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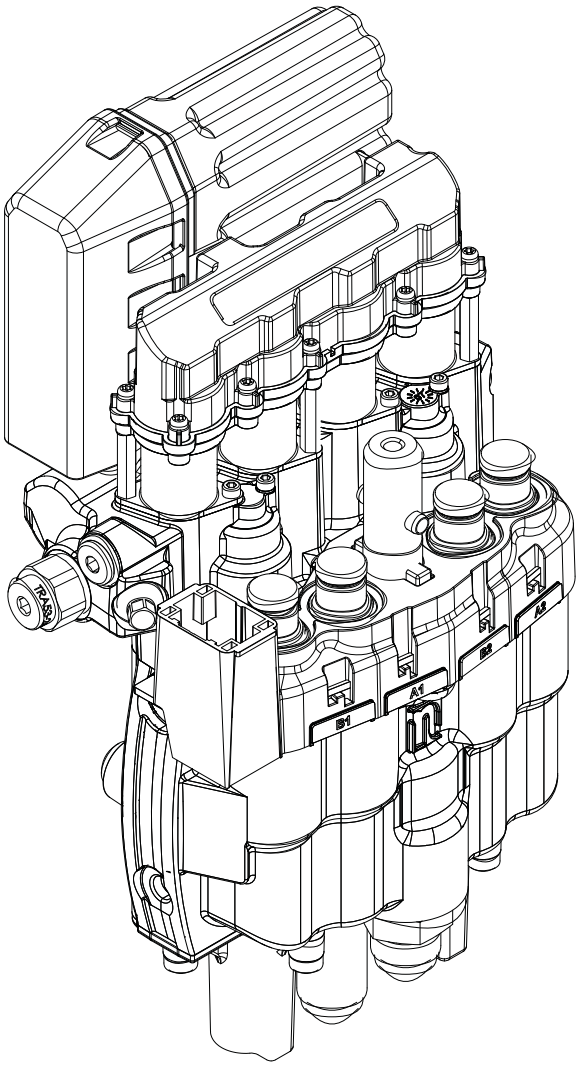
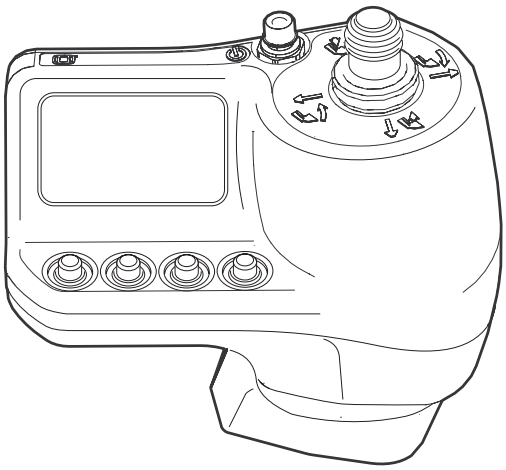
Service Manual

Loader Control System

EasyDrive LCS Load Sensing | ElectroDrive LCS Load Sensing | Live3





Original instructions

Caution!

Read through the entire instruction manual before you begin to use the product.

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1 PREFACE

This service manual describes service, repair and troubleshooting work on the LCS control system together with front loaders manufactured by ÅLÖ AB.

The service manual is aimed at professional service technicians specializing in agricultural machinery and heavy machinery.

Read and study the text in the instruction manual for the control system, loader and tractor thoroughly before using the machine. If you are not an experienced driver, study the instruction manual and ask an experienced driver to explain things to you.

Warning!
Read through the entire instruction manual before you start to use the product.

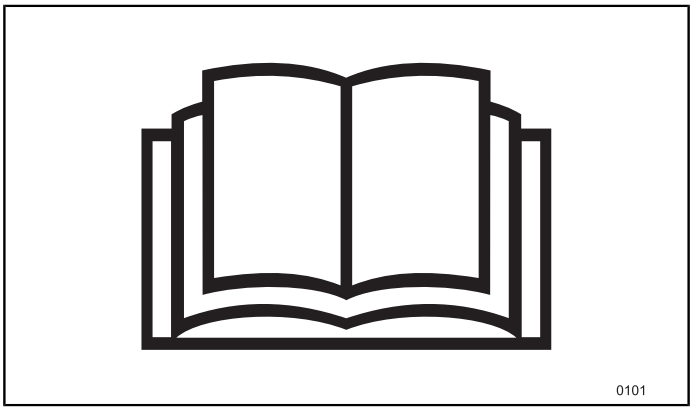


Fig.1 Read through the entire instruction manual before you start to use the product.

We reserve the right to introduce changes to the design and specification, or improvements at any time, without prior notice or commitment.

Important! The loader base is designed to suit specific models of tractor. Do not install a loader base on another model of tractor without prior permission from the manufacturer.

Installation and operation instructions for implements and options are not included in this instruction manual. Use the publications supplied with each implement.

1.1 Necessary and supplementary documentation

To be able to perform the work described in this service manual properly, the following documentation is required:

- Instruction manual, front loader
- Instruction manual, LCS system
- Instruction manual, tractor
- Service and repair manual, tractor
- Technical specifications, tractor

1.2 Identification

1.2.1 Model and part-number

Each valve and joystick has a decal with an identification number. A decal is placed on one side of the valve and another is placed on the bottom of the joystick.

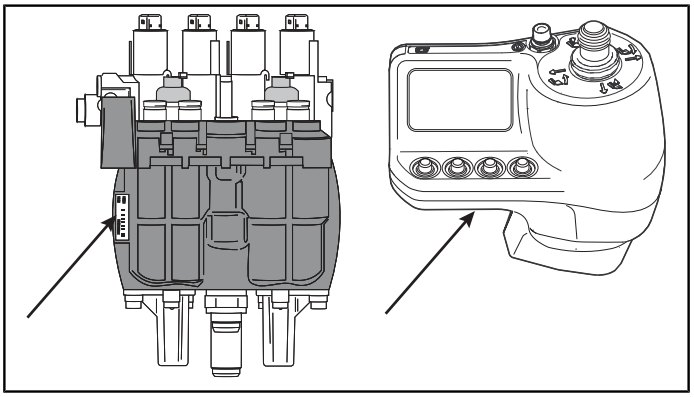


Fig.2 Position of decal.

1.3 Alignment reference

Throughout this service manual, references to the right and left are seen from the operator's seat in forward direction.

Note. Some illustrations in this service manual may show a different model of tractor or loader, compared with your loader. The same information applies to your equipment unless otherwise specified, however.

1.4 Definitions

1.4.1 3rd service

Optional hydraulic function for operating the implement's hydraulics.

1.4.2 4th service

Extra hydraulic function for operation of tools with more than one hydraulic function.

1.4.3 Multi Coupling MC4

Equipment for coupling and uncoupling the loader's hydraulics from the tractor.

1.4.4 Loader Control System (LCS)

LCS consists of a control valve and a Joystick.

1.4.5 ErgoDrive LCS

The ErgoDrive system is composed of a control valve and mechanical joystick as well as hydraulic connections and control cables for specified tractor models.

1.4.6 ElectroDrive LCS

Installation kit as above but with an electrically operated valve and electronic joystick.

The joystick is maneuvered only with the thumb or thumb and index finger. On the unit there are buttons for extra functions and for making changes to the menus, as well as a display.

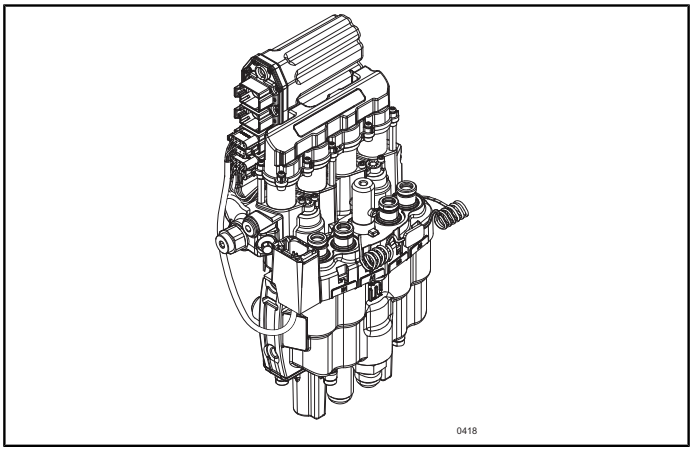


Fig.3 ElectroDrive valve unit (valve and master unit)

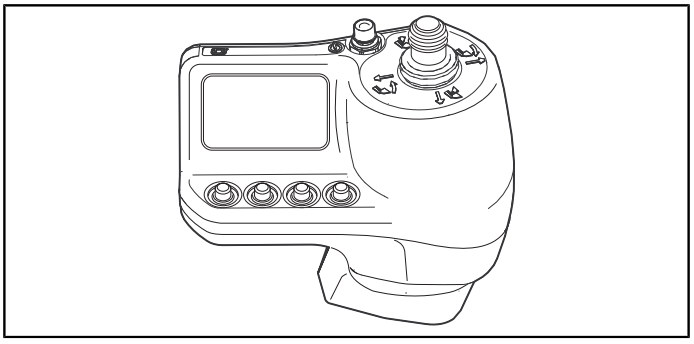


Fig.4 ElectroDrive joystick

2 SAFETY INSTRUCTIONS

2.1 General information

Driver safety is one of the most important matters when a new loader is designed. The designer builds in as many safety functions as possible. However, several accidents occur every year which could have been avoided by a few seconds of reflection and more careful operation of the machine.

Avoid personal injury. Read the following personal safety instructions and insist that everybody who works with you, or for you, also complies with the instructions.

Only use implements which have been approved by the manufacturer for use with the loader.

2.1.1 Guards

This instruction manuals contains a number of illustrations which show the guards removed, to give a better picture. Never use the machine with the guards removed. If a guard has been removed for service/repairs, re-install the guard before the machine is taken back into service.

2.1.2 Explanation of warning levels

When you see the safety symbol and the signal word on decals or in the instruction manual, the instructions MUST be followed since they are related to your own personal safety.

Warning!
Means that an accident could occur if the instruction is not followed. The accident might lead to serious personal injury or fatality.

Caution!
Means that an accident could occur if the instruction is not followed. An accident could lead to personal injury.

The following texts and instructions do not refer to personal safety, but are used consistently in the instruction manual, to provide tips about operation or service of the machine.

