained in these areas.

Stability must be ensured during all type of work on the machine at all times.

The work equipment must be secured against movement by lowering it to the ground or equivalent measures, e.g. cylinder supports, trestles. With the engine running, the unprotected articulation range of articulated loaders must not be entered.

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

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

Earth-moving machines which are raised with work equipment must be stabilized by a supporting structure immediately after lifting. Work under machines which are only supported by their hydraulics is forbidden.

The engine/motor must be turned off prior to all maintenance and repair work. These requirements may only be ignored in the case of maintenance or repair work which cannot be performed without the engine/motor running.

When performing maintenance and repair work on the hydraulic system, the latter must be relieved of pressure. With the engine

turned off, lower the work equipment to the ground and actuate all hydraulic control levers until there is no pressure in the hydraulic system.

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

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

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

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

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

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

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

Overhead guards (FOPS) must not be welded or drilled in any way which could impair their sturdiness.

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

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

Swallowing lubricants, or long and repeated skin contact, can be hazardous to health. When used properly, there is no particular danger to health. The safety specification sheets from the mineral companies must be observed.

Only the hoses specified by the manufacturer may be used.

Hydraulic hoses must be routed and assembled by expert personnel.

In the vicinity of fuel or batteries, smoking and naked flames are prohibited.

## 2.17 Recovery, loading, transportation

Earth-moving machines may only be loaded onto recovery vehicles when adequate towing vehicles are used.

The tow fixing points specified by the manufacturer must be employed.

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

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

When transporting the earth-moving machine on trucks, flatbed trailers, or by rail, it must be sufficiently secured with chocks and by attachment to the lashing points.

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

## 2.18 Monitoring and inspections

The machine must be submitted to a general inspection according to the existing UVV-regulations (Accident Prevention Regulations). This inspection must be carried out by an expert (e.g. machine engineer or machine foreman):

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

The results of this inspection have to be recorded in writing and this record has to be kept until the next inspection takes place.

Prior to every work shift, the machine operator must check the earth-moving machine according to inspection plan.

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

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

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

Prior to operations, the machine operator must check the function of the safety devices.

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

In the event of shortcomings which jeopardize the operating safety of the earth-moving machine, it must not be used until these have been eliminated.

## 2.19 Fire protection



The fire extinguisher must be kept in the cab. The fire extinguisher symbol must be attached.

## 2.20 Emergency exit

The right-hand cab door acts as an emergency exit.

## 2.21 Other dangers

### *Failure of the hydraulic system*

If the standstill of the diesel engine, a defect of the hydraulic pump or the loss of hydraulic oil leads to the failure of the hydraulic system, only the **EMERGENCY functions “lowering the work equipment”** are possible.

### 3. Technical data

#### 3.1 Views

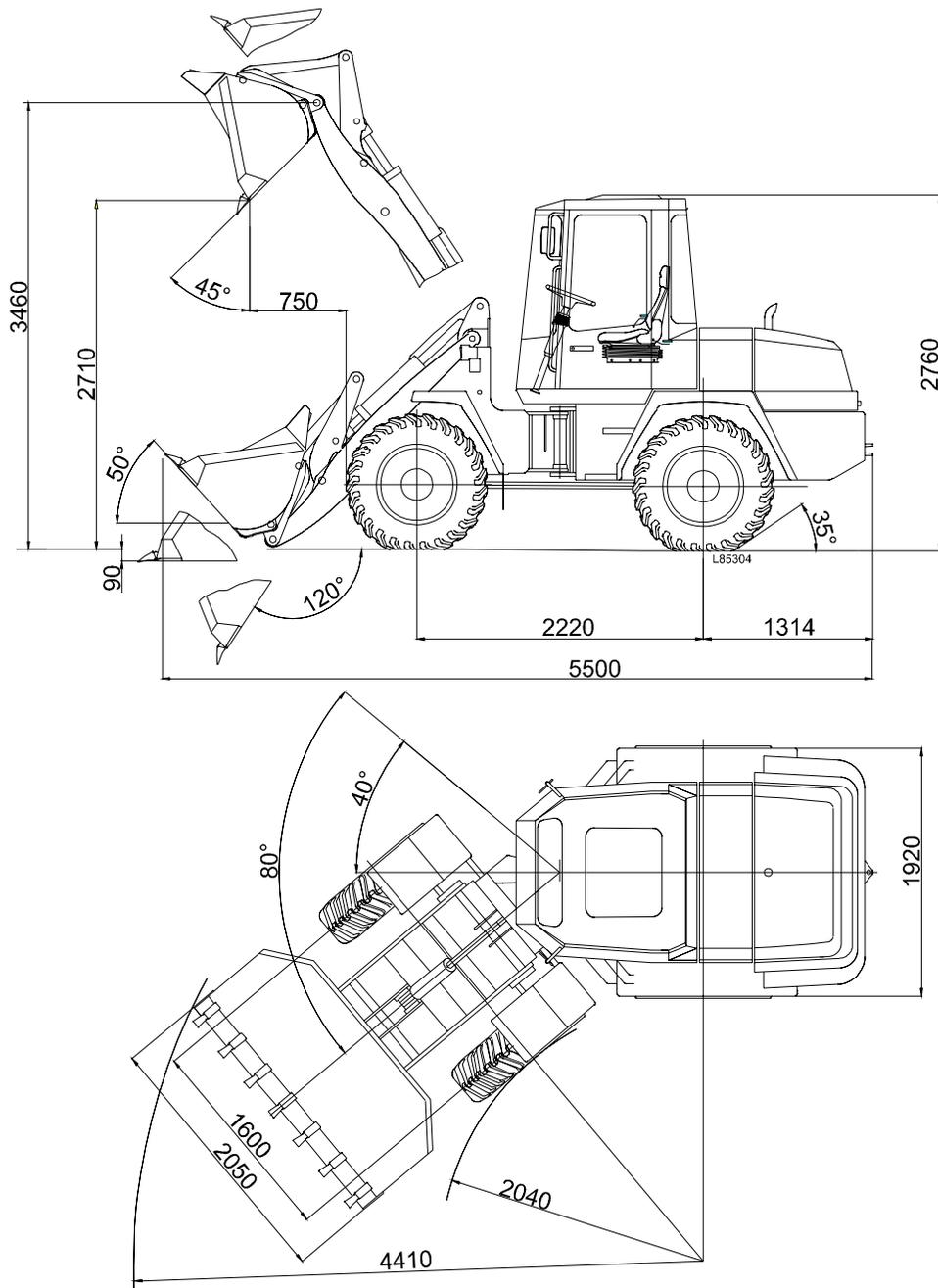


Fig. 4 - Dimensioned drawing with general-purpose bucket  
Tyres 14.5-20 MPT

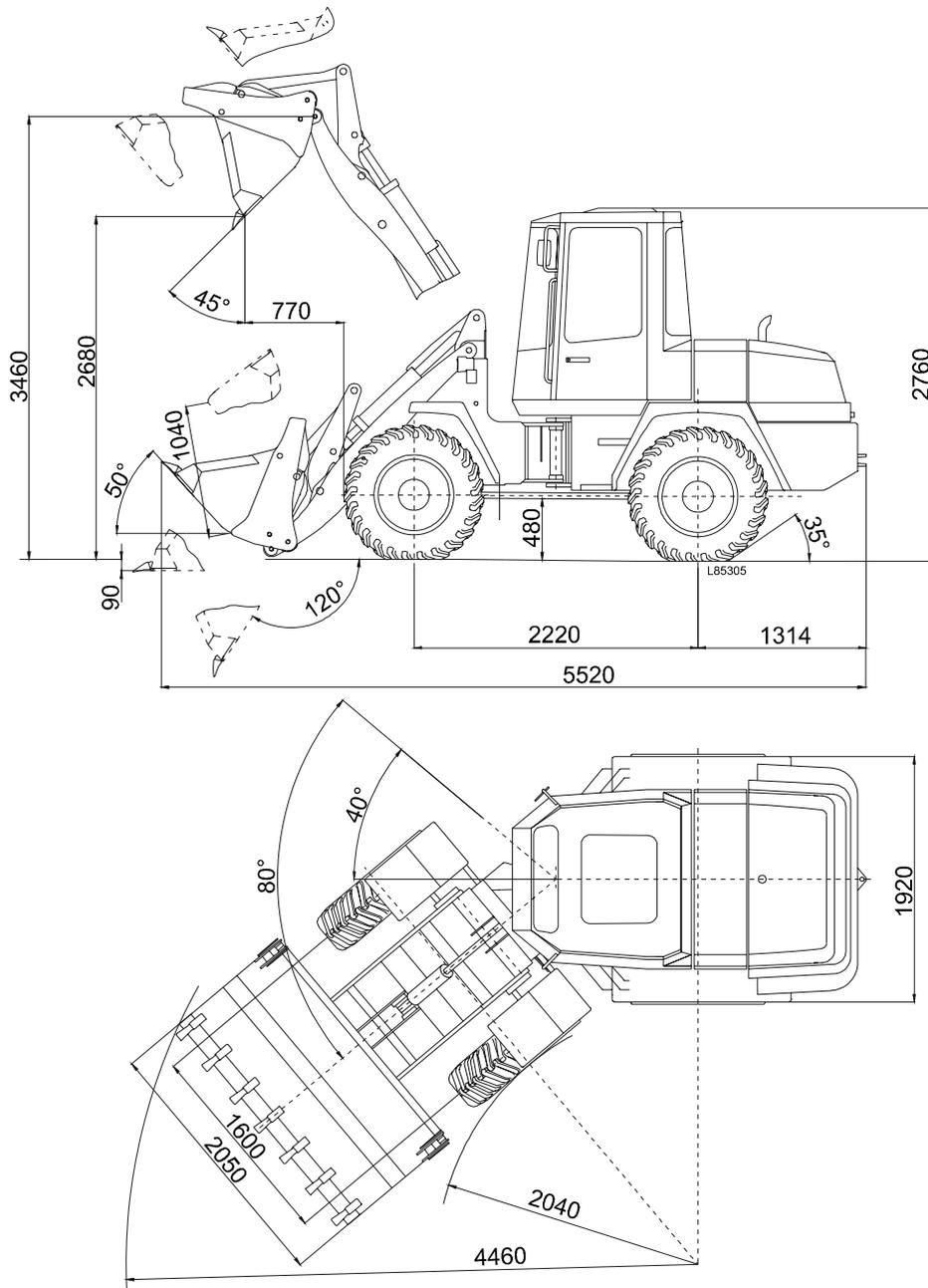


Fig. 5 - Dimensioned drawing with multi-purpose bucket  
Tyres 14.5-20 MPT

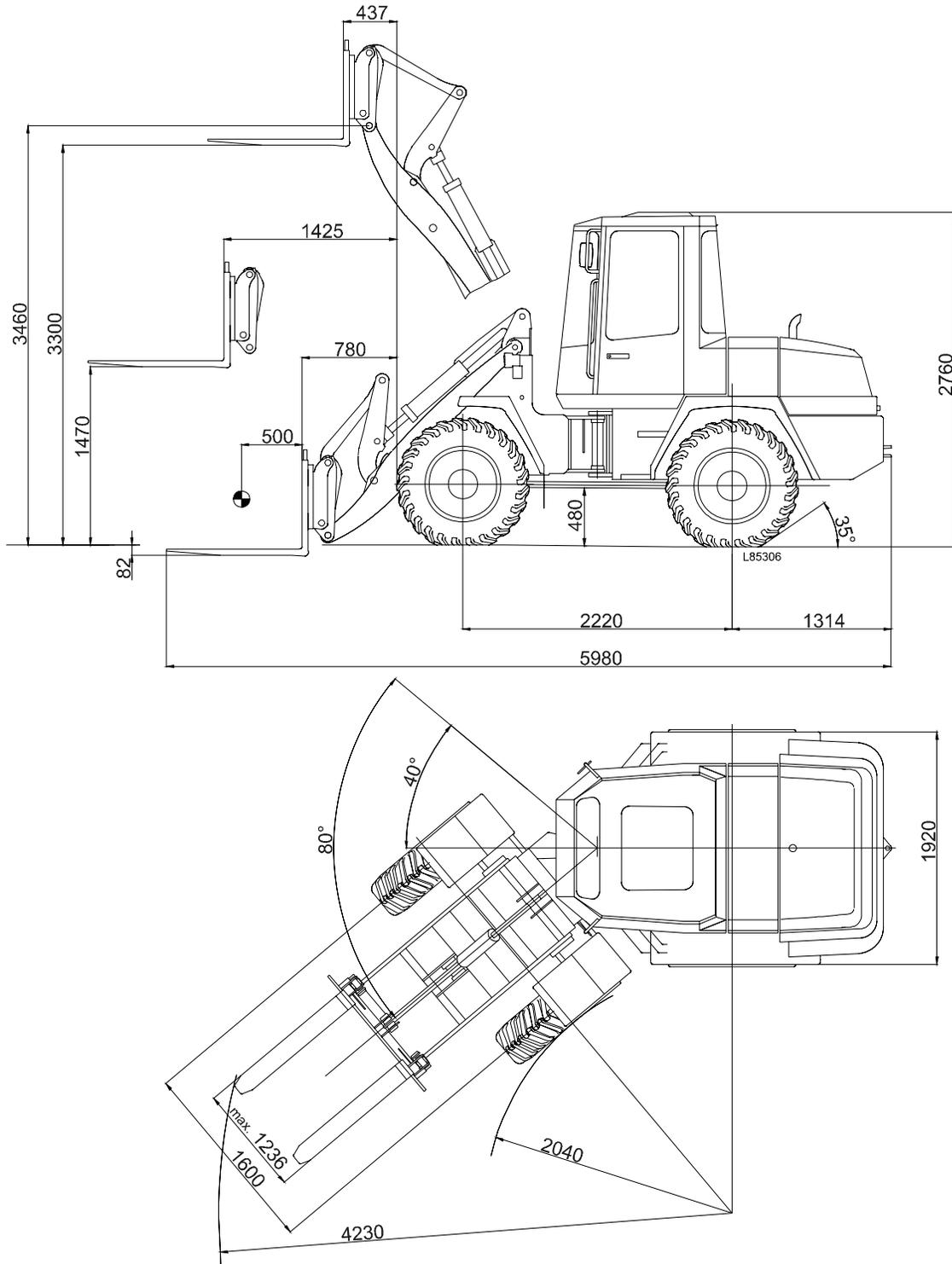


Fig. 6 - Dimensioned drawing with fork lift attachment  
Tyres 14.5-20 MPT

### 3.2 Diesel engine

Make: Perkins  
 Type: 1004-4  
 Design: 4 cylinders in line  
 Four-stroke diesel engine with direct injection  
 Displacement: 4,000 cm<sup>3</sup>  
 Power to DIN 70020: 59.0 kW at n=2,200 rpm  
 Torque: max. 279 Nm / 1,400 rpm  
 Specific fuel consumption: 215 g/kWh  
 Cooling: Water/ antifreeze for all-year operation  
 Heating: Fresh air with heat exchanger connected to coolant

### 3.3 Electrical system

Operating voltage: 12 V  
 Battery: 12 V /105 Ah / 450 A  
 Generator: 12 V 55 A threephase current  
 Starter: 2.8 kW  
 Starting aid: Glow plugs  
 Lighting system: to German Regulations Authorizing the Use of Vehicles for Road Traffic (StVZO) with halogen H4 floodlights

### 3.4 Travel drive

Travel drive: Variable displacement pump flange-mounted directly onto diesel engine, two-stage variable-capacity motor with power shift on the rear axle reduction gear.  
 The **high-speed version** has a standstill gear on the rear axle.  
 Suction filter in the form of a tank insert filter.  
 Driving speed: Forwards - reverse

	Standard version	High-speed version	
		Gear range I	Gear range II
Gear range "Work"	0 - 6.5	0 - 6.0	0 - 12
Gear range "Road"	0 - 20	0 - 17	0 - 36

Power transmission: Hydrostatic drive with perfected driving automatics. Automatic adjustment of propulsive force and speed. Stepless regulation of driving speed forwards and reverse. Four-wheel drive via the cardan shaft connection.

Operating pressure for driving: max. 440 bar

### 3.5 Brakes

Service brake:	Hydraulically actuated drum brake on front axle, combined with hydrostatic brake of travel drive. The brake acts on all four wheels via four-wheel drive.
Parking brake:	Mechanically actuated drum brake on front axle.
Auxiliary brake:	The hydrostatic travel drive in the closed circuit acts as an additional non-wearing auxiliary brake.

### 3.6 Hydraulic system

Hydraulic pump:	Gear pump on the power take-off of the diesel engine. Pump capacity: max. 73 l/min. Working pressure, steering: 175 bar Working pressure, loading: 250 bar
Priority valve:	Priority supply of hydraulic oil to steering by means of <b>load sensing</b> system, which ensures that all the available oil can be provided to the steering if necessary. In this way, rapid steering movements are possible even at low revs.
Steering:	Hydraulically actuated, proportional articulated steering by means of steering control unit and two double-acting steering cylinders.
Total steering angle:	80°
Loading system:	Double-acting work cylinders, one lift cylinder and one patented tilt cylinder with double end rod. Control valve with three control circuits. Electro/hydraulically operated float position for "Lower" function. Single, four-way lever (joystick) with integrated direction-of-travel switch, float position switch and a switch for an additional control circuit. Combined return suction filter in the form of a tank insert filter.
Hydraulic oil radiator:	Thermostatically controlled.

### 3.7 Axles

**Front axle:** Fixed planetary final drive axle with limited slip-type differential and integrated drum brake.

**Rear axle: (standard)** Oscillating planetary final drive axle with limited slip-type differential and integrated reduction gear.

**Rear axle: (high-speed version)** Oscillating planetary final drive axle with limited slip-type differential and integrated 2-stage reduction gear.

Angle of oscillation  $\pm 12^\circ$

### 3.8 Tyres

Tyre size	Type	Profile	Tyre pressure front	Tyre pressure rear
14.5-20	10 PR MPT	E 58	3.0	2.0
16/70-20	10 PR MPT	E 91-2	3.0	1.8
365/80	R 20 EM	SPT 9	3.7	3.0
375/75	R 20 XM	27 TL	3.0	2.0
405/70	R 20 EM	SPT 9	3.2	3.0
425/75	R 20 XM	27 TL	3.2	2.3

Special tyres available on request!



#### Note

The tyre pressure refers to standard equipment.

During fork lift operations, the tyre pressure of the front wheels must be increased by at least 0.5 bar.

### 3.9 Lubricants

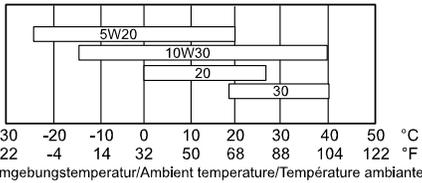
#### 3.9.1 Filling quantities:

Fuel tank:	approx.	112.0	ltr.	Diesel fuel
Engine with filter:	approx.	8.5	ltr.	Engine oil (change quantity)
Hydraulic oil, tank and system:	approx.	80.0	ltr.	Hydraulic oil
Hydraulic oil tank:	approx.	61.0	ltr.	Hydraulic oil (change quantity)
Service brake:	approx.	0.25	ltr.	ATF-oil
Front axle centre housing:	approx.	8.0	ltr.	Gear oil
Rear axle centre housing with gear:	approx.	9.0	ltr.	Gear oil
Wheel hubs, front/ rear axle:	each approx.	0.6	ltr.	Gear oil
Coolant:	approx.	17.5	ltr.	Water with anti-corrosion agent and antifreeze

All values stated are approximate.

The level marking is always the decisive factor.

### 3.9.2 Lubricant specifications

	Bi*	
Engine	EOxxxxA	<p>Lubricants must conform to test standard API CD/SE.</p> <p>Recommended SAE oil viscosities</p>  <p>The chart shows the recommended temperature ranges for four SAE oil grades: 5W20, 10W30, 20, and 30. The x-axis represents temperature in both Celsius (°C) and Fahrenheit (°F). 5W20 is recommended for temperatures down to -30°C (-22°F) up to 40°C (104°F). 10W30 is recommended from -20°C (-4°F) to 40°C (104°F). 20 is recommended from 0°C (32°F) to 40°C (104°F). 30 is recommended from 10°C (50°F) to 40°C (104°F).</p> <p>-30 -20 -10 0 10 20 30 40 50 °C -22 -4 14 32 50 68 88 104 122 °F Umgebungstemperatur/Ambient temperature/Température ambiante</p>
Hydraulic system	HYD1040	<p><b>Mineral hydraulic oils</b> The limit values for hydraulic oils which can be used for <b>Schaeff</b> construction machines and attachments are approx. 12 mm<sup>2</sup>/s (cSt) at 100°C and approx. 1500mm<sup>2</sup>/s (cSt) at -10°C. See also hydraulic oil recommendation chart for <b>Schaeff</b> construction machines and attachments.</p> <p><b>Biodegradable hydraulic oils</b> As an alternative to mineral oils, we recommend biodegradable hydraulic oils of a synthetic ester base. The same viscosity specifications apply as for mineral oils.</p> <p><b>! Note</b> When changing from mineral to biodegradable oils, the tank and hydraulic system must be completely drained, cleaned and flushed. For further details before changing oils, please consult your <b>Schaeff</b> dealer.</p>
Travel gear	GO90LS	Gear oil MIL-L-2105 B, and API-GL 5, SAE 85 W 90 LS or SAE 90 LS
Grease nipples	MPG-A	Multi-purpose grease to DIN 51825 - K2G - 40
Coolant	SP-C	Antifreeze with anti-corrosion agent and clean water
<p>*BI = Regulation lubricants code designation of the Main Association of the German Building Industry e.V.</p>		



### 3.14 Equipment overview

#### 3.14.1 Loading bucket

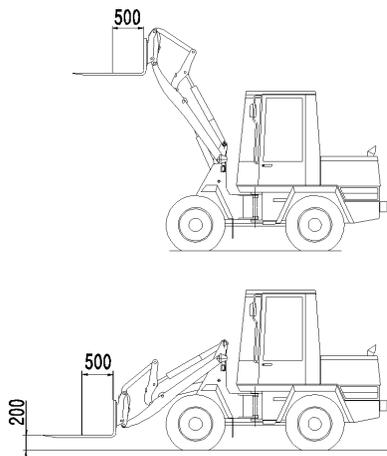
	Capacity, heaped m <sup>3</sup>	Width mm	Max. density (g) per t/m <sup>3</sup>
General-purpose bucket	1.1	2,050	1.8
Earth bucket	1.2	2,050	1.6
Multi-purpose bucket	1.0	2,050	1.6
Light-material bucket	1.35	2,050	1.2
Light-material bucket	1.55	2,200	0.8
Side-dump bucket	0.7	2,050	1.8
High-tip bucket	1.0	2,050	1.2

### 3.15 Fork lift attachment

- Fork-arm connection to ISO/FEM Class 3 Form B DIN 15 173 or ISO 2328

Width of fork carrier: 1,240 mm  
 Fork length: 1,120 mm  
 Max. stacking height: 3,300 mm

- The stated carrying capacity is based on the machine travelling over level ground and with a lowered load, with a stability factor of 1.25 or 80% of the tipping load to DIN 24094 and ISO 8313.
- When operating the machine on uneven ground and with lowered load, the carrying capacity is 1.67.
- The carrying capacities apply for the described equipment level and a full fuel tank.



