MECALAC

OPERATING INSTRUCTIONS
SWING SHOVEL LOADER

GB

AS 150e

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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 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"** and **"right"** are to be seen from the driver's seat in the driving direction.
- Special 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, ◄

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Abbreviations used

UVV = Unfallverhütungsvorschrift (Accident Prevention Regulations)

StVZO = Straßenverkehrzulassungsordnung (German Traffic Regulations)

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Safety regulations

1 Fundamental safety instruction

1.1 Warnings and symbols

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

NOTE

Special information for the economical use of the machine.

CAUTION

Special information for necessities and prohibitions for avoiding damages.

DANGER

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

1.2 Use of the loader as authorized

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

1.2.2 The machine and attachments may only be used in a technical non-objectionable condition, taking all safety regulations 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 determined exclusively for the purposes described in this operating manual. Any other utilization is not permitted. The manufacturer is not liable for any damage caused in this connection. The user solely carries the risk.

The authorized use of the machine also requires the observation of the operating manual (machine and engine) as well as the observation of the inspection and maintenance conditions.

1.3 Organizational measures

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

1.3.2 In addition to the operating manual (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 environment protection must be observed and the personnel must be accordingly instructed. Traffic regulations must also be observed.

1.3.3 The personnel in charge of working with the machine must read the operating manual (machine and engine) before start of 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 jewelry including rings as this could cause injuries by getting caught up or pulled in by the machine.

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 in legible condition.

1.3.8 In case of modifications to the machine, especially in case of damages or changes in the operating behavior of the machine which could influence the safety of the machine, stop the machine immediately and inform the competent person in charge about the incident.

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

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

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

1.4 Selection of personnel and necessary qualifications

Fundamental obligations

1.4.1 The machine may only be driven and maintained 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 diligent manner.

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

1.4.3 Only qualified specialists may carry out work on the transmission mechanism and to the hydraulic 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 During starting and switching-off operation observe the control lamps according to the operation manual (machine and engine)!

1.5.1.4 Before commencing work/driving check brakes, steering, signal lights and lights for their functioning!

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 ground, undertaking the necessary protection precautions between the building site and the public traffic.

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

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

1.5.1.9 Avoid any work operation 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 only carry out work with the machine when no persons are in the danger zone.

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

- by work-induced movements of the machine,

- by work attachments and devices,

- by loads swiveling out,

- by loads falling down,

- by attachments falling down 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 machine immediately and safeguard it. Eliminate defects immediately!

1.5.1.14 Check machine at least once every shift for external visible damage and defects with regard to any changes and to the operating behavior of the engine. Report any defects or changes immediately to the person in charge. If necessary stop the machine immediately and safeguard it.

1.5.1.15 The driver may only slew the attachments overhead driving, operating and working areas if these areas are suitably safeguarded by protective roofing. These protection roofs must offer appropriate safety against loads and goods falling down. In case of doubt, it should be assumed that they are **not** protective roofs.

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 in beforehand.

1.5.1.18 In general, switch on lights in poor visibility and during darkness.

1.5.1.19 If 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 subways, bridges, tunnels, electrical over-head lines make sure that there is adequate clearance!

1.5.1.25 Keep good 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 installation are provided to prevent the machine from running or sliding down.

1.5.1.27 Avoid such work which could have detrimental effect on the stability of the machine.
The stability can be detrimented by:
- overloading,
- too soft ground,
- abrupt acceleration or deceleration of driving movement or working movement,
- reversing out of high driving speed,
- working on slopes,
- driving too quickly round sharp bends,
- driving the machine on rough terrain with the bucket arm swung.

1.5.1.28 Do not drive along slopes in traverse direction. 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 Before the slope, reduce the speed and always adapt to the local conditions! Always adapt the speed of the machine to the environmental conditions when driving down slopes! Never change into low gear when driving on slopes but before entering 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 or prevent non-authorized 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 work-brakes and after work hours the driver should endeavor to leave the machine on good bearing soil and if possible on level ground and safeguard the machine to prevent it from unintentionally rolling away.

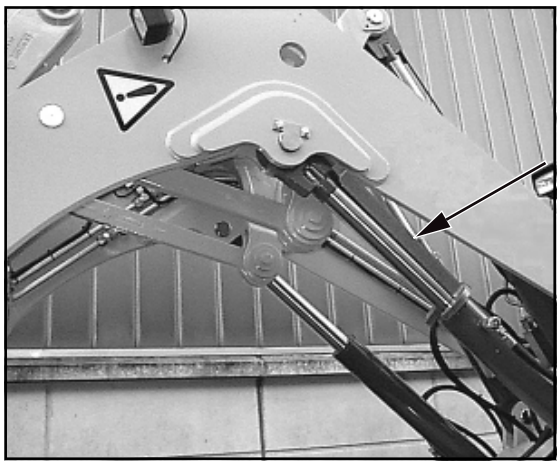


Figure 1-1

1.5.2 Special work within the exploitation of the machine and elimination of defects during process or work; disposal

1.5.2.1 The prescribed 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 details regarding the interchanging of parts/ part equipment. This work may only be executed by skilled personnel.

1.5.2.2 For all work concerning the operation, conversion or adjustment of the machine and its safety devices as well as inspection, maintenance and repair work please observe the switching and stopping operation 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 propped up, e.g. by inserting the bucket arm support (option) (1-1/ arrow).
- the hand levers for the hydraulic loader (1-2/1) and auxiliary functions (1-2/2) must be secured.
- the swing mechanism must be blocked. Remove the blocking wedge (1-3/arrow) out of the mounting, switch to swing blocking (1-4/arrow), and secure with spring pin.

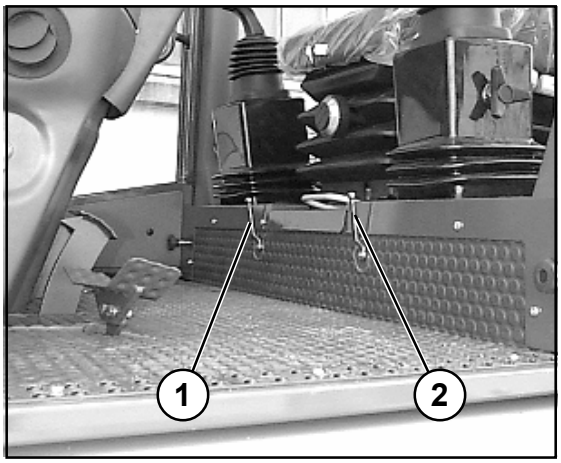


Figure 1-2

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

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

This applies especially to works to the electrical equipment.

1.5.2.8 Individual pieces and large assemblies must be carefully secured to hoisting equipment when being substituted to avoid any damage. Only suitable and technical 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 to swivel 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 having to be carried out above normal human height, suitable safety ascent devices and working platforms must be used. Do not use engine parts as climbing and descending facilities. Use safety harnesses when working at very great heights.
All handles, steps, railings, podests, platforms, 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, such parts as engine components, e.g. injection pump, generator governor, starter are very delicate.

1.5.2.18 After cleaning completely remove all protection covering and tape.

1.5.2.19 After cleaning check all pipelines for fuel, engine oil and hydraulic oil for leakages, loose connections, abrased parts and damages. 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 material and interchanged 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. In addition, it should be checked 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 because of operating conditions.

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

1.6 Instructions regarding special categories of danger

1.6.1 Electrical energy

1.6.1.1 Only use original fuses (mandatory current). Immediately switch off machine in case of breakdown of electrical supply.

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 clearance must be observed, to meet the above mentioned requirement:

Nominal voltage			Safety clearance
(kilovolt)			(meter)
	up 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 slung 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 any work or movement must stop. Instructions to be followed:
bring the machine out of the danger area by lifting or lowering the attachments or by swiveling away or driving the machine out of the 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 trained electrician according to electrotechnical regulations.

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

1.6.1.6 Always de-energise machine or system parts to be inspected, maintained or repaired by disconnecting the battery main switch.

1.6.1.7 Always disconnect the battery main switch before starting any electrical welding on the machine.
Also unplug the connectors for the engine controller (to the left in the engine compartment) and for the traction drive controller (underneath the maintenance flap behind the driver's seat).

1.6.2 Hydraulic systems

1.6.2.1 Only experts 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 damages. Immediately eliminate 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 made free of pressure 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 get the connections mixed up. The spare parts must be in an accordance with the technical requirements stipulated by the manufacturer. This is, of course, guaranteed when original spare parts are ordered.
1.6.2.5 Never change factory settings for hydraulic components (such as the maximum permissible speed for the axial piston engine). Changing such settings will cause the warranty to become void.

1.6.3 Noise

Sound protection equipment must be in 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 using oil, grease or other chemical substances.

1.6.4.2 Caution when working with hot fuel and other accessory material (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 refuel, switch off engine and remove ignition key.
- Do not refuel in a closed operating area.
- Never refuel near open fire or sparks.
- Do not smoke during refueling.
- Immediately wipe up spilled fuel.
- Keep machine free of fuel, oil and grease.

1.6.5 Gas, dust, steam, smoke

1.6.5.1 The machine may only be started and run in closed operating areas where there is sufficient ventilation.

The regulations for the respective working site must be strictly observed.

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

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

Explosion hazard!

1.7 Transport and towing, restart

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 When towing drive slowly. Persons must not remain 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 tires must be kept clean of mud, snow and ice so that the machine can drive on the ramp without danger of sliding.

1.7.5 Restart the machine strictly observing the regulations of the operating manual.

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

1.8.1 Organizational measures

1.8.1.1 We would like to emphasize that parts and accessories that are not supplied by us are also not tested and approved by us. Installation and/or use of such products can thus negatively affect the constructional qualities of your loader and thereby reduce the active and passive driving stability. The manufacturer cannot be held responsible for damage that results from the use of non-original parts and accessories.

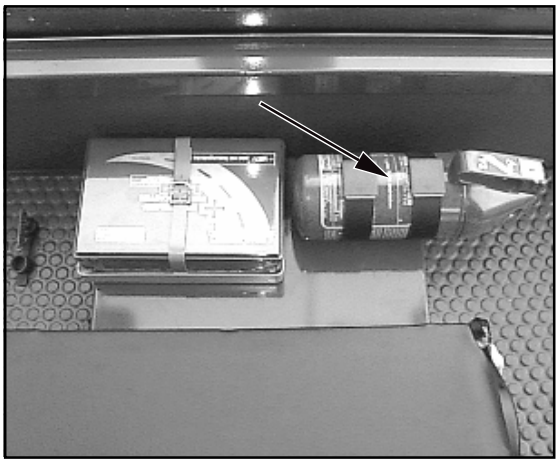


Figure 1-5

1.8.1.2 Inform about the location/use of fire extinguishers (1-5/arrow) and first-aid kit (on the maintenance plate behind the driver's seat)!

1.8.2 Selection of personnel, qualifications; additional duties

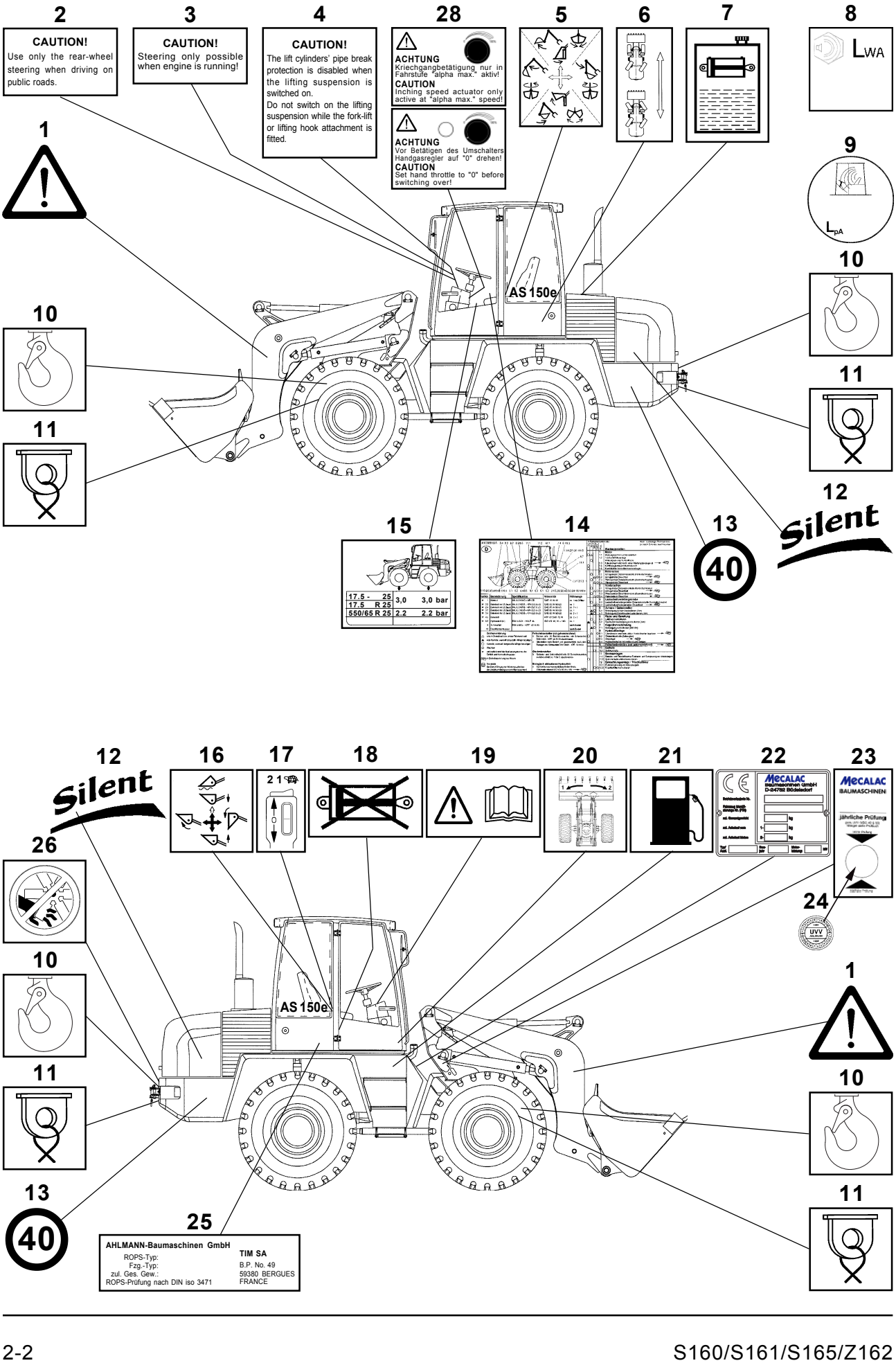
1.8.2.1 Only reliable persons are allowed to work on/with the machine. The minimum legal age must be observed.

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

1.8.2.3 Determine the driver's responsibility regarding traffic regulations. Authorize him 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 that are being trained are permitted to operate the loader only if they are under constant supervision of an experienced person authorized by the employer!

Signs


2
CAUTION!
Use only the rear-wheel steering when driving on public roads.
3
CAUTION!
Steering only possible when engine is running!
4
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.
28
ACHTUNG
Kriechgangbetätigung nur in Fahrstufe "alpha max." aktiv!
CAUTION
Inching speed actuator only active at "alpha max." speed!
ACHTUNG
Vor Betätigen des Umschalters Handgasregler auf "0" drehen!
CAUTION
Set hand throttle to "0" before switching over!
5
6
7
8
LWA
1
9
LpA
10
11
AS 150e
12
Silent
13
40
14
15
17.5 - 25 3,0 3,0 bar
17.5 R 25
550/65 R 25 2.2 2.2 bar
16
17
18
19
20
21
22
23
MECALAC
jährliche Prüfung
24
UVV
25
AHLMANN-Baumaschinen GmbH
ROPS-Typ:
Fzg.-Typ:
zul. Ges. Gew.:
ROPS-Prüfung nach DIN iso 3471
TIM SA
B.P. No. 49
59380 BERGUES
FRANCE
26

1	Symbol:	Stay out of the danger zone
2	Sign:	**CAUTION!** -Use only rear-wheel steering when driving on public roads.
3	Sign:	**CAUTION!** - Steering only possible when engine is running!
4	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.
5	Symbol:	Hand lever for auxiliary hydraulics (4-6/5) » to the left of the seat «
6	Symbol:	Steering type switching (4-6/4) rear-wheel/four-wheel steering
7	Symbol:	Hydraulic oil tank
8	Sign:	Sound power level (sect. 11.17)
9	Sign:	Acoustic power level (sect. 11.17)
10	Symbol:	Lifting hook
11	Symbol:	Lashing eyes
12	Sign:	Lettering "Low-noise construction machine"
13	Sign:	Maximum speed
14	Sign:	Maintenance schedule
15	Sign:	Tyre pressure
16	Symbol:	Hand lever for working hydraulics (4-7/2)
17	Symbol:	Gear shift - 2nd gear: - 1st gear: - Alpha max. (turtle symbol)
18	Symbol:	Ball block valve for working/auxiliary hydraulics closed
19	Symbol:	Read and observe the operating instructions before commissioning. Make sure that all other users have read the safety instructions!
20	Symbol:	Swivelling
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
25	Type label:	Driver's cab
26	Symbol:	Open only when the engine is not running
27	free	
28	Sign:	**CAUTION -** Inching speed actuator only active at "alpha max." speed!
	Sign:	**CAUTION -** Set hand throttle to "0" before switching over! (Option)

Protection against theft

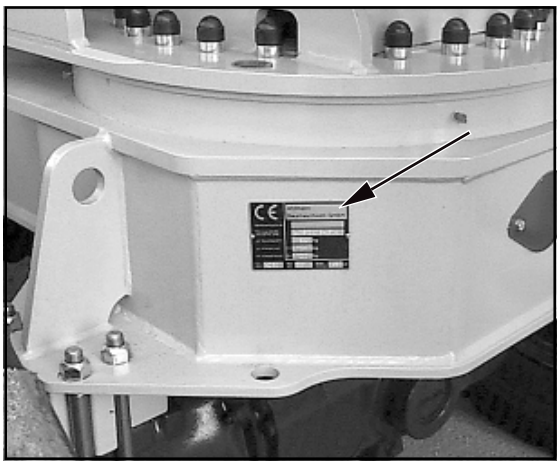


Figure 3-1

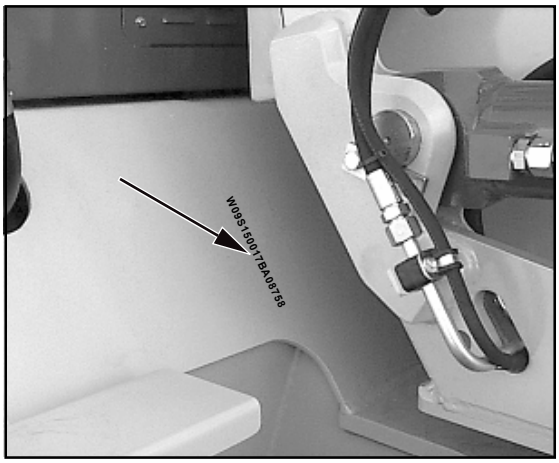


Figure 3-2

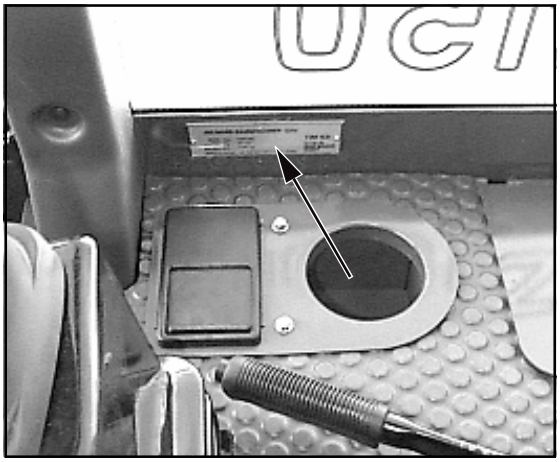


Figure 3-3

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, **MECALAC** 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 (4-7/4).

(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 both ball block valves (1-2/1 and 1-2/2).

(5) Set the drive switch (4-7/3) to „forward“ or „reverse“.

(6) Switch to gear stage "Alpha max. (snail symbol)“ with the gear shift (4-7/1) on the pilot valve for working hydraulics.

(7) Remove the ignition key.

(8) Remove the main battery switch (8-31/2).

(9) Switch on the working lights (4-8/17). *

(10) Switch on the warning beacon (opt.) (4-8/6). *

(11) Switch on the hazard flasher (4-8/14). *

(12) Push the steering column switch (4-5/5) 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

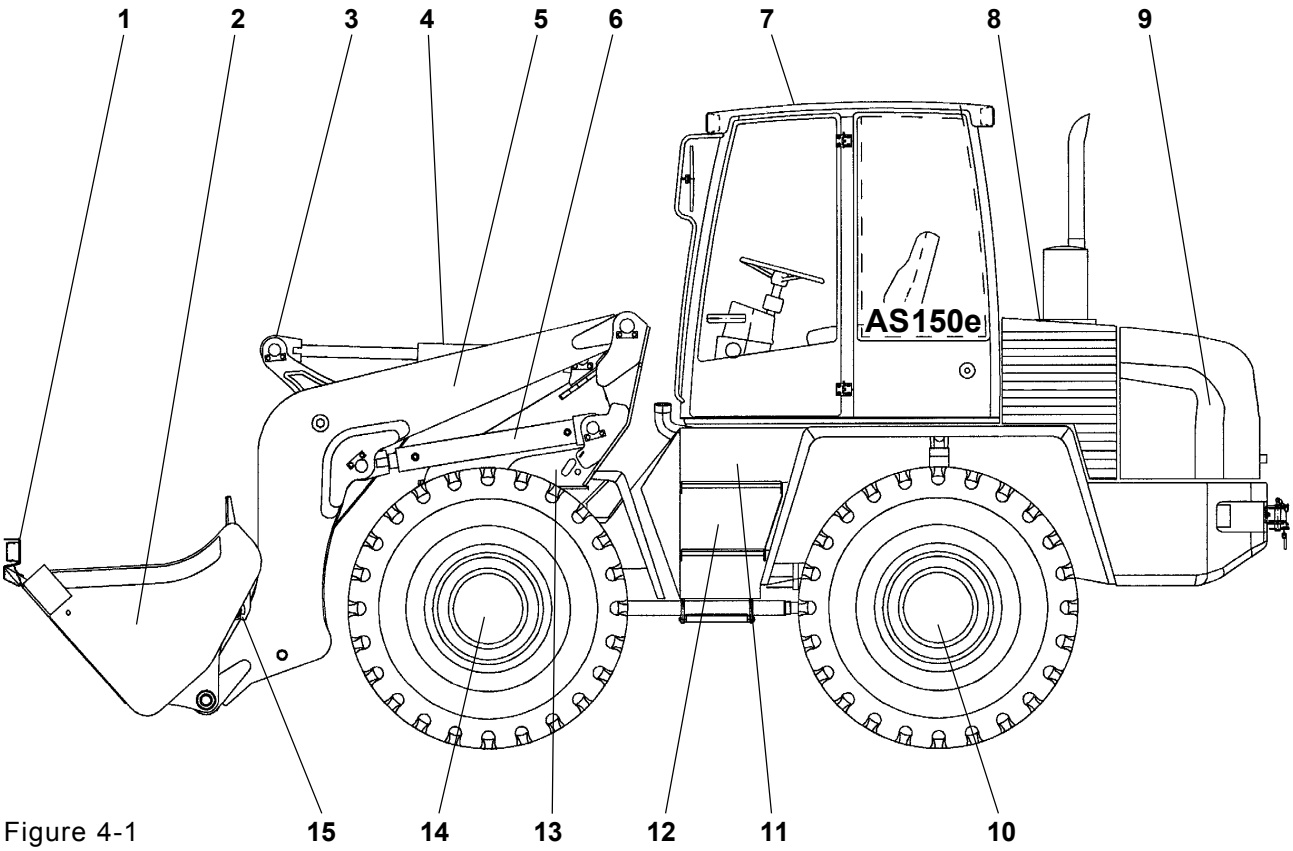


Figure 4-1

1 - Bucket protection
2 - Bucket/attachment
3 - Deflection lever
4 - Tip cylinder
5 - Bucket arm
6 - Lift cylinder
7 - Driver's cab
8 - Hydraulic oil reservoir / filler neck
9 - Drive motor
10 - Rear axle
11 - Battery compartment
12 - Tool box
13 - Revolving seat
14 - Front axle
15 - Quick-change device
16 - Fuel tank, steps at 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 (4-7/2) 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 float position may only be activated when the bucket arm is in the lowermost position.

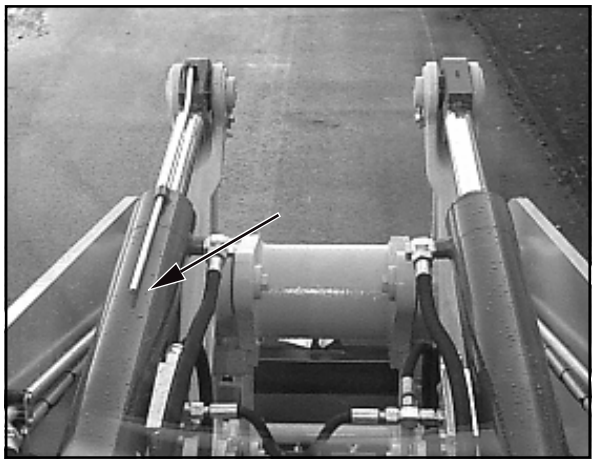


Figure 4-2

4.4 Bucket position indicator

The driver can read the position of the bucket using colour marks on the 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.

4.5 Acoustic warning buzzer

The loader features an acoustic warning system:

1. The hydraulic oil temperature exceeds 100° C (+/- 3° C).
   » in conjunction with indicator (4-10/14) «
2. The diesel engine is switched off (starter switch set to 0) when road or parking lights (4-8/7) are switched on.

4.6 Air-conditioning system (option)

The loader features an airconditioning system allowing the driver to set the desired temperature. It significantly enhances the driver's ability to respond and power of concentration. At the same time, it dehumidifies the air flowing into the cabin, prevents water condensation on the window panes and thus enhances the visibility. It also features a dust air filter and also prevents dust and other unpleasant and harmful substances from entering the cabin by generating a permanent slight overpressure.

To ensure trouble-free operation and full performance of the air conditioning system, you should switch on the compressor for a short period of time once a week; this will ensure lubrication of the inner seals.

At low ambient temperatures you must switch on the compressor only when the engine has reached its operating temperature. This will cause the refrigerant collecting at the lowest point of the compressor circuit when liquid to evaporate due to the heat irradiation of the engine. Liquid refrigerant can cause damage to the compressor.

DANGER

- Never open the air conditioning circuit; this will result in refrigerant loss.
- The circuit contains a gas that can be noxious under certain circumstances.

CAUTION

- Perform a visual inspection every 6 months. Pay particular attention to any loss of refrigerant.
- All work on the air conditioning system must only be carried out by authorized personnel.
- The compressor is equipped with an oil level gauge plug. You must never remove this plug since this would cause the system to run empty. An oil level check only occurs when the circuit is emptied.

NOTE

Leaks in the circuit will degrade the system's performance.

4.7 Lifting device suspension

When the loader must be driven over larger distances, especially with a loaded bucket, the lifting device suspension (4-8/9) 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.
- The 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.

NOTE

- A pushbutton (4-8/9) is used to switch on the lifting suspension.
- Turning the starter switch (4-8/13) to “0” automatically disables the lifting suspension; it must then be enabled if required.

4.8 Pipe break protection (option)

A pipe break safety valve is installed underneath each lift and tip cylinder. In the event of a pipe or hose break in the lift and/or tip system, the movements of the bucket arm and the tipping rod are blocked until the damage is repaired.

CAUTION

The pipe break protection is disabled when the lifting suspension is switched on.

4.9 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 (4-7/3) to “0”.

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

(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/arrow)] 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.

Figure 4-3

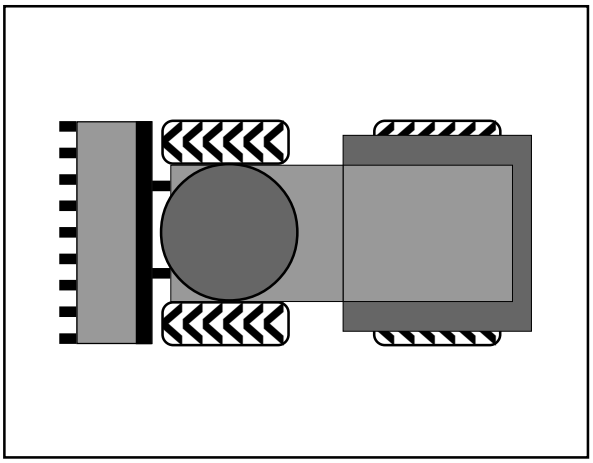


Figure 4-4

(5) Turn the ignition key (4-8/13) to the left to position “0”.

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

(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.

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.

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 tyres 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.