Important! Means that an accident could occur if the instruction is not followed. The accident might lead to damage to the property or to the process, or personal injury.

Note. Refers to extra information which could facilitate the understanding or implementation of a certain task.

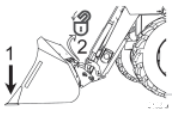
2.1.3 Explanation of symbols

A Instruction manual. Read the instruction manual — it contains important information for your safety.

Fig.5 Safety symbol.

B Safety symbol. Information adjacent to this symbol refers to your personal safety and must be observed.

C Implement lock. Check that coupled implements are locked in place.



D Risk of crushing. Never stand between the front of the loader and the cross-tube on the loader.

E Risk of falling. Do not use the loader to lift or transport people.

F Attention. Information adjacent to this symbol refers to your personal safety and refers to the section in the instruction manual.

2.1.4 Responsibility

- If there is no instruction manual included with the tractor then obtain one from the dealer before fitting and using the loader.
- Read through all material carefully and learn how to use the equipment in a safe and correct manner.
- Only qualified individuals are permitted to operate the machine.

Warning!
Only use the loader in the intended area of application.

Warning!
Do not grip objects that extend the centre of gravity to a significant extent. This can lead to instability.

2.2 Installing the loader

Warning!
The loader must not be connected in series with any of the tractor's functions. Working with the loader requires the operator's full attention.

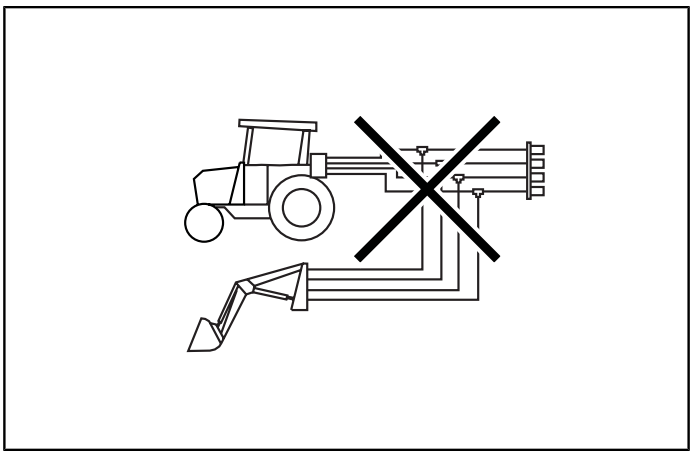


Fig.6 The loader must not be connected in series with any of the tractor's functions.

Caution!
The tractor and loader use fluids under high pressure when working. Check all components and keep them in good condition.

Make sure that no hydraulic components, especially hoses, are damaged in contact with moving components.

Fig.7 NEVER use fingers or hands for leakage detection.

2.2.1 Tether stop

Warning!
The loader must not be operated with a programmable joystick or other equipment that enables automatic loader movements.

If the loader is connected to a tractor valve with a programmable joystick, see the tractor's user manual for information on how the programmable function can be deactivated.

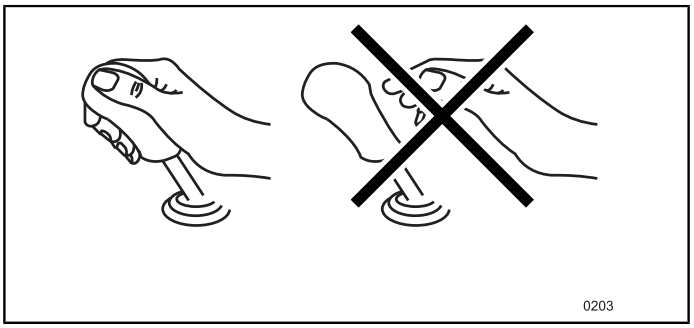


Fig.8 The loader must not be operated with a programmable joystick or other equipment that enables automatic loader movements.

2.3 Protection equipment

Always wear safety equipment appropriate to the job, such as protective clothing, shoes and gloves, safety vests (high visibility clothing), goggles, helmet, hearing protection and respiratory protection.

Warning!
Do NOT wear rings, watches, jewelery or flapping / loose / open clothing eg. tie, scarf, etc. that can be caught in moving parts. Long hair should be tied behind the head.

Caution!
Always wear eye protection when cleaning components with compressed air.

Caution!
Always wear appropriate protective equipment for welding jobs as safety shoes, gloves, welding helmet with approved eye protection. NEVER look directly at the arc without approved eye protection.

Warning!
If the tractor is equipped with a seatbelt, it must be used and be correctly adjusted during work. Change damaged seat belts before the machine is used.

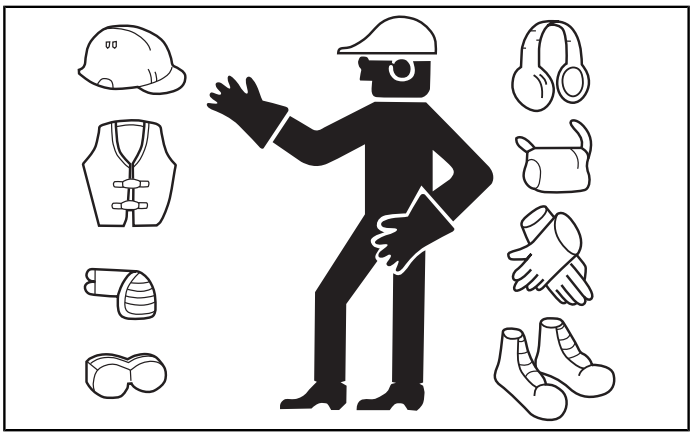


Fig.9 Use suitable protection equipment.

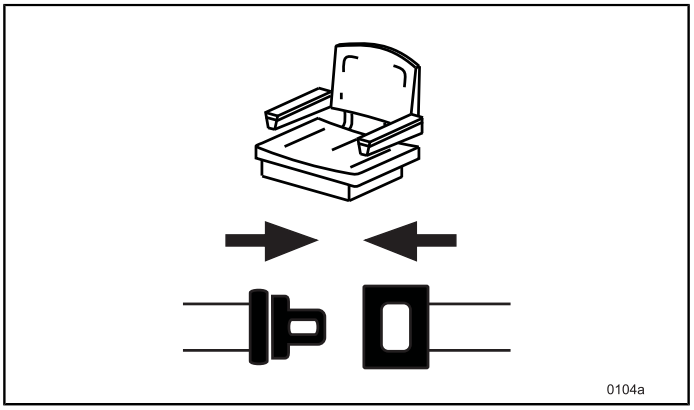


Fig.10 Wear the seatbelt when working.

2.3.1 Roll Over Protective Structure (ROPS)

The tractor must be equipped with Roll Over Protective Structure (ROPS) - frame or cab.

Warning!
Only use a loader on a tractor equipped with ROPS. If possible, use the tractor and loader with ROPS in the upright and locked position and with the safety belt fastened and correctly adjusted. When driving in areas with limited height clearance and ROPS lowered, never use the safety belt. ALWAYS reset ROPS to the upright and locked position as soon as circumstances allow.

Fig.11 Rollover risk - wear the seatbelt.

2.3.2 Counterweight and track

Caution!
Check that the machine has ballast (counterweight) at the rear to stabilise the machine's load-carrying ability. The counterweight is essential for maintaining control of the machine.

- Refer to section in the loader operator's manual for information on the counterweight and tread width. Also refer to the tractor operator's manual for further information.

Important! Incorrectly designed implements can damage the loader. For this reason, do not install third party implements without making sure that it has been approved by the loader manufacturer.

2.3.2.1 Before work

Familiarise yourself with the working area and terrain. ALWAYS inspect the site before starting work. Look out for holes in the ground, stones and other hidden dangers.

- Do NOT drive a machine which is damaged or lacks any component. Make sure that the recommended maintenance work has been done before the machine is used.
- Check all controls regularly and adjust as necessary. Ensure that the tractor's brakes are adjusted to pull evenly.
- Check all screws and nuts regularly for tightening, especially those that fix the tractor wheels. See section in the loader operator's manual for information about tightening torques.
- Ensure that the loader is correctly installed on the tractor, and that all pins are locked.
- Change worn components before the machine is used.

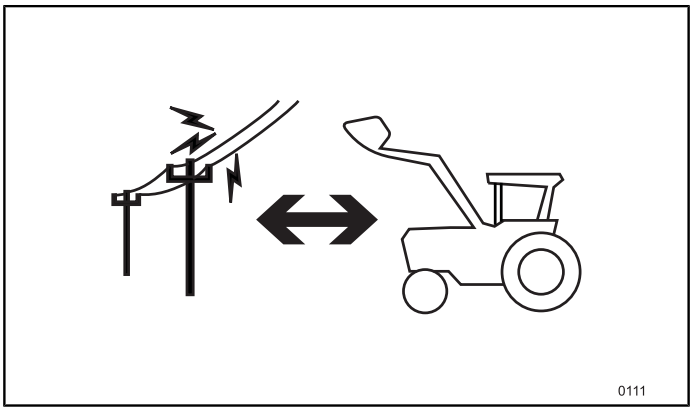


Fig.12 Familiarize yourself with the working area before starting. Maintain a safe distance from electrical cables.

2.4 Operation

2.4.1 User's position

Caution!
Only operate the machine when sitting in the driver's seat.

Fig.13 Only operate the machine when sitting in the driver's seat.

- Drive carefully and think about safety.
- Always leave the brake pedals locked to each other. NEVER use parted brakes with a loader mounted to avoid the risk of losing control of the tractor and/or the tractor overturning.
- Always adjust the speed to the current conditions. Never drive so fast that you cannot stop quickly in an emergency situation.

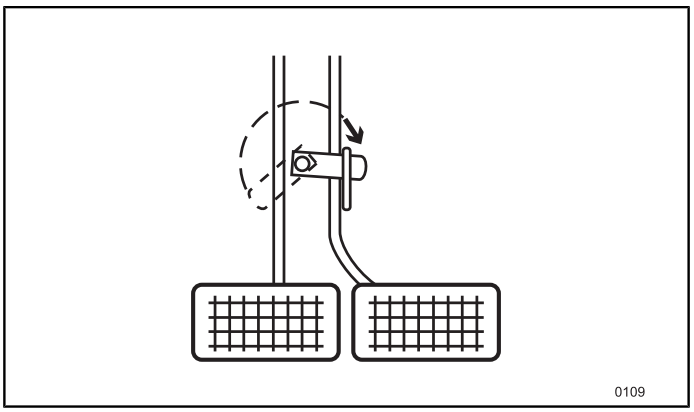


Fig.14 Always leave the brake pedals locked to each other.