Carrying capacity	Tyres 14.5-20MPT 10PR
<b>Total lifting and steering range</b>	2,400 kg
<b>with additional weights</b>	2,600 kg *
<b>Transport position</b>	3,100 kg *

\* When screw-on rear axle weights or rear tyres with water

filling are used.



#### Note

During fork lift operations, the tyre pressure of the front wheels must be increased by at least 0.5 bar.

### 3.16 Optional accessories

- Pressurized cab
- Air conditioning
- High-speed version
- Quick-mount hitch, hydraulically actuated
- Independent diesel heater with timer
- Diverse electrical accessories such as working floodlights, rotating beacon, radio, etc.
- Back-up alarm system
- Snow blade
- Sweeper
- Load hook for attaching to fork arms
- Outlet for hydraulic hand hammer
- Diesel exhaust cleaner
- Catalytic converter
- Engine version for RME-fuel
- Air-cushioned driver's seat
- Orthopaedic driver's seat
- Electric tank refilling pump
- Fire extinguisher
- Crawling speed version
- Immobilizer
- Rear axle weights

- Further optional equipment available on request -



#### **Note**

Any modifications of **Schaeff** products and their equipment using extras and work attachments which are not included in our product range require our written approval. If our approval is not sought, our warranty expires, as does our product liability for any resulting consequential damages.

## 4 Operation

### 4.1 First commissioning

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

This chapter deals with all functions.

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

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

Each time before putting the machine into operation, the inspections according to section 7.5 must be carried out.

## 4.2 Operating and display elements

The following list includes non-standard equipment!

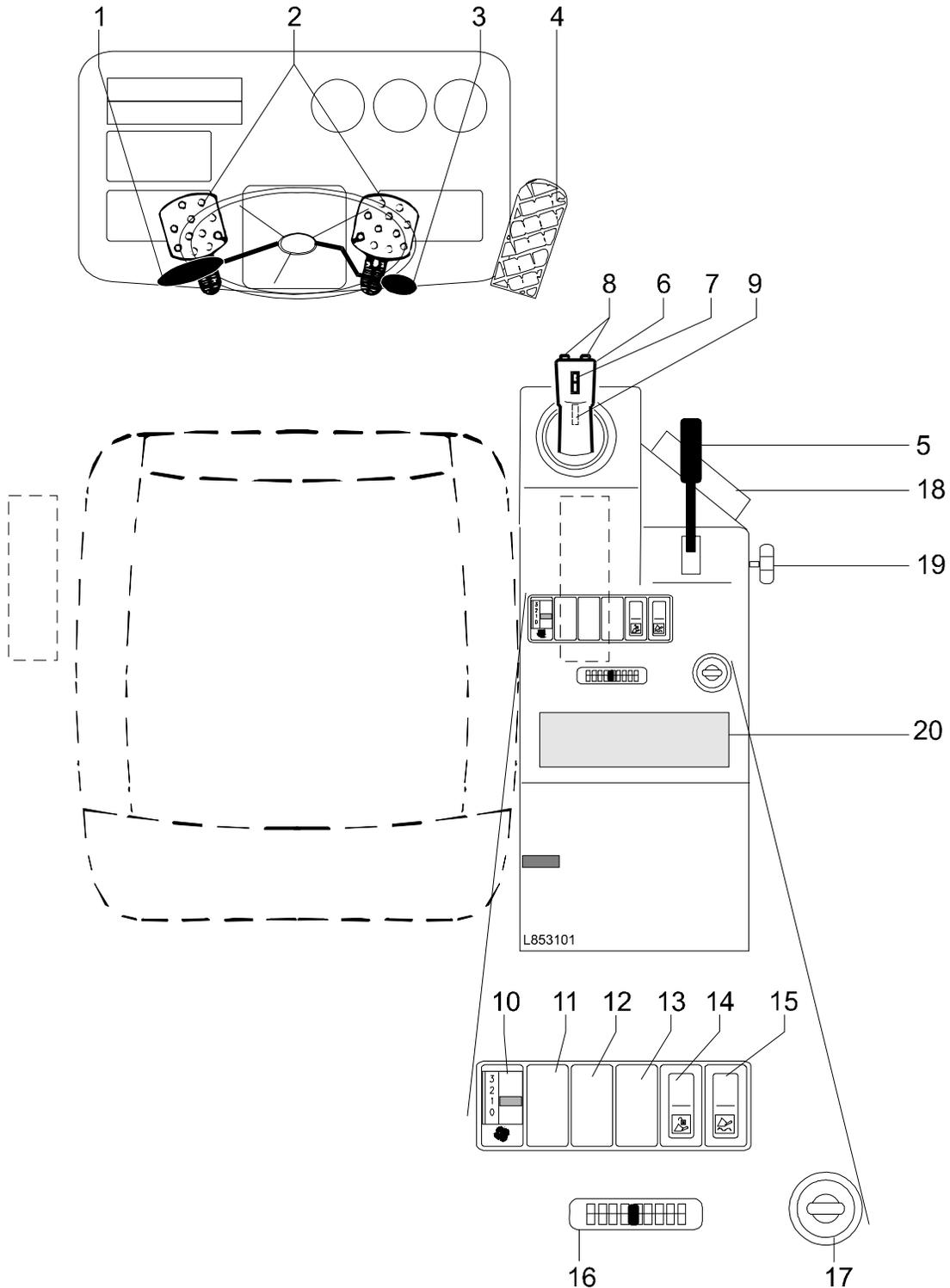


Fig. 10.1-Actuation

**Description fig. 10.1**

- 1 Direction indicator - signal horn - lower/ upper beam switch (steering column switch)
- 2 Double brake inching pedal
- 3 Steering wheel - Tilt adjustment
- 4 Accelerator pedal
- 5 Parking brake
- 6 Actuating lever for loading equipment
- 7 Direction-of-travel selector switch (without function when working hydraulics are switched off)
- 8 Actuation - Additional control circuit
- 9 Actuation of impulse mode - Float position
- 10 Fan switch
- 11 not assigned \*
- 12 not assigned \*
- 13 not assigned \*
- 14 Cut-off switch for actuation of additional control circuit (Pos. 8)
- 15 Selection switch for float position - OFF/Impulse-/Continuous operation mode
- 16 Slider control - Heating
- 17 Pre-heat/ starter switch
- 18 Fuse and relay box
- 19 Shift lever for fan- Fresh air/ recirculating air
- 20 Radio

\*e.g. for accessories such as vibration absorption, bucket re-positioning, etc.

# Operating and display elements

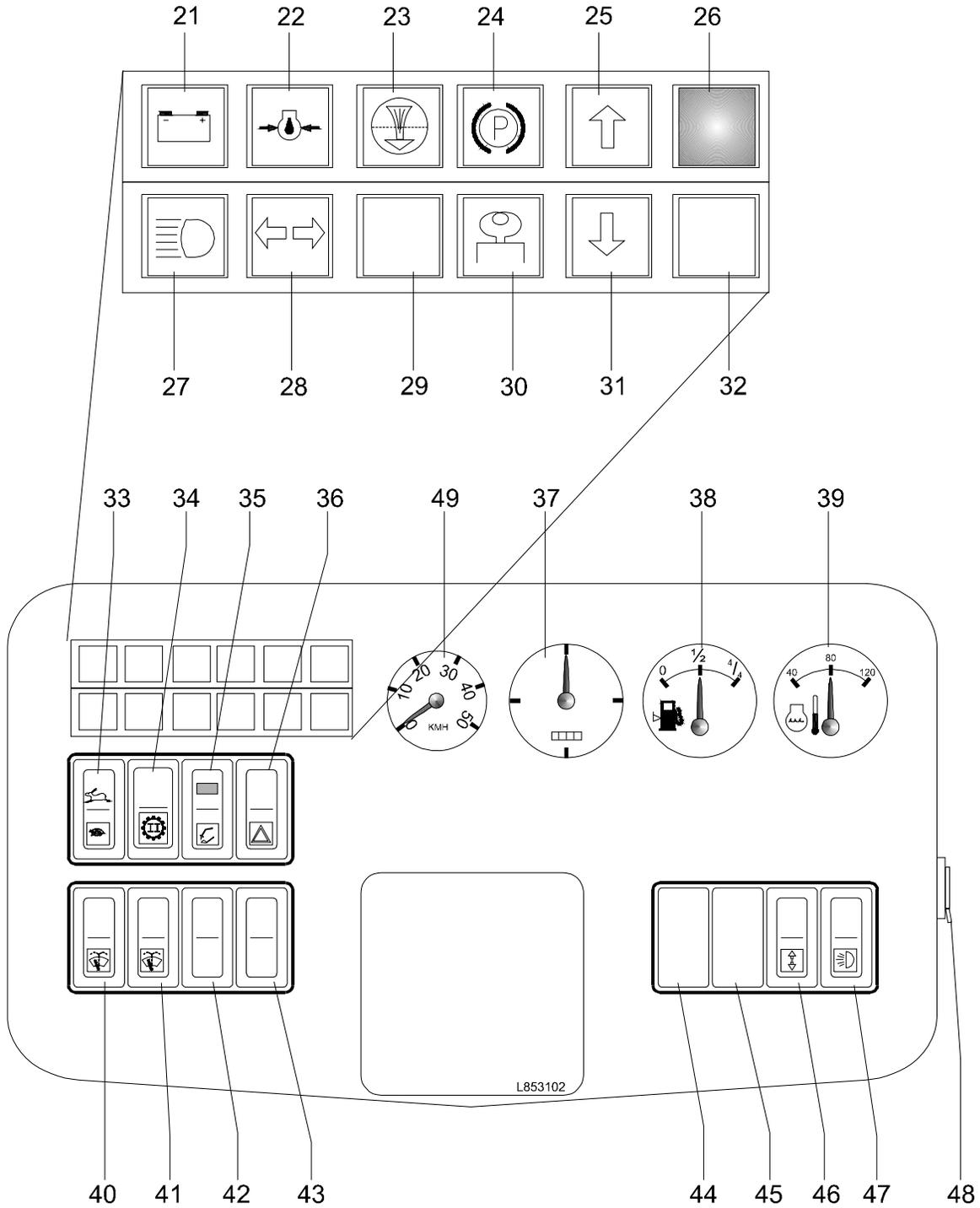


Fig. 10.2-Instrument panel

**Description fig. 10.2**

- 21 Battery charge indicator
- 22 Engine oil pressure indicator
- 23 Air filter clogging indicator
- 24 Parking brake indicator lamp
- 25 Travel forwards
- 26 Indicator lamp - shift gear (only high-speed version)

**! Note**

When the **shift gear indicator lamp** lights up, the shift gear is in an intermediate position. **The machine is not ready to drive!** This can be remedied by brief steering movements in such a manner that the shift gear is engaged.

- 27 Upper beam
- 28 Direction indicator
- 29 not assigned \*
- 30 Pre-heat indicator
- 31 Travel in reverse
- 32 not assigned \*
- 33 Travel range switch - fast/ slow
- 34 Change-over switch for high-speed gear

**! Note**

Only press the button when machine is at standstill!

- 35 Multi-function switch with locking function for work equipment cut-off and setting of direction-of-travel selector switch from pos. 07 to pos. 46

**! Note**

Only press when machine is at standstill!

- 36 Hazard warning switch
- 37 Operating hour meter
- 38 Fuel gauge
- 39 Coolant temperature indicator
- 40 Switch for windscreen wiper, front, wash/ wipe function
- 41 Switch for windscreen wiper, rear, wash/ wipe function
- 42 not assigned \*
- 43 not assigned \*
- 44 not assigned \*
- 45 not assigned \*
- 46 Direction-of-travel selection - Function only when working hydraulics are switched off
- 47 Light switch
- 48 Socket
- 49 Speedometer (only high-speed version)

\* e.g. for accessories such as rotating beacon, water pump for sweeper, additional floodlights, etc.

## 4.3 Engine

### 4.3.1 Starting the engine

#### Note

Every time the machine is put into operation the inspections acc. to section 7.5 must first be carried out.

#### Attention

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

- All shift levers must be put into neutral position.
- Parking brake (10/5) applied, direction-of-travel selector (10/7; 10/46) set to "O".
- Insert ignition key in pre-heat/ starter switch (10/17).
- Turn clockwise to "1", the indicator lamps (10/21; 10/22) light up.

#### Normal start/hot start

- Press accelerator pedal (10/4) completely down for normal start and to the quarter-open position for hot start.
- Turn the pre-heat/ starter switch to position "3". As soon as the engine is running, turn the key back to pos. "1" and decrease the revs to bottom-end idle speed.
- The indicator lamps should go out.

#### Cold start with flame glow plugs

- Turn the ignition key to position "2" (pre-heating setting - indicator lamp 10/30 lights up) and hold in that position for approx. 15 seconds.
- Press the accelerator pedal to full-throttle position and turn the ignition key further to pos. "3" to actuate the starter.
- Once the engine is running, turn the ignition key back to position "1". Lower the revs to bottom-end idle speed.
- If the engine has not started after approx. 15 seconds, turn the ignition key to pos. "1" or "0", and pause for at least 10 seconds before trying again. Repeat the start-up procedure.

#### Note

Do not drive the engine at full throttle straight away. Drive with restraint until the operating temperature of the engine has been reached.

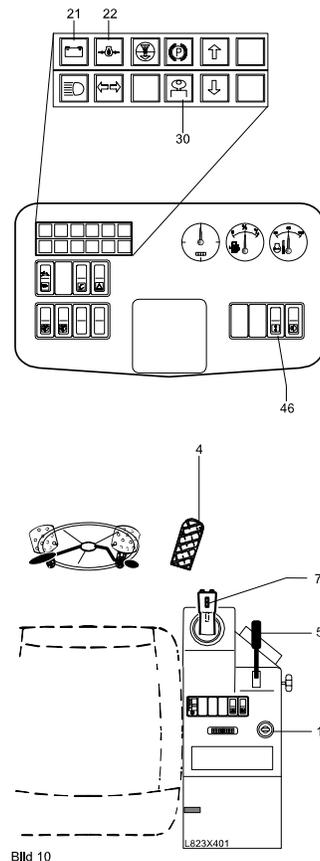


Fig. 10-Actuation

### 4.3.2 Monitoring during operation

- If the battery charge indicator lamp (10/21) or engine oil pressure lamp (10/22) light up, switch off the engine immediately and determine the cause, or call for service personnel.
- If the permitted coolant temperature (10/39) is exceeded, stop work, open the engine cover and keep the engine running at idle speed to allow it to cool down.
- Once the engine has cooled down, turn it off and determine the cause of overheating, or call for service personnel.



#### Note

If the engine and the machine are put into operation **without** prior remedy of the defect, severe damage to the engine may result!

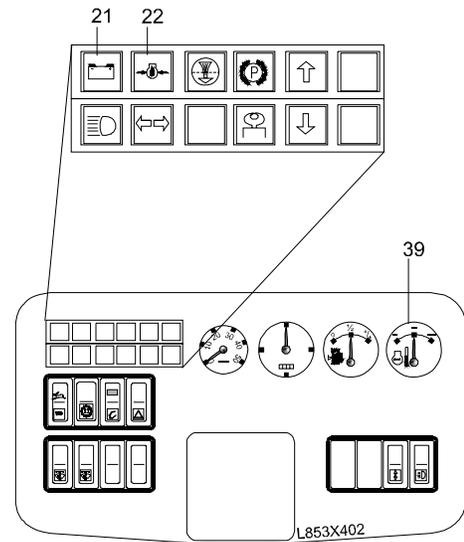


Fig. 10-Actuation

### 4.3.3 Switching off the engine



#### Note

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

- Turn the ignition key to "0".
- The engine stops automatically.

## 4.4 Operator's seat/ Tilt adjustment of steering wheel

### Operator's seat

- The luxury seat is spring-mounted with oil-pressure operated shock absorbers.
- The seat meets international quality and safety standards acc. to ISO 7096 Class 3 and ISO 6683 (fig. 11).

1. Horizontal adjustment
2. Weight adjustment
3. Seat back adjustment
4. Vertical adjustment

#### Raising seat:

Raise seat until it clicks audibly into place.

#### Lowering seat:

Raise seat as far as the stop; it then sinks to the lowest position.

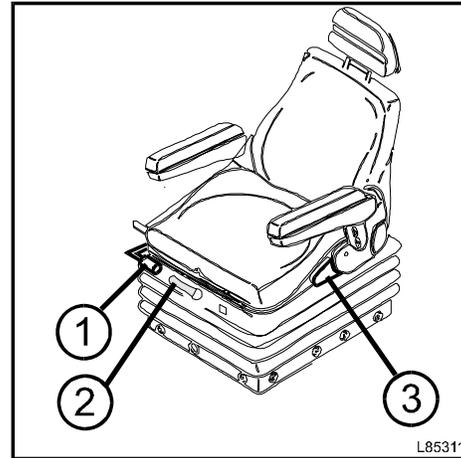
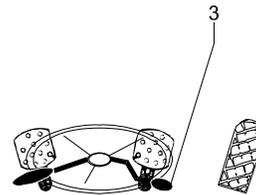


Fig. 11-Operator's seat

### Tilt adjustment of steering wheel

- Press lever (10/3)
- Adjust steering column.
- Release lever.



## 4.5 Heating / Ventilation

### 4.5.1 Heating

- The heater, which is connected to the coolant circuit, is adjusted with the slider control (10/16).
- The fan is operated using the switch (10/10). It can be operated with fresh air and re-circulating air.
- Open aspirating holes (10/19) for re-circulating air mode.

### 4.5.2 Ventilation

- In ventilation mode the slider control for the heater (10/16) remains in the "cold" position.
- The ventilation is operated by pressing the switch (10/10).
- The air is distributed and aimed as desired by adjusting the air vents.

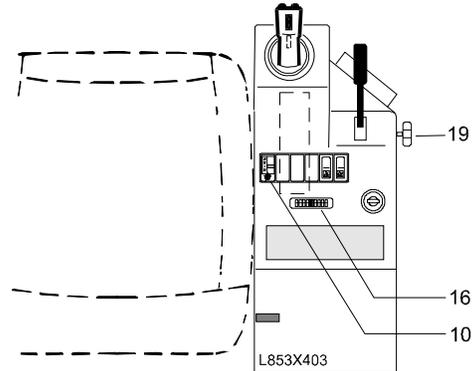


Fig. 10-Actuation

## 4.6 Light switch

The loader's lighting is switched on and off using the light switch (10/47).

- Setting 0** Light off
  - Setting 1** Parking light
  - Setting 2** Headlights (lower/ upper beam)
- Switch from one to another by lifting the steering column switch (10/1).  
Blue indicator lamp 10/27 lights up.

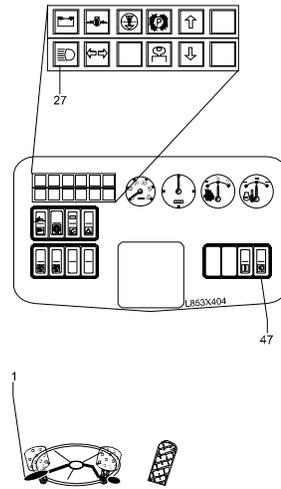


Fig. 10-Actuation

## 4.7 Filling the tyres with water

- When the loader is used with a fork lift attachment, the rear wheels may be filled with a water/antifreeze mixture to increase the lifting capacity.
- Prepare the mixture in an appropriately sized container. Allow it to cool and stir until there are no more lumps.



### Attention

**Always pour magnesium chloride into the water, not the other way round!**

Do not allow the solution to come into contact with eyes, skin or clothing - **caustic substance!**

Recommendation when filled to 75% with antifreeze protection to -20 °C.			
Values per wheel:			
Type of tyre	Magnesium chloride approx. (kg)	Water (ltr.)	Increase in weight due to antifreeze filling in kg approx.
14.5-20 10 PR	57	74	131
16/70-20 10 PR	68	87	155
365/80	54	98	152
375/75	51	85	136
405/70 R20	69	117	186
425/75 R 20	71	118	189



### Note

For antifreeze protection to -30°C:  
25% more magnesium chloride and 10% less water.

## 4.8 Driving, steering and braking

### 4.8.1 Driving

#### **Note**

When driving on public roads, the wheel loader, as a self-propelled work machine, is subject to legal regulations (in the Federal Republic of Germany, the StVZO and StVO).

#### **Attention**

The vehicle has a direction-of-travel-selection switch on the instrument panel and another such switch on the actuating lever for the working hydraulics. When driving on roads the direction-of-travel-selection switch (10/46) on the instrument panel is active due to the deactivation of the actuating lever via the multi-function switch (10/35). Before operating the actuating lever care must be taken to ensure that both direction-of-travel-selection switches are set in the same direction. **The multi-function switch can only be pressed when the machine is at a standstill** in order to avoid unintentional braking or changes in the travel direction.

