MECALAC

OPERATING INSTRUCTIONS
SWING SHOVEL LOADER (Translation)

GB

AS 210e

MECALAC Baumaschinen GmbH Am Friedrichsbrunnen 2 D-24782 Büdelsdorf
Telefon (+49) (0)4331/351-325 Internet: www.mecalac.de
Telefax (+49)(0)4331/351-404 E-Mail: info@mecalac.de

You will find the

spare parts documentation

online at:

https://www.mecalac.de/abm_doc/

Log in as final customer and specify the **FIN** number (truck identification number) of your MECALAC truck. When you already own an **MECALAC** truck, you can also view the spare parts documentation here. To do so, please specify the **FIN** number of this truck.
If required, you can print the documentation.

Introduction

Preface

MECALAC's swivel shovel loaders, articulated loaders and loader excavators with backhoe are machines included in **MECALAC's** vast product range covering a wide variety of working tasks.

Decades of experience in the construction of earth-moving machines, the wide range of attachments available as well as modern production facilities, careful testing and highest quality demands guarantee the highest degree of reliability of your **MECALAC** machine.

The extent of documentation delivered by the manufacturer includes the following:

- Loader operating instructions
- Engine operating instructions
- Loader spare parts list
- Engine spare parts list
- EC conformity declaration

Operating instructions

The operating instructions contain all the information which the user requires for operation and maintenance.

In the "Maintenance" section, all maintenance work and operation tests are described which can be carried out by trained personnel.

This section does not cover more extensive maintenance work that is reserved to personnel authorized and trained by the manufacturer. In particular, this applies to facilities governed by Motor Vehicle Construction and Use Regulations and the Regulations for the Prevention of Accidents.

Due to the construction modifications reserved by the manufacturer, there may be differences in the figures; however, this has no influence on the technical contents.

How to use this manual

Explanations

- The designations **"left"<P> and** "right"<CTRACK 0> are to be seen from the driver's seat in the driving direction.
- Optional equipment
  means: not fitted in series.

Information about illustrations

- (3-35)
  means: chapter 3, fig. 35
- (3-35/1)
  means: chapter 3, fig. 35, item 1
- (3-35/arrow)
  means: chapter 3, fig. 35, ◄

Abbreviations used

UVV = Unfallverhütungsvorschrift (Accident Prevention Regulations)

StVZO = Straßenverkehrzulassungsordnung (German Traffic Regulations)

Edition: 01.2012
Printed: 01.2012

Table of Contents

Safety Regulations

1 Fundamental safety instructions

1.1 Warnings and symbols

In this operation manual, the following designations or symbols are used for important information.

NOTE
Extra information about the economical use of the loader.

CAUTION
Special information for regulations and prohibitions for avoiding damage.

DANGER
Information or regulations and prohibitions for prevention of damage to persons or extensive damage to goods.

1.2 Proper use of the loader

1.2.1 This machine was designed according to the state of the art and recognised safety rules. Nevertheless, use of the machine may cause danger for the user or third parties or impairments to the machine or other objects.

1.2.2 The machine and manufacturer-approved attachments may only be used in a technical non-objectionable condition, taking all safety regulations into account, especially with regard to the operating manuals (machine and engine). In particular, defects which could have a detrimental effect on the safety of the machine should be eliminated immediately.

1.2.3 The machine is designed exclusively for the purposes described in this operating manual. Any other use beyond these purposes is regarded as being improper use. The manufacturer is not liable for any damage caused in this connection. The risk is solely that of the user.
Authorised use of the machine also requires that the operating manual (machine and engine) be heeded and the inspection and maintenance conditions are complied with.

1.3 Organisational measures

1.3.1 The operating manuals (machine and engine) must be available at all times and at the site where the machine is in operation.

1.3.2 In addition to the operating manuals (machine and engine), the general applicable and other binding regulations for the prevention of accidents (especially the safety regulations of the German Trade Association - VBG 40) as well as the regulations for environmental protection must be observed; personnel must be instructed accordingly.
Also heed all regulations governing public traffic.

1.3.3 The personnel who are to work with the machine must read the operating manuals (machine and engine) before starting work, especially the chapter concerning safety precautions.
This also applies to personnel working occasionally with the machine, e.g. during maintenance work.

1.3.4 The driver must wear a seat belt during operation.

1.3.5 Personnel working with the machine must not wear long flowing hair, loose clothing or jewellery, including rings. Danger of injuries, e.g. by getting caught or being pulled in.

1.3.6 All safety and danger plates on the machine must be observed!

1.3.7 All safety and danger plates must be attached to the machine and must be kept legible.

1.3.8 In case of modifications to the machine, especially in case of damage or changes in the operating behaviour of the machine which could influence its safety, stop the machine immediately and inform the responsible person in charge about the incident.

1.3.9 Do not make any modifications or conversions to the machine which could affect safety without the manufacturer's consent. This also applies to the installation and adjustment of safety devices, valves and welding of supporting parts.

1.3.10 Check the hydraulic system, especially hydraulic pipes, at regular intervals for defects and immediately eliminate any defects found.

1.3.11 The inspection periods specified in the operating manual (machine and engine) and the maintenance plan must be observed.

1.4 Selection of personnel and necessary qualifications

Basic responsibilities

1.4.1 The machine may be driven and maintained only by personnel selected by the employer for this purpose.

These persons must:

- have attained the age of 18 years,
- be physically and intellectually suitable,
- have been instructed in the operation or maintenance of the machine and must have demonstrated their ability to their employer,
- must be expected to carry out the work conveyed to them in a diligent manner.

1.4.2 Electrical work on the machine may be carried out only by a qualified electrician or persons supervised by a qualified electrician according to the electrical regulations.

1.4.3 Only qualified specialists may carry out work on the chassis, the brake and steering system.

1.4.4 Only personnel with special experience and the necessary know-how are permitted to carry out work on the hydraulic system.

1.5 Safety Information for Certain Operating Phases

1.5.1 Normal Operation

1.5.1.1 Other persons must not be transported!

1.5.1.2 Start and drive the machine from the driver's seat only!

1.5.1.3 Observe the control lamps according to the operation manual (machine and engine) during starting and switching-off operation!

1.5.1.4 Before commencing work / driving, make sure that the brakes, steering, signal beacons and lights function!

1.5.1.5 Before moving the machine, always check that the attachments are safely stowed so that no accident may occur!

1.5.1.6 Before commencing work, make yourself familiar with the working environment. This means observing obstacles on the working site, quality and resistance of the soil, undertaking the necessary protection precautions between the building site and public traffic.

1.5.1.7 Before starting the machine, make sure that no person is endangered by the moving machine!

1.5.1.8 Take measures so that the machine can be operated **only** in a safe and functional manner. The machine may only be operated when all safety devices, e.g. detachable safety devices and sound absorption, exist and function.

1.5.1.9 Avoid any action which appears to be dangerous!

1.5.1.10 Persons must not be carried in the working equipment, e.g. in the attachments!

1.5.1.11 The operator may carry out work with the machine only if no persons are in the danger zone.

The danger zone is the area near the machine where persons may be injured

- by work-induced movements of the machine,

- by work attachments and devices,

- by loads swinging out,

- by dropping loads,

- by attachments falling from the machine.

1.5.1.12 In case of danger to persons, the operator must give appropriate warning signs. It may be necessary to stop work.

1.5.1.13 In case of functional defects, stop the machine **immediately** and secure it. Eliminate defects immediately!

1.5.1.14 Check the machine at least once every shift for external visible damage and defects. Report any defects (including changes in the operational behaviour) immediately to the person in charge. If necessary, stop the machine immediately and secure it.

1.5.1.15 The driver may slew the attachments in overhead driving, operating and working areas only if these areas are suitably safeguarded by protective roofing. These protection roofs must offer appropriate safety against loads and falling goods. If you are in doubt, assume **no** protection roofs are present.

1.5.1.16 When driving, the attachment is to be kept as close to the ground as possible.

1.5.1.17 Please observe the applicable traffic regulations when driving on public roads, paths or open spaces. The machine must be brought into road-worthy condition beforehand.

1.5.1.18 Make sure to always switch on the lights in the dark and when visibility is poor.

1.5.1.19 If the lights of the machine are not adequate for the safe execution of certain work, additional lighting must be provided on the working site, especially at dumping points.

1.5.1.20 Should the driver's sight of his driving and working area be restricted due to work-induced influences, he must be given guidance or he must safeguard the working area by a firm barrier.

1.5.1.21 The person giving guidance must be a reliable person and must be informed about his tasks before commencement of the work.

1.5.1.22 The driver and guide must agree on signals for communication. These signals may only be given by the driver and guide.

1.5.1.23 The guide must be easily recognizable – e.g. by wearing warning clothing – and must always be in the driver's field of vision.

1.5.1.24 When passing under subways, bridges, tunnels, electrical overhead lines, etc., make sure that there is adequate clearance!

1.5.1.25 Maintain adequate clearance when working at the edge of quarries, pits, rubbish dumps and embankments to eliminate any danger of the machine plunging down. The contractor or his deputy must stipulate the distance from the edge, taking the soil bearing capacity into consideration.

1.5.1.26 The machine may only be used at stationary dumping areas when firmly integrated installations are provided to prevent the machine from running or sliding down.

1.5.1.27 Avoid such work which could have a detrimental effect on the stability of the machine.

The following may affect the stability:
- overloading,
- ground that is too soft,
- abrupt acceleration or deceleration of driving or working movement,
- reversing out of a high driving speed,
- working on slopes,
- driving too quickly round sharp bends,
- driving the machine on rough terrain when the bucket arm is swivelled.

1.5.1.28 Do not traverse across slopes. Always carry working equipment and loads near the ground, especially when driving down slopes. Sudden cornering is forbidden!

1.5.1.29 On steep inclines and gradients, the load is to be carried on the uphill side.

1.5.1.30 Reduce speed before inclines; always adapt the speed of the machine to the local conditions!
Never change into low gear when driving on slopes, but rather before the slope!

1.5.1.31 Reversing over a longer period must be avoided!

1.5.1.32 When leaving the machine, always safeguard the machine to prevent it from unintentionally rolling away; prevent non-authorised persons from using it!

1.5.1.33 The driver must not leave the machine if the attachments are not lowered or safeguarded.

1.5.1.34 During breaks and after work hours, the driver must park the machine on solid and, if possible, level ground and safeguard it against unintentionally rolling away.

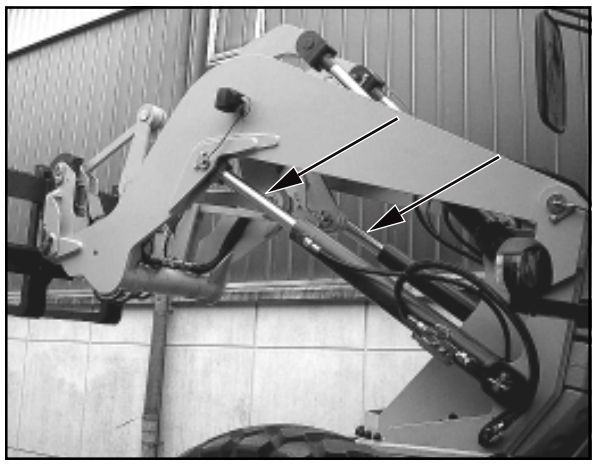


Figure 1-1

1.5.2 Special work regarding the use of the machine and elimination of defects during work; disposal

1.5.2.1 The dates for adjustment work, maintenance work and inspections laid down in the operating manual (machine and engine) must be strictly observed. This also applies to information regarding the replacement of parts/ part equipment. This work may only be executed by skilled personnel.

1.5.2.2 For all work involving the operation, conversion or adjustment of the machine and its safety devices as well as inspection, maintenance and repair work, please observe the switch-on and switch-off procedures in accordance with the operating manual (machine and engine) as well as the related instructions for maintenance work.

1.5.2.3 The engine must be switched off before maintenance or repair work is carried out.

1.5.2.4 The stability of the machine or the attachments must be guaranteed at all times during maintenance and repair work.

1.5.2.5 Maintenance and repair work may only be carried out when the attachment is set down on the ground or supported or when equivalent measures against unintentional movement were taken.
During maintenance and repair work under the bucket arm:
- the bucket arm must be mechanically supported,e.g. insert the bucket arm support (option) (1-1/arrows)
- the hand lever for working and auxiliary hydraulics (1-2/ arrow) must be secured (horizontal position).
- the swivel unit must be blocked. To do this, remove the blocking chock from the tool box (1-3), insert it in the swivel block (1-4/arrow) and secure it with the spring locking lever.

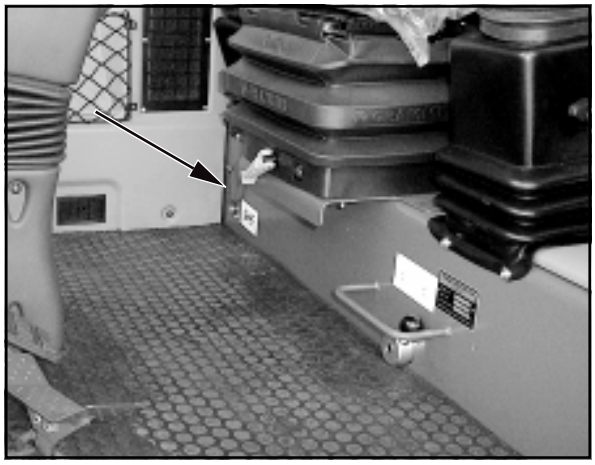


Figure 1-2

1.5.2.6 If necessary, secure the maintenance area on a large scale.

1.5.2.7 The machine must be protected from unintentionally starting after it has been switched off for maintenance and repair work:
- remove the ignition key and
- attach a warning sign to the main battery switch.

This applies especially to works on the electrical equipment.

1.5.2.8 Individual pieces and large assemblies must be carefully secured to hoisting equipment when being replaced to avoid any damage. Only suitable and technically sound hoisting equipment may be used as well as crane equipment with adequate payload. Do not stand or work underneath suspended loads!

Figure 1-3

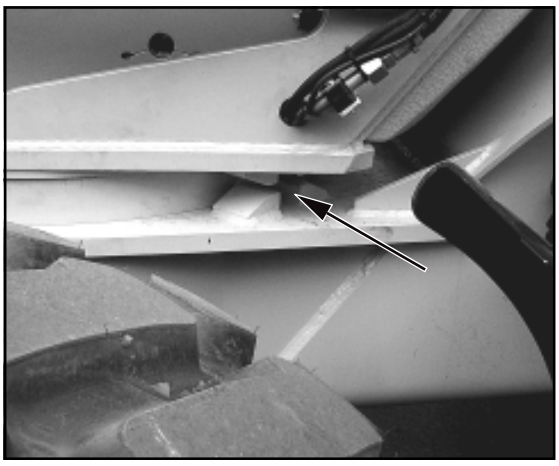


Figure 1-4

1.5.2.9 Only experienced personnel should be entrusted with the securing of loads! Loads must be secured so that they cannot slip or fall down.

1.5.2.10 Attached loads may only be moved with the machine when the road is graded.

1.5.2.11 When working with hoisting equipment / elevators the slingers may only work with the approval of the driver and from the side of the boom. The driver may only give his consent if the machine is standing still and the working attachment is not being moved.

1.5.2.12 Persons assisting with the guidance of loads and slingers may only stay in visual or communication reach of the driver.

1.5.2.13 The operator must move the load as close to the ground as possible and avoid swivelling the load.

1.5.2.14 The operator may not move the load over the heads of persons.

1.5.2.15 In the case of erection work that must be carried out above normal human height, suitable safety ascent devices and working platforms must be used. Do not use engine parts, especially attachments such as buckets, as climbing and descending facilities. Use safety harnesses when working at very great heights. All handles, steps, railings, platforms, scaffolds, and ladders must be kept free from dirt and ice.

1.5.2.16 Clean the machine, especially connections and screw connections, before commencement of maintenance work and make sure that the machine is free from oil, fuel oil or dirt. Do not use aggressive detergents. Use lintless cleaning rags!

1.5.2.17 Before cleaning the machine with water or steam jet (high pressure cleaning unit) or with detergent, protect all areas where water/steam/detergent may penetrate and affect the functions or safety of the machine by a suitable cover or by applying tape. In particular, engine components such as the injection pump, generator, generator governor and starter are very delicate.

1.5.2.18 After cleaning, completely remove all protective covering and tape.

1.5.2.19 After cleaning, check all fuel, engine oil and hydraulic oil pipelines for leakages, loose connections, abraded parts and damage. Eliminate defects immediately!

1.5.2.20 Always fasten screw connections after completion of maintenance and repair work.

1.5.2.21 Should it be necessary to dismantle safety devices during mounting, maintenance or repair work, these safety devices must be re-installed and checked carefully after completed maintenance and repair work.

1.5.2.22 Make sure that fuel, accessory materials and exchanged parts are safely disposed of with no danger to the environment.

1.5.2.23 The machine should be checked by a specialist before commissioning and after essential modifications before it returns to service.

1.5.2.24 The machine must be checked by a specialist once a year. Furthermore, a specialist must check the machine whenever necessary according to operating conditions.

1.5.2.25 The test results must be recorded and kept in the archives at least until the following inspection date.

1.6 Instructions regarding special categories of danger

1.6.1 Electrical energy

1.6.1.1 Only use original fuses with stipulated ratings. Immediately switch off the machine if the electrical supply fails.

1.6.1.2 When working near overhead lines and overhead wires, a safety clearance must be kept between the machine and its working equipment in order to prevent sparking over. The safety clearance depends on the nominal voltage of the overhead/wire line. This also applies to the distance between the lines and to the attachments and slung loads.

The following safety clearances must be observed to meet the above mentioned requirement:

Nominal voltage (kilovolts)			Safety clearance (meters)
	to	1 kV	1.0 m
above 1 kV	up to	110 kV	3.0 m
above 110 kV	up to	220 kV	4.0 m
above 220 kV	up to	380 kV	5.0 m
unknown nominal voltage			5.0 m

When approaching overhead lines, all working movements of the machine must be taken into consideration, e.g. the position of jibs, the swinging of ropes and the dimensions of attached loads.

In addition, attention must be paid to any roughness of soil which could cause an inclined position of the machine, thus getting it closer to the overhead line.

The fact that overhead lines may swing out during windy weather and may reduce the distance must also be taken into consideration.

1.6.1.3 In the case of sparking over, the driver must bring the machine out of the danger area by lifting or lowering the attachments or by swivelling away or driving the machine out of the danger area. If this is not possible then the following rules must be observed:
- Do not leave the driver's cabin!
- Warn persons standing near the machine not to approach or touch the machine!
- Give immediate instructions to have the power cut off!
- Leave the machine only when it is sure that the electricity in the damaged / contacted power line is switched off so that the line is dead!

1.6.1.4 Work on the electrical system or on the operating system may only be carried out by a skilled electrician or by personnel instructed or supervised by such a trained electrician according to electrotechnical regulations.

1.6.1.5 The electrical system of the machine must be checked/inspected at regular intervals. Any defects, e.g. loose connections or scorched cabling, must be eliminated immediately.

1.6.1.6 The main battery switch must be disconnected before inspection, maintenance or repair of machine parts and components so that they are not under power.

1.6.1.7 Electric welding operations may only be performed if the main battery switch has been removed.

1.6.2 Hydraulics

1.6.2.1 Only experts with special expertise and experience may carry out work on the hydraulic system!

1.6.2.2 All pipelines, hoses and screw connections must be checked regularly for leakages and visible damage! Immediately repair such defects! Spurting hydraulic oil may cause injuries and fire.

1.6.2.3 Those hydraulic system segments which are to be opened must be depressurised before commencement of the repair work according to the assembly group description!

1.6.2.4 The hydraulic pipelines must be correctly laid and connected! Do not mix up the connections. Spare parts must meet the technical requirements of the manufacturer. Original spare parts ensure the fulfilment of these requirements.

1.6.2.5 The factory settings of hydraulic components (e.g. the maximum permissible speed of the axial piston engine) must not be altered. Any adjustment will render the warranty invalid.

1.6.3 Noise

Sound protection equipment must be in the protective position during operation of the machine.

1.6.4 Oil, grease and other chemical substances

1.6.4.1 The relevant safety regulations must be observed when handling oil, grease or other chemical substances.

1.6.4.2 Caution when working with hot fuel and other accessory materials (danger of burning and scalding).

1.6.4.3 Caution when working with brake fluid and battery acid.

TOXIC AND CAUSTIC!

1.6.4.4 Be careful when working with fuel.

FIRE HAZARD!

- Before refuelling, switch off the engine and remove the ignition key.
- Do not refuel in an enclosed area.
- Never refuel near open fires or sparks.
- Do not smoke during refuelling.
- Immediately wipe up spilled fuel.
- Keep the machine free of fuel, oil and grease.

1.6.5 Gas, dust, steam, smoke

1.6.5.1 The machine may be operated in closed rooms only if sufficient ventilation is ensured! Ensure sufficient ventilation prior to starting the machine!
The regulations for the respective working site must be strictly observed.

1.6.5.2 Carry out welding, burning and grinding work on the machine only when this is explicitly approved. Otherwise, there is the danger of fire and explosion!

1.6.5.3 Before carrying out welding, burning and grinding work, clean the machine and its vicinity of combustibles and make sure that the room is adequately ventilated.

Explosion hazard!

1.7 Transport and towing; recommissioning

1.7.1 The machine may only be towed if the brakes and steering function.

1.7.2 Towing may be carried out only by means of an adequately dimensioned towing bar in connection with towing devices.

1.7.3 Start towing at a low speed. Persons must not be near the towing bar.

1.7.4 When the machine is loaded and transported, the necessary auxiliary equipment must be fitted to prevent any unintended movement. The tyres must be kept clean of mud, snow and ice so that the machine can drive on ramps without danger of sliding.

1.7.5 Strictly observe the operating manual during recommissioning.

1.8 Safety information for the contractor or the contractor's authorised personnel

1.8.1 Organizational measures

1.8.1.1 We emphasise that attachments that are not supplied by us are also not tested and approved by us. Use of such products can under certain conditions adversely affect the present constructional qualities of your loader and thus limit the active and passive driving safety. The manufacturer cannot be held responsible for damage that occurs through the use of such products.

Figure 1-5

1.8.1.2 Inform yourself of the location/use of fire extinguishers (1-5/arrow) and first-aid kit (1-6/arrow)!

1.8.1.3 When travelling on public roads, a first-aid kit, a warning triangle and a warning lamp must be available on the vehicle.

1.8.2 Selection of personnel and necessary qualifications; basic responsibilities

1.8.2.1 Only reliable persons are allowed to work on/with the machine. The minimum legal age must be observed.

1.8.2.2 Employ trained or instructed personnel only. Clearly define the competencies of the personnel regarding operation, installation, maintenance and repair work.
Ensure that only authorised personnel may work on/with the machine!

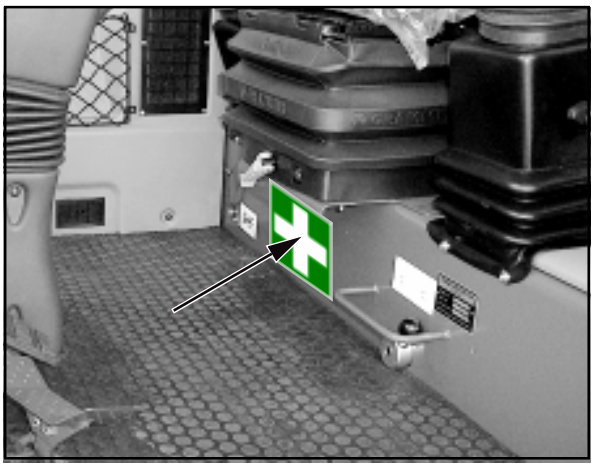
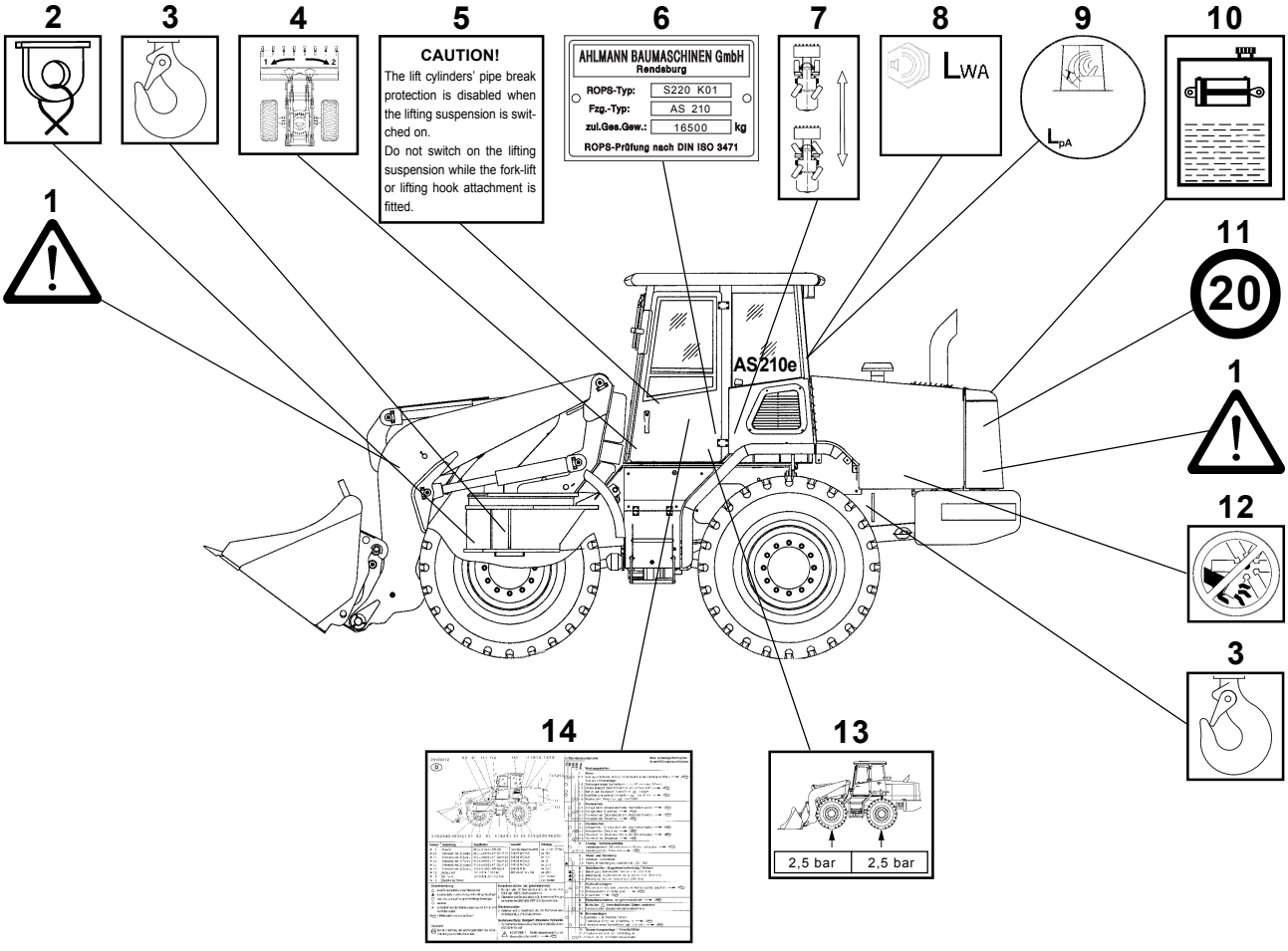


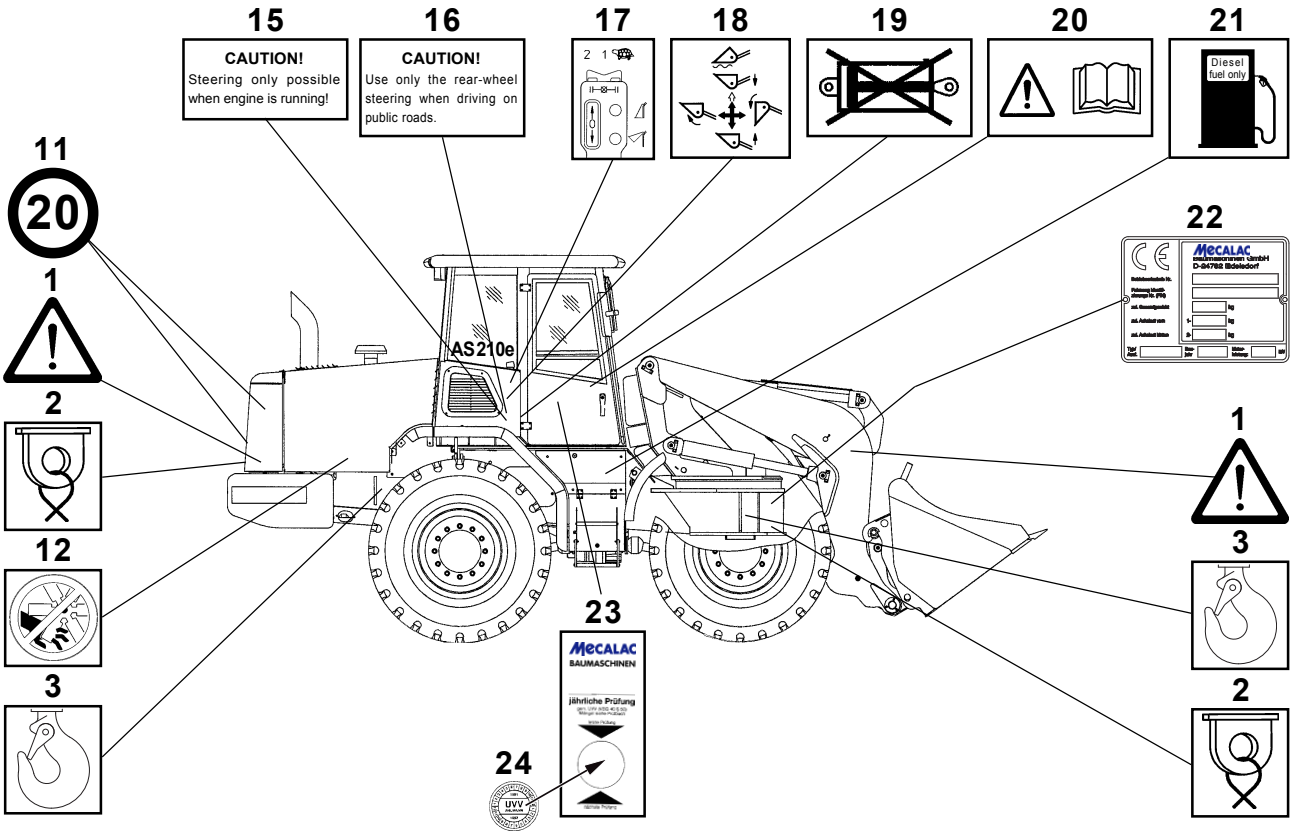
Figure 1-6

1.8.2.3 Authorise the driver to refuse instructions given by third parties when these instructions are detrimental to the safety of the driver and the machine.

1.8.2.4 Personnel who are to be trained, instructed or working on/with the machine in the scope of professional training must not work on/with the machine unless they are supervised by an experienced person who has been authorised by the employer.