2.4.2 Workplace

Always check the machine's surroundings and ensure that all individuals, especially children, and animals have moved away before starting or driving the machine.

You may not hear any shouting to attract your attention from individuals on the outside when you are sitting in the cab with the door closed.

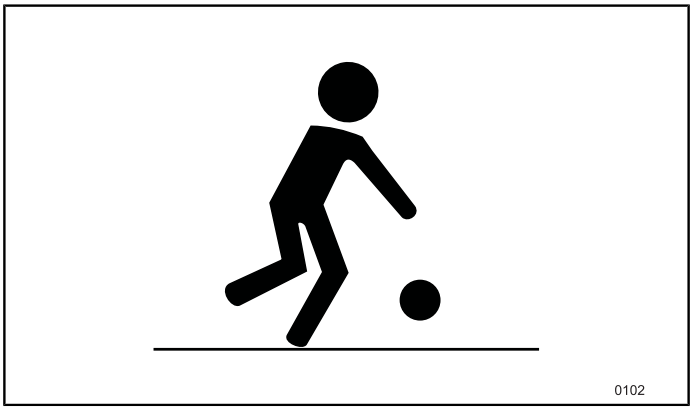


Fig.15 Before starting, make sure that no individuals are in the vicinity of the machine.

Check that the bucket or other implements are correctly installed on the tool carrier and that the pins are in the locked position. Press the front end of the implement against the ground to make sure that the implement is firmly fixed.

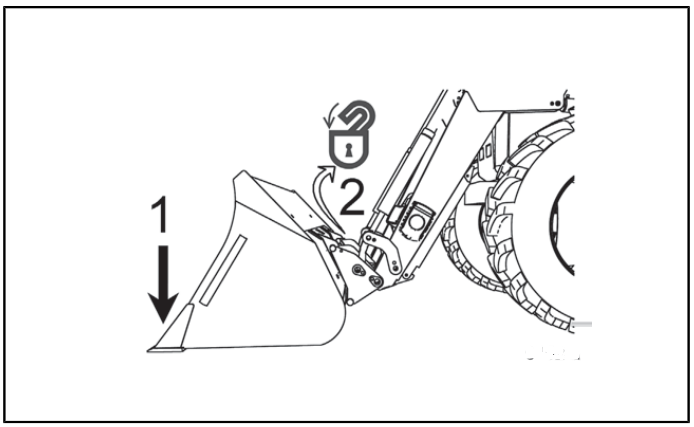


Fig.16 Check that the implement is secured by pressing its front end against the ground.

Familiarise yourself with the working area and terrain. Pay attention to vertical clearance and limitations that arise due to the increased reach.

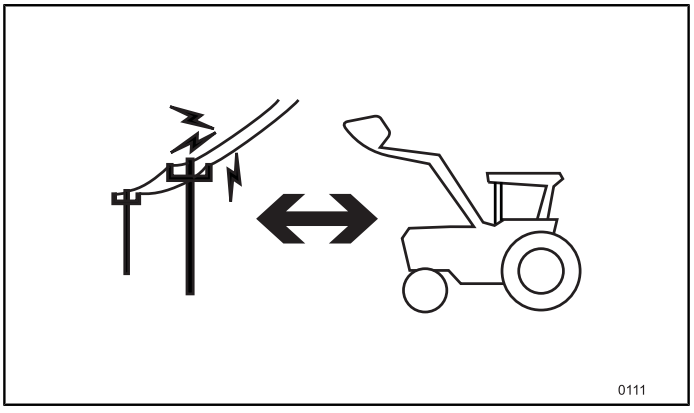


Fig.17 Familiarise yourself with the working area before starting. Maintain a safe distance from electrical cables and other obstructions.

Warning!
Do NOT use the loader or the bucket as a working platform.

Fig.18 Do NOT use the loader or the bucket as a working platform.

Warning!
Do NOT use the loader to lift or transport people.

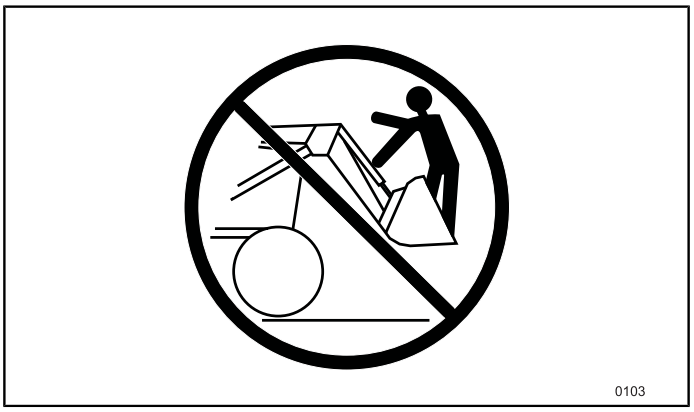


Fig.19 Do NOT use the loader to lift or transport people.

With standard fittings, the loader is not designed for lifting that requires one person to be in the vicinity of the loader.

For this type of handling, the loader must be equipped with a safety device that prevents the loader from falling down if a hydraulic failure were to occur.

Contact your dealer for more information.

Warning!
Do NOT stand, walk or work under a lifted loader. Make sure that you keep individuals, especially children and animals, away from the working area.

- Always keep an eye on your workplace.
- Never carry out work with an implement that requires another person to be in the vicinity of the loader, e.g. handling large sacks or pallets.

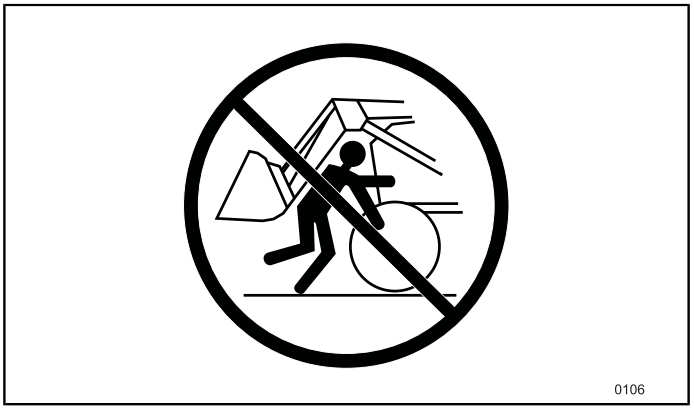


Fig.20 Do NOT stand, walk or work under a lifted loader.

2.4.3 Load stability

Warning!
Always look at the implement. Objects can fall or roll backwards onto the driver when the loader is raised.

Only lift loads that fit and are designed for that specific implement.

Some implements should be equipped with a collapse protector.

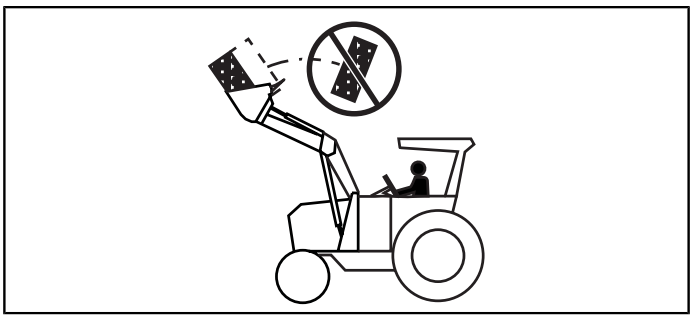


Fig.21 Pay attention to the implement, objects may fall off.

Warning!
If the tractor is only equipped with Roll Over Protective Structure (ROPS), and does not have a Falling Objects Protective Structure (FOPS), there is only limited protection against falling loads. The driver risks injury if the load falls when the loader is operated at height.

FOPS is not designed to protect against all falling loads. It is therefore critical to use an implement that prevents the load from falling.

Exercise caution when working with raised loads.

The tractor may not be operated on public roads with a load in the implement.

- Only use implements that are approved for the relevant application.
- Check that the load is positioned stably in the implement. In terms of loose material, the implement must not be overfilled, and for solid material, the load must not stick up above the rear of the implement.

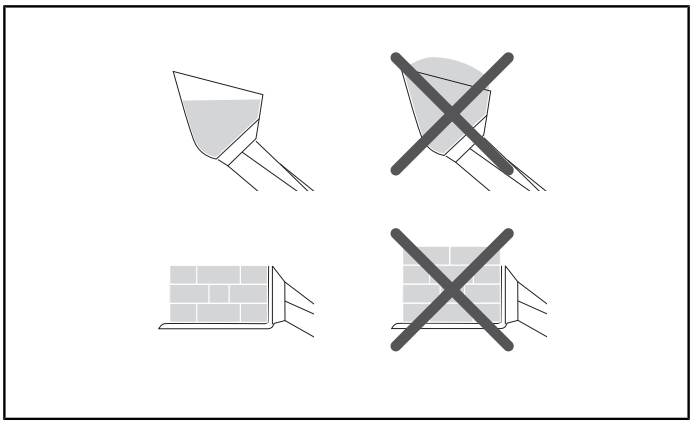


Fig.22 Only lift loads that fit and are designed for that specific implement.

- Adjust the tilt angle of the implement when the load is raised so that the load is not aimed at the driver.

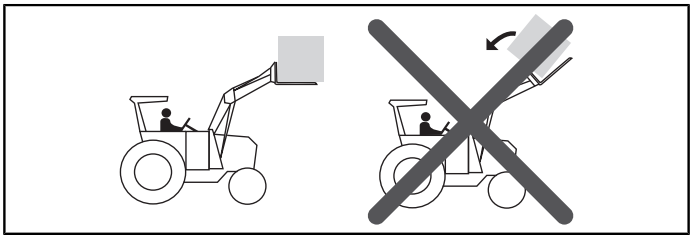


Fig.23 Exercise caution when working with raised loads.

Warning!
Reduce speed before cornering to avoid overturning the machine.

Avoid sudden turns when driving down slopes.

- Always leave the engine in gear to obtain engine braking when driving downhill. Do not allow the tractor to roll freely. Use the same gear when driving downhill as when driving up.
- Lower the loader as far as possible when moving. Keep in mind that the higher you lift the loader, the higher the centre of gravity, resulting in increased risk of the tractor overturning.