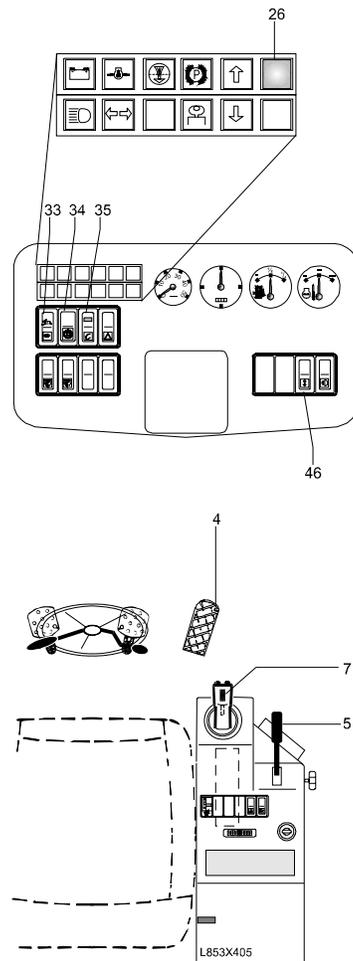


Fig. 10-Actuation

## Driving off

- Direction-of-travel selector rocker switch in joystick (10/7) and on instrument panel (10/46) set to “O”- neutral.
- Start engine.
- Raise lift frame up to the “Drive” height mark (12/1).
- Select **gear range “I” or “II”** only in high-speed version (10/34).

### **!** Note

Pay attention to indicator lamp!

- Select travel range “fast” or “slow” (10/33) as required.
- Release parking brake (10/5).
- Set the desired travel direction with the direction-of-travel selector (10/7 and 10/46).
- Press the accelerator pedal (10/4). The automatic clutch means that the machine only drives off once a certain engine speed is reached.
- The driving speed is regulated by means of the accelerator pedal. Driving speed is directly dependent upon engine speed.
- The direction of travel may be changed quickly by means of the selector lever.

## Coming to a halt

- The travel speed is reduced by releasing the accelerator pedal. The hydrostatic drive then acts as a non-wearing auxiliary brake.
- See also section 4.8.3, “brakes”.

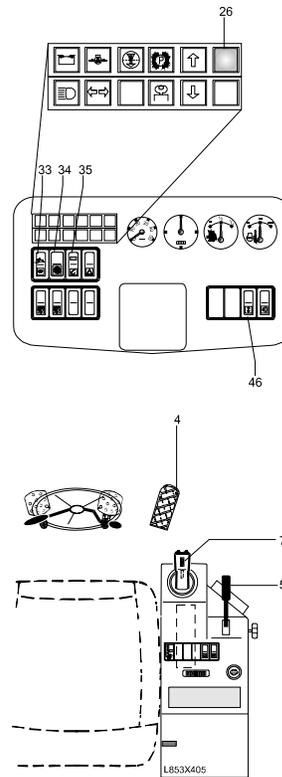


Fig. 10-Actuation

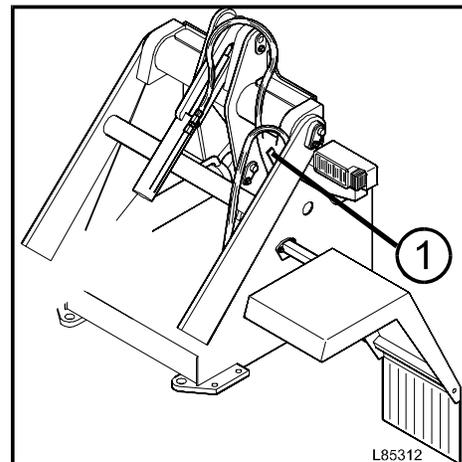


Fig. 12-Height mark

## 4.8.2 Steering

- The wheel loader has hydraulically operated articulated steering, which is actuated by a steering control unit.

### **!** Note

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

## 4.8.3 Braking

### Service brake and auxiliary brake

- To bring the machine to a halt, release the accelerator pedal. The hydrostatic drive then acts as an auxiliary brake.
- Press the brake/ inching pedal (10/2) as required.

### Parking brake

- Only apply the parking brake (10/5) when the machine is stationary.

### **!** Note

Applying the parking brake (10/5) simultaneously switches off the travel drive.

### Brake/ inching mechanism

- The machine is equipped with a brake/ inching mechanism which alters the relationship between the driving speed and the engine speed.
- When the brake/ inching pedal (10/2) is actuated, the driving speed is reduced - irrespective of engine speed - until the machine comes to a stop.
- This permits sensitive driving at maximum engine speed, e.g. when loading a truck, where fast working cycles are required.

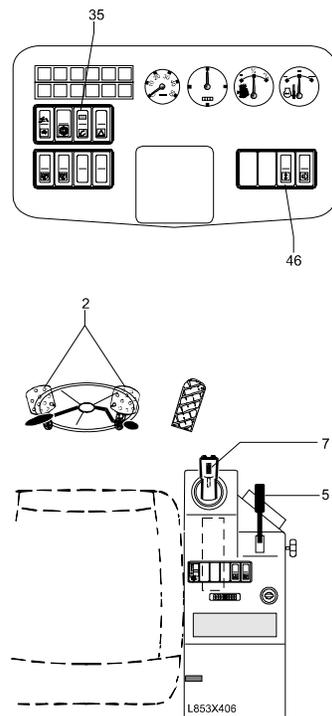


Fig. 10-Actuation

#### 4.8.4 Driving on roads

Prior to driving on open roads observe the following points:

- Empty the bucket and tip completely inward.
- Attach the protective device on the front bucket edge.
- Secure the side-dump bucket with pins.
- Completely retract the high-tip bucket.
- Fold the fork arms of the fork lift attachment upwards, lock and secure against lateral shifting.
- Raise the lift arm to height mark (12/1) in such a manner that sufficient ground clearance is secured.
- Switch off the working hydraulics (10/35).



#### Note

Only press when machine is stationary!

- Check the function of direction indicators, hazard warning lights, horn, lower beam and upper beam.
- Close cab doors.

#### 4.8.5 Parking the machine

- Set direction-of-travel rocker switch (10/7 and 10/46) to "0".
- Lower the work equipment to the ground.
- Switch off working hydraulics (10/35).
- Apply the parking brake (10/5).
- Switch off the engine and remove ignition key.
- Lock the cab after finishing work to keep **unauthorized persons** from getting in.



#### Note

If necessary, secure the machine with chocks so that it cannot roll away.

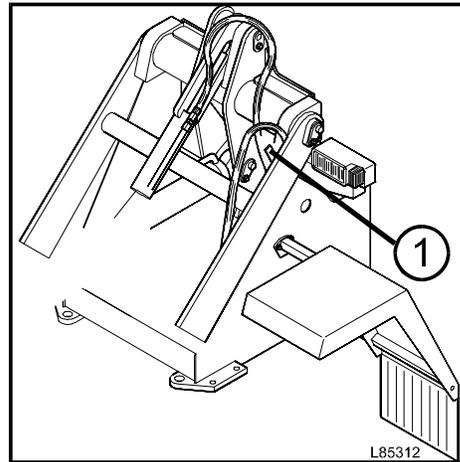


Fig. 12-Height mark

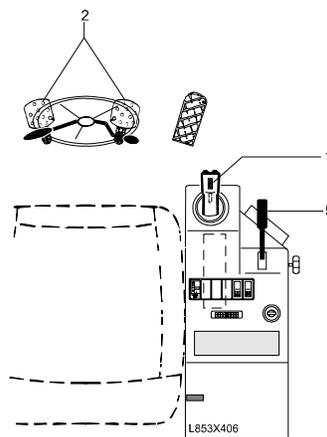
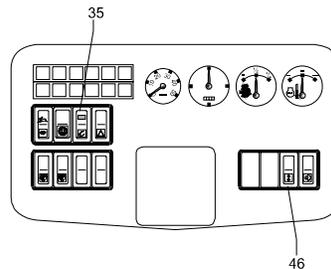


Fig. 10-Actuation

## 5. Loading operation

### 5.1 General

#### **!** Note

Every day before commencing work, and after each change of equipment, a check must be carried out to ensure that the work attachment is correctly fastened, or the quick-mount hitch is properly locked. The bucket must be moved carefully at a low height.

- Before commencing loading work, memorize the lever controls well.
- During loading work, driving and work movements should flow in smooth succession.
- Drive slowly when familiarizing yourself with the controls.

### 5.2 Loader operation

#### Actuation - Loading bucket

- With actuating lever (10/6)

#### Actuation - Additional control circuit

- Switch on additional control circuit (10/14) (e.g. multi-purpose bucket).
- Actuation with right-hand and left-hand push-button switch (10/8).

#### **!** Note

The additional control circuit must always be switched off if no additional equipment is actuated (e.g. opening / closing multi-purpose bucket).

- Other attachments, e.g. a hydraulically actuated quick-mount hitch, a side-dump bucket, etc., may also be connected to this additional control circuit.

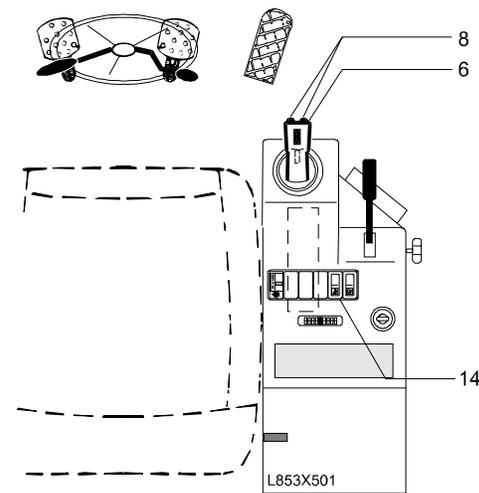
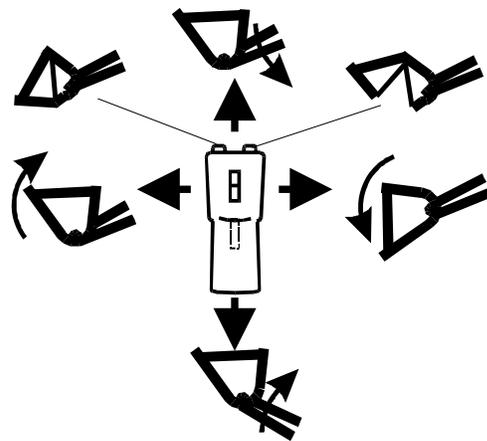


Fig. 10-Actuation

## Actuation - Float position

### Note

The float position must always be switched off unless actuated. Set switch (10/15) to “0”.

### Impulse mode

- Press switch (10/15) for float position to step “1”.
- Press switch (10/9).

### Continuous mode

- Lower the loading bucket to the ground and set switch (10/15) to “2”.

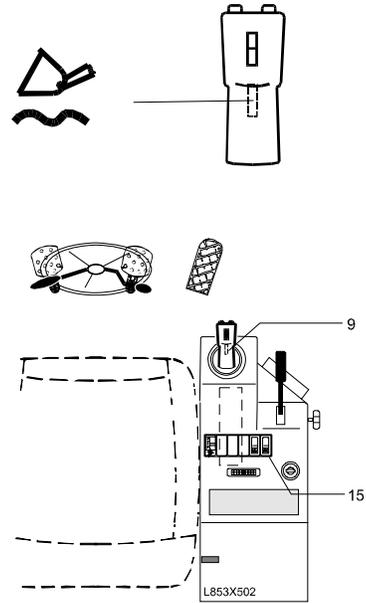


Fig. 10-Actuation

## 5.3 Changing work attachments

### 5.3.1 General

In order to achieve maximum utilization of the machine for a variety of applications, a great number of work attachments are available.

The machine can be equipped with a quick-mount hitch, to shorten the time it takes to change attachments.

When mounting a multi-purpose bucket, front sweeper, etc., an additional control circuit is required.

### Attention

When attachments have been removed, they must be secured against overturning to avoid possible injury to persons.

### 5.3.2 Assembly of work attachments

#### Note

The bearings of the lift frame, the attachment and the quick-mount hitch must be free from dirt.

#### Procedure for changing directly mounted work attachments

#### Note

In the event of a hydraulically actuated attachment, first of all the hydraulic connection must be disconnected.

- Rest the attachment on the ground so that it cannot overturn.
- Remove the pin of the tip lever and the pin of the lift frame.
- Move the lift frame out of the attachment and insert a new one.

#### Procedure for changing work attachments with mechanical quick-mount hitch

#### Note

In the event of a hydraulically actuated attachment, first of all the hydraulic connection must be disconnected.

- For changing, rest the attachment on the ground so that it cannot overturn, and release using the control rod (13/1).
- The control rod is kept in the driver's cab.

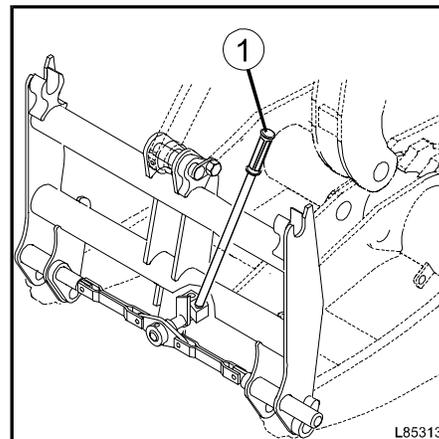


Fig. 13-Mechanical quick-mount hitch

## Procedure for changing work attachments with hydraulic quick-mount hitch

- Lower the work attachment to the ground so that it cannot overturn.
- Switch off the diesel engine.
- Switch on the ignition.
- Operate the push-button switches (10/8) for pressure relief. In the case of a hydraulically actuated work attachment, the hydraulic connections on both manifold blocks must be disconnected.
- Ball valve (14) must be set to “Unlocking of quick-mount hitch”.
- Start the diesel engine.
- Unlock quick-mount hitch (10/8) and move out of the work attachment.
- Take up new work attachment and lock by pressing the push-button switch (10/8).

### **!** Note

Visual check to ensure that the quick-mount hitch is correctly locked.

- Switch off diesel engine.
- Operate push-button switches (10/8) for pressure relief.
- Ball valve (14) must be set to “Quick-mount hitch locked”.
- Connect hydraulically actuated work attachment to connection of additional control circuit.

### **!** Attention

If no hydraulically actuated attachment is connected, the additional control circuit (10/14) must be switched off.

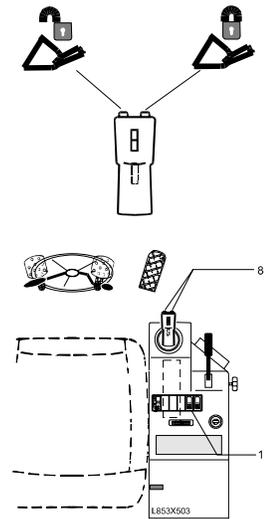


Fig. 10-Actuation

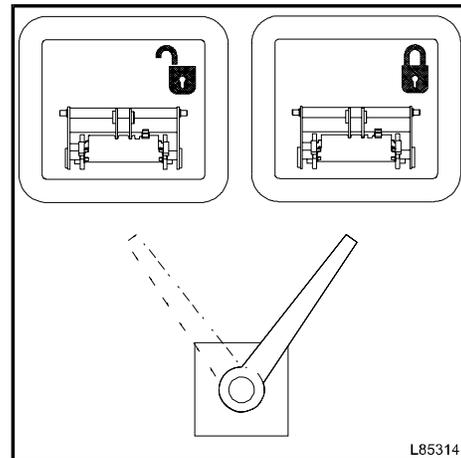


Fig. 14-Locking the quick-mount hitch

## 5.4 Notes on how to work with the machine

### 5.4.1 Loading

- During transport, the loading bucket, either filled or empty, must be kept as close to the ground as possible.
- If possible, avoid long transport distances!



#### Note

For loading, lower the bucket and position the cutting edge parallel to the ground. Reduce speed by inching as required.

Move bucket in material to be loaded.

As soon as the bucket is filling, slightly raise the lift frame and retract the bucket.

For emptying, raise the bucket to such a degree that it is above the location where to unload the material and then start to unload.

### 5.4.2 Loading earth top layers, grading

- Lower the lift frame and descend the cutting edge with flat angle of inclination in the ground. Do not cut in too deeply to ensure jolt-free removal of earth.
- During this work the depth may only be graded by retracting and dumping of the loading bucket.

### 5.4.3 Excavation

- In order to excavate a construction pit, attempt to excavate layers which are as homogeneous as possible.
- Plan the excavation work in such a manner that the wheel loader can drive out of the construction pit with full bucket in forwards direction.
- Attempt to keep the exit of the construction pit as flat as possible.

## 6 Recovery and transport of the machine

### 6.1 Recovery of the machine

Towing of the wheel loader must be restricted to clearing a junction or a road, in order to prevent damage to the hydrostatic drive. If possible, let the diesel engine run at idle speed during towing.

#### Towing lugs:

Front: Right and left on the axle plates  
Rear: On the towing fixture



#### Note

Max. load capacity of towing lugs approx. 4,200 kg.

- Whenever the loader has to be towed, for whatever reason, the "Drive" oil circuit must be opened so that the hydrostatic drive no longer acts as an auxiliary brake.
- At the two high-pressure relief valves with bypass (16/1), unscrew the spring sleeve (17/1) by approx. 3 revolutions and counter with nut (17/2).
- After towing, tighten the sleeve (17/1) once more.
- Re-tighten the nut (17/2).



#### Note

Absolute cleanliness is essential when working on the hydraulic system. Always secure the machine with chocks and relieve the hydraulic system of pressure before carrying out maintenance and repair work.

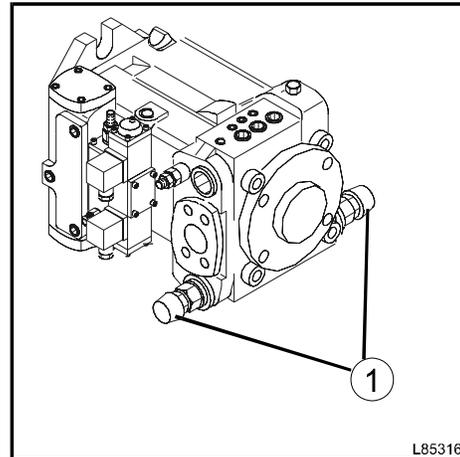


Fig. 16-Hydraulic pump

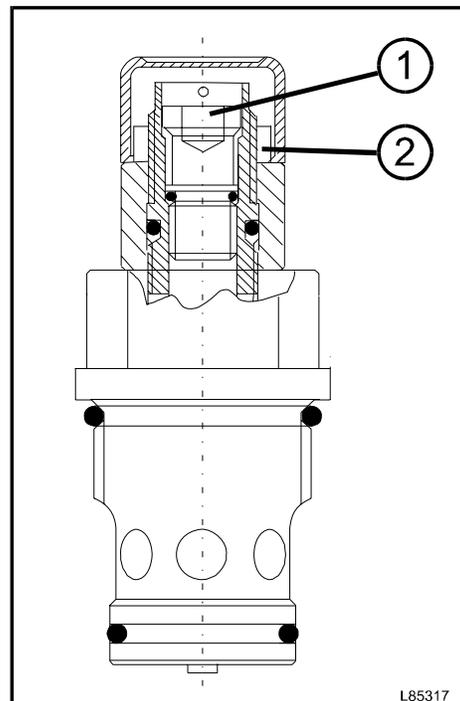


Fig. 17-Pressure relief valve

### 6.2 Loading the machine using a crane

**! Attention**

Use a crane harness and a crane with sufficient lifting capacity.

To load the machine onto a flat bed trailer, etc., the following steps must be taken:

- Empty the bucket and tip back
- Bring the lift frame into driving position
- Apply the articulation lock
- Turn off the engine
- Dismount from the machine and close the doors
- Attach the loader in the proper manner to the 3-point hoisting appliance at the specified, marked points

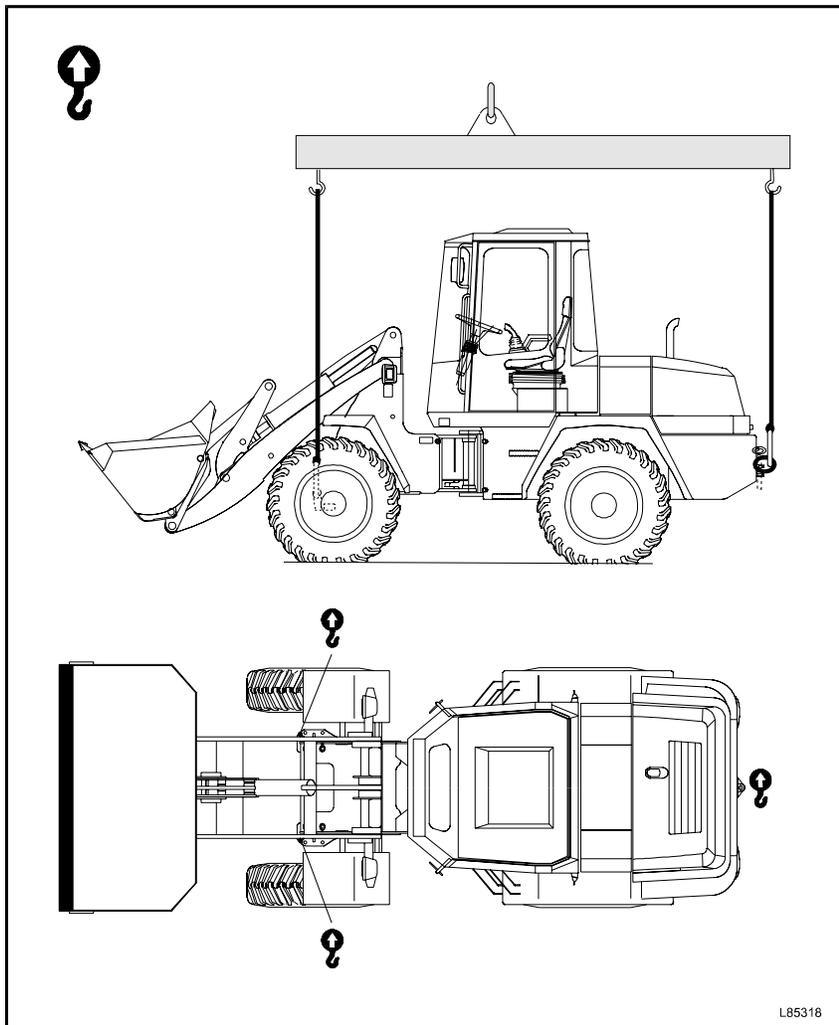


Fig. 18-Loading the machine using a crane

### 6.3 Transporting the machine

During transport on a flat bed trailer, goods wagon, etc., the machine must be properly lashed at the marked points and secured with chocks.