Signs


2
3
4
5
CAUTION!
The lift cylinders' pipe break protection is disabled when the lifting suspension is switched on.
Do not switch on the lifting suspension while the fork-lift or lifting hook attachment is fitted.
6
AHLMANN BAUMASCHINEN GmbH
Rendsburg
ROPS-Typ: S220 K01
Fzg.-Typ: AS 210
zul.Ges.Gew.: 16500 kg
ROPS-Prüfung nach DIN ISO 3471
7
8
LWA
9
LpA
10
1
11
20
AS210e
1
12
3
14
13
2,5 bar
2,5 bar


15
CAUTION!
Steering only possible when engine is running!
16
CAUTION!
Use only the rear-wheel steering when driving on public roads.
17
2 1
18
19
20
21
Diesel fuel only
11
20
1
2
12
3
AS210e
22
MECALAC
D-24782 Büdelsdorf
1
3
2
23
MECALAC
BAUMASCHINEN
jährliche Prüfung
24
UVV

1	Symbol:	Stay out of the danger zone
2	Symbol:	Lashing eyes
3	Symbol:	Lifting hook
4	Symbol:	Swivelling
5	Sign:	**» Only for loaders with pipe break protection «** **CAUTION!** The lift cylinders' pipe break protection is disabled when the lifting suspension is switched on. Do not switch on the lifting suspension while the fork-lift or lifting hook attachment is fitted.
6	Type label:	Driver's cab
7	Symbol:	Steering type switching (4-10/4) rear-wheel/four-wheel steering
8	Sign:	Sound power level (sect. 11.17)
9	Sign:	In-band accoustic level (sect. 11.17)
10	Symbol:	Hydraulic oil tank
11	Sign:	Maximum speed
12	Symbol:	Open only when the engine is not running
13	Sign:	Tyre pressure
14	Sign:	Maintenance schedule
15	Sign:	**CAUTION!** - Steering only possible when engine is running!
16	Sign:	**CAUTION!** -Use only rear-wheel steering when driving on public roads.
17	Symbol:	Gear shift - 2nd gear - 1st gear - Alpha max.
18	Symbol:	Hand lever for working hydraulics (4-11/5)
19	Symbol:	Ball block valve for working/auxiliary hydraulics closed
20	Symbol:	Read and observe the operating instructions before commissioning. Make sure that all other users have read the safety instructions!
21	Symbol:	Fuel tank
22	Machine type label (includes the identification number of the vehicle)	
23	Sign:	Annual inspection as per UVV
24	Sign:	UVV badge

Protection Against Theft

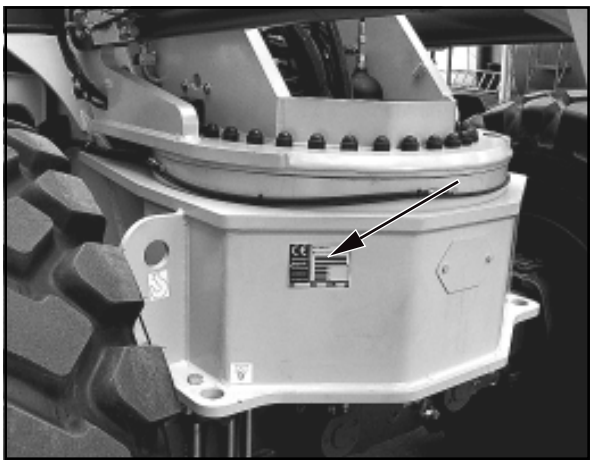


Figure 3-1

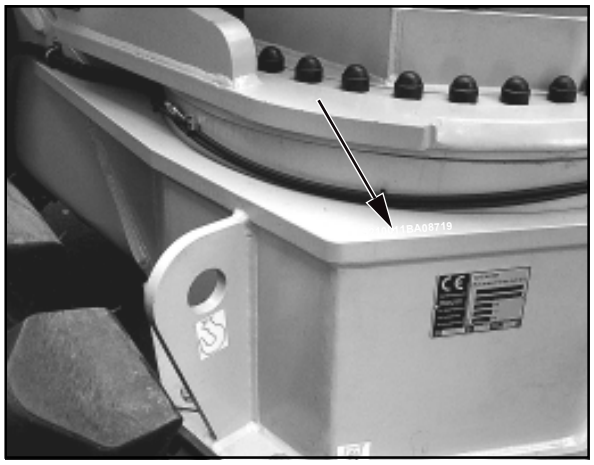


Figure 3-2

Figure 3-3

3 Protection against theft

Instances where construction machines were stolen have considerably increased in recent years.
To make it possible for the police, customs and other authorities to find and identify machines much faster, **Ahlmann** construction machines are fitted with the following identifying features:

3.1 Identifying features on the loader

(1) Loader type plate (3-1/arrow). Among other details, the loader type plate also gives the 17-digit **FIN** number (truck identification number) starting with W09.
(2) The **FIN** number is also stamped into the front part (3-2/arrow) of the loader.
(3) ROPS plate (3-3/arrow).
This plate gives the name of the manufacturer as well as details on the ROPS type, the loader type and the permissible overall weight.

3.2 Parking the loader

(1) Turn the steering wheel fully to the left or the right.

(2) Apply the parking brake (4-11/4).

(3) Tip the quick-change device until
- the tines of the bucket,
- the tines of the fork-lift attachment or
- the boom of the lifting hook, etc.

is placed on the ground.

(4) Close the ball block valve for the working and auxiliary hydraulics (4-10/3).

(5) Set the drive switch (4-11/6) to “forward” or “reverse”.

(6) Set transmission stage “I”(4-11/7) on the pilot valve for the working hydraulics.

(7) Remove the ignition key.

(8) Remove the main battery switch (8-21/2).

(9) Switch on the working lights (4-15/1 and 4-15/2). *

(10) Switch on the warning beacon (opt.) (4-15/4). *

(11) Switch on the hazard flasher (4-5/2). *

(12) Push the steering column switch (4-6/1) to the “High beam” position. *

(13) Lock both doors.

(14) Lock the engine hood.

(15) Lock the tank lid.

* In case of short-circuiting, persons in the vicinity should be made aware of the unusually lit machine.

3.3 Transponder for drive-away interlock

(option)
The “transponder for drive-away interlock” is an electronic drive-away interlock that deactivates vital loader functions. If the transponder (e.g. a tag at the ignition key) is taken away from the receiver unit (in the immediate vicinity of the ignition lock), these vital functions are interrupted.

Advantages in case of an insured event:

The transponder for drive-away interlock meets the new, stricter requirements of the insurance companies.
Ask your insurance company for the appropriate details.

Description

4 Description

Figures and descriptions may vary due to modifications in the construction that become possible and necessary to improve the loader and to develop it further technically.
These modifications are summarised in section 13.

4.1 Overview

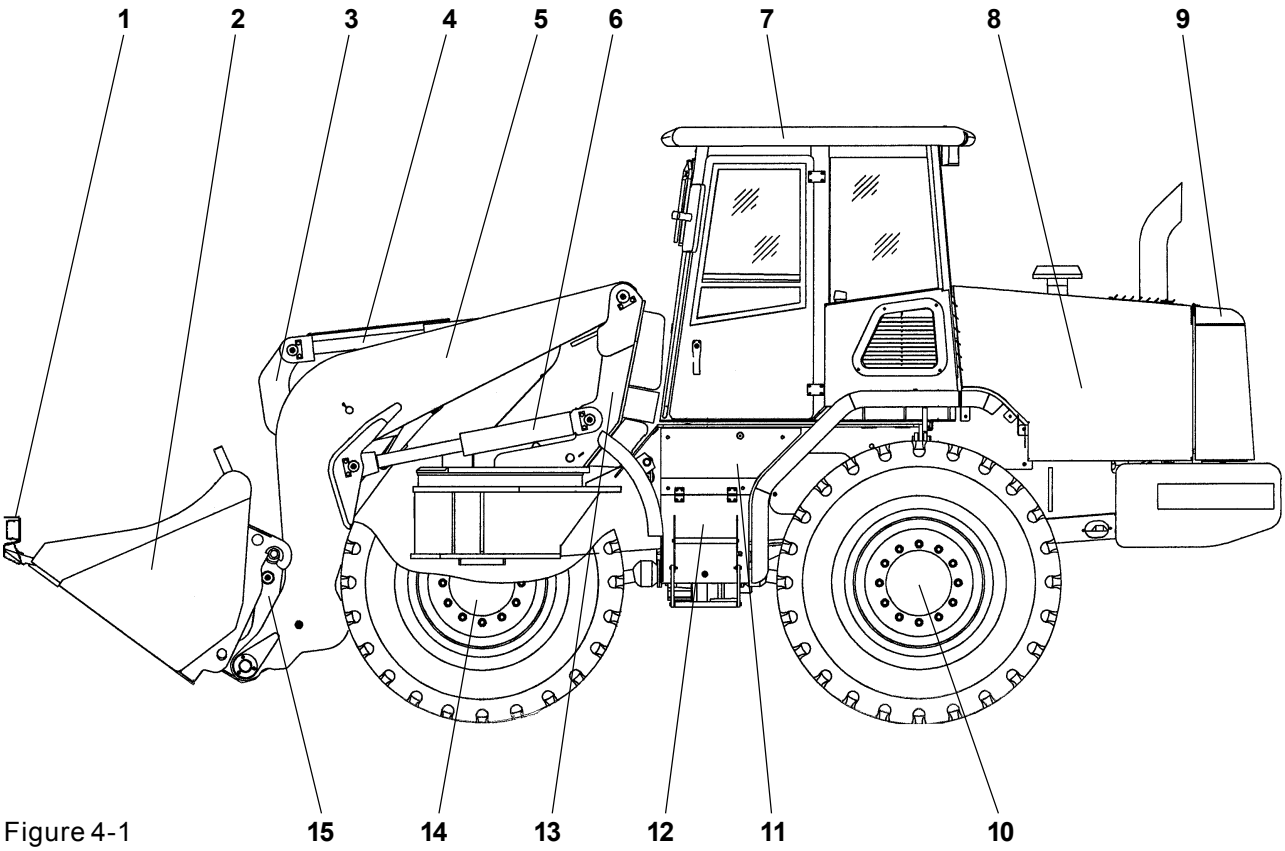


Figure 4-1

1 - Bucket protection
2 - Bucket/attachment
3 - Deflection lever
4 - Tip cylinder
5 - Bucket arm
6 - Lift cylinder
7 - Driver's cab
8 - Drive motor
9 - Hydraulic oil reservoir / filler neck
10 - Rear axle
11 - Battery compartment
12 - Tool box
13 - Revolving seat
14 - Front axle
15 - Quick-change device
16 - Fuel tank, right loader side (not shown)

4.2 Swivel unit and axle support

Two swivel cylinders are fed by a separate gear-type pump via a servo valve. The revolving seat is connected to the cylinders by a chain drive and is thus completely free of play. Swivelling can be carried out simultaneously with lifting of the bucket arm without mutual interference.

The bucket's swivelling radius is 90° to the right or to the left.
If the bucket is swivelled more than approx. 30°, the axle support system is automatically activated. The load-side support cylinder that affects the rear axle is subjected to hydraulic pressure by the force of the load via the support valve, counteracting the swivelled load.

NOTE
The axle support is deactivated when swivelling back.

4.3 Floating position

The loader is equipped with a floating position function that allows work such as levelling (grading) on uneven ground to be performed. To do this, move the hand lever for the working hydraulics (4-9/6) forwards beyond its pressure point.
The hand lever remains in this position until the bucket arm is to be raised again by moving the hand lever in the opposite direction.

DANGER
The floating position may only be activated when the bucket arm is in the lowermost position.

4.4 Bucket position indicator

The driver can read the position of the bucket using clip marks on the right tip cylinder. When the marks on the tip cylinder and the end of the control rod (4-2/arrow) form a line, the bucket floor is parallel to the ground.

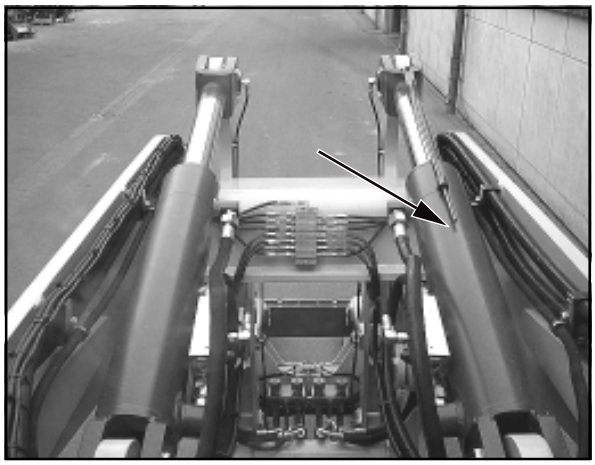


Figure 4-2

4.5 Lifting device suspension (option)

When the loader must be driven over larger distances, especially with a loaded bucket, the lifting device suspension (4-12/10) should be activated to avoid resonant motion. This becomes even more important with increasing unevenness of the terrain and increasing speed of the loader.

CAUTION
- The lifting device suspension must only be used for driving over long distances, not for working with the loader.

- Do not switch on the lifting suspension while the fork-lift or lifting hook attachment is fitted.
- The pipe break protection is disabled when the lifting suspension is switched on.

4.6 Fan reversal (option)

The loader is equipped with a fan reversal unit, permitting the radiator to be cleaned quickly and easily.
Depending on the degree of air pollution in the working area, the fan reversal unit should be activated regularly in intervals of 15 minutes (in extreme cases) to daily (in less serious cases).
To do this, press and hold the fan reversal button (4-12/12).

NOTE
Fan reversal can be activated both when the loader is at a standstill and when it is moving.

4.7 Wheel change

DANGER
Before changing a wheel on public roads, the danger area must be properly marked.

(1) Park the loader on a hard surface.

(2) Set the drive switch (4-9/5) to “0”.

(3) Apply the parking brake (4-9/7).

(4) When changing a wheel on the front axle:
- Lift and mechanically prop up the bucket arm [e.g. by inserting the bucket arm support (option) (1-1/arrows)] and lower the bucket arm until it rests on the bucket arm support.
- Block the swivel unit. To do this, remove the blocking wedge (1-3/arrow) from the holder, insert it into the swivel block (1-4/arrow) and secure it with the spring locking lever.

(4) When changing a wheel on the rear axle:
Lower the attachment to the ground.

(5) Turn the ignition key (4-7/5) to the left to position “0”.

(6) Secure the ball hand lever for the working and auxiliary hydraulics (1-2/arrow).

(7) Ensure that the loader does not roll away by securing it on one of the wheels of the axis in both driving directions. The wheel that does **not** have to be changed is to be secured.

(8) Loosen the wheel nuts of the wheel to be changed so that they can be turned manually.

(9) Fit a suitable jack (minimum capacity 6.0 tons) from the side under the axle bridge in the vicinity of the axle fixture so that it is centred and cannot slip (4-3). Lift the front/rear axle until the wheel does not have any contact to the ground.

Figure 4-3

DANGER

- Secure the jack by a suitable support to prevent it from sinking into the ground.
- Make sure that the jack is fitted correctly.

(10) Loosen the wheel nuts completely and remove them.

(11) Lower the loader slightly with the jack until the wheel bolts are free.

(12) Push the wheel from the wheel hub by moving it back and forth. Remove the wheel and roll it aside.

(13) Mount the new wheel onto the planetary axle.

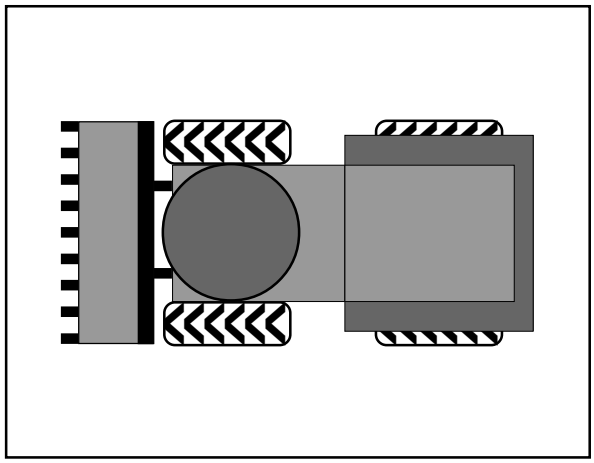


Figure 4-4

NOTE

- Only the tyres that are listed in section 11.7 are permitted.
- Pay attention to the profile position.
- If the profile position of the spare tyre does not fit, the spare tyre may only be used temporarily until a suitable tyre can be fitted.
- All four tires must be the same size and have the same PR rating (PR = ply rating: number of textile plies). For the running direction, if it exists, see Fig. 4-4.

(14) Tighten the wheel nuts by hand.

(15) Lower the front/rear axle using the jack.

(16) Tighten the wheel nuts to 550 Nm with a torque wrench.

CAUTION

Retighten the wheel nuts after the first 8-10 operating hours.

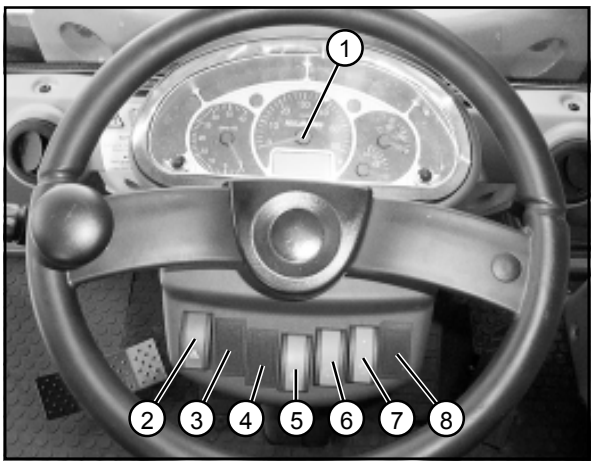


Figure 4-5

4.8 Controls

1 - Multifunction panel (Figure 4-8)
2 - Toggle switch for hazard flasher system
3 - free
4 - free
5 - Toggle switch for driving lights
- Position I: Parking light
- Position II: Road light
6 - Toggle switch for rear wiper/washer
7 - Pushbutton for releasing the quick-change device (for loaders with bolt lock together with the lower button 4-11/3 = ***standard equipment***)
8 - free

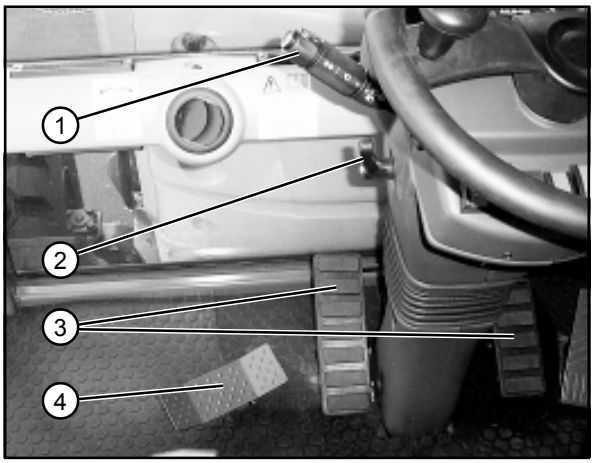


Figure 4-6

1 - Steering column switch
- to the front: turn signal, right
- to the rear: turn signal, left
- up: Dipped beam
- down: High beam
- Pushbutton: Signal horn
- Turn, step 1: Interval windshield wiper, front
- Turn, step 2: Windshield wiper, front
- Push upper ring in axial direction: Windshield washer, front

2 - Lock lever for steering column adjustment
- to the front/rear
- in axial steering column direction

3 - Double pedal for service brake/inching
4 - Swivelling pedal

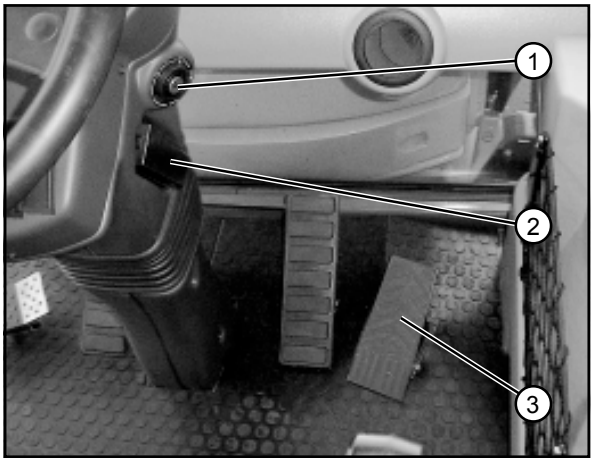


Figure 4-7

1 - Starter switch
2 - Fuse box (Figure 4-9)
3 - Accelerator

Multifunction panel (4-5/1)

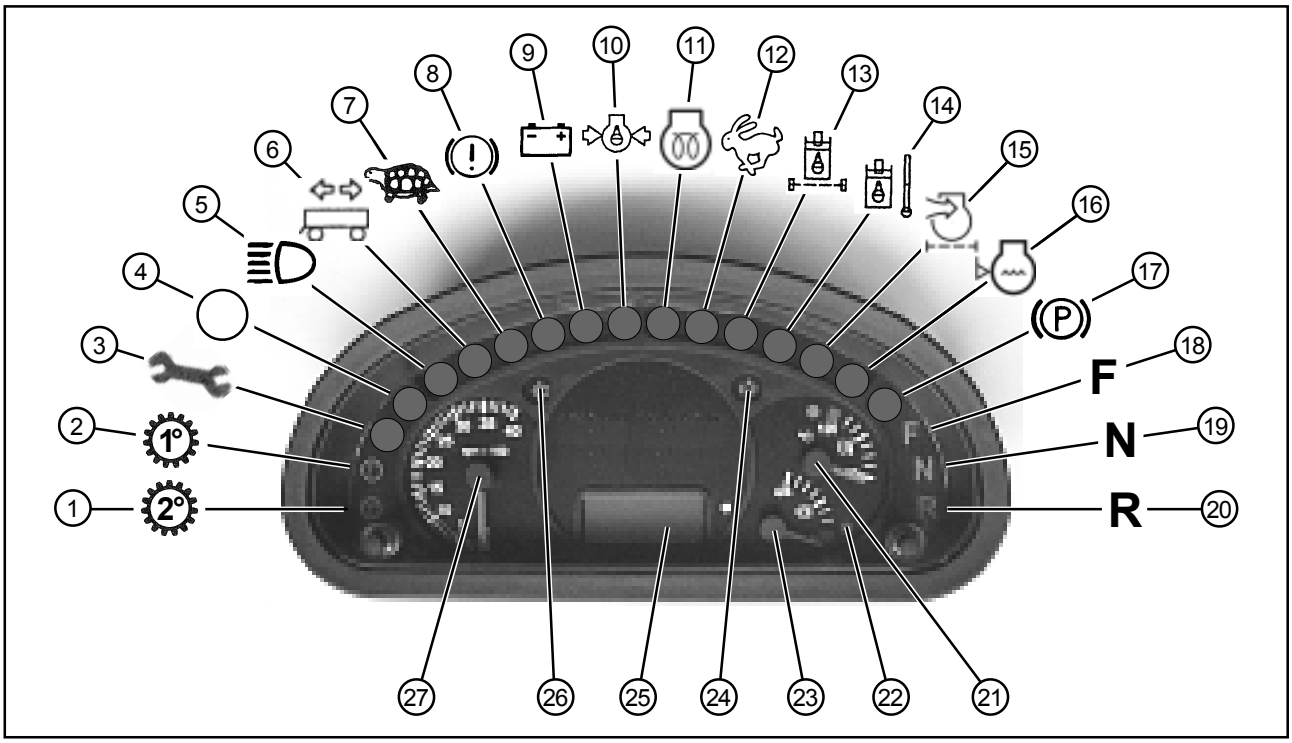


Figure 4-8

1 - Indicator: 2nd gear
2 - Indicator: 1st gear
3 - Error indicator: Traction drive
4 - Indicator: Engine diagnosis (4-8/1)
5 - Indicator lamp: High beam
6 - free
7 - Indicator lamp: “Alpha max.” drive stage
8 - Parking brake
9 - Battery charge indicator
10 - Engine oil pressure
11 - Indicator lamp: Preheating
12 - free
13 - Hydraulic oil filter clogging indicator (opt.)
14 - Signal lamp: Hydraulic oil temperature
15 - Air filter clogging indicator (opt.)
16 - Signal lamp: Low cooling water
17 - Indicator lamp: Parking brake
18 - Indicator lamp: Travel direction “forward“
19 - Indicator lamp: Travel direction “0-position“
20 - Indicator lamp: Travel direction “reverse“
21 - Cooling water temperature gauge
22 - Indicator lamp: Fuel on reserve
23 - Fuel gauge
24 - Indicator lamp: Turn signal “right“
25 - Operating hours counter and digital clock
26 - Indicator lamp: Turn signal “left“
27 - Rev meter

Fuse box (4-7/2)

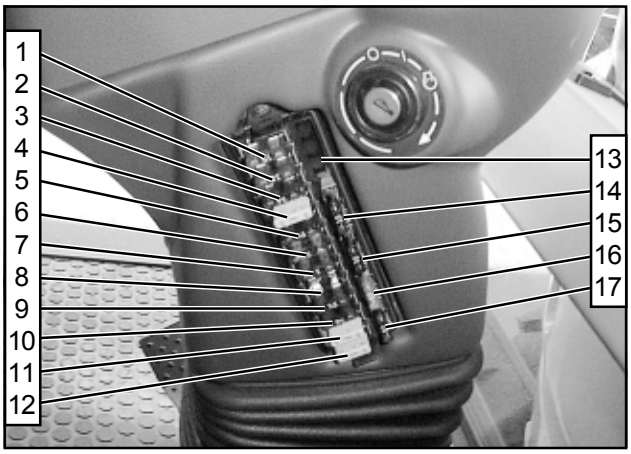


Figure 4-9

1	Window wiper/washer	15,0 A
2	Hydraulics	10,0 A
3	Turn indicator	7,5 A
4	Brake light	5,0 A
5	Controller engine	7,5 A
6	Traction drive	3,0 A
7	Traction drive	1,0 A
8	free	
9	Dipped beam	7,5 A
10	High beam	7,5 A
11	Tail light, left; parking light, left	5,0 A
12	Tail light, right; parking light, right	5,0 A
13	free	
14	Warning beacon (opt.)	15,0 A
15	Hazard flasher	7,5 A
16	Controller engine	25,0 A
17	Traction drive	15,0 A

opt. = optional equipment

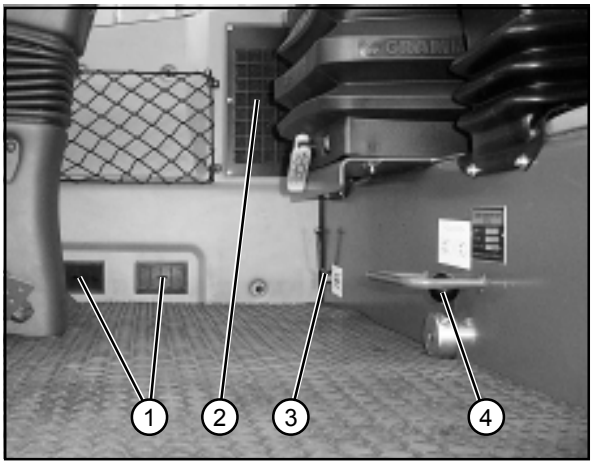


Figure 4-10

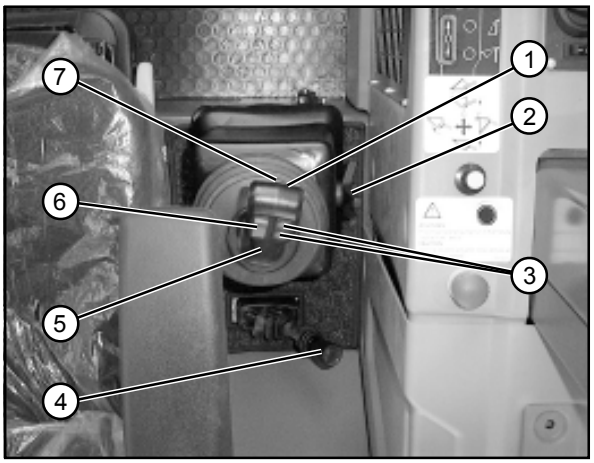


Figure 4-11

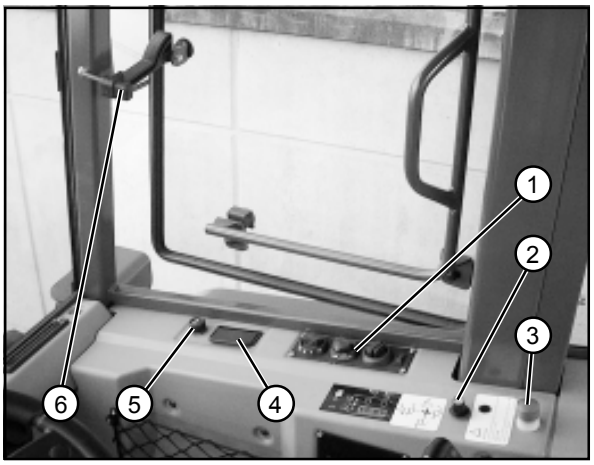


Figure 4-12

1 - Air outlet nozzle (heater)
2 - Suction flap for recirculation mode (air-conditioning system – option)
3 - Ball block valve for working and auxiliary hydraulics
4 - Switching lever for steering
  - to the left four-wheel steering
  - to the right: rear-axle steering

To the right of the driver's seat (4-11):

1 - Two pushbuttons for differential lock, wired in series
  - Pushbuttons pressed: Differential lock enabled
  - Pushbuttons not pressed: Differential lock disabled
2 - Lever for console adjustment
3 - Actuator for auxiliary hydraulics:
(for loaders with bolt lock = ***standard equipment***)
  - upper pushbutton: - Lock attachment
    - Close multipurpose bucket
  - bottom pushbutton: - Unlock attachment (only in conjunction with 4-5/7)
    - Open multipurpose bucket

3 - Actuator for auxiliary hydraulics:
(for loaders with claw lock = ***optional equipment***)
  - upper pushbutton: - Close multipurpose bucket
  - bottom pushbutton: - Open multipurpose bucket

4 - Hand lever for parking brake

NOTE
You can clearly hear the fan speed increase when applying the parking brake.

5 - Pilot valve for working hydraulics
6 - Drive switch:
forward/0/reverse
7 - Gear shifts:
  - left: 2nd gear shift:
  - centre: 1st gear shift:
  - right: Alpha max. (turtle symbol)

Operator's cabin right (4-12):

1 - Heater/ventilation/air-conditioning system (option)
2 - Inching speed control

NOTE
You can set the maximum speed in the range from 0 to 12 km/h in the "Alpha max." gear stage.

3 - Emergency stop switch (traction drive cut-out)

DANGER
Immediately apply the parking brake (4-11/4) when you have actuated the emergency stop switch.

NOTE
To restart the loader after the emergency stop switch was actuated, you must shut down the engine, remove the battery main switch (8-21/2), insert it again after approx. 10 seconds and restart the engine.

4 - Ash tray
5 - Cigarette lighter
6 - Latch for front side window

1. **Opening the window:**
   First pull the window handle inwards and up by 90 degrees, then push it outwards. Finally push the window handle down until it locks. The handle will automatically lock in its front position.

2. **To close the window:**
   First pull the handle to the rear to unlock it while pushing it upwards, then pull it inside. Finally push handle down by 90 degrees.