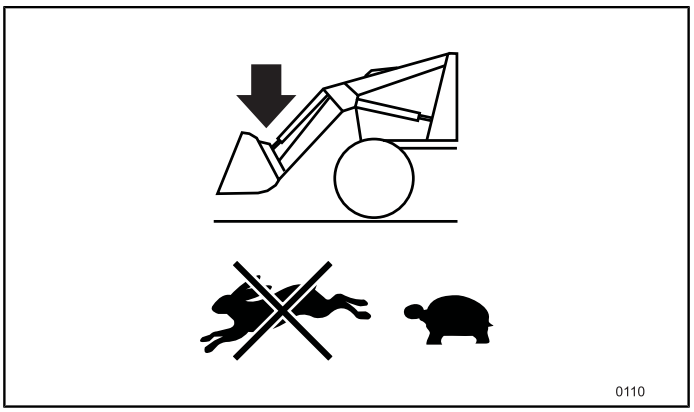


Fig.24 Lower the load and reduce the speed when cornering.

2.4.3.1 Machine stability

Warning!
Do NOT work on or close to steep slopes.

The distance from a slope must be as far or further than the height of the slope.

- Drive straight up or down slopes (not horizontally). Avoid braking sharply or driving away at speed. Lower the loader as far as possible.
- Drive the tractor forwards up slopes with an empty bucket. Fill the bucket and then reverse slowly down the slope.

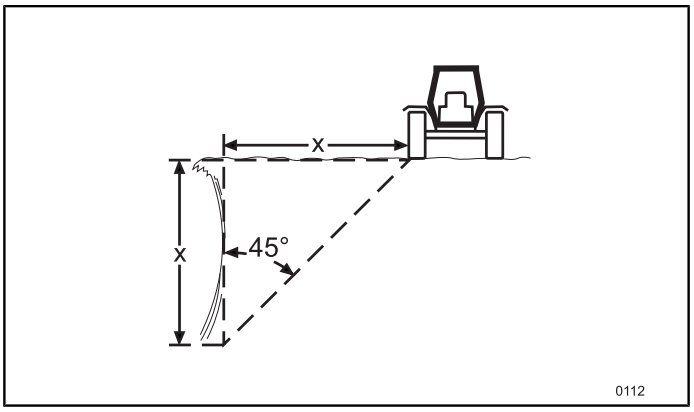


Fig.25 Keep at a distance when working near slopes.

Warning!
Before you leave the operator's seat:

1. Lower the loader and implement to the ground.
2. Apply the handbrake securely.
3. Move the gear lever to the neutral or park position.
4. Shut the engine off.
5. Remove the ignition key.
6. Move the control handle through all positions, then return the control handle to the centre position to unload the hydraulic pressure.

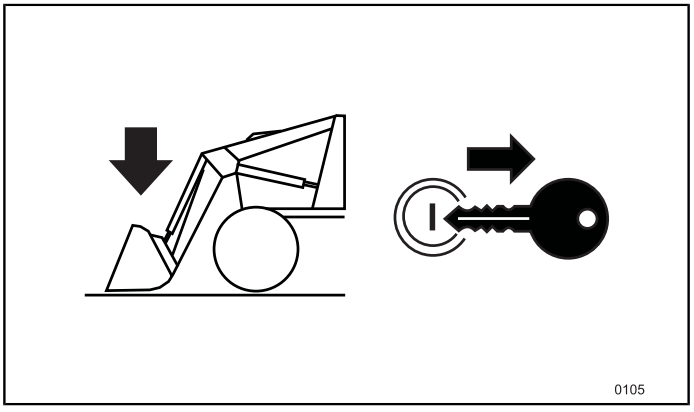


Fig.26 Lower the loader and remove the ignition key.

Warning!
Lock the joystick in neutral to prevent inadvertent operation of the loader.

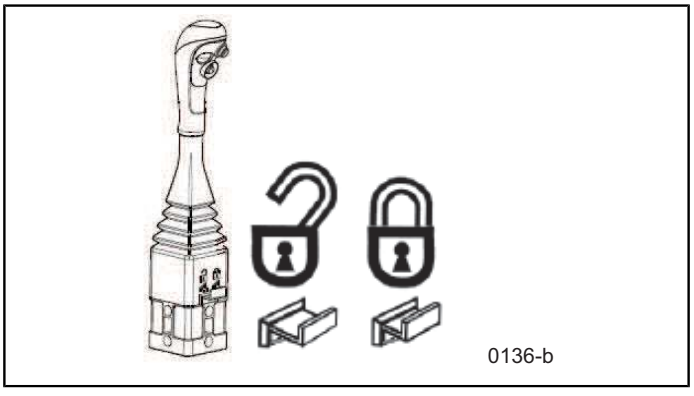


Fig.27 Leave the joystick in the neutral position.

Warning!
Never stand between the front of the tractor and the loader's cross tubes.

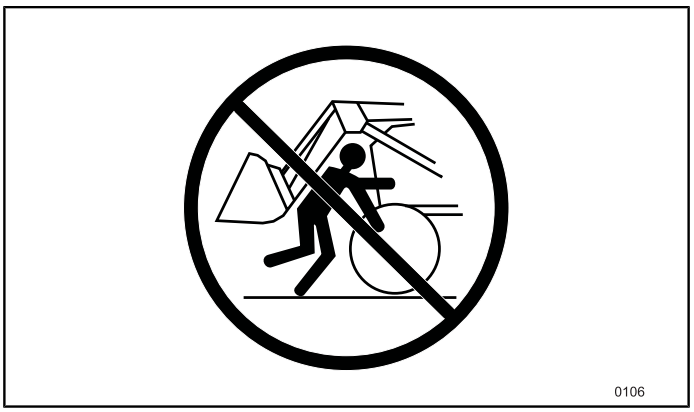


Fig.28 Never stand between the front of the tractor and the loader's cross tubes.

2.5 Risk factors during work

2.5.1 During transport

Caution!
When the machine is used for carrying or transporting loads on public roads, by day or at night, the warning signs may not be visible. When this occurs, make sure that extra warning material is used.

When transporting bulky load on public roads, make sure that SMV-emblem, lights and reflectors are visible and use extra warning devices if needed.

When driving either with or without a load, always lower the loader as far as possible to give maximum visibility and allow others to see you at all times.

- Disconnect or tilt up the implement to minimise the risk of damage in the event of collision.
- Leave a margin for the vehicle's extra length and weight when cornering, braking etc.
- Make sure that lamps and reflectors are visible during road transport and are not obscured by the implement.

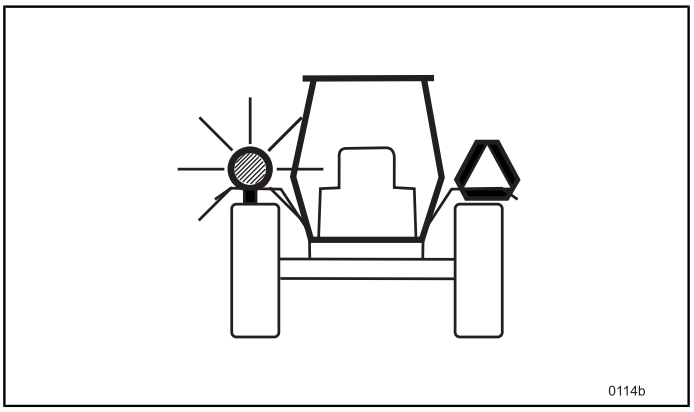


Fig.29 During transport

Warning!
The loader may not be moved during transport. When transporting on public roads, the control lever must be locked in neutral. Refer to section in the loader operator's manual.

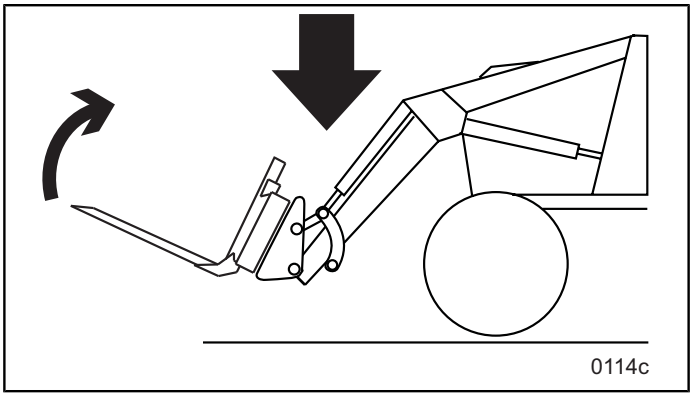


Fig.30 Lower the loader to obtain maximal visibility.

Warning!
Only use the attachment for the intended application area. Do not grip objects that extend the centre of gravity by a significant extent.

Warning!
Always look at the implement. Objects can fall or roll backwards onto the driver when the loader is raised. Only lift loads that are designed for each specific implement.

Warning!
Always look at the implement. Objects can fall out during transport. Only transport loads that are designed for each specific implement.

The loader may not be moved during transport. When transporting on public roads, the control lever must be locked in neutral. Refer to section in the loader operator's manual.

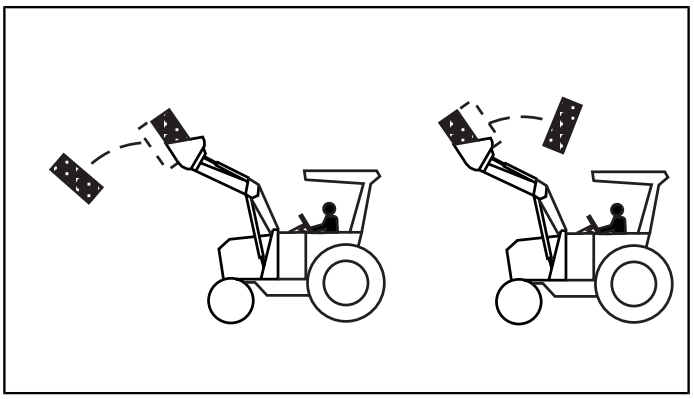


Fig.31 Always look at the implement. Objects can fall or roll backwards onto the driver when the loader is raised.