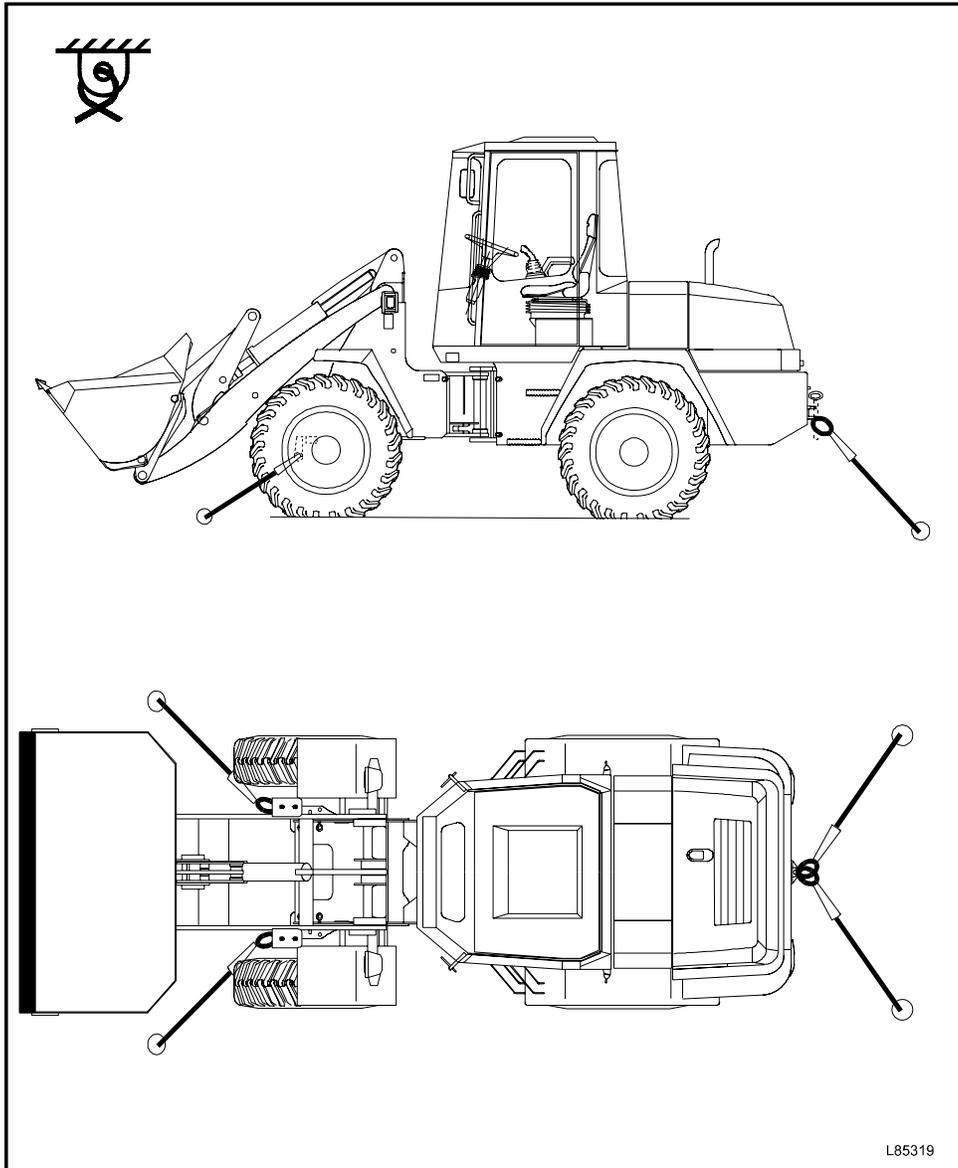


Fig. 19-Lashing for transport

## 7 Care and maintenance

### 7.1 General notes

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

For this reason, it is in every machine owner's interest to perform the specified maintenance work and comply with the service intervals. This section deals in detail with periodic maintenance, inspection and lubricating tasks.

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

Type-specific maintenance and inspection plans for this purpose are contained in every instruction book and every warranty certificate.

Inspection intervals		
1st inspection	after approx.	100 operating hours
2nd inspection	after approx.	500 operating hours
3rd inspection	after approx.	1000 operating hours
Subsequently,	every	500 operating hours



#### Note

The three inspections are obligatory and must be paid for. If they are omitted, the warranty may be subject to restrictions.

It is **essential** that the recommendations in **chapter 2, "Accident Prevention"**, are observed.

## 7.2 Inspection parts and aids

<b>Service parts</b>	<b>Spare parts number</b>
Hydraulic oil - filter insert combined filter	5 003 659 206
Ventilation filter	5 003 650 362
Engine oil filter	5 568 656 314
Fuel filter with sealing	5 568 656 315
Air filter - main cartridge	5 501 660 912
Air filter - safety cartridge	5 501 660 914
V-belts	5 568 656 652
Valve cap sealing	5 568 656 843
<b>Extras</b>	
Schaeff hydraulic oil, mineral	4 312 005 050
Schaeff hydraulic oil, biodegradable	For further information, please contact your <b>Schaeff</b> dealer
Gear oil (SAE 85 W 90 LS)	4 314 005 775
Engine oil (SAE 15 W 40 )	4 312 905 759
Antifreeze and anti-corrosion agent	4 440 305 025

### **Note**

Service parts for inspections should be ordered well in advance!

### **Lubricants**

- The machine's life expectancy and operating condition are largely dependent upon the use of the specified lubricants and compliance with the service intervals.
- If lubricants which do not conform to our recommendations are used, consequential damages may occur for which we will not assume liability, even inside the warranty period.
- For lubricant specifications see section 3.9.

### 7.3 Care and cleaning

#### **Note**

The machine must be cleaned on a suitable surface with an oil separator.

- Neither a steam-jet appliance nor a high-pressure cleaning apparatus may be used for cleaning during the first two months after the machine is used for the first time or when newly painted to avoid damage to the paint.
- Do not use aggressive detergents for cleaning the machine. We recommend using commercially available cleaning agents for passenger cars.
- When cleaning with a steam-jet appliance, the hot water jet must not exceed 80 °C and a spray pressure of 20 bar. The nozzle must be at a minimum distance of 30 cm from the machine.
- Linings (insulating materials, etc.) must not be exposed directly to water, steam or high-pressure jets.
- When cleaning with water or steam jets, take care not to spray exhaust-gas and air filter openings.
- If cleaning the engine with water or steam jets, do not expose sensitive engine parts, such as generator, cabling, oil pressure switch, etc. directly to the jet.
- After each wet clean, the machine must be lubricated in accordance with the lubricating plan and a test of all work cycles, steering and driving functions carried out.

The following points - and the relevant notes in the engine instruction book - should be observed during winter operation.

#### **Hydraulic oil**

- If the machine is not used for longer periods at temperatures around and below freezing, warm up the engine by running at medium revs for approx. 3-5 min.

#### **Engine oil**

- The oil viscosity (SAE class) should be selected according to the ambient temperature at the machine's place of operation.
- See lubricant specifications, section 3.9.2

#### **Coolant**

- Before the beginning of the cold season, check the level of antifreeze and adjust in line with the ambient temperature if necessary.
- At the factory, the antifreeze protection is set to approx. -25°C.

#### **Battery charge**

- A good cold start performance requires a well-charged battery. By warming the battery to approx. +20° (remove the battery after the engine has been turned off and store it in a warm room), the minimum starting temperatures can be lowered by 4-5°C.
- When installing the battery, ensure good contact of terminal connections.
- Only tighten terminal screws so that they are "hand-tight", to prevent deformation of the terminal cones!

#### **Fuel**

- Use only winter diesel fuel in winter, in order to prevent cables becoming blocked through paraffin deposits. At very low temperatures, troublesome deposits may also occur when winter diesel is used.

### 7.4 Notes for winter operation

## 7.5 Jobs before putting into operation

### 7.5.1 Checking the engine oil level

- Check the oil level daily before starting, with the machine parked on level ground.
- The notches on the oil dipstick (21/1) indicate the min. and max. oil levels.
- If necessary, top up engine oil. Unscrew the cap (21/2) and top up oil using a clean container.

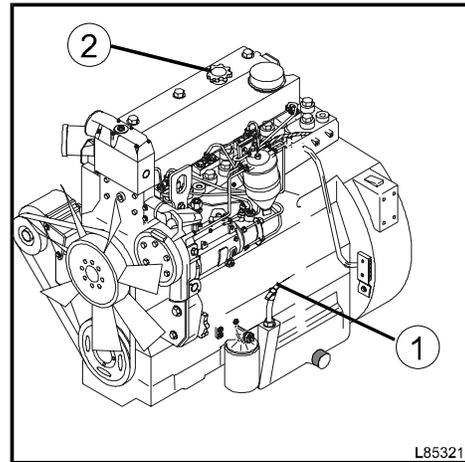


Fig. 21-Engine oil level

### 7.5.2 Cooling system

#### Coolant level

#### Attention

Only check when the engine is cold.  
**Danger of scalding** from hot coolant!

- Check coolant level using the level indicator (22/1).
- If necessary, remove the cap (22/2) and top up coolant level.

#### Note

Top up with a mixture of 50 % water and 50 % antifreeze.

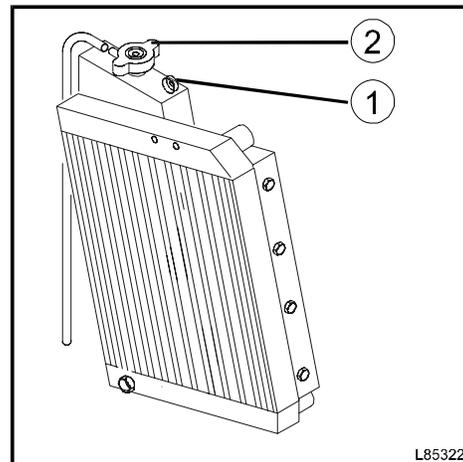


Fig. 22-Radiator

#### Checking the antifreeze

- Before the beginning of the cold season, the antifreeze protection must be checked and adjusted in line with the ambient temperature if necessary.
- At the factory, the antifreeze protection is set to approx. -25°C.

### 7.5.3 Fuel system

#### Fuel level

- Check the fuel level on the fuel gauge (10/38).
- In order to prevent condensation from forming before the machine is next put into operation, top up the fuel every day after use (23/1).

#### Note

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

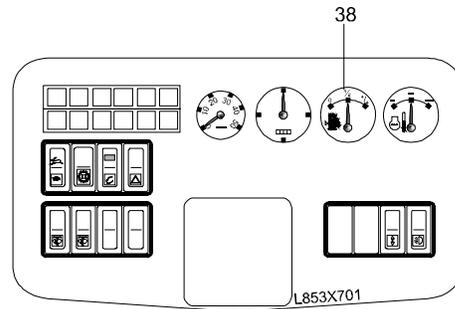


Fig. 10-Actuation

#### Water separator

- Check daily using the sight glass (23/2) and drain water if necessary.

### 7.5.4 Checking the hydraulic oil level

- Check the oil level with the dipstick (24/1), and top up hydraulic oil if necessary.

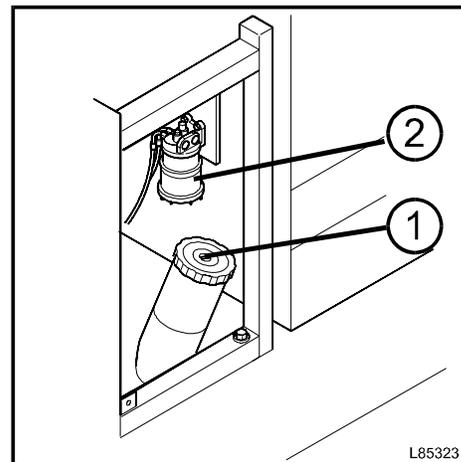


Fig. 23-Fuel tank

### 7.5.5 Checking the brake oil level

- Visual inspection of brake oil level (24/2).

#### Attention

Only top up with ATF oil.

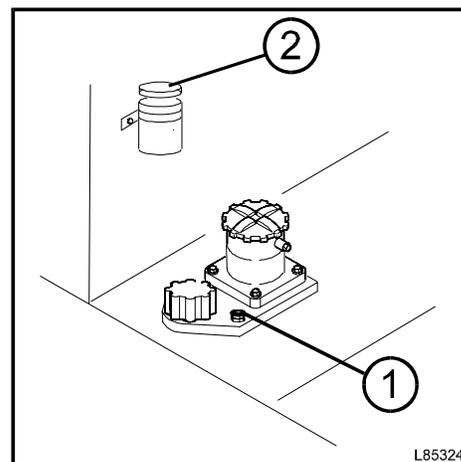


Fig. 24-Hydraulic oil level

### 7.5.6 Checking the oil level of axles

Remove the filler/checking plugs of the following, check oil level and top up if necessary:

- Front axle differential (25/1)

- Rear axle differential (26/1)

- Wheel hub (27/1)

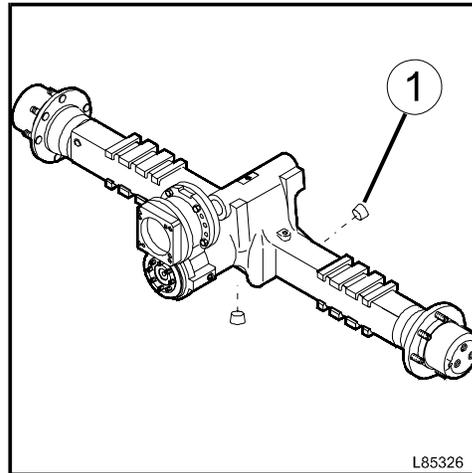


Fig. 26-Rear axle

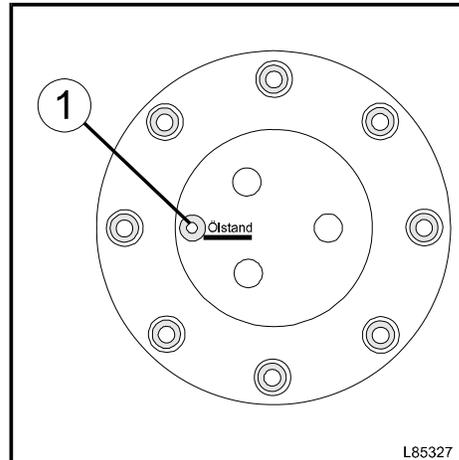


Fig. 27-Wheel hub

Ölstand = Oil level

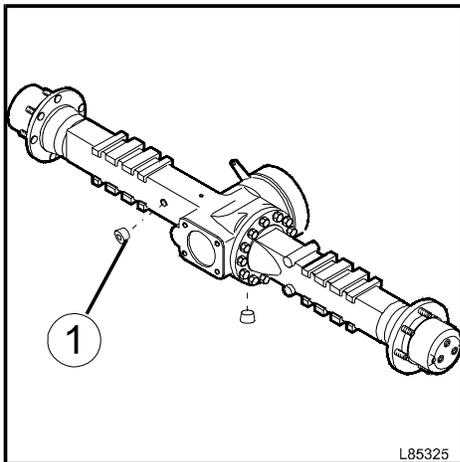


Fig. 25-Front axle

### **7.5.7 Checking the tyre pressure**

- Check the tyre pressure according to the table in section 3.8.

### **7.5.8 Tightness of wheel nuts**

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

**Tightening torque: 460 Nm**

- When fitting a wheel, tighten the nuts to the correct torque crosswise in several stages.

### **7.5.9 Electrical equipment**

- The lighting and warning devices must be checked - including function test of indicator lamps - before use.

## 7.6 Inspection and maintenance work

### 7.6.1 Changing the engine oil

For oil change filling quantity and oil specifications, see section 3.9.

Oil change acc. to inspection plan, section 7.7.3.



#### Note

Collect waste oil, do not allow it to seep into the ground.

**Dispose of according to regulations!**

#### Oil change

- Run the engine until it reaches operating temperature, oil temperature approx. 80°C
- Park the machine on a level surface
- Stop the engine
- Remove the cap under the rear carriage
- Place suitable drip pans below the opening
- Screw the oil drain hose (30/1) onto the oil-change safety valve.



#### Attention

**Danger of scalding** when hot oil is drained!

- Remove the oil drain hose and screw the protective cap onto the valve.
- Close the service hole with the cap.
- Change engine oil filter (see section 7.6.2).
- Fill with lubricating oil up to the "MAX" mark on the dipstick (30/3) via the filler hole (30/2).
- Start the engine and run at low idle speed for approx. 2 minutes.
- Switch off the engine.
- Check the oil level and top up if necessary.

### 7.6.2 Engine oil filter

The engine oil filter must be replaced with every engine oil change.

- Place oil drip pan below the engine oil filter.
- Clean the outside of the engine oil filter.
- Unscrew the filter cartridge (31/1) and check that the fastening stud is firmly secured in the filter head.
- Dispose of the filter cartridge according to regulations
- Check filter head condition.
- Fill the new filter with oil, wet the sealing ring with oil and tighten firmly by hand
- After a test run, check the tightness of the engine oil filter cartridge

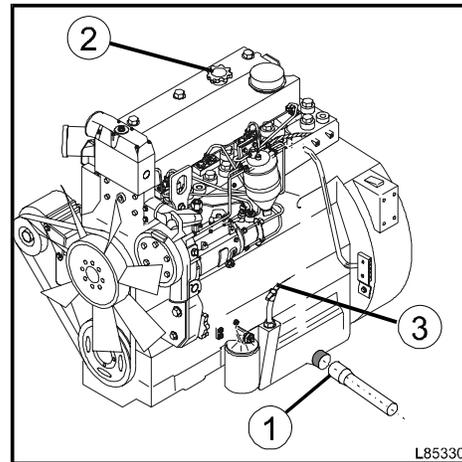


Fig. 30-Engine oil change

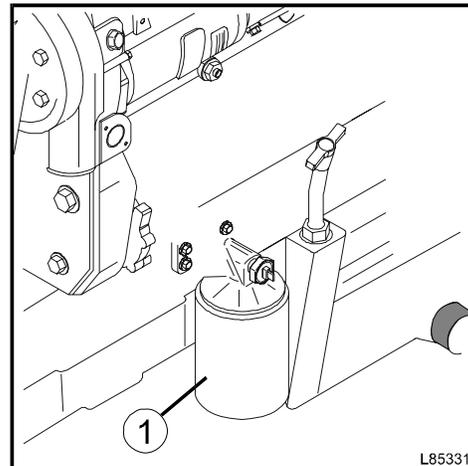


Fig. 31-Engine oil filter

### 7.6.3 Engine breather

Clean acc. to inspection plan, section 7.7.3

#### **!** Note

Perform the maintenance in connection with section 7.6.8 "Checking the valve lash"

- Release the hose clips and carefully remove the hose (32/3) from the angle piece (32/4).
- Remove the valve cover (32/2).
- Loosen the screws and carefully remove the cover (32/5) of the engine breather from the cover.
- Slacken the clips of the valve and press the engine breather valve out of the cover.
- Remove the cellular filter (32/6) and dispose of it.
- Clean the valve cover (32/2), cover (32/5), grill (32/7) and the angle (32/4).
- Take care to ensure that the openings below the grills are free. Clean if necessary.

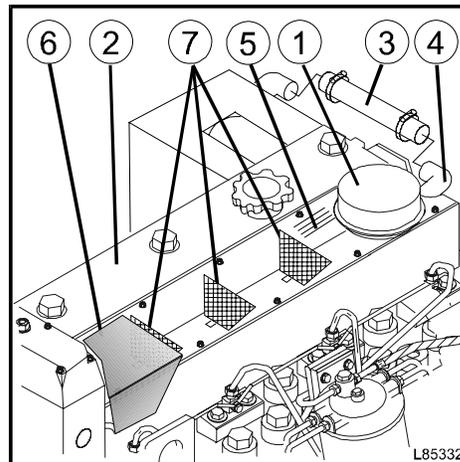


Fig. 32-Engine breather

#### Assembly

- Insert the grill into the channel of the cover.
- Insert new cellular filter.
- Mount new or cleaned engine breather valve into the cover.

*Ensure that the components of the breather assembly are fitted in their correct positions.*

- Attach the cover with sealing on valve cover.

#### **Tightening torque: 3 Nm**

- Mount hose on angle piece and fasten with hose clips.
- Mount valve cover.

## 7.6.4 Fuel system

### 7.6.4.1 Fuel filter

Change acc. to inspection plan, section 7.7.3.

- Clean the outside of the fuel filter (33/1).  
Open the drain plug on the bottom of the filter and drain the fuel.

#### **!** Note

Collect the fuel and dispose of according to regulations!

- Hold the bottom cover of the filter element and release the setscrew (33/2) which is fitted through the filter head above the centre of the filter element.
- Lower the bottom cover (33/3) of the filter.
- Remove the filter insert (33/7) and dispose of according to regulations.
- Clean the top and bottom parts of the filter.
- Renew the sealing rings (33/4, 33/5, 33/6) and slightly wet them with clean fuel.
- Fit the new filter insert on the bottom part and hold the element squarely to the filter head.
- Tighten the setscrew.
- Vent the fuel system (see section 7.6.4.4).

### 7.6.4.2 Cleaning the fuel-pump screen

Clean according to inspection plan, section 7.7.3.

- Remove the cover and upper seal (34/1) from the fuel pump (34/2) and take out the screen (34/3).
- Remove any residues from the pump housing.
- Clean the screen, seal and cover.
- Re-assemble the fuel pump with an undamaged seal, taking care to ensure that the cover is not askew, as this would cause a leak through which air could penetrate the fuel system.
- Vent the fuel system (see 7.6.4.4).

