Sidelifter SB450

Operation, Service & Maintenance Manual

DC-41479-02EN V1310

STEELBRO

Container Handling Solutions

Contents

Change History

This page records changes to this publication.

DATE	VERSION	DESCRIPTION
October 2013	V1310	Care of Lifting chains

Warranty Summary

This warranty statement is a summary of the full product warranty and does not constitute a full statement of the warranty terms and conditions.

The following warranty is given in lieu of and to the exclusion of any other guarantee, condition or warranty, either expressed or implied by statute or otherwise and whether regarding goods manufactured by ourselves or others. Provided the terms of payment are promptly complied with by you, we undertake to remedy with reasonable despatch, any original defects arising from faulty workmanship, in any goods manufactured by us, which under proper and normal conditions of use, are revealed within twelve (12) calendar months or one thousand (1000) hours of operation, whichever occurs soonest from the date of delivery, provided the defective item is returned to our Works, freight paid both ways, or in the case of the item not being returnable, then provided the expenses of travelling, transport, plant hire and accommodation are to your account.

Any goods supplied or work done in remedying such defects shall not extend our liability under this clause beyond the time stipulated above. At the expiration of such time, all further liability on our part shall cease. In the case of goods or material not of our manufacture, we shall endeavour to secure for you, the benefit of any guarantee given to us in respect thereof. In no case, shall we be liable for the cost of replacing and fitting of defective goods, and goods replaced shall become our property. No responsibility will be accepted for any defect, unless we first receive a written complaint, and we have been given first priority and ample opportunity to rectify the defect.

Liability for consequential damage or loss arising from defects, faulty materials, omissions, or negligence of workmanship, in any goods supplied by us is excluded.

Labour charges for work carried out under the terms of this warranty are to the purchaser's account.

Variations to the above are subject to STEELBRO New Zealand Limited Management approval.

Claims under warranty will only be accepted if all conditions of warranty are satisfied.

Foreword

This Operators Manual deals with your new **STEELBRO** Sidelifter. Take the time to read it through - it will be time well spent. The manual contains a short description of the Sidelifter together with instructions on its operation and maintenance. Usually this manual is provided along with other documentation, including manuals provided by third party manufacturers, compliance certification, parts lists, technical drawings and schematics. This information is provided in bound print format, in a folder or on a data CD.

To ensure a long life for your Sidelifter, you should ensure it is maintained regularly. All servicing, apart from lubrication and minor repairs should, wherever possible, be carried out by a **STEELBRO** approved service facility.

We reserve the right to introduce without notice, changes in data, equipment and service and maintenance instructions.

Symbols

This symbol means that the instruction in the shaded area is essential to the safe operation of your Sidelifter and failure to follow the instruction is likely to lead to injury or damage to property

This symbol means that the instruction in the shaded area relates to safe or recommended practice and failure to follow the instruction could lead to damage or accident.

This symbol means that the information in the shaded area is useful and/or is something we wish to emphasise.

Owner and Operator Responsibilities

Regulation Compliance

It is the responsibility of the **OWNER** to ensure that use of the Sidelifter fully complies with all Local Authority, State and Government regulations covering lifting equipment, road use, health and safety in the country where the Sidelifter is being used.

Health and Safety Compliance

The **OWNER** must provide and maintain work environments, systems of work, and equipment that is, as far as practicable, safe and without risks to health.

The **OWNER** must ensure that only properly trained and approved operators use the Sidelifter. In some locations, the law requires an operator's Certificate of Competency. The **OWNER** must ensure that they comply in full with such requirements.

Operators must consistently demonstrate:

1. Healthy and safe work practices.
2. Medical and mental fitness for the task.
3. A sound knowledge of emergency procedures.
4. A sound knowledge of the contents and requirements of the **STEELBRO** Manuals.

If there is a hazard to health or safety that cannot be eliminated, the **OWNER** must immediately cease using the Sidelifter and contact **STEELBRO** for advice.

Maintenance and Servicing

The **OWNER** should be aware that the reliability, safety, and longevity of the Sidelifter depends on the standard of maintenance and servicing that it receives during its working life. The maintenance and servicing schedules set out in the **STEELBRO** Manuals must be met, and **ONLY** suitably qualified technicians should carry out this work using best practice safe working methods.

Service personnel should always wear appropriate personal protective equipment when maintaining and servicing Sidelifters.