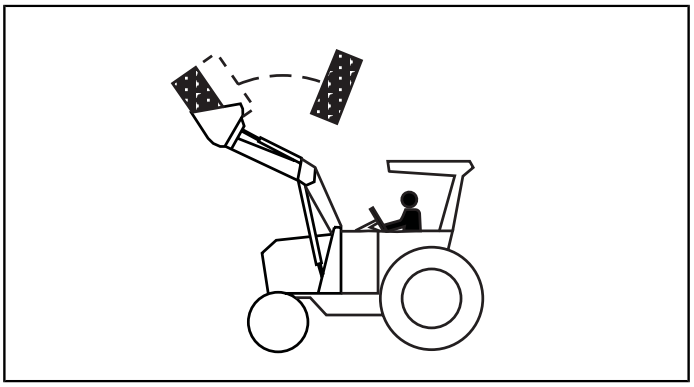


Fig.32 Only lift loads which fit inside the implements.

2.5.1.1 During service

Important!
Prepare for emergencies:

1. Be prepared if a fire starts. Keep a fire extinguisher handy.
2. Keep a first aid kit handy.
3. Keep a telephone handy as well as emergency numbers for ambulance service, hospital and fire department.

- Never drive or operate the controls while standing on ground. All operation should be from the driver's seat.
- Only use whole and approved lifting equipment when lifting components or equipment.
- Never use a jack or lifting equipment to support components or equipment.
- Use whole and approved equipment to relieve the weight of components or equipment.
- Illuminate work area adequatbly.
- Use appropriate tools. Provisional tools, parts and procedures can create safety hazards.
- Use containers or absorbents for oil and other liquids. DO NOT pour the liquids into drains, water courses or onto the ground. Comply with local rules with the disposition of waste oil and fluids.
- Do NOT do any service on the loader when the tractor engine is running or hot, or when the machine is moving.

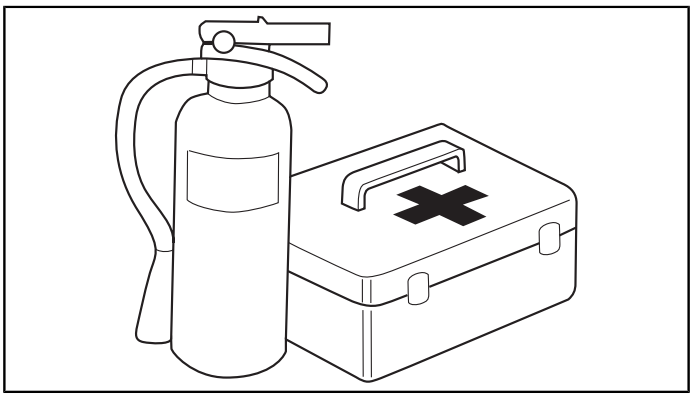


Fig.33 Be prepared for emergencies.

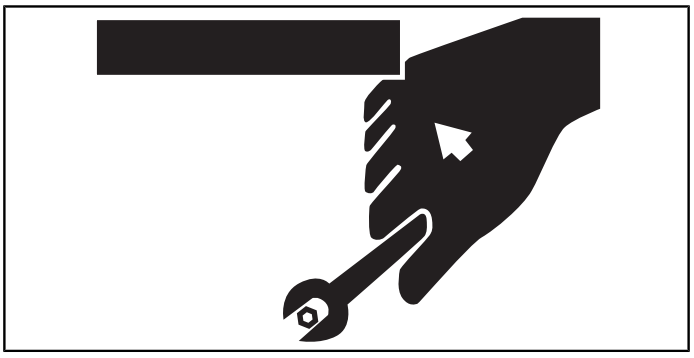


Fig.34 Use appropriate tools. Provisional tools, parts and procedures can create safety hazards.

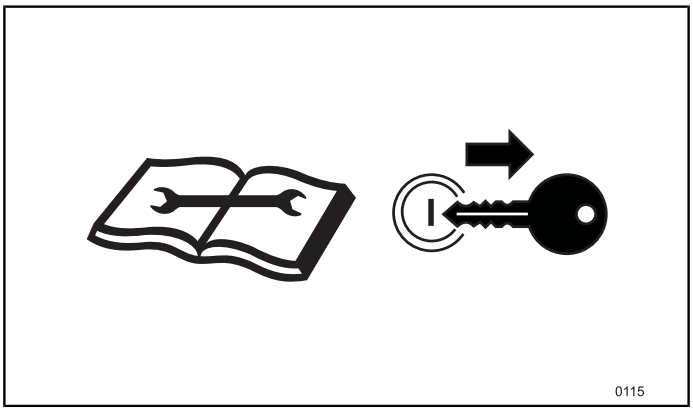


Fig.35 Before service, read the instructions and remove the ignition key.

The loader is equipped with a shut-off mechanism. The design can vary depending on the type of control valve.

The shut-off valve should be activated during service work, or when the loader is left in raised position for extended periods of time for any reason.

Warning!
This shut-off mechanism must NOT be used when working on the loader's lift cylinders or associated lines. In such cases, the loader must be lowered to the ground. Turn off the tractor's engine and relieve the oil pressure using the operating control before disconnecting any couplings or doing any other work on the hydraulics — oil subjected to high pressure can cause severe injuries.

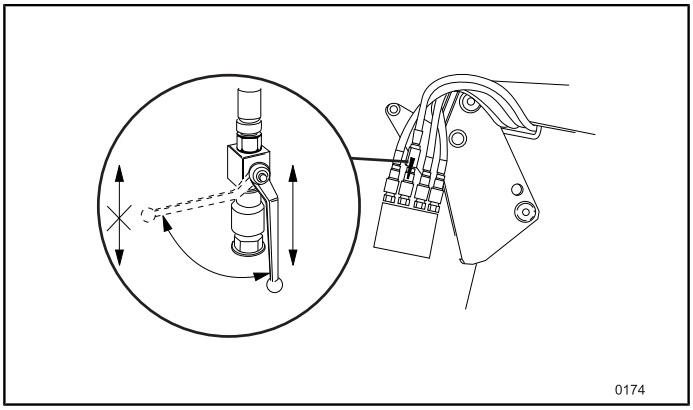


Fig.36 Turn the shut-off valve handle to the closed position during service work.

- When working on the loader's hydraulic system, unload the hydraulic pressure by moving all hydraulic controls to all positions a number of times once the engine has been shut off.
- Do NOT use the loader to lift the tractor during servicing of the tractor or the loader.

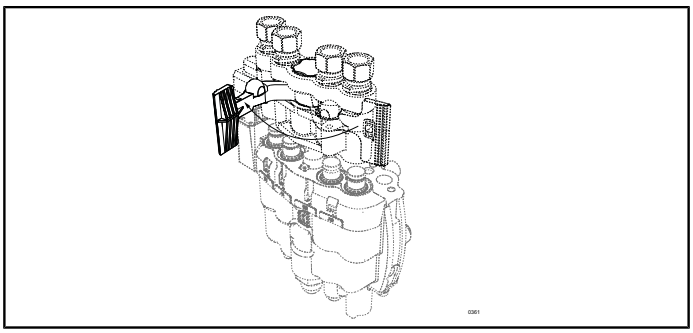


Fig.37 Open the multi-connection to the open position during service work.

Caution!
Watch out for pressurised hydraulic fluid.

NEVER use fingers or hands for leakage detection. The fluid which flows out from small holes can be almost invisible. Use a piece of wood or cardboard instead.

Fig.38 NEVER use fingers or hands for leakage detection.

- Undo hydraulic couplings slowly. Keep your hands and fingers away from loosened couplings.
- Get medical attention at once if fluid penetrates your skin. Serious reactions and/or infections can rapidly occur if the oil is not removed at once by surgical operation.

2.5.1.2 Welding

Caution!
Always wear appropriate protective equipment for welding jobs as safety shoes, gloves, welding helmet with approved eye protection. NEVER look directly at the arc without approved eye protection.

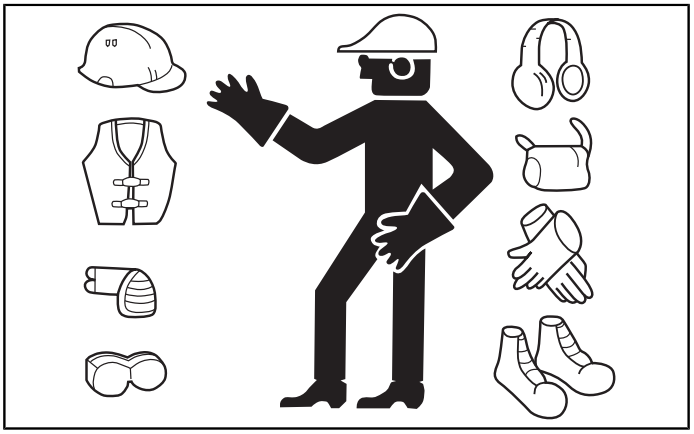


Fig.39 Use suitable protection equipment.

Warning!
Avoid heat near pressurized pipes by soldering, welding, gas cutting, etc. Pressurized flammable liquid can be sprayed out due to heat and cause severe burns to yourself and bystanders. Use fire sheets to protect the cables or other materials.

Warning!
Remove all paint before welding. Vapours and gases released from the paint or other materials on heating can be hazardous. Ensure good ventilation.

Fig.40 Avoid heat near pressurized pipes.

Remove the LCS system plus (+) and negative (-) from the tractor's electrical system before welding begins.

2.5.2 Spare parts

When a spare part is needed for periodic maintenance or service, use only genuine, original equipment spare parts to restore your equipment to original specifications

The manufacturer is not responsible for damages that may occur due to installation of non-approved parts and/or accessories.

3 DESCRIPTION AND FUNCTION

The LCS system is specially developed for operating the main functions of a front loader.

The LCS valves are available adapted for hydraulic systems of the types Open Center and Load Sensing, with electrohydraulically or mechanically operated spool valves. All valve versions use the same platform.

3.1 Electrohydraulically controlled valve

The two spool valves of the electronic LCS valves are servo-hydraulically controlled.

The driver moves the lever in the direction that he wants the front loader to move. The joystick unit which is mounted in the tractor cab converts lever position to electronic signals, which are transferred to the valve.

The master unit of the LCS valve amplifies and converts the signals to pulses, which are used to open the PWM solenoid valves.

The spool valves are moved by the PWM solenoid valves (one solenoid valve for each direction) opening and directing a regulated pressure to the end of the spool valve.

When the valve spool is moved, this opens channels in the LCS valve, which transfer oil flow from the tractor hydraulic pump to the loader hydraulic cylinders.