Fig. 33-Fuel filter

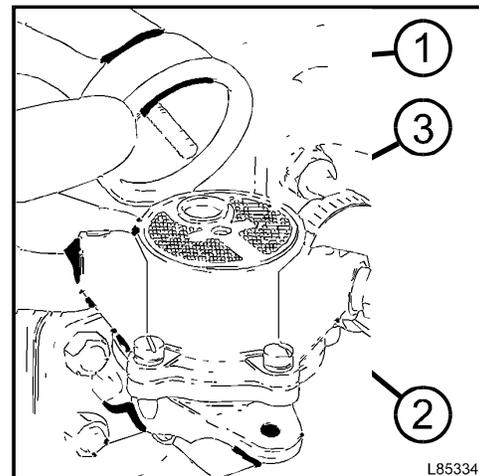
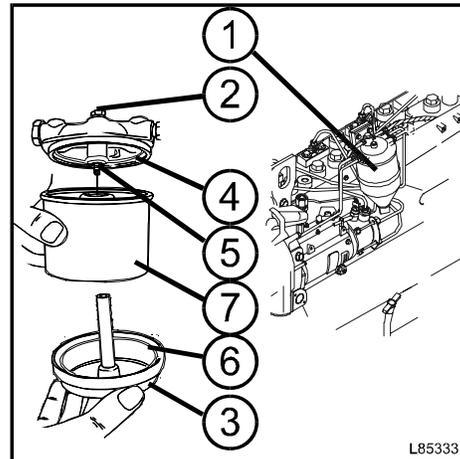


Fig. 34-Screen/ fuel pump

#### 7.6.4.3 Fuel tank

- Maintenance acc. to inspection plan, section 7.7.3
- Drain water from the fuel tank via the drain plug (35/1).
- Clean the filler screen (35/2) and check for damage.

#### 7.6.4.4 Venting the fuel system

- If air enters the fuel system, it must be vented before the engine can be started.
- Air enters the fuel system when:
  - The tank is run dry
  - Fuel lines are removed
  - Fuel filters are replaced

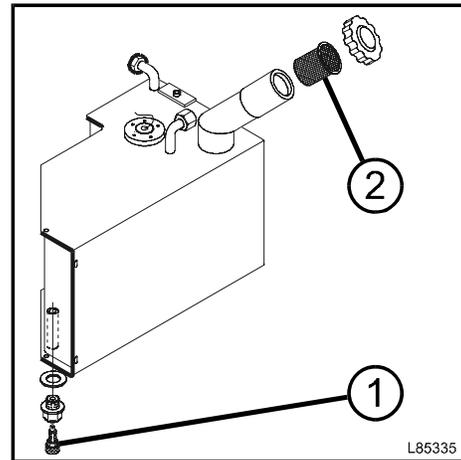


Fig. 35-Fuel tank

#### Venting

- Switch on the ignition.
- Actuate the fuel-pump hand lever for approx. 2 minutes.

#### **!** Note

- If the drive cam for the fuel pump is set to max. delivery, the hand lever cannot be actuated.
- In this case, turn the crankshaft further by one revolution.
- Actuate the starter until the engine runs.
- If the engine runs correctly for a short time and then stops or runs irregularly, check whether there is still air in the fuel system.
- If so, examine the low-pressure system of the fuel system and repeat venting procedure.
- For further details, see instruction book for Perkins-engine **type 1000** .

## 7.6.5 Air filter, air intake

### **!** Note

All maintenance work on the air filter system must be carried out with the engine off.

Do not start the engine while the filter cartridge is removed.

#### 7.6.5.1 Dust extraction valve

- Dust extraction valves (36/1) are largely maintenance-free.
- Any baked-on dust can be removed by squeezing the valve together.

#### 7.6.5.2 Air intake

- Check the air filter attachment and retaining straps for damage.
- Check the tightness of the air intake between the air filter and the engine.
- Examine rubber parts for damage.

### **!** Note

Replace defective parts immediately.

#### 7.6.5.3 Cartridge maintenance interval

##### **Air filter - Main cartridge**

- The air filter main cartridge must be replaced as soon as the filter clogging indicator lamp (10/23) on the instrument panel lights up during operation.
- Brief delay in maintenance does not result in lower filter efficiency.

##### **Air filter - Safety cartridge**

The air filter safety cartridge must be replaced in the following cases :

- After the fifth maintenance of the main cartridge
- After 2 years of operation at the latest
- If the service indicator switches on after the main cartridge has just been serviced
- If the main cartridge is defective
- If the safety cartridge is defective

Fig. 36-Air filter

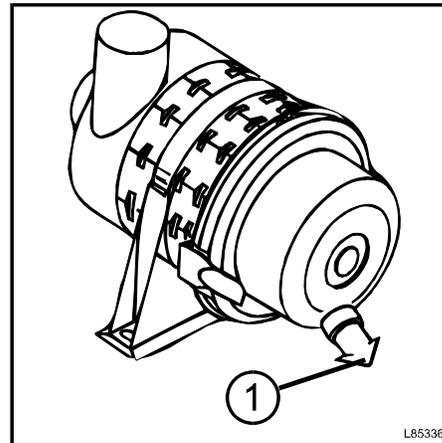
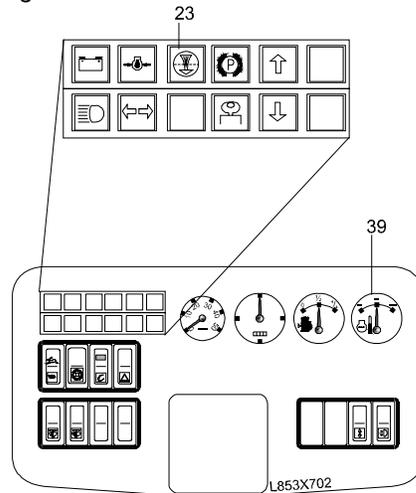


Fig. 10-Actuation



### 7.6.5.4 Replacing cartridges

#### Main cartridge

- Pull the two clasps (37/1) on the lower part of the housing (37/4) outward and remove this lower section.
- Withdraw the main cartridge (37/2) by twisting slightly to and fro.
- Check whether the safety cartridge must be replaced.

#### **!** Note

Remove safety cartridge **only** in the case of necessary maintenance work.

- Note down the date of maintenance in the appropriate sections of the safety cartridge (37/3).
- Insert the new or cleaned main cartridge carefully into the filter housing and check that it is correctly positioned.
- Fit on the lower part of the housing (37-A), push on firmly (37-B) and close with the clasps.

#### **!** Attention

Take care to ensure that both clasps are correctly fastened (37-C).

- The main cartridge is automatically pushed into the correct position.

#### Safety cartridge

- Remove the main cartridge.

#### **!** Note

Only open the seal (37/5) of the safety cartridge (37/3) for the purpose of replacement.

Do not clean the safety cartridge and, once it has been removed, **do not use it again**.

- Using a suitable tool (e.g. screwdriver), pierce the seal (37/5) of the safety cartridge from the inside, then lift up the two clips (37/6).
- Grasp the safety cartridge (37/3) by the two clips (37/6), withdraw by twisting slightly to and fro, and dispose of it.
- Insert a new safety cartridge and check that it is correctly positioned.
- Install the main cartridge.

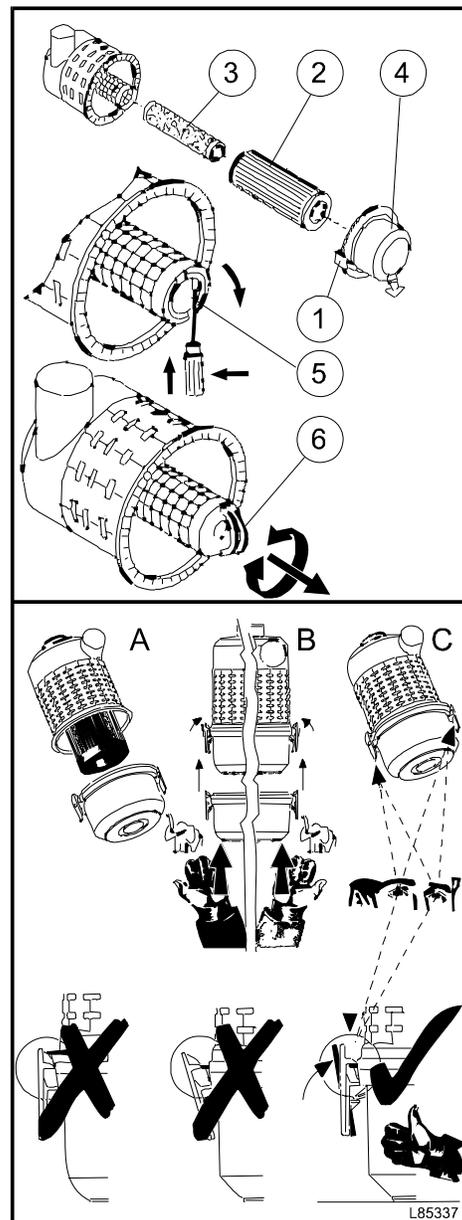


Fig. 37-Air filter - cartridge replacement

### 7.6.5.5 Cleaning the main cartridge

#### **!** Note

Never wash or brush out the filter cartridge.

When blowing out, take care to ensure that dust does not land on the inside of the cartridge.

- The cartridge can be cleaned up to five times if necessary.
- It must be replaced once it reaches its maximum service life of two years, at the latest. The number of times it is cleaned must be marked.
- For cleaning, a pipe the end of which is bent at 90° should be attached to a compressed-air pistol. It must be sufficiently long to reach the floor of the cartridge.
- Blow out the cartridge from the inside to the outside with dry compressed air (max. 5 bar) by moving the pipe up and down in the cartridge. Continue until no more dust escapes.
- Check the clean filter cartridge for damage to the paper bellows and rubber seals.
- Tears and perforations in the paper bellows can be determined using a torch.

#### **!** Note

**Never continue to use** damaged filter cartridges. If in doubt, use a new one.

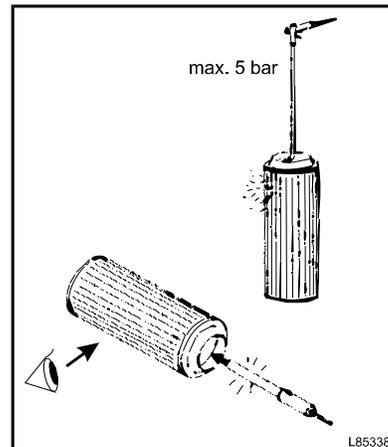


Fig. 38-Cleaning the cartridge

## 7.6.6 Combined hydraulic oil/water radiator

### 7.6.6.1 Cleaning the cooling fins

Clean acc. to inspection plan, section 7.7.3.

#### **Note**

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

- Clean the radiator from the outlet side with compressed air.
- If necessary, e.g. if there is oil in the radiator, clean with cold cleaner or a steam jet appliance.
- After cleaning, run the engine until it reaches operating temperature, to dry the radiator.

### 7.6.6.2 Changing the coolant

Clean acc. to inspection plan, section 7.7.3.

#### **Attention**

Only open the radiator cap when the engine is cold.

**Danger of scalding** from hot coolant!

- Park the machine on level ground.
- Switch off the engine and let cooling system cool down.
- Remove the cap (39/1) of the coolant surge tank.
- Unscrew the water drain plug (40/1) on the cylinder block and drain coolant.
- Remove the water drain plug (39/2) from the radiator and drain the coolant.
- If necessary, flush the cooling system with clean water.
- Re-fit the drain plug on the engine and the radiator.
- Fill the cooling system with coolant (see Technical Data section 3.9.) and close the cap.
- Start the engine and bring to operating temperature, then turn off and allow to cool.
- Check the coolant level (39/3) and top up (several times, if necessary).

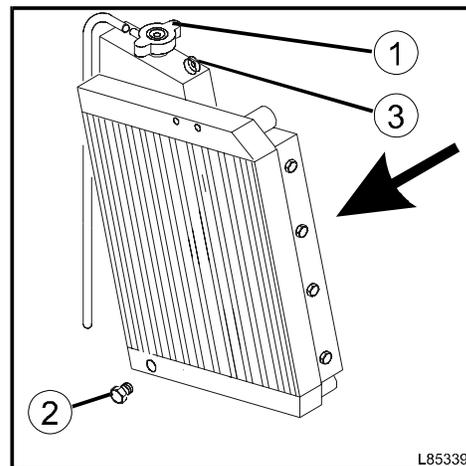
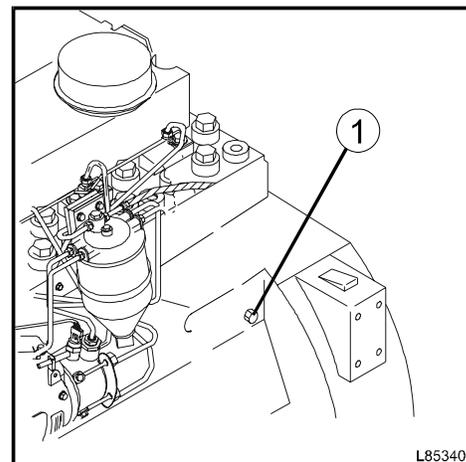


Fig. 39 Combined radiator

Fig. 40-Engine block



### 7.6.7 Checking V-belts

Maintenance acc. to inspection plan, section 7.7.3.

#### **!** Note

Replace worn or damaged V-belts immediately.

- To check the tension, press the V-belt with your thumb in the middle of the greatest free length, and measure the sag.
- Using medium thumb pressure of approx. 45 N, the V-belt sag should equal approx. 10mm.

### Tensioning V-belts

- Slacken the fastening screws (41/1) of the generator and control handle (41/2).
- Rotate the generator until the tension is correct.
- Tighten the fastening screws of the generator and control handle.
- Check the tension once more.

#### **!** Note

When new V-belts are fitted, their tension must be checked and adjusted if necessary after the **first 15 minutes**.

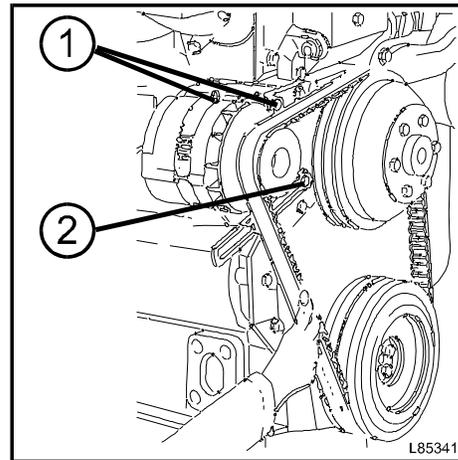


Fig. 41-V-belts

## 7.6.8 Checking and adjusting the valve lash

Maintenance acc. to inspection plan, section 7.7.3.

- The valve lash (42/1) is tested by means of a reed gauge placed between the upper part of the valve stem (42/3) and the rocker arm (42/2) on the engine.
- The correct valve lash is  
0.20 mm for the inlet valve and  
0.45 mm for the exhaust valve.

### **!** Note

The first cylinder is located at the front on the water pump side.

- Remove the valve cover.
- Turn the crankshaft in clockwise direction until the valves intersect at number 4 cylinder
- In this position, check the valve lash of the valves of number 1 cylinder.

*If required, adjust valve lash. To do so, proceed as follows:*

- Slacken the lock nut (42/4).
- Using a screwdriver, adjust the setting screw (42/5) in such a manner that the correct valve lash (37/1) is obtained when the lock nut is tightened.
- When the valves of number 2 cylinder intersect check the valve lash of the valves of number 3 cylinder and adjust, if necessary.
- When the valves of number 1 cylinder intersect check the valve lash of the valves of number 4 cylinder and adjust, if necessary.
- When the valves of number 3 cylinder intersect check the valve lash of the valves of number 2 cylinder and adjust, if necessary.

### **!** Note

If necessary, perform “Engine breather” maintenance (section 7.6.3).

- Mount valve cover with new sealing.

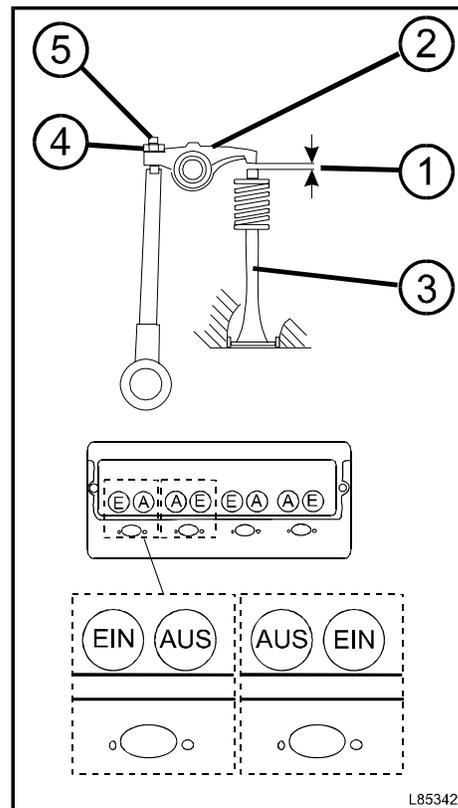


Fig. 42-Valve adjustment

EIN INLET  
AUS OUTLET

### 7.6.9 Battery

- Maintenance acc. to inspection plan, section 7.7.3.



#### Note

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

- The acid level should be approx. 10 mm above the edges of the plates. If necessary, top up with pure distilled water.
- Only check the battery with the engine off.



#### Note

With maintenance-free batteries, this check can be omitted.

### Removing the battery

- The battery is located at the rear right-hand side of the rear carriage.
- Disconnect first the battery earth cable, then the positive cable.
- Detach the clamping bracket (43/1).
- Lift out the battery

### Installing the battery

- Lay the battery in the machine and secure with the clamping bracket.
- First connect the positive cable (+), then the battery earth cable (-).



#### Note

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

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

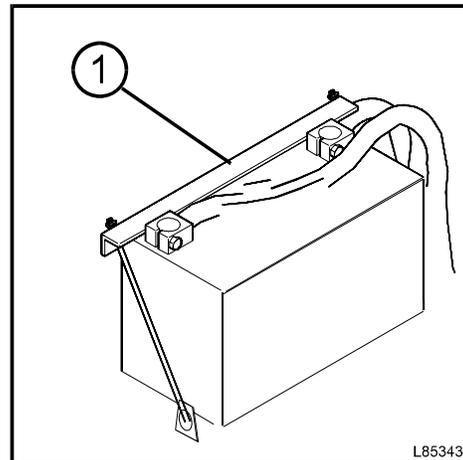


Fig. 43-Battery

### 7.6.10 Checking the brake oil level

Maintenance acc. to inspection plan section 7.7.3.

#### **Attention**

Only top up with ATF-oil!

#### **Note**

Collect waste oil, do not allow it to seep into the ground.

**Dispose of according to regulations!**

- The brake oil must be changed by a trained person.

### 7.6.11 Changing the hydraulic oil

- For hydraulic oil filling quantities and specifications, see Technical Data, section 3.9.
- Change according to inspection plan, section 7.7.3.

#### Hydraulic oil change

#### **Note**

Change the hydraulic oil at operating temperature.

- Retract all hydraulic cylinders.
- Stop the engine.
- Unscrew the oil dipstick (44/1).
- Remove the drain plug (44/4) from the hydraulic oil tank and drain oil into a clean container.

#### **Note**

Collect waste oil, do not allow it to seep into the ground.

**Dispose of according to regulations!**

- Flush and clean the hydraulic oil tank as required (to do so, remove combined return suction filter 44/2, see section 7.6.12).
- Screw on the drain plug carefully.
- Fill up with clean hydraulic oil via the ventilation filter. To do so, remove filter head.
- Screw on ventilation filter head.
- Screw in the oil dipstick.

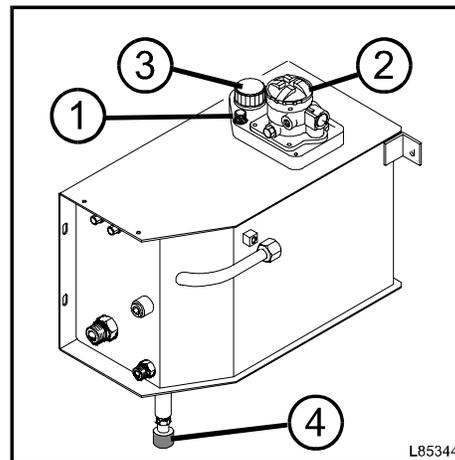


Fig. 44-Hydraulic oil tank

### 7.6.12 Hydraulic oil - combined filter

Change acc. to inspection plan, section 7.7.3.

#### **!** Note

After a larger repair job, following the test run the filter cartridge of the suction filter must also be renewed.

#### Replacing the filter insert

- Unscrew the oil dipstick (44/1).
- With the aid of a tool, remove the filter cap (45/1).
- Take out the filter element (45/5) together with the screw neck (45/3) by pulling and turning at the same time.
- Remove the filter element from the screw neck and dispose of according to regulations.
- Take care to ensure that the gasket (45/2) in the cap and the O-ring (45/4) on the screw neck are in faultless condition and replace defective parts.
- Fit new filter element on screw neck and insert together in filter.
- Screw on filter cap (45/1) and tighten using a torque of 20 Nm.
- Screw in oil dipstick.
- Check the tightness of the filter by means of a test run.

Fig. 44-Hydraulic oil tank

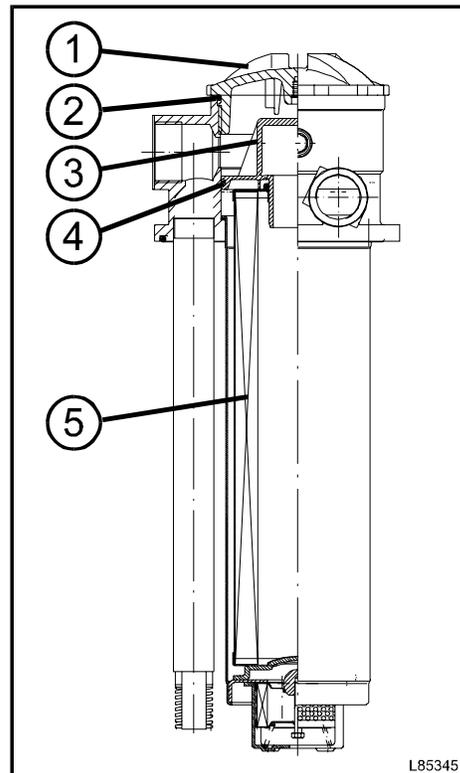
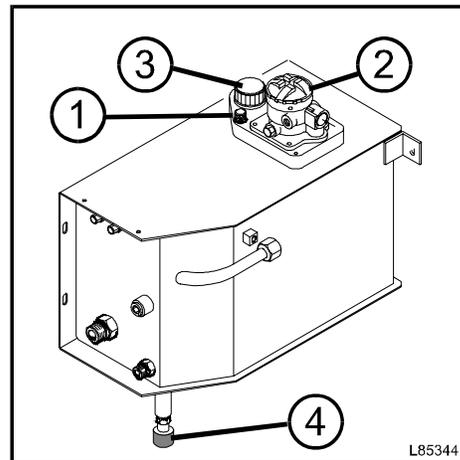


Fig. 45-Hydraulic oil filter

### 7.6.13 Ventilation filter

Change acc. to inspection plan, section 7.7.3.