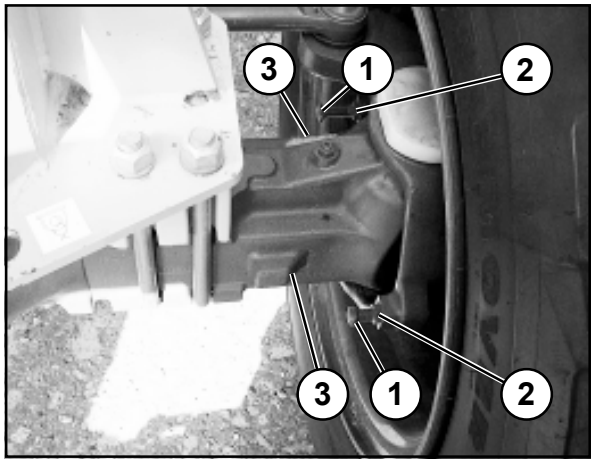
(14) Tighten the wheel nuts by hand.

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

(16) Tighten the wheel nuts to 600 Nm with a torque wrench.

CAUTION

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


3
1
2
3
1
2

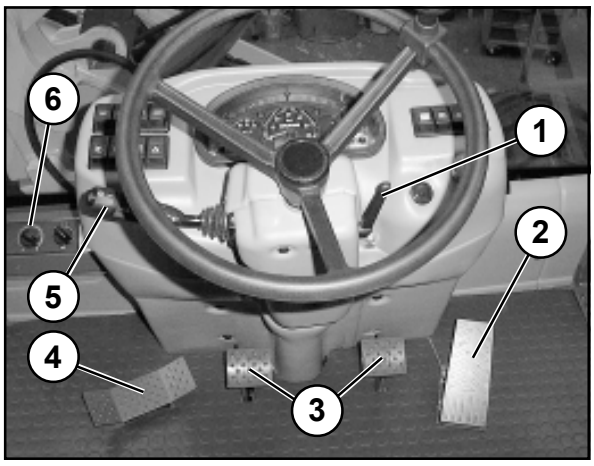


Figure 4-5

4.10 Controls

1 - Lock lever for steering column adjustment
  - to the front/rear
  - in axial steering column direction
2 - Accelerator
3 - Double pedal for service brake/inching
4 - Swivelling pedal
5 - Steering column switch
  - to the front: Turn signal, right
  - to the rear: Turn signal, left
  - to the top - Low beam
  - to the bottom - High beam
  - Push button - Signal horn
6 - Heater/ventilation/air-conditioning system (option)

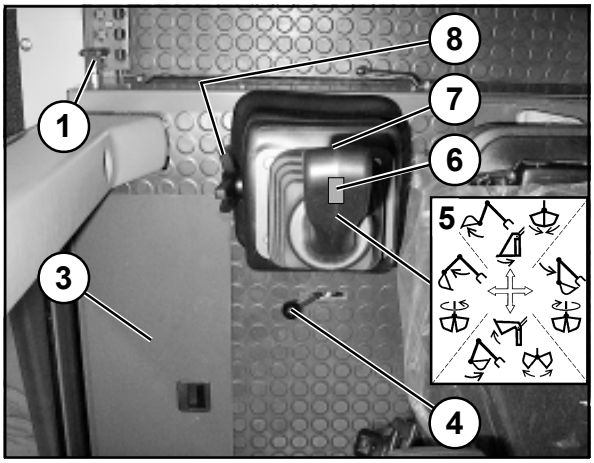


Figure 4-6

To the left of the driver's seat:

1 - Door handle
2 - free
3 - Maintenance door
4 - Switching lever for steering
  - outwards: four-wheel steering
  - inwards: rear-axle steering
5 - Pilot valve for auxiliary hydraulics
6 - Switch for auxiliary front-end excavator hydraulics (option)
7 - Dump interlock button (option)
8 - Handwheel for console adjustment (pilot valve for auxiliary hydraulics)

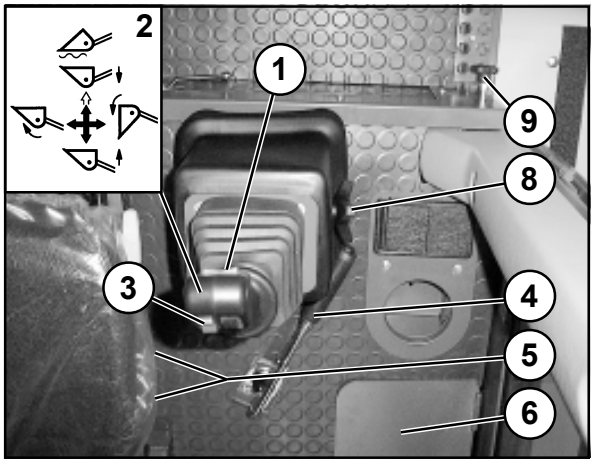


Figure 4-7

To the right of the driver's seat:

1 - Gear shift:
  - left: 2nd gear
  - centre: 1st gear
  - right: Alpha max. (turtle symbol)
2 - Pilot valve for working hydraulics
3 - Drive switch: forward/0/reverse
4 - Hand lever for parking brake
5 - Two sockets for connection of two laptops (e.g. for reading engine diagnostic codes (error codes), see chapter 9.1)
6 - Maintenance door
7 - free
8 - Handwheel for console adjustment (pilot valve for working hydraulics)
9 - Door handle

4.11 Instrument panel

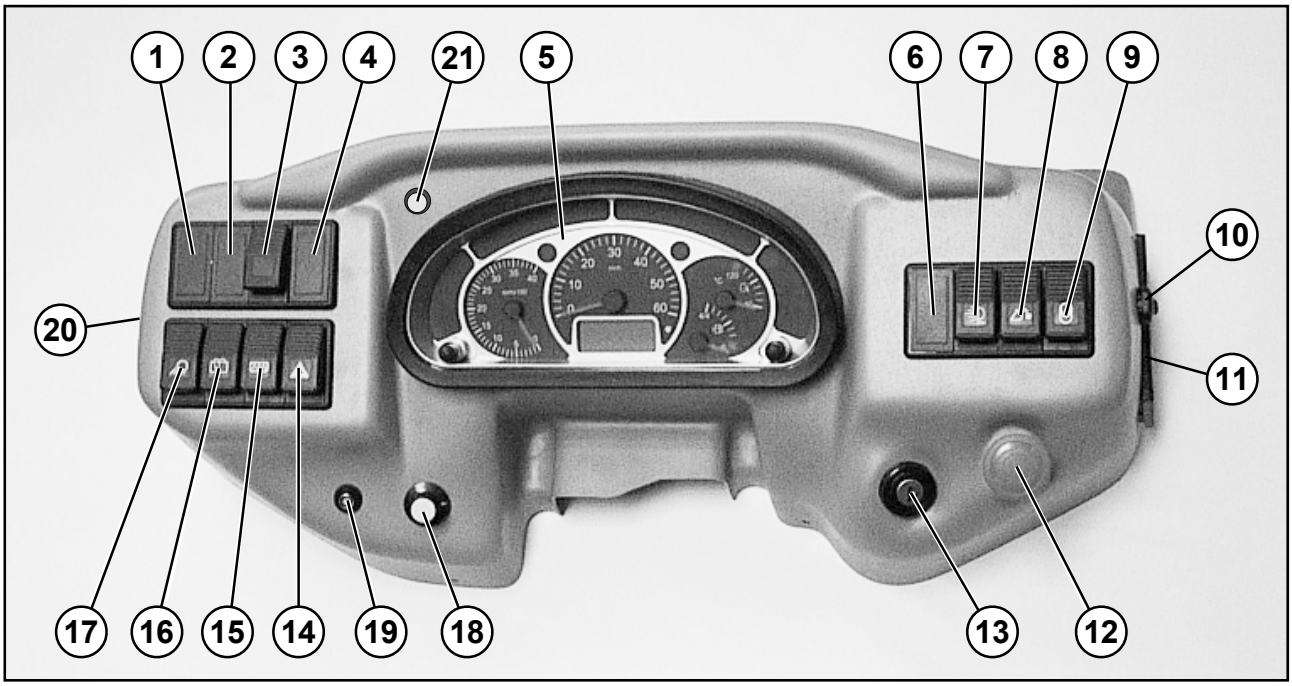


Figure 4-8

1 - Pushbutton for engine diagnosis
(engine error codes - see chapter 9.1 -)
2 - Pushbutton for fan reversal unit (option) see fig. 4-9c
3 - free
4 - Toggle switch for ECO-mode function

NOTE
Actuating the toggle switch for the ECO-mode function will reduce the engine speed when travelling at maximum speed in the 2nd gear stage, resulting in a reduced fuel consumption.

5 - Multifunction panel (4.11.1)
6 - Toggle switch for beacon light (option)
7 - Toggle switch for driving lights
- Position I: Parking light, tail light
- Position II: Low beam or high beam (depending on the position of the steering column switch 4-8/1)

8 - Pushbutton for releasing the quick-change device
9 - Toggle switch for lifting device suspension
10 - Socket
11 - Fuse box
12 - Emergency stop switch (traction drive cut-out)

DANGER
Immediately apply the parking brake (4-7/4) 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 (8-31/2), insert it again after approx. 10 seconds and restart the engine.

13 - Starter switch
14 - Toggle switch for hazard flasher system
15 - Toggle switch for heatable rear window/ rear view mirror (option)
16 - Toggle switch for rear wiper/washer rear
17 - Toggle switch for work lights
- Position I: front
- Position II: front and rear

18 - 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.

18 - Hand throttle control (option)
19 - Switchover hand throttle/foot throttle (option)

DANGER
Before actuating the switchover
- do **not** actuate the accelerator (4-5/2),
- apply the parking brake (4-7/4),
- set the drive switch (4-7/3) to “0”,
- Turn the hand throttle (4-8/18) all the way to the left to position “0”.

Operate the vehicle only with the hand throttle enabled only if the drive switch is set to „0“ and the parking brake has been applied.
Moving the vehicle with the hand throttle engaged is expressly forbidden for reasons of safety.

20 - Fuse box
21 - Pushbutton for teach function (4.11.2)

Fuse box (4-8/11):

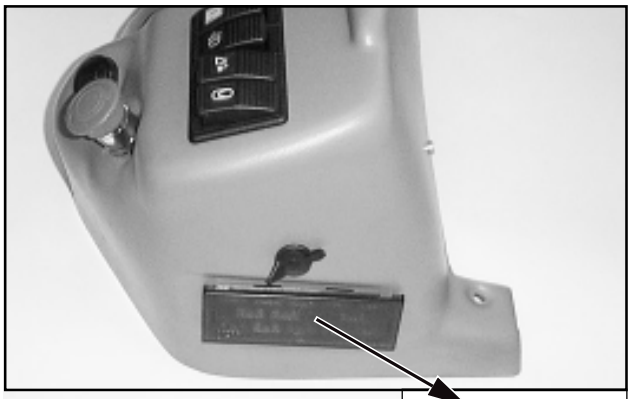


Figure 4-9a

1	Window wiper/washer	15.0 A
2	Turn indicator	7.5 A
3	Hydraulics	10.0 A
4	Rear window heater	15.0 A
5	High beam	7.5 A
6	Dipped beam	7.5 A
7	Tail light, left; parking light, left	5.0 A
8	Tail light, right; parking light, right	5.0 A
9	Spocket, interior lighting	10.0 A
10	Hazard flasher	10.0 A
11	Warning beacon (opt.), signal horn	20.0 A

Fuse box (4-8/20):

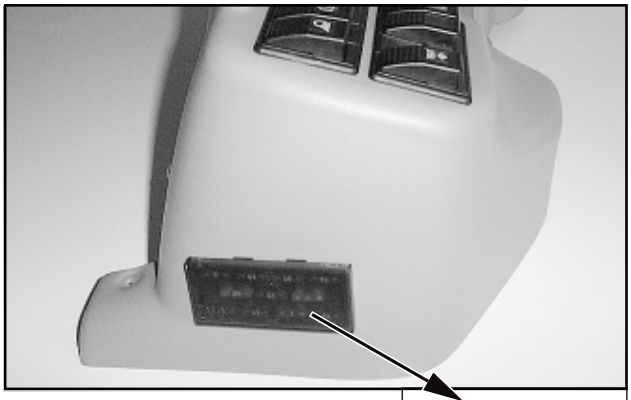


Figure 4-9b

1	Controller engine	7,5 A
2	Controller traction drive	3,0 A
3	Controller traction drive	15,0 A
4	Controller traction drive	1,0 A
5	Reversing light, reversing warning indicator	7,5 A
6	Working light, front	10,0 A
7	Working light, rear	10,0 A
8	Multifunction panel	3,0 A
9	Brake light	5,0 A
10	free	
11	Heating/air condition	20,0 A

opt. = optional equipment

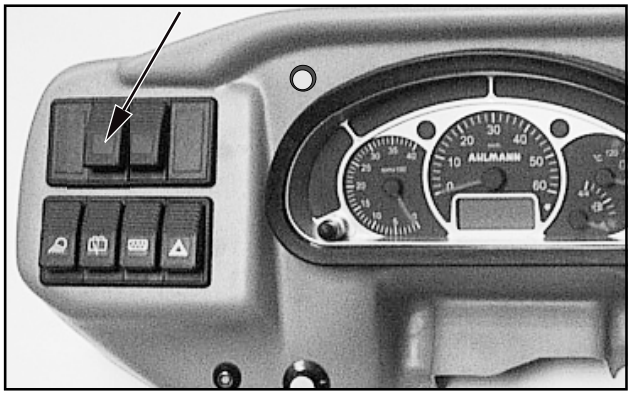


Figure 4-9c

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 (4-9c/ arrow).

NOTE

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

4.11.1 Multifunction panel (4-8/5)

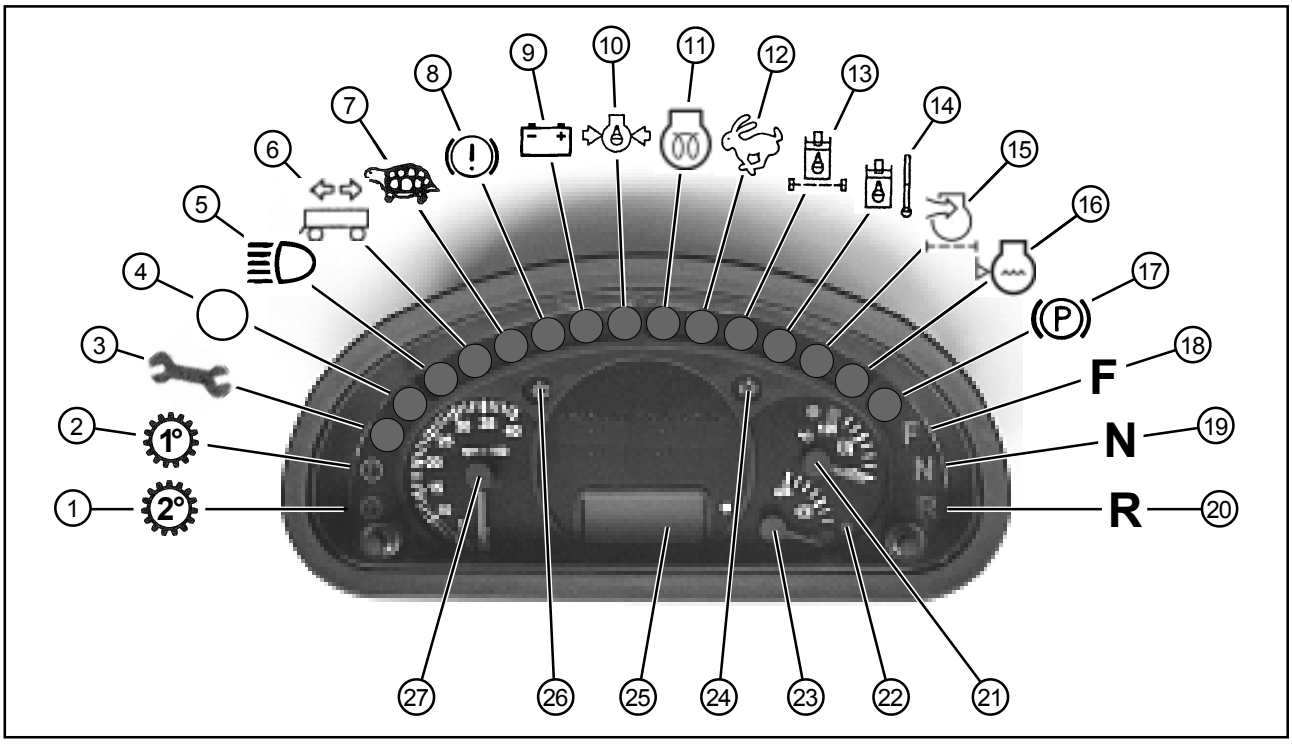


Figure 4-10

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

4.11.2 Teach function

4.11.2.1 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 (4-8/21) pressed. The error indicator (4-10/3) lights up permanently as soon as the controller has booted.
2. Release the pushbutton for the teach function (4-8/21) when the controller has booted (error indicator » 4-10/3 « is lit permanently).
3. Briefly press the pushbutton for the teach function (4-8/21) not later than 5 seconds after releasing the pushbutton for the teach function (4-8/21) and before the error indicator (4-10/3) goes dark and starts flashing.
4. This will activate the teach function for potentiometer alignment. The error indicator (4-10/3) 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 (4-8/21) 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.

4.11.2.2 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 (4-7/3) 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 (4-8/21) to activate a parameter-defined replacement value.

2. Preselect the drive direction (4-7/3) while keeping the pushbutton for the teach function (4-8/21) and the accelerator (4-5/2) 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

4.11.2.3 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 support (option) (1-2/arrow)]; remove if necessary
- Open ball block valves for the working and auxiliary hydraulics (1-2/1 and 1-2/2) if necessary **»** only if work is to be commenced **«**
- **»** For vehicles with hand throttle (option) only **«** The hand throttle (4-8/18) must be set to the leftmost position (0 position).
- **»** For vehicles with hand throttle (option) only **«** The „Switchover hand throttle/foot throttle“ (4-8/19) must be set to foot throttle (green control pin in the switch **not** visible).
- 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

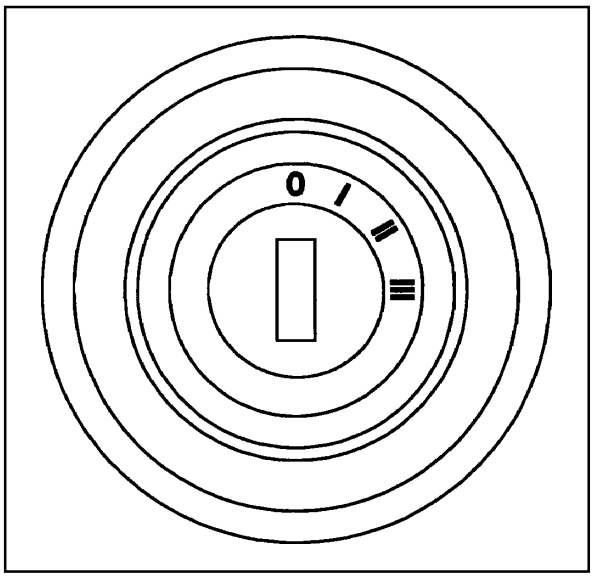


Figure 5-1

5.2.1 Start the diesel engine

(1) Engage the parking brake lever (4-7/4).
(2) Insert the battery main switch (8-31/2).
(3) Set the drive switch (4-7/3) to “0” (starter interlock!).
(4) Insert the ignition key into the starter switch (4-8/13) and turn the key clockwise to position “I“ (5-1).

NOTE

- Do not step on the accelerator (4-5/2) 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.
- A warning buzzer sounds when you apply the parking brake while the ignition is switched on.

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

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 (4-10/13) 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 (4-10/13) 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.

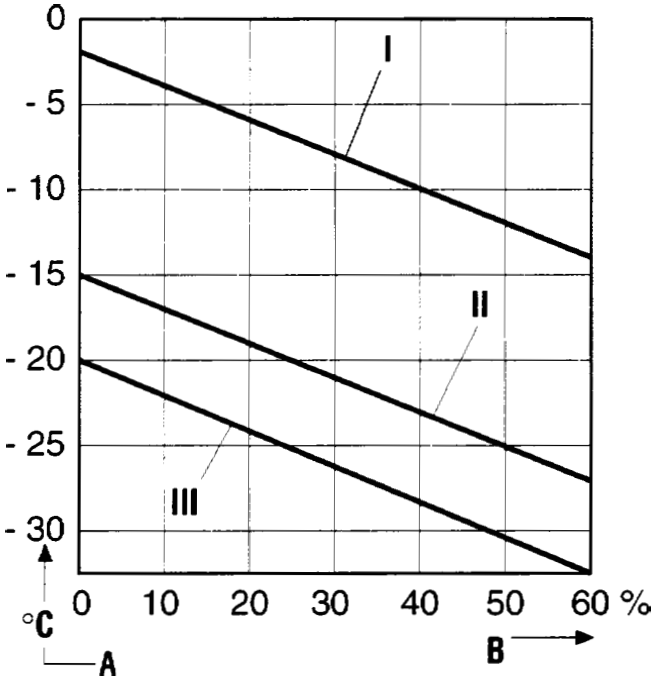


Figure 5-2

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 the 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 8.2.10. for the oil change procedure required for the hydraulic system.

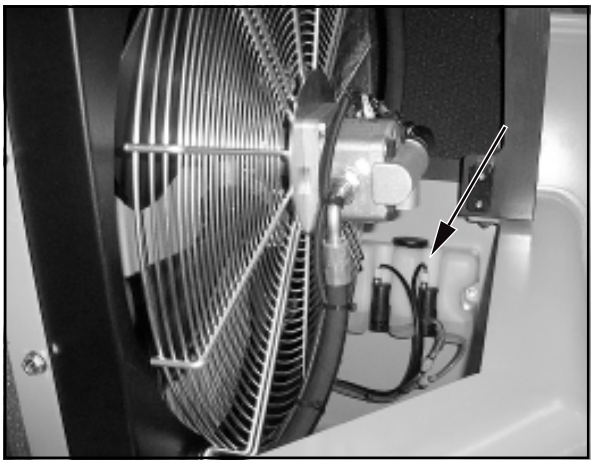


Figure 5-3

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 manufacturer's instructions 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.
- It is expressly forbidden to drive on public roads with the inching speed control (4-8/18) or the hand throttle (4-8/18 and 4-8/19) enabled.
- 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) No. 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 for the respective machine type.

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 both ball block valves (1-2/1 and 1-2/2).

CAUTION
When closed, the levers of the ball block valves are perpendicular to the flow direction. This prevents the bucket arm from being inadvertently lowered and the bucket tipped while driving.


Figure 5-4

(3) Block the swivel unit by inserting the blocking wedge (1-3/arrow) 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 (4-6/4).

DANGER
The working lights (4-8/17) must be switched off.

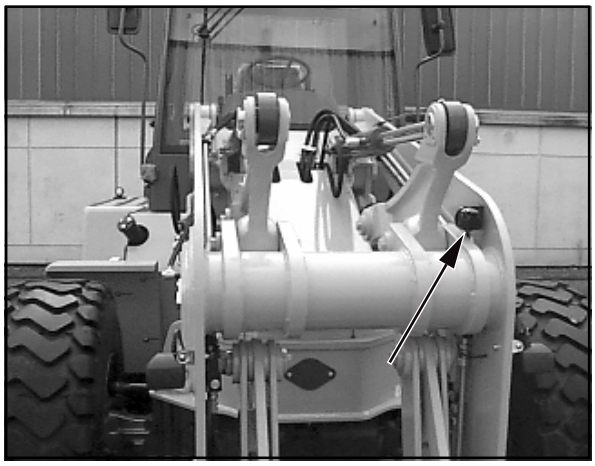


Figure 5-5

(10) Release the parking brake (4-7/4).
(11) Switch to gear stage “II2“ (4-7/1).
(12) Select the travel direction (4-7/3).
(13) Press the accelerator pedal (4-5/2).

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

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 “2“ (4-7/1). For special tasks which ask for a more sensitive control of the speed or a higher engine speed at reduced travel speed, gear stage “1“ can be selected. This allows the maximum travel speed to be limited.

Speed range/gear stage

“20 km/h“ variant				
Alpha max. (turtle symbol)	from	0	to	4 km/h
1	from	0	to	12 km/h
2	from	0	to	20 km/h
“25 km/h“ variant				
Alpha max. (turtle symbol)	from	0	to	4 km/h
1	from	0	to	12 km/h
2	from	0	to	25 km/h
“40 km/h“ variant				
Alpha max. (turtle symbol)	from	0	to	4 km/h
1	from	0	to	12 km/h
2	from	0	to	40 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 (4-5/2) is briefly pressed.
  - when the loader stops.

(1) Lock both doors.
(2) Release the parking brake (4-7/4).
(3) Select the gear stage (4-7/1).
(4) Select the travel direction (4-7/3).
(5) Press the accelerator pedal (4-5/2).

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.

Overheat protection

The cooling water temperature of the diesel engine is compared with a parameterisable limit value. The overheat protection comes into action when this limit value is exceeded or when the oil temperature sensor indicates an overtemperature:

- The diesel engine control is restricted to a parameterisable value.
- The pump control is restricted to a parameterisable value.
- The angle of the variable displacement motor is restricted to a parameterisable value.
- Shifting up is no longer permitted.

CAUTION

- If the hydraulic oil temperature indicator lamp (4-10/13) lights up during operation or the buzzer sounds, the loader must be switched off immediately, the cause must be determined by a hydraulics expert and the malfunction must be eliminated.
- The hydraulic quick-change device must only be locked if an attachment has been mounted.
- 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 and to prevent leaks.

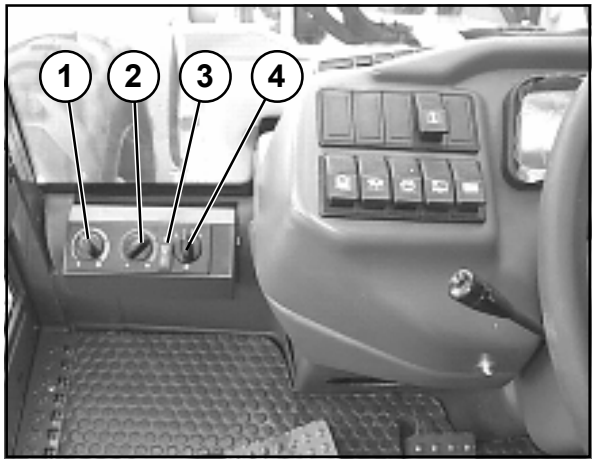


Figure 5-6

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.
- Operate the vehicle only with the hand throttle (option) enabled only if the drive switch (4-7/3) is set to „0“ and the parking brake (4-7/4) has been applied.
  It is expressly forbidden to move the vehicle with the hand throttle (4-8/18 and 4-8/19) enabled.

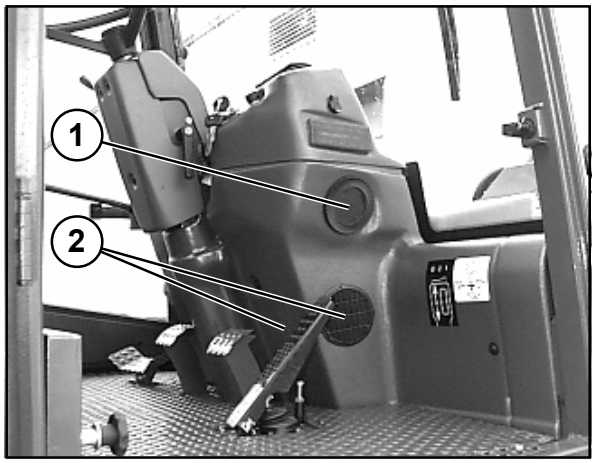


Figure 5-7

5.2.5 Heater and ventilation system/air-conditioning system (option)

5.2.5.1 Setting the air flow

(1) Turn the rotary switch (5-6/4) for the blower to position 0, 1, 2, or 3 depending on the air flow desired.
(2) Set the air flow direction at the left and right with the lateral air nozzles (5-7/1 and 5-8/1).

5.2.5.2 Switch on the heater

(1) Turn the knob (5-6/2) in clockwise direction (warm) or in anti-clockwise direction (cold) to reach the desired temperature.

5.2.5.3 Switching on the air-conditioning system (option)

(1) Press the “ON/OFF“ switch (5-6/3) to control the air condition as desired.

Switch pressed in the upper half - Air condition “ON“
Switch pressed in the lower half - Air condition “OFF“

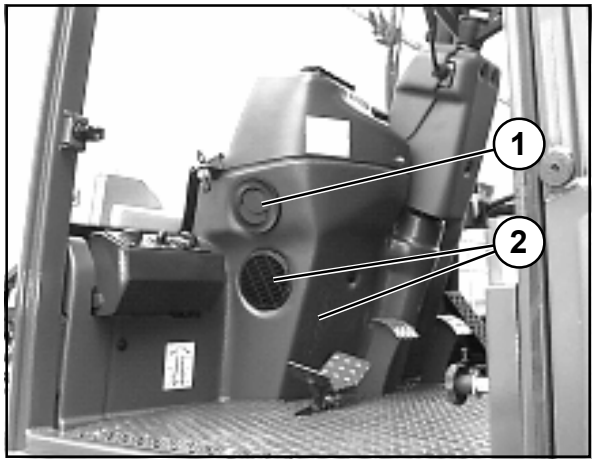


Figure 5-8

5.2.5.4 Setting the temperature

(1) The rotary switch (5-6/1) lets you control the temperature in the driver's cabin.
Rotary switch in clockwise direction - colder
Rotary switch in counter clockwise direction - warmer

NOTE
The air conditioning system takes in air via the four air intake openings (5-7/2 and 5-8/2).