Figure 4-13

Pilot valve for auxiliary hydraulics (2nd auxiliary hydraulic circuit) » Optional equipment «

NOTE

If the loader has a 2nd auxiliary hydraulic circuit, the two buttons (4-11/3) have no function or are missing.

The working movements of the two buttons (4-11/3) (e.g. opening/closing the multi-purpose bucket – the lock/unlock attachment working functions in the case of loaders with bolt locks) are then carried out using the pilot valve for auxiliary hydraulics (4-14/arrow).

Loaders with bolt locks:

- Hand lever forward: Lock attachment
  Close multipurpose bucket
- Hand lever to the rear: Unlock attachment
  » only inconjunction with 4-5/7 «
  Open the multipurpose bucket.

Loaders with claw locks:

- Hand lever forward: Close multipurpose bucket
- Hand lever to the rear: Open the multipurpose bucket.

Figure 4-14

Operator's cabin up right (4-12):

1 - Toggle switch for working lights, front
2 - Toggle switch for working lights, rear
3 - Toggle switch for heatable rear window
4 - Toggle switch for beacon light (option)
5 - Toggle switch for lifting device suspension
6 - Toggle switch for four-wheel drive shutdown
7 - Pushbutton for engine diagnosis
8 - Pushbutton for fan reversal unit (option)
9 - Pushbutton for teach function (option)
10 - Toggle switch for ECO-mode function
11 - free
12 - Pushbutton for teach function (4.10)
13 - free

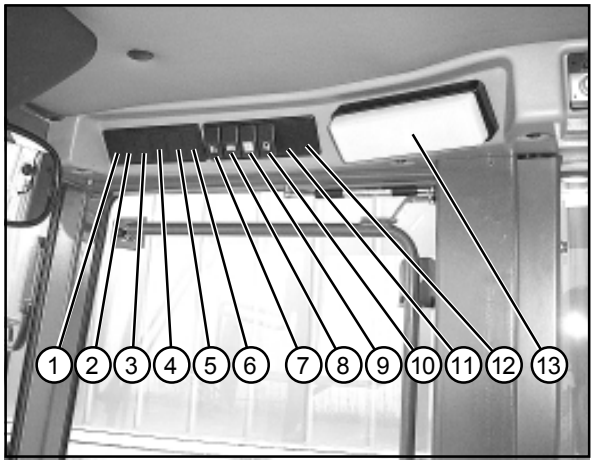


Figure 4-15

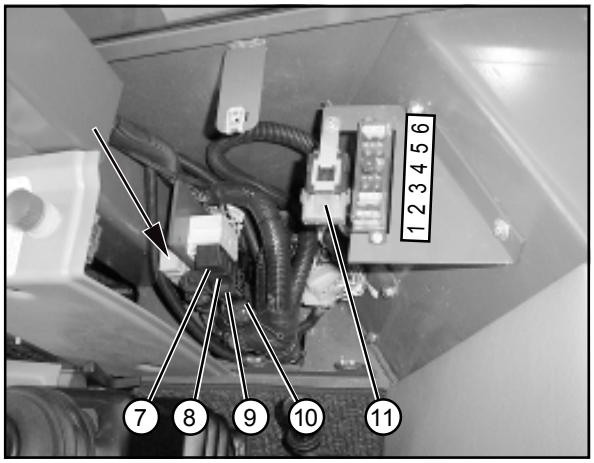


Figure 4-16

4.9 Fuses

NOTE

Fuses, relays, the turn signal relay, the interval timer, etc. are located at the right behind the driver's seat (4-16). To access them, push the seat to its frontmost position, tilt the backrest forward and remove the cover.

Fuses:

1	-	Working lights, rear	10.0 A
2	-	Reversing beacon	5.0 A
3	-	Heatable rear window	15.0 A
4	-	Power supply for driver's seat	15.0 A
5	-	Drive-away interlock	5.0 A
6	-	Cigarette lighter/interior lighting	20.0 A

Relays (4-16/arrow): (from top to bottom)

R1 - Auxiliary hydraulics: close bucket
R2 - Auxiliary hydraulics: open bucket
R3 - Differential lock
R4 - Traction drive cut-out
R5 - Reversing beacon/reversing buzzer
R6 - Starter interlock

7	-	Relay: Engine controller	
8	-	Relay: Working lights, front	
9	-	Interval timer	
10	-	Turn signal relay	
11	-	Fuse: Working lights, front	40,0 A

4.10 Teach function

4.10.1 How to activate the teach function

The teach function is required to write the minimum and maximum values to the traction drive controller after a potentiometer was replaced.

NOTE

To perform a teach-in, the engine of the loader must have been running until immediately before teaching in the potentiometers to obtain an inch signal via the brake pressure reservoirs. You must align all three relevant potentiometers at the same time even if only one was exchanged (accelerator, brake/inch pedal and potentiometer for speed limitation). All of them must be in the zero position (minimum value)!

1. Start the ignition and keep the pushbutton for the teach function (4-15/12) pressed. The error indicator (4-8/3) lights up permanently as soon as the controller has booted.
2. Release the pushbutton for the teach function (4-15/12) when the controller has booted (error indicator » 4-8/3 « is lit permanently).
3. Briefly press the pushbutton for the teach function (4-15/12) not later than 5 seconds after releasing the pushbutton for the teach function (4-15/12) and before the error indicator (4-8/3) goes dark and starts flashing.
4. This will activate the teach function for potentiometer alignment. The error indicator (4-8/3) now being in the flash mode signalises that the controller is ready for alignment.
5. You must now align all three relevant potentiometers to their maximum value even if you replaced only one of them. To do so, fully press down accelerator and brake/inch pedal and turn the potentiometer for speed limitation all the way to the right, then release or turn back all the way.
6. Press the pushbutton for the teach function (4-15/12) briefly three times to write the values into the controller and to conclude the teach-in.
7. Check all functions and repeat the procedure if necessary.

4.10.2 How to activate the emergency traction mode (when there is an accelerator fault)

1. When an accelerator fault is pending, set the drive direction switch (4-11/6) to the neutral position once as soon as the loader stops.

   NOTE

   A loader standstill is detected when a hydraulic motor speed of less than 50 rpm is detected. From this point onwards, you can press the pushbutton for the teach function (4-15/12) to activate a parameter-defined replacement value.

2. Preselect the drive direction (4-11/6) while keeping the pushbutton for the teach function (4-15/12) and the accelerator (4-7/3) pressed.

   NOTE

   The speed with the default value for the accelerator replacement value (30%) is
   - in the 1st gear: approx. 1 km/h
   - in the 2nd gear: approx. 6 km/h

4.10.3 How to activate the emergency traction mode (when there is a fault with the EP magnet of the hydro motor)

NOTE

When there is a fault with the EP magnet of the hydro motor, the hydro motor controller remains disabled, and driving is restricted to a maximum pump control value of 40%. The actual position of the hydro motor depends on the type of the fault and the hydraulic mechanical conditions.
- On level ground, the speed in the 1st gear is approx. 4 km/h.
- Negotiating inclines is possible with severe restrictions only.

Operation

5 Operation

Figures and descriptions may vary due to modifications in the construction that become possible and necessary to improve the loader and to develop it further technically. These modifications are summarised in section 13.

5.1 Checks before start-up

- Engine oil level (see the operating instructions for the engine)
- Hydraulic oil level
- Fuel level
- Tyre pressure
- Profile depth
- Battery fluid level
- Lighting system
- Mirror positioning
- Seat position
- Swivel unit safeguard (1-4/arrow); remove if necessary
  » only if work is to be commenced «
- Bucket arm prop [(e.g. bucket arm supports (option) (1-1/arrows)]; remove if necessary
- Ball block valve for the working and auxiliary hydraulics (1-2/arrow); open if necessary
  » only if work is to be commenced «
- General state of the loader, e.g. check for leaks
- The presence of
  - a fist aid kit
  - a warning triangle
  - a signal lamp

  must be verified.

5.2 Commissioning

5.2.1 Starting the diesel engine

(1) Engage the parking brake lever (4-11/4).
(2) Insert the battery main switch (8-21/2).

NOTE
The vehicle is ready for operation after eight seconds.

(3) Set the drive switch (4-11/6) to “0” (starter interlock!).
(4) Insert the ignition key into the starter switch (4-7/1) and turn the key clockwise to position “I” (5-1).

NOTE
- Do not step on the accelerator (4-7/3) while starting the engine.
- The indicator lamps for battery charge, parking brake and engine oil pressure light up. The fuel level and coolant temperature instruments function.

(5) Turn the ignition key clockwise to position „III“. As soon as the engine starts, release the ignition key.

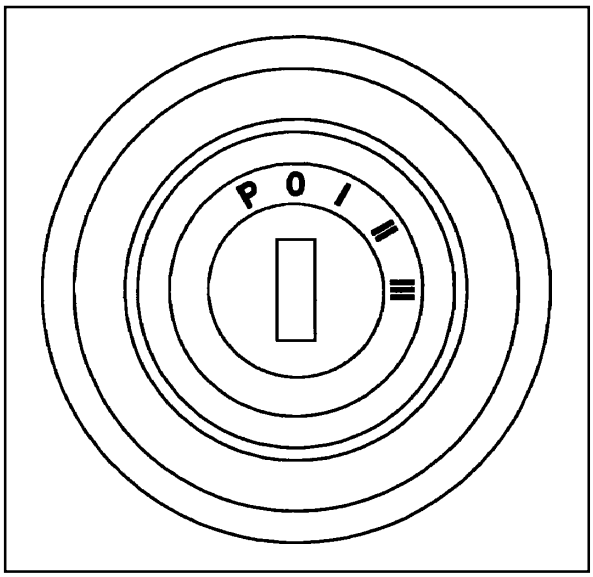


Figure 5-1

NOTE

- If the engine has not started after two attempts, determine the cause using the malfunction table in the operating instructions for the engine.
- For operation at extremely low temperatures, see the operating instructions for the engine.
- The clogging indicator (4-8/13) may light up prematurely after a cold start. It will go out when the hydraulic oil warms up. Operate the loader at a **low** speed until the indicator lamp (4-8/13) goes out. Never subject the loader to full loads in this state.

5.2.2 Winter operation

CAUTION

If the outside temperature is below 0 °C, the loader must be properly „warmed up“ to avoid damage to certain assemblies. To do so, actuate all cylinders (lifting, tipping and swivelling cylinders) for some time (depending on the ambient temperature) with the machine idling.

Proper operation of the machine, even for subzero temperatures, can only be guaranteed if the following measures have been taken:

5.2.2.1 Fuel

At low temperatures, paraffin precipitating from the fuel can cause the fuel system to clog up. For this reason, always use winter diesel fuel (suitable for temperatures down to -15 °C) when the outside temperature is below 0 °C.

NOTE

The fuelling stations normally start offering winter diesel fuel in good time before the cold season starts. Often, they offer diesel fuel that can be used down to temperatures of 20 °C (super-grade diesel fuel).
If the temperature is below -15 °C or -20 °C, paraffin oil must be added to the diesel fuel. For the mixture ratio, refer to the diagram (5-2).

I = Summer diesel fuel
II = Winter diesel fuel
III = Super-grade diesel fuel

CAUTION

Only mix the ingredients in the tank! First, fill in the required amount of paraffin oil, then top up with diesel fuel.

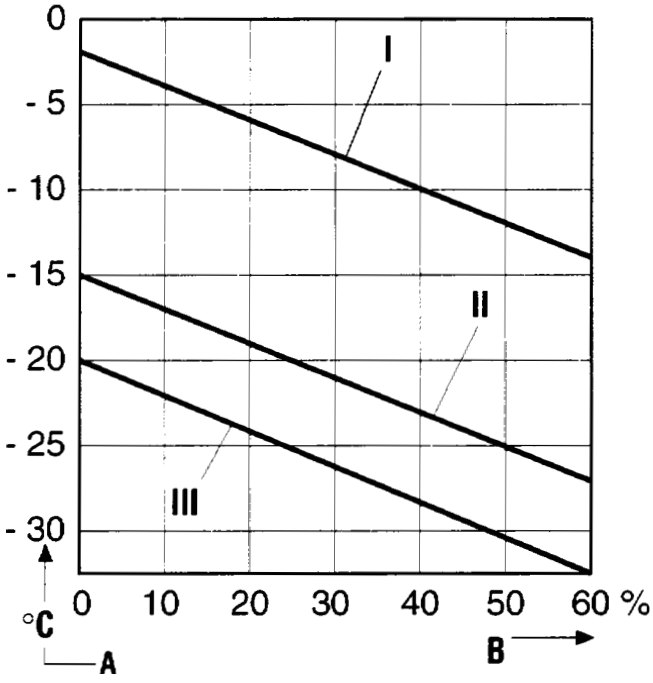


Figure 5-2

5.2.2.2 Engine oil change

See the operating instructions for the engine and for the machine (section 8.2.6).

5.2.2.3 Changing oil in the hydraulic system

CAUTION

The viscosity of the hydraulic oil changes according to the temperature; therefore, the ambient temperature in the location where the machine will be used determines what viscosity class (SAE class) must be chosen. If the hydraulic oil used matches the expected ambient temperature, optimum operating conditions can be attained. Therefore, use hydraulic oil of an appropriate grade if required.

See section 8.2.9 for the oil change procedure required for the hydraulic system.

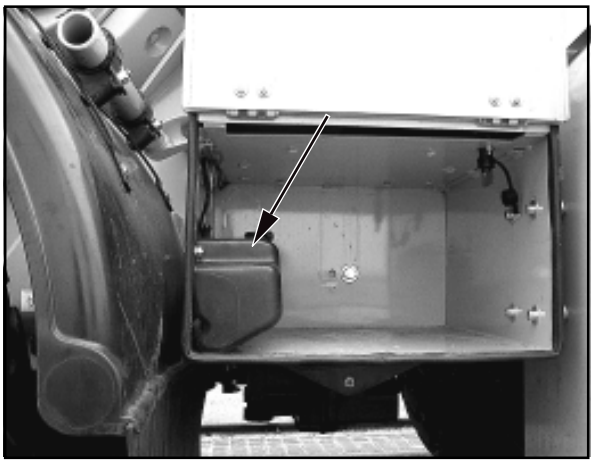


Figure 5-3

5.2.2.4 Anti-freezing agent for the windshield washer system

CAUTION

If the temperature is expected to drop below 0° C, add a sufficient amount of anti-freezing agent to the water in the windshield washer system (5-3/ arrow) to prevent it from icing up.
Heed the instructions provided by the manufacturer for the mixture ratio.

5.2.3 Driving the loader on public roads

CAUTION

- Driving on public roads is **only** permitted with an **empty** standard or multi-purpose bucket and **only** with bucket protection.
- When the road lights (which are used solely to light up the road) are switched on, the highest permissible speed is 30 km/h.
- According to § 52 (4) Nr. 1 of the German Motor Vehicle Construction and Use Regulations, the warning beacon (optional equipment) may be switched on only if the loader is marked by red and white warning stripes.
- A warning triangle and a first-aid kit must be provided in the loader.

The driver of the loader must possess a valid driver's license.

The driver must carry his driver's license (original) and the operating permit (original) with him.

Before driving on public roads, the following road safety measures must be taken:

5.2.3.1 Carrying a bucket

(1) Lower the bucket arm until the lowest point of the bucket arm or the bucket is at least 30 cm above the road (5-4).
(2) Close the ball block valve for the working and auxiliary hydraulics (4-10/3).

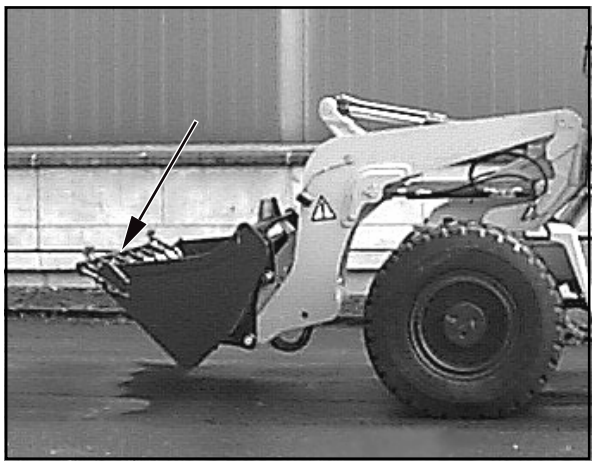


Figure 5-4

CAUTION
When closed, the ball block valve is perpendicular to the flow direction. This prevents the bucket arm from being lowered accidentally and the bucket from tipping accidentally while driving.

(3) Block the swivel unit by inserting the blocking wedge into the swivel block (1-4/arrow) and secure it with the spring locking lever.
(4) Cover the bucket cutting edge and teeth with the bucket protector (5-4/arrow).
(5) Insert the plug of the bucket protector into the socket (5-5/arrow, option).
(6) Perform a function check.
(7) Lock both doors.
(8) Put on the safety belt.
(9) Switch the switching lever for the steering to the „rear-wheel steering“ position (4-10/4).

Figure 5-5

DANGER
The working lights (4-15/1 and 4-15/2) must be switched off.

(10) Release the parking brake (4-9/7).
(11) Switch to gear stage “II” (4-9/1).
(12) Select the travel direction (4-9/5).
(13) Press the accelerator pedal (4-7/3).

DANGER
Changing the travel direction during driving is **not** allowed to avoid any danger to other road users.

NOTE
When you switch from the 2nd to the first gear at a speed higher than 8 km/h:
- The switchover occurs when the loader reaches the permitted speed or falls below this speed
  - when the accelerator (4-7/3) is briefly pressed.
  - when the loader stops.

5.2.4 Working with the loader

DANGER
Always use seat belts when working with the swivel shovel loader.

Generally, all work is carried out in gear stage “I” (4-11/7). For special tasks which ask for a more sensitive control of the speed or a higher engine speed at reduced travel speed, gear stage “Alpha max.” can be selected. The travel speed can thus be limited to 5 km/h.

NOTE
When you switch from the 2nd to the first gear at a speed higher than 8 km/h:

- The switchover occurs when the loader reaches the permitted speed or falls below this speed
  - when the accelerator (4-7/3) is briefly pressed.
  - when the loader stops..

(1) Lock both doors.

(2) Release the parking brake (4-11/4).

(3) Select the gear stage (4-11/7).

(4) Select the travel direction (4-11/6).

(5) Press the accelerator pedal (4-7/3).

NOTE
- To attain full performance, the combined action of propulsion and of the working hydraulics is necessary. It is up to the operator to control the available power using the accelerator, the inching function and the hand lever for the working hydraulics.
- The travel speed and the thrust force are altered exclusively by depressing the accelerator pedal.
- When driving up gradients, the travel speed decreases in spite of full throttle in favour of the thrust force.
- The thrust forces and travel speeds are the same in the forward and the reverse direction.
- Set drive direction switch (4-11/6) to „0“ before continuing (forward/reverse) if you apply the parking brake (4-11/4) and disengage it again during operation.

DANGER
When stopping the machine on an uphill/ downhill grade, make sure to apply the service brake (4-6/3) before you apply the parking brake (4-11/4).
The parking brake acts with a delay and would cause the machine to move for a short distance, depending on the inclination.

CAUTION

- If the hydraulic oil temperature indicator lamp (4-8/14) lights up during operation, the loader must be switched off immediately, the cause must be determined by a hydraulics expert and the malfunction must be eliminated.
- The attachment may be locked/unlocked only when the engine is at idling speed so that the insertion/retraction speed of the locking bolts does not become too high.

DANGER

If driving with the bucket arm swivelled is required in special cases, the bucket/attachment must be positioned close over the wheel and the travel distance must be kept as short as possible. If unevenness of the ground causes the support system to lift a wheel off the ground, the bucket arm must be briefly swivelled in the direction of travel so that the axle block can be cancelled.

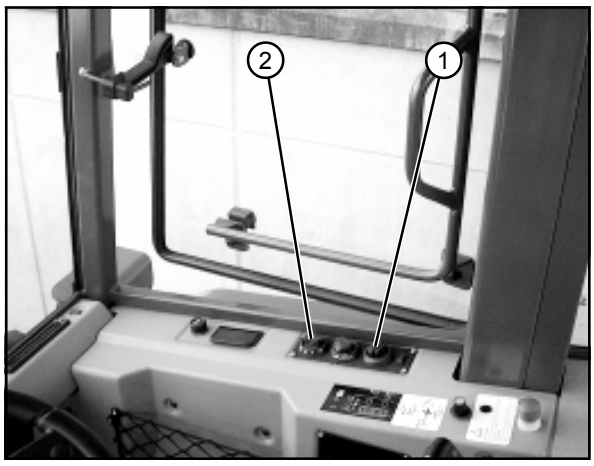


Figure 5-6

5.2.5 Heater and ventilation system

5.2.5.1 Set the air flow

(1) Turn the rotary switch (5-6/2) for the blower to position 0, 1, 2, or 3 depending on the air flow desired.

(2) Adjust the air flow direction with the nozzles at the windshield (5-7/arrows) or in the floor area (5-8/arrows).

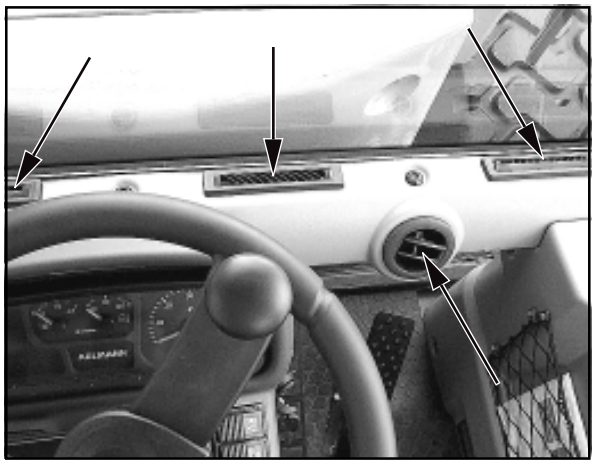


Figure 5-7

5.2.5.2 Switching on the heater

(1) Turn the knob (5-6/1) in the clockwise (cold) or the anti-clockwise direction (warm) to reach the desired temperature.

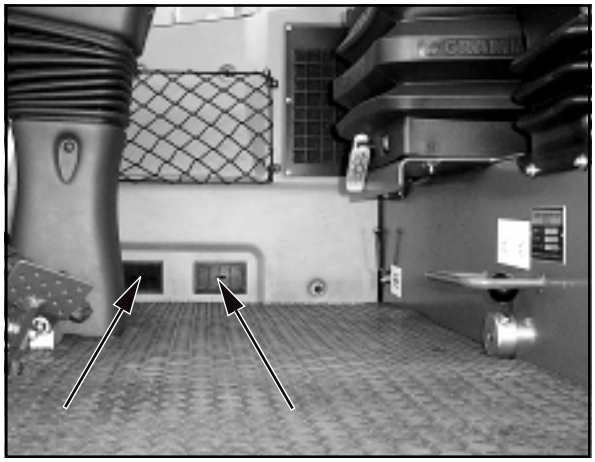


Figure 5-8

5.3 Decommissioning the loader

5.3.1 Parking the loader

(1) Stop the loader on solid ground; if possible, not on a slope.

(2) Apply the parking brake (4-11/4).

(3) Place the bucket or the attachment on the ground.

(4) Set the drive switch (4-11/6) to “0”.

DANGER

If parking on a gradient cannot be avoided, wheel chocks must be used and placed on the sloping side of the front axle wheels **in addition to** applying the parking brake.

5.3.2 Switching off the diesel engine

CAUTION

If the diesel engine is very hot or has been subjected to heavy loads, let the engine idle for a short time before switching it off.

Turn the ignition key to the left to position „0“ (5-1) and remove the key.

NOTE

In position “P”, the parking light and the dashboard illumination remain switched on.

5.3.3 Switching off the heater and ventilation system

(1) Shut off the hot air supply (5-6/1).

(2) Turn the rotary switch (5-6/2) for the blower to position “0”.

5.3.4 Leaving the loader

(1) Lock the ball block valve for the working and auxiliary hydraulics (4-10/3).

(2) Remove the main battery switch (8-21/2).

NOTE

If the loader is to remain shut down for a long period of time, carry out the duties in Chapter 3 (Protection Against Theft).

(3) Remove the ignition key and lock the doors.

5.4 Adjusting the driver's seat

5.4.1 Isri seat

(1) Adjust or swing forward the backrest using the hand lever (5-9/1).

(2) Adjust the seat height and rear inclination by pulling the hand lever (5-9/3) upwards.

(3) Adjust the seat height and front inclination by pulling the hand lever (5-9/4) upwards.

(4) The seat suspension can be adjusted to the driver's weight (40 - 130 kg) with the handwheel (5-10/1).

(5) Adjust the height of the arm rest by turning the knob (5-9/2).

(6) Readjust the position of the pilot valve for the working and auxiliary hydraulics (4-11/5 or 4-14/Pfeil) if necessary.

(7) The operator's seat can be adjusted in the horizontal direction to suit the driver's requirements by pulling the handle (5-10/2) upwards and moving the seat forward or backward.

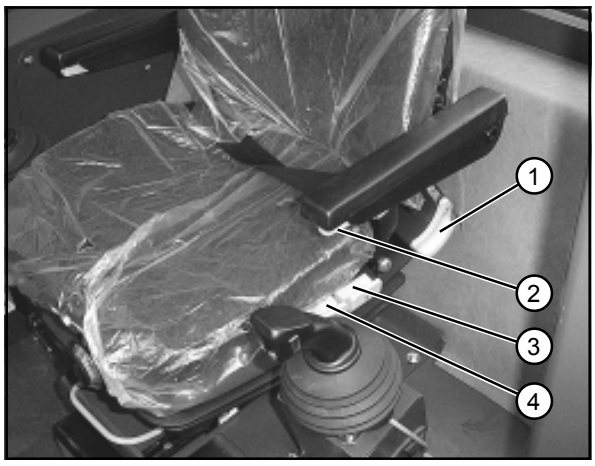


Figure 5-9

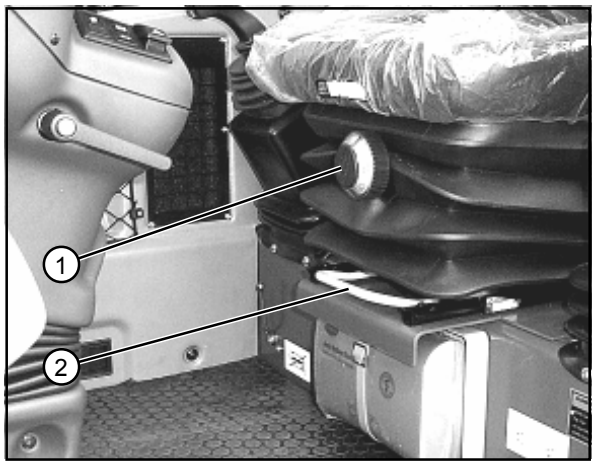


Figure 5-10

5.4.2 Grammer seat

(1) **Weight adjustment:**
Adjust the seat to the driver's weight by actuating the weight adjustment lever. The set driver's weight is visible in the ispection window (5-11).

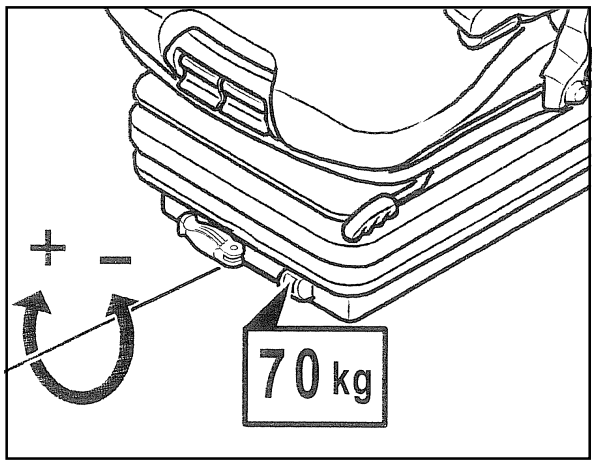


Figure 5-11

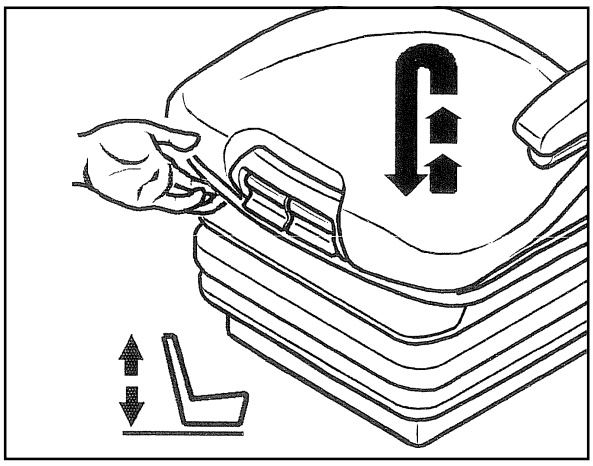


Figure 5-12

(2) **Height adjustment:**
The height can be adjusted in several steps.
Lift the driver's seat to the desired height until it can be heard to engage. The seat returns to the lowest position when it is lifted over the topmost position (stop) (5-12).

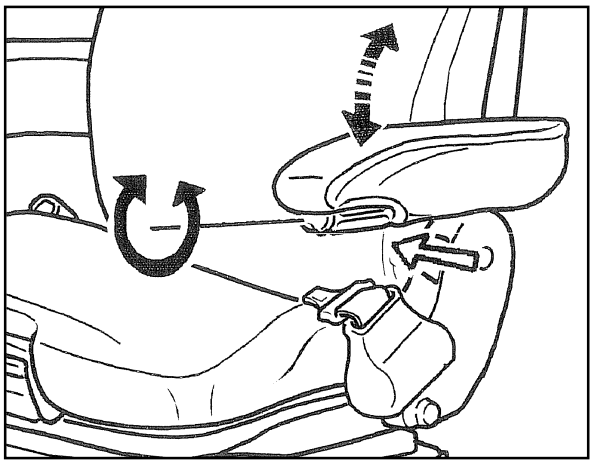


Figure 5-13

(3) **Armrest inclination:**
Turn the handwheel (5-13/arrow) to adjust the armrest in longitudinal direction.

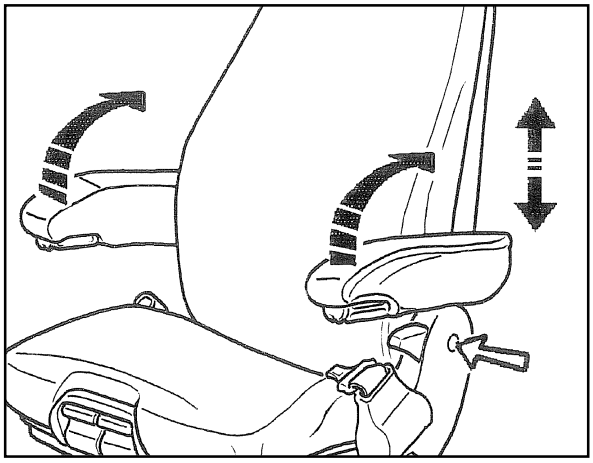


Figure 5-14

(4) **Armrests:**
If desired, you can swing the armrests to the rear and adjust their height.

To adjust the armrest height, remove the round cap (5-14/arrow) in the covering.

Loosen the hex nut (wrench size 13 mm), set the armrest as desired and tighten the nut again. Push the removed cap onto the nut again.

(5) **Adjusting the backrest:**
Use the locking lever (5-15/arrow) to adjust the backrest.