3.1.1 Features

- Proportional control of spool valves with regulated servo pressure and PWM solenoid valves.
- CAN BUS communication between the joystick unit and master unit.
- Separate servo circuit with regulated pressure
- Built-in accumulator for servo pressure
- Shock valve for loader's lift function (port A1).

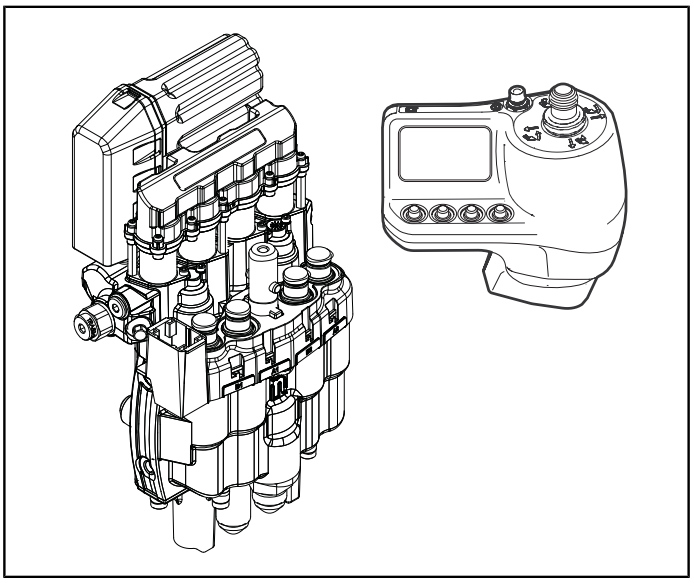


Fig.41 Electrohydraulically operated system

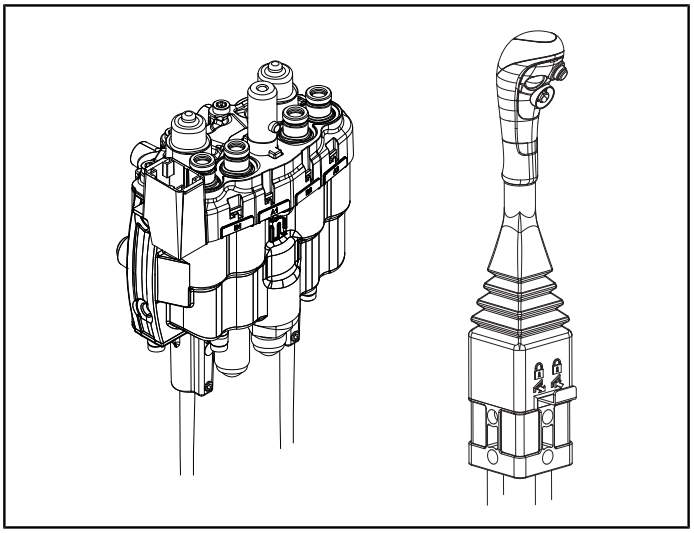


Fig.42 Mechanically operated system

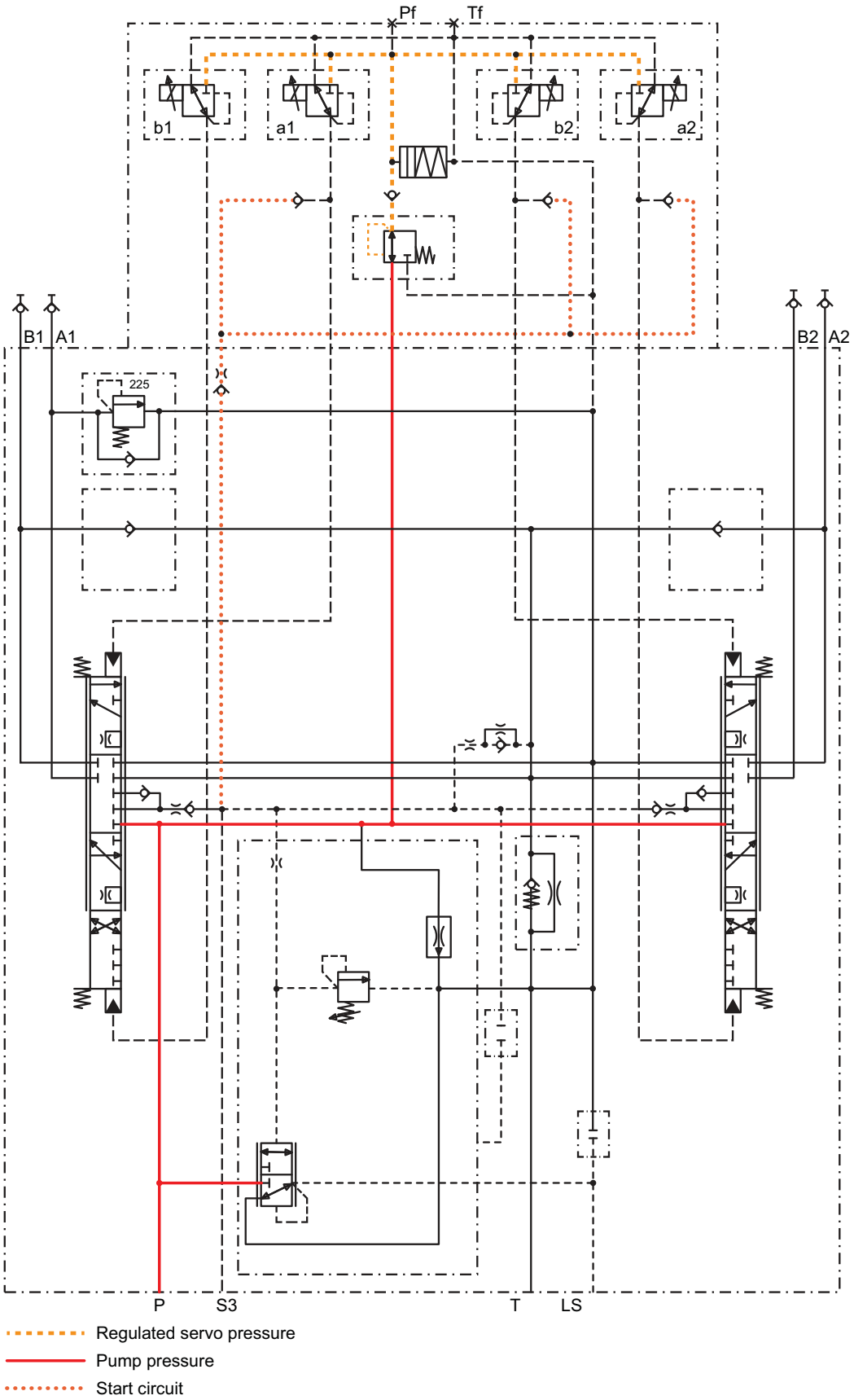


Fig.43 The pressure in port P is fed to the servo circuit via the servo pressure control valve. A special start circuit helps to generate servo pressure in hydraulic systems with low standby pressure.

3.2 Electronic features

There are two variants of electronically controlled LCS systems – ElectroDrive LCS and EasyDrive LCS. Refer to the user manual of the respective system for a more detailed function description.

3.2.1 ElectroDrive LCS

- Electronic joystick, thumb controlled
- Backlit display
- Soft shifting between implement movement and 3rd/4th service.
- Hydraulic implement lock control*
- Loader boom suspension, on/off*
- Tortoise function
- Shake function
- Visual AAC (Automatic Angle Control)
- Transport mode with loader boom suspension*
- Pressure relief function
- 3rd service on/off*
- 3rd service, locked*
- 3rd service, continuous flow, configurable*
- On/off configuration of 4th service*
- Hare function
- Programmable Quick Selection button

* depending on loader configuration

3.2.2 EasyDrive LCS

- Electronic joystick, thumb controlled
- Backlit display
- Soft shifting between implement movement and 3rd/4th service.
- Hydraulic implement lock control*
- Loader boom suspension, on/off*
- Transport mode with loader boom suspension*
- Pressure relief function

* depending on loader configuration

3.3 Hydraulic features

- Smooth operation features and complete control over heavy loads.
- Regulated flow on all functions makes it easy to combine functions.
- Float position for both loader arm and bucket.
- Low-pressure regeneration function that saves energy and flow; active during loader arm lowering and bucket unloading.
- Anti cavitation function keep the cylinders completely filled with oil.
- Valve does not affect tractor max. system pressure.

- Shock valve on boom lift circuit (not standard on all valves).
- Non-spill, flat-face quick couplings (JIC adapters on valves for centre-position mounting).
- The valve is adapted for Multi Coupling (accessory), which connects both hydraulic and electrical connections simultaneously.