CAUTION
For safety instructions and pertaining disposal regulations as well as for maintenance information, refer to the operating instructions that come with the air condition.

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 (4-7/4).
(3) Place the bucket or the attachment on the ground.
(4) Set the drive switch (4-7/3) to "0".

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

For vehicles with hand throttle (option) only
- The hand throttle (4-8/18) must be set to the leftmost position (0 position).
- The „Switchover hand throttle/foot throttle" (4-8/19) must be set to foot throttle (green control pin in the switch **not** visible).

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.

5.3.3 Switching off the heater and ventilation/air conditioning (option) system

(1) Shut off the hot air supply (5-6/2).
(2) Turn the rotary switch (5-6/4) for the blower to position "0".
(3) Switch off the air conditioning system (option) (5-6/3).

5.3.4 Leaving the loader

(1) Lock the hand levers for the working and auxiliary hydraulics (1-2/1 and 1-2/2).

(2) Remove the main battery switch (8-31/2).

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.

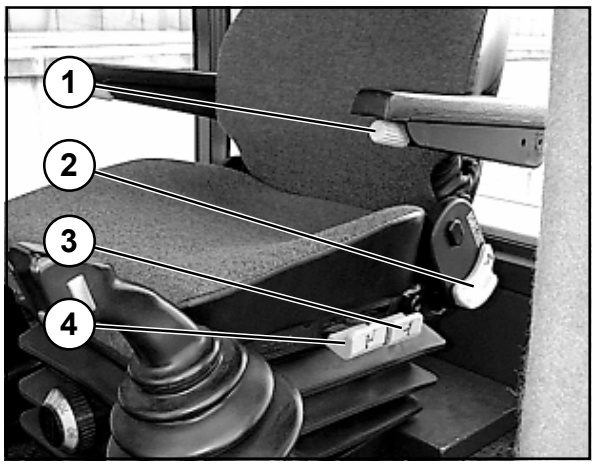


Figure 5-9

5.4 Adjusting the driver's seat

5.4.1 Isri seat

(1) Adjust or swing forward the backrest using the hand lever (5-9/2).

(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 (5-9/1).

(6) Readjust the position of the pilot valves for the working (4-7/8) and auxiliary hydraulics (4-6/8) 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.

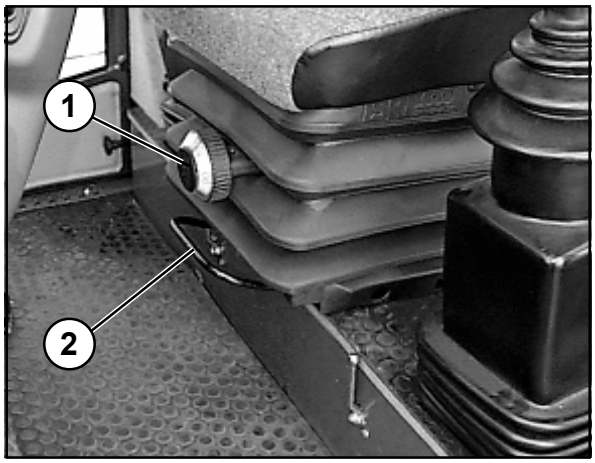


Figure 5-10

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 inspection window (5-11).

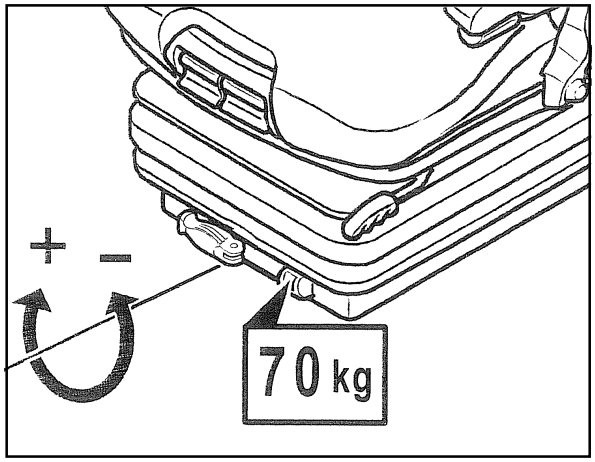


Figure 5-11

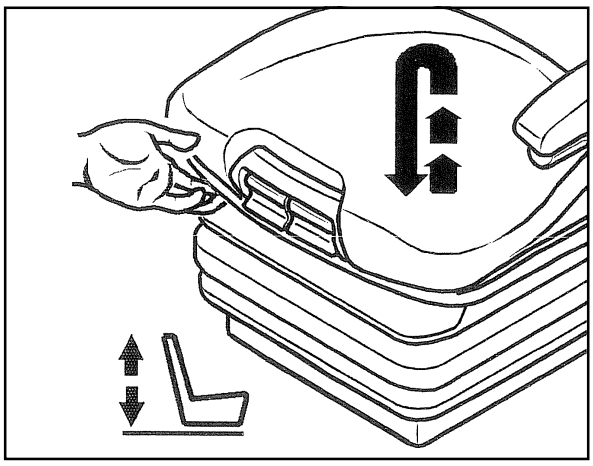


Figure 5-12

(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).

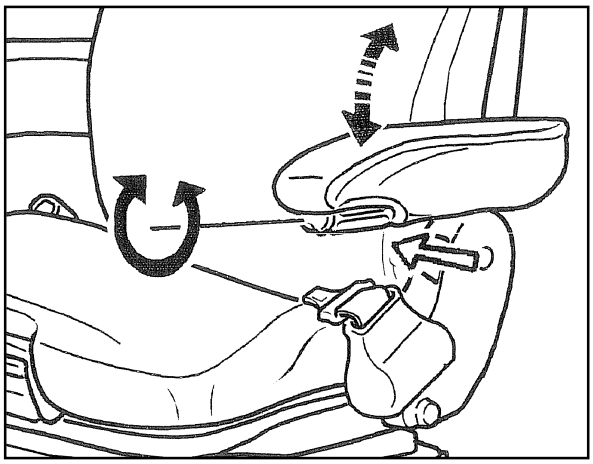


Figure 5-13

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

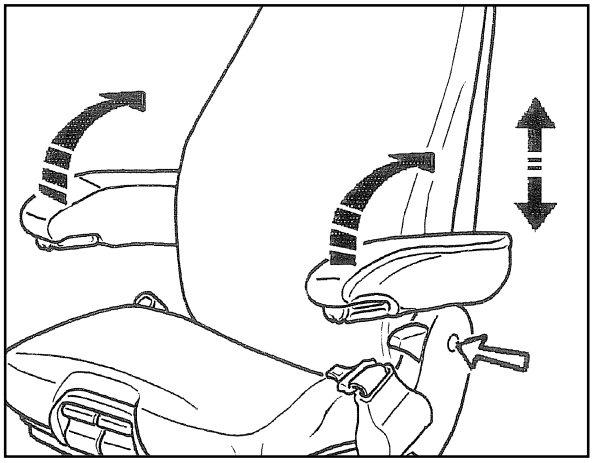


Figure 5-14

(4) **Arm rests:**
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.

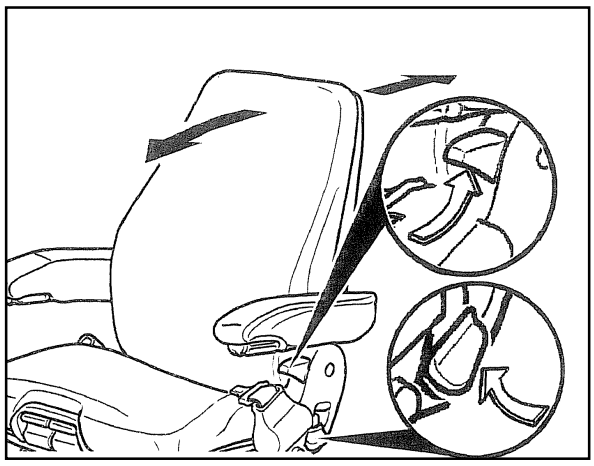


Figure 5-15

(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.

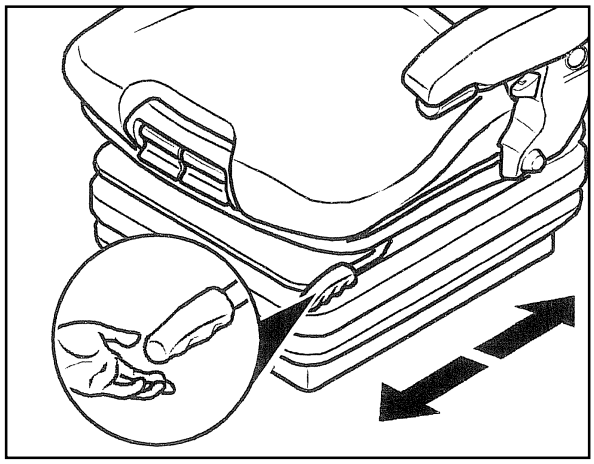


Figure 5-16

5.4.3 Grammer seat (air-cushioned)

CAUTION
- Adjust the seat only when the loader is not moving.
- Check fastening and locking parts from time to time.

(1) **Seat depth adjustment** (5-17/1):
You can adjust the seat depth to your wishes.
To adjust the seat depth, lift the right button (5-17/1). Push the set to the front or rear to obtain the correct position while keeping the button lifted.

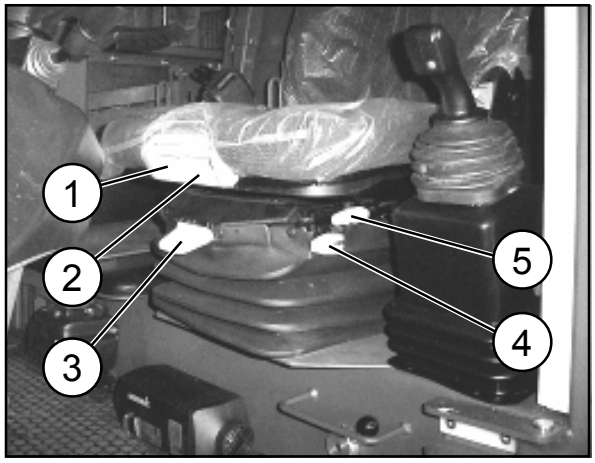


Figure 5-17

(2) **Seat inclination adjustment** (5-17/2):
You can adjust the seat inclination to your wishes.
To adjust the seat inclination, lift the left button (5-17/2). Exert pressure on the seat or relieve the pressure while keeping the button lifted to set the desired inclination.

(3) **Height adjustment** (5-17/3):
The height can be continuously adjusted with compressed air.
Fully pull or push the lever (5-17/3) to adjust the seat height. When the upper or lower height limit is reached, an automatic height adjustment will occur to ensure a minimum suspension travel.

NOTE
The ignition must be switched on.

CAUTION
Operate the compressor for not more than one minute to avoid damage.

(4) **Horizontal suspension** (5-17/4):
We recommend enabling the horizontal suspension when certain conditions (e.g. trailer operation) prevail. In this setting, the driver's seat can better compensate for impacts in travelling direction.

Lever to the front: = Horizontal suspension "OFF"
Lever to the rear: = Horizontal suspension "ON"

(5) **Longitudinal adjustment** (5-17/5):
You can adjust the seat in longitudinal direction when you pull the locking lever 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.

(6) **Lumbar support** (5-18/1):
Turn the knob to adjust the curvature of the back cushion to suit your needs.
This will increase the seating comfort and also the driver's performance.

(7) **Backrest adjustment** (5-18/2):
Use the locking lever (5-18/2) to adjust the backrest.

CAUTION
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.

(8) Readjust the position of the pilot valve for the auxiliary hydraulics (4-6/5) if necessary.

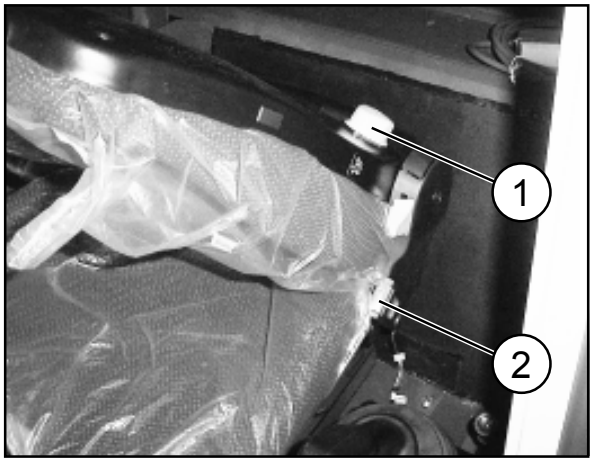


Figure 5-18

5.5 Switching the steering type

CAUTION

- The wheels of the rear axle must be straight before the switching lever (5-19/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-wheel steering) or to the left (four-wheel steering).

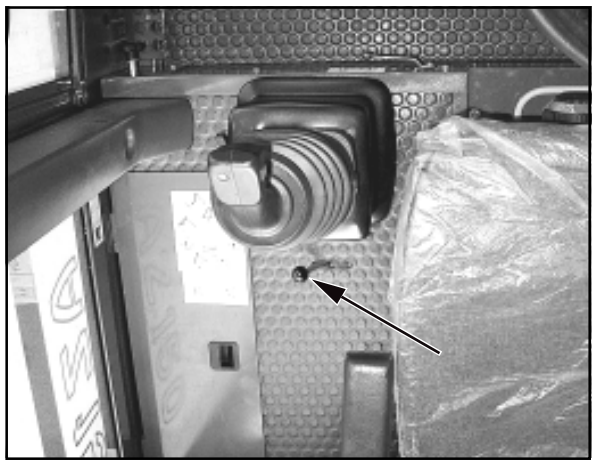


Figure 5-19

5.5.1 Synchronising the steering

(1) Set the steering type selection valve to “four-wheel steering“.

(2) Actuate the steering so that the front wheels are straight.

(3) Set the steering type selection valve to “rear wheel steering“.

(4) Actuate the steering so that the rear wheels are straight.

Attachments

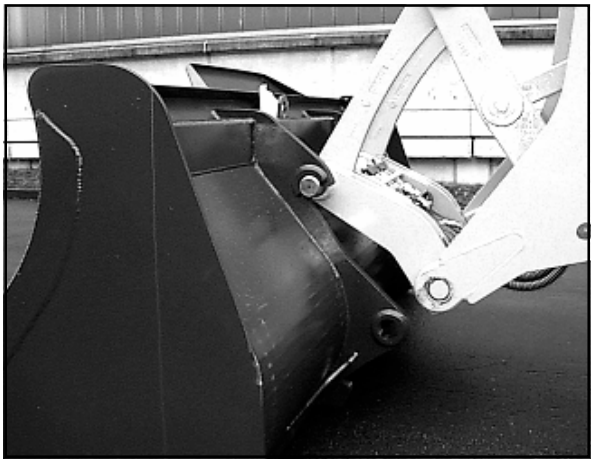


Figure 6-1

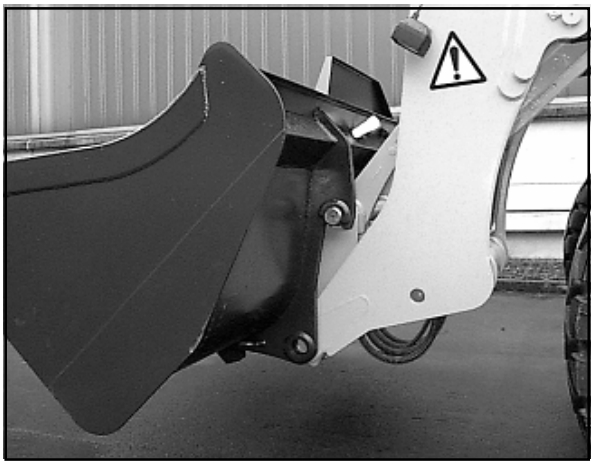


Figure 6-2

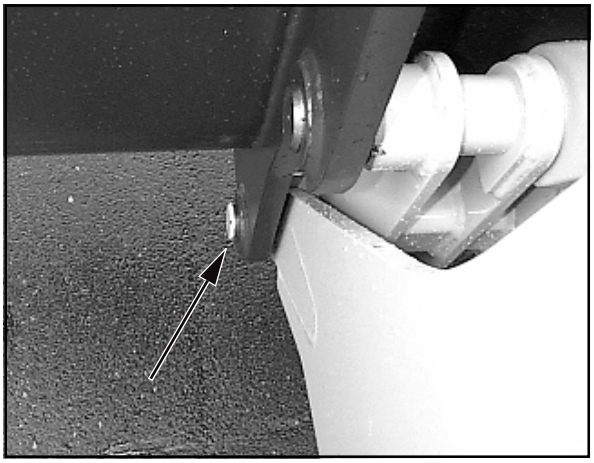


Figure 6-3

6 Attachments

6.1 Mounting and dismounting attachments without hydraulic connections

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 hand lever for the auxiliary hydraulics (4-6/5).

CAUTION
The attachment may be locked only when the engine is at idling speed so that the extension speed of the locking bolts does not become too high and leaks are prevented.

(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 (4-8/8) and unlock the bucket with the hand lever for the auxiliary hydraulics (4-6/5).

CAUTION
- The attachment may be locked only when the engine is at idling speed so that the retraction speed of the locking bolts does not become too high and leaks are prevented.
- The hydraulic quick-change device must only be locked when an attachment has been mounted.

(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.

6.1.2 Fork-lift attachment

NOTE

- Figure 6-4 shows the loader with the fork-lift attachment in the topmost bucket arm position.
- Mounting and dismounting are carried out in the same way as for the standard/lightweight bucket (section 6.1.1).

Figure 6-4

DANGER

- The two bolts of the quick-change device must be in the holes on both sides of the fork-lift attachment suspension and must be clearly visible (6-5/arrow).
- 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.
- Position both fork tines at an equal distance from the centre (6-6/arrows) and lock them.
- Moving loads on the forks is only permitted close to the ground!
- Avoid abrupt acceleration, braking or steering movements when handling loads.

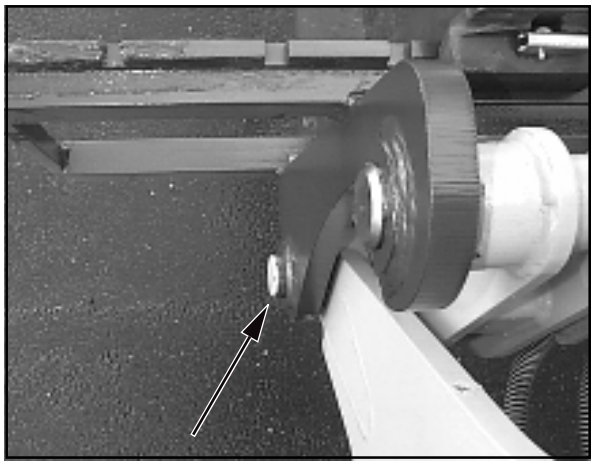


Figure 6-5

CAUTION

- You must not actuate the lifting device suspension (4-8/9) of loaders with pipe break protection (option) since this would disable the pipe break protection.
- The driver must not leave the loader if the attachment has not been lowered.
- The fork-lift 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 and leaks are prevented.
- The hydraulic quick-change device must only be locked when an attachment has been mounted.

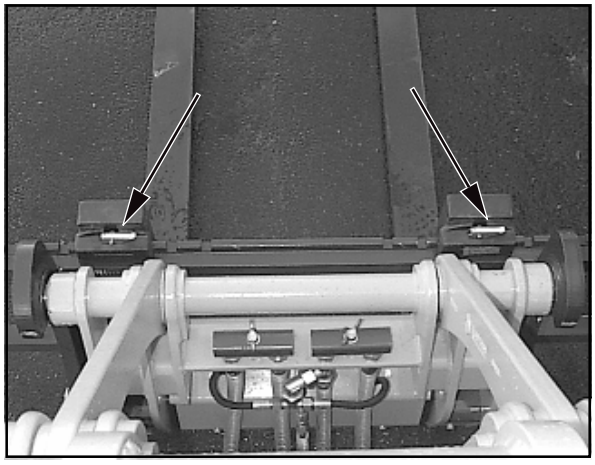


Figure 6-6

NOTE

- The fork tines are locked correctly when the two tiltable locking levers fully rest on the fork carrier.
- The type plate is on the rear of the upper fork carrier.

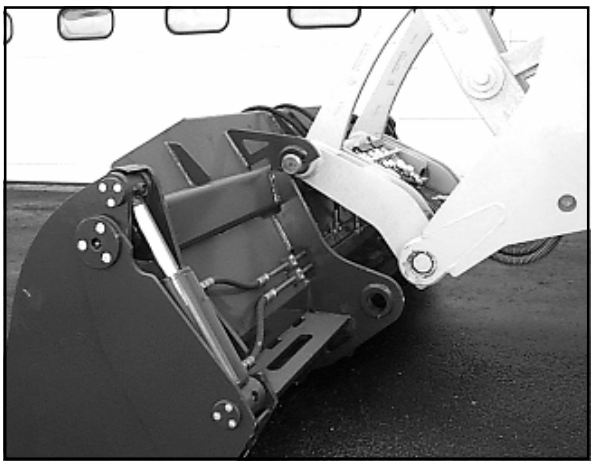


Figure 6-7

Figure 6-8

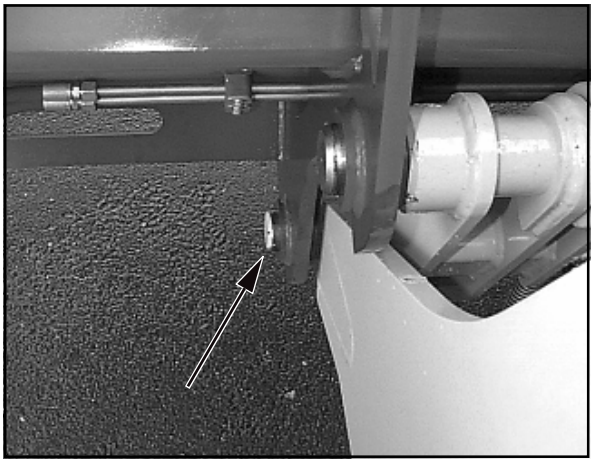


Figure 6-9

6.1.3 Lifting hook

NOTE

- Mounting and dismounting are carried out in the same way as for the standard/lightweight bucket (section 6.1.1).
- The type plate is on the upper side of the crane hook support, on the right-hand side.

DANGER

- The two bolts of the quick-change device must be in the holes on both sides of the lifting hook attachment suspension and must be clearly visible.
- Check the safety flap of the crane hook for proper functioning.

CAUTION

- You must not actuate the lifting device suspension (4-8/9) of loaders with pipe break protection (option) since this would disable the pipe break protection.
- The lifting hook 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 and leaks are prevented.
- The hydraulic quick-change device must only be locked when an attachment has been mounted.

6.2 Mounting and dismounting attachments with hydraulic connections

6.2.1 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 (6-7).

(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 (6-8).

(4) Lock the bucket (6-9) with the hand lever for the auxiliary hydraulics (4-6/5).

CAUTION

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

(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 carrier and must clearly protrude (6-9/arrow).

(6) Shut down the engine.

(7) Depressurise the hydraulic lines by moving the hand lever for the auxiliary hydraulics (4-6/5) to and fro.

(8) Unscrew the right cover from the coupling of the quick-change device (6-10/arrow).

(9) Fasten the cover to the cross arm of the quick-change device (6-11/2).

(10) Swing up the protective flaps of the quick-change couplings on the multi-purpose bucket (6-11/1) and connect them with the hoses of the quick-change device (6-11) by tightly pushing them in.

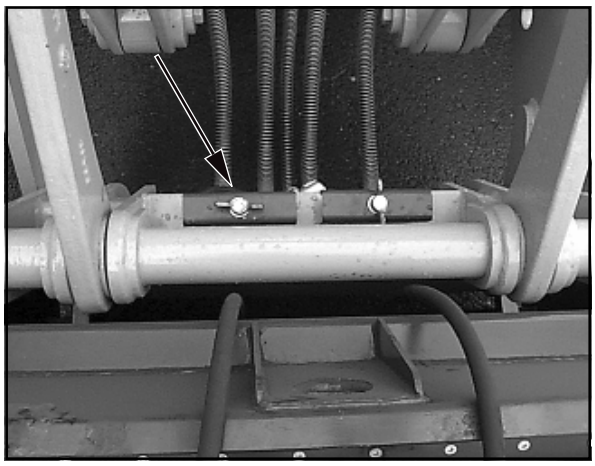


Figure 6-10

CAUTION

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

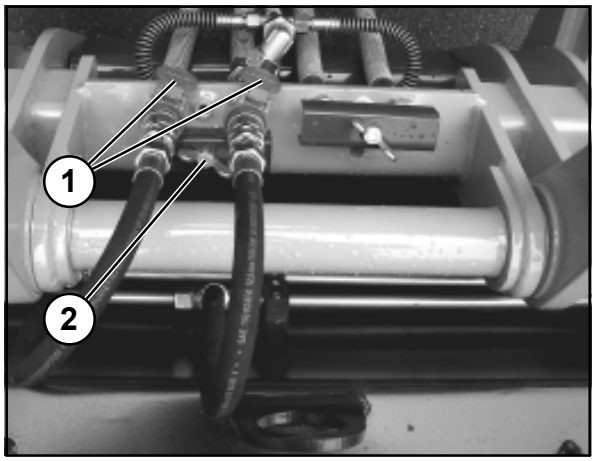


Figure 6-11

Dismounting

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

(2) Shut down the engine.

(3) Depressurise the hydraulic lines by moving the hand lever for the auxiliary hydraulics (4-6/5) to and fro.

(4) Dismounting takes place in the reverse order of mounting. However, to unlock the multi-purpose bucket, the release button for the quick-change device (4-8/8) must be used.

CAUTION

- The attachment may be locked only when the engine is at idling speed so that the retraction speed of the locking bolts does not become too high and leaks are prevented.
- To separate the coupling sockets from the coupling plugs, make the notches on the knurled collars (6-12/arrows) match the noses on the coupling sockets (can be distinctly felt to engage) and then firmly pull upwards.
- The hydraulic quick-change device must only be locked when an attachment has been mounted.

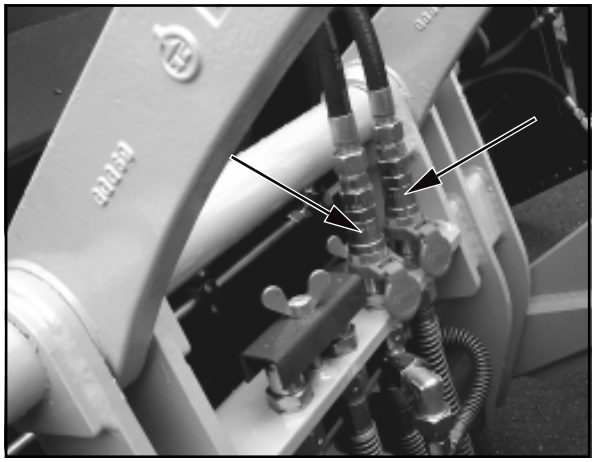


Figure 6-12

NOTE

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

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)

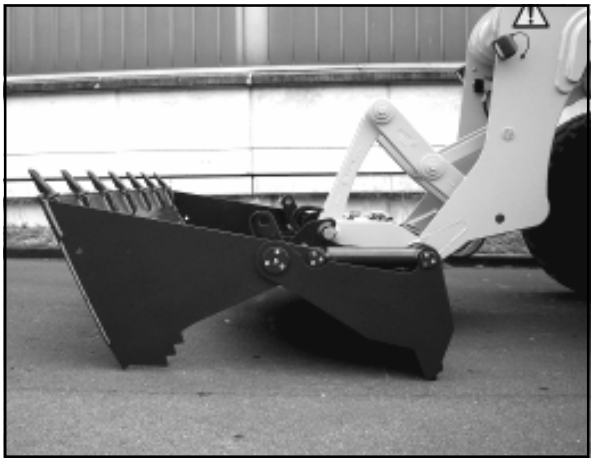


Figure 6-15

- grabbing (6-15) and

- in bucket operation.

6.2.2 Front-end excavator

Mounting

The front-end excavator is mounted in a manner similar to the multi-purpose bucket [(section 6.2.1 (1) ...(10)], 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.
While doing so, make sure the two right hoses on the front-end excavator arm connect to the right coupling plugs on the quick-change device and the two left hoses on the front-end excavator arm connect to the left coupling plugs on the quick-change device. The hoses must never cross.

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 (2-1/5).

DANGER

The two bolts of the quick-change device must be in the bore holes of the front-end excavator suspension and must be clearly visible (6-16/ arrow).

CAUTION

- The front-end excavator may be locked only when the engine is at idling speed so that the extension speed of the locking bolts does not become too high and leaks are prevented.
- When making connections, make sure that the hydraulic connections are clean and completely connected.