NOTE
The locking lever must engage in the desired position. It must be impossible to move the backrest to another position when the lever has engaged.

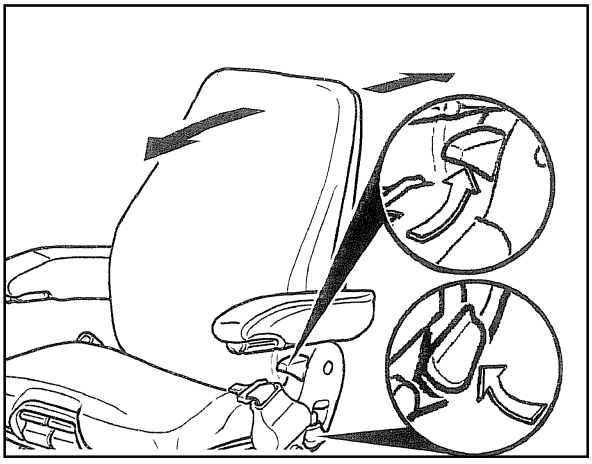


Figure 5-15

(6) **Longitudinal adjustment:**
You can adjust the seat in longitudinal direction when you pull the lever (5-16) upwards.

NOTE
The locking lever must engage in the desired position. It must be impossible to move the driver's seat to another position when the lever has engaged.

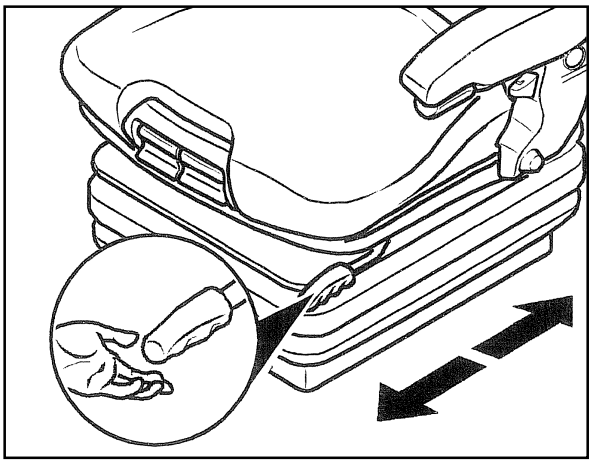


Figure 5-16

5.5 Switching the steering type

CAUTION
- The wheels of the rear axle must be straight before the switching lever (5-17/arrow) can be applied.
- Enable the steering switch only when the loader is at a standstill. To switch the steering type, move the hand lever to the right (rear-axle steering) or to the left (four-wheel steering).

Figure 5-17

Attachments

Figure 6-1

Figure 6-2

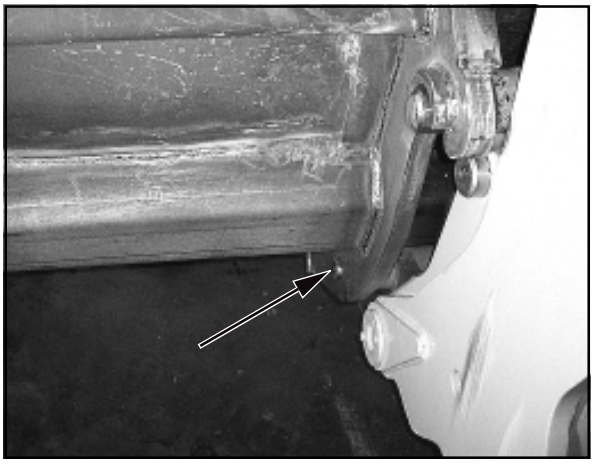


Figure 6-3

6 Attachments

6.1 Mounting and dismounting attachments without hydraulic connections to loaders with bolt locks (standard equipment)

6.1.1 Standard/lightweight bucket

Mounting

(1) Bring the bucket arm to its lowest position and tip the quick-change device.

(2) Drive the loader up to the bucket (6-1).

(3) Pick up the bucket using the quick-change device and, by simultaneously tilting the quick-change device, raise the bucket until the quick-change device is next to it (6-2).

(4) Lock the bucket (6-3) with the upper pushbutton for the auxiliary hydraulics (4-11/3).

CAUTION

The attachment may be unlocked only when the engine is at idling speed so that the retraction speed of the locking bolts does not become too high.

(5) Check that the device is mounted and locked correctly on both sides.

DANGER

The two bolts of the quick-change device must be in the bore holes of the bucket suspension and must be clearly visible (6-3/arrow).

Dismounting

(1) Place the bucket firmly on the ground.

(2) Press the release button for the quick-change device (4-5/7) and, while keeping the button depressed, unlock the bucket by pressing the bottom pushbuttons for the auxiliary hydraulics (4-11/3).

CAUTION

The attachment may be locked only when the engine is at idling speed so that the insertion speed of the locking bolts does not become too high.

(3) Tilt the quick-change device and reverse out.

NOTE

The type plate is on the rear of the bucket, on the right-hand side of the cross arm.

6.2 Mounting and dismounting attachments without hydraulic connections to loaders with claw locks (optional equipment)

6.2.1 Standard/lightweight bucket

Mounting

(1) Bring the bucket arm to its lowest position and tip the quick-change device.

(2) Drive the loader up to the bucket (6-4).

(3) Press and hold the release button for the quick-change device (4-5/7).

(4) Pick up the bucket using the quick-change device and, by simultaneously tilting the quick-change device, raise the bucket until the quick-change device is next to it (6-5).

(5) Release the release button for the quick-change device (4-5/7).

Figure 6-4

NOTE

- When the release button for the quick-change device is pressed, the claws release as long as the button is pressed.
- The bucket claws engage again when the button is released.

(6) Check that the device is mounted and locked correctly on both sides.

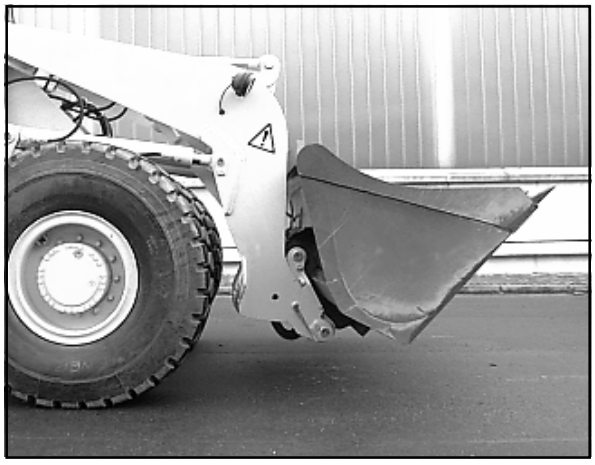


Figure 6-5

DANGER

The bucket is mounted and locked correctly when the bucket is located next to the quick-change device and the piston rods of the quick-change device cylinder can be plainly seen (6-6/ arrow).

Dismounting

(1) Place the bucket firmly on the ground.

(2) Press and hold the release button for the quick-change device (4-5/7).

(3) Tilt the quick-change device and reverse out.

(4) Release the release button for the quick-change device (4-5/7).

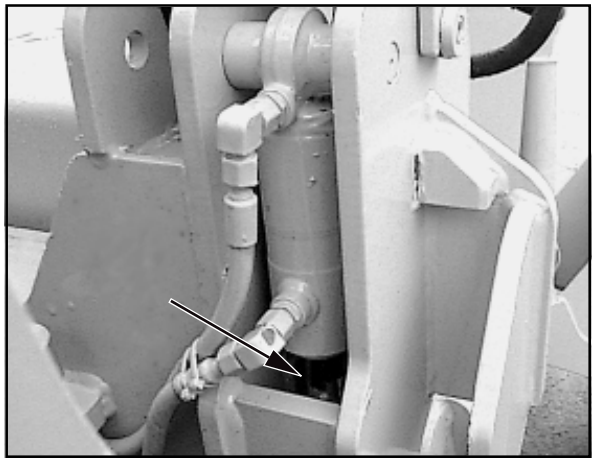


Figure 6-6

NOTE

- The claws return to their locking position.
- The type plate is on the rear of the bucket, on the right-hand side beneath the cross arm.

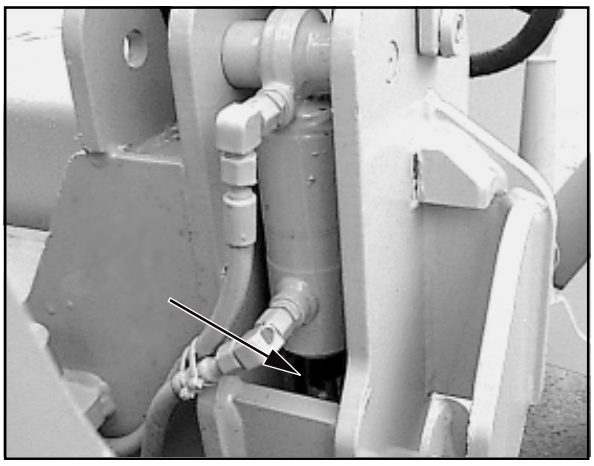


Figure 6-7

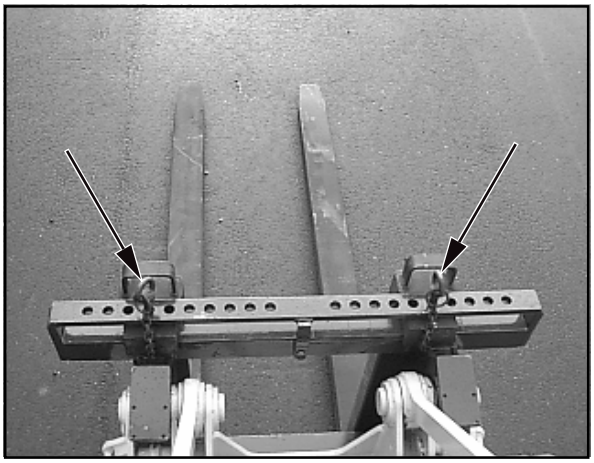


Figure 6-8

6.2.2 Fork-lift attachment

NOTE

Mounting and dismounting are carried out in the same way as for the standard/lightweight bucket (section 6.2.1).

DANGER

- The fork-lift attachment is mounted and locked correctly when it is located next to the quick-change device and the piston rods of the quick-change device cylinder can be plainly seen (6-7/arrow).
- Position both fork tines at an equal distance from the centre (6-8/arrows) and secure them with socket pins.
- Distribute the load equally on both fork tines and secure it against moving and falling off.
- Let the load rest against the rear of the fork and tilt the fork-lift attachment.

NOTE

The type plate is on the rear of the upper fork carrier.

Figure 6-9

6.3 Mounting and dismounting attachments with hydraulic connections to loaders with claw locks (optional equipment)

6.3.1 Multi-purpose bucket

Mounting

(1) Bring the bucket arm to its lowest position and tip the quick-change device.

(2) Drive the loader up to the bucket (6-9).

(3) Press and hold the release button for the quick-change device (4-5/7).

(4) Pick up the bucket using the quick-change device and, by simultaneously tilting the quick-change device, raise the bucket until the quick-change device is next to it (6-10).
(5) Release the release button for the quick-change device (4-5/7).

NOTE

- When the release button for the quick-change device is pressed, the claws release as long as the button is pressed.
- The bucket claws engage again when the button is released.

(6) Check that the device is mounted and locked correctly on both sides.

DANGER

The bucket is mounted and locked correctly when the bucket is located next to the quick-change device and the piston rods of the quick-change device cylinder can be plainly seen (6-11/ arrow).

(7) Shut down the engine and turn the ignition key to „I“.
(8) Remove the pressure from the hydraulic lines. For this purpose, press both pushbuttons for the auxiliary hydraulics (4-11/3) alternatingly several times.
(9) Unscrew the protective caps (6-12/1) of the hoses of the multi-purpose bucket.
(10) Unscrew the protective caps (6-12/2) of the quick-change couplings on the bucket arm and connect the hoses of the multi-purpose bucket (6-12/3) to those in the bucket arm.

CAUTION

- When making connections, make sure that the hydraulic connections are clean and completely connected and that the colour codings coincide.
- Connections that are not used (6-12/4) must be protected by caps.

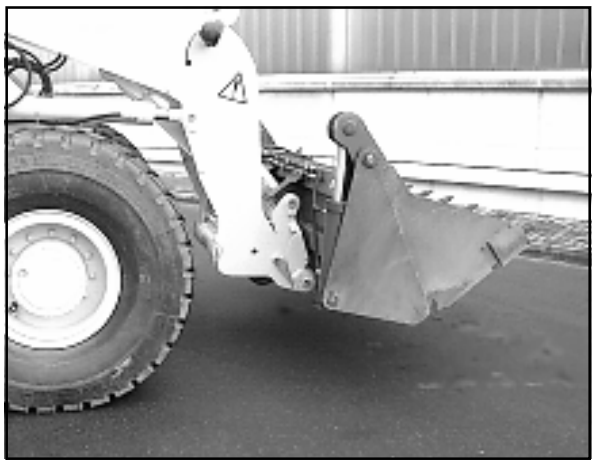


Figure 6-10

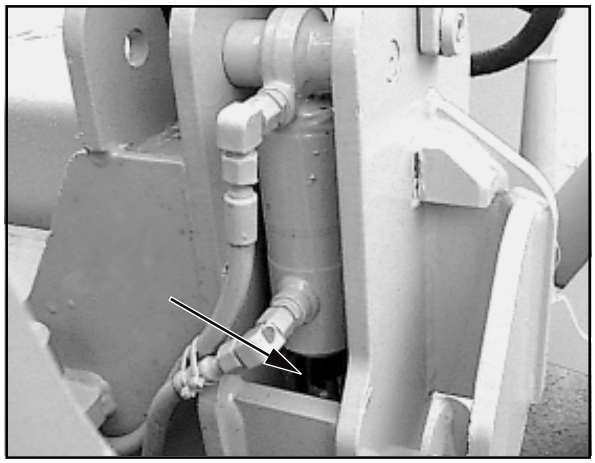


Figure 6-11

Dismounting

(1) Place the multi-purpose bucket firmly on the ground.

(2) Shut down the engine and turn the ignition key to „I“.

(3) Remove the pressure from the hydraulic lines. For this purpose, press both pushbuttons for the auxiliary hydraulics (4-11/3) alternatingly several times.

(4) Further dismounting is in the reverse order.

NOTE

The type plate is on the rear of the bucket, on the right-hand side beneath the cross arm.

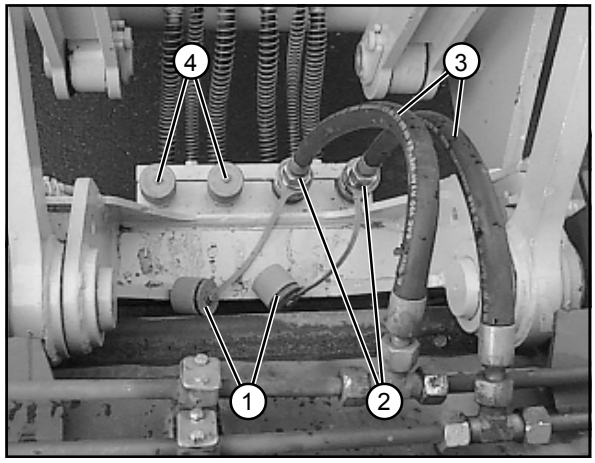


Figure 6-12

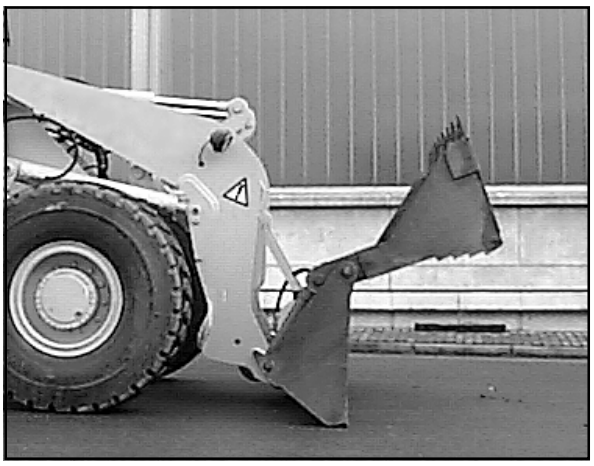


Figure 6-13

Notes on the application of the multipurpose bucket

The multi-purpose bucket can be used for:

- peeling (6-13)

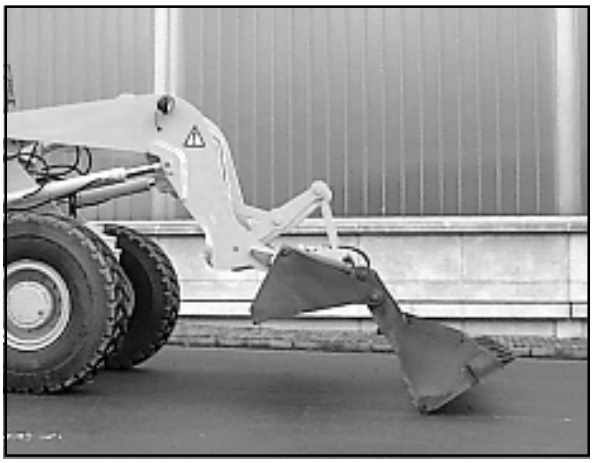


Figure 6-14

- scraping (6-14)

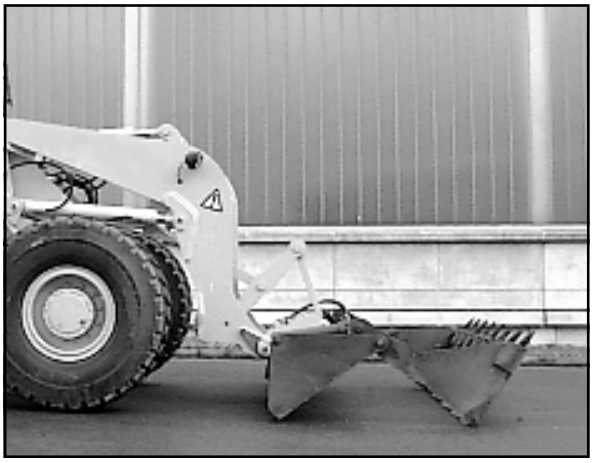


Figure 6-15

- grabbing (6-15) and
- in bucket operation.

6.3.2 Front-end excavator

Mounting

The front-end excavator is mounted in a manner similar to the multi-purpose bucket (section 6.3.1), except that all four hydraulic hoses of the front-end excavator must be connected to the four quick-change couplings of the quick-change device (6-16).

CAUTION

When making connections, make sure that the hydraulic connections are clean and completely connected and that the colour codings coincide.

NOTE

Improper connection of the hydraulic hoses may mean that movements of the front-end excavator arm and/or the shovel do not correspond to the symbols in the sign for the auxiliary hydraulic system.

DANGER

The front-end excavator is mounted and locked correctly when it is located next to the quick-change device and the piston rods of the quick-change device cylinder can be plainly seen (6-17/ arrow).

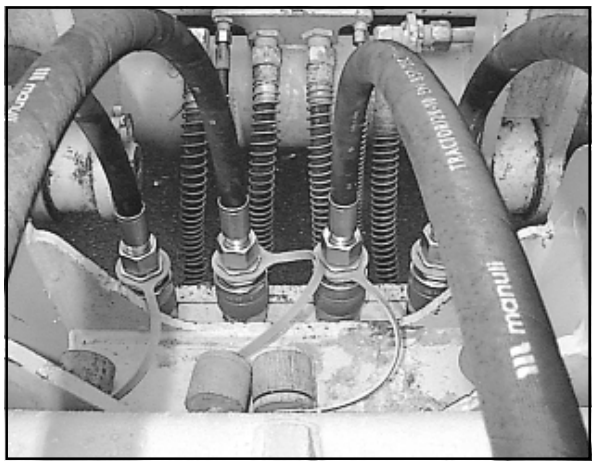


Figure 6-16

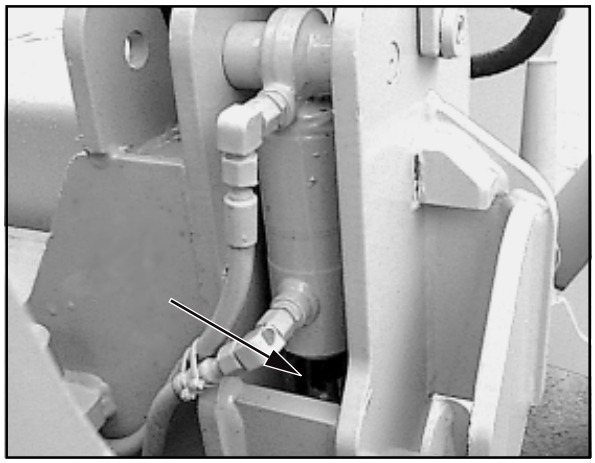


Figure 6-17

Dismounting

The front-end excavator is dismounted in a manner similar to the multi-purpose bucket (section 6.3.1), except that the four hydraulic hoses of the front-end excavator must be disconnected from the four quick-change couplings of the quick-change device.

NOTE

The type plate is on the right-hand side of the shovel, near the support.

6.3.2.1 Shovel replacement

(1) Prop up the bucket arm mechanically [e.g. by inserting the bucket arm support (option) (1-2/arrows)].

(2) Position the front-end excavator so that the rear of the shovel lies on the ground.

(3) Depressurise the hydraulic lines. For this purpose, press both pushbuttons for the auxiliary hydraulics (4-11/3) alternatingly several times.

(4) Close the ball block valve (1-2/arrow) for the working and auxiliary hydraulics.

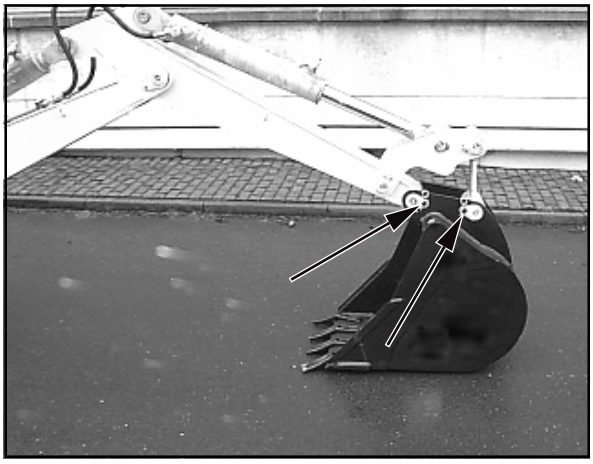


Figure 6-18

(5) Remove the spring locking lever of the bolt locks (6-18/ arrows).

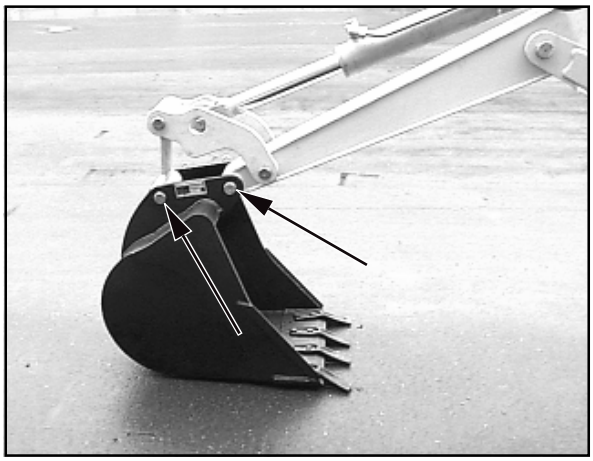


Figure 6-19

(6) Knock out the bearing bolts (6-19/arrows) and remove the shovel.

(7) Mounting is in the reverse order.

NOTE

The type plate of the shovel is on the left outer side.

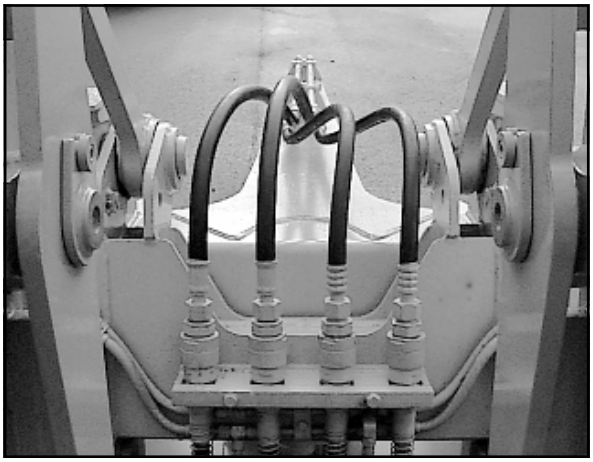


Figure 6-20

6.3.3 Grab bucket

NOTE

- The movements of the grab bucket can be seen in the symbols of the sign for the auxiliary hydraulic system.
- The grab bucket can be turned to the left or right around its vertical axis without limits.

Mounting

The grab bucket is mounted in a manner similar to the multi-purpose bucket (section 6.3.1), except that all four hydraulic hoses of the grab bucket must be connected to the four quick-change couplings of the quick-change device (6-20).

CAUTION

- When making connections, make sure that the hydraulic connections are clean and completely connected and that the colour codings coincide.
- The grab bucket must be set down with the grab scoops open. The spacing plate (6-21/1) soldered onto the boom must be inserted between the two grab scoops.
- The end of the boom and the connected hydraulic rotary knob rest on the spacing plate (6-21/2) – which is soldered onto the boom for this purpose – which rests on the ground.
- The hose guard (6-21/3) may not be used as a support.

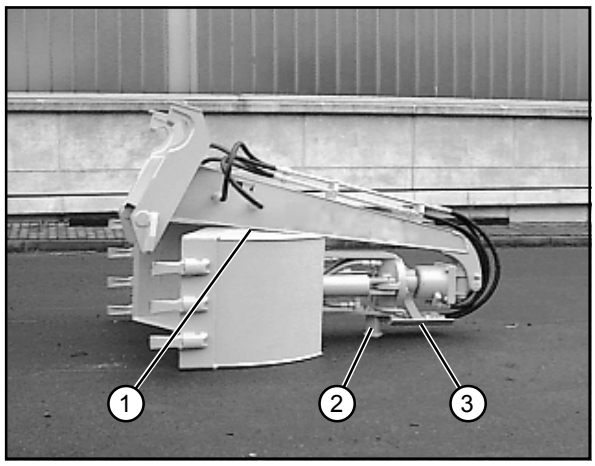


Figure 6-21

NOTE

Improper connection of the hydraulic hoses may mean that movements of the grab bucket do not correspond to the symbols in the sign for the auxiliary hydraulic system.

DANGER

The grab bucket is mounted and locked correctly when it is located next to the quick-change device and the piston rods of the quick-change device cylinder can be plainly seen (6-22/arrow).

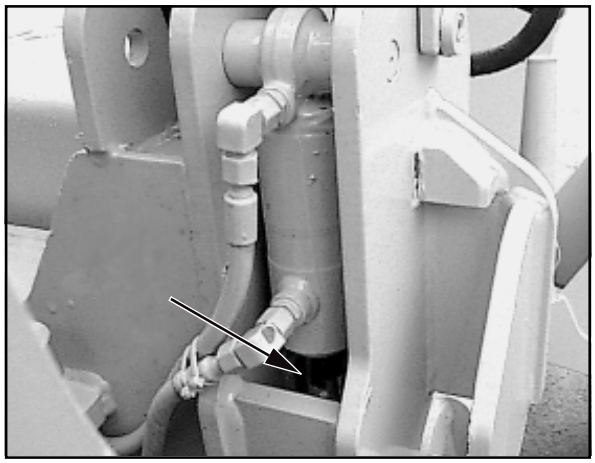


Figure 6-22

Dismounting

Dismounting is carried out in the same way as for the multi-purpose bucket (section 6.3.1).

NOTE

The type plate is on the top side of the boom, near the support.

6.4 Use of additional attachments

DANGER

1. Only those attachments described in these operating instructions may be used.
2. We emphasise that attachments that are not supplied by us are also not tested and approved by us. Use of such products can, under certain conditions, adversely affect the constructional qualities of your loader and thus limit the active and passive driving safety. The manufacturer cannot be held responsible for damage that occurs through the use of such products.

Rescue, Towing, Lashing, Lifting by Crane

7 Rescue, towing, lashing, lifting by crane

7.1 Rescue, towing, lashing

7.1.1 Rescue/towing of the swivel shovel loader if the engine or drive has failed

DANGER
Secure the rescue location if it is on a public road.

CAUTION
- The swivel shovel loader must not be tow-started. Any attempt to tow-start leads to damage.
- Towing is permitted only to remove the loader from a danger zone and to load it onto a low loader.

NOTE
Preparation for towing depends on whether the engine has failed, thus causing a failure of the entire hydraulic system, or if only the drive has failed and the engine can drive the rest of the hydraulic system.

7.1.1.1 Towing the swivel shovel loader if the engine has failed

(1) Actuate the toggle switch for the hazard flasher (4-5/2).

(2) Secure both wheels of the front axle against rolling away in both directions.

(3) Set the drive switch (4-11/6) to “0”.

NOTE
The preparations described in steps (4), (6), (7) and (13) are only to be carried out if the rescue location is **not** on a public road:

(4) After the front-axle wheels have been straightened, switch the switching lever for the steering (4-10/4) to the „rear-axle steering“ position.

(5) Release the parking brake (4-11/4).

(6) Cover the bucket cutting edge and teeth with the bucket protector (5-4/arrow).

(7) Insert the plug of the bucket protector into the socket (5-5/arrow, option).

(8) Push the valve lever for the working hydraulics (4-11/5) beyond its pressure point into the forward position.

(9) Using a suitable lifting device, e.g. a second swivel shovel loader with an attached bucket, lift the bucket arm of the swivel shovel loader to be towed until the mechanical bucket arm support can be inserted at the swivel shovel loader to be towed (7-1).

Figure 7-1

NOTE

- If the loader has been out of operation for a longer period of time, the hydraulic hoses must be disconnected from the lifting cylinders before attaching the lifting gear. Collect the escaping hydraulic oil in a sufficiently large oil pan.
- After towing has been completed, fill the lifting cylinders with hydraulic oil and deaerate them by raising and lowering the bucket arm several times.

(10) Mechanically prop up the bucket arm [e.g. by inserting the bucket arm supports (option) (1-2/arrows)] and lower the bucket arm until it rests on the bucket arm support.

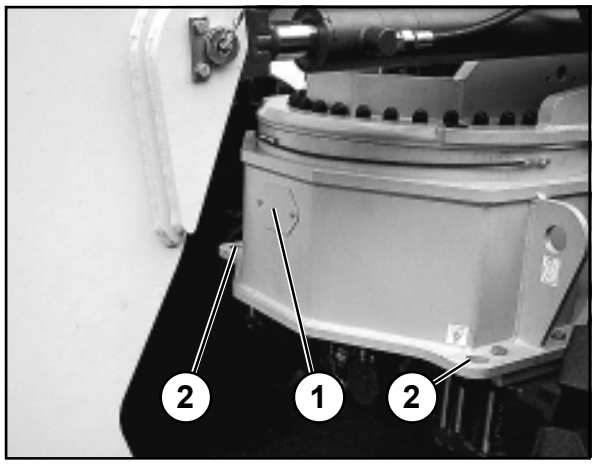


Figure 7-2

(11) Close the ball block valve for the working and auxiliary hydraulics (4-10/3).

(12) Set the pilot valve for the working hydraulics (4-11/5) to its starting position.