- Unscrew oil dipstick (46/4).
- Remove ventilation filter (46/1) and dispose of according to regulations.
- Clean screen (46/3), check for damages and replace, if necessary.
- Screw in new ventilation filter (46/1) with O-Ring (46/2) and tighten so that it is hand-tight.
- Screw in oil dipstick.

#### **!** Note

The ventilation filter must also be replaced if it is dirty, e.g. due to hydraulic oil mist.

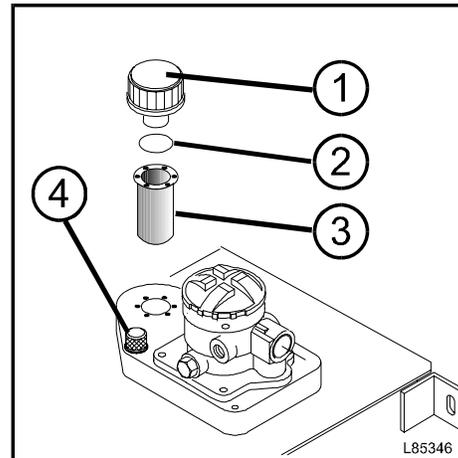


Fig. 46-Ventilation filter

### 7.6.14 Changing the axle oil

- For oil specifications and filling quantity, see section 3.9.
- Change acc. to inspection plan, section 7.7.3.

**The axle oil must be changed at operating temperature.**

#### **!** Note

Catch waste oil, do not allow it to seep into the ground.

**Dispose of according to regulations!**

#### **!** Note

**After** filling the axles with oil, move the machine for approx. **5 minutes**, to ensure that the oil is evenly distributed.

**Check the oil level again, and top up if necessary.**

#### 7.6.14.1 Front axle differential

- Park the machine on level ground.
- Open the filler/checking plug (47/1).
- Unscrew the drain plug (47/2) on the differential and drain the oil.
- Flush the axle if necessary.
- Close the drain plug carefully.
- Pour in oil via the filler/checking hole until oil escapes.
- Close the filler/checking plug carefully.

#### 7.6.14.2 Rear axle differential and gearbox



#### Note

The rear axle differential and the gearbox have a common oil supply.

- Park the machine on level ground.
- Open the inspection/ filler plug (48/1).
- Open the filler plug (48/3) on the gear.
- Open the drain plug (48/2) on the differential and on the gear and drain the oil.
- Purge the axle if necessary.
- Carefully close both drain plugs.
- Pour in approx. 1 ltr. oil via the inspection/ filler hole (48/3) on the gear.
- Carefully close the inspection/ filler hole (42/3) on the gear.
- Fill in oil via the inspection/ filler hole (48/1) until oil escapes.
- Carefully close the inspection/ filler hole.

#### 7.6.14.3 Wheel hub



#### Note

The wheel hub has a combined inspection, filler and drain plug.

- Turn the wheel until the screw plug (49/1) on the hub is at the bottom.
- Open the screw plug and catch the escaping oil.
- Purge if necessary.
- Turn the wheel to the filling and inspection position: The inspection mark must be horizontal.
- Fill in oil up to the lower edge of the hole.
- Carefully close the screw plug.

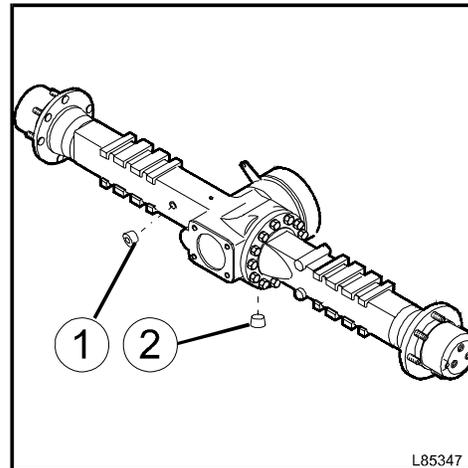


Fig. 47-Front axle

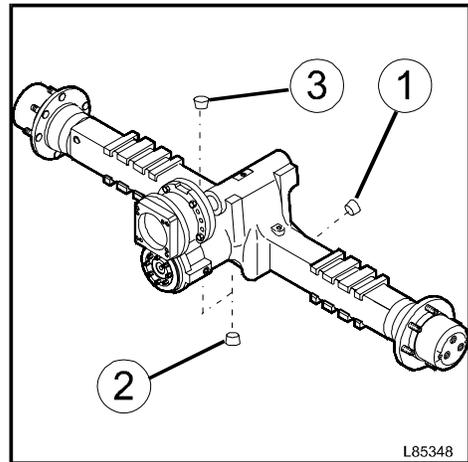


Fig. 48-Rear axle

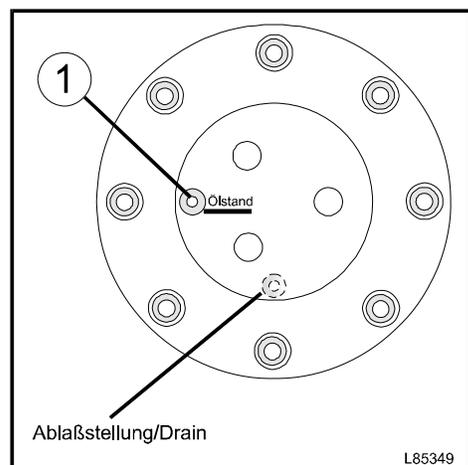


Fig. 49-Wheel hub

Ölstand = Oil level

### 7.6.15 Dust filter - Cab ventilation

The air intake of the cab is equipped with a dust filter or optionally with a charcoal/ pollen filter.

#### **Removal**

- Remove ventilation grid (50/1)
- Remove bracket (50/2)
- Take out dust filter (50/3)
- Clean the filter or replace it resp.

#### **Cleaning the dust filter**

##### **!** Note

Never wash or brush out the filter!

- Throw the filter with the intake side several times against a flat and hard surface (side covered by grid).
- Using compressed air (max. 5 bar), blow against the direction of flow.
- Check the clean filter for damage to the paper bellows and rubber seals.

##### **!** Note

Never continue to use damaged dust filters.

#### **Installation**

- Insert new or cleaned dust filter until stop.

##### **!** Note

Observe the mounting position!  
Air flow arrows pointing towards the cab.

- Attach the dust filter using a support bracket.
- Fit a ventilation grid.

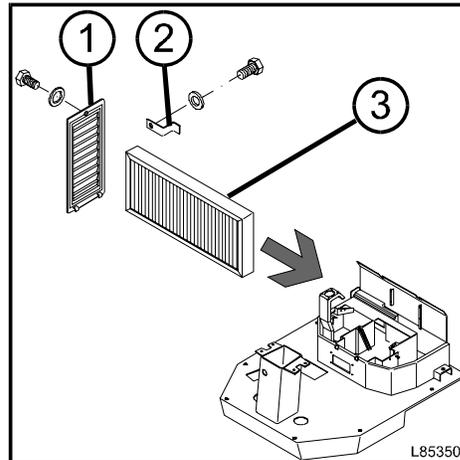


Fig. 50-Cab air filter

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**Notizen**

**Notes**

**Annotazioni**

**Notas**

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## 7.7 Maintenance and inspection plans

### 7.7.1 Daily and weekly maintenance tasks

#### Inspection and maintenance jobs to be performed by service personnel

#### **Daily**

- 1 Check hydraulic oil level
- 2 Check engine oil level
- 3 Check coolant level
- 4 Check fuel level (fuel gauge on instrument panel)
- 5 Check fuel pre-filter for water accumulation. Drain water if necessary.
- 6 Check water level for windscreen wiper.
- 7 Visual inspection (general) e.g. for material cracks, external damages, loose screws or nuts, completeness, etc.
- 8 Check for leaks in:  
pipes, hoses, control unit, hydraulic pumps, cylinders, etc.



#### **Note**

When tightening hoses or pipe connections, lock screw-in couplings to prevent rotation

- 9 Check electrical indicating and warning elements, and lighting system
- 10 Check smooth running of operator controls

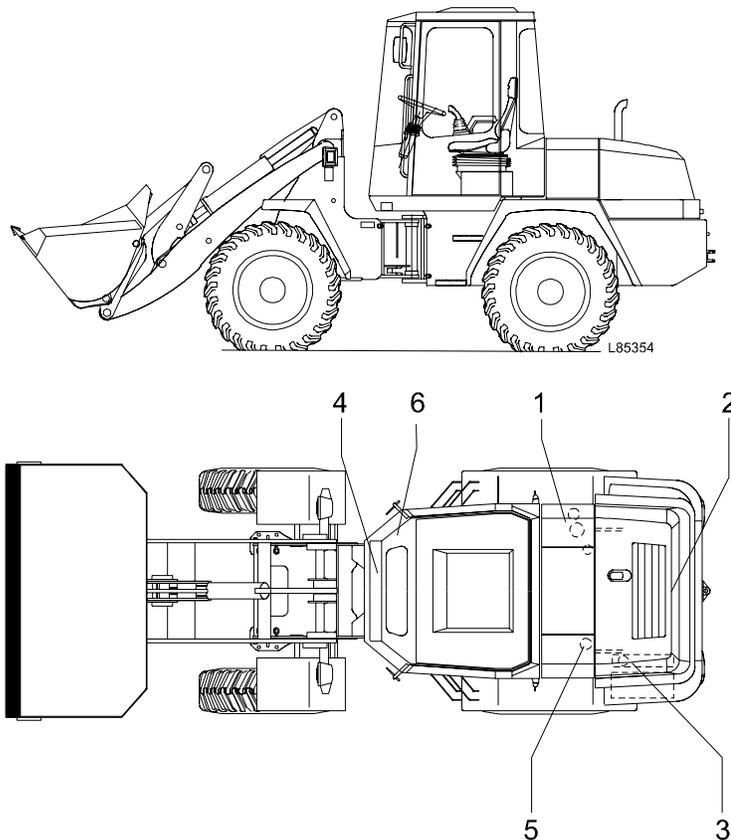


Fig. 54-Daily

## Weekly

- 11 Clean cooling fins of the combined hydraulic oil/water radiator



### Note

In case of extreme exposure to dust, shorten cleaning intervals

- 12 Check acid level and connections of battery
- 13 Check that door catches function perfectly
- 14 Check tyre pressure and tightness of wheel nuts
- 15 Check fastening of axles and cardan shaft
- 16 Check bushes and bolts of work equipment
- 17 Check bolts, bushes and linkages of articulated steering
- 18 Check that pneumatic springs of engine cover function perfectly
- 19 Check function, condition and completeness of safety devices
- 20 Check brake oil level
- 21 Check that the dust filter for the cab ventilation is not dirty. Clean if necessary.



### Note

In case of extreme exposure to dust, shorten cleaning intervals

- 22 Check function of brakes
- 23 Grease machine according to overview of lubricating points

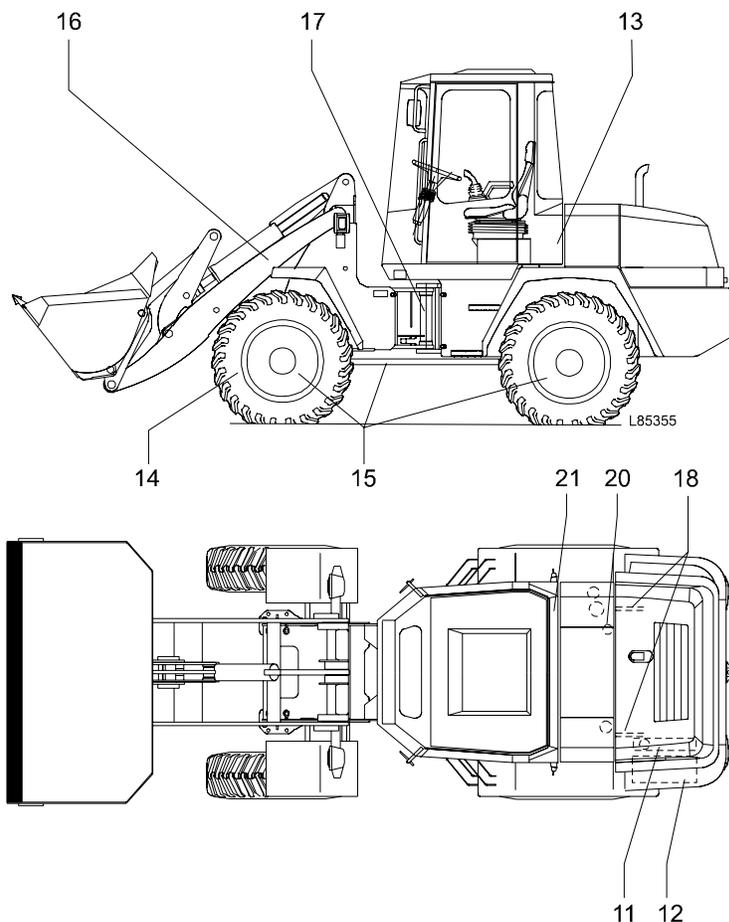


Fig. 55-Weekly

*maintenance*

### 7.7.2 Overview of lubricating points

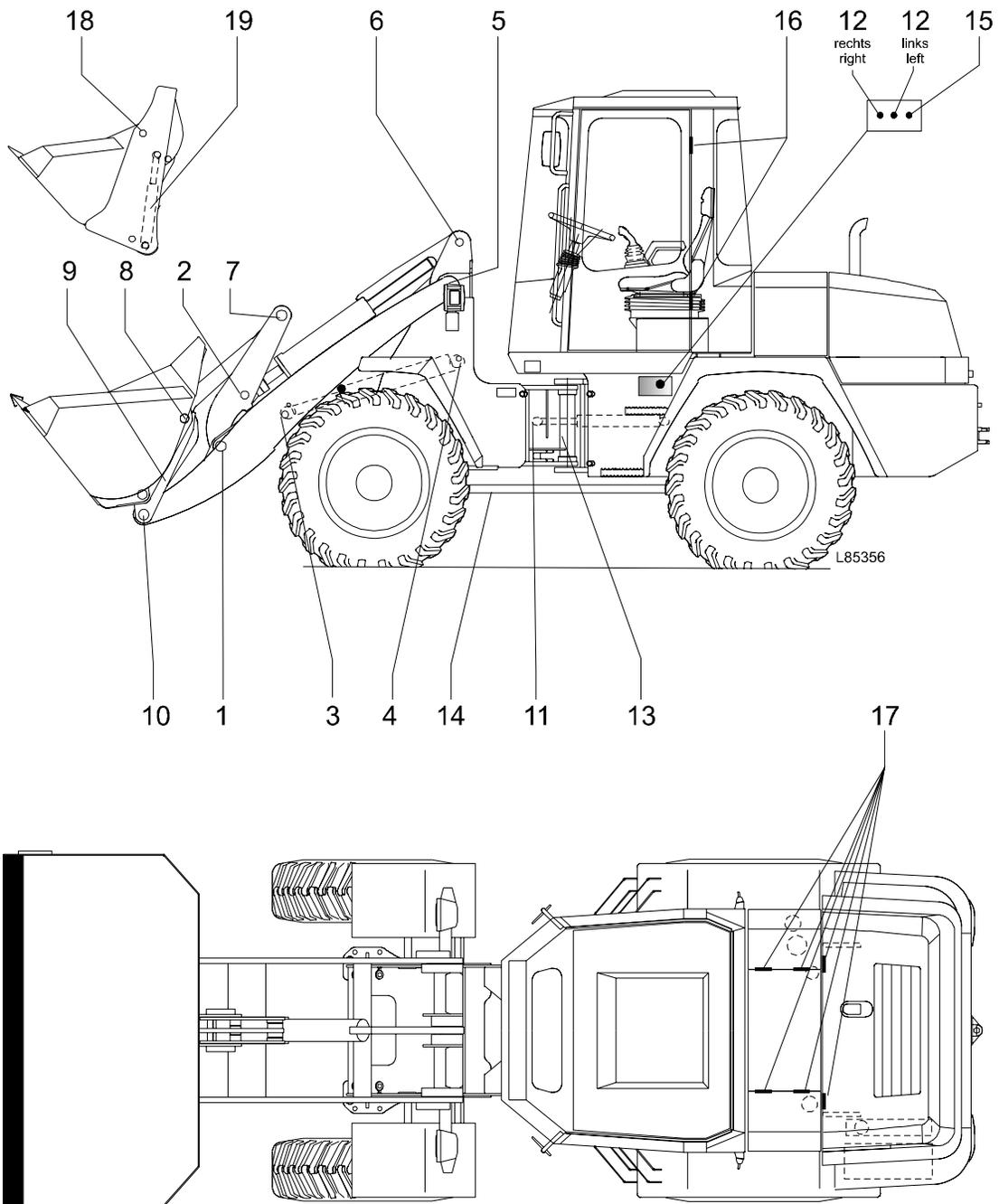


Fig. 56-Lubricating plan

**Grease all lubrication points with multi-purpose grease.**

The intervals stated are valid for one-shift operation				
Item	Lubricating point	Qty.	Daily	Weekly
1	Lift frame - Rocker arm	1		X
2	Tilt cylinder - Rocker arm	1		X
3	Lift cylinder - Lift frame	1		X
4	Lift cylinder - Front carriage	1		X
5	Lift frame - Front carriage	2		X
6	Tilt cylinder - Front carriage	1		X
7	Rocker arm - Arm	1		X
8	Rocker arm - Quick-mount hitch	1		X
9	Mechanical quick-mount hitch	3		X
	Hydraulic quick-mount hitch	3		X
10	Lift frame - Quick-mount hitch	2		X
11	Steering cylinder - Front carriage	2		X
12	Steering cylinder - Rear carriage	2		X
13	Articulation	3		X
14	Joints of cardan shaft	2		X
15	Rear axle bearing	1		X
16	Door hinges	4		X
17	Hinges for engine bonnet and cover	6		X
18	Multi-purpose bucket	2		X
19	Hydraulic cylinder of multi-purpose bucket	4		X

**!** **Note**

In the case of special operating conditions, e.g. working on sandy ground, the lubrication intervals should be shortened, in order to encourage self-cleaning of bearing points.

### 7.7.3 Inspection plan

To be carried out by trained specialist dealer personnel.

O = <i>Checking, maintenance</i> X = <i>Replacement</i>		Operating hours							min 2x year- ly	min 1x year- ly
		100	500	1000	1500	2000	2500	3000		
<b>Perform work with machine at operating temperature</b>										
1	Check whether machine-specific instruction book is in the machine	O	O	O	O	O	O	O		
2	Change engine oil	X	X	X	X	X	X	X		X
3	Change engine oil filter	X	X	X	X	X	X	X		X
4	Drain water from fuel tank	O	O	O	O	O	O	O	O	
5	Change fuel filter		X	X	X	X	X	X		X
6	Clean fuel pump and screen	O	O	O	O	O	O	O		O
7	Check air intake	O	O	O	O	O	O	O		
8	Change air filter - main cartridge	acc. to service indicator								X
9	Change air filter - safety cartridge 1)	as required								
10	Clean cooling fins of combined hydraulic oil/water radiator.  <b>Note</b> In case of high exposure to dust, shorten the cleaning intervals.	O	O	O	O	O	O	O		
11	Check antifreeze level in coolant									O
12	Change coolant 1)	as required								
13	Check V-belt tension	O	O	O	O	O	O	O		
14	Check engine mounts and pump attachments	O	O	O	O	O	O	O		
15	Check engine speed adjustment, top-end and bottom-end idle speed	O	O	O	O	O	O	O		
16	Check valve lash of engine and adjust if necessary			O		O		O		
17	Check injection nozzles			O		O		O		
18	Replace engine breather in valve cover 1) 3)					O				
19	Check acid level and connections of battery	O	O	O	O	O	O	O		
20	Clean dust filter for cab ventilation or replace	O	O	X	O	X	O	X		X
21	Check condition of tyres, tyre pressure and tightness of wheel nuts	O	O	O	O	O	O	O		
22	Check secure fastening of axles and cardan shaft	O	O	O	O	O	O	O		
23	Check bearing bushes and bolts of work equipment and replace if necessary	O	O	O	O	O	O	O		
24	Check bushes and bolts of the articulation and the articulated steering and replace if necessary.	O	O	O	O	O	O	O		
25	Check that door catches function perfectly, replace if necessary	O	O	O	O	O	O	O		

1) at least every 2 years

3) Replace engine breather valve every 4,000 operating hours

<b>O = Checking, maintenance</b> <b>X = Replacement</b>		Operating hours							min 2x year- ly	min 1x year- ly
		100	500	1000	1500	2000	2500	3000		
<b>Perform work with machine at operating temperature</b>										
26	Check electrical indicating and warning elements, and lighting system	O	O	O	O	O	O	O		
27	Check smooth running of operator controls and adjust if necessary	O	O	O	O	O	O	O		
28	Check tightness of all pipes, hoses, control valve, hydraulic pumps, cylinders, etc. <b>!</b> <b>Note</b> When tightening hose and pipe connections, screw-in couplings must be locked to prevent rotation	O	O	O	O	O	O	O		
29	Check or change hydraulic oil <b>2)</b>	O	O	X	O	X	O	X		X
30	Replace insert of hydraulic oil filter	X	X	X	X	X	X	X	X	
31	Replace ventilation filter			X		X		X		X
32	Rear axle differential with gearbox - oil check or oil change	O	X	O	X	O	X	O		X
33	Front axle differential - oil check or oil change	O	X	O	X	O	X	O		X
34	Wheel hubs of front and rear axles: oil check or oil change	O	X	O	X	O	X	O		X
35	Check function of brakes and replace brake oil	O	O	O	O	X	O	O		X
36	Grease machine according to overview of lubricating points	O	O	O	O	O	O	O		
37	Check function, condition and completeness of safety equipment	O	O	O	O	O	O	O		
38	Hydraulic function check with pressure function test	O	O	O	O	O	O	O		
39	Test run and test work	O	O	O	O	O	O	O		
40	Initial inspection cards and return to <b>Schaeff</b>	O	O	O						

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

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

## 7.8 Shutdown

### 7.8.1 Preservation (temporary shutdown)

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

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

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

### 7.8.3 After shutdown

Before putting the machine into operation once more, the following measures must be carried out:

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

### 7.8.2 During shutdown

## 8 Operating problems

### 8.1 General

Operating problems are often the result of incorrect handling of the machine, the use of unsuitable materials or irregular maintenance.