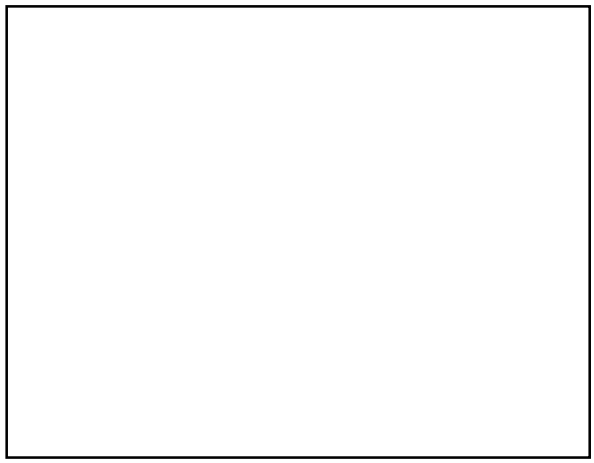


Figure 6-16

Dismounting

The front-end excavator is dismounted in a manner similar to the multi-purpose bucket (section 6.2.1), except that the four hydraulic hoses of the front-end excavator must be disconnected from the four quick-change coupling plugs of the quick-change devicce.

CAUTION

- The front-end excavator 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 and leaks are prevented.
- The hydraulic quick-change device must only be locked if an attachment has been mounted.

NOTE

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

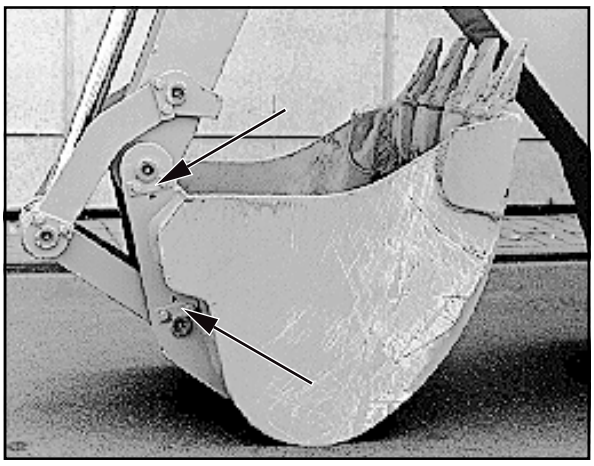


Figure 6-17

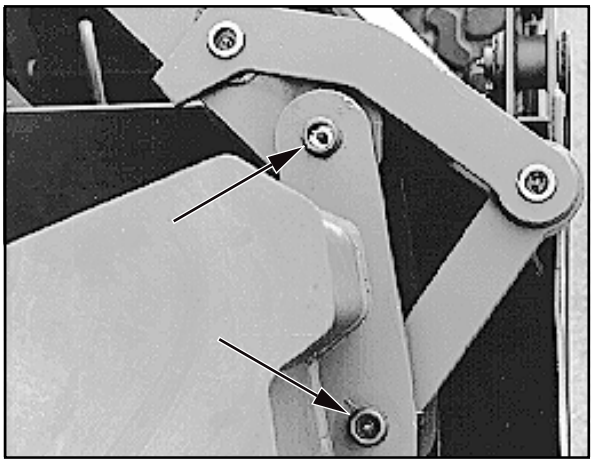


Figure 6-18

6.2.2.1 Shovel replacement

(1) Lift and mechanically prop up the bucket arm [e.g. by inserting the bucket arm support (option) (1-1/arrow)] and lower the bucket arm until it rests on the bucket arm support.

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

(3) Shut down the engine.

(4) Depressurise the hydraulic lines by moving the hand lever for the auxiliary hydraulics (4-6/5) to and fro.

(5) Close both ball block valves (1-2/1 and 1-2/2).

(6) Unscrew the bolt retainer (size 19) (6-17/arrows).

(7) Knock out the bearing bolts (6-18/arrows) and remove the shovel.

(8) Mounting is in the reverse order.

NOTE

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

6.3 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 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.

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

CAUTION
- You must only tow a loader with failed engine in order to move it out of the danger area.
- Unmount both cardan shafts if you need to tow the loader over longer distances because it cannot be loaded on a trailer.

(1) Actuate the toggle switch for the hazard flasher (4-8/14).

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

(3) Set the drive switch (4-7/3) 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 (4-6/4) to the “rear-axle steering” position.

(5) Release the parking brake (4-7/4).

(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 (4-7/2) 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 support (option) (1-1/arrow)] and lower the bucket arm until it rests on the bucket arm support.

(11) Close both ball block valves (1-2/1 and 1-2/2).

(12) Set the pilot valve for the working hydraulics (4-7/2) 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 – or 7-3/1 – rearwards towing] and to the towing vehicle.

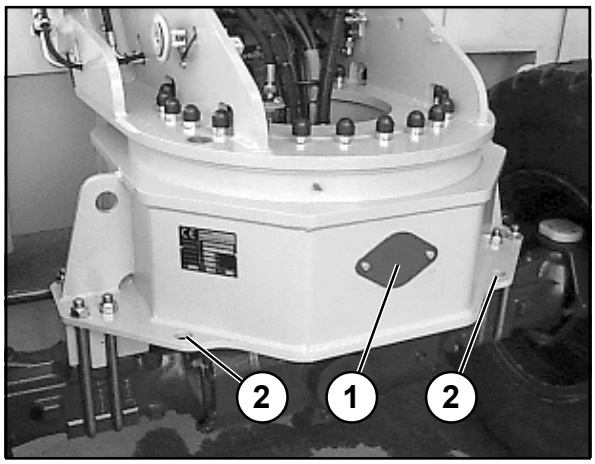


Figure 7-2

CAUTION

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

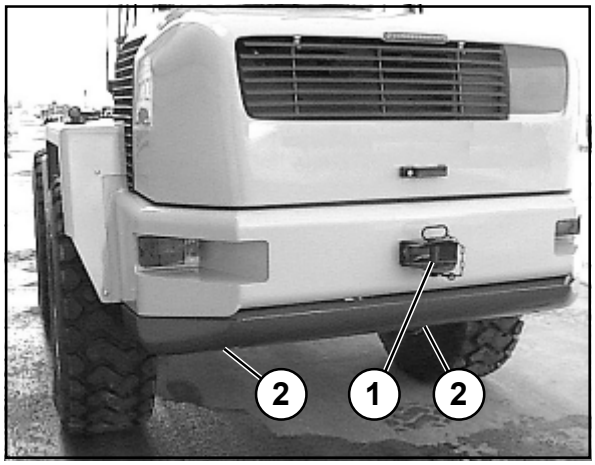


Figure 7-3

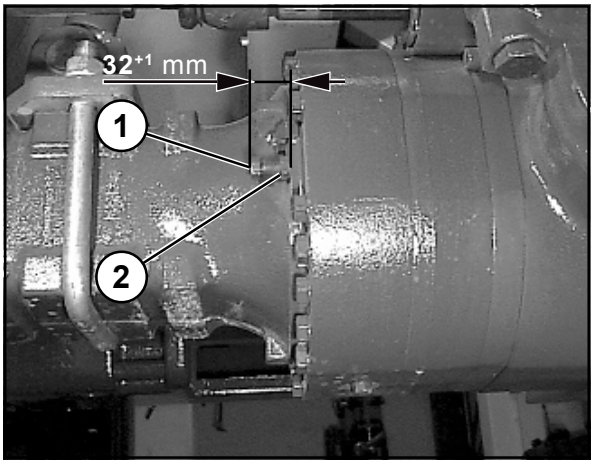


Figure 7-4a

(15) Loosen the spring. To do so, undo the lock nuts (7-4a/2 or 7-4b/2 and 7-5/4) and turn them back to a distance of approx. 6 mm from the axle body.

Screw the setscrews (7-4a/1 or 7-4b/1 and 7-5/3) into the axle body up to the stop of the thrust plate (7-4b/3). A resistance can be clearly felt at the stop.

Then continue screwing in the setscrews alternately by 1/4 turn each.

One turn is required for unlocking.

CAUTION
- The value of "1 turn" must never be exceeded.
- Make sure to synchronously tighten the adjusting screws. In other words: you must synchronously repeat tightening both screws after each 1/4 turn to prevent seizing or canting.
- Loosen the springs at the left and right of the axle body separately.

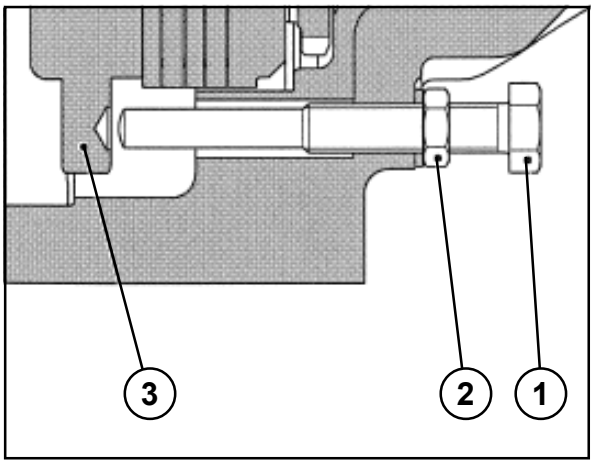


Figure 7-4b

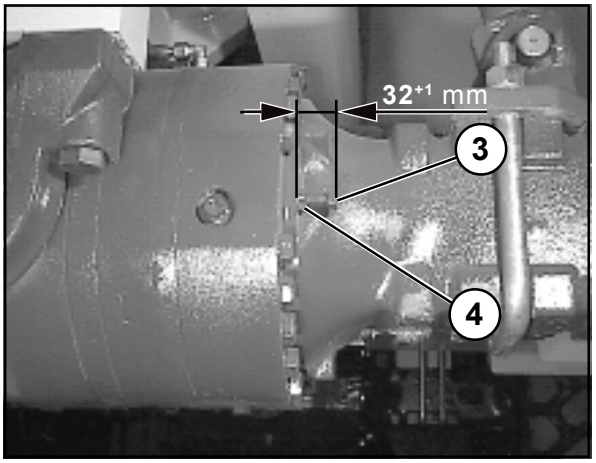


Figure 7-5

Settings following each manual unlocking
- Unscrew adjusting screws (7-4a/1 or 7-4b/1 and 7-5/3) with lock nuts (7-4a/2 or 7-4b/2 and 7-5/4) and seals.
- Replace seals.
- Apply TECNO LUBE 101 silicone grease to the adjusting screws.
- Fit adjusting screws with lock nuts and seals again.

(16) Screw in the adjusting screws until the distance between screw head and axle body is 32^{+1} mm.

(17) Lock the adjusting screws in position with the lock nuts.

CAUTION
The dimension of 32^{+1} mm (7-4a or 7-5) must always be heeded.

(18) Switch the hydrostatic drive motor to free oil flow before towing. To this end, the pressure relief valves in the variable displacement pump feature a bypass function. Turning the screw (7-6/1) in question (approx. 2 turns) will relieve the valve insert so that the oil can flow freely.

NOTE

Turn the screw (7-6/1) back when towing is finished. This will restore the original setting of the pressure relief valves.

(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 8,0 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 3,0 t at an assumed bracing angle of 45°.
  - Pay attention to clearances under structures!

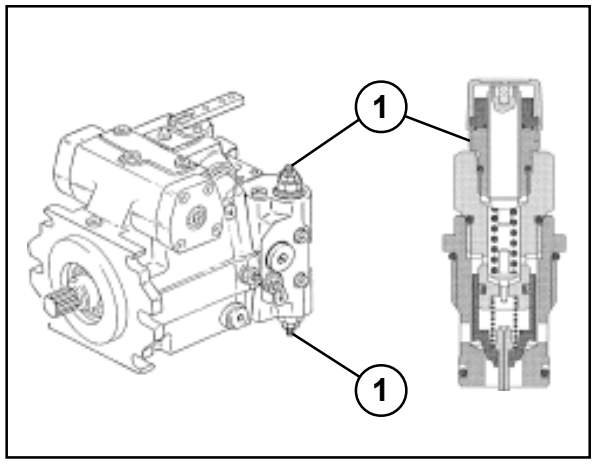


Figure 7-6

7.1.1.2 Towing the swivel shovel loader if the drive has failed

(1) Actuate the toggle switch for the hazard flasher (4-8/14).

(2) Set the drive switch (4-7/3) to “0”.

NOTE

The preparations described in steps (4), (6), (7) and (11) are only to be carried out if the rescue location is **not** on a public road:

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

(4) After the front-axle wheels have been straightened, switch the switching lever for the steering (4-6/4) to the “rear-axle steering” position.

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

(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) Lift and mechanically prop up the bucket arm [e.g. by inserting the bucket arm support (option) (1-1/arrow)] and lower the bucket arm until it rests on the bucket arm support.
(9) Close both ball block valves (1-2/1 and 1-2/2).
(10) Shut down the engine.
(11) Block the swivel unit by inserting the blocking wedge (1-3/arrow) into the swivel block (1-4/arrow).
(12) 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.

(13) Switch the hydrostatic drive motor to free oil flow before towing. To this end, the pressure relief valves in the variable displacement pump feature a bypass function. Turning the respective screw (7-6/1) will relieve the valve insert so that the oil can flow freely.

NOTE

Turn the screw (7-6/1) back when towing is finished. This will restore the original setting of the pressure relief valves.

(14) Remove the chocks.
(15) Start the engine.
(16) Release the parking brake (4-7/4).

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 8,0 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 3,0 t at an assumed bracing angle of 45°.
  - Pay attention to clearances under structures!

7.2 Lifting by crane

The loader to be lifted must be prepared as follows:

(1) Apply the parking brake (4-7/4).

(2) Set the drive switch (4-7/3) to “0”.

(3) Switch to gear stage “Alpha max. (snail symbol)” (4-7/1).

(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 (5-2).

(5) Close the ball block valves for the working and auxiliary hydraulics (1-2/1 and 1-2/2).

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

(7) Lock both doors.

(8) Fold the outside mirror inwards.

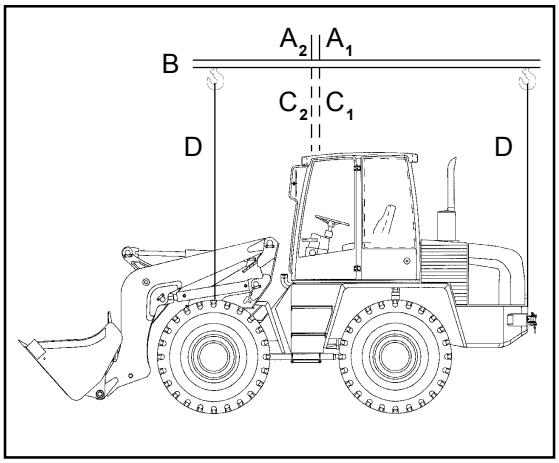


Figure 7-7

CAUTION

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

- 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 center axis of the loader.
- The lifting gear (D) must lead vertically upwards from the lifting points of the loader (7-8/arrows and 7-9/arrows).

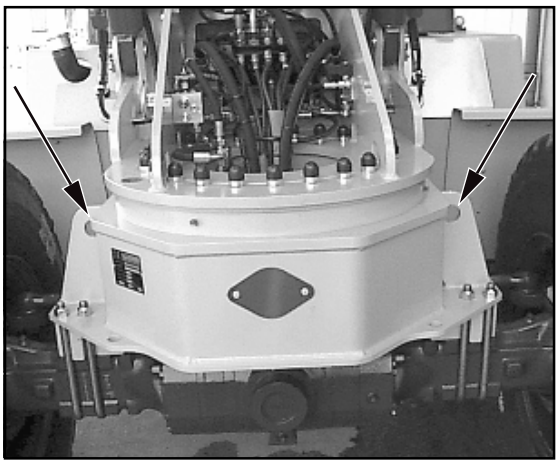


Figure 7-8

DANGER

The lifting gear must have a lifting capacity of at least 6.5 t.

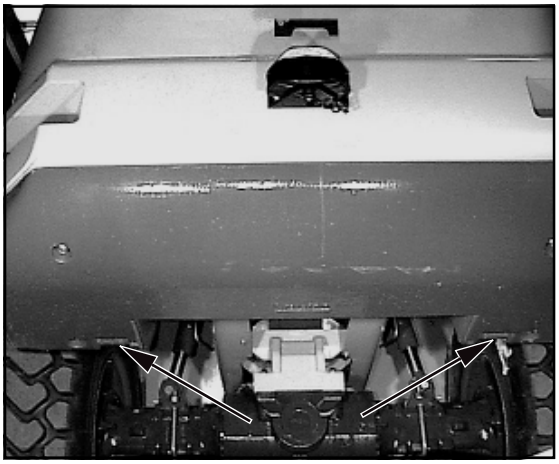


Figure 7-9

Maintenance

8 Maintenance plan AS 150e

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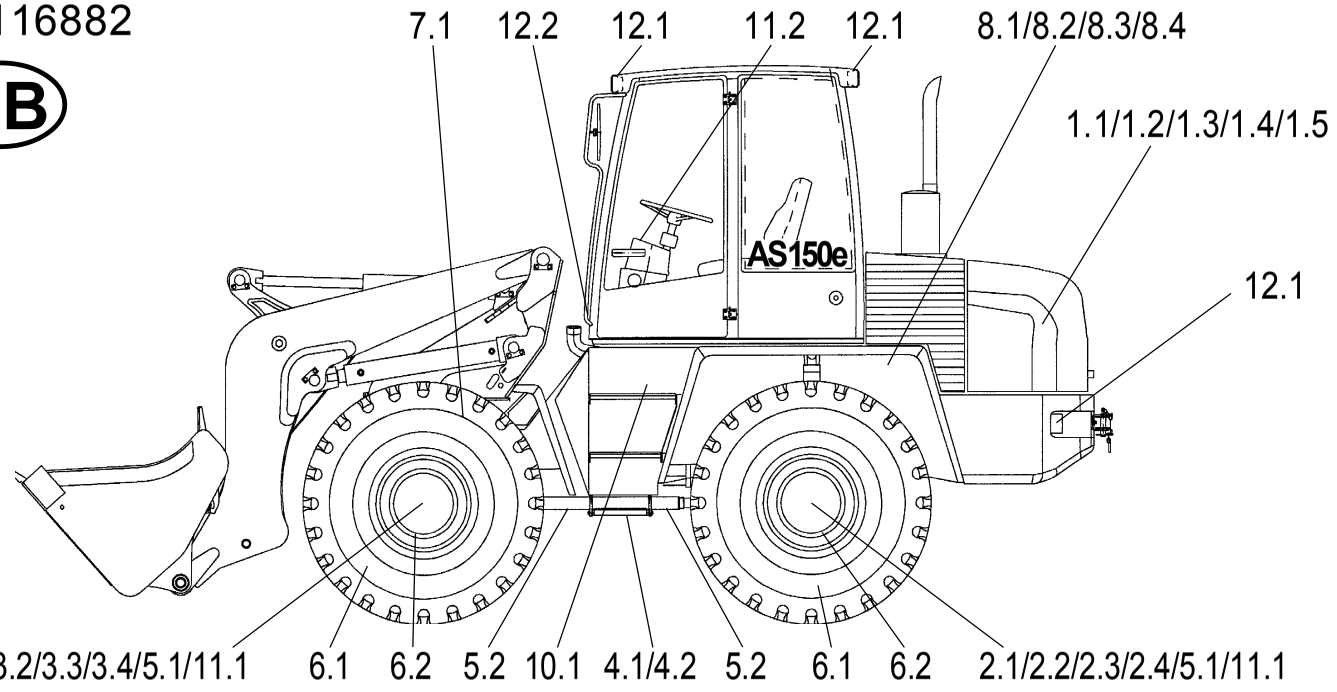


	Item	Name	Specification	Viscosity	Quantity
*	1	Engine Oil	MIL-L-2104 C = API-CD	SAE 15 W 40	= 10 l with Oil filter
*	2.2	Transm. Oil with LS Add.	MIL-L-2105 B = API-GL5-6-LS	SAE 85 W 90-LS	= 12,8 l
*	2.4	Transm. Oil with LS Add.	MIL-L-2105 B = API-GL5-6-LS	SAE 85 W 90-LS	= 2 x 1,9 l
*	3.2	Transm. Oil with LS Add.	MIL-L-2105 B = API-GL5-6-LS	SAE 85 W 90-LS	= 15,0 l
*	3.4	Transm. Oil with LS Add.	MIL-L-2105 B = API-GL5-6-LS	SAE 85 W 90-LS	= 2 x 1,9 l
*	4.2	Transmission Oil	General Motors ATF Typ DEXRON II	ATF 22 SAE 75 W	= 4,7 l (upper oil compartment)
					= 3,9 l (lower oil compartment)
*	8.3	Hydraulic Oil (4.)	DIN 51524 - HVLP 46	ISO VG 46, VI > 180	= 160 l
	9	Grease	DIN 51825 - KPF 1/2 N-20		as required
	10	Distilled water			as required
	12	Coolant	R 134 a		850 g ± 50 g

Legend

△ First oil or filter change or cleaning

▲ First service interval, repair any failures noted

○ Service, repair any failures noted

◇ Change or cleaning

* these marks, filling or service points are mandatory:

Refer to manual

Attention
Observe accident prevention measures when performing servicing tasks!

Lubrication Points (marked in red)

1. Grease bolts with DIN 51825 - KPF 1/2 N-20 every 10 hours.
2. Grease friction points as required and after cleaning with DIN 51825 - KPF 1/2 N-20.

Oil Lubrication Points

3. Oil joints and bell cranks every 50 working hours with engine oil MIL-L-2104 C

Biodegradable Hydraulic Oil

4. Synthetic ester based hydraulic oil viscosity class ISO VG 46 VI > 180

Intervals in working hours — max. permissible intervals, can be shorter dep. on use

10	100	500	750	1500	Pos.	Maintenance Points
○	△	◇			**1**	**Engine**
					1.1	Maintenance according to manufacturers specs
	○				1.2	Dry air filter unit: Check service display
						Change filter element if display shows red
		○			1.3	Check and clean fuel filter →
○					1.4	Check coolant fill-level
○					1.5	Check and clean combined cooling unit
	○				**2**	**Rear axle**
	△		◇		2.1	Check oil fill-level of transmission unit (inspection screw)
	○				2.2	Oil change transmission unit →
	△		◇		2.3	Check oil fill-level of helical planetary gearing (inspection screw)
					2.4	Oil change helical planetary gearing →
	○				**3**	**Front axle**
	△		◇		3.1	Check oil fill-level of transmission unit (inspection screw)
	○				3.2	Oil change transmission unit →
	△		◇		3.3	Check oil fill-level of helical planetary gearing (inspection screw)
					3.4	Oil change helical planetary gearing →
	○				**4**	**Transfer Case**
	△			◇	4.1	Check oil fill-level of transfer case (inspection screw)
					4.2	Oil change transfer case →
▲		○			**5**	**Axles / Articulated Shafts**
	▲	○			5.1	Check tightness of axles (500 Nm)
					5.2	Check tightness of articulated shafts (65 Nm)
	○				**6**	**Wheels and Tyres**
▲		○			6.1	Check air pressure
					6.2	Check tightness of wheel bolts (550 Nm)
	▲	○			**7**	**Swivel Joint**
					7.1	Check tightness (610 Nm)
	△		◇		**8**	**Hydraulic Unit**
○					8.1	Change suction return line filter insert, check electr. display →
					8.2	Check oil fill-level (inspection glass)
				◇	8.3	Oil change →
○					8.4	Check and clean hydraulic oil cooler
					9	**Greasing points (marked in red)** →
		○			**10**	**Battery**
					10.1	Visual check
					11	**Brakes**
○					11.1	Perform visual and functional check of brakes and parking brakes before starting work
					11.2	Check accumulator valve
		○		◇	**12**	**Lighting unit / Air filter / Air conditioning unit**
					12.1	Perform functional check before starting work
		○			12.2	Check air filter
	○				12.3	Visual check air conditioning unit
					12.4	Check condensator for contamination
	○				12.5	Check tension of compressor drive belt

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 support (option) (1-2/arrow)],
  - the ball block valves for the working and auxiliary hydraulics (1-2/1 and 1-2/2) 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 (4-7/4) and by setting the drive direction switch (4-7/3) 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 pressure 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 guarantee.
- 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 in chapter 5.2.2 “Winter operation”.

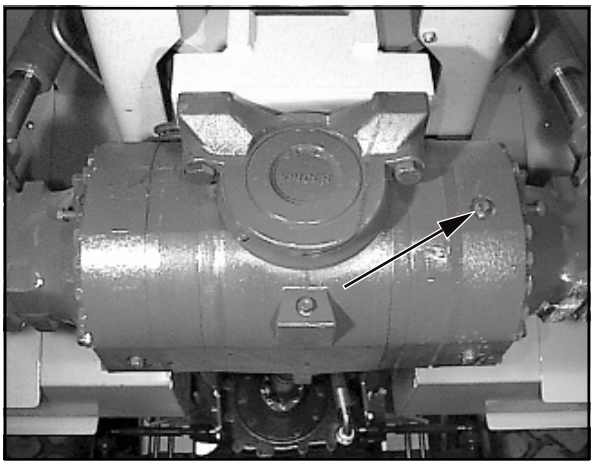


Figure 8-1

8.2 Maintenance work

8.2.1 Engine oil level check

See the operating instructions for the engine.

8.2.2 Oil level check for axles

8.2.2.1 Rear axle

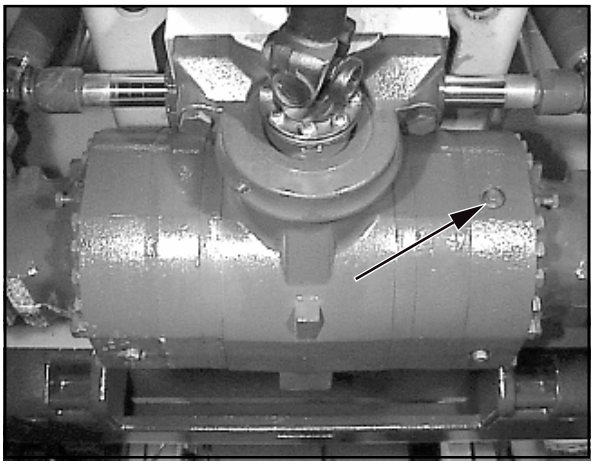


Figure 8-2

(1) Unscrew the plugs from the axle arch (8-1/arrow) or (8-2/arrow).

NOTE

- The oil level must reach the plug bores. If necessary, top up oil.
- Collect any oil that escapes.

(2) Screw in the plug again.

8.2.2.2 Planetary gear

Figure 8-3

(1) Move the loader until the marking line "OIL LEVEL" is horizontal and the plug is located above the top left of the marking line (8-3/arrow).

(2) Unscrew the plug.

NOTE

- The oil level must reach the plug bore. If necessary, top up oil.
- Collect any oil that escapes.

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

8.2.2.3 Front axle

(1) Unscrew the plugs from the axle arch (8-4/arrow) or (8-5/arrow).

NOTE

- The oil level must reach the plug bore. If necessary, top up oil.
- Collect any oil that escapes.

(2) Screw in the plug again.

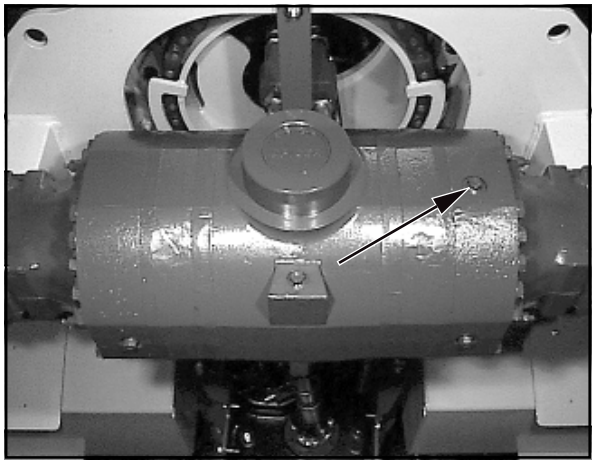


Figure 8-4

8.2.3 Oil level check (distribution gear)

8.2.3.1 Oil level check (distribution gear)

Type 1:

(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).

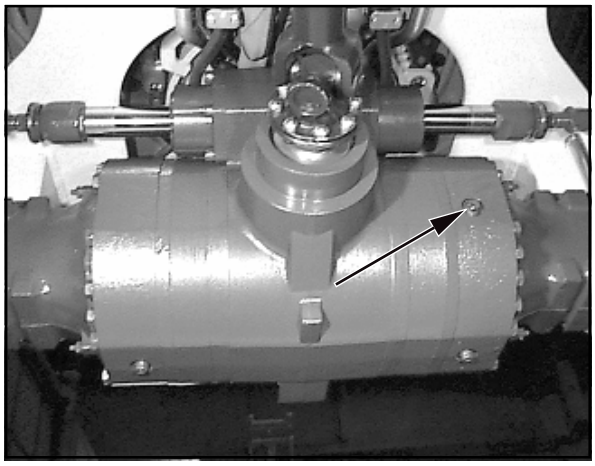


Figure 8-5

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.
  The filling bore of the upper oil compartment is accessible when you have loosened the union nut of the ventilation hose and pushed the hose aside.
- Collect any oil that escapes.