3.4 Load Sensing valve

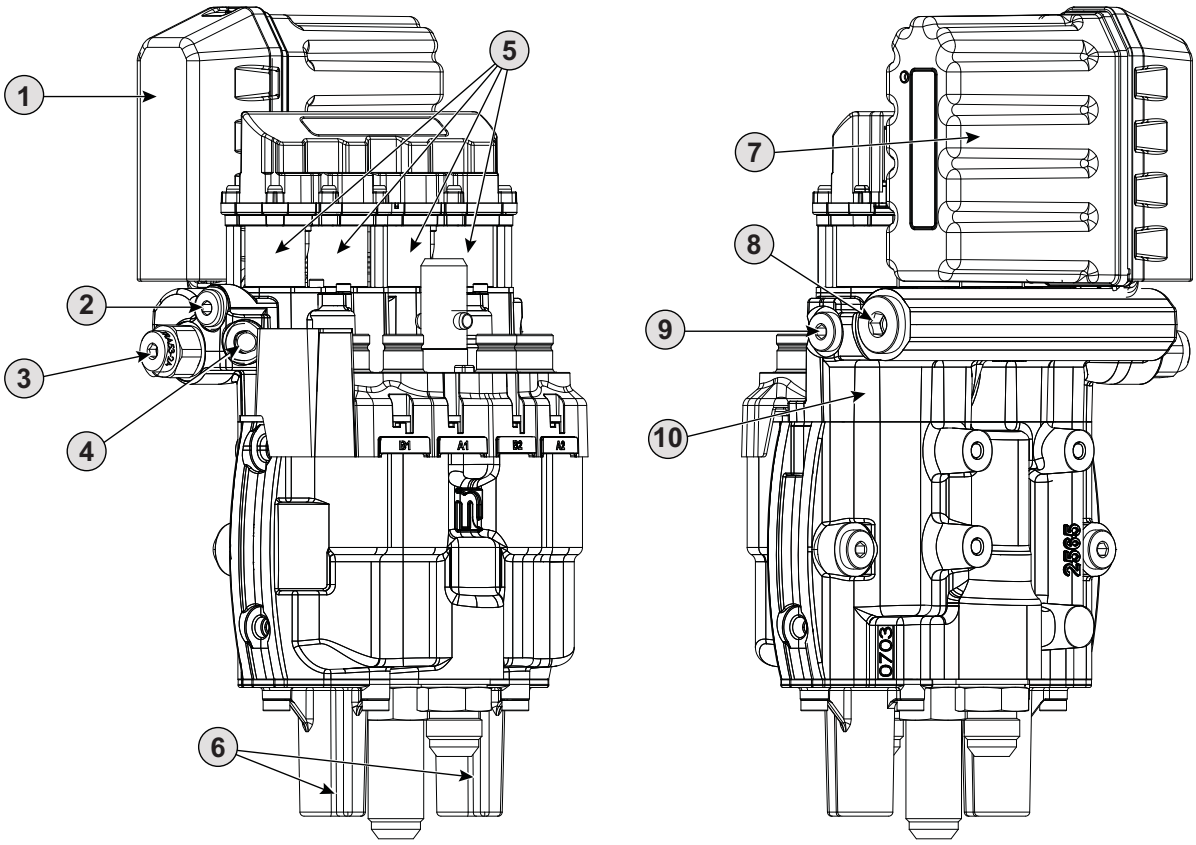
The LCS Load Sensing has a centrally-positioned LS control spool that transfers the load signal pressure to the pressure/flow compensator on the hydraulic pump of the tractor.

3.4.1 Features

- No impact on the tractor system pressure level. When the valve's pressure setting is reached, the load signal pressure is limited to the pressure/flow compensator of the tractor.
- Heating function to prevent thermal shock (seizing spool valves due to large difference in temperature).

4 STRUCTURE

4.1 Components



1. Protective cover, electrical connections
2. Measuring point Tf, tank pressure
3. Servo pressure reducing valve
4. Check valve, servo pressure
5. PWM solenoid valves
6. Servo cover, lower
7. Master unit
8. Ackumulator
9. Measuring point Pf, servo pressure
10. Servo cover, upper

4.1.1 PWM solenoid valves

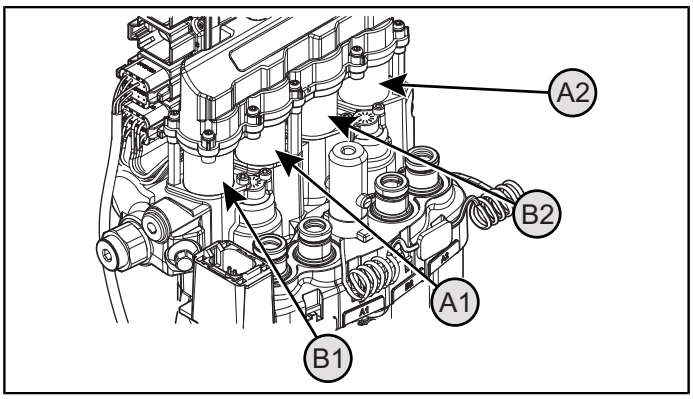
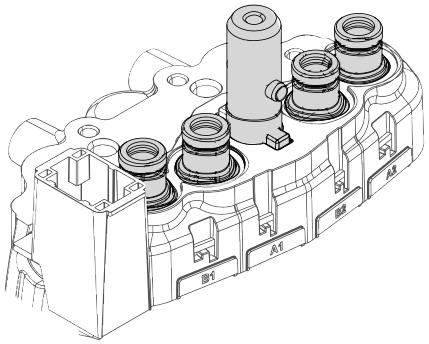


Fig.44 Solenoid valves B1, A1, B2, A2

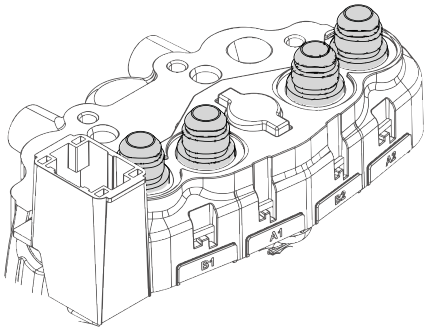
4.2 Connectors

4.2.1 Upper interface - valve

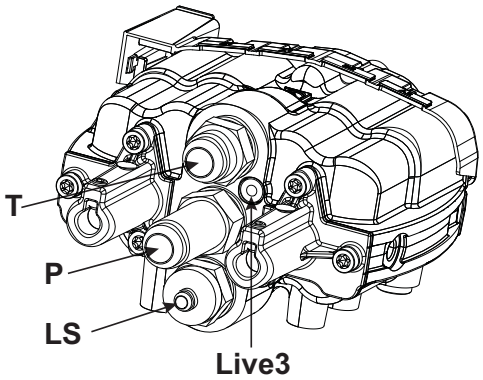
Version with quick couplings ISO16028



Version with adapters JIC 7/8"



4.2.2 Lower interface - valve



Connection P, T: adapters - JIC 1 1/16 "(external thread), valve ports - BSP 3/4" (internal thread).

Connection LS: adapters - JIC 9/16" (external thread), valve ports - BSP 3/4" (internal thread).

Connection Live3: BSP 1/8"

4.2.3 Connectors - Master unit

Connector	Pin	Function
D Live3 (if fitted)	1	PWM 3A+
	2	PWM 3A-
	7	PWM 3B-
	8	PWM 3B+
C CAN-BUS / Power supply *Joystick	1	12V+ (red)
	2	VDD*
	3	IGN (yellow)
	4	CAN H*
	5	CAN L*
	6	Pwr On*
	7	GND*
	8	12V GND (black)
B Multi Coupling	1	3rd service
	2	4th service
	3	Suspension
	7	Hydraulic locking
	8	GND
A Solenoids	1	PWM A1+
	2	PWM A1-
	3	PWM A2+
	4	PWM A2-
	5	PWM B2-
	6	PWM B2+
	7	PWM B1-
	8	PWM B1+

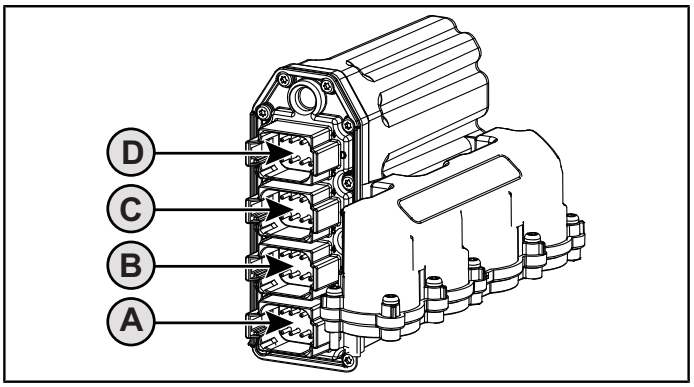


Fig.45 Connectors, Master unit

4.2.4 Connector - Joystick

1. Not used
2. PWR ON (Active low)
3. GND
4. CAN L
5. CAN H
6. VDD +12V

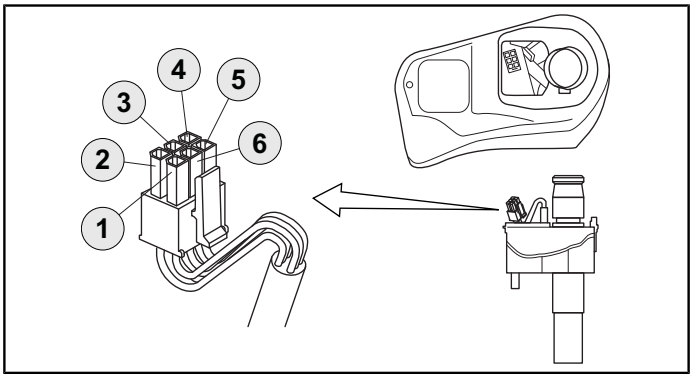
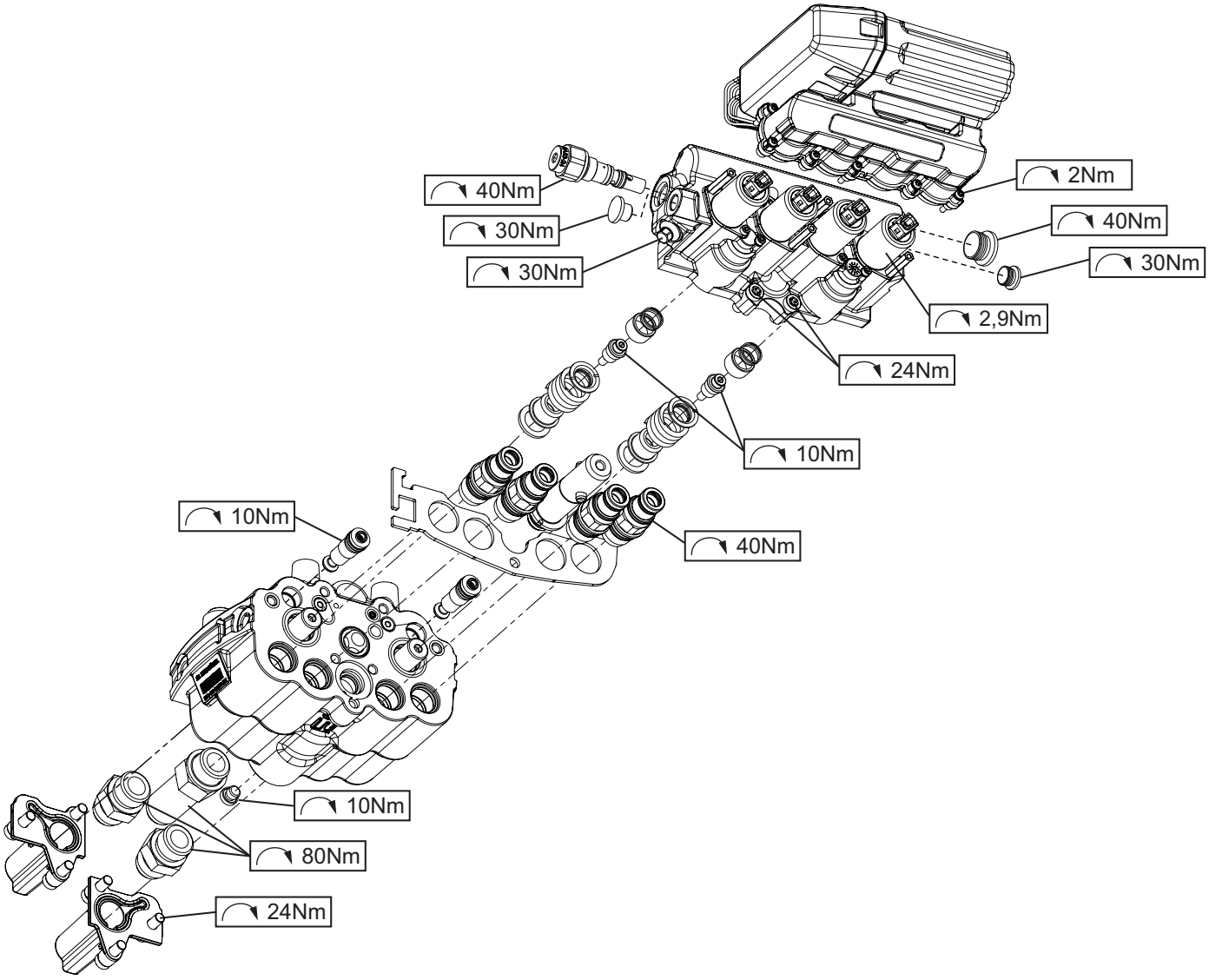