(13) Block the swivel unit by inserting the blocking wedge (1-3/arrow) into the swivel block (1-4/arrow).

(14) Attach the tow rod to the loader to be towed [7-2/1 – forwards towing (optional shunting and towing coupling) or 7-3/1 – rearwards towing] and to the towing vehicle.

CAUTION

If the front of the loader does not have a shunting and towing coupling, the loader may only be towed rearwards.

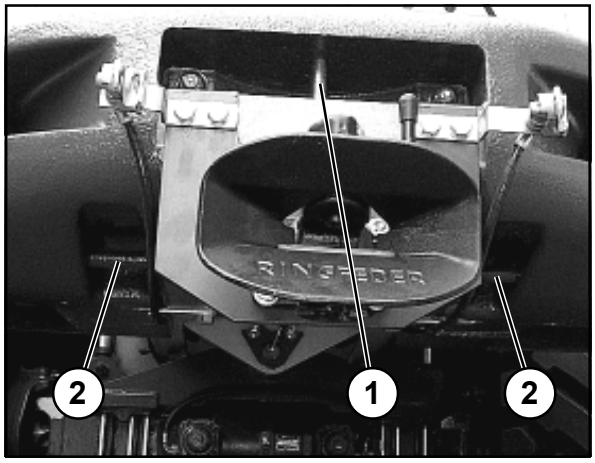


Figure 7-3

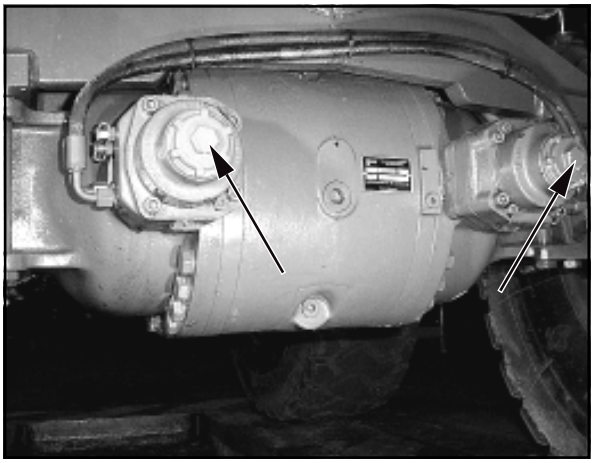


Figure 7-4

(15) Loosen the spring. To do this, loosen and remove the two caps (7-4/arrows).

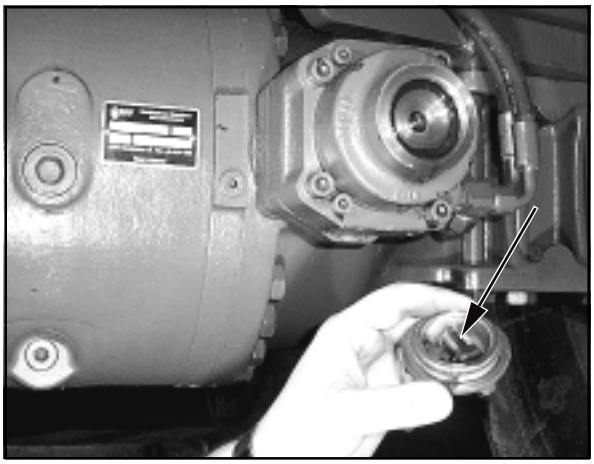


Figure 7-5

(16) Remove the quick-release hex screws (7-5/arrow) within the caps and screw them into the spring cylinder (7-6/arrow) until a definite stop can be felt. This tensions the spring package.

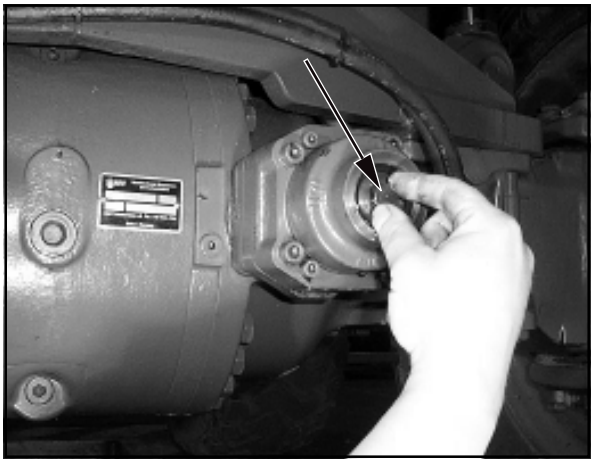


Figure 7-6

(17) Screw both caps on again and tighten manually.

NOTE

After towing is completed, unscrew the caps (7-4/arrows) again, remove the quick-release hex screws (7-6/arrow), insert them in the caps (7-5/arrow) and tighten the caps again by hand.

(18) Switch the hydrostatic drive motor to free oil flow before towing. For this purpose, screw in the setscrews at both high-pressure relief valves (7-7/arrows) of the drive pump until they are level with the hexagon nuts (size 13) loosened beforehand. Then tighten the hexagon nuts.

NOTE

After towing has been completed, loosen the hexagon nuts again. Screw the setscrews out of both high-pressure relief valves until they stop. Tighten the lock nuts.

(19) Remove the chocks.

DANGER

- More power is required to steer if the engine has failed.
- Tow the loader at walking speed (2 km/h).
- For a longer towing distance, the defective loader must be loaded onto a truck (for the lashing points, see 7-2/1 and 7-2/2 or 7-3/1 and 7-3/2).
  - The max. permissible load of the shunting and towing coupling (7-2/1) is 8.0 t horizontally in the longitudinal direction.
  - The max. permissible load of the rear shunting and towing coupling (7-3/1) is 12.0 t horizontally in the longitudinal direction.
  - The max. permissible load of the lashing points/loadbearing points (7-2/2 and 7-3/2) is 4.0 t at an assumed bracing angle of 45°.
  - Pay attention to clearances under structures!

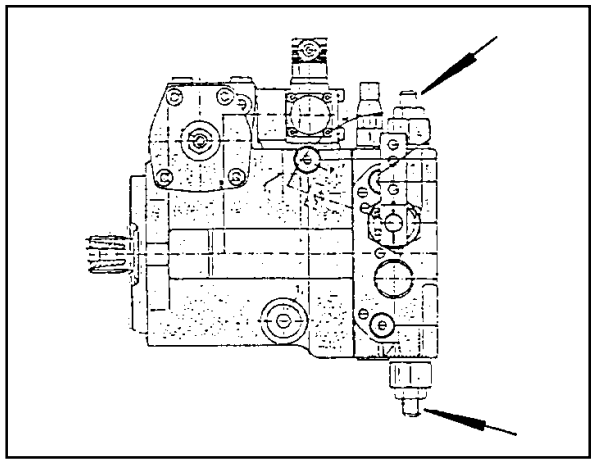


Figure 7-7

7.1.1.2 Towing the swivel shovel loader if the drive has failed

(1) Actuate the toggle switch for the hazard flasher (4-5/2).
(2) Apply the parking brake (4-11/4).

CAUTION

If the rescue location is on a slope, wheel chocks must be placed on the sloping side of both front axle wheels in addition to applying the parking brake.

(3) Set the drive switch (4-11/6) to “0”.

NOTE

The preparations described in steps (4), (5), (6) and (9) are only to be carried out if the rescue location is **not** on a public road:

(4) After the front-axle wheels have been straightened, switch the switching lever for the steering (4-10/4) to the „rear-axle steering“ position.

(5) Cover the bucket cutting edge and teeth with the bucket protector (5-4/arrow).

(6) Insert the plug of the bucket protector into the socket (5-5/arrow, option).

(7) Lift and mechanically prop up the bucket arm [e.g. by inserting the bucket arm support (option) (1-2/arrows)] and lower the bucket arm by activating the pilot valve for the working hydraulics (4-11/5) until the arm rests on the bucket arm support.

(8) Close the ball block valve for the working and auxiliary hydraulics (4-10/3).

(9) Block the swivel unit by inserting the blocking wedge (1-3/arrow) into the swivel block (1-4/arrow).

(10) Attach the tow rod to the loader to be towed [7-2/1 – forwards towing – or 7-3/1 – rearwards towing] and to the towing vehicle.

CAUTION

If the front of the loader does not have a shunting and towing coupling, the loader may only be towed rearwards.

(11) Switch the hydrostatic drive motor to free oil flow before towing. For this purpose, screw in the setscrews at both high-pressure relief valves (7-7/arrows) of the drive pump until they are level with the hexagon nuts (size 13) loosened beforehand. Then tighten the hexagon nuts.

NOTE

After towing has been completed, loosen the hexagon nuts again. Screw the setscrews out of both high-pressure relief valves until they stop. Tighten the lock nuts.

(12) Remove the chocks (if applicable).

(13) Release the parking brake (4-11/4).

NOTE

If the loader cannot be towed, remove both cardan shafts (8-29 to 8-32).

DANGER

- More power is required to steer if the engine has failed.
- Tow the loader at walking speed (2 km/h).

- For a longer towing distance, the defective loader must be loaded onto a truck (for the lashing points, see 7-2/1 and 7-2/2 or 7-3/1 and 7-3/2).
  - The max. permissible load of the shunting and towing coupling (7-2/1) is 8.0 t horizontally in the longitudinal direction.
  - The max. permissible load of the rear shunting and towing coupling (7-3/1) is 12.0 t horizontally in the longitudinal direction.
  - The max. permissible load of the lashing points/load-bearing points (7-2/2 and 7-3/2) is 4.0 t at an assumed bracing angle of 45°.
  - Pay attention to clearances under structures!

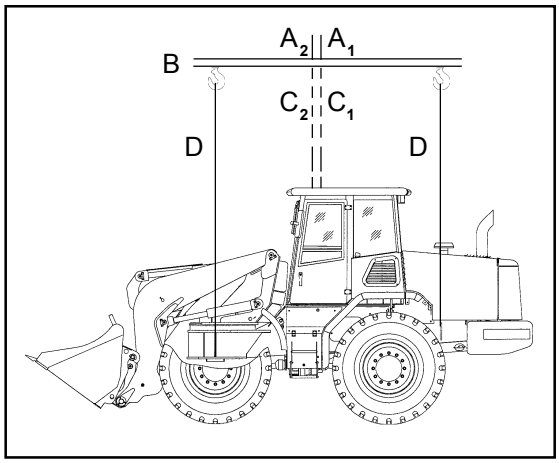


Figure 7-8

7.2 Lifting by crane

The loader to be lifted must be prepared as follows:

(1) Apply the parking brake (4-11/4).
(2) Set the drive switch (4-11/6) to “0”.
(3) Switch to gear stage „Alpha max.“ (4-11/7).
(4) Lift or lower the bucket arm until the lowest point of the bucket arm or of the bucket is at least 30 cm above the road (5-4).
(5) Close the ball block valve for the working and auxiliary hydraulics (4-10/3).
(6) Block the swivel unit by inserting the blocking wedge into the swivel block (1-4/arrow).
(7) Lock both doors.
(8) Fold the outside mirror inwards.

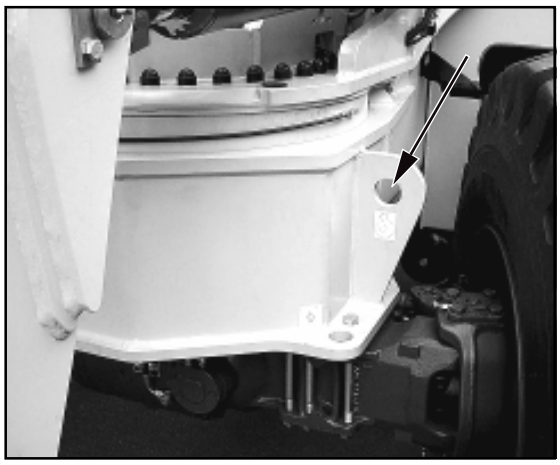


Figure 7-9

CAUTION

The following items must be observed when lifting the loader by crane (Figure 7-8):

- The lifting point (A_1 - loader without standard bucket or A_2 - loader with standard bucket) of the lifting device (B) must be precisely vertically over the centre of gravity (C_1 or C_2) of the loader so that the lifting device is **horizontally** above the longitudinal centre axis of the loader.

- The lifting gear (D) must lead vertically upwards from the lifting points to the left and right of the loader (7-9/arrow and 7-10/arrow).

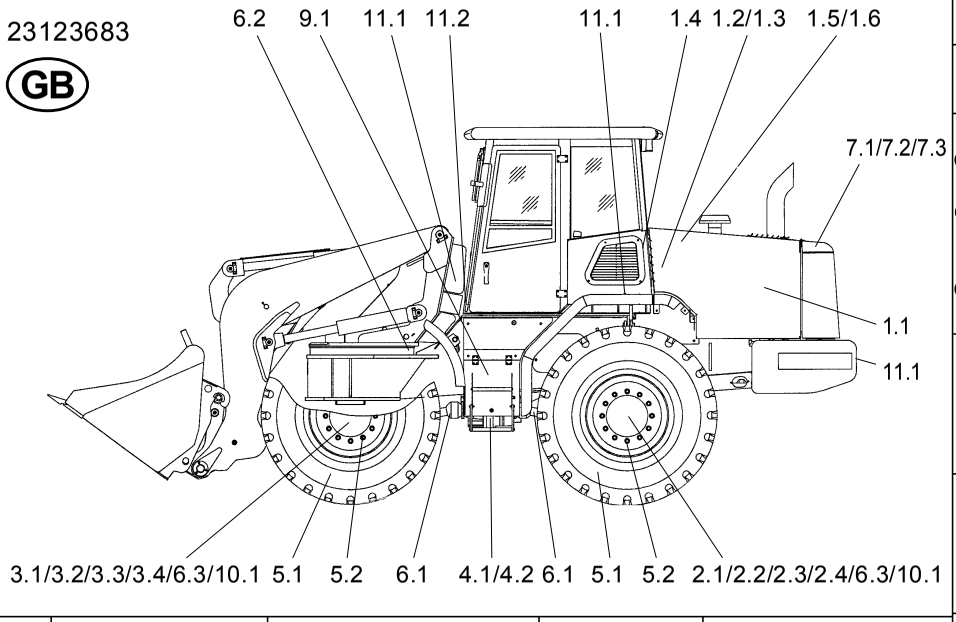
DANGER

The lifting gear must have a lifting capacity of at least 7.0 t.

Figure 7-10

Maintenance

8 Maintenance (Maintenance Plan)



Item	Designation	Specification	Viscosity	Filling amount
* 1	Motor oil	MIL-L-2104 C = API-CD	Acc. to manufacturer	approx. 14 l with oil filter
* 2.2	Transm. oil with LS additive	MIL-L-2105 B = API-GL5-6-LS	SAE 85 W 90-LS	approx.15l
* 2.4	Transm. oil with LS additive	MIL-L-2105 B = API-GL5-6-LS	SAE 85 W 90-LS	approx. 2 x 5 l
* 3.2	Transm. oil with LS additive	MIL-L-2105 B = API-GL5-6-LS	SAE 85 W 90-LS	approx. 15 l
* 3.4	Transm. oil with LS additive	MIL-L-2105 B = API-GL5-6-LS	SAE 85 W 90-LS	approx. 2 x 5 l
* 4.2	Transm. oil	General Motors ATF type DEXRON II	ATF 22 SAE 75 W	approx. 5.2 l (upper compartment) approx. 4.3 l (lower compartment)
* 7.3	Hydraulic oil	DIN 51524 - HVLP 46	ISO VG 46, VI > 180	approx. 230 l
* 8	Grease	DIN 51825 - KPF 1/2 N-20		as required
* 9	Distilled water			as required

Key to symbols

△ First oil change, first filter replacement
▲ First check; eliminate any determined problems
○ Check; eliminate any determined problems
◇ Change
* The markings, filling and check plugs are binding

Refer to operating instructions

Caution!

STOP When carrying out maintenance work, heed the accident prevention regulations!

Grease points (indicated in red)

1. Lubricate bolts every 10 operating hours with grease (DIN 51825 - KPF 1/2 N-20).
2. Lubricate glide points as required and always after cleaning using grease (DIN 51825 - KPF 1/2 N-20).

Oil lubrication points

3. Use MIL-L-2104 C engine oil to lubricate the joints and deflection levers every 50 operating hours.

Optional equipment: Biodegradable hydraulic oil

4. Ester-based synthetic hydraulic oil, viscosity class ISO VG 46 VI > 180

⚠ **CAUTION !** The service brake must be operated with mineral oil only!

Every x operating hours 10	50	500	1500	Item	Maintenance points (Max. permissible intervals or shorter (depending on use))
				1	**Engine**
○	△	◇		**1.1**	Maintenance acc. to manufacturer's regulations (open left and right engine flaps) →
					Dry air filter system:
○				1.2	Check maintenance display (open left engine flap)
				1.3	Maintain/replace filter element / safety cartridge →
	○			1.4	Check cooler and clean if necessary
○				1.5	Check coolant level, top off if necessary →
		○	◇	1.6	Check anti-freeze, top off if necessary
				2	**Rear axle**
	○			2.1	Check axis transmission oil level (check plug) →
		△	◇	2.2	Change axis transmission oil →
	○			2.3	Check planetary gear transmission oil level (check plug) →
		△	◇	2.4	Change planetary gear oil →
				3	**Front axle**
	○			3.1	Check axis transmission oil level (check plug) →
		△	◇	3.2	Change axis transmission oil →
	○			3.3	Check planetary gear transmission oil level (check plug) →
		△	◇	3.4	Change planetary gear oil →
				4	**2-gear distribution gear**
	○			4.1	Check distribution gear oil level (check plug) →
		△	◇	4.2	Change distribution gear oil →
				5	**Wheels and tyres**
	○			5.1	Check air pressure
▲		○		5.2	Check fastening of wheel nuts (550 Nm)
				6	**Cardan shafts / ball bearing ring / axes**
	▲	○		6.1	Check fastening of cardan shafts (115 Nm)
	▲	○		6.2	Check fastening of ball bearing rings (610 Nm)
	▲	○		6.3	Check fastening of axles (385 Nm)
				7	**Hydraulic systems**
	△		◇	7.1	Replace filter inserts, observe electr. control lamp →
○				7.2	Oil level check (view glass) →
			◇	7.3	Oil change →
				8	**Grease points, indicated in red →**
				9	**Batteries ⚠ Opening the lid is prohibited!**
		○		9.1	Visual check (cleanness / battery terminals)
				10	**Brake systems**
○				10.1	Service and parking brake: Function test before starting work →
	○			10.2	Check parking brake, adjust if necessary →
				11	**Lighting system / fresh air filter**
				11.1	Function test before starting work
		○	◇	11.2	Maintaining/replacing the fresh air filter

8 Maintenance

Figures and descriptions may vary due to modifications in the construction that become possible and necessary to improve the loader and to develop it further technically. These modifications are summarised in section 13.

8.1 Notes regarding maintenance

DANGER

- The engine must be turned off.
- For work to be carried out under the bucket arm:
  - the bucket must be emptied or the attachment must be relieved,
  - the bucket arm must be mechanically propped up [e.g. by inserting the bucket arm supports (option) (1-1/arrows)],
  - the ball block valve for the working and auxiliary hydraulics (1-2/arrow) must be closed,
  - the swivel mechanism is to be blocked (1-4/arrow).
- The loader must be secured against rolling by applying the parking brake (4-11/4) and by setting the drive direction switch (4-11/6) to position „0“. In addition, wheel chocks must be placed on both sides of one of the two wheels of the front axle.

CAUTION

- Change the oil when the units are lukewarm.
- Perform maintenance work when the loader is on level ground and the bucket arm is in its lowest position.
- Replace damaged filter inserts and gaskets immediately.
- Clean force-feed lubrication nipples before lubricating.

NOTE

- For the maintenance work required, refer to the maintenance plan (page 8-1).
- Damage which is traceable to non-observance of the maintenance plan is not covered by the warranty.
- The lubricants listed in the maintenance plan can be used at ambient temperatures ranging from **-15°C** to **+40°C**.

CAUTION

For ambient temperatures below 15°C, refer to the description given in section 5.2.2, “Winter operation”.

Figure 8-1

8.2 Maintenance work

8.2.1 Engine oil level check

See the operating instructions for the engine.

8.2.2 Coolant level check

The coolant level of the engine is to be checked each time that the loader is started or at least once per day. The compensation tank (8-1/arrow) in the motor compartment is located on the right side of the loader; the filling hole is located at the engine hood (8-2/arrow). The level of coolant must be between the „Minimum“ and „Maximum“ marks.

CAUTION

If coolant needs to be added, note that the water/ anti-freeze mixing ratio is 2:1!

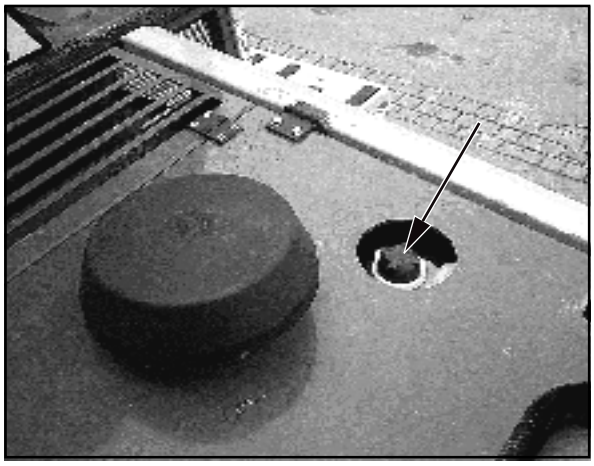


Figure 8-2

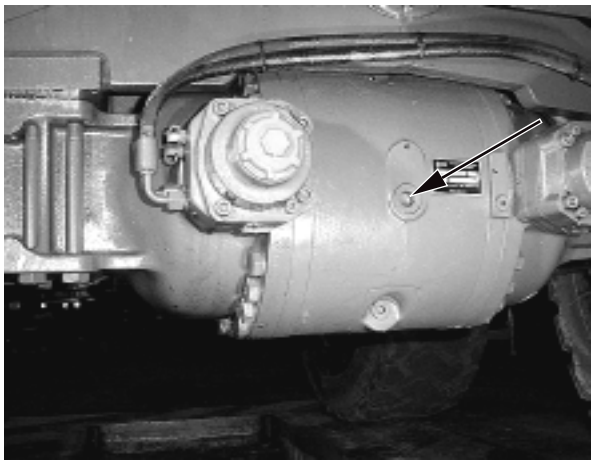


Figure 8-3

8.2.3 Oil level check for axles

8.2.3.1 Rear axle

(1) Unscrew the plug from the axle arch (8-3/arrow).

NOTE

- The oil level must reach the plug bore.
- Collect any oil that escapes.

(2) Fit a new gasket and screw the plug back in.

8.2.3.2 Planetary gear

(1) Move the loader so that the plug (8-4/2) is positioned at 3 o'clock.

(2) Unscrew the plug.

NOTE
- Collect any oil that escapes.
- The oil level must reach the plug bore.
- If necessary, fill oil into the plug bore (8-4/1) until the oil reaches the required level.

(3) Fit a new gasket and screw the plug back in.

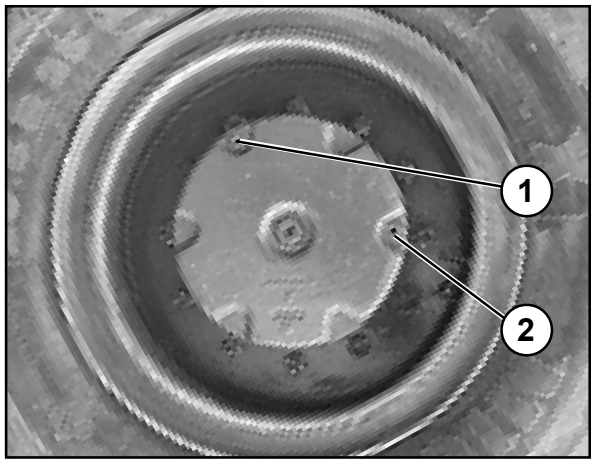


Figure 8-4

8.2.3.3 Front axle

(1) Unscrew the plug from the axle arch (8-5/arrow).

NOTE
- Collect any oil that escapes.
- The oil level must reach the plug bore.
- If necessary, fill oil into the plug bore until the oil reaches the required level.

(2) Fit a new gasket and screw the plug back in.

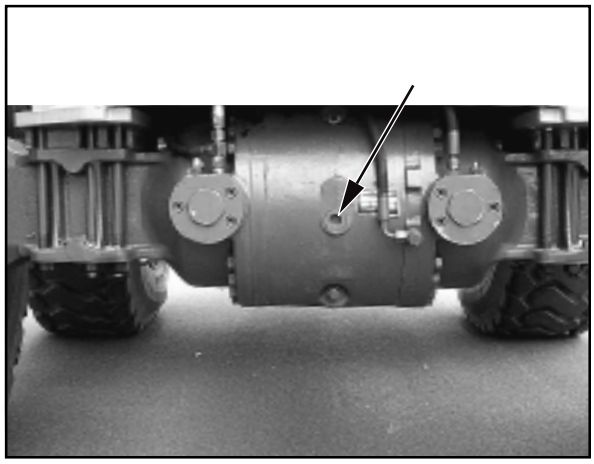


Figure 8-5

8.2.4 Oil level check (distribution gear)

(1) Remove the foot mat in the footwell of the operator's cabin.
(2) Dismantle the floor plate under the foot mat.
(3) Check the oil level using the check marking of the oil dipstick (8-6/1) for the upper oil compartment (coupling space).
(4) Unscrew the plug (8-6/4) from the lower oil compartment (spur gear space).

NOTE
- The loader must have been standing still for at least 15 minutes before you can check the oil level.
- The transmission housing temperature must be at least 60 °C (warm up if necessary).
- The oil level must reach the plug bore (8-6/4).
- If necessary, fill oil into oil filling screw 8-6/2 (upper oil compartment) or 8-6/3 (lower oil compartment) until the oil reaches the required level.
- Collect any oil that escapes.

(5) Fit a new gasket and screw the plug back in.

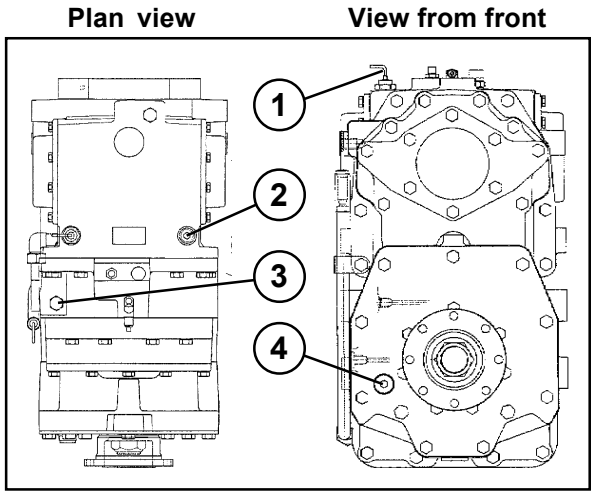


Figure 8-6

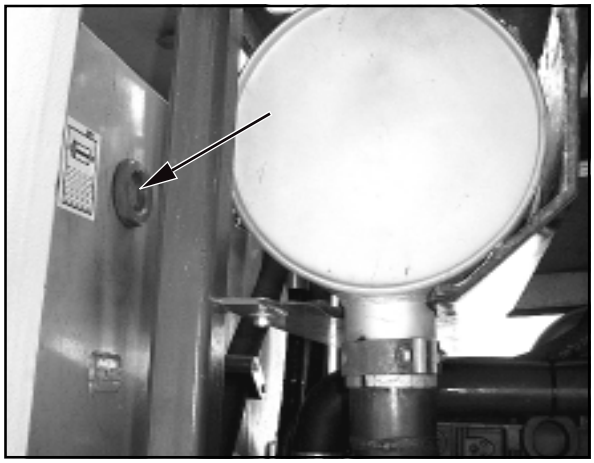


Figure 8-7

8.2.5 Oil level check of the hydraulic oil reservoir

(1) Park the loader in a level position.
(2) Bring the bucket arm to its lowest position and tip the quick-change device.
(3) Open the engine flap on the right side of the loader.
(4) Check the oil level in the sight glass.

NOTE

The oil level must be visible in the upper quarter of the sight glass (8-7/arrow). If necessary, fill oil into the filler neck (8-14/arrow).

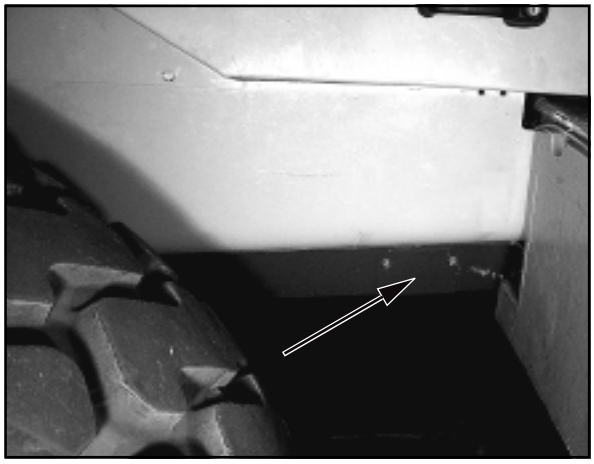


Figure 8-8

8.2.6 Oil change, engine

NOTE

Move the steering wheel of the loader all the way to the left.

(1) Place a sufficiently large oil drain pan underneath.
(2) Remove the covering plate from the lower part of the crankcase on the left side of the loader (8-8/arrow).
(3) Unscrew the covering plate of the oil drain plug.
(4) Screw the drainage nozzle with hose from the tool box (4-1/12) to the oil drain plug.
(5) Remove the cover cap from the hose.
(6) Further procedures are to be found in the Engine Operating Manual.

8.2.7 Oil change, axles

8.2.7.1 Rear axle

(1) Place a sufficiently large oil drain pan underneath.
(2) Unscrew the plugs from the axle arch (8-9/1 and 8-9/2) and drain the oil.

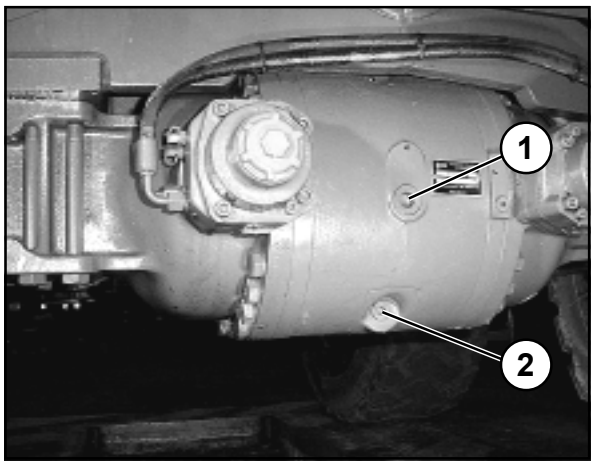


Figure 8-9

CAUTION

Waste oil must be disposed of in such a way that it will not cause pollution!

(3) Screw in the plug (8-9/2) again with a new gasket.
(4) Fill in oil via the plug bore (8-9/1) until the oil level reaches the opening.

NOTE

- Information about the quantity of oil is given in the maintenance plan (chapter 8).
- After a few minutes, when the oil level has lowered, top up the oil until the oil level reaches the marked level and remains stable.

(5) Screw in the plug (8-9/1) again with a new gasket.