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

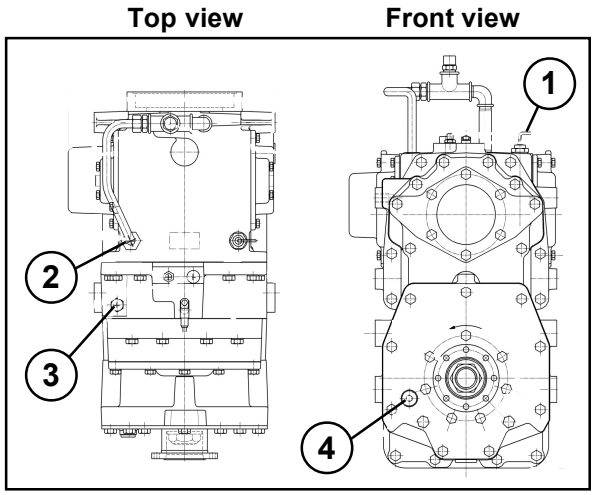


Figure 8-6

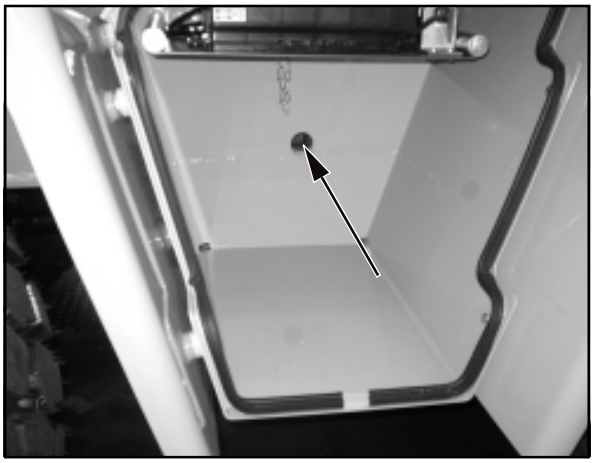


Figure 8-7

8.2.3.2 Oil level check distribution gear Type 2:

(1) Open battery and tool compartment on the left side of the loader.

(2) Move the bucket arm all the way to the left or right and remove the front cover plate below the driver's cabin in the swivel unit area.

(3) Unscrew check plug (8-7/arrow) and sealing plug (8-8/arrow) from the upper oil compartment (clutch compartment).

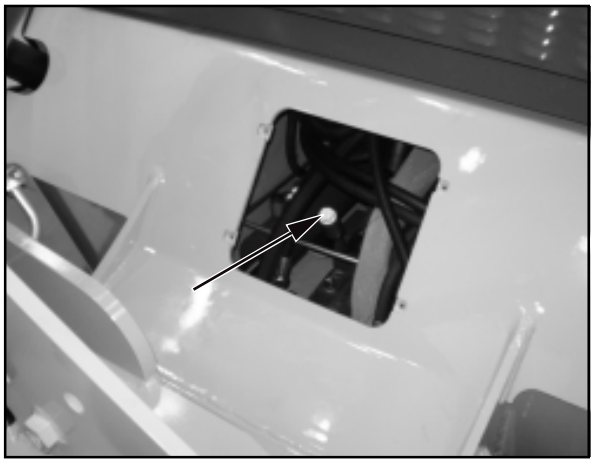


Figure 8-8

(4) Unscrew the plug (8-9/1 and 8-9/2) from the lower oil compartment (spur gear compartment).

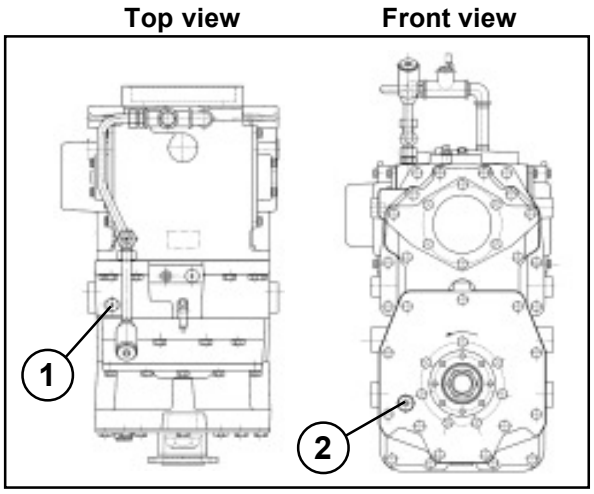


Figure 8-9

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 check hole (8-7/arrow) of the upper oil compartment or the sealing plug hole (8-9/2) of the lower oil compartment.
- If necessary, fill oil into oil filling hole 8-8/arrow (upper oil compartment) or 8-9/1 (lower oil compartment) until the oil reaches the required level.
- Collect any oil that escapes.

(5) Screw check plug (8-7/arrow) and sealing plugs (8-8/arrow, 8-9/1 and 8-9/2) back in with new sealing washers.

8.2.4 Oil level check of the hydraulic oil reservoir

(1) Park the loader in a level position.

(2) Move the bucket to its lowest position.

(3) Tilt the quick-change device and move out the locking bolts using the hand lever for the auxiliary hydraulics (4-6/5).

(4) Open the motor hood.

(5) Check the oil level in the view glass (8-10/arrow).

NOTE

- The oil level must be visible in the upper quarter of the view glass.
- If necessary, top up hydraulic oil via the filler neck (8-11/arrow). Use the special tool (flat open-ended spanner) to undo the lid of the hydraulic oil tank.

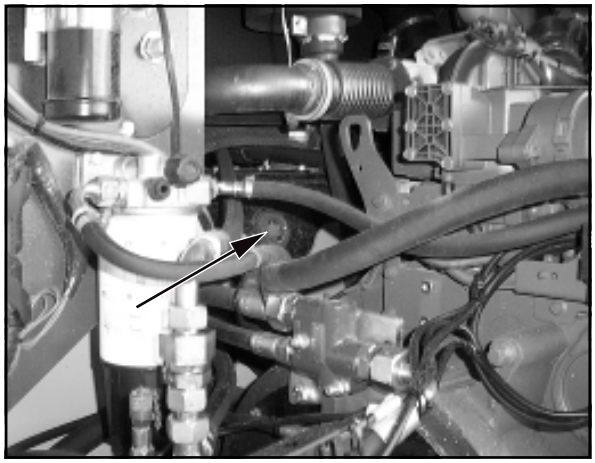


Figure 8-10

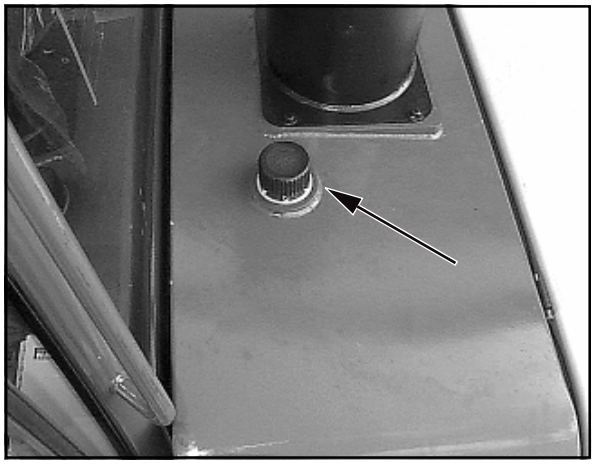


Figure 8-11

8.2.5 Oil change, engine

(1) Unscrew the maintenance flap from the motor protection (8-12/arrow).

(2) Place a sufficiently large oil drain pan underneath the axle.

(3) Open the motor hood.

(4) Unscrew the cover of the oil drain plug on the motor.

(5) Screw the drainage nozzle with hose from the tool box (4-1/13) to the oil drain plug.

(6) Remove the cover cap from the hose.

(7) Further procedures are to be found in the Engine Operating Manual.

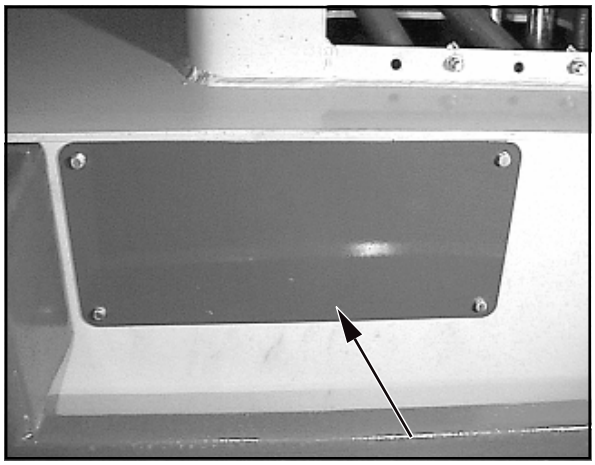


Figure 8-12

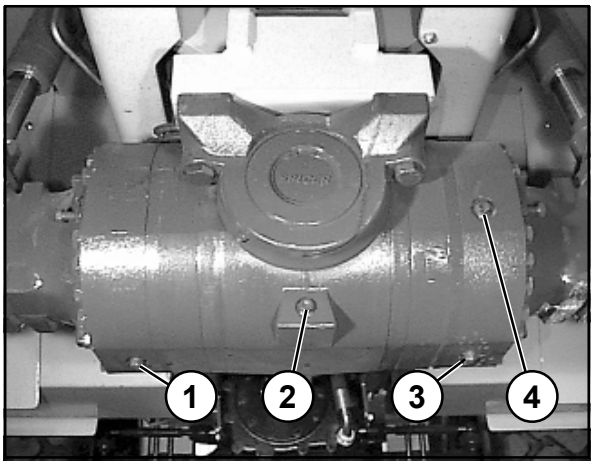


Figure 8-13

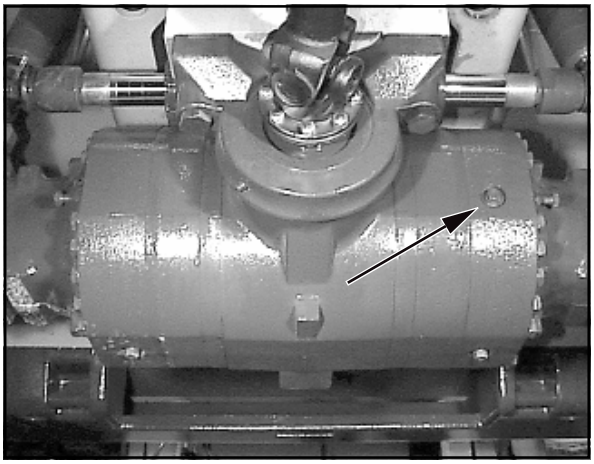


Figure 8-14


Figure 8-15

8.2.6 Oil change, axles

8.2.6.1 Rear axle

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

(2) Unscrew the plugs from the axle arch (8-13/1, 8-13/2, 8-13/3, 8-13/4 and 8-14/arrow) and drain the oil.

CAUTION

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

(3) Replace the plugs for the axle arch (8-13/1, 8-13/2 and 8-13/3).

(4) Fill oil into the plug bore of the axle arch (8-13/4 or 8-14/arrow) until the oil level reaches the opening.

NOTE

- Details regarding the amount of oil required are given in the maintenance plan (page 8-1).
- 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.
- The vent valve of the axle (8-15/arrow) must be free from dirt.

(5) Screw in the plugs of the axle arch (8-13/4 and 8-14/arrow) again.

8.2.6.2 Planetary gear

(1) Move the loader so that the plug (8-16/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!

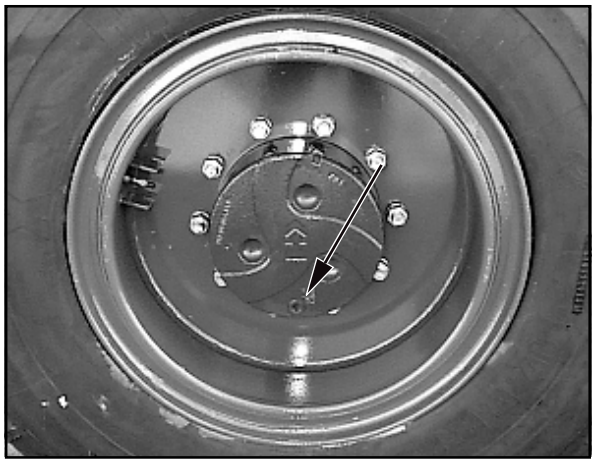


Figure 8-16

(4) Move the loader until the marking line "OIL LEVEL" is horizontal and the plug is located above the top left of the marking line (8-17/arrow).

(5) Fill in oil via the plug bore until the oil level reaches the opening.

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

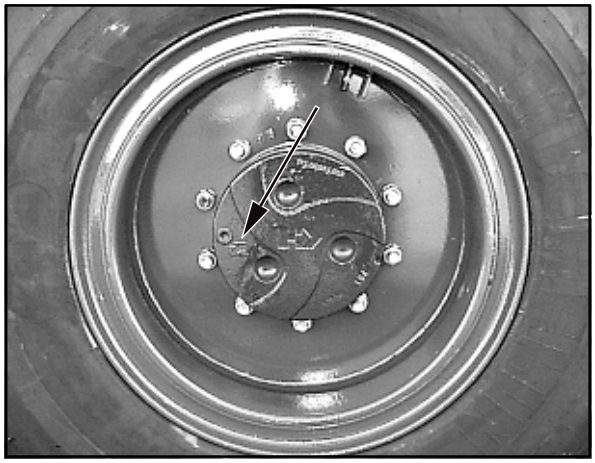


Figure 8-17

8.2.6.3 Front axle

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

(2) Remove the plugs from the axle arch (8-18/1, 8-18/2, 8-18/3, 8-18/4 and 8-19/Pfeil) and drain the oil.

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

(3) Screw the plugs (8-18/1, 8-18/2 and 8-18/3) back in.

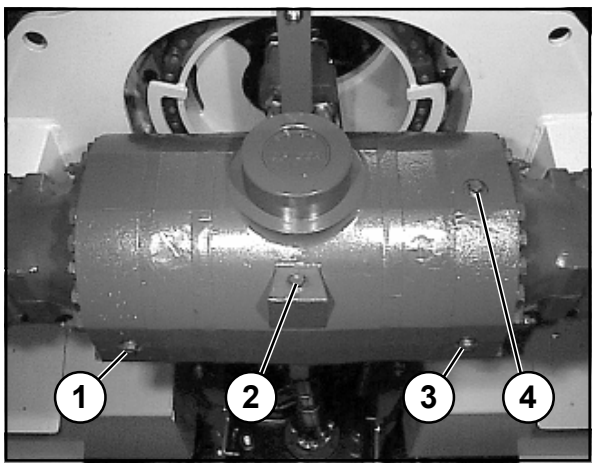


Figure 8-18

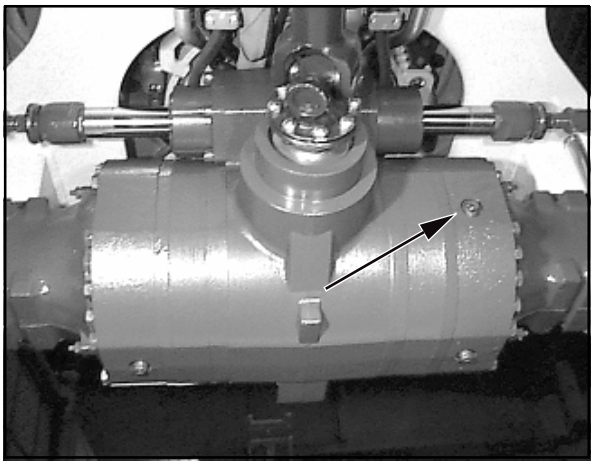


Figure 8-19

(4) Fill oil into the plug bore (8-18/4 or 8-19/arrow) until the oil level reaches the opening.

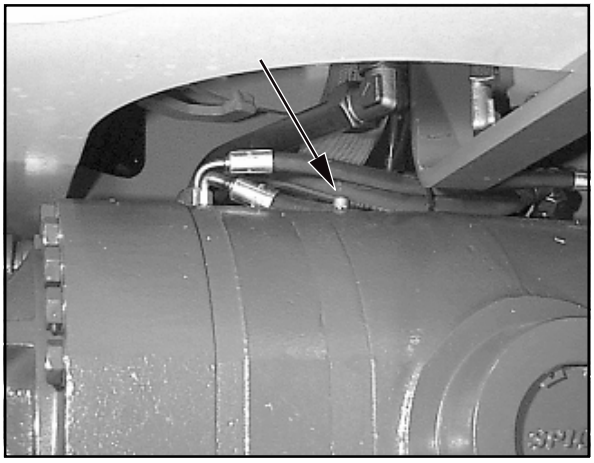


Figure 8-20

NOTE

- Details regarding the amount of oil required are given in the maintenance plan (page 8-1).
- 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.
- The vent valve of the axle (8-20/arrow) must be free from dirt.

(5) Screw the plugs (8-18/4 and 8-19/arrow) back in.

Top view

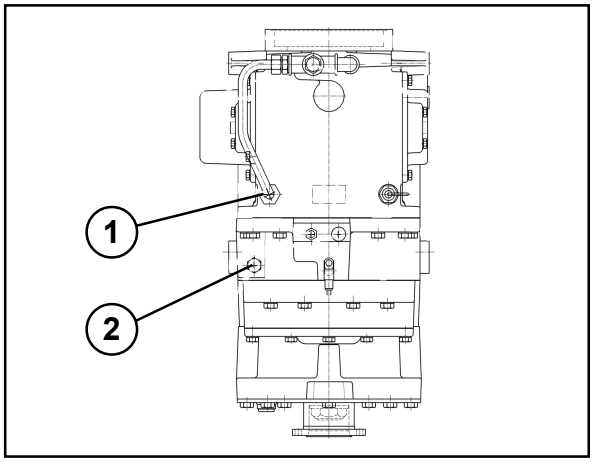


Figure 8-21

8.2.7 Oil change, distribution gear

8.2.7.1 Oil change, distribution gear

Type 1:

(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 (8-21/1 and 8-21/2) and drain plugs (8-22/2) and let oil drain from the upper oil compartment through the drain channel.

(5) Unscrew the drain (8-22/3) and inspection plugs (8-22/4) 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 plugs (8-22/2 and 8-22/3) back in with new gaskets.
(7) Fill in oil through the filling plug bore of the upper oil compartment (8-21/1) until the oil reaches the mark on the dipstick (8-22/1).
(8) Fill in oil through the filling plug bore of the lower oil compartment (8-21/2) until the oil reaches the lower edge of the oil inspection bore (8-22/4).

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 (8-21/1 and 8-21/2) and inspection plugs (8-22/4) back in with new gaskets.

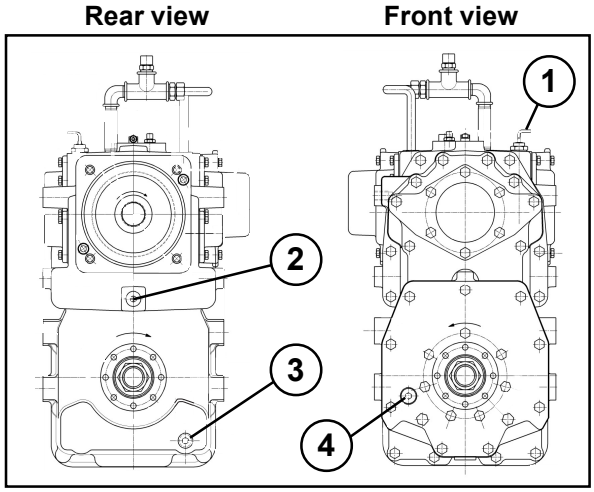


Figure 8-22

8.2.7.2 Oil change distribution gear Type 2:

(1) Open battery and tool compartment on the left side of the loader.
(2) Move the bucket arm all the way to the left or right and remove the front cover plate below the driver's cabin in the swivel unit area.
(3) Place a sufficiently large oil drain pan with a drain channel underneath.
(4) Unscrew check plug (8-7/arrow), filling plug (8-8/arrow) and drain plug (8-24/1) of the upper oil compartment (clutch compartment) and let the oil drain off via a drain channel.
(5) Unscrew check plug (8-24/3), filling plug (8-23/arrow) and drain plug (8-24/2) of the lower oil compartment (spur gear compartment) and let the oil drain off via a drain channel.

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

(6) Screw the plugs (8-24/1 and 8-24/2) back in with new gaskets.
(7) Fill in oil through the filling of the upper oil compartment (8-8/arrow) until the oil reaches the lower edge of the oil check hole (8-7/arrow).
(8) Fill in oil through the filling plug bore of the lower oil compartment (8-23/arrow) until the oil reaches the lower edge of the oil inspection bore (8-24/3).

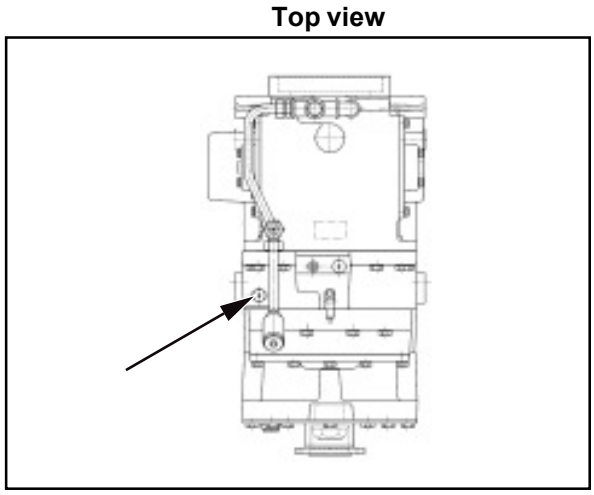


Figure 8-23

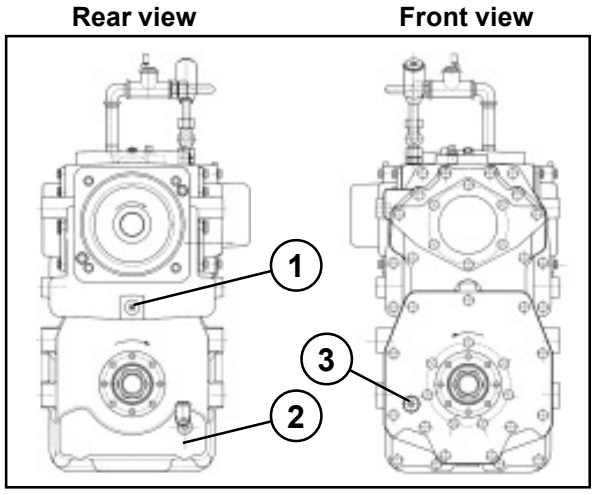


Figure 8-24

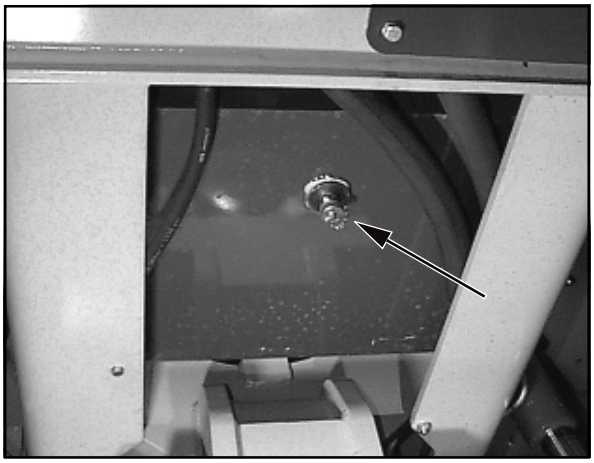


Figure 8-25

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.

(9) Screw filling plug (8-8/arrow) and check plug (8-7/arrow) of the upper oil compartment back in with new sealing washers.
(10) Screw filling plug (8-23/arrow) and check plug (8-24/3) of the lower oil compartment back in with new sealing washers.
(11) Move the loader for a short period of time (approx. 10 to 15 minutes) and then check the oil level (see chapter 8.2.3).

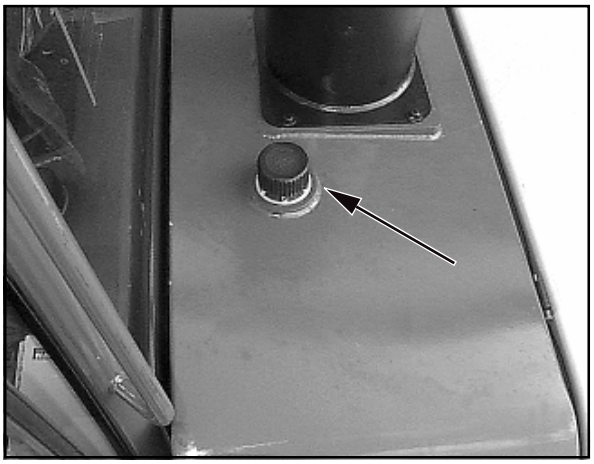


Figure 8-26

8.2.8 Oil change, hydraulic system

(1) Open the motor hood.
(2) Have an oil drain pan ready (for the minimum size, refer to section 11.11).
(3) Unscrew the covering flap of the oil drain plug (8-25/arrow).
(4) Screw the drainage nozzle with hose from the tool box (4-1/13) to the oil drain plug.
(5) Remove the cover cap from the hose.
(6) Drain the oil into the oil vessel.

CAUTION

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

(7) Fit the cover cap on the hose and unscrew the drainage nozzle with the hose.
(8) Screw the covering plate onto the oil drain plug.
(9) Change the hydraulic oil filter cartridge (section 8.2.9).
(10) Fill oil into the filler neck (8-26/arrow).

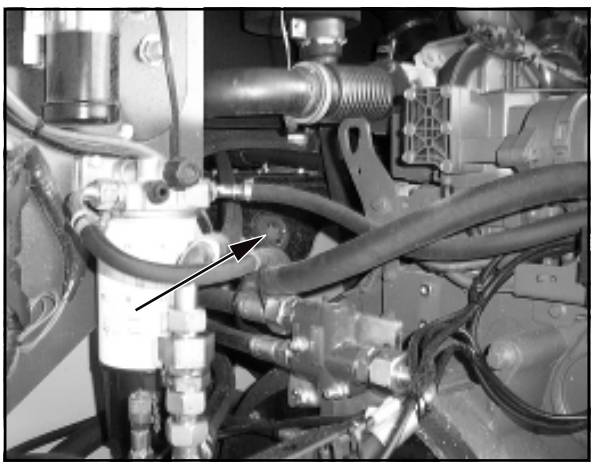


Figure 8-27

CAUTION

For 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.

(11) Check the oil level at the sight glass (8-27/arrow).

NOTE

- The bucket arm must be in the lowest position.
- The quick-change device must be tipped and the locking bolts extended with the hand lever for the auxiliary hydraulics (4-6/5).
- The oil level must be visible in the upper quarter of the view glass.

(12) Close the filler neck with the special tool (flat open-ended spanner).

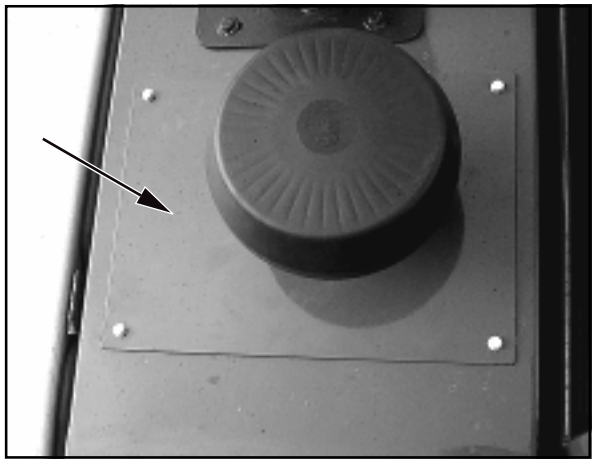


Figure 8-28

8.2.9 Replacing the suction return flow filter cartridge

CAUTION

Replace the filter insert according to the maintenance plan or when the clogging indicator lamp (4-10/13) 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) Unscrew the maintenance plate (8-28/arrow).
(2) Undo the hose clamp on the rubber bellows (8-29/3) and pull of the bellows.
(3) Loosen but do not unscrew both screws of the hydraulic oil filter lid (8-29/1).
(4) Lift out the hydraulic oil filter lid with the magnetic tube (8-30/2).
(5) Swing up the handle (8-30/3), pull out the filter cartridge (8-30/4) and replace it with a new one.

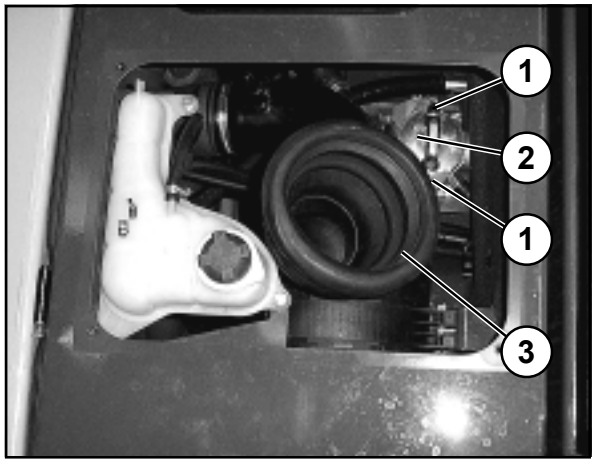


Figure 8-29

CAUTION

The used hydraulic oil filter cartridge must be disposed of in such a way that it does not cause pollution.

(6) Use a clean cloth to wipe the magnet tube (8-30/2) before fitting it back in.
(7) Refit the hydraulic oil filter lid with magnet tube and fasten it again.
(8) Connect the ventilation hose to the ventilation valve (8-29/2 or 8-30/1).
(9) Start the engine.
(10) 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.