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

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

### 8.2 Engine

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

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

<b><i>Fault</i></b>	<b><i>Possible cause</i></b>	<b><i>Remedy</i></b>
<b>8.3 No steering movement</b>		
1	Oil supply to pump interrupted	Check and repair suction line
2	Hydraulic pump defective	Repair or replace
3	Priority valve defective	Remedy fault (call Service Agent)
4	Steering control unit defective	Remedy fault (call Service Agent)
5	Steering cylinders defective	Repair
6	Mechanical fault	Repair
<b>8.4 Insufficient performance of service brake</b>		
1	Brake discs worn	Adjust or repair (call Service Agent)
2	Main brake cylinder defective	Repair or replace (call Service Agent)
3	Mechanical fault	Repair (call Service Agent)
<b>8.5 Insufficient performance of parking brake</b>		
1	Wear of drum brake	Adjust or repair
2	Mechanical fault in brake actuation	Repair and/ or re-adjust
<b>8.6 Hydrostatic drive has no neutral position</b>		
1	Switch for direction of travel defective	Repair or replace
2	Solenoids of switching valve defective	Repair or replace
3	Neutral position has shifted	Check, re-calibrate (call Service Agent)
4	Internal damage to travel pump	Replace travel pump
5	Idling speed of engine too high	Adjust

<b>Fault</b>	<b>Possible cause</b>	<b>Remedy</b>
<b>8.7 Hydraulic oil exceeds max. admissible temperature</b>		
1	Thermo switch defective	Replace
2	Oil level too low	Top up oil to mark on dipstick
3	Oil radiator clogged or faulty	Clean, check, replace if necessary
4	Suction filter clogged	Replace
5	High-pressure valves do not respond all the time or too early	Check high-pressure valves, re-adjust or replace if necessary
6	Flushing circulation does not function	Check pressure of flushing and filling pump, possible back pressure in cooling circuit, check housing pressure
7	Travel pump or engine damaged (worn)	Replace
8	Working pump worn	Replace
9	Main high-pressure relief valve defective	Replace
<b>8.8 Sluggish acceleration and deceleration, too little propulsive power</b>		
1	Insufficient engine power	Check diesel engine
2	A brake has got stuck	Check, remedy damage
3	No pressure in tank	Check ventilation filter, replace
4	Combined filter clogged	Replace filter element
5	Fast/ slow-gear does not shift electrically or mechanically	Check power supply and solenoid valve, repair and replace if necessary, check travel engine
6	Fault in brake inching device	Check, adjust, replace
7	Filling pump sucks up air	Check, eliminate leakages
8	Travel pump misadjusted	Re-adjust travel pump
9	Filling or supply pressure too low	Check pressure, adjust
10	Pressure relief valve of filling circuit clogged or faulty	Check, re-adjust or replace
11	High-pressure too low	Check high-pressure (pressure cut-off), and re-adjust high-pressure valves or replace if necessary
12	Travel pump does not travel fully, pilot pressure too low	Nozzles clogged, check, repair
13	Internal damage to travel pump or engine	Replace units
14	Engine misadjusted	Re-adjust engine

<b>Fault</b>	<b>Possible cause</b>	<b>Remedy</b>
<b>8.9 Gear works in one direction only</b>		
1	Switch for direction of travel defective	Repair or replace if necessary
2	Solenoid valve sticks or is defective	Repair or replace if necessary
3	Power supply to switch for direction of travel or solenoid valve interrupted	Check and repair (incl. earth connection)
4	Pilot pressure too low on one side	Nozzles clogged, check, clean
5	High-pressure relief valve is faulty or incorrectly set	Swap valves around. If machine now travels in the other direction, examine valve, clean and replace if necessary
<b>8.10 Gear works in neither direction</b>		
1	Too little hydraulic oil in tank	Top up to mark on dipstick
2	Mechanical connection to diesel engine faulty	Check, repair
3	Filling pump defective, no filling pressure	Remove pump and examine, install new pump if necessary
4	Switch for direction of travel defective	Repair and replace if necessary
5	Solenoid valve for direction of travel defective	Repair and replace if necessary
6	Combined filter clogged	Replace filter element
7	Suction line from tank to pump kinked	Check and eliminate kink
8	Power supply to switch for direction of travel and solenoid valve interrupted	Remedy cause of interruption
9	Internal damage to travel pump or engine	Replace units completely
10	Mechanical connection of engine to axle interrupted	Check, repair
<b>8.11 Loading system is not working</b>		
1	Oil supply to pump interrupted	Check suction line and repair if necessary
2	Main high-pressure relief valve defective	Check and replace if necessary
3	Hydraulic pump defective	Check, repair or replace
4	Hydraulic pump drive mechanically interrupted	Check and repair

<b>Fault</b>	<b>Possible cause</b>	<b>Remedy</b>
<b>8.12 Decrease in machine's performance (loading system)</b>		
1	Insufficient engine power	Check diesel engine and adjust if necessary
2	Hydraulic oil level too low	Top up hydraulic oil to the mark on the dipstick
3	Pump is sucking up air	Tighten hose connections. Replace O-ring or seals
4	Insufficient working pressure	Re-adjust main high-pressure relief valve, replace if necessary
5	Wear of pump	Replace pump
6	Incorrect hydraulic oil	Quality of hydraulic oil must conform to our recommendation
<b>8.13 Working cylinders are not working satisfactorily</b>		
1	Seals in cylinders worn	Re-seal cylinders
2	Secondary valves faulty	Check secondary valves and replace completely if necessary
<b>8.14 Trouble in the electrical system</b>		
1	Outside and/or internal lighting defective	Check cables, connections, bulbs and fuses
2	Windscreen wiper does not work	Check cables, connections and fuses. Examine windscreen wiper for mechanical damage. Replace complete wiper if necessary
3	Horn does not work	Check cables, connections and fuses. Replace complete horn
4	Control organs are imprecise	Determine the fault or source of the problem, call Service Agent if necessary
5	Starting system does not work satisfactorily	Check charge capacity of battery. Test starter function. Check connection and condition of power and battery earth cables. Check function of ignition lock, replace complete unit if necessary.

## 9. Appendix

### 9.1 Hydraulic system

- Steering

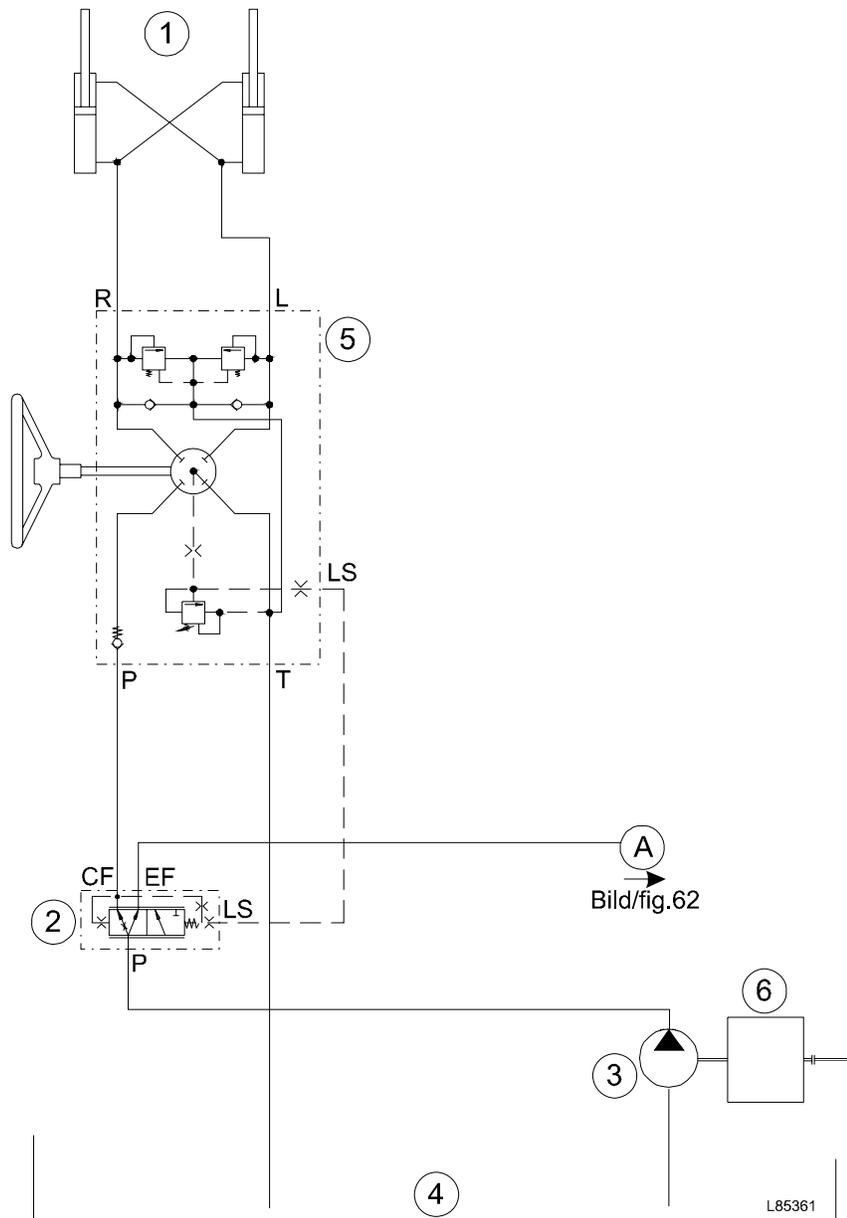


Fig. 61-Hydraulic system - steering

- |   |                        |   |                       |
|---|------------------------|---|-----------------------|
| 1 | Steering cylinder      | 4 | Hydraulic oil tank    |
| 2 | Priority valve         | 5 | Steering control unit |
| 3 | Steering/ loading pump | 6 | Diesel engine         |



• Travel drive, pilot control for loading system

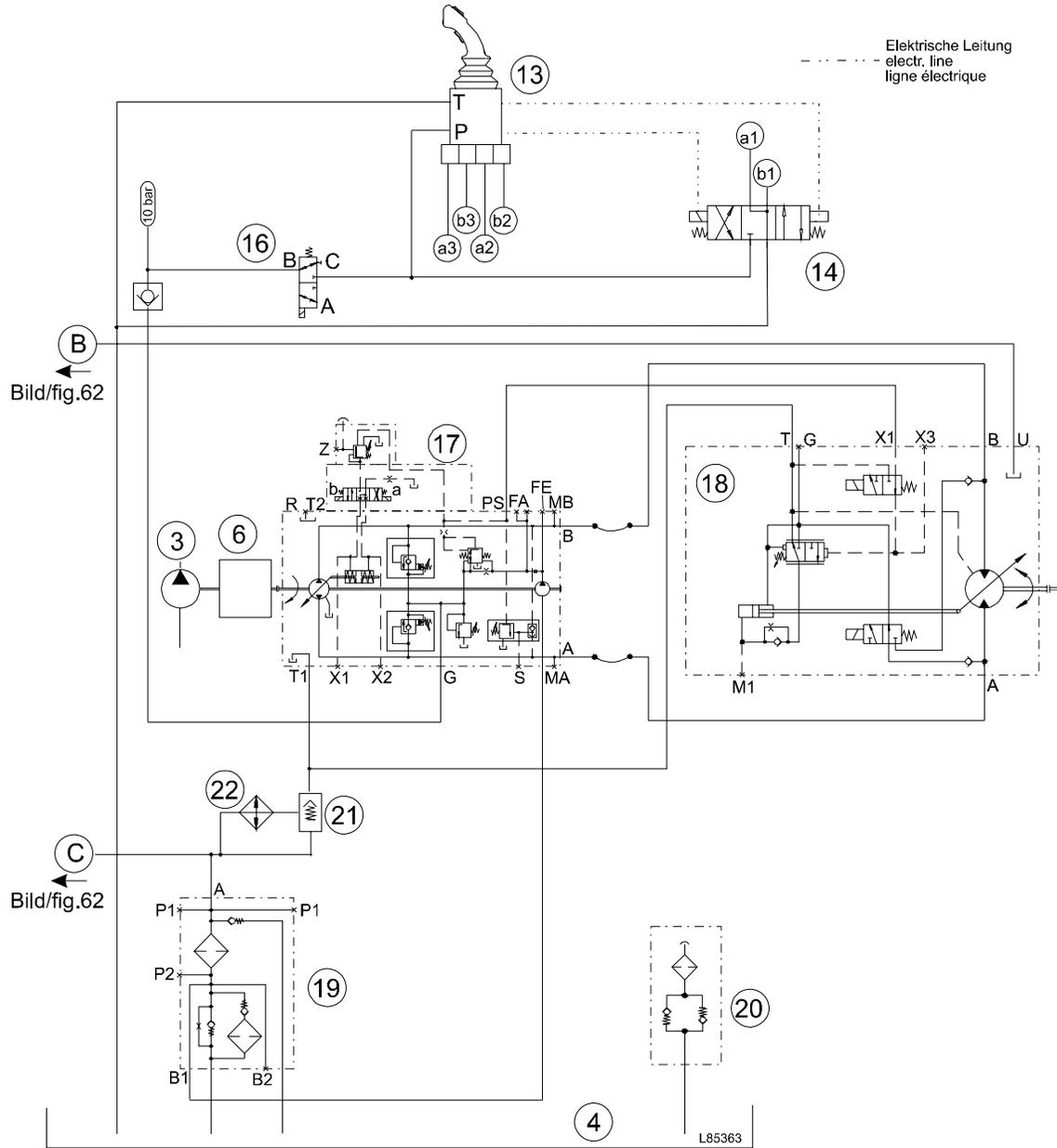
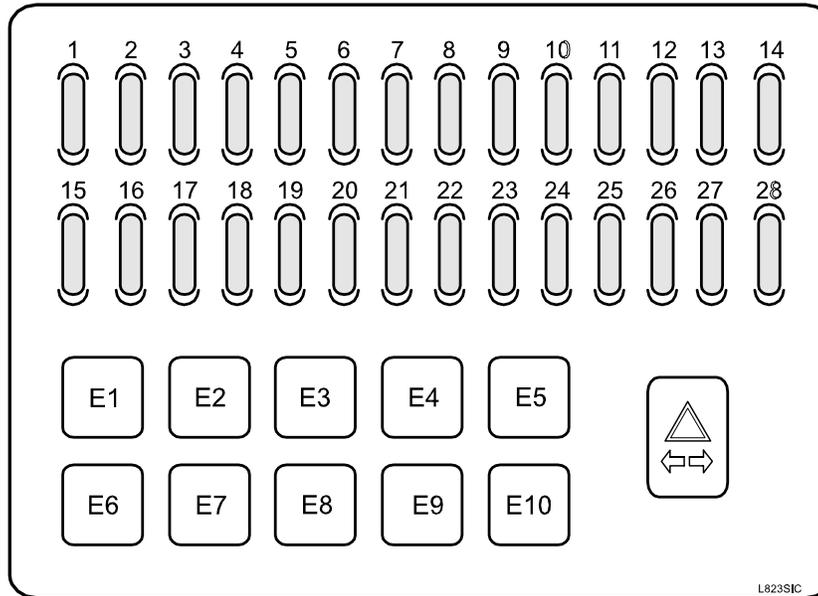


Fig. 63-Hydraulic system for driving

- |    |                                  |    |                                   |
|----|----------------------------------|----|-----------------------------------|
| 3  | Steering/ loading pump           | 17 | Travel pump                       |
| 4  | Hydraulic oil tank               | 18 | Engine                            |
| 6  | Diesel engine                    | 19 | Hydraulic oil combined filter     |
| 13 | Loader lever                     | 20 | Ventilation filter                |
| 14 | Additional control circuit       | 21 | Hydraulic oil temperature control |
| 16 | Working hydraulics cut-off valve | 22 | Hydraulic oil radiator            |

## 9.2 Electrical system

Fuse and relay box - Assignment diagram



Location	Relay	Function
E 1	--	not assigned
E 2	K 2	Starting safeguard
E 3	K 3	Driving - Reverse
E 4	K 4	Driving - Forwards
E 5	K 5	Float position
E 6	K 6	Additional valve
E 7	K 7	Additional valve
E 8	K 8	Brake inching
E 9	K 9	Working floodlights
E 10	K 10	Working floodlights
	K 11	Flasher transmitter

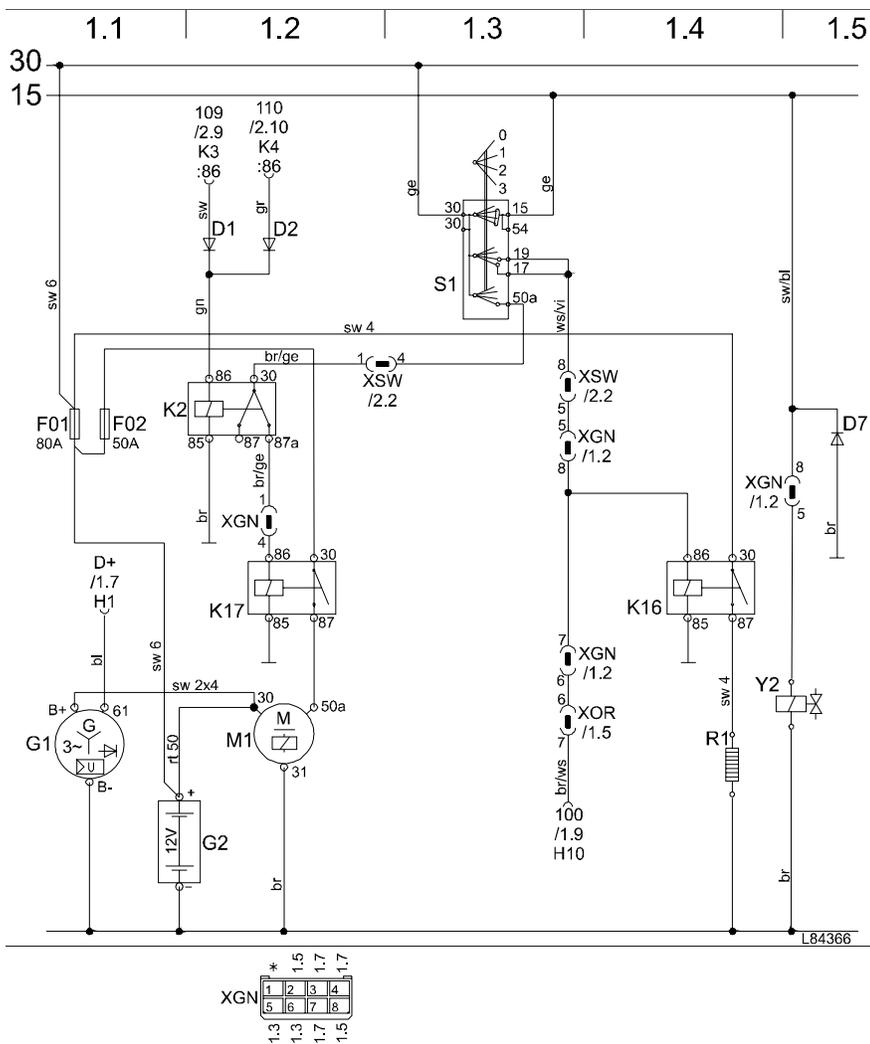
## Fuse and diode assignment

Position	Ampere	Assigned to	Position	Ampere	Assigned to
F 1	10	Hazard warning switch Immobilizer	F 15	10	Hazard warning switch Immobilizer
F 2	15	Working hydraulics cut-off	F 16	20	Rotating beacon Cab light Front working floodlights
F 3	15	Driving - Fast/ slow Hydrostatic brake	F 17	20	Socket Radio Rear working floodlights
F 4	15	Parking brake relay	F 18	15	Lower beam
F 5	10	Signal horn	F 19	15	Upper beam
F 6	10	Brake light	F 20	10	Left side marker light
F 7	10	Heater fan	F 21	10	Instruments' illumination Right side marker light
F 8	15	Front wiper	F 22		not assigned
F 9	15	Rear wiper	F 23 D 5	Diode 1A	Back-Alarm
F 10	10	Instruments	F 24 D 4	Diode 1A	Hydrostatic brake
F 11	15	Float position relay	F 25 D 3	Diode 3A	Activation fast / slow Hydrostatic brake
F 12	10	Radio	F 26 D 1	Diode 1A	Starting safeguard
F 13	10	Additional control circuit	F 27 D 2	Diode 1A	Starting safeguard
F 14 D 6	Diode 1A	Three-phase alternator	F 28 D 7	Diode 3A	Recovery diode engine shut-off