8.2.7.2 Planetary gear

(1) Move the loader so that the plug (8-10/arrow) is positioned at 6 o'clock.

(2) Place an oil drain vessel with a drain channel underneath the gear.

(3) Unscrew the drain plug and let the oil drain out.

CAUTION
Waste oil must be disposed of in such a way that it will not cause pollution!

(4) Move the loader so that the plug (8-10/arrow) is positioned at 3 o'clock (8-4/2).

(5) Fill in oil via the plug bore (8-4/1) until the oil level reaches the opening.

NOTE
- Information about the quantity of oil is given in the maintenance plan (chapter 8).
- After a few minutes, when the oil level has lowered, top up the oil until the oil reaches the marked level and remains stable.

(6) Use new gaskets when screwing the plug back in.

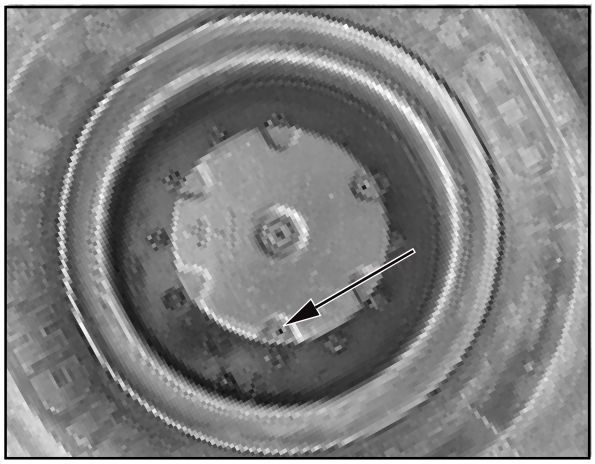


Figure 8-10

8.2.7.3 Front axle

(1) Place a sufficiently large oil drain pan underneath.

(2) Unscrew the plugs from the axle arch (8-11/1 and 8-11/2) and drain the oil.

CAUTION
Waste oil must be disposed of in such a way that it will not cause pollution!

(3) Screw in the plug (8-11/2) again with a new gasket.

(4) Fill in oil via the plug bore (8-11/1) until the oil level reaches the opening.

NOTE
- Information about the quantity of oil is given in the maintenance plan (chapter 8).
- After a few minutes, when the oil level has lowered, top up the oil until the oil reaches the marked level and remains stable.

(5) Screw in the plug (8-11/1) again with a new gasket.

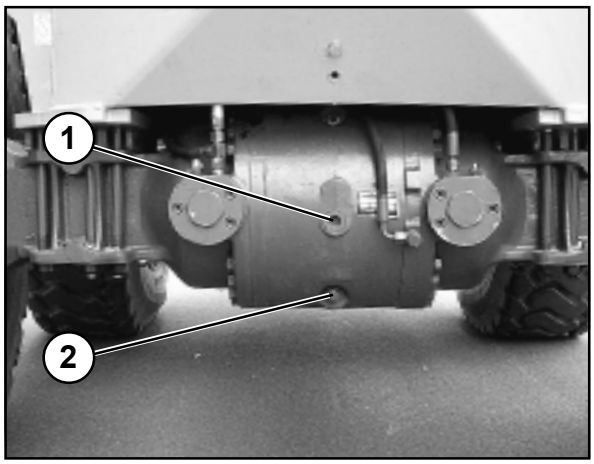


Figure 8-11

Plan view

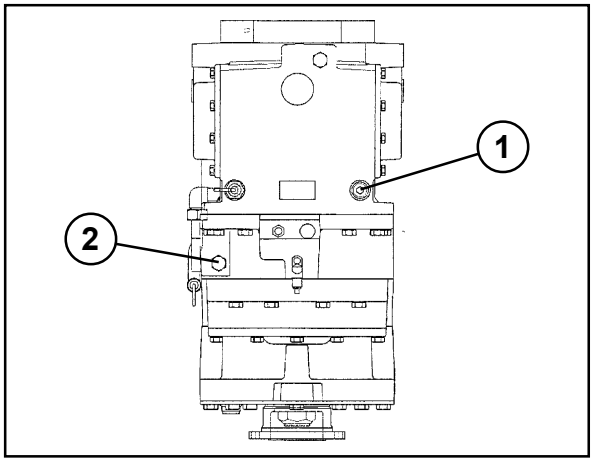


Figure 8-12

View from rear View from front

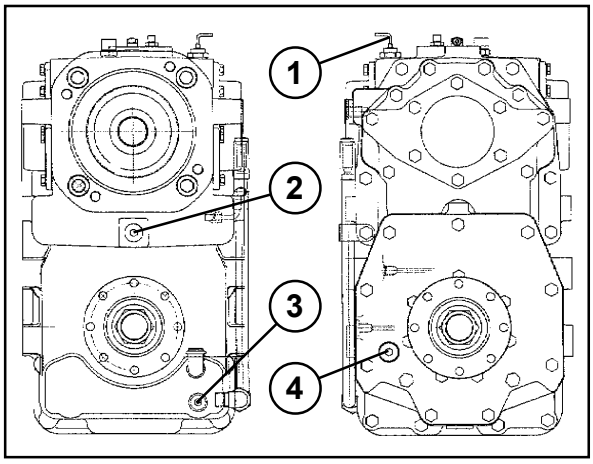


Figure 8-12a

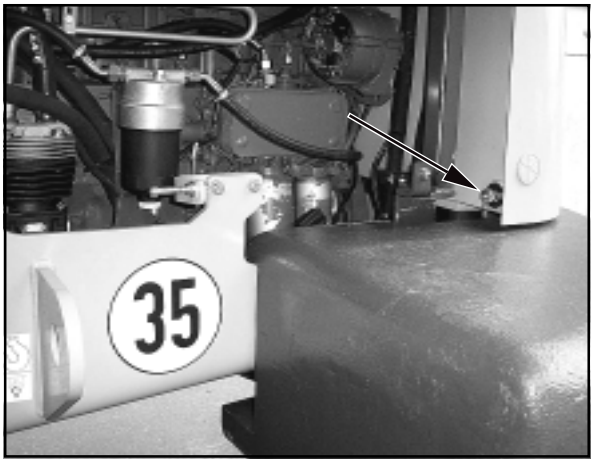


Figure 8-13

8.2.8 Oil change, distribution gear

(1) Remove the foot mat in the footwell of the operator's cabin.
(2) Dismantle the floor plate under the foot mat.
(3) Place a sufficiently large oil drain pan with a drain channel underneath.
(4) Unscrew the filling (8-12/1 and 8-12/2) and drain plugs (8-12a/2) and let oil drain from the upper oil compartment through the drain channel.
(5) Unscrew the drain (8-12a/3) and inspection plugs (8-12a/4) and drain the oil from the lower oil compartment.

CAUTION
Waste oil must be disposed of in such a way that it will not cause pollution!

(6) Screw the drain plugs (8-12a/2 and 8-12a/3) back in with new gaskets.

(7) Fill in oil through the filling plug bore of the upper oil compartment (8-12/1) until the oil reaches the mark on the dipstick (8-12a/1).

(8) Fill in oil through the filling plug bore of the lower oil compartment (82/3) until the oil reaches the lower edge of the oil inspection bore (8-12/4).

NOTE
- The transmission housing temperature must be at least 60 °C (warm up if necessary).
- Details regarding the amount of oil required are given in the maintenance plan (page 8-1).
- When the oil level has lowered – not earlier than after 15 minutes - top up the oil until the oil reaches the marked level and remains stable.

(9) Screw the filling (8-12/1 and 8-12/2) and inspection plugs (8-12a/4) back in with new gaskets..

8.2.9 Oil change, hydraulic system

(1) Have an oil pan ready (at least 250 l).
(2) Open both engine flaps.
(3) Unscrew the covering flap of the oil drain plug (8-13/ arrow).
(4) Screw the drainage nozzle with hose from the tool box (4-1/12) to the oil drain plug.
(5) Remove the cover cap from the hose.
(6) Drain the oil into the oil pan.

CAUTION
Waste oil must be disposed of in such a way that it will not cause pollution!

(7) Remove the nozzle with the hose and replace the cover cap on the hose.
(8) Screw the covering plate onto the oil drain plug.
(9) Replace the suction / return flow filter cartridge (section 8.2.10).

(10) Fill oil into the filler neck (8-14/arrow).

CAUTION
For those loaders which are fitted to run with biodegradable hydraulic oil (ester-based synthetic hydraulic oil of viscosity class ISO VG 46 VI > 180 – designation can be found on the hydraulic oil reservoir and on the dashboard), only this type of oil may be used for oil changes.
Mineral and biodegradable hydraulic oils must **never** be mixed!
Biodegradable hydraulic oil must be changed every **1000 operating hours**.
Changing the oil type from mineral oil to biodegradable oil must be performed according to the VDMA 24 569 conversion guidelines.

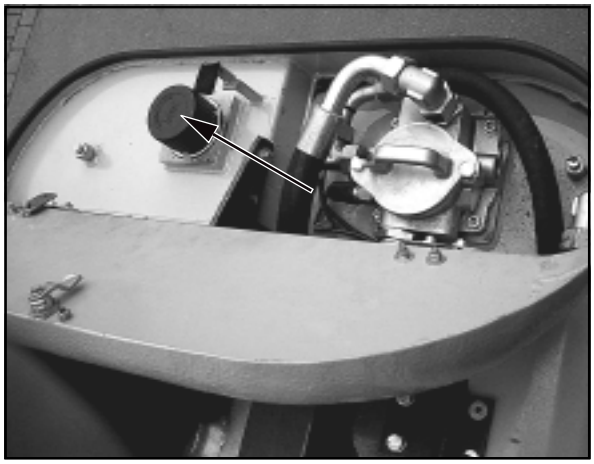


Figure 8-14

(11) Check the oil level at the sight glass (8-7/arrow).
(12) Close the filling nozzle.

8.2.10 Replacing the suction / return flow filter cartridge

CAUTION
Replace the filter insert according to the maintenance plan or when the clogging indicator lamp (4-8/13) lights up.

NOTE
The clogging indicator may light up prematurely after a cold start. It will go out when the hydraulic oil warms up.

(1) Open the maintenance flap of the hydraulic oil reservoir (8-15/1).
(2) Loosen but do not unscrew both screws of the hydraulic oil filter lid (8-15/2 or 8-16/1).
(3) Turn the hydraulic oil filter lid with the magnetic tube (8-15/4 or 8-16/2) to the left and lift it out. Collect hydraulic oil dripping off.
(4) Swing up the handle (8-16/3), slowly pull out the filter cartridge (8-16/4) and replace it with a new one.

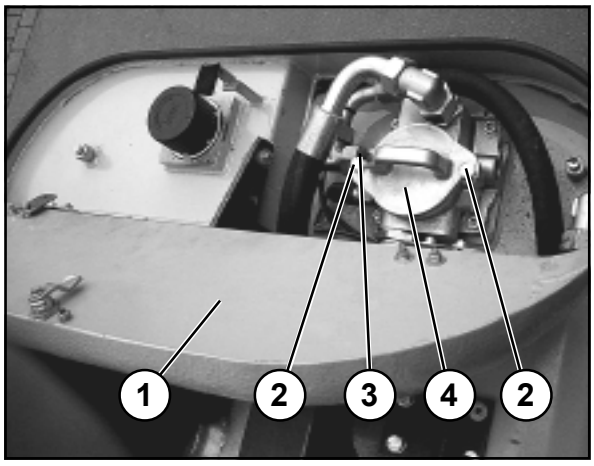


Figure 8-15

CAUTION
- Collect any hydraulic oil dripping off when you pull out the filter cartridge.
- The used hydraulic oil filter cartridge must be disposed of in such a way that it does not cause pollution.

(5) Use a clean cloth to wipe the magnet tube (8-16/2) before fitting it back in.
(6) Refit the hydraulic oil filter lid with the magnet tube and fasten it again.
(7) Connect the ventilation hose to the ventilation valve (8-15/3 or 8-16/1).
(8) Start the engine.
(9) Have an oil drain pan ready and open the ventilation valve.

NOTE
Keep the ventilation valve open until there are no more bubbles in the escaping oil.

(10) Close the ventilation valve.

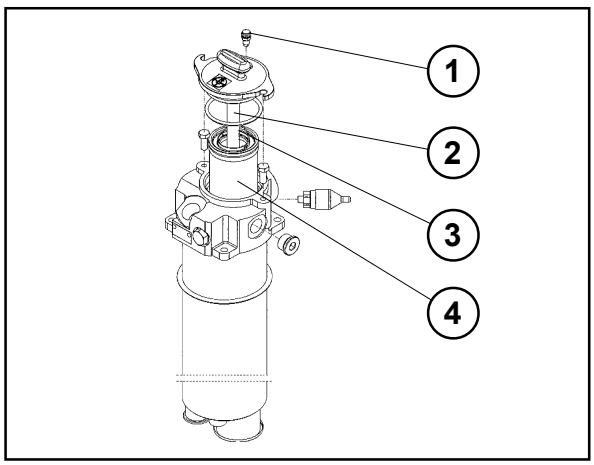


Figure 8-16

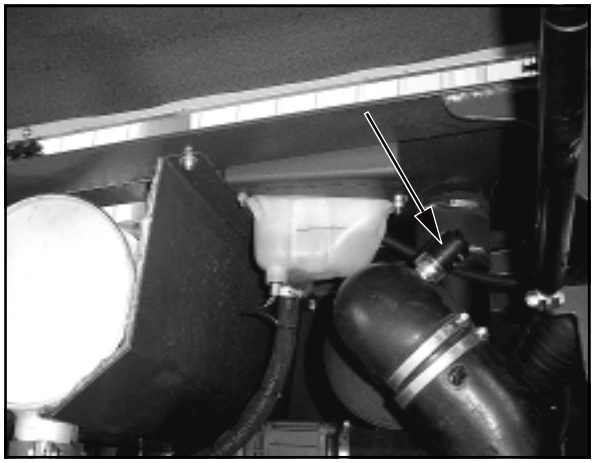


Figure 8-17

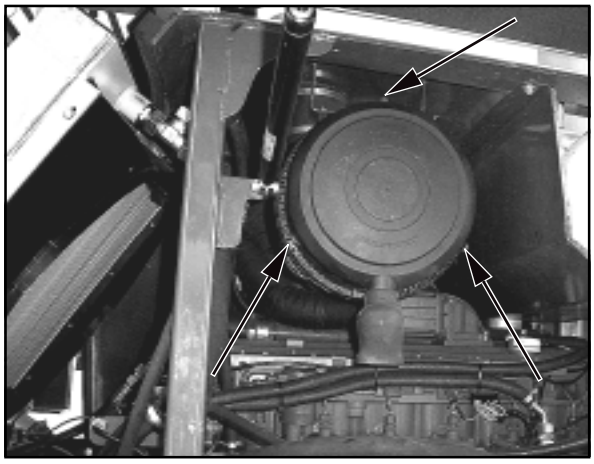


Figure 8-18

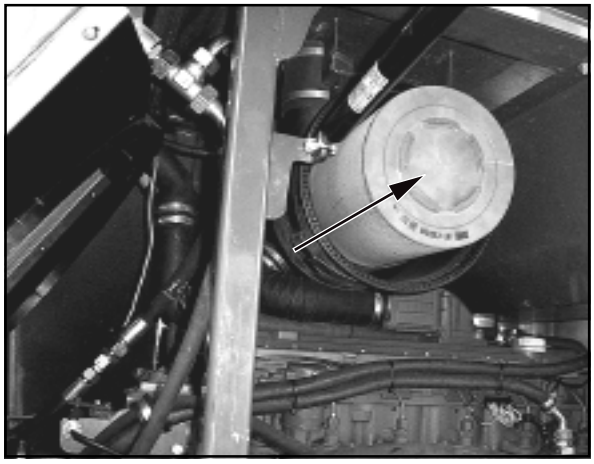


Figure 8-19

8.2.11 Maintaining/replacing the air filter

NOTE

Maintenance of the filter cartridge is necessary when either the red range is visible in the maintenance indicator (8-17/1 on the right side of the loader) or after 12 months, whichever is sooner.

(1) Open the engine flap on the left side of the loader.

(2) Loosen the three retaining clamps of the air filter lid (8-18/arrows) and remove the air filter lid.

(3) Pull out the filter cartridge (8-19/arrow) by carefully turning it back and forth.

(4) Clean the filter cartridge.

CAUTION

- For cleaning, use a compressed air gun to which a pipe (angled at 90°) has been attached. The pipe must be sufficiently long to reach the bottom of the cartridge. Use dry compressed air of no more than 5 bar to blow out the cartridge by moving the pipe back and forth in the interior of the cartridge. Cleaning can be stopped when dust formation ceases.

- Do not use petrol or hot liquids for cleaning.

(5) Use a hand-held lamp to check the cartridge paper and the rubber gasket of the filter cartridge for damage.
If the cartridge or the gasket is damaged, replace the cartridge.

(6) Carefully insert the filter cartridge.

(7) Install the air filter lid on the filter housing in such a way that the direction arrow in the marking "**OBEN-TOP**" points upwards. This ensures that the dust removal valve faces downwards.

(8) When the indicator field becomes red (8-17/arrow), push the reset button. The field becomes clear.

CAUTION

Check all connection pipes and hoses of the air filter system for damage before starting the engine.

8.2.12 Replacing the safety cartridge

CAUTION

- The safety cartridge must not be cleaned.
- The safety cartridge must be replaced after the filter cartridge has been maintained/ cleaned 5 times, but no later than two years.
- Make sure that no dirt or dust can enter the filter housing during replacement of the safety cartridge.

(1) Remove the filter cartridge (section 8.2.11).
(2) Pierce the seal of the safety cartridge (8-20/arrow) from the inside by using a screwdriver or similar tool and pull up both strips.
(3) Hold the safety cartridge by both strips and pull it out by carefully turning it back and forth. Replace the safety cartridge and the filter cartridge by new ones.
(4) The remaining installation is performed as described in section 8.2.11 (6) - (8).

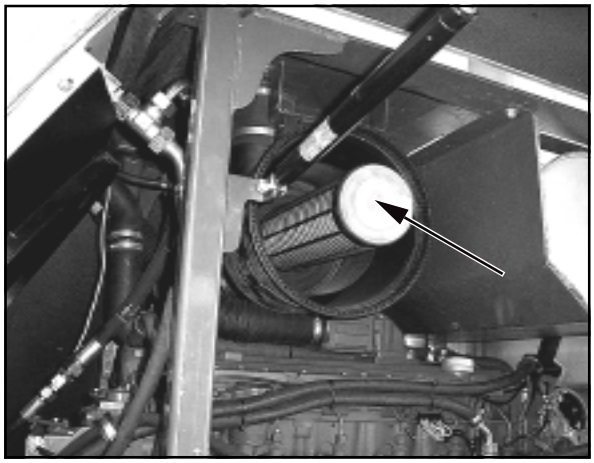


Figure 8-20

8.2.13 Replacing the fuel filter

See the operating instructions for the engine.

8.2.14 Replacing the starter batteries

NOTE

The starter batteries are maintenance-free according to DIN 72311, section 7. They are located on the left side of the cabin access area.

(1) Dismount the maintenance flap (8-22).
(2) Remove the main battery switch (8-21/2).
(3) Loosen the fastening screws (8-22/2) of the battery holders and remove them together with the retaining plates.
(4) Loosen and remove the connecting cables (8-22/1) from the batteries (size 13).

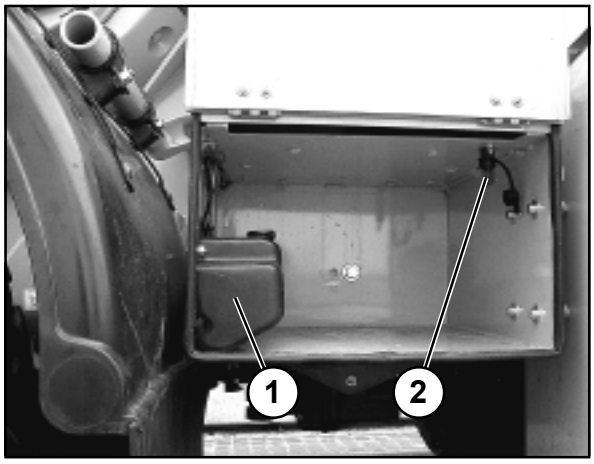


Figure 8-21

DANGER

Always remove the negative terminal first and then the positive terminal. Installation is in reverse order.

(5) Remove both batteries and replace them.
(6) Apply grease to the terminals before fastening them.
(7) Installation is in reverse order.

DANGER

Make sure the fastenings are secure.

(8) Attach the maintenance flap and close and lock it.

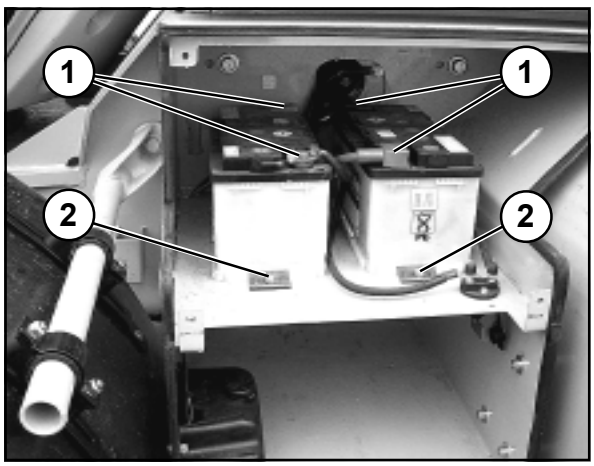


Figure 8-22

Figure 8-23

Figure 8-24

8.2.15 Cleaning the cooler

NOTE

The cooler must be checked every **50 operating hours** and cleaned when necessary. To do this, flip back the lamella plate (8-23/arrow) on the engine hood.

8.2.16 Maintaining/replacing the fresh air filter

NOTE

The fresh air filter is located at the right loader side in the vicinity of the front side window.

(1) Loosen the five fastening screws (8-24/arrows) of the compensator cover and remove the cover.
(2) Unscrew the filter cover behind together with the interior filter cartridge (4 fastening screws) and pull out.
(3) Remove the filter element and clean it with compressed air.

CAUTION

Do not use any petrol, hot fluids or industrial compressed air for cleaning.

(4) Check the filter element for damage.

NOTE

The filter element must be replaced when it is damaged, but at least every **1500 operating hours.**

(5) Insert the filter element and reinstall the filter cartridge and compensator covers.

8.2.17 Checking/adjusting the service/ spring parking brake

DANGER

- The combined service/parking brake must be checked and, if necessary, adjusted every **500 operating hours**.
- All work on the brake system must only be carried out by authorised personnel.
- Oil loss (leaks) in the brake system must be immediately reported to authorised personnel.
- Operation of the loader must be stopped immediately if the pedal can be pressed down too far or the braking effect decreases noticeably.

(1) Check the pedal travel.
(2) Check the entire system for proper functioning and absence of leaks (visual test).

NOTE

The combined service/parking brake is maintenance-free and therefore does not require any further check.

8.2.18 Lubrication points

NOTE

The lubrication points are marked in red on the loader.

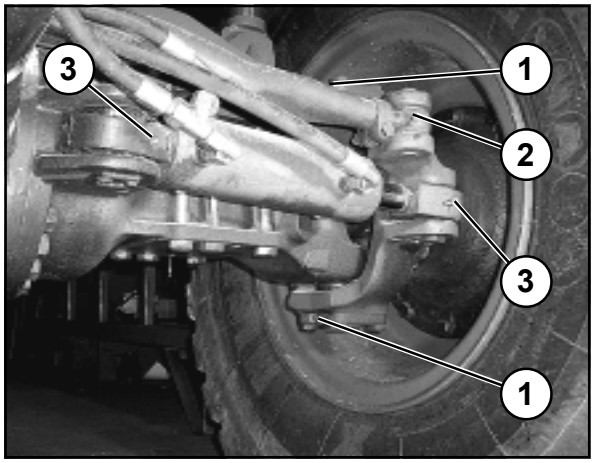


Figure 8-25

8.2.18.1 Rear axle

CAUTION

- The spindle bolts (8-25/1),
- the track rod bearings (8-25/2), and
- the steering cylinder bearings (8-25/3) must all be lubricated **every 50 operating hours**.

NOTE

Lubricate the axle spindle bolts (top and bottom), the track rod bearings and the steering cylinder bearings on both sides of the axle.

8.2.18.2 Rear axle pivot bolts

CAUTION

- The rear axle pivot bolts (8-26/arrows) must be lubricated **every 10 operating hours.**
- Release the rear axle from load before lubricating the rear axle pivot bolts.

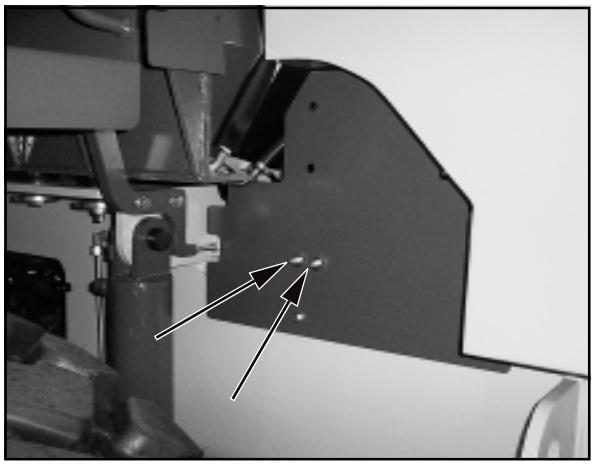


Figure 8-26

8.2.18.3 Front axle

CAUTION

- The spindle bolts (8-27/1),
- the track rod bearings (8-27/2), and
- the steering cylinder bearings (8-27/3)

must all be lubricated **every 50 operating hours**.

NOTE

Lubricate the axle spindle bolts (top and bottom), the track rod bearings and the steering cylinder bearings on both sides of the axle.

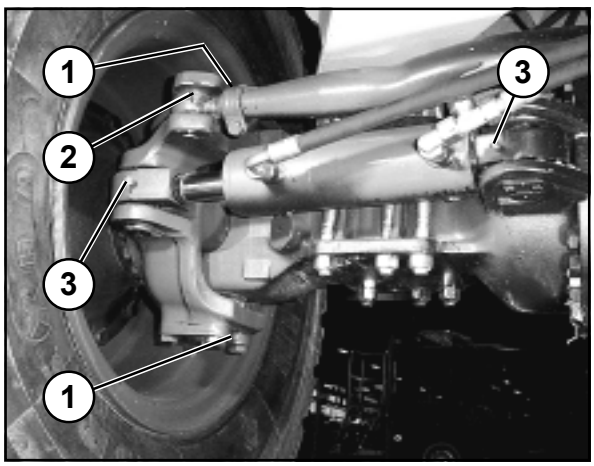


Figure 8-27

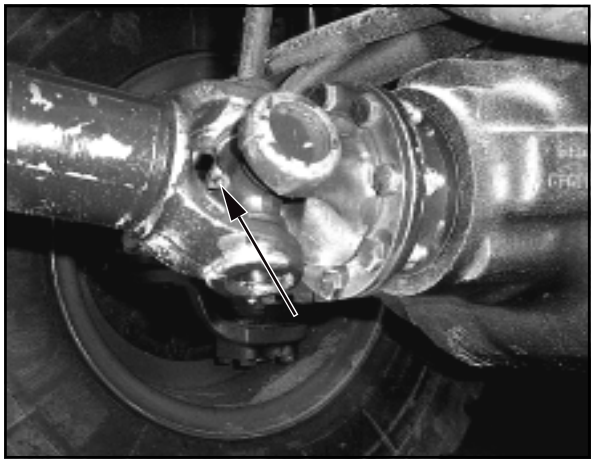


Figure 8-28

8.2.18.4 Rear cardan shaft

CAUTION

The cardan shaft must be lubricated **every 50 operating hours** (8-28/arrow and 8-29/arrow).

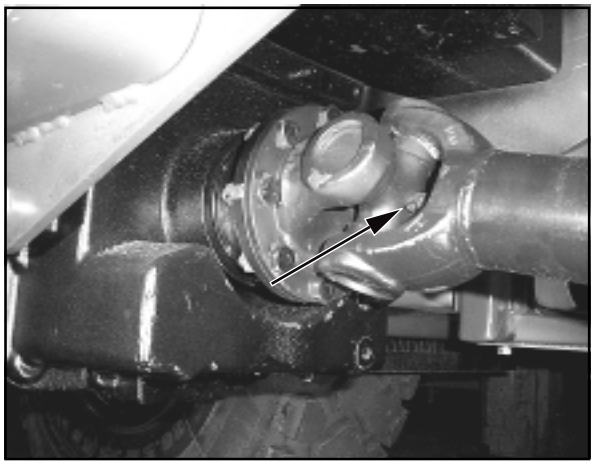


Figure 8-29

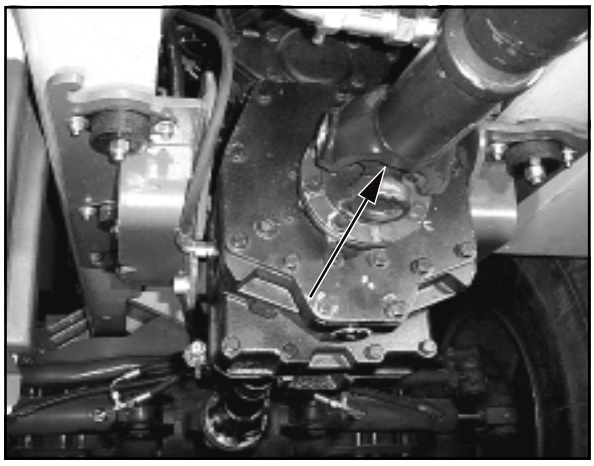


Figure 8-30

8.2.18.5 Front cardan shaft

CAUTION

The cardan shaft must be lubricated **every 50 operating hours** (8-30/arrow and 8-31/arrow).

Figure 8-31

8.2.18.6 Ball bearing ring

The grease filling is to avoid friction and to provide sealing and protection against corrosion. Therefore, the ring must be lubricated **every 10 operating hours** until grease becomes visible on the outside. When lubricating the ball bearing ring, swivel the bucket arm by 20° at a time. Then lubricate all four grease nipples (8-32/arrows) at each stage. It is absolutely necessary to lubricate the machine before and after a longer period of inactivity.

DANGER

- Before you start lubricating, mechanically support the bucket arm [e.g. by inserting the bucket arm support (optional) (1-1/arrows)], apply the parking brake (4-11/4) and set the drive direction switch (4-11/6) to the „0“ position.
- **During** swivelling, no-one may be present in the swivel area of the bucket arm.

Figure 8-32

8.2.18.7 Bucket assembly

CAUTION

The support bolts/lubrication points of the bucket assembly must be lubricated **every 10 operating hours**.