(11) Close the ventilation valve.
(12) Push the rubber bellows (8-29/3) on the air filter hose and fasten it with the hose clamp.
(13) Screw the maintenance plate (8-28/arrow) back on.

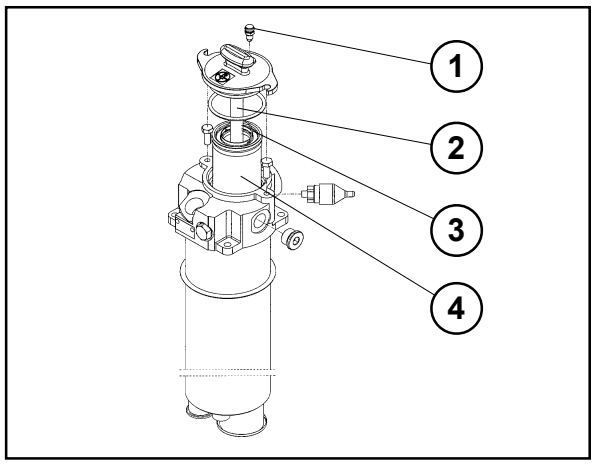


Figure 8-30

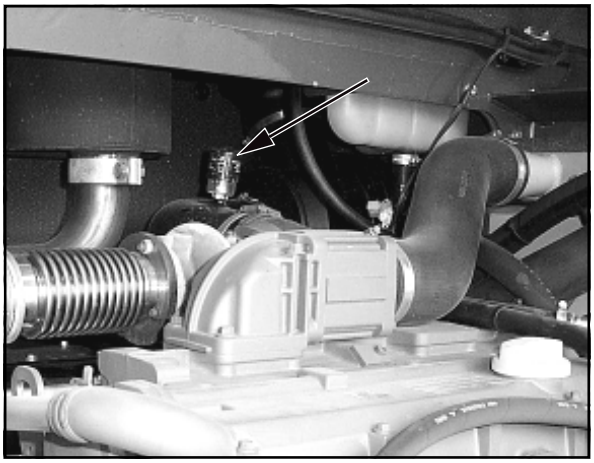


Figure 8-31

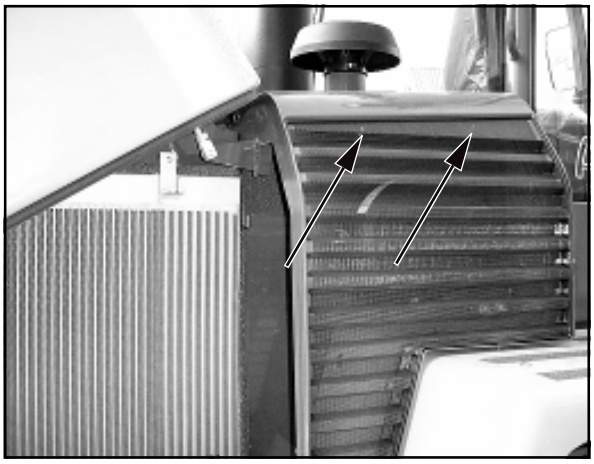


Figure 8-32

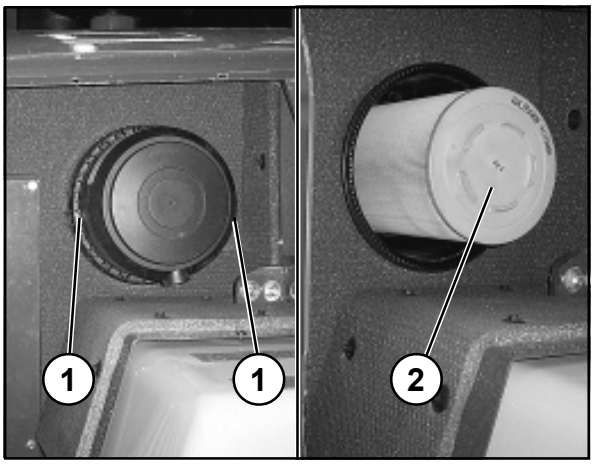


Figure 8-33

8.2.10 Maintaining/replacing the air filter

NOTE

Maintenance of the filter cartridge is necessary when either the red range is visible in the maintenance indicator (8-31/arrow) or after 12 months, whichever is sooner.

(1) Open the motor hood.

(2) Unscrew the two upper wing nuts on the maintenance grille (8-32/arrows). Push the grille outward at the upper section and lift it out.

(3) Loosen the two retaining clamps of the air filter lid (8-33/1) and remove the air filter lid.

(4) Pull out the filter cartridge (8-33/2) by carefully turning it back and forth.

(5) 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 car tridge 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.

(6) 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.

(7) Carefully insert the filter cartridge.

(8) 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.

(9) When the indicator field becomes red (8-31/arrow), push the reset button. The field becomes clear.

(10) Screw the maintenance plate (8-32/arrows) back on.

CAUTION

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

8.2.11 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 after 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 08/02/2010).
(2) Pierce the seal of the safety cartridge (8-34/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 8.2.10 (7)...(10).

Figure 8-34

8.2.12 Replacing the fuel filter

See the operating instructions for the engine.

8.2.13 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.
- The batteries are to be kept clean and dry.

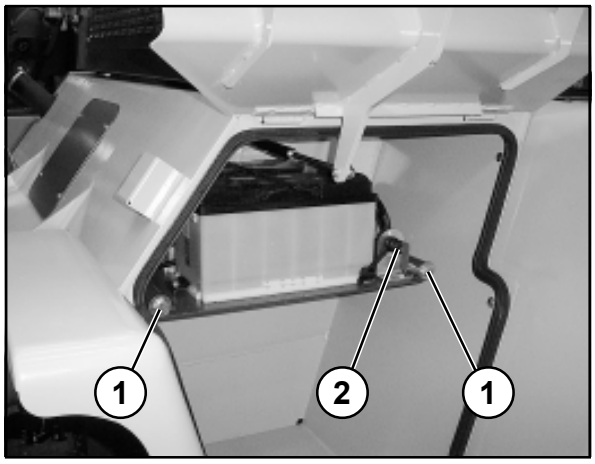


Figure 8-35

(1) Remove the main battery switch (8-35/2).
(2) Use a square spanner to open the maintenance flap.
(3) Unscrew both securing screws (size 19) (8-35/1) of the battery drawer.
(4) Pull out the drawer with the batteries until it stops.
(5) Loosen and remove the fastening screws (size 17) (8-36/1) of the battery holders.
(6) Loosen and remove the connecting cables (8-36/2) from the batteries (size 13).

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

(7) Remove the batteries and replace them.
(8) Lightly grease the terminals and battery poles with acid-free and acid-resistant grease before fastening.
(9) Installation is in reverse order.

DANGER
Make sure the fastenings are secure.

(10) Close the maintenance flap again.

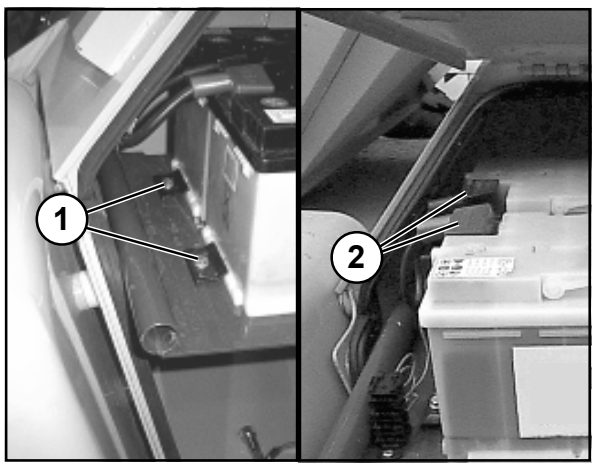


Figure 8-36

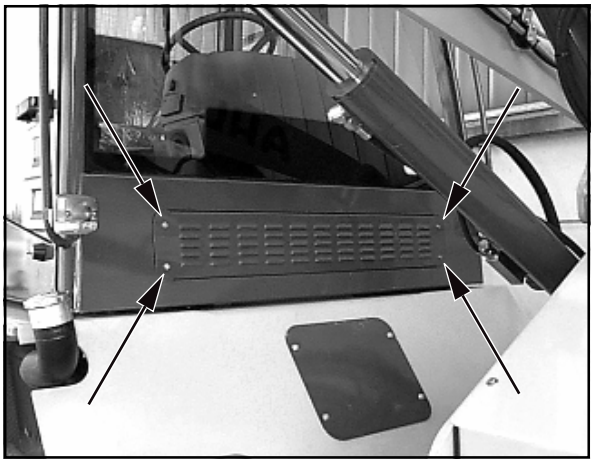


Figure 8-37

8.2.14 Maintaining/replacing the fresh air filter

(1) Lift and mechanically prop up the bucket arm [e.g. by inserting the bucket arm support (option) (1-1/arrows)], lower the bucket arm until it rests on the bucket arm support and swivel it all the way to right or left.

(2) Loosen the four fastening screws (8-37/arrows) of the heater cover and remove the cover.

(3) Remove the filter elements (8-38/arrows) and clean them with compressed air.

CAUTION

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

(4) Check the filter elements for damage.

NOTE

The filter elements must be replaced when they are damaged or every **1500 operating hours**.

(5) Insert the filter elements and install the heater cover.

Figure 8-38

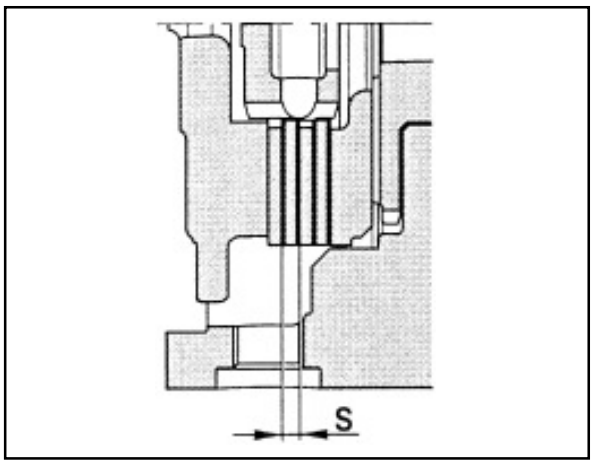


Figure 8-39

8.2.15 Checking the lining play

(1) Apply the parking brake (4-7/4).

(2) Unscrew the plugs (8-14/arrow and 8-19/arrow) from the axle arch.

(3) Use the special tool (feeler gauge) to check the dimension “S” between the center brake discs (8-39).

CAUTION

- “S” minimum: 5 mm.
- If necessary, replace the centre brake discs on both sides.

(4) Screw the plugs (8-14/arrow and 8-19/arrow) back in.

8.3 Lubrication points

NOTE

The grease points are marked in red on the loader.

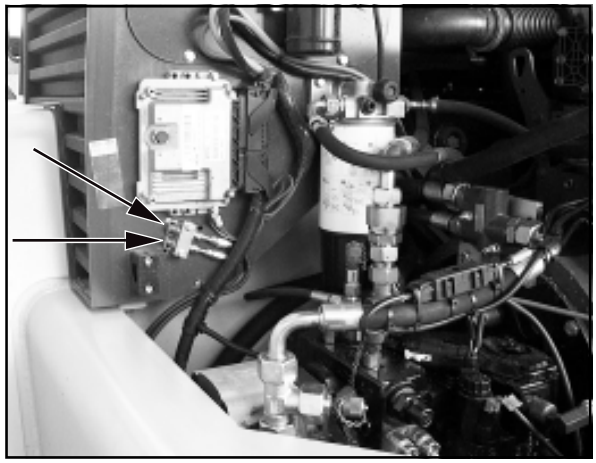


Figure 8-40

8.3.1 Rear axle pivot bolt (8-40/arrows)

CAUTION

- The rear axle pivot bolt must be lubricated **every 10 operating hours**.
- Release the rear axle from load before lubricating the rear axle pivot bolts.

8.3.2 Rear axle (8-41/arrows)

CAUTION

The spindle bolts must be lubricated every **50 operating hours**.

NOTE

Lubricate the top and the bottom of the axle spindle bolts on both sides of the axle.

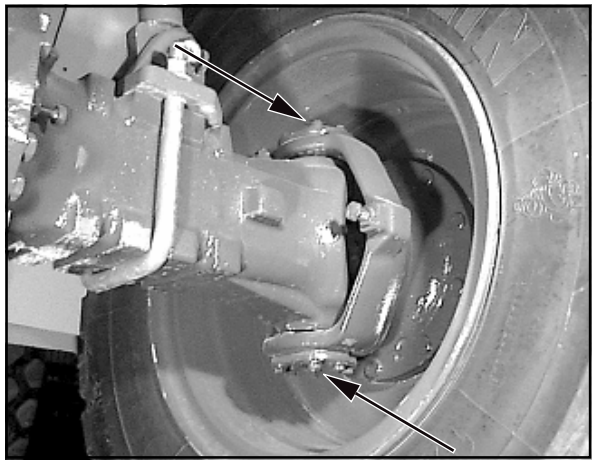


Figure 8-41

8.3.3 Front axle (8-42/arrows)

CAUTION

The spindle bolts must be lubricated every **50 operating hours**.

NOTE

Lubricate the top and the bottom of the axle spindle bolts on both sides of the axle.

Figure 8-42

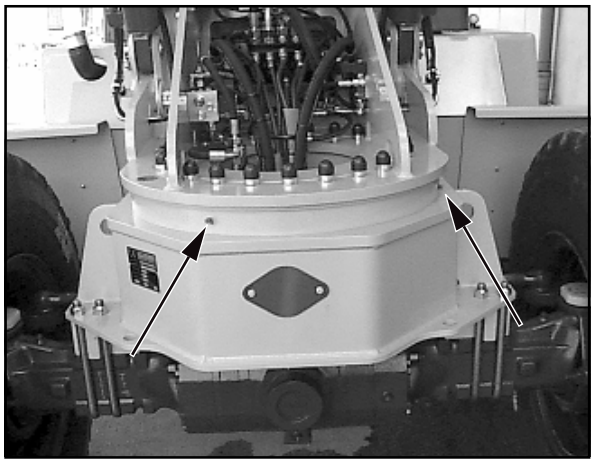


Figure 8-43

8.3.4 Ball bearing ring (8-43/arrows)

The grease filling is to avoid friction, and to provide sealing and protection against corrosion. Therefore, the bearing 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. Grease all four grease nipples in each position. 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/arrow)], apply the parking brake (4-7/4) and set the drive direction switch (4-7/3) to the "0" position.
- **During** swivelling, no-one may be present in the swivel area of the bucket arm.

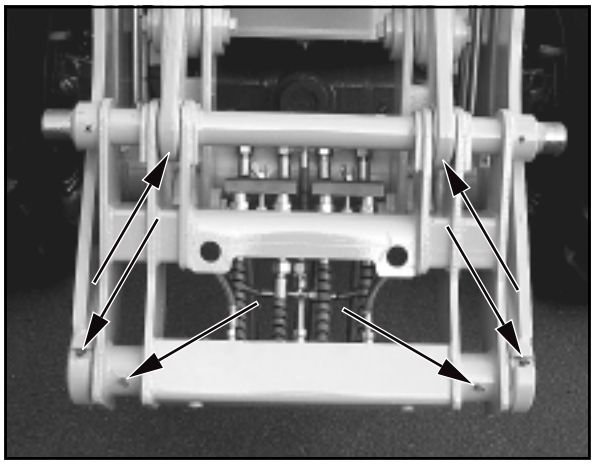


Figure 8-44

8.3.5 Bucket assembly

CAUTION

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

Figure 8-45

8.3.6 Driver's cabin doors (8-45/arrows)

CAUTION

The hinges of the driver's cabin doors must be lubricated **every 50 operating hours**.

NOTE

Lubricate the hinges on both doors of the driver's cabin.

8.3.7 Engine hood

CAUTION
The hinges of the engine hood (8-46/arrows) must be lubricated **every 50 operating hours**.

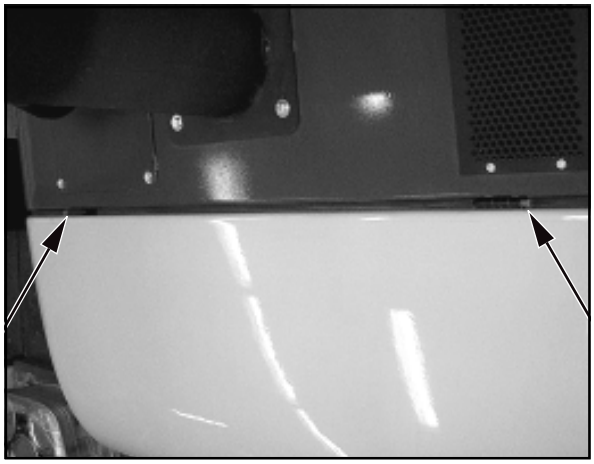


Figure 8-46

8.4 Oil lubrication points

8.4.1 Supporting valve actuator

CAUTION
The leverage of the supporting valve actuator must be lubricated with engine oil **every 50 operating hours**.

(1) Lift the bucket arm, insert the bucket arm support and swivel the bucket arm all the way to the right or to the left.

(2) Unscrew the four screws (8-47/arrows) that fix the maintenance plate and remove the plate.

Figure 8-47

NOTE
Lubricate only the visible surface of the spring housing piston rod (8-48/arrow).

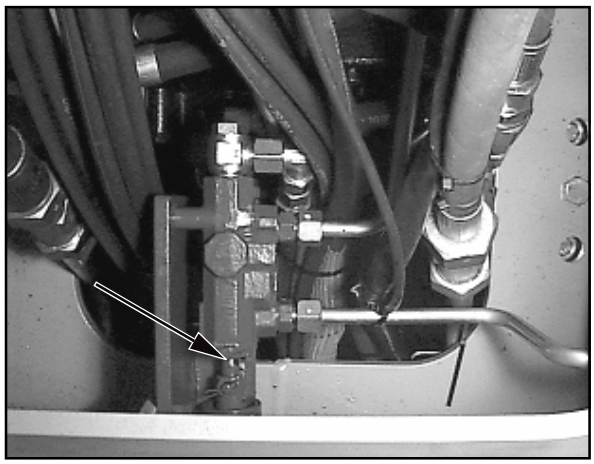


Figure 8-48

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 (4-7/3) is not in neutral position	Set the drive switch to the neutral position
The loader does not start	"Alpha max." gear stage is active and the inching speed control is set to "0".	Select a different gear stage or set the inching speed control to more than "0"
The bucket arm cannot be lifted/ lowered	Pressure-relief valve in servo valve is open	Remove and clean entire pressure-relief valve, readjust *
	Pilot valve for working hydraulics (4-7/2) is locked	Unlock pilot valve (1-2/1)
	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 telescope 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 cartridges
	Lack of oil in hydraulic oil reservoir	Top up oil
	Electrical connection at axial piston pump are not tight, are not connected or are oxidised	Establish or clean connections according to electric wiring diagram
	High-pressure valves soiled	Clean the high-pressure valves
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 blown	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!
	Increased pressure in basic machine	Turn off the engine and eliminate pressure from the lines by repeatedly moving the pilot valve for the auxiliary hydraulics (4-9/5) to and fro.

9.1 Diagnostic code (engine error code)

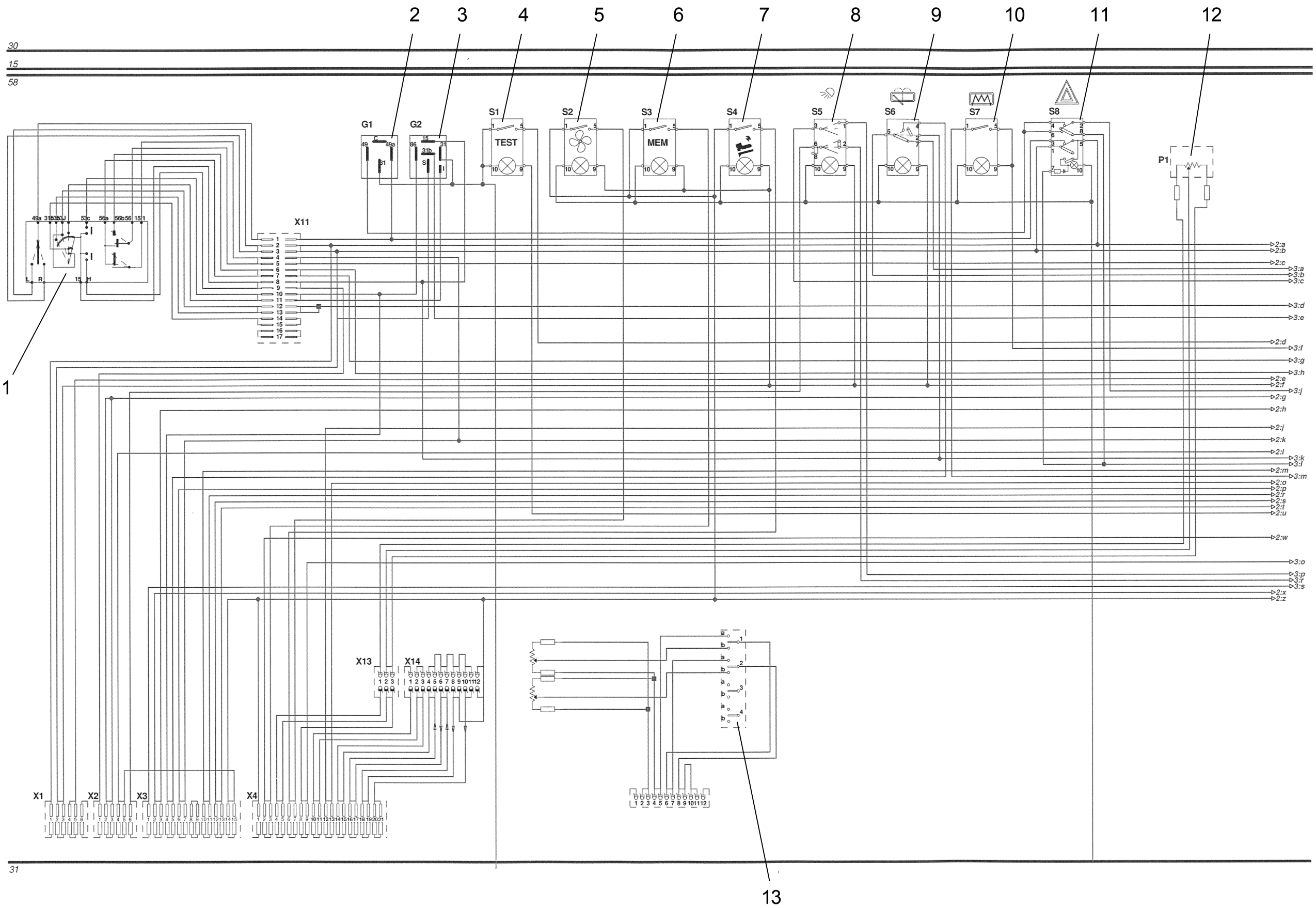
Flash code			Function / component	Error
Short 0.4 s	Long 0.8 s	Short 0.4 s		
1	2	3	Output to coolant temperature indicator	Faulty signal, controller overtemperature
1	2	6	Hand throttle	Faulty/implausible signal
1	2	8	Intake air temperature sensor	Faulty signal
1	3	3	Transmission oil temperature sensor	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

Circuit diagrams

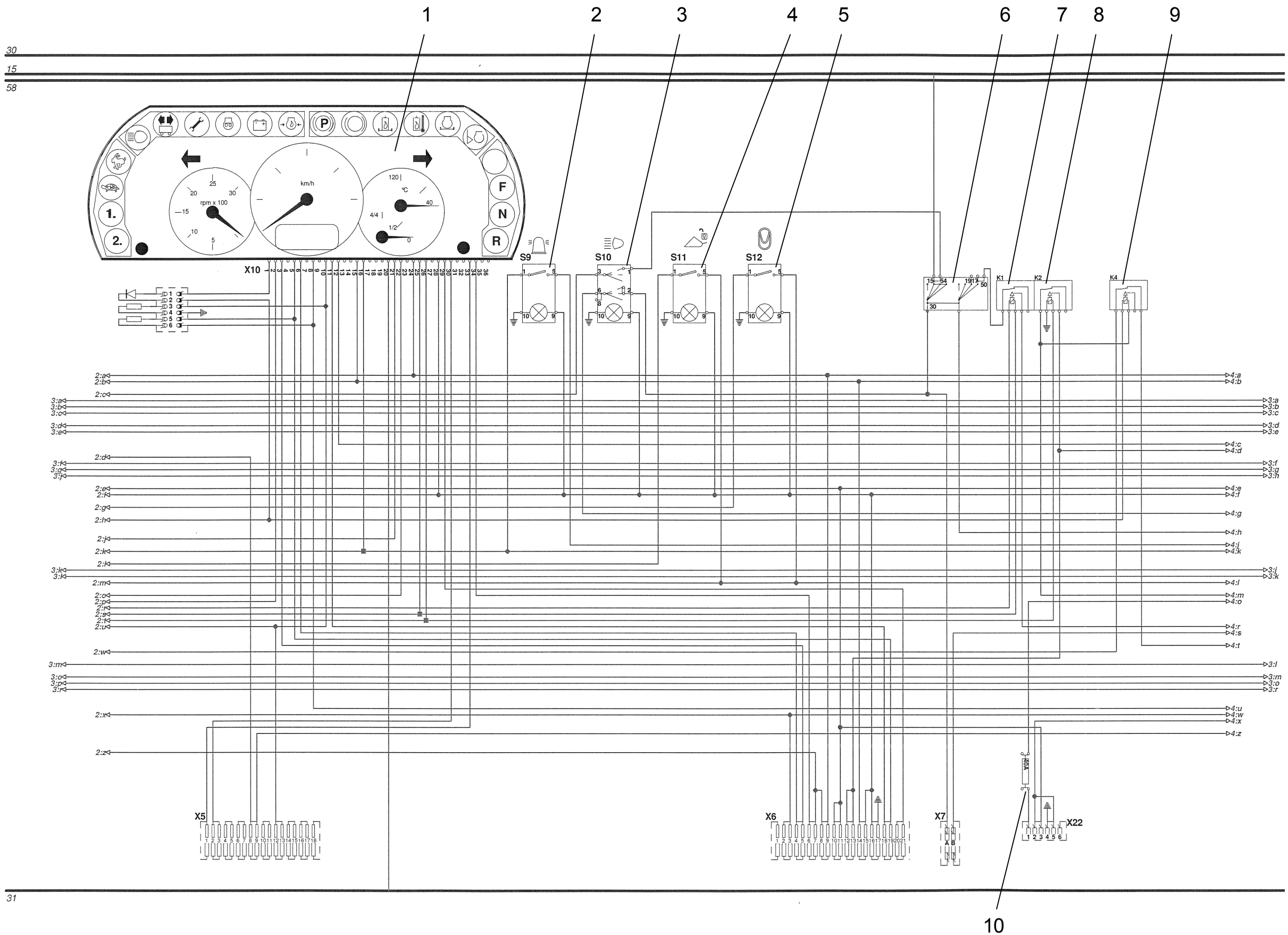
10.1 - 04.2008 Elektrik-Schaltplan/Schéma électrique/Wiring diagramm/Elektrisch schakelschema/Elektrisk kopplingsschema