Maintenance Hazards

Service personnel should be aware of these materials and substances which can be hazardous when working with Sidelifter components:

- *Exhaust Gas* - Exhaust gases from power pack engines contain many toxic air contaminants including carbon monoxide which is a colourless, odorless gas. Power packs should only be operated in well ventilated areas.
- *Diesel Fuel* - The vapour and the liquid are irritants to the lungs and skin. Use nitrile or viton gloves to avoid skin contact with diesel fuel. Handle diesel fuel with care and avoid exposure to naked flame.
- *Hydraulic Oil* - Hazards associated with hydraulic oils include burns from hot fluid and accidental injection of fluid beneath the skin due to pinhole leaks in hoses. Gloves will not prevent this type of accident. Always ensure hydraulic system pressure has been relieved before working on hydraulic systems. When detecting hydraulic leaks use a piece of wood or cardboard and not your fingers to find a leak. Pinhole leaks can also atomise hydraulic fluid which can then be ignited by spark or flame. Use nitrile gloves to avoid skin contact with hydraulic oils.
- *Battery Acids and Gases* - Lead acid batteries use highly corrosive sulphuric acid and produce hydrogen and oxygen which are flammable. Avoid naked flames around batteries and protect your skin using butyl gloves.
- *Antifreeze* - The power pack uses an ethylene glycol long life coolant as a corrosion inhibitor and protection against freezing damage. These coolants are toxic by ingestion and absorption through the skin. Use butyl or viton gloves for protection.

Design and Modifications

When **STEELBRO** notifies you that a modification is required, it is the responsibility of the **OWNER** to ensure that the modification is carried out in accordance with the instructions from **STEELBRO** and if requested, to withdraw the Sidelifter/trailer from service until the modification has been carried out.

The **OWNER** should withdraw the Sidelifter/trailer from use when any deficiencies are identified during inspection of the Sidelifter/trailer which may affect its safe operation, until the design or operational deficiency is rectified.

The **OWNER** should ensure that neither the Sidelifter/trailer nor any of its components are used beyond their design capacity. For crane design capacity refer to the Working Load Limit decal and for the chassis design capacity (when applicable) refer to the Chassis Plate decal. Copies of both of these are included in the manual.

Particular care should be taken to ensure that the emergency stop controls are always operational.

Safety Instructions

It is the responsibility of the Owner to ensure that a Steelbro Sidelifter is only operated by an operator who:

- **is well trained, mentally alert and physically prepared**
- **is working under safe conditions in a comfortable environment**
- **is using a properly maintained and inspected machine in a safe manner**
- **has knowledge of operational and safety measures before operating the Sidelifter**

Operator Safety

Do not use a mobile phone or wear radio or music headphones while operating the Sidelifter.

Avoid any distractions or interruptions while operating the Sidelifter. Stop your lift operation in a safe position if you are being distracted or interrupted.

Always use personal protective equipment when operating the Sidelifter.

If you are unable to continue crane operation due to injury or illness, the Sidelifter must be stopped immediately and the fact must be reported to a responsible person. All operations must be disabled until it has been established whether the Sidelifter caused the injury or illness and the Sidelifter has been assessed as suitable for service.

Take care of your back when bending or manually lifting heavy items (e.g. when changing tyres or attaching chains to Sidelifter crane arms).

All Sidelifter operations can be carried out with the operator at ground level. **DO NOT** climb onto the crane structure. For maintenance or other operations that require 'working at height' refer to the appropriate regulations.

Shift Safety Practices

For the first lift of a working shift and the first lift of each shift where the load is greater than 50% of the maximum lifting capacity, the load must be raised a short distance to test the system before continuing the operation.

At the end of a working shift the Sidelifter should be left in a safe condition in a designated parking area and reasonable precautions taken against unauthorized operation. **SAFE CONDITION** is defined as power supply turned off and with cranes fully stowed. If laden, the container/s should be properly loaded onto the twistlocks, not suspended in any way.

Tractor Unit Safety

A trailer mounted Sidelifter should not be operated unless a tractor unit is coupled to it for stability purposes.

Always apply the vehicle park brake before operating the Sidelifter.

Never overload axles.

Regularly check tyre pressures. Incorrect tyre pressure reduces driving performance and increases tyre wear.