2x item 8-33/1 Tip lever / pivot arm
2x item 8-33/2 Pivot arm / reversing rod
2x item 8-33/3 Tip lever / quick-change device
2x item 8-33/4 Bucket assembly / quick-change device

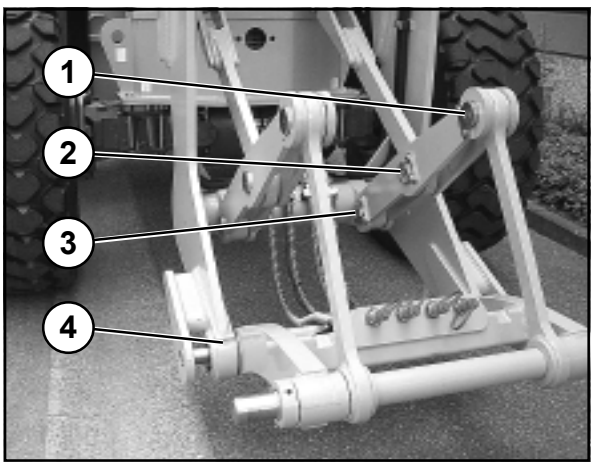


Figure 8-33

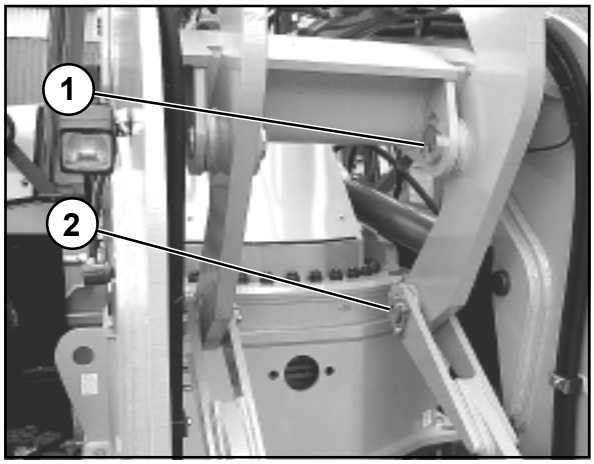


Figure 8-34

2x Item 8-34/1 Pivot arm / bucket assembly
2x Item 8-34/2 Reversing lever / reversing rod

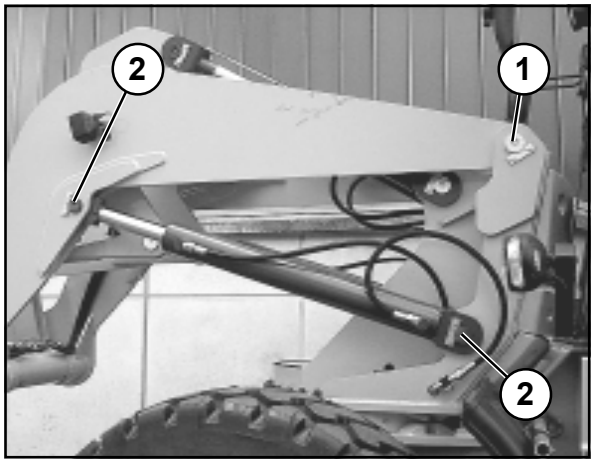


Figure 8-35

2x item 8-35/1 Bucket assembly / swivel unit
4x item 8-35/2 Lift cylinder

Figure 8-36

4x item 8-36/arrows Tip cylinder

8.2.18.8 Engine flaps

CAUTION

The hinges of the engine flaps (8-37/arrows) must be lubricated **every 50 operating hours**.

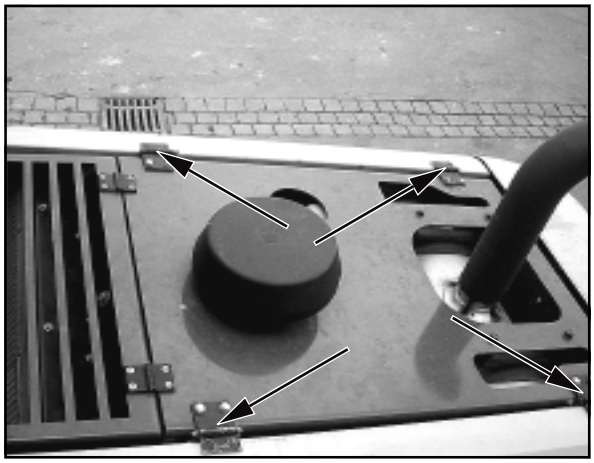


Figure 8-37

8.2.18.9 Multi-purpose bucket

CAUTION

The bearing bolts of the multi-purpose bucket must be lubricated **every 10 operating hours**.

NOTE

The bolt (8-38/arrow) must be lubricated on both sides of the multi-purpose bucket.

Figure 8-38

NOTE

The bolts (8-39/arrows) must be lubricated on both sides of the multi-purpose bucket.

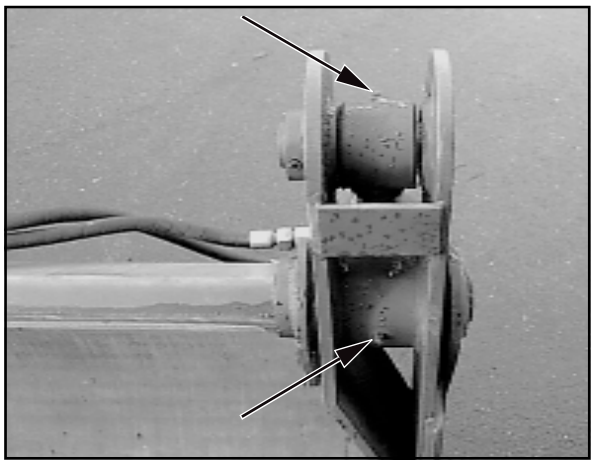


Figure 8-39

Faults, Causes and Remedies

9 Faults, causes and remedies

NOTE

*) Faults may be eliminated only by authorised personnel

Fault	Probable cause	Remedy
Engine		See the operating instructions for the engine
Engine does not start.	Drive switch (4-11/6) is not in neutral position	Set the drive switch to the neutral position
The bucket arm cannot be lifted/ lowered	Pressure-relief valve in servo valve is open	Remove and clean pressure-relief valve coupling, readjust*
	Pilot valve for working hydraulics (4-11/5) is locked	Unlock pilot valve (4-10/3)
	Pilot pressure too low or does not exist	Open, clean and readjust pressure-relief valve in control line *
	Diesel engine failed	Spring force can be used to bring the bucket arm to its lowermost position immediately after an engine failure.
Steering is sluggish	Pressure-relief valve in steering unit is open	Remove and clean entire pressure-relief valve, readjust*
	Slide in priority valve stuck	Replace priority valve *
Swivel unit does not swivel	Swivel block blocks swivelling (1-4/ arrow)	Remove swivel block and store in holder
	Pressure-relief valve in servo valve is open	Remove and clean entire pressure-relief valve, readjust*
Support fails	Switching of stop valve in frame under revolving seat stuck	Bring bucket arm into travel direction; unstick leverage
The support fails when the bucket arm is lowered in a swivelled state	Non-return valve in pressure line stuck in open position	Bring bucket arm into travel direction, remove and clean non-return valve (replace if necessary) *

Fault	Probable cause	Remedy
Faults in the driving and working hydraulics	Clogged filter	Replace filter cartridge (section 8.2.10).
	Lack of oil in hydraulic oil reservoir	Top off oil
	Electrical connection at axial piston pump are not tight, are not connected or are oxidised	Connect or clean electrical connection according to electrical plan
	High-pressure valves soiled	clean
Faults in the braking system	Parking brake does not hold the device	Check setting; adjust if necessary*
		Check whether electrical traction drive break is connected to brake lever
Alternator does not charge	Loose connection	Press in and lock connection
	V-belt torn	Replace V-belt
	Alternator speed too low	Check V-belt tension, tighten if necessary
Heater and ventilation system failed	Fuse in fuse box defective	Replace fuse
Hose couplings of attachments cannot be connected	Increased pressure due to heating of the attachment	**Carefully** loosen the screwed connection on the end of the hose using the quick-change couplings. Oil squirts out and the increased pressure is eliminated. Tighten the screwed connection. **NOTE** Waste oil must be disposed of in such a way that it will not cause pollution! Turn off the engine and eliminate pressure from the lines by alternatingly pressing the two buttons for the auxiliary hydraulic system (4-11/3) several times.

9.1 Diagnostic code (engine error code)

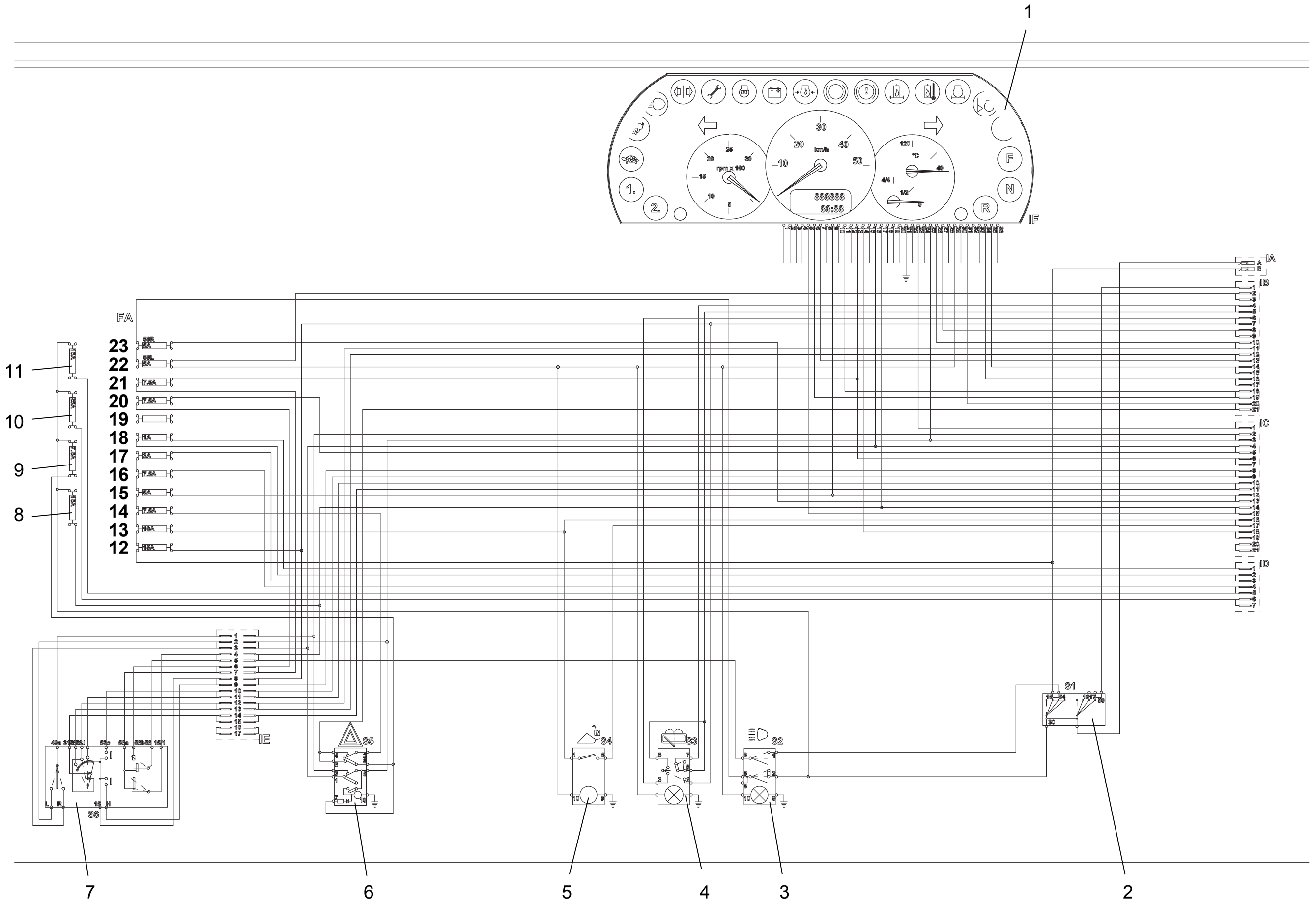
Flash code Short 0.4 s	Long 0.8 s	Short 0.4 s	Function / component	Error
1	2	3	Output to coolant temperature indicator	Faulty signal, controller overtemperature
1	2	6	Hand throttle	Faulty/implausible signal
1	2	8	Intake air temperature sensor	Faulty signal
1	3	3	Transmission oil temperature sensor	Faulty signal
1	3	4	Rail pressure monitoring	Implausible signal, pressure / pressure deviation exceeds permissible range
1	3	5	Output to oil pressure warning lamp	Faulty signal, controller overtemperature
			Output to the valve controller	Faulty signal, overtemperature of fuel metering
1	3	6	Air filter monitoring	Air pressure downstream of filter too low
1	3	7	Output to actuators	Short-circuit to battery
1	3	8	Output to actuators	Short-circuit to ground
1	4	2	Output to engine ready lamp	Faulty signal, overtemperature of fuel metering
1	4	3	Multi-level switch 1 / 2 / 3	Faulty/implausible signal
1	4	4	Oil temperature sensor	Faulty/implausible signal
			Oil temperature monitoring	Temperature not within nominal range
1	4	5	Override switch monitoring	Implausible signal
1	4	6	Rail pressure limitation valve	Valve open / pressure surge required / no opening after pressure surge
1	4	7	Rail pressure sensor	Implausible signal, pressure deviation exceeds permissible range
2	1	2	Camshaft/crankshaft monitoring	No camshaft/crankshaft signal
2	1	3	Camshaft/crankshaft monitoring	Deviation between camshaft and crankshaft signal
2	1	4	Motor protection	Implausible overspeed/ override status
2	1	6	Fuel low pressure sensor	Faulty signal
			Fuel low pressure monitoring	Fuel low pressure not within nominal range
2	1	9	Output to engine brake exhaust flap actuator	Faulty signal, controller overtemperature
2	2	2	Input accelerator 1 (PWM)	Faulty PWM signal
2	2	3	Charge air pressure sensor	Faulty signal
			Charge air pressure monitoring	Charge air pressure not within nominal range
2	2	4	Oil pressure sensor	Faulty/implausible signal
2	2	5	Coolant temperature sensor	Faulty/implausible signal in comparison to oil temperature, invalid CAN signal
2	2	6	Input accelerator 1 (analogue)	Faulty/implausible signal
2	2	7	Fuel temperature sensor	Faulty signal
2	2	8	Water level sensor in the fuel filter	Faulty signal
			Fuel filter water level monitoring	Max. water level exceeded
2	3	1	Oil pressure monitoring	Pressure not within nominal range
2	3	2	Coolant temperature monitoring	Temperature above nominal range
2	3	3	Intake air temperature monitoring	Temperature above nominal range
2	3	5	Coolant level monitoring	Level below nominal
2	3	7	Fuel temperature monitoring	Temperature not within nominal range
2	3	8	Output to fan actuator 1 / 2	Faulty signal, overtemperature of fuel metering
			Fan speed monitoring	Speed not within nominal range
2	4	1	Combustion monitoring	Misfire detected in one or several cylinders
2	6	1	Monitoring of output to actuators	Relay fails to open or opens too late, short-circuit to ground
2	6	3	Output to cold start aid	Faulty signal, relay defective, stuck or incorrectly wired, short circuit
2	7	1	CAN bus	Time out of one or several messages, inactive bus
2	8	2	Sensor supply voltage 1 / 2 / 3	Voltage not within nominal range
2	9	2	Atmospheric pressure sensor	Faulty/implausible signal

Flash code			Function / component	Error
Short 0.4 s	Long 0.8 s	Short 0.4 s		
3	1	4	Hydraulic oil temperature sensor	Faulty signal
			Hydraulic oil temperature monitoring	Temperature not within nominal range
3	1	8	Battery monitoring	Voltage not within nominal range
3	2	8	Output to cold start aid indicator	Faulty signal, controller overtemperature
4	1	4	Output to external AGR actuator	Faulty signal
4	1	5	Output to external AGR actuator	Faulty signal, controller overtemperature
4	1	6	Output to external AGR actuator	Faulty signal
4	1	7	Oil wear timer	Critical time reached
5	1	2	Output to start relay	Faulty signal, controller overtemperature
5	1	3	Output to error indicator	Faulty signal, controller overtemperature
5	1	4	Terminal 15 monitoring	No signal detected
5	1	5	Terminal 50 monitoring	Permanent signal detected
5	2	1	Speed measurement	Implausible travelling speed
5	2	8	Output to internal engine brake	Faulty signal

For all other flash codes: Please consult your service partner

Diagrams

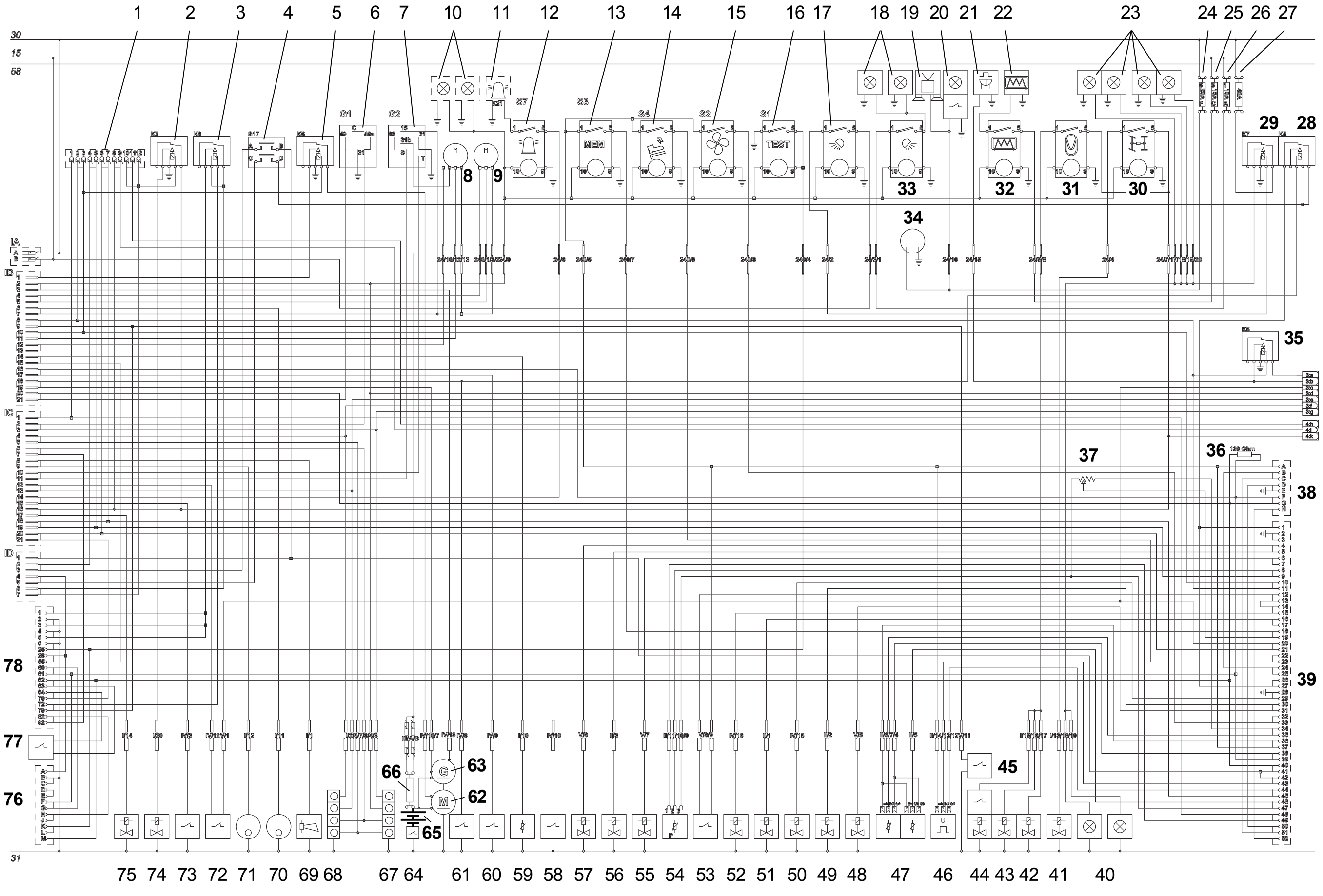
10.1 - 05.2008 Elektrik-Schaltplan/Schéma électrique/Wiring diagramm/Elektrisch schakelschema



10.1 Electric wiring diagram

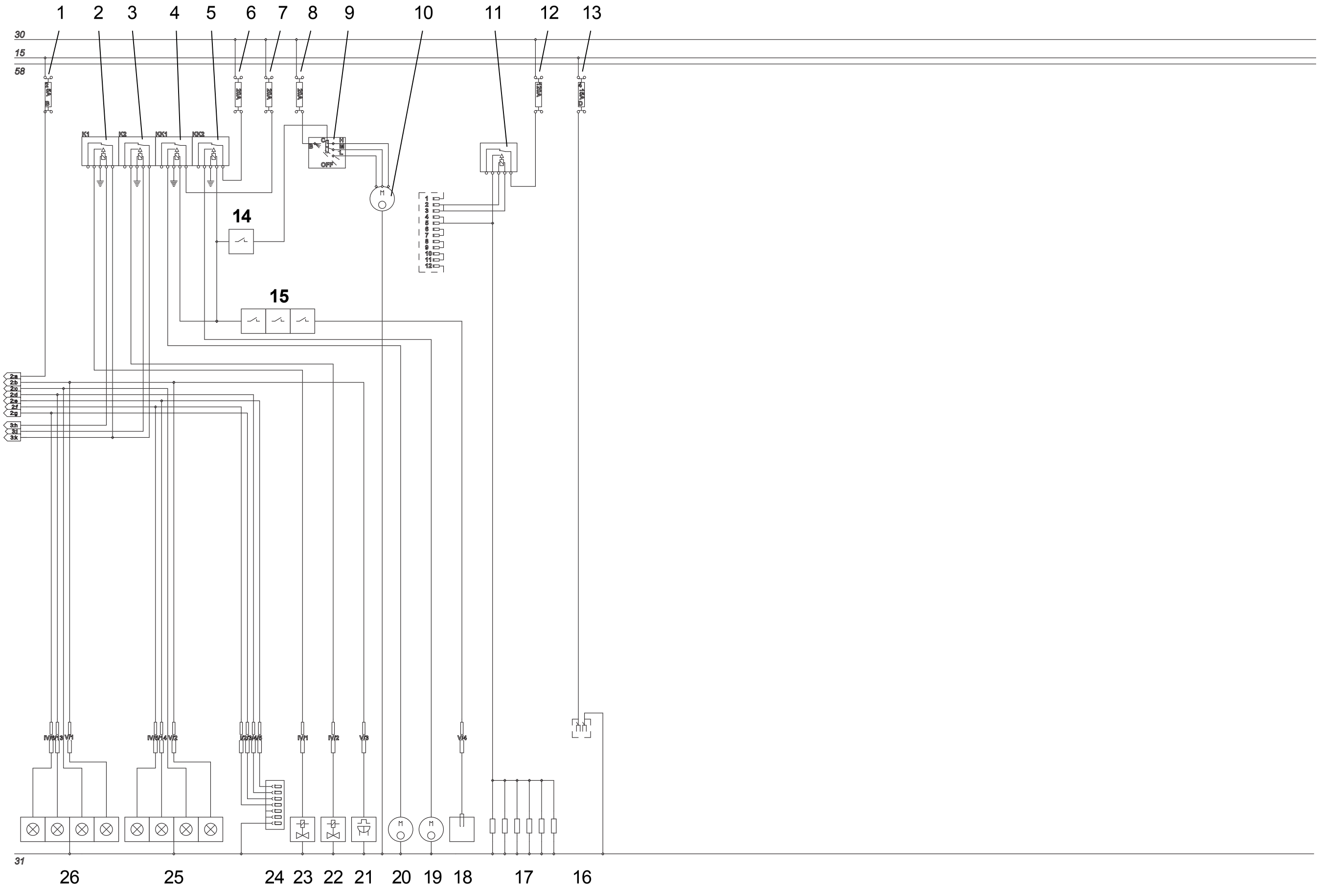
Sheet/ item	Designation
1-3/1	Multifunction panel
1-3/2	Start switch
1-3/3	Actuator: road lights
1-3/4	Actuator: rear window wiper/washer
1-3/5	Actuator (pushbutton): quick-change device release
1-3/6	Actuator: Hazard flasher
1-3/7	Steering column switch
1-3/8	Fuse 15.0 A (Figure 4-9/14)
1-3/9	Fuse 7.5 A (Figure 4-9/15)
1-3/10	Fuse 25.0 A (Figure 4-9/16)
1-3/11	Fuse 15.0 A (Figure 4-9/17)
1-3/12	Fuse 15.0 A (Figure 4-9/1)
1-3/13	Fuse 10.0 A (Figure 4-9/2)
1-3/14	Fuse 7.5 A (Figure 4-9/3)
1-3/15	Fuse 5.0 A (Figure 4-9/4)
1-3/16	Fuse 7.5 A (Figure 4-9/5)
1-3/17	Fuse 3.0 A (Figure 4-9/6)
1-3/18	Fuse 1.0 A (Figure 4-9/7)
1-3/19	free
1-3/20	Fuse 7.5 A (Figure 4-9/9)
1-3/21	Fuse 7.5 A (Figure 4-9/10)
1-3/22	Fuse 5.0 A (Figure 4-9/11)
1-3/23	Fuse 5.0 A (Figure 4-9/12)

10.1 - 05.2008 Elektrik-Schaltplan/Schéma électrique/Wiring diagramm/Elektrisch schakelschema



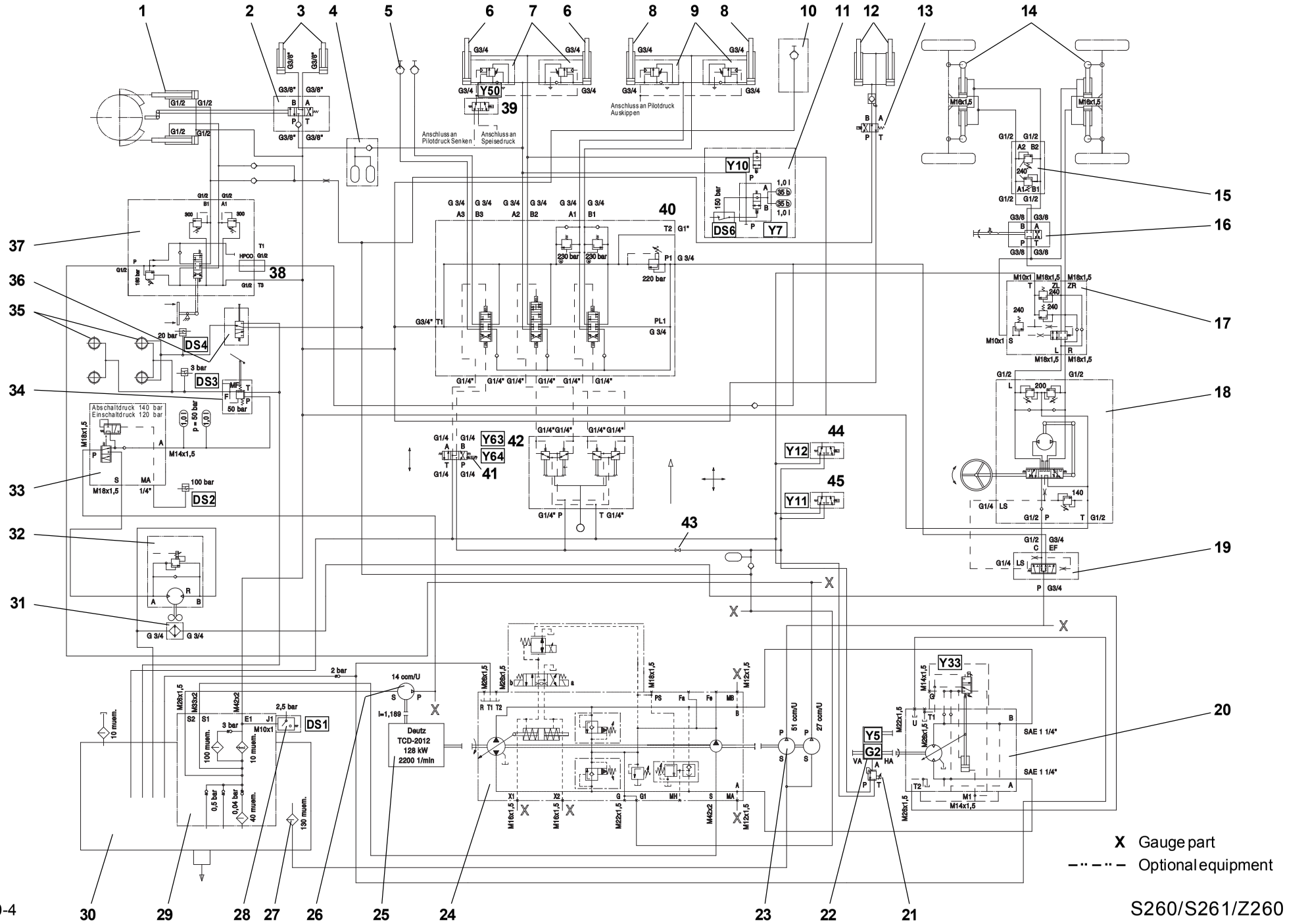
Sheet/ item	Designation
2-3/1	Connector, multifunction lever right
2-3/2	Relay: Differential lock (Figure 4-16/R3)
2-3/3	Relay: Engine controller (Figure 4-16/7)
2-3/4	Emergency stop switch
2-3/5	Relay: Starter interlock (Figure 4-16/R6)
2-3/6	Turn signal relay (Figure 4-16/10)
2-3/7	Interval timer (Figure 4-16/9)
2-3/8	Wiper motor, front
2-3/9	Wiper motor, rear
2-3/10	License plate illumination
2-3/11	warning beacon (opt.)
2-3/12	Actuator: warning beacon (opt.)
2-3/13	Actuator (pushbutton): TEACH function (option)
2-3/14	Actuator: ECO mode function
2-3/15	Actuator (pushbutton): fan reversal (option)
2-3/16	Actuator (pushbutton): engine diagnosis
2-3/17	Actuator: Working lights, front
2-3/18	Working lights, rear left/right
2-3/19	Radio (option)
2-3/20	Interior lighting
	Switch for interior lighting
2-3/21	Reversing warning buzzer
2-3/22	Rear window heater
2-3/23	Working lights, cabin front
2-3/24	Fuse 20.0 A (Figure 4-16/6)
2-3/25	Fuse 15.0 A (Figure 4-16/3)
2-3/26	Fuse 10.0 A (Figure 4-16/1)
2-3/27	Fuse 40.0 A (Figure 4-16/11)
2-3/28	Relay: Traction drive cut-out (Figure 4-16/R4)
2-3/29	Relay: Working lights, front (Figure 4-16/8)
2-3/30	Actuator: Four-wheel drive shutdown (option)
2-3/31	Actuator: Lifting device suspension
2-3/32	Actuator: Rear window heater
2-3/33	Actuator: Working lights, rear
2-3/34	Cigarette lighter
2-3/35	Relay: Reversing light/reversing buzzer (Figure 4-16/R5)
2-3/36	CanBus resistor 120 Ohms
2-3/37	Inching speed control
2.3/38	Connector, traction drive diagnosis
2-3/39	Traction drive controller
2-3/40	Working lights, bucket arm
2-3/41	Four-wheel drive valve (option)
2-3/42	Combination valve, pipe break protection/ lifting device suspension (option)
2-3/43	Reservoir valve, lifting device suspension (option)
2-3/44	Memory valve, lifting device suspension (option)
	Switch: Memory valve, lifting device suspension (option)
2-3/45	Switch: water low
2-3/46	Speed transducer, hydro motor
2-3/47	Accelerator
2-3/48	Valve: pump
2-3/49	Valve: hydro motor
2-3/50	Valve: pump forward
2-3/51	Valve: coupling/transmission
2-3/52	Valve: pump reverse
2-3/53	Switch: Engine oil temperature
2-3/54	Pressure sensor, inching
2-3/55	Valve: fan reversal
2-3/56	Valve: parking brake
2-3/57	Proportional valve, fan
2-3/58	Switch, hydraulic oil filter
2-3/59	Dip pipe sensor
2-3/60	Switch: hydraulic oil temperature
2-3/61	Switch: Parking brake
2-3/62	Starter
2-3/63	Alternator
2-3/64	Battery main switch
2-3/65	Batteries
2-3/66	Master fuse
2-3/67	Driving light, left
2-3/68	Driving light, right
2-3/69	Signal horn
2-3/70	Washer motor, rear
2-3/71	Washer motor, front
2-3/72	Brake light switch
2-3/73	Switch: service brake failure
2-3/74	Valve: differential lock
2-3/75	Valve: release of quick-change device
2-3/76	Connector, engine diagnosis
2-3/77	Switch: Water in fuel
2-3/78	Connector: Engine controller