## Cable colours

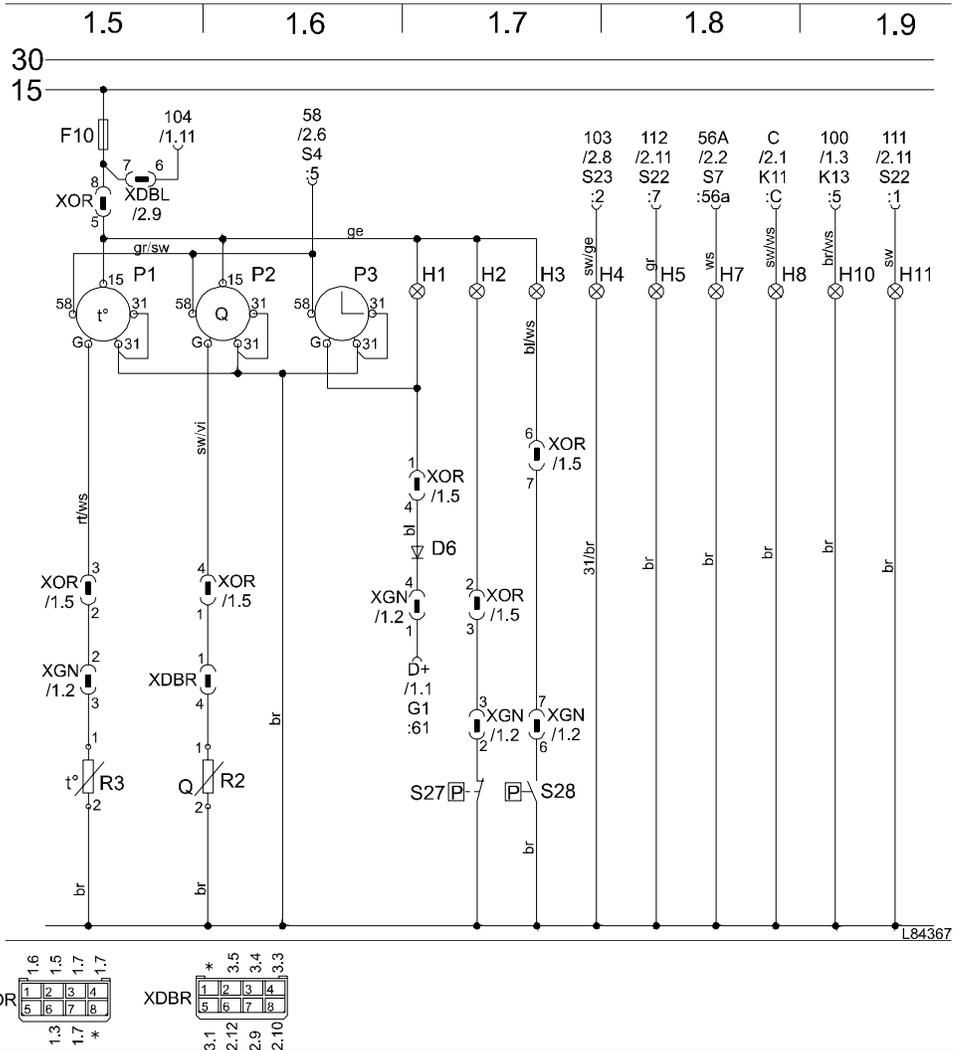
bg	beige	dgr	dark grey	hbr	light brown	rt	red
bl	blue	ge	yellow	hgr	light grey	sw	black
br	brown	gn	green	hr	light red	vi	violet
dbl	dark blue	gr	grey	nt	nature	ws	white
dbr	dark brown	hbl	light blue	or	orange		

# Start-up, pre-heater system



Path	Designation	Device	Path	Designation	Device
		<b>Start-up, pre-heater system</b>			
1.1	G1	Generator	1.2	D1	Diode
1.1	G2	Battery 12V	1.2	D2	Diode
1.2	M1	Starter	1.3	S1	Glow plug/ starter switch
1.2	K2	Starting relay (Starting safeguard)	1.4	K16	Cut-off relay
1.2	K17	Starting relay (starting aid)	1.4	Y2	Cut-off
1.1	F01	Flat-type fuse 30A	1.4	R1	Glow plugs
1.1	F02	Flat-type fuse 50A	1.5	D7	Diode

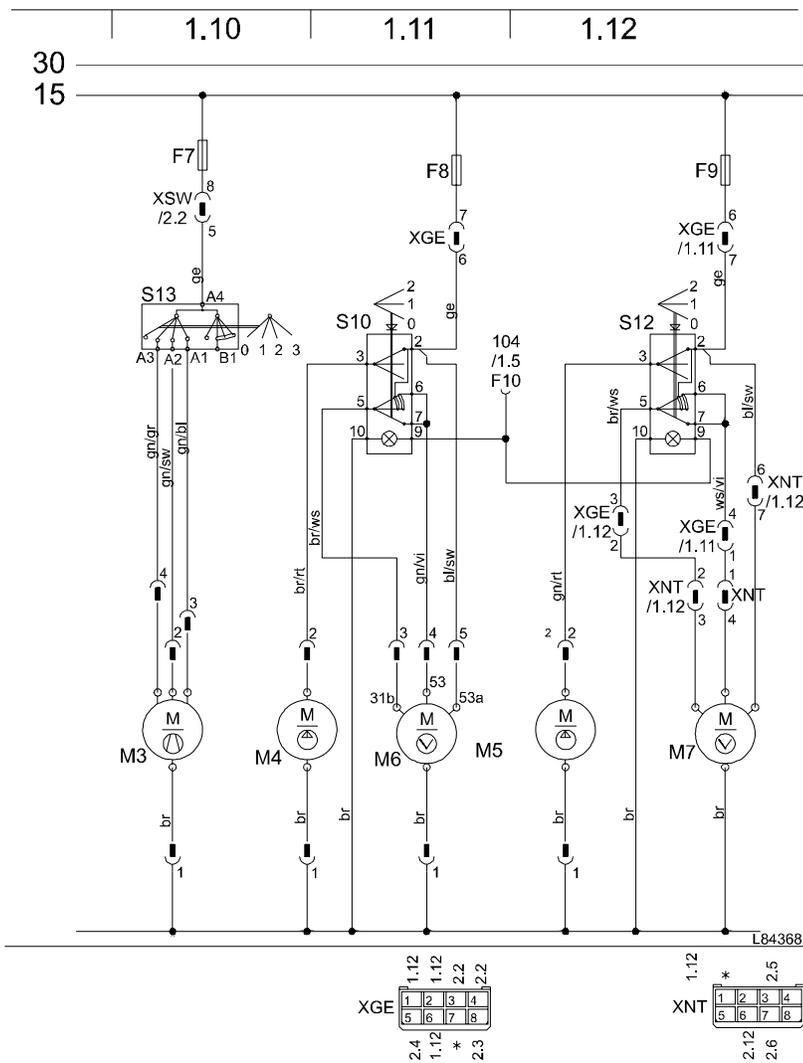
# Instruments, indicating units



Path	Designation	Device	Path	Designation	Device
		<b>Instruments, indicating units</b>	1.7	H4	Parking brake indicator lamp
1.5	P1	Temperature indicator	1.8	H5	Driving - forwards
1.6	P2	Fuel gauge	1.9	H11	Driving - in reverse
1.6	P3	Operating hour meter	1.8	H7	Upper beam indicator lamp
1.5	R3	Temperature sensor - Coolant	1.8	H8	Turning indicator
1.6	R2	Fuel gauge transmitter	1.9	H10	Pre-heater indicator lamp
1.5	F10	Fuse	1.7	D6	Diode
1.7	H1	Battery charge indicator lamp	1.7	S27	Engine oil pressure switch
1.7	H2	Engine oil pressure indicator lamp	1.7	S28	Air filter clogging switch
1.7	H3	Air filter clogging indicator lamp			

Heater fan

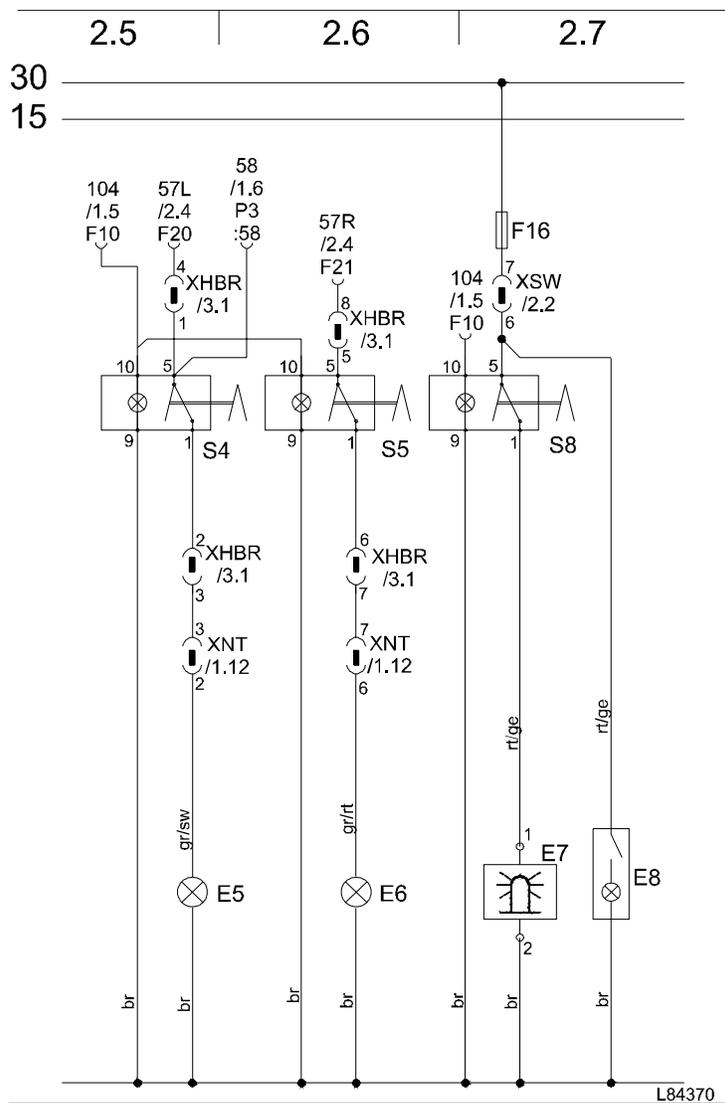
Wash/ wipe system



Path	Designation	Device	Path	Designation	Device
		<b>Heater fan</b>			
1.10	F7	Fuse	1.11	S10	Front wash/ wipe switch
1.10	S13	Heater fan switch	1.12	S12	Rear wash/ wipe switch
1.10	M3	Heater fan	1.10	M4	Front wash pump
		<b>Wash/ wipe system</b>	1.11	M6	Front wipe motor
1.11	F8	Fuse	1.12	M5	Rear wash pump
1.12	F9	Fuse	1.12	M7	Rear wipe motor

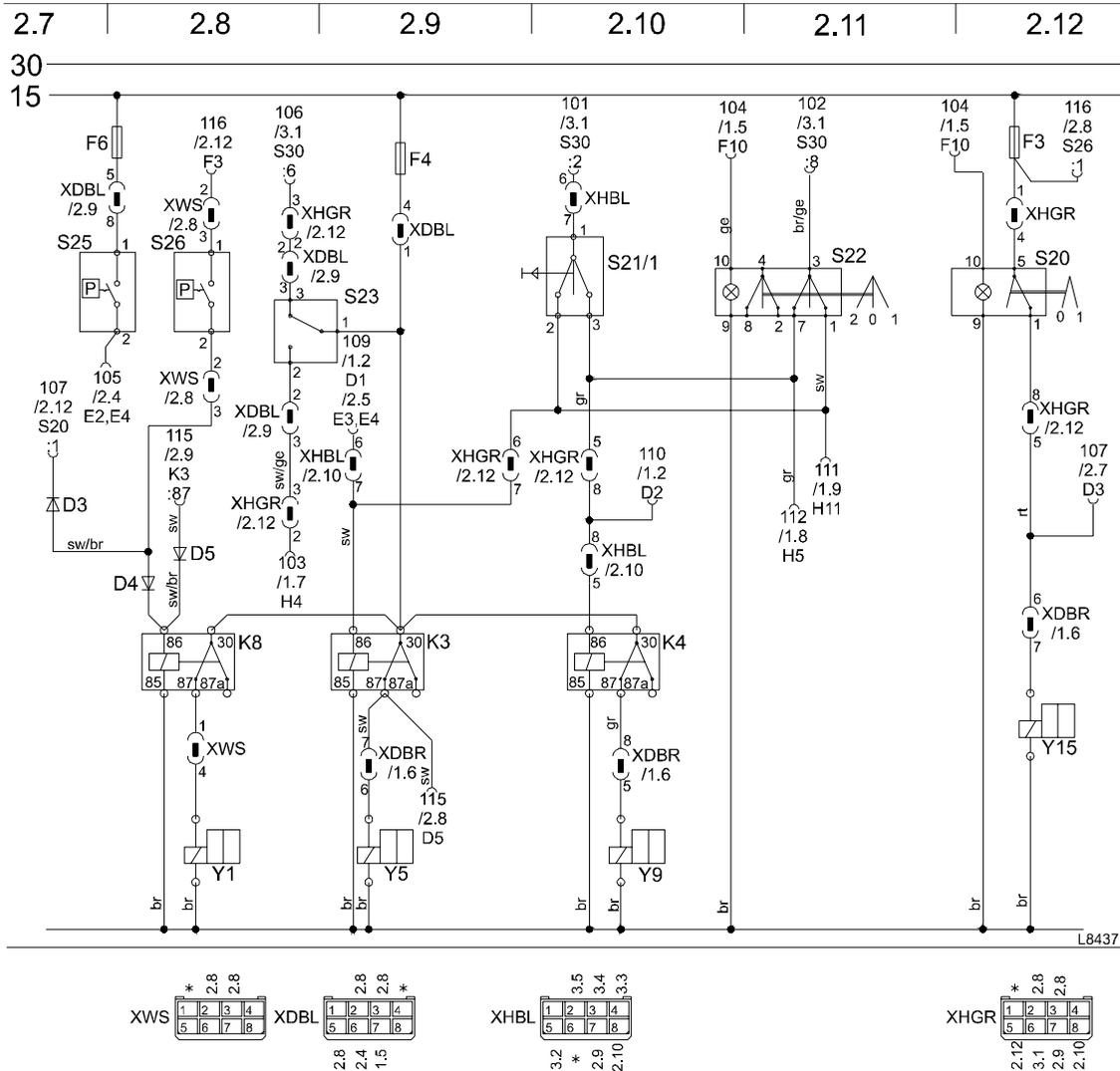


# Illumination and signalling system



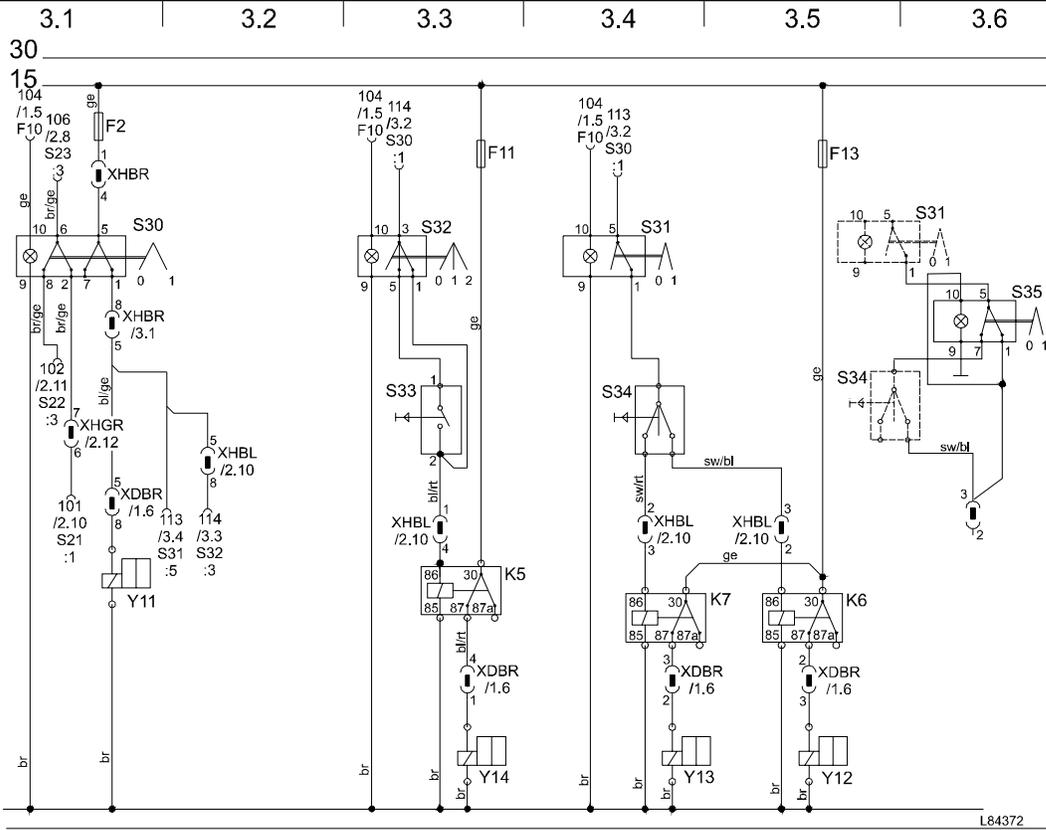
Path	Designation	Device	Path	Designation	Device
		<b><i>Illumination and signalling system</i></b>			
2.7	F16	Fuse	2.5	E5	Front working floodlights
2.5	S4	Front working floodlights	2.6	E6	Rear working floodlights
2.6	S5	Rear working floodlights	2.7	E7	Rotating beacon
2.7	S8	Rotating beacon	2.7	E8	Cab illumination

# Driving, brakes



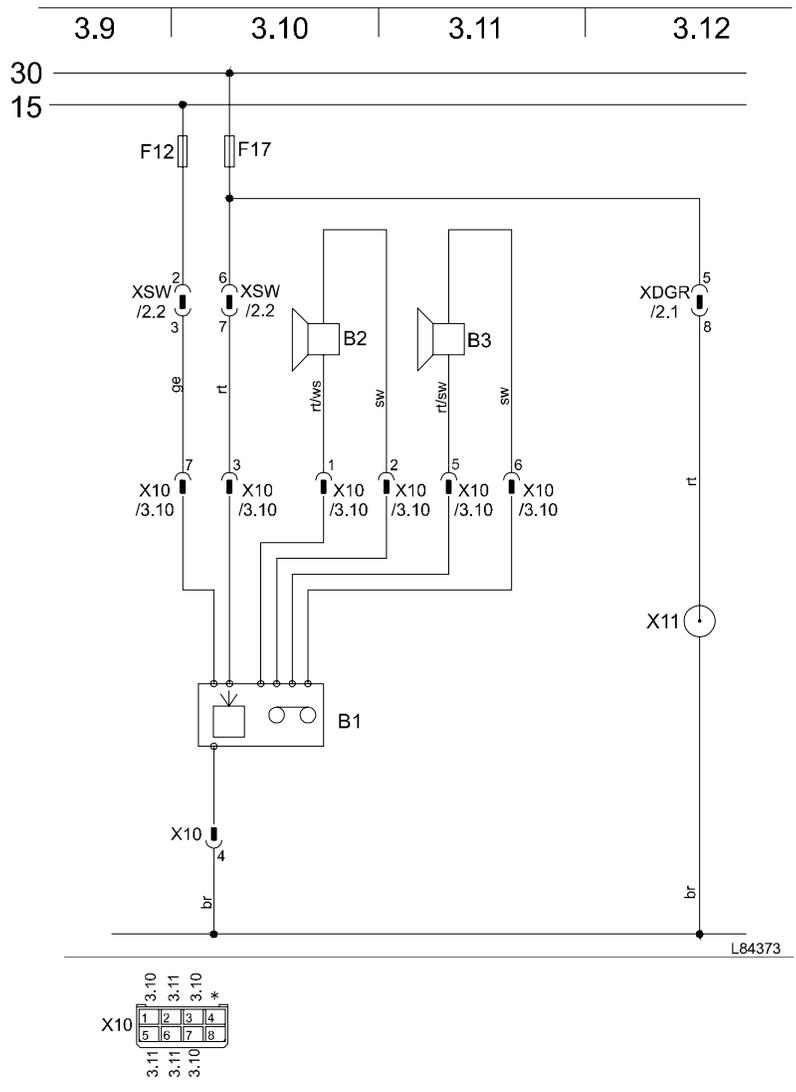
Path	Designation	Device	Path	Designation	Device
		<b>Driving, brakes</b>			
2.8	F6	Fuse	2.7	D3	Diode
2.9	F4	Fuse	2.8	D4	Diode
2.12	F3	Fuse	2.8	D5	Diode
2.8	S25	Brake light switch	2.8	K8	Hydrostatic brake
2.8	S26	Hydrostatic brake	2.9	K3	Driving in reverse
2.8	S23	Parking brake switch	2.10	K4	Driving forwards
2.10	S21/1	Co-ordinate lever	2.8	Y1	Direction-of-travel recognition
2.11	S22	Driving forwards - in reverse	2.9	Y8	Valve for driving in reverse
2.12	S20	Driving fast - slow	2.10	Y9	Valve for driving forwards
			2.12	Y15	Valve for driving fast - slow

Working hydraulics	Float position	Additional control circuit	Option
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Path	Designation	Device	Path	Designation	Device
		<b>Working hydraulics</b>			<b>Additional control circuit</b>
3.1	F2	Fuse	3.5	F13	Fuse
3.1	S30	Working hydraulics cut-off	3.4	S34	Co-ordinate lever for 3rd control circuit
3.1	Y11	Working hydraulics valve	3.4	S31	3rd control circuit cut-off
		<b>Float position</b>	3.4	K7	Additional control circuit valve
3.3	F11	Fuse	3.5	K6	Additional control circuit valve
3.2	S32	Float position	3.4	Y13	Additional control circuit valve
3.3	S33	Co-ordinate lever for float position	3.5	Y12	Additional control circuit valve
3.3	K5	Float position relay			<b>Option</b>
3.3	Y14	Float position valve	3.6	S35	3 <sup>rd</sup> control circuit continuous operation

Radio, socket



Path	Designation	Device	Path	Designation	Device
		<b>Radio, socket</b>			
3.10	F12	Fuse			
3.10	F17	Fuse			
3.10	B2	Loudspeaker			
3.11	B3	Loudspeaker			
3.10	B1	Radio			
3.12	X11	Socket			
3.10	X10	Radio socket (AMP)			

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<b>Notizen</b>	<b>Notes</b>	<b>Annotazioni</b>	<b>Notas</b>
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