Fig.46 Connector, joystick

5 TIGHTENING TORQUES



6 TECHNICAL DATA

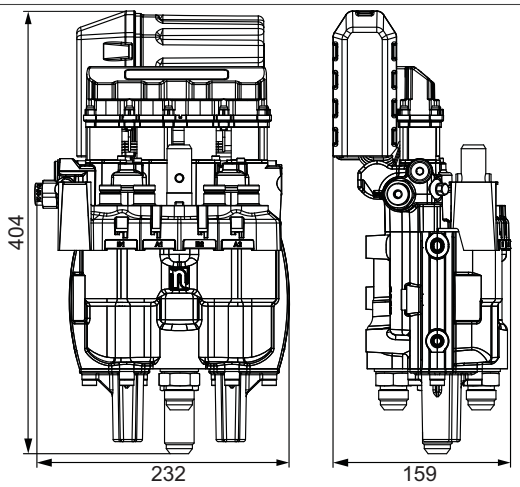
6.1 Pressure

Working pressure	170 bar+ΔP (standby pressure tractor)
Max. system pressure	250 bar
Max. tank pressure	20 bar
Servo pressure	23 bar
Choke valve port A1 (if installed)	225 bar

6.2 Temperature range

Ambient temperature	-30°C to +50°C
Oil temperature range during operation	-15°C to +90°C

6.3 Environment

Max. permitted contamination level in the hydraulic system fluid as per ISO4406	Better than or equal to 19/16
Viscosity range during operation	10-400 cSt
Weight (electronically controlled valve)	~17 kg
Dimensions (mm)	

6.4 Power supply

System operating voltage	12,0-16,0 Volt DC
System fuse	MINI FK1 15A
Max. system current	13A

6.5 PWM solenoid, main valve

Type	3/2 way proportional pressure reducing valve, 25 bar, 12V
Resistance	5,0 Ohm (±7% at +25°C)
Operating current	Loader operation: 500-950 mA
	Float position: 1200-1500 mA

7 SERVICE

7.1 Removing a valve from the tractor

Warning!
Relieve pressure before performing service work.

1. Stop the engine and relieve the pressure from the loader and LCS valve.
2. Place a container under the valve to collect spilled oil when the hoses are detached.
3. Clean around all hydraulic and electrical connections before disassembly.
4. Detach the hydraulic and electrical connection to the loader.

Important! There may still be pressure in the valve.

5. Detach the hydraulic and electrical connection to the tractor. Plug the hydraulic connections to the tractor and at the valve to protect against dirt and prevent oil spill.
6. Remove the valve from the tractor and place it on a clean workbench.

Important! The removed valve must **not** be cleaned with a high-pressure washer under any circumstances!

7. Clean away dirt and foreign objects from the outside of the valve. Do not use a cleaner that damages the surface treatment or plastic components.

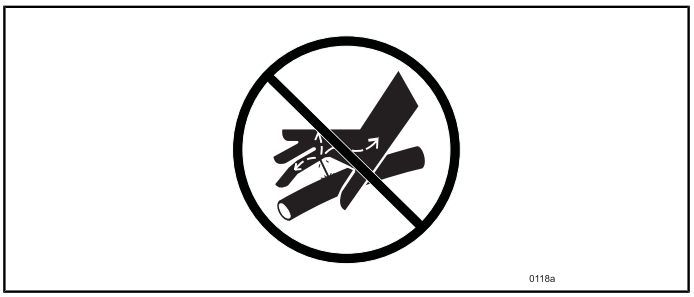


Fig.47 Relieve pressure before performing service work to prevent the risk of serious injury.

7.2 Disassembly of a valve on the workbench

7.2.1 General information

Valve disassembly must be done on a clean surface. The valve housing and removed parts must be protected from dust and dirt. Mark component positions in the valve as necessary.

7.2.2 Tools

- Combination spanner 25 mm, 32 mm
- Allen key 3 mm, 4 mm, 6 mm, 10 mm
- Hex socket 7 mm, 10 mm, 26 mm, 32 mm
- Hex socket, long 25 mm
- Hex socket, long 25 mm, internal depth: min. 36 mm (loader interface with JIC adapter)
- Slotted screwdriver 8 mm
- Torx spanner TX20, TX45

7.2.3 Removal

1. Place the valve in a container to collect spilled oil.
2. Remove all JIC adapters (21, 22, 23) for connection to the tractor's hydraulic system.
3. Remove the covers (24, 25) over the valve's actuator spools.
4. Detach the connector (3) and remove the plastic cover (1) over the quick couplings/JIC adapters.
5. Remove the electronic unit (2) from the servo cover (5) and disconnect the electric cables from the solenoid valves.
6. Clean the area around the quick couplers/JIC adapters.
7. Remove the quick couplings/JIC adapters (9).

   NOTE! The socket for removing JIC adapters must have an internal depth of min. 36 mm.
8. Lift the anti-cavitation valves (13) out of ports A2 and B1.
9. Lift the shock valve (12) (if installed) out of port A1.
10. Remove the solenoid valves (qty 4) (7), servo pressure check valve (26), servo pressure accumulator (4) and pressure reducing valve for servo pressure (6).

    Remove the servo cover (5) from the valve.

    Important: Check that all O-rings (qty 8) are in place.
11. Lift out the actuator spools for the bucket (18) and loader arm (17).

    Important: Note the position of the respective actuator spool. Handle with care. Make sure the spool surfaces are not damaged!
12. Lift out the LS control spool (11).

    Important: Handle with care. Make sure the spool surfaces are not damaged!
13. Remove the check valves (14).
14. Fit an M5 threaded screw in the threaded hole on holder for the check-valves (15, 16). Use a suitable tool to pull out the check valve holders. Disassemble the check valves (qty 2).

    Important! Note check valve seat position in the valve body.

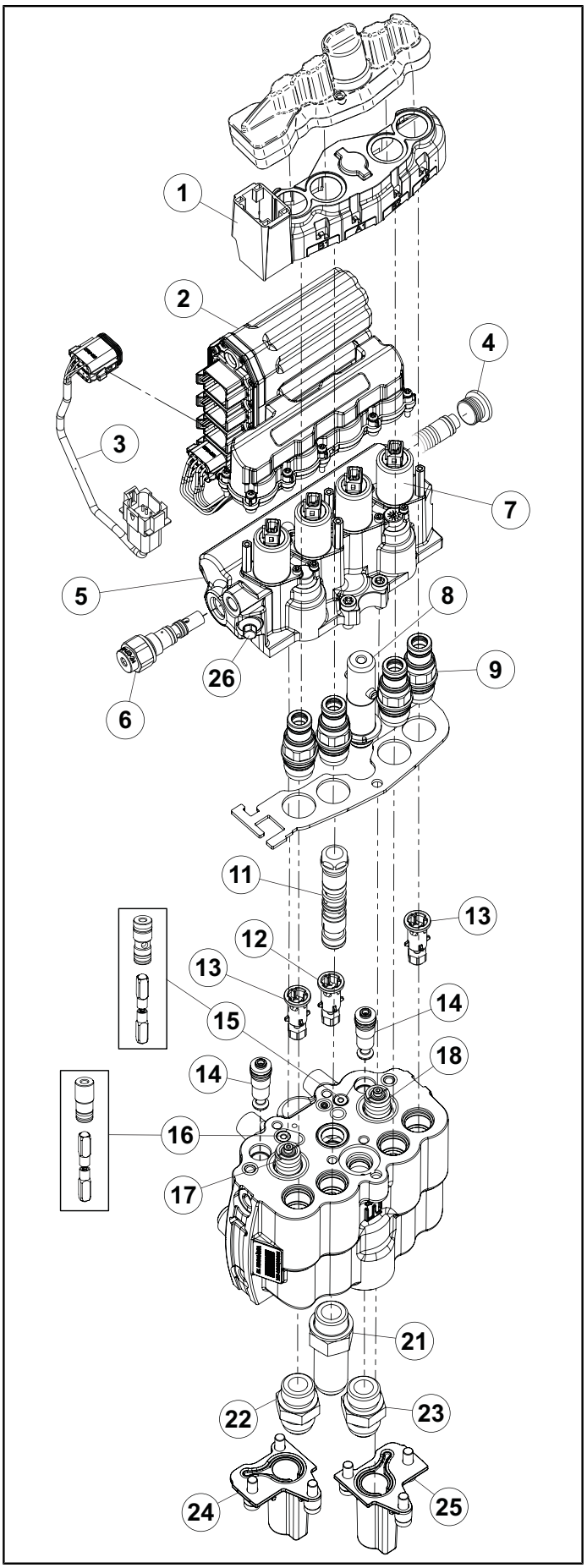


Fig.48 Disassembly of a valve on the workbench