10.1 - 05.2008 Elektrik-Schaltplan/Schéma électrique/Wiring diagramm/Elektrisch schakelschema



Sheet/ item	Designation
3-3/1	Fuse 5,0 A (Figure 4-16/2)
3-3/2	Relay for auxiliary hydraulics: Close bucket (Figure 4-16/R1)
3-3/3	Relay for auxiliary hydraulics: Open bucket (Figure 4-16/R2)
3-3/4	Relay: Air-conditioning system
3-3/5	Relay: Air-conditioning system
3-3/6	Fuse 20,0 A (air conditioning system)
3-3/7	Fuse 20,0 A (air conditioning system)
3-3/8	Fuse 20,0 A (air conditioning system)
3-3/9	Switch: Fan, air conditioning system
3-3/10	Fan, air conditioning system
3-3/11	Relay: Glow start system (option)
3-3/12	Fuse 120,0 A (glow start system)
3-3/13	Fuse 15,0 A (Figure 4-16/4)
3-3/14	Switch: Air-conditioning system on/off
3-3/15	Pressure switch: air-conditioning compressor
3-3/16	Power supply for driver's seat
3-3/17	Glow plugs
3-3/18	Air-conditioning compressor
3-3/19	Capacitor for fan 2
3-3/20	Capacitor for fan 1
3-3/21	Reversing warning buzzer
3-3/22	Auxiliary hydraulics valve: open bucket
3-3/23	Auxiliary hydraulics valve: close bucket
3-3/24	7-pole socket
3-3/25	Tail light, right
3-3/26	Tail light, left

10.2.1 - 02.2008 Hydraulic diagram AS 210e (claw lock)



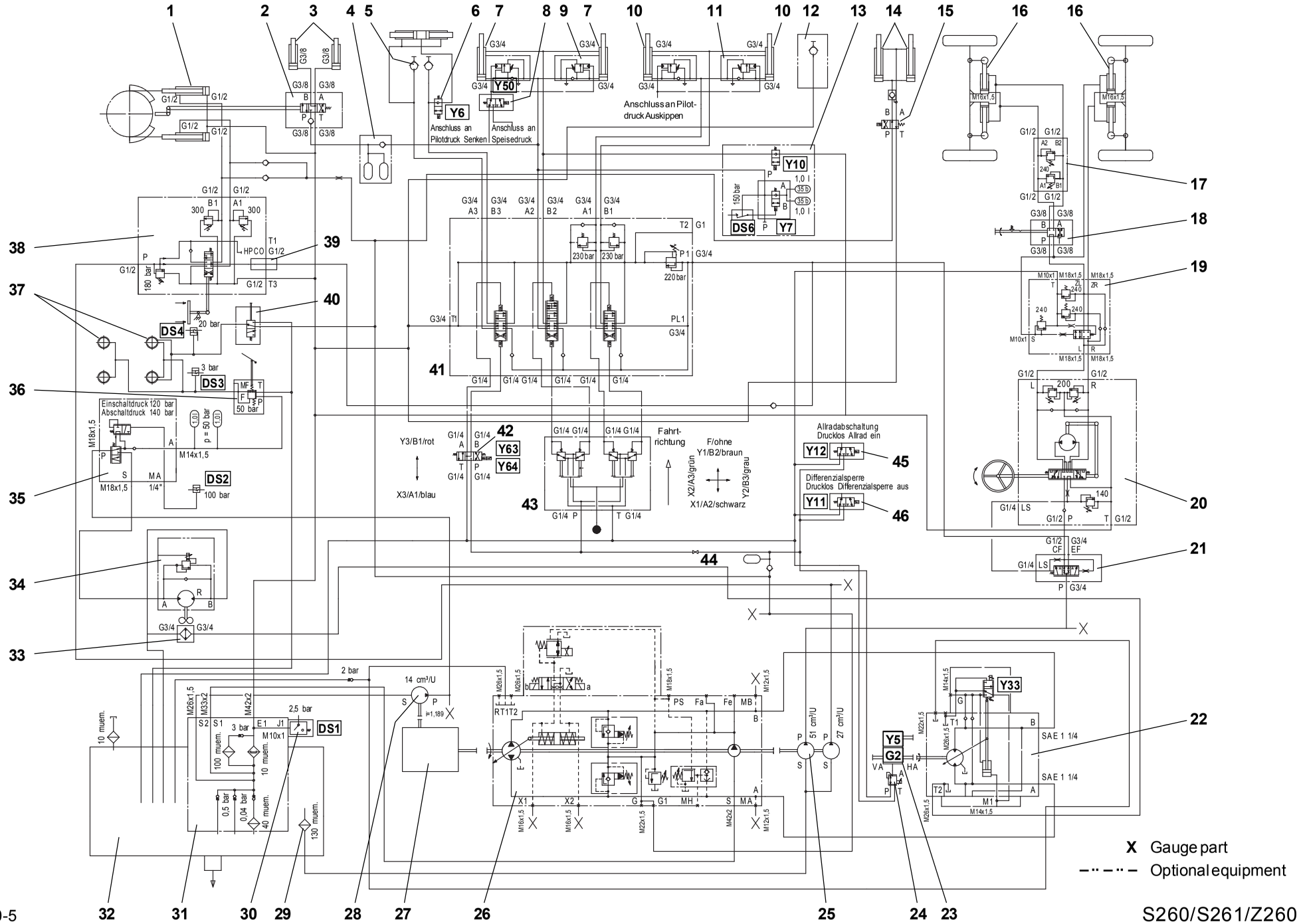
10.2 Hydraulic diagram

10.2.1 AS 210e hydraulic diagram (claw lock)

Item Designation

01 Swivel cylinder DW 110/45/910/1287
02 Supporting valve
03 Supporting cylinder EW 70/210/470
04 Reservoir system, pipe break protection (option)
05 Auxiliary hydraulics, external circuit
06 Lift cylinder DW 110/70/908/1317
07 Pipe break protection, lift cylinder (option)
08 Tip cylinder DW 110/70/545/1015
09 Pipe break protection, tilt cylinder (option)
10 Unpressurised return line (option)
11 Lifting device suspension
12 Locking cylinder DW 40/63/70/397
13 Shift valve for locking the quick-change device
14 Steering cylinder 80/40/152/472.5
15 Double shock valve
16 Steering switching valve
17 Blocking valve
18 Steering unit, 300/100 cm^3/rev.
19 Priority valve
20 Drive motor A6VM 160 EP2
21 Gear shift valve
22 Transfer case
23 Gear-type pump (51+27) cm^3/rev.
24 Drive pump A4VG 125 D2D1
25 Drive motor TCD-2012
26 Gear-type pump 14 cm^3/rev.
27 Suction strainer
28 Electric contamination indicator
29 Combined suction and return flow filter
30 Hydraulic oil tank
31 Hydraulic oil cooler
32 Hydrostatic fan
33 Shut-off valve
34 Brake valve
35 Lamella brake
36 Parking brake valve
37 1-way valve
38 High-pressure transition
39 Combination valve: pipe break protection / lifting device suspension (option)
40 3-way valve
41 Control pressure valve, auxiliary hydraulics
42 Control pressure transmitter, working hydraulics
43 Shut-off valve, working hydraulics
44 Four-wheel drive shutdown valve
45 Differential lock valve

10.2.2 - 09.2009 Hydraulic diagram AS 210e (bolt lock)



10.2.2 AS 210e hydraulic diagram (bolt lock)

Item Designation

01 Swivel cylinder DW 110/45/910/1287
02 Supporting valve
03 Supporting cylinder EW 70/210/470
04 Reservoir system, pipe break protection (option)
05 Auxiliary hydraulics, external circuit
06 Electrohydraulic interlock for quick-change device
07 Lift cylinder DW 110/70/908/1317
08 Combination valve: pipe break protection / lifting device suspension (option)
09 Pipe break protection, lift cylinder (option)
10 Tip cylinder DW 110/70/545/1015
11 Pipe break protection, tilt cylinder (option)
12 Unpressurised return line (option)
13 Lifting device suspension
14 Locking cylinder DW 40/63/70/397
15 Shift valve for locking the quick-change device
16 Steering cylinder 80/40/152/472.5
17 Double shock valve
18 Steering switching valve
19 Blocking valve
20 Steering unit, 300/100 cm^3/rev.
21 Priority valve
22 Drive motor A6VM 160 EP2
23 Transfer case
24 Gear shift valve
25 Gear-type pump (51+27) cm^3/rev.
26 Drive pump A4VG 125 D2D1
27 Drive motor TCD-2012
28 Gear-type pump 14 cm^3/rev.
29 Suction strainer
30 Electric contamination indicator
31 Combined suction and return flow filter
32 Hydraulic oil tank
33 Hydraulic oil cooler
34 Hydrostatic fan
35 Shut-off valve
36 Brake valve
37 Lamella brake
38 1-way valve
39 High-pressure transition
40 Parking brake valve
41 3-way valve
42 Control pressure valve, auxiliary hydraulics
43 Control pressure transmitter, working hydraulics
44 Shut-off valve, working hydraulics
45 Four-wheel drive shutdown valve
46 Differential lock valve

Technical Data (Loader)

11 Technical data (loader)

NOTE
The technical data refer to 20.5 -25 tyres.

11.1 Loader

- Height	3.155 mm
- Width	2.700 mm
- Wheelbase	2.400 mm
- Track width	2.080 mm
- Operating weight w/o attachment	13.800 kg
- Ground clearance	
- Distribution gear	600 mm
- Differential	500 mm
- Turning radius (across the rear with four-wheel steering)	4.985 mm
- Steering angle	+/- 25°
- Swinging angle	+/- 10°
- Climbing ability with payload due to the permitted slanting of the engine, limited to	60 %
- Max. lifting capacity	106 kN
- Max. thrust force	113 kN

11.2 Engine

- Type	TCD 2012 L06-2V
- Water-cooled turbodiesel engine with charge air-cooling	
- 6 cylinders, 4-stroke, direct injection	
- Displacement	6.057 cm³
- Performance acc. to ISO 9249	128 kW at 2.200 rpm
- Cooling system	Water
- Total coolant	approx. 16 l
- Anti-freeze	8 l
- Exhaust gas emission acc. to RL 97/68 EC level 3 + TIER	

11.3 Starter

-	4 kW, 24 V

11.4 Alternator

-	55 A, 24 V

11.5 Hydrostatic drive motor

“20 km/h” variant

Alpha max. - (with inching speed control)	0.....11 km/h
1st gear shift:	0.....11 km/h
2nd gear shift:	0.....20 km/h

“35 km/h” variant

Alpha max. - (with inching speed control)	0.....11 km/h
1st gear shift:	0.....11 km/h
2nd gear shift:	0.....35 km/h

11.6 Axle loads

- Perm. axle loads acc. to StVZO	-	front	7.000 kg
	-	rear	9.000 kg
- Perm. total weight acc. to StVZO			14.500 kg

11.7 Tyres

The following tyres are permitted:

- Size			20.5 - 25
- Tyre pressure	-	front	3.0 bar
	-	rear	3.0 bar
- Size			20.5 R 25
- Tyre pressure	-	front	3.0 bar
	-	rear	3.0 bar

11.8 Steering system

- Four-wheel (can be switched to rear-wheel steering)
- Hydrostatic via priority valve
- Pressure max. 140 bar

11.9 Brake system

- Service brake:
  Hydraulic wet lamella brake in the front and rear axles, acting on all four wheels.
- Parking brake:
  Spring-loaded wet lamella brake in the rear axle.

- Flow rate pump III 36 l/min

11.10 Electrical system

- Battery 2 x 88 Ah

11.11 Hydraulic system

- Contents 230 l
- Hydraulic oil reservoir 180 l

11.11.1 Working hydraulics

- Flow rate pump I (via priority valve) 114 l/min
- Flow rate pump II (via swivel unit) 60 l/min
- Total flow rate 174 l/min
- Operating pressure max. 220 bar
- 2 lift cylinders Ø 110 mm
- 2 tip cylinders Ø 110 mm
- Times acc. to DIN ISO 7131
  Lift (with payload) 6.0 s
  Lower (without load) 3.5 s
  Dump 90° 1.5 s
  Tilt 45° 1.0 s

11.11.2 Swivel unit hydraulics

- Flow rate pump II (via shut-off valve) 60 l/min
- Operating pressure max. 180 bar
- 2 swivel cylinders Ø 110 mm
- Time to swivel 180° 15.0 s

11.11.3 Support system

- Operating pressure	depending on load
- 2 support cylinders	
Plunger diameter	70 mm

11.12 Fuel supply system

- Contents	
Fuel tank	250 l

11.13 Heater and ventilation system (driver's cabin)

- Water heat exchanger	
- Type	Gallay PVH 2505
- Heating capacity, continuously adjustable	6.4 kW
- Air-conditioning system capacity	5.5 kW
Throughput	400 m³/h

11.14 Suction / return flow filter (hydraulics).

- Filter mesh acc. to ISO 4572	10 µm abs.
- Bypass response pressure	p = 3.0 bar

11.15 Electric contamination indicator

- Switch-on pressure	Δ p = 2.5 bar

11.16 Oil cooler (hydrostatic)

- Performance	max. 35 kW
- Flow rate	56 l/min

11.17 Noise emission

Sound power level (L_{WA})	
Noise outside:	104 dB(A)
In-band accoustic level (L_{pA})	
Noise level in cab:	76 dB(A)

Technical Data (Attachments)

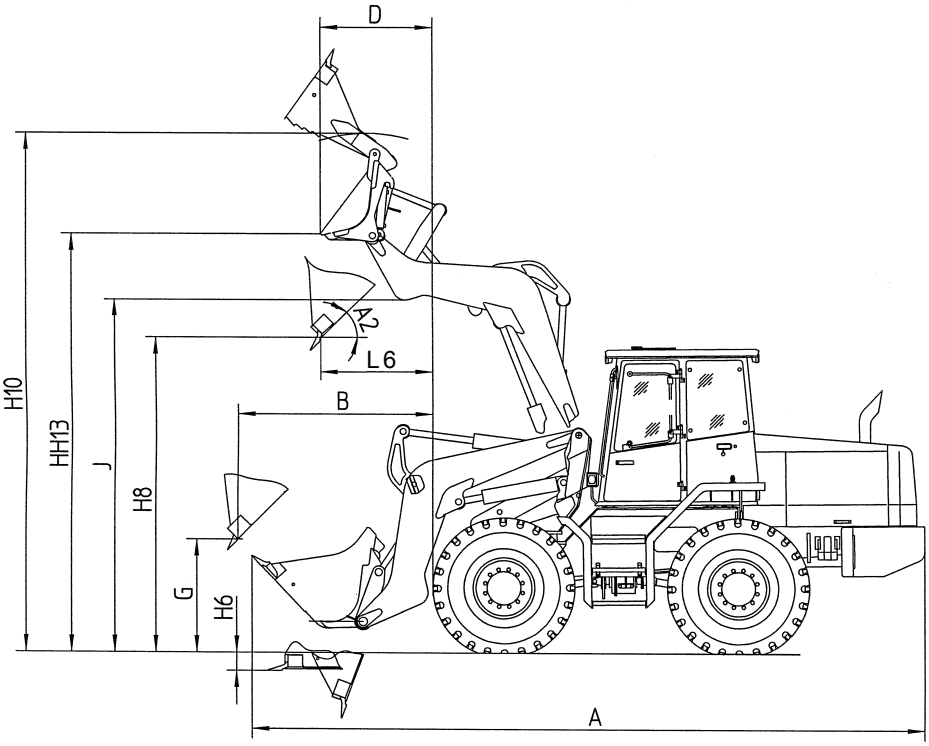
12 Attachments

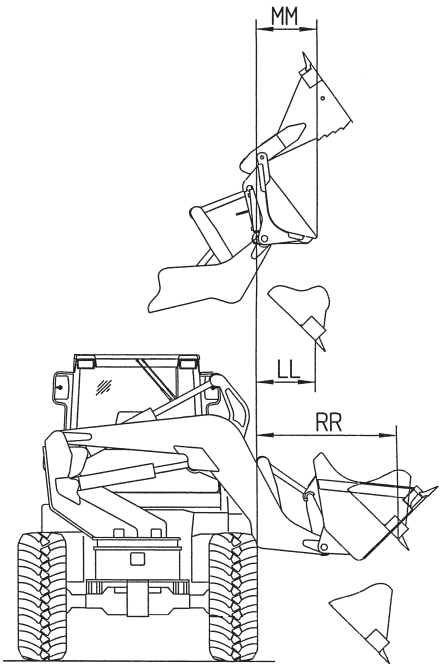
NOTE

The technical data refer to 20.5 -25 tyres.

12.1 Buckets

Dimensions acc. to ISO 7131/35





12.1 Buckets

Bucket type		Standard bucket	Lightweight bucket	Multi-purpose bucket
Bucket volume	m³	**2.1**	**2.4**	**1.8**
Bucket width	mm	2700	2700	2700
Dead weight	kg	730	760	840
Loads acc. to ISO 14397 *1				
Bulk density	t/m³	1.8	1.5	2.0
Dump load				
- frontal	kg	7800	7750	7600
- swivelled	kg	7450	7350	7200
Payload				
- frontal	kg	3900	3875	3800
- swivelled	kg	3725	3675	3600
Loads acc. to ISO 8313 *2				
Bulk density	t/m³			
Dump load				
- frontal	kg			
- swivelled	kg			
Payload				
- frontal	kg			
- swivelled	kg			
Tear-out force acc. to ISO 8313	kN	130	120	145
A Total length	mm	7155		7145
AA4 Max. dump angle	°	100		100
A2 Max. dump angle	°	45		45
B Max. dumping distance at dumping angle 45°	mm	2190		2360
G Dumping height at max. dumping distance and dumping angle 45°	mm	1350		1285
H6 Depth of feed-in	mm	90		90
H8 Dumping height at max. lifting height and dumping angle 45°	mm	3420		3355
H10 Max. working height	mm	5600		5575
J Free lift height	mm	3660		3660
LL Dumping distance at max. lifting height and dumping angle 45°	mm	890		985
L6 Dumping distance at max. lifting height and dumping angle 45°	mm	1335		1425
RR Max. dumping distance at dumping angle 45°	mm	1740		1910
Multipurpose bucket opened:				
D Dumping distance at max. lifting height and tilted bucket	mm	-	-	1170
HH13 Max. dumping height with tilted bucket	mm	-	-	4120
MM Dumping distance at max. lifting height and tilted bucket	mm	-	-	720

NOTE

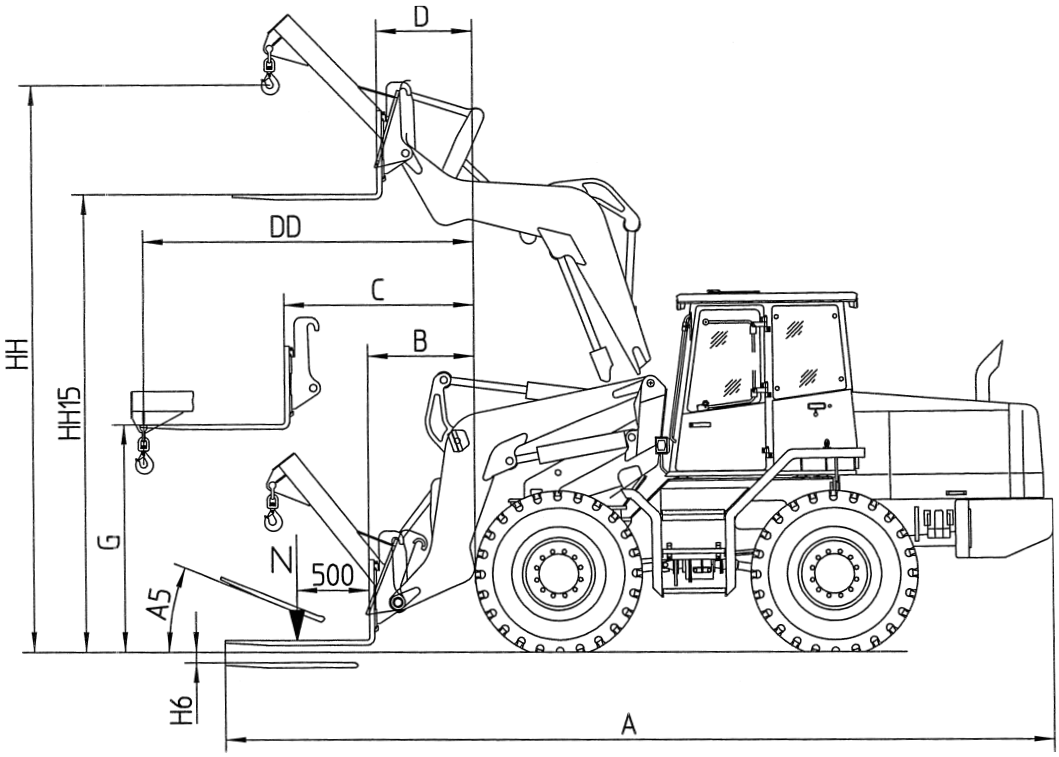
*1 - ISO 14397: "Calculation of permissible payload“
*2 - ISO 8313: "Measurement of dump load”

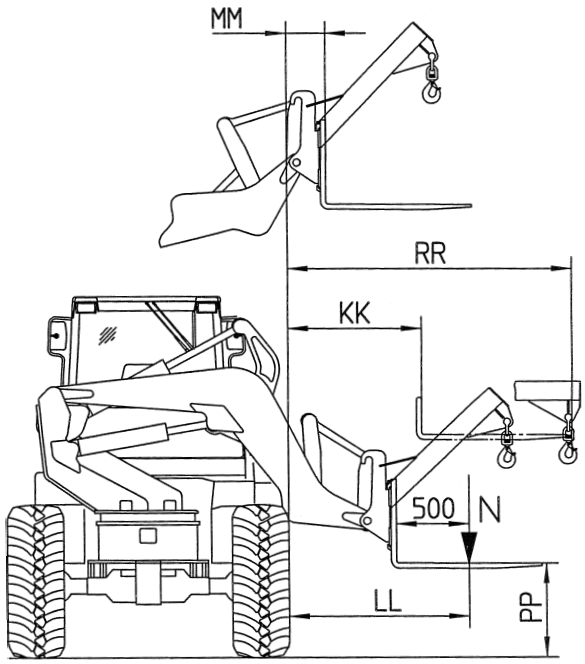
12.2 Fork-lift attachment

Dimensions acc. to ISO 7131/35

12.3 Lifting hook

Dimensions acc. to ISO 7131/35





12.2 Fork-lift attachment

Tine length	mm
Tine height	mm
Tine spacing (centre)	
- min.	mm
- max.	mm
Dead weight	kg

Perm. payload N acc. to EN 474-3

frontal	
- level ground (stability factor 1.25)	5300 kg
- uneven ground (stability factor 1.67)	4800 kg
swivelled	
- level ground (stability factor 1.25)	4500 kg
- uneven ground (stability factor 1.67)	kg

Perm. payload N acc. to EN 474-3, **fork-lift attachment 300 mm above ground**

frontal	
- level ground (stability factor 1.25)	6400 kg
- uneven ground (stability factor 1.67)	kg

A	Total length	7950 mm
A5	Tilt angle	25°
B	Min. reach	1095 mm
C	Max. reach	1810 mm
D	Reach at max. lifting height	950 mm
G	Free lift height at max. reach	2000 mm
H6	Depth of feed-in	100 mm
HH15	Free lift height at max. reach (upper tine edge)	4100 mm
KK	Max. reach	1390 mm
LL	Distance between tyre and payload	1750 mm
MM	Reach at max. lifting height	500 mm
PP	Min. free lift height	750 mm

12.3 Lifting hook

Perm. payload acc. to DIN EN 474-3 (measurement procedure analogue to ISO 8313)

Max. outreach (stability factor 2)	
- frontal	2530 kg
- swivelled	1930 kg
Dead weight	kg

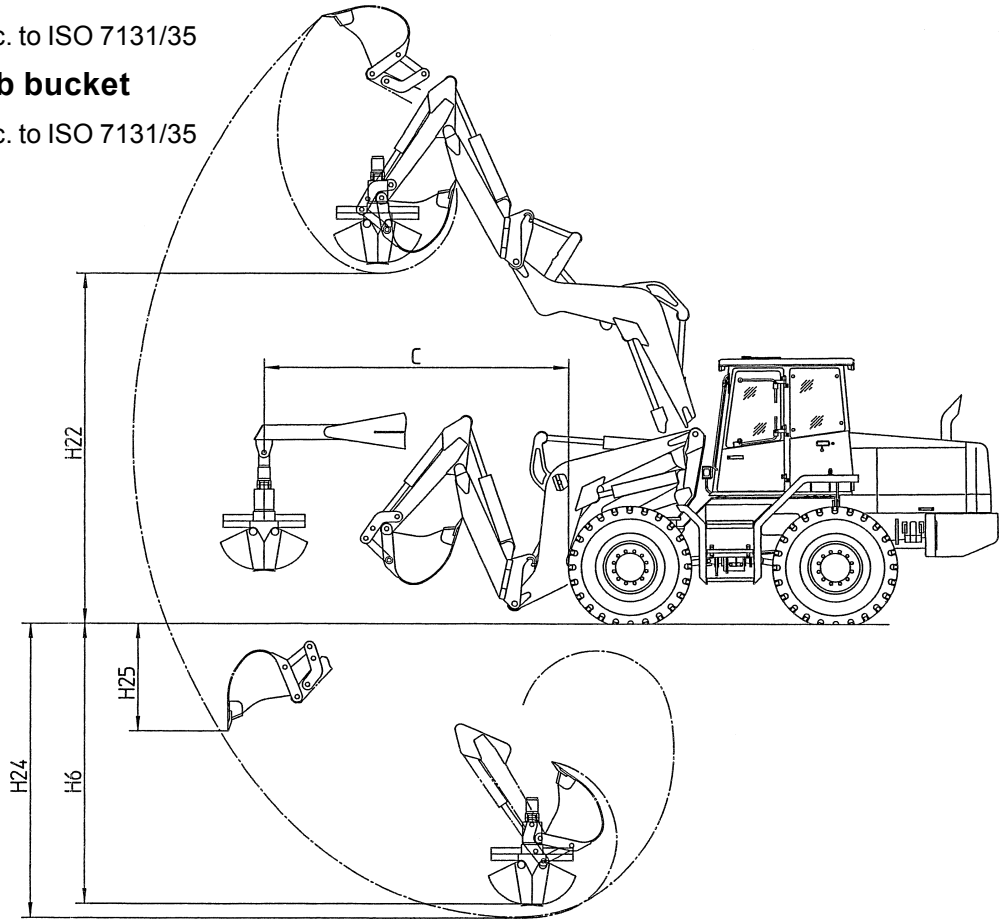
A	Total length	7385 mm
DD	Max. outreach	3480 mm
HH	Max. lifting height	5425 mm
RR	Max. outreach	3030 mm

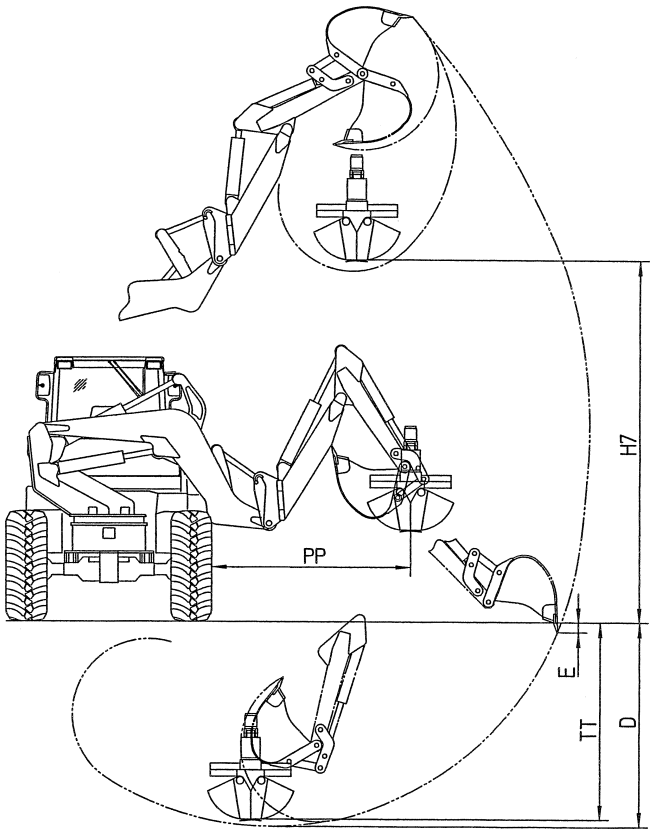
12.4 Front-end excavator

Dimensions acc. to ISO 7131/35

12.5 Grab bucket

Dimensions acc. to ISO 7131/35





12.4 Front-end excavator

Max. breakout force at the shovel cutting edge daN

Max. tear-out force at the shovel cutting edge daN

Shovel volume acc. to DIN ISO 7451	Shovel width acc. to DIN ISO 7451	Dead weight
m³	mm	kg
m³	mm	kg
m³	mm	kg
m³	mm	kg
m³	mm	kg

Dead weight
- Front-end excavator without shovel kg

D	Max. digging depth over cutting edge acc. to DIN ISO 7135	2650 mm
E	Depth of feed-in	100 mm
H22	Max. dumping height acc. to DIN ISO 7135	3900 mm
H24	Max. digging depth over cutting edge acc. to DIN ISO 7135	3420 mm
H25	Depth of feed-in	1420 mm

Working times at $n_{engine\ max.}$:

- Stalk extension s
- Stalk retraction s
- Opening shovel s
- Closing shovel s

12.5 Grab bucket

Grab bucket type	Grab bucket volume	Scoop width	Dead weight
	m³ m³	mm mm	kg kg

- Swivel range of grab swivel engine
- Dead weight of grab boom kg

C	Max. dumping distance	4065 mm
H6	Max. grab depth over cutting edge	3270 mm
H7	Max. free lift height over shovel floor	4100 mm
PP	Min. dumping distance	3460 mm
TT	Max. grab depth over cutting edge	2500 mm

NOTE
- Only the grab buckets listed in the table above may be attached.
- Reaches **"C"** to **"TT"** refer to the grab bucket.

Additional Options

13 Additional options, modifications, notes on inspection for loaders

13.1 Additional options