10.1 Electric wiring diagram

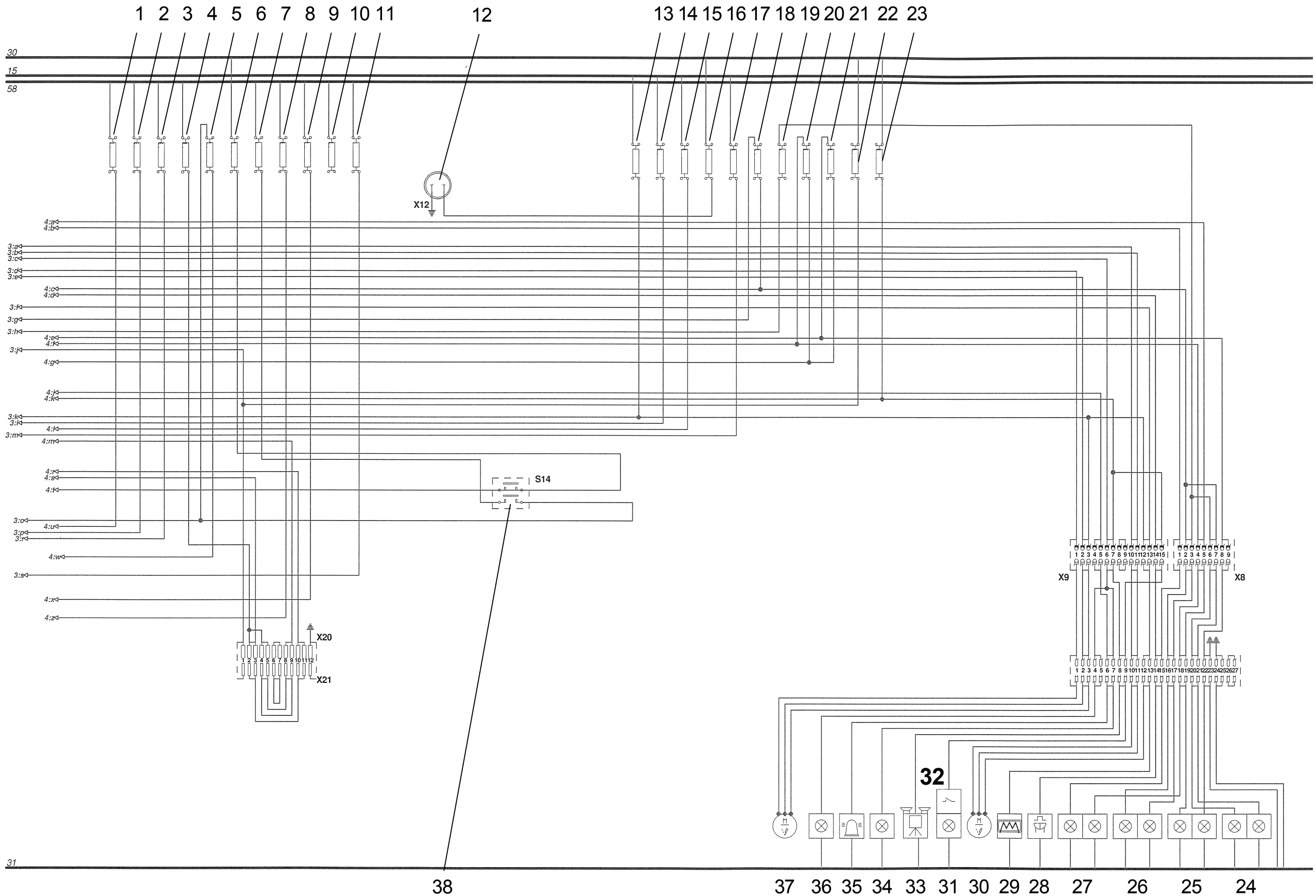
Sheet/item	Designation
1-5/1	Steering column switch
1-5/2	Turn signal relay
1-5/3	Interval timer
1-5/4	Actuator (pushbutton): engine diagnosis
1-5/5	Actuator (pushbutton): fan reversal (option)
1-5/6	Actuator (pushbutton): TEACH function (option)
1-5/7	Actuator: ECO mode function
1-5/8	Actuator: Working lights
1-5/9	Actuator: rear window wiper/washer
1-5/10	Actuator: Rear window heater
1-5/11	Actuator: Hazard flasher
1-5/12	Inching speed control
1-5/13	Switchover hand throttle/foot throttle

10.1 - 04.2008 Elektrik-Schaltplan/Schéma électrique/Wiring diagramm/Elektrisch schakelschema/Elektrisk kopplingsschema



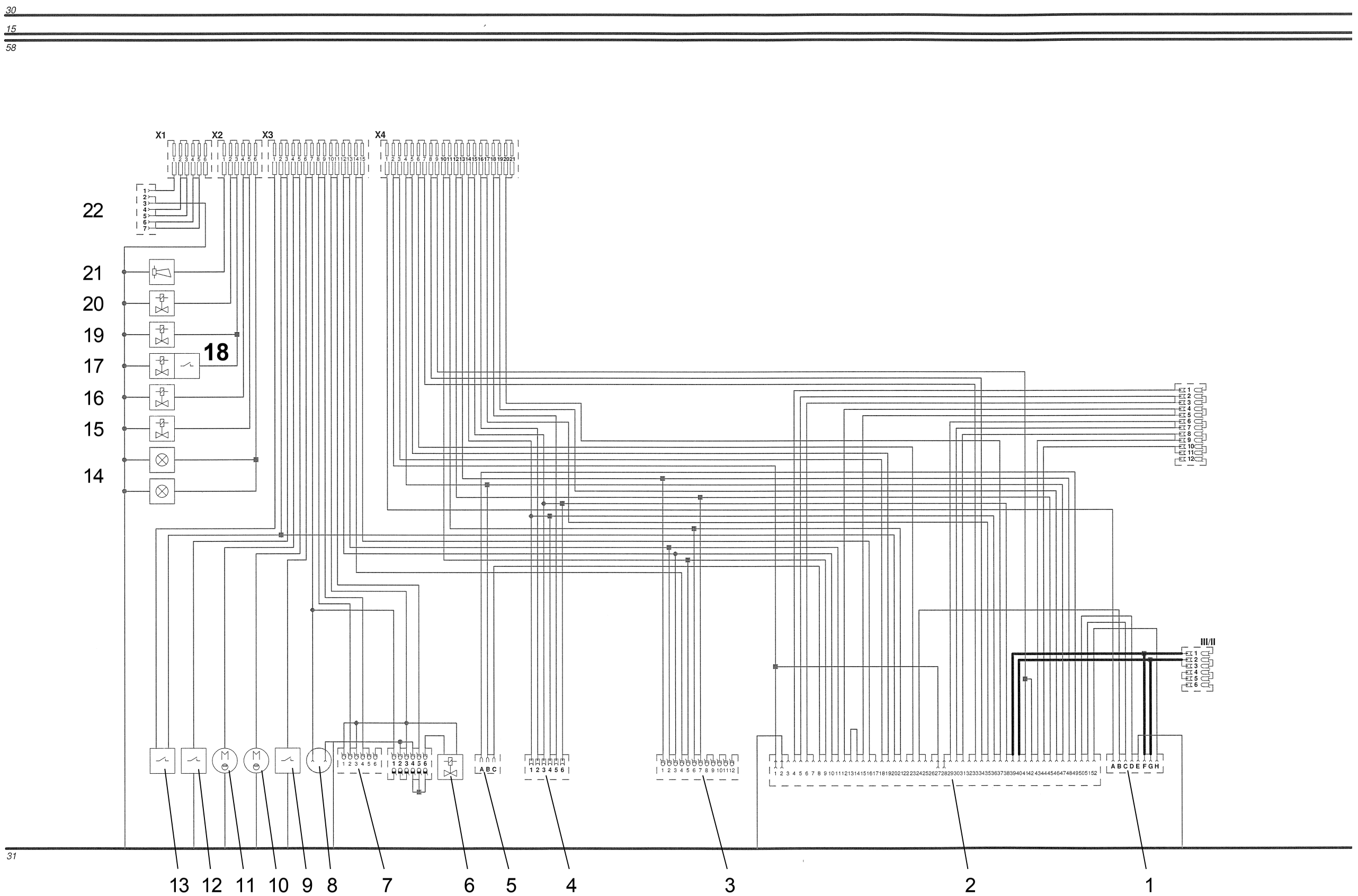
Sheet/item	Designation
2-5/1	Multifunction panel
2-5/2	Actuator: warning beacon (opt.)
2-5/3	Actuator: road lights
2-5/4	Actuator (pushbutton): quick-change device release
2-5/5	Actuator: Lifting device suspension
2-5/6	Start switch
2-5/7	Starter interlock relay
2-5/8	Relay reversing light/reversing buzzer
2-5/9	Traction drive cut-out relay
2-5/10	Maxi fuse (air conditioner)

10.1 - 04.2008 Elektrik-Schaltplan/Schéma électrique/Wiring diagramm/Elektrisch schakelschema/Elektrisk kopplingsschema



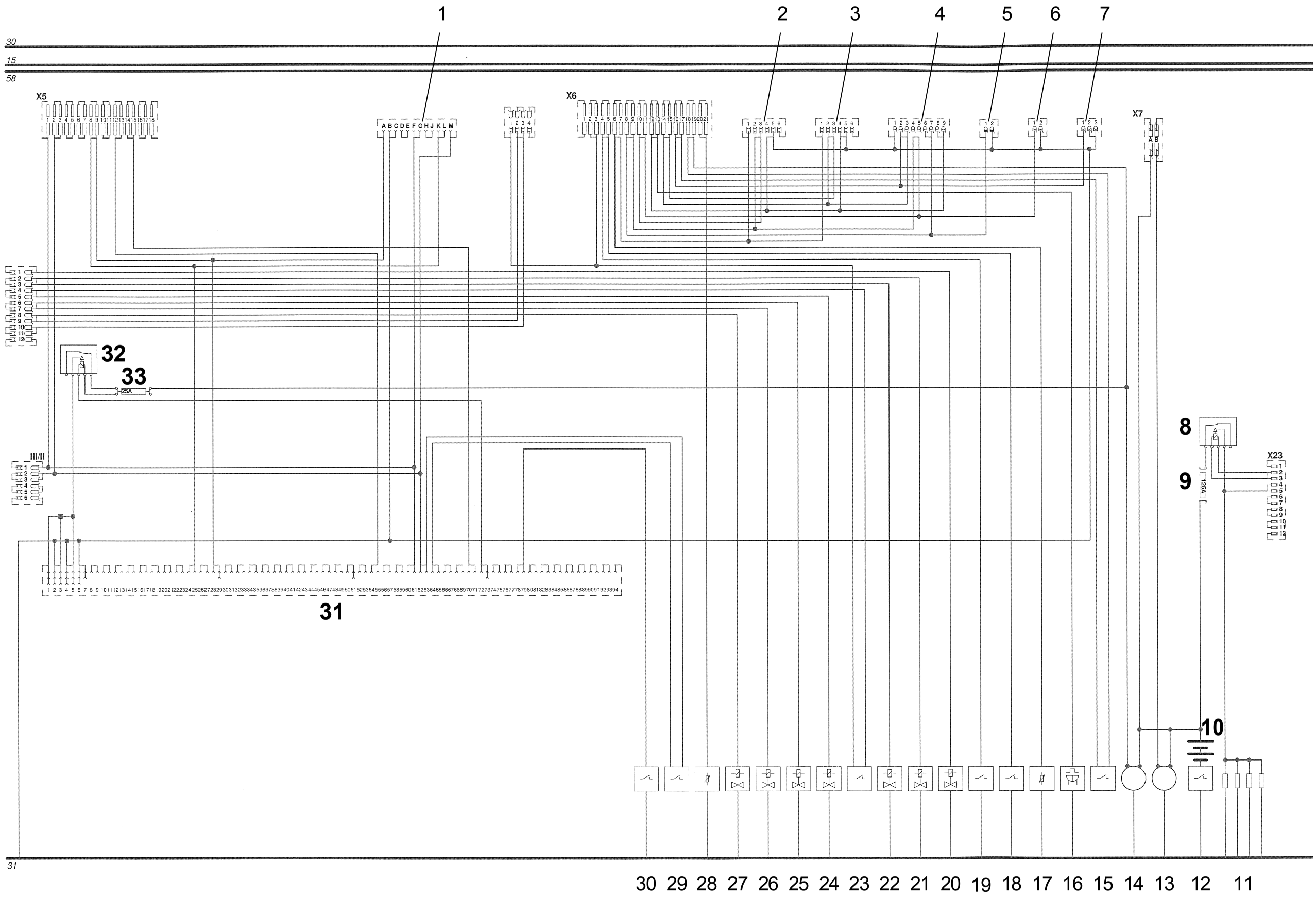
Sheet/item	Designation
3-5/1	Fuse (Figure 4-9b/1)
3-5/2	Fuse (Figure 4-9b/2)
3-5/3	Fuse (Figure 4-9b/3)
3-5/4	Fuse (Figure 4-9b/4)
3-5/5	Fuse (Figure 4-9b/5)
3-5/6	Fuse (Figure 4-9b/6)
3-5/7	Fuse (Figure 4-9b/7)
3-5/8	Fuse (Figure 4-9b/8)
3-5/9	Fuse (Figure 4-9b/9)
3-5/10	Fuse (Figure 4-9b/10)
3-5/11	Fuse (Figure 4-9b/11)
3-5/12	2-pole socket in instrument panel
3-5/13	Fuse (Figure 4-9a/1)
3-5/14	Fuse (Figure 4-9a/2)
3-5/15	Fuse (Figure 4-9a/3)
3-5/16	Fuse (Figure 4-9a/4)
3-5/17	Fuse (Figure 4-9a/5)
3-5/18	Fuse (Figure 4-9a/6)
3-5/19	Fuse (Figure 4-9a/7)
3-5/20	Fuse (Figure 4-9a/8)
3-5/21	Fuse (Figure 4-9a/9)
3-5/22	Fuse (Figure 4-9a/10)
3-5/23	Fuse (Figure 4-9a/11)
3-5/24	Driving light, left
3-5/25	Indicator/position lamp, left
3-5/26	Driving light, right
3-5/27	Indicator/position lamp, right
3-5/28	Reversing warning buzzer
3-5/29	Rear window heater
3-5/30	Wiper motor, rear
3-5/31	Interior lighting
3-5/32	Switch for interior lighting
3-5/33	Radio (option)
3-5/34	Working lights, left
3-5/35	Warning beacon (opt.)
3-5/36	Working lights, right
3-5/37	Wiper motor, front
3-5/38	Emergency stop switch

10.1 - 04.2008 Elektrik-Schaltplan/Schéma électrique/Wiring diagramm/Elektrisch schakelschema/Elektrisk kopplingsschema



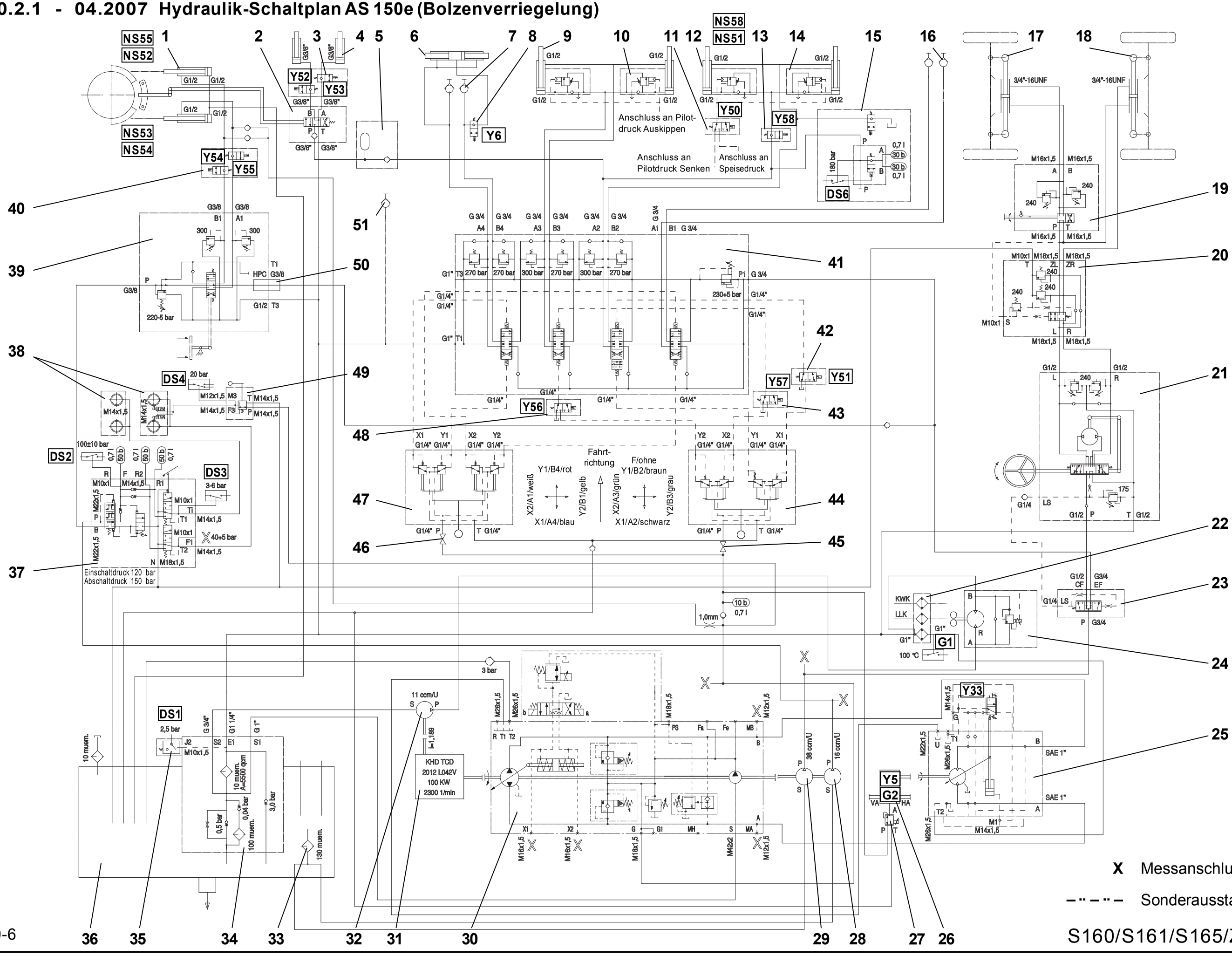
Sheet/item	Designation
4-5/1	Connector, traction drive diagnosis
4-5/2	Traction drive controller
4-5/3	Connector, multifunction lever right
4-5/4	Connector, accelerator
4-5/5	Pressure sensor, inching
4-5/6	Valve, working hydraulics cut-off
4-5/7	Connector, multifunction lever left
4-5/8	2-pole socket (seat console)
4-5/9	Switch, service brake failure
4-5/10	Washer motor, rear
4-5/11	Washer motor, front
4-5/12	Parking brake switch
4-5/13	Brake light switch
4-5/14	Working lights, bucket arm
4-5/15	Valve, coupling/transmission
4-5/16	Valve, quick-change device release
4-5/17	Memory valve, lifting device suspension (option)
4-5/18	Switch, memory valve, lifting device suspension switch (option)
4-5/19	Reservoir valve, lifting device suspension (option)
4-5/20	Combination valve: pipe break protection / lifting device suspension (option)
4-5/21	Signal horn
4-5/22	7-pole socket

10.1 - 04.2008 Elektrik-Schaltplan/Schéma électrique/Wiring diagramm/Elektrisch schakelschema/Elektrisk kopplingsschema



Sheet/item	Designation
5-5/1	Connector, engine diagnosis
5-5/2	Connector, tail light, left
5-5/3	Connector, tail light, right
5-5/4	Connector, socket, rear
5-5/5	Connector, 3rd brake light
5-5/6	Connector, engine compartment lighting
5-5/7	Connector, license plate lighting
5-5/8	Glow start system relay
5-5/9	Maxi fuse, glow start system
5-5/10	Batteries
5-5/11	Glow plugs
5-5/12	Battery main switch
5-5/13	Starter
5-5/14	Alternator
5-5/15	Switch, low cooling water
5-5/16	Reversing warning buzzer
5-5/17	Dip pipe sensor
5-5/18	Switch, hydraulic oil temperature
5-5/19	Switch, hydraulic oil filter
5-5/20	Proportional valve, fan
5-5/21	Valve, parking brake
5-5/22	Valve, fan reversal
5-5/23	Switch, engine oil temperature
5-5/24	Valve, reverse drive direction
5-5/25	Valve, forward drive direction
5-5/26	Valve, hydro motor
5-5/27	Pressure reduction valve
5-5/28	Speed transducer, hydro motor
5-5/29	Switch, water in fuel
5-5/30	Level switch, water low
5-5/31	Engine controller
5-5/32	Relay, engine controller
5-5/33	Fuse, engine controller

10.2.1 - 04.2007 Hydraulik-Schaltplan AS 150e (Bolzenverriegelung)

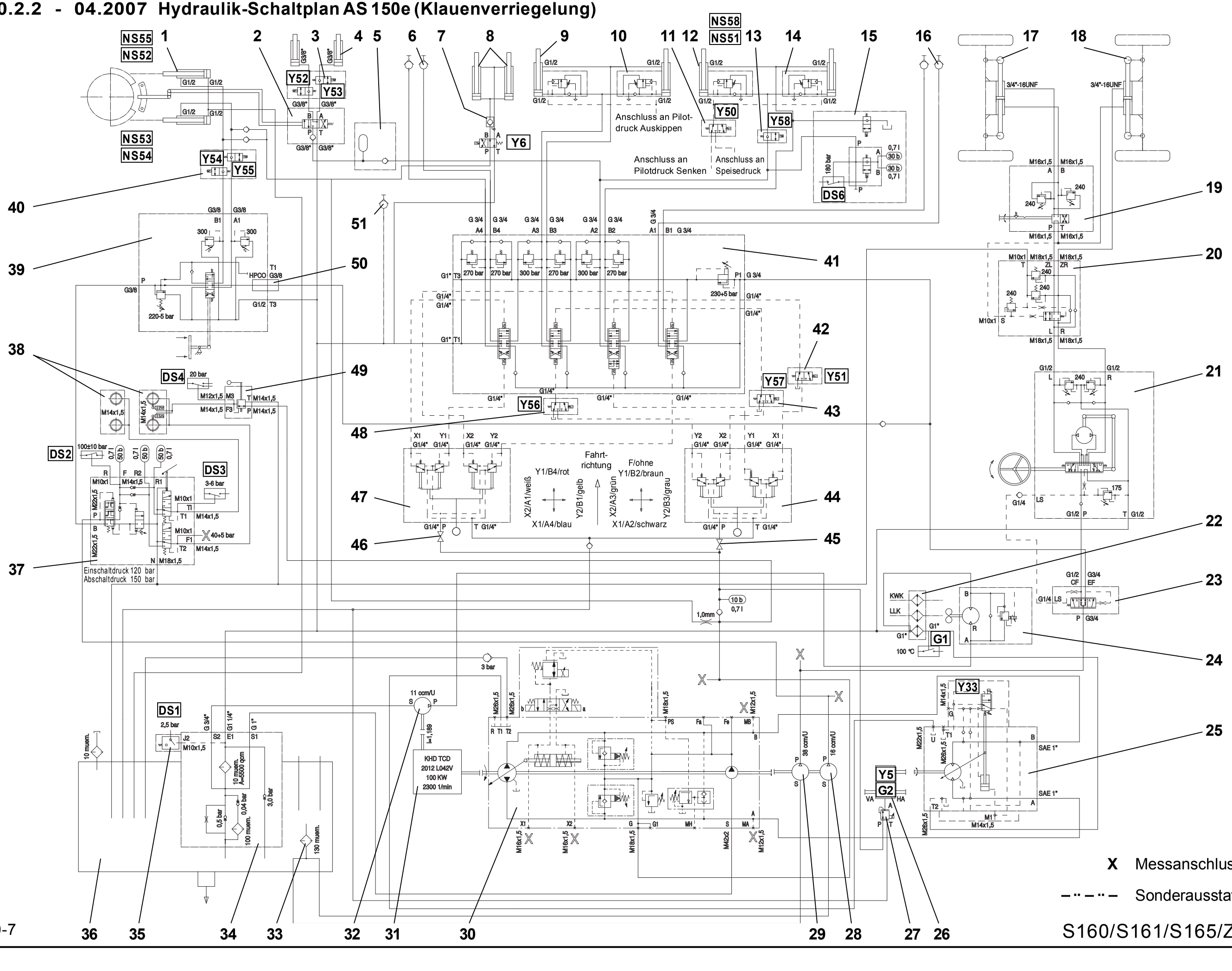


10.2 Hydraulic diagram

10.2.1 Hydraulic diagram AS 150e (bolt lock)

Item	Designation
01	Swivel cylinder DW 100/45/785/1095
02	Supporting valve
03	Leakage-free lock
04	Supporting cylinder EW 60/210/518
05	Reservoir system, pipe break protection (option)
06	Locking cylinder GDW 63/40/70/382
07	Auxiliary hydraulics, external circuit
08	Electrohydraulic interlock for quick-change device
09	Tip cylinder DW 90/55/540/964
10	Pipe break protection, tip cylinder (option)
11	Combination valve: pipe break protection / lifting device suspension (option)
12	Lift cylinder DW 100/60/704/1146
13	Lowering restriction valve (AKE) (SA)
14	Pipe break protection, lift cylinder (option)
15	lifting device suspension (option)
16	Auxiliary hydraulics, left circuit
17	Steering cylinder front GDW100/50/180
18	Steering cylinder rear GDW100/50/180
19	Steering switching valve
20	Blocking valve (option)
21	Steering unit, 240/100 cm^3/rev.
22	Combination cooler/oil section
23	Priority valve
24	Fan motor 15 cm^3
25	Drive motor A6VM 140 EP2
26	Power shift transmission
27	Gear shift valve
28	Gear-type pump 16 cm^3/rev.
29	Gear-type pump 38 cm^3/rev.
30	Drive pump A4VG 90 DE2D1
31	Drive motor
32	Gear-type pump 11 cm^3/rev.
33	Suction strainer
34	Combined suction and return flow filter
35	Electric contamination indicator
36	Hydraulic oil tank
37	Brake central (option)
38	Lamella brake
39	1-way valve
40	Hydraulic swivel restriction (option)
41	4-way valve
42	Lifting height restriction (option)
43	Hydraulic tip lock (option)
44	Control pressure transmitter, working hydraulics
45	Shut-off valve, working hydraulics
46	Shut-off valve, auxiliary hydraulics
47	Control pressure transmitter, auxiliary hydraulics
48	Hydraulic dump restriction (option)
49	Parking brake valve
50	High-pressure transition
51	Unpressurised return line (option)

10.2.2 - 04.2007 Hydraulik-Schaltplan AS 150e (Klauenverriegelung)



X Messanschluss

– ·· – ·· – Sonderausstattung

10.2.2 Hydraulic diagram AS 150e (claw lock)

Item	Designation
01	Swivel cylinder DW 100/45/785/1095
02	Supporting valve
03	Leakage-free lock
04	Supporting cylinder EW 60/210/518
05	Reservoir system, pipe break protection (option)
06	Auxiliary hydraulics, external circuit
07	Electrohydraulic interlock for quick-change device
08	Locking cylinder
09	Tip cylinder DW 90/55/540/964
10	Pipe break protection, tip cylinder (option)
11	Combination valve: pipe break protection / lifting device suspension (option)
12	Lift cylinder DW 100/60/704/1146
13	Lowering restriction valve (AKE) (SA)
14	Pipe break protection, lift cylinder (option)
15	lifting device suspension (option)
16	Auxiliary hydraulics, left circuit
17	Steering cylinder front GDW100/50/180
18	Steering cylinder rear GDW100/50/180
19	Steering switching valve
20	Blocking valve (option)
21	Steering unit, 240/100 cm^3/rev.
22	Combination cooler/oil section
23	Priority valve
24	Fan motor 15 cm^3
25	Drive motor A6VM 140 EP2
26	Power shift transmission
27	Gear shift valve
28	Gear-type pump 16 cm^3/rev.
29	Gear-type pump 38 cm^3/rev.
30	Drive pump A4VG 90 DE2D1
31	Drive motor
32	Gear-type pump 11 cm^3/rev.
33	Suction strainer
34	Combined suction and return flow filter
35	Electric contamination indicator
36	Hydraulic oil tank
37	Brake central (option)
38	Lamella brake
39	1-way valve
40	Hydraulic swivel restriction (SA)
41	4-way valve
42	Lifting height restriction (option)
43	Hydraulic tip lock (option)
44	Control pressure transmitter, working hydraulics
45	Shut-off valve, working hydraulics
46	Shut-off valve, auxiliary hydraulics
47	Control pressure transmitter, auxiliary hydraulics
48	Hydraulic dump restriction (option)
49	Parking brake valve
50	High-pressure transition
51	Unpressurised return line (option)

Technical data (loader)

11 Technical data (loader)

NOTE

The technical data refer to 17.5-25 12 PR tyres.

11.1 Loader

- Height	3100 mm
- Width	2460 mm
- Wheelbase	2280 mm
- Track width	1980 mm
- Operating weight w/o attachment	10455 kg
- Ground clearance	
- Differential	440 mm
- Turning radius (across the rear with four-wheel steering)	4350 mm
- Steering angle	+/- 35 °
- Swinging angle	+/- 10 °
- Embankment angle	33 °
- Climbing ability with payload	
due to the permitted slanting of the engine, limited to	60 %
- Perm. towed load at max. drawbar load of 250 kg	
- braked	3500 kg
- unbraked	750 kg
- Max. lifting capacity	69 kN
- Max. thrust force	90 kN

11.2 Engine

- Water cooled intercooler turbo diesel engine	
- 4 cylinders, 4-stroke, direct injection	
- Displacement	4038 cm³
- Performance acc. to ISO 14396	100 kW at 2300 rpm
- Emissions class according to EU-RL 97/68	
- Cooling system	Water
- Total coolant	approx. 16 l
- Anti-freeze	8 l

11.3 Starter

-	3.0 kW / 24 V

11.4 Alternator

-	55 A, 28 V

11.5 Hydrostatic drive motor

“20 km/h” variant

Alpha max. (turtle symbol)	0.....4 km/h
- [with inching speed control (option)	0.....12 km/h]
1st gear	0 ....12 km/h
2nd gear	0.....20 km/h

“25 km/h” variant

Alpha max. (turtle symbol)	0.....4 km/h
- [with inching speed control (option)	0.....12 km/h]
1st gear	0 ....12 km/h
2nd gear	0.....25 km/h

“40 km/h” variant

Alpha max. (turtle symbol)	0.....4 km/h
- [with inching speed control (option)	0.....12 km/h]
1st gear	0 ....12 km/h
2nd gear	0.....40 km/h

11.6 Axle loads

- Perm. axle loads acc. to StVZO	- front	7000 kg
	- rear	7500 kg
- Perm. total weight acc. to StVZO		11500 kg

11.7 Tyres

The following tyres are permitted:

- Size		17.5 - 25
- Tyre pressure	- front	3.0 bar
	- rear	3.0 bar
- Size		17.5 R 25
- Tyre pressure	- front	3.0 bar
	- rear	3.0 bar
- Size		455/70 R 24
- Tyre pressure	- front	4.5 bar
	- rear	3.0 bar
- Size		550/65 R 25
- Tyre pressure	- front	2.2 bar
	- rear	2.2 bar

11.8 Steering system

- Four-wheel (can be switched to rear-wheel steering)
- Hydrostatic via priority valve
- Pressure max. 175 bar

11.9 Brakes

- Service brakes: 1. Hydraulic wet lamella brake in the front and rear axles, acting on all four wheels.
  2. Hydrostatic inching brake, acting on all four wheels.
- Parking brake: Wet lamella spring brake in the rear axle, acting on all four wheels.