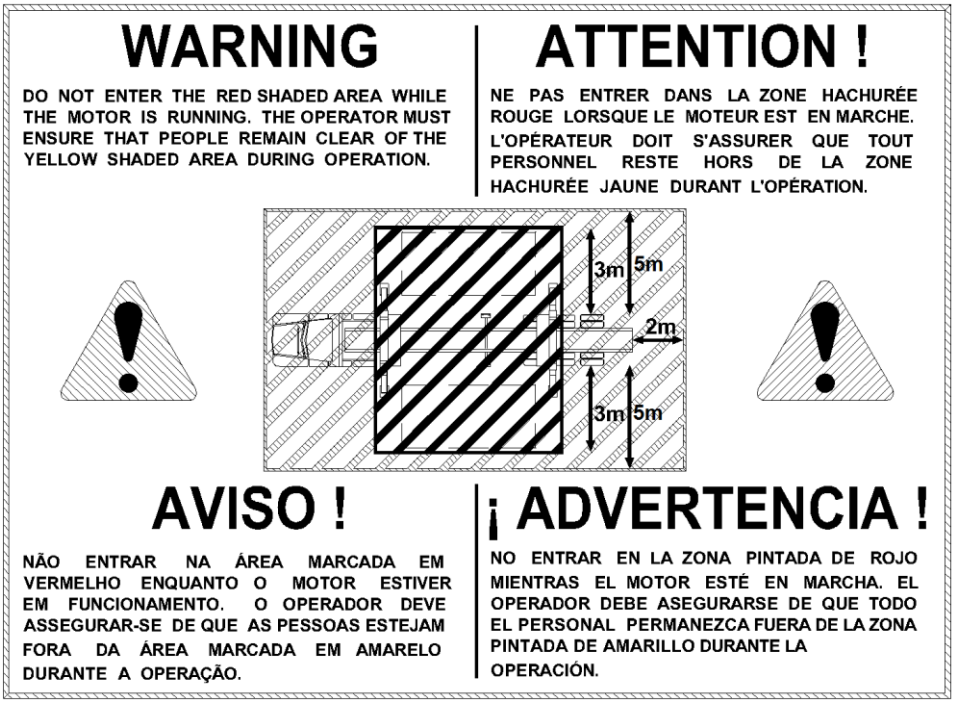
When some tractor unit park brakes are applied they stop providing air to the Sidelifter. Sidelifters with a powerpack need an air supply to operate the pneumatic throttle control on the powerpack. If this is the case then apply the Sidelifter park brake rather than the tractor unit park brake.

Stabiliser Legs

Always deploy the stabiliser legs before operating the cranes. Check that the feet have a firm surface sufficient to withstand the combined weight of the Sidelifter and load, which could be as much as 29 tonne per foot, before commencing any lifting or unloading.

The stabiliser legs must never be operated when the Sidelifter cranes are under load.

Work Area Safety



During operations unauthorised personnel **MUST** keep out of the working area of the Sidelifter as shown in the Dangerous Zone Warning decal.

Always keep the Sidelifter clean and keep loose parts stowed away securely. (Use toolbox provided for this specific purpose)

Never walk or stand below a suspended load.

Never leave the Sidelifter unattended with the load on the hooks and/or the operation controls enabled.

When transferring containers to or from other vehicles do not stand between those vehicles. The Sidelifter must be operated from the end of the companion vehicle. Refer to Lifting Safety (on page 12) for more information on the recommended operating areas.

Lifting Safety

This STEELBRO Sidelifter is designed to lift from one side only. Do not lift any load beyond the centre-line of the Sidelifter onto the ‘non-lifting’ side, referred to in this document as the 'offside'. Do not attempt to lift a container from the offside.

Never exceed the maximum capacity stated on the Working Load Limit Chart for your unit.

Always ensure the twistlocks are unlocked prior to commencing lifting operations.

With Sidelifters that traverse to handle different container sizes, lifting is only permitted when the crane modules are placed into the correct lift positions as defined by the crane stops.

Lifting lugs are left hand and right hand and must be used in their correct positions.

Ensure that lugs are fitted according to the instructions in the manual Lifting Lug Instructions (on page 38).

Do not lift containers from the top lifting points without the use of a STEELBRO top-lifting frame.

ISO Tanktainer Lifting

When flammable liquids are being charged to or discharged from ISO Tanktainer containers:

- the engine must be **SHUT DOWN**
- the battery isolating switch turned **OFF**.

When ISO Tanktainers are being loaded or unloaded from the Sidelifter ensure that **ALL TANKTAINER VALVES ARE SHUT**.

Recommended Operating Area

The Sidelifter Operator must have a full view of the load during the lift and if required sufficient competent persons must be available to assist. The recommended operating area is shown below:

This is a view from above. Operator stands on the lifting side at least 2 metres back from the rear of the Sidelifter where he has a clear field of vision of both the lifting side and rear of Sidelifter. This position is also recommended for transfer to or from a companion vehicle

For transfer to or from a railway carriage, the recommended Operating Area is at least 2 metres back from the rear of the Sidelifter, close enough to the gap between the Sidelifter and carriage to be able to see both.

Other Hazards

Be aware of these other hazards which may affect the safety of your lifting operation:

- Wind Effects - Strong or gusty winds can make it difficult to safely load or unload a container.
- Soft Ground - The ground under the stabiliser legs must be capable of supporting the load. Assess the ground conditions before loading or unloading. Use packing material to spread the load when the ground is assessed as not being capable of supporting the load with the stabiliser foot alone.
- Do not climb on the Sidelifter. Use a ladder if you need to reach the chain lugs when double stacking containers.
- Load shifting - To prevent unsecured container contents moving during a transfer, keep the container as level as possible when lifting and transferring the container.
- Ground Angle - Ensure that you are operating within the acceptable ground angle limits of the Sidelifter.