11.10 Electrical system

- Battery 2 x 88 Ah

11.11 Hydraulic system

- Contents 160 l
- Hydraulic oil reservoir 115 l

11.11.1 Working hydraulics

- Flow rate pump I (via priority valve)	87 l/min
- Flow rate pump II (via swivel unit and shut-off valve)	38 l/min
- Total flow rate	125 l/min
- Operating pressure	max. 230 bar
- 2 lift cylinders	Ø 100/70 mm
- 2 tip cylinders	Ø 90/55 mm
- Times acc. to DIN ISO 7131	
Lift (with payload)	5.6 s
Lower (without load)	3.0 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)	38 l/min
- Operating pressure	max. 210 bar
- 2 swivel cylinders	Ø 100/45 mm
- Time to swivel 180°	7.0 s

11.11.3 Support system

- Operating pressure	depending on load
- 2 support cylinders	
Plunger diameter	60 mm

11.12 Fuel supply system

- Contents	
Fuel tank	170 l

11.13 Heater and ventilation system (driver's cabin)

- Water heater
- Type
- Heating power - 3-stage
- Fan power - 3-stage

11.14 Suction / return flow filter (hydraulics).

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

11.15 Electric contamination indicator

- Switch-on pressure	p = 2.5 bar

11.16 Oil cooler (combination cooler) with thermostat valve

- Performance	max. 30 kW
- Flow rate	43 l/min

11.17 Noise emission

"20 km/h" variant

Sound power level (L_{WA})	
Noise outside:	103 dB(A)
Acoustic power level (L_{WA})	
Noise in the driver's cabin:	77 dB(A)

"40 km/h" variant

Sound power level (L_{WA})	
Noise outside:	103 dB(A)
Acoustic power level (L_{WA})	
Noise in the driver's cabin:	77 dB(A)

Technical data (attachments)

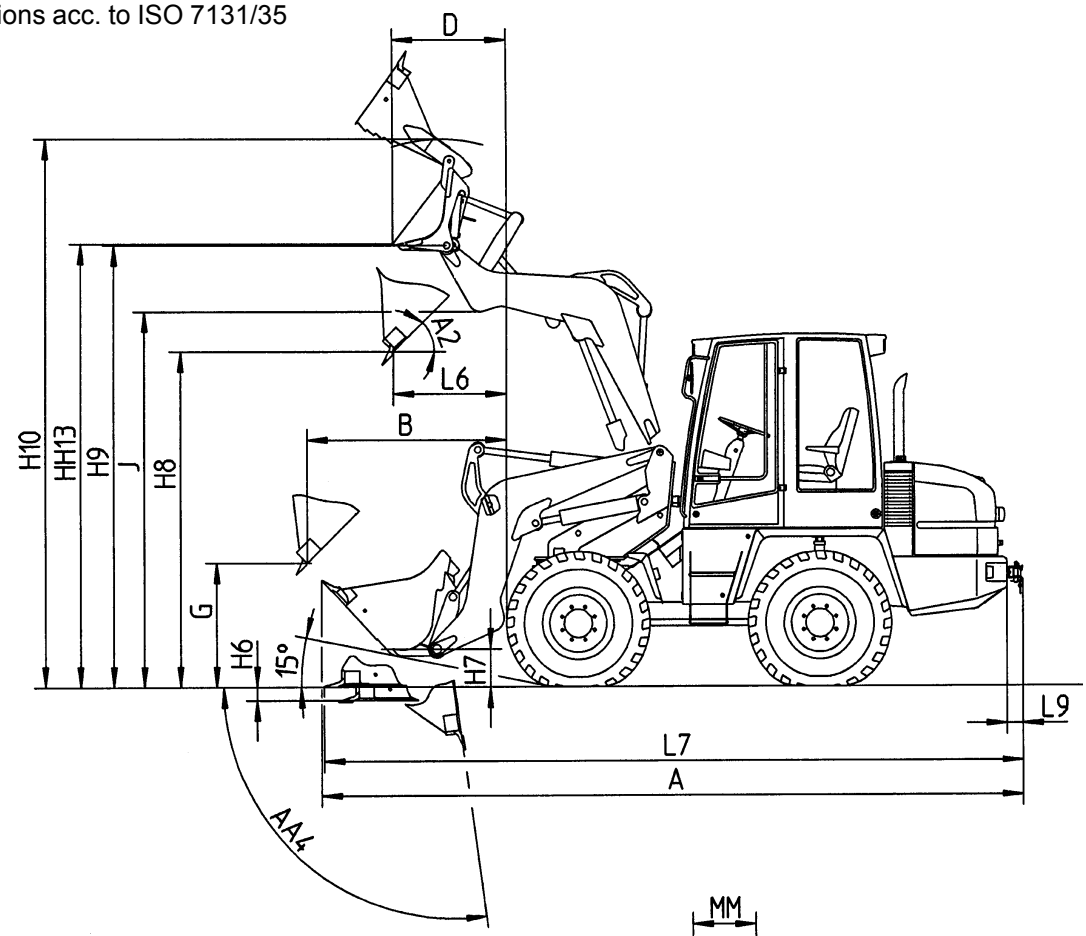
12 Attachments

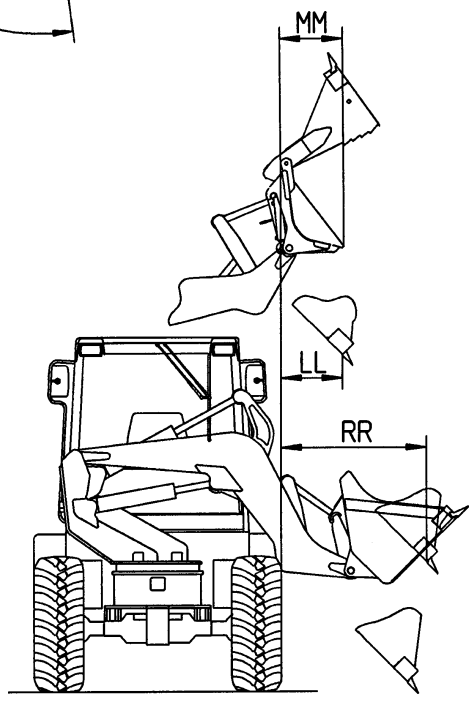
NOTE

The technical data refer to 17.5-25 12 PR tyres.

12.1 Buckets

Dimensions acc. to ISO 7131/35



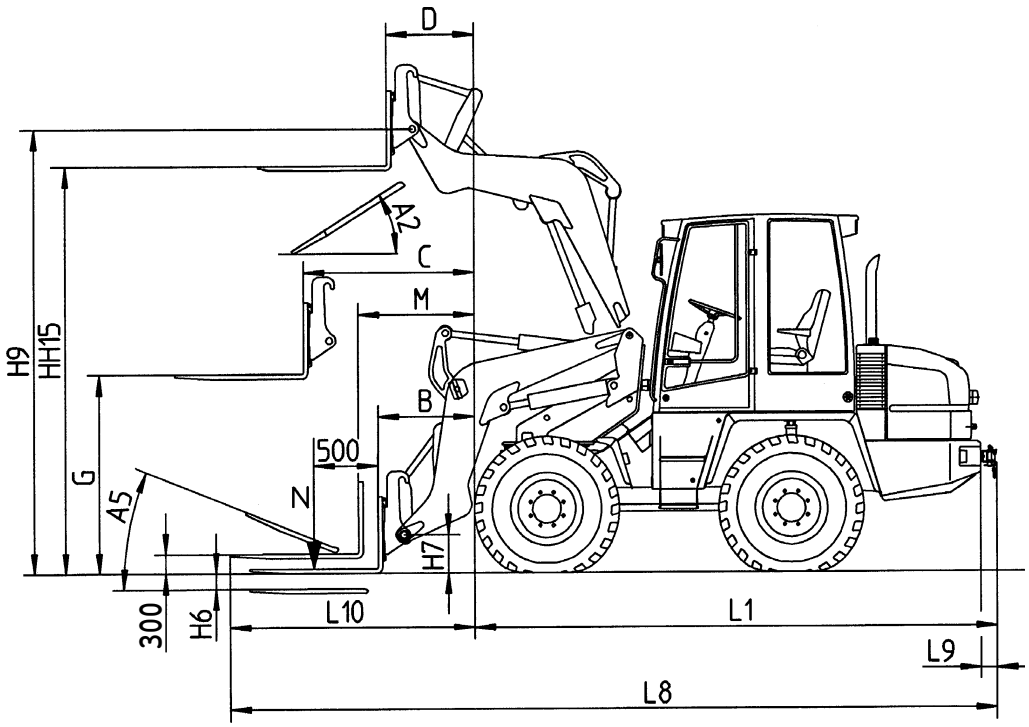


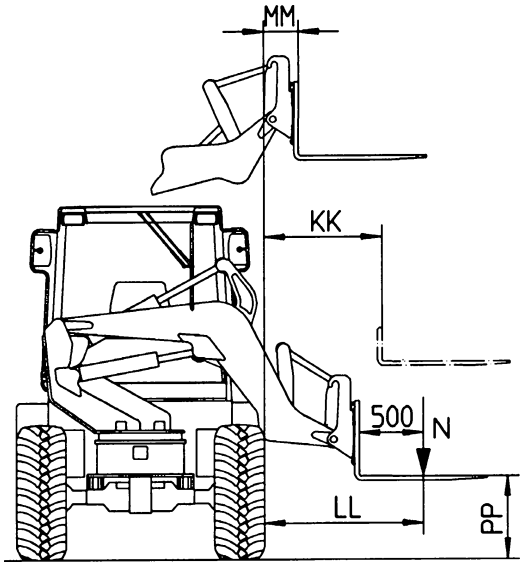
12.1 Buckets

Bucket type		Bucket I with tines	Bucket II w/o tines	Bucket III w/o tines	Multi-purpose bucket
Bucket volume acc. to DIN ISO 7546	m³	1.5	2.00	2.40	1.30
- piled	m³	1.60	2.20	2.65	1.45
Bucket width	mm	2480	2480	2480	2480
Dead weight	kg	465	525	575	690
Loads acc. to ISO 14397					
Bulk density	t/m³	1,9	1,4	1,1	2,0
Dump load					
- frontal	kg	6000	5800	5660	5590
- swivelled	kg	6010	5820	5670	5600
Payload					
- frontal	kg	3000	2900	2830	2795
- swivelled	kg	3005	2910	2835	2800
Tear-out force acc. to ISO 8313	kN	80	66	55	73
A Total length	mm	6580	6630	6715	6570
AA4 Max. dump angle	°	100	100	100	100
A2 Max. dump angle	°	53	53	53	53
B Max. dumping distance at dumping angle 45°	mm	1915	2055	2145	1995
G Dumping height at max. dumping distance and dumping angle 45°	mm	1100	960	870	1035
H6 Depth of feed-in	mm	110	110	110	110
H7 Distance to centre of bolt (quick-change device)	mm	565	565	565	565
H8 Dumping height at max. lifting height and dumping angle 45°	mm	3100	2935	2845	3010
H9 Distance to centre of bolt (quick-change device)	mm	3985	3985	3985	3985
H10 Max. working height	mm	4975	5165	5290	4950
J Free lift height	mm	3390	3390	3390	3390
LL Dumping distance at max. lifting height and dumping angle 45°	mm	550	605	690	610
L6 Dumping distance at max. lifting height and dumping angle 45°	mm	1070	1215	1300	1140
L7 Total length	mm	6505	6575	6690	6600
L9 Shunting and towing coupling	mm	125	125	125	125
RR Max. dumping distance at dumping angle 45°	mm	1495	1545	1635	1555
Multipurpose bucket opened:					
D Dumping distance at max. lifting height and tilted bucket	mm	-	-	-	790
HH13 Max. dumping height with tilted bucket	mm	-	-	-	3910
MM Dumping distance at max. lifting height and tilted bucket	mm	-	-	-	370

12.2 Fork-lift attachment

Dimensions acc. to ISO 7131/35





12.2 Fork-lift attachment

Tine length	1200 mm
Tine height	50 mm
Tine spacing (centre)	
- min.	340 mm
- max.	1340 mm
Dead weight	310 kg

Perm. payload N acc. to ISO 14397

frontal	
- level ground (stability factor 1.25)	4125 kg
- uneven ground (stability factor 1.67)	3020 kg
swivelled	
- level ground (stability factor 1.25)	3945 kg
- uneven ground (stability factor 1.67)	2960 kg

Perm. payload N acc. to DIN 8313

frontal	
- level ground (stability factor 1.25)	3750 kg
- uneven ground (stability factor 1.67)	2810 kg
swivelled	
- level ground (stability factor 1.25)	3460 kg
- uneven ground (stability factor 1.67)	2595 kg

Perm. payload N acc. to DIN 8313, fork-lift attachment 300 mm above ground

frontal	
- level ground (stability factor 1.25)	4560 kg
- uneven ground (stability factor 1.67)	3345 kg

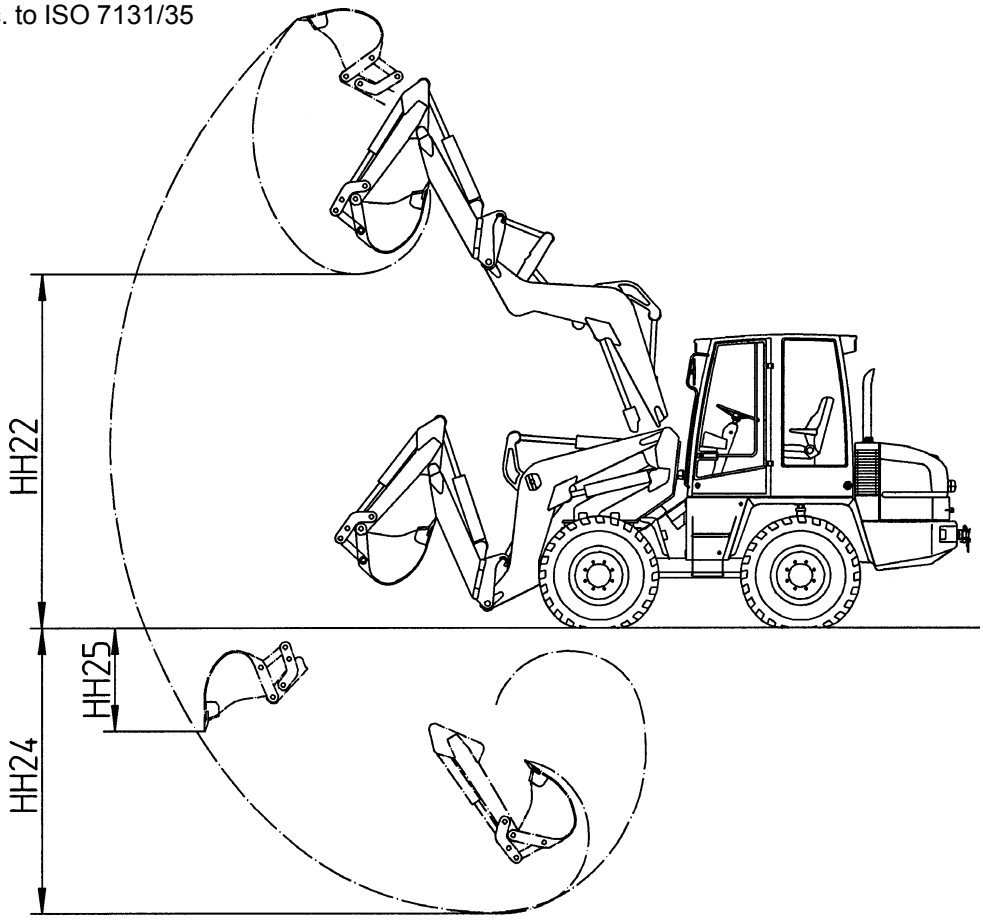
A2	Tip angle	50 °
A5	Tilt angle	25 °
B	Min. reach	940 mm
C	Max. reach	1535 mm
D	Reach at max. lifting height	680 mm
G	Free lift height at max. reach	1750 mm
H6	Depth of feed-in	60 mm
H7	Distance to centre of bolt (quick change device)	765 mm
H9	Distance to centre of bolt (quick change device)	3995 mm
HH15	Free lift height at max. reach (upper tine edge)	3735 mm
KK	Max. reach	1110 mm
LL	Distance between tyre and payload	1415 mm
L1	Length	4615 mm
L8	Total length	7015 mm
L9	Shunting and towing coupling	125 mm
L10	Distance between tyres and tine tip (upper tine edge 300 mm)	2400 mm
M	Reach (upper tine edge 300 mm)	1195 mm
MM	Reach at max. lifting height	305 mm
PP	Min. free lift height	780 mm

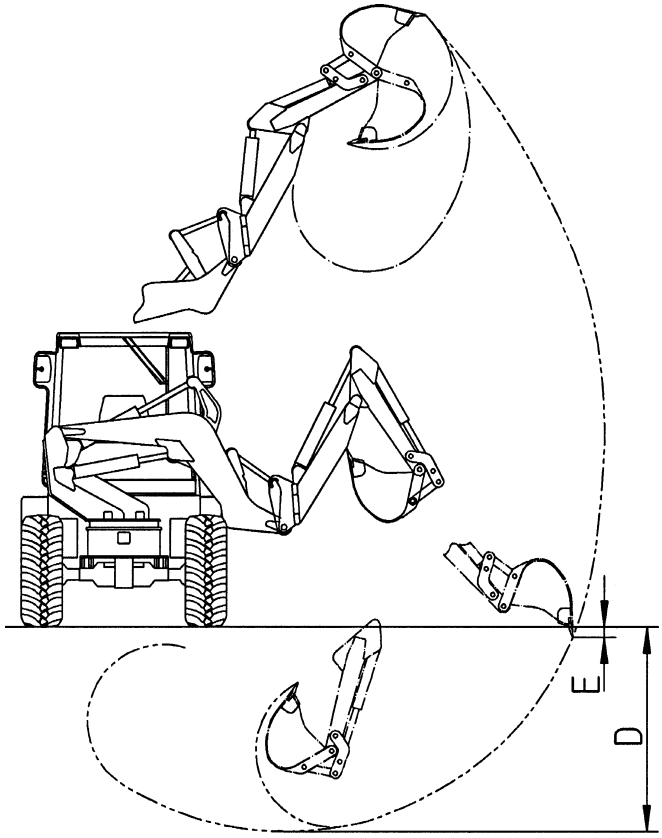
NOTE

- The permitted payloads according to **ISO 14397** are provided only for **purposes of comparison.**
- The permitted payloads according to **ISO 8313** are the **actual payloads.**

12.3 Front-end excavator

Dimensions acc. to ISO 7131/35





12.3 Front-end excavator

Max. breakout force at the shovel cutting edge 3720 daN

Max. tear-out force at the shovel cutting edge 2830 daN

Shovel volume acc. to DIN ISO 7451	Shovel width acc. to DIN ISO 7451	Dead weight
0.06 m³	300 mm	65 kg
0.09 m³	400 mm	75 kg
0.12 m³	500 mm	90 kg
0.14 m³	600 mm	95 kg
0.17 m³	700 mm	105 kg

Dead weight
- Front-end excavator without shovel 435 kg

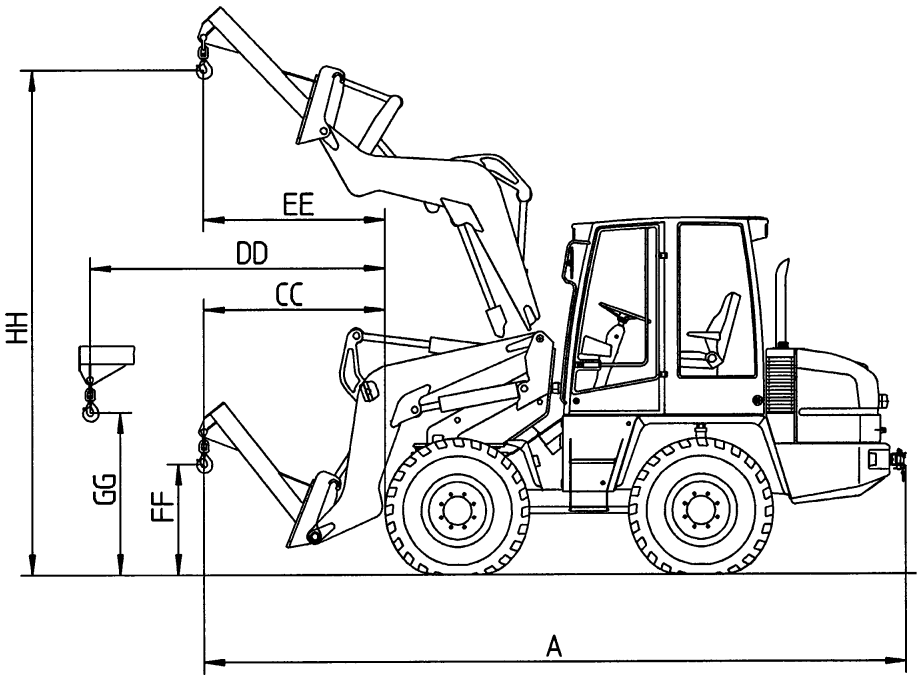
D	Max. digging depth over cutting edge acc. to DIN ISO 7135	2090 mm
E	Depth of feed-in	100 mm
HH22	Max. dumping height acc. to DIN ISO 7135	2920 mm
HH24	Max. digging depth over cutting edge acc. to DIN ISO 7135	2890 mm
HH25	Depth of feed-in	1170 mm

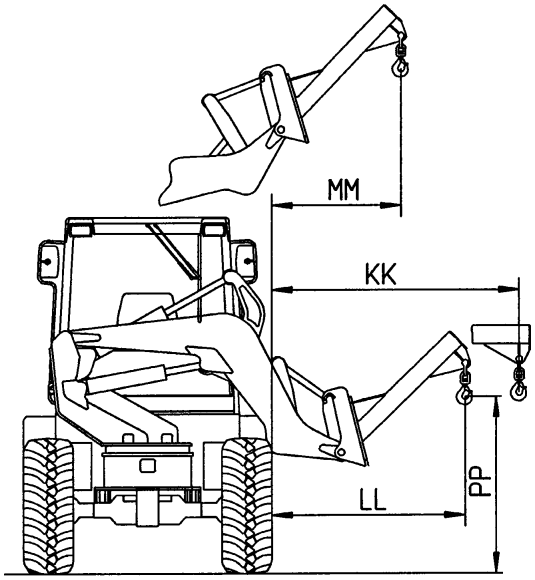
Working times at $n_{engine\ max.}$:

- Stalk extension 0.9 s
- Stalk retraction 1.8 s
- Opening shovel 0.9 s
- Closing shovel 1.8 s

12.4 Lifting hook

Dimensions acc. to ISO 7131/35





12.4 Lifting hook

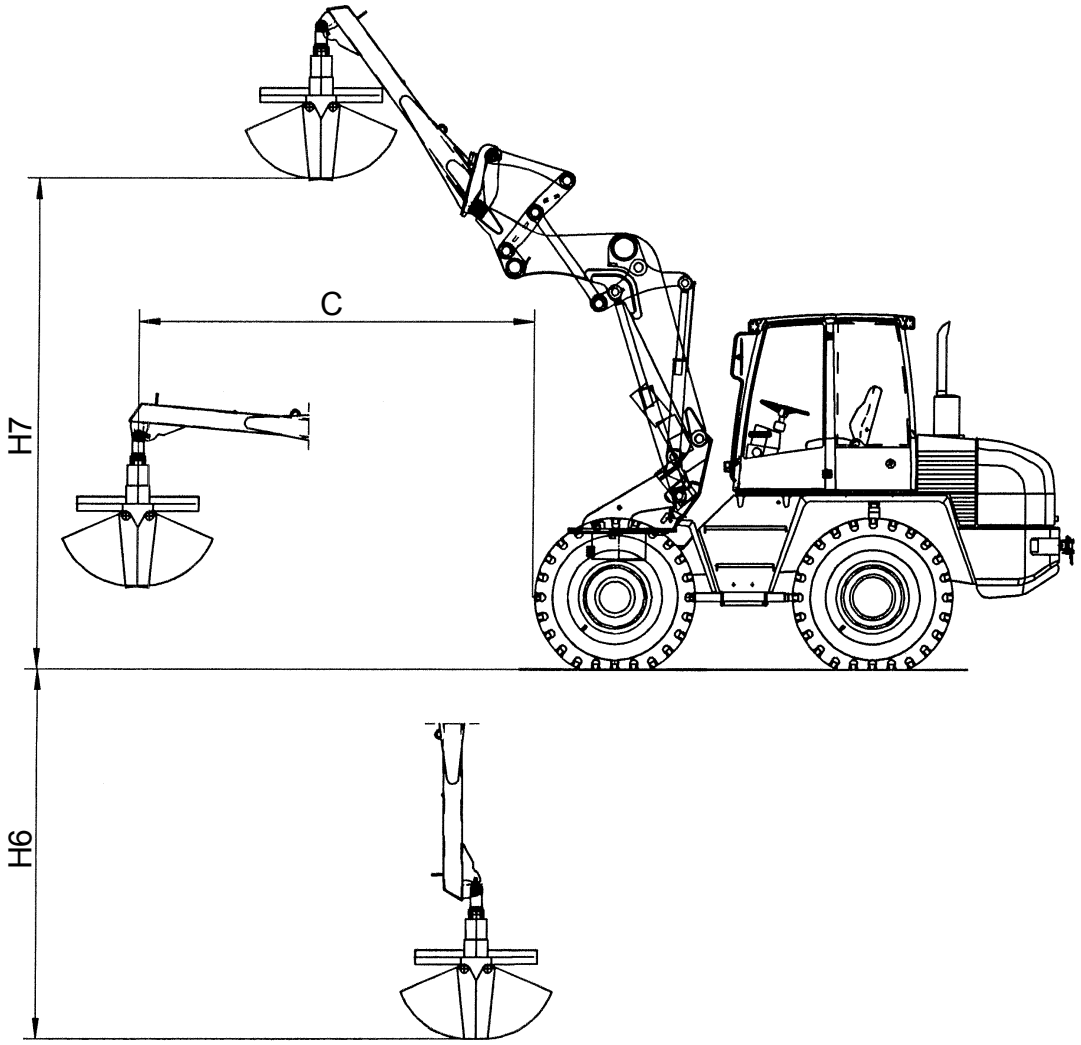
Perm. payload acc. to DIN EN 474-3 (measurement procedure analogue to ISO 8313)

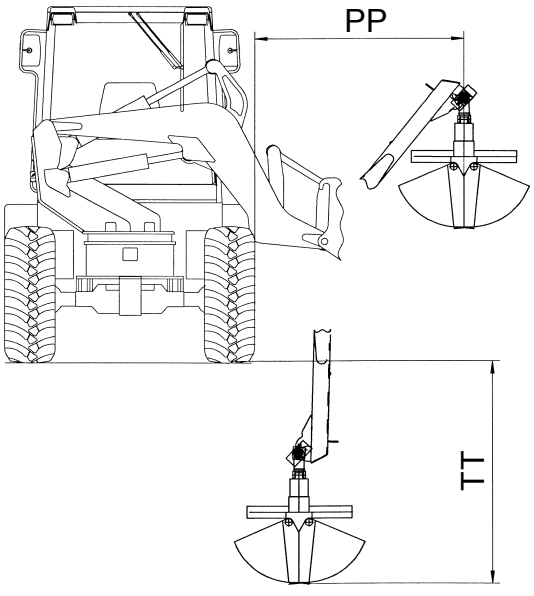
Max. outreach (stability factor 2)	
- frontal	1660 kg
- swivelled	1320 kg
Dead weight	230 kg

A	Total length	6515 mm
CC	Min. reach	1895 mm
DD	Max. outreach	3255 mm
EE	Max. reach at max. lifting height	1785 mm
FF	Min. lifting height with tilted quick-change device	1380 mm
GG	Lifting height at max. outreach	1670 mm
HH	Max. lifting height	5145 mm
KK	Max. outreach	2845 mm
LL	Min. outreach	2010 mm
MM	Max outreach at max. lifting height	1260 mm
PP	Lifting height at min. outreach	2515 mm

12.5 Grab bucket

Dimensions acc. to ISO 7131/35





12.5 Grab bucket

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

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

C	Max. dumping distance	3310 mm
H6	Max. grab depth over cutting edge	3170 mm
H7	Max. free lift height over shovel floor	4230 mm
PP	Min. dumping distance	2070 mm
TT	Max. grab depth over cutting edge	2210 mm

NOTE

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

Additional options

13 Additional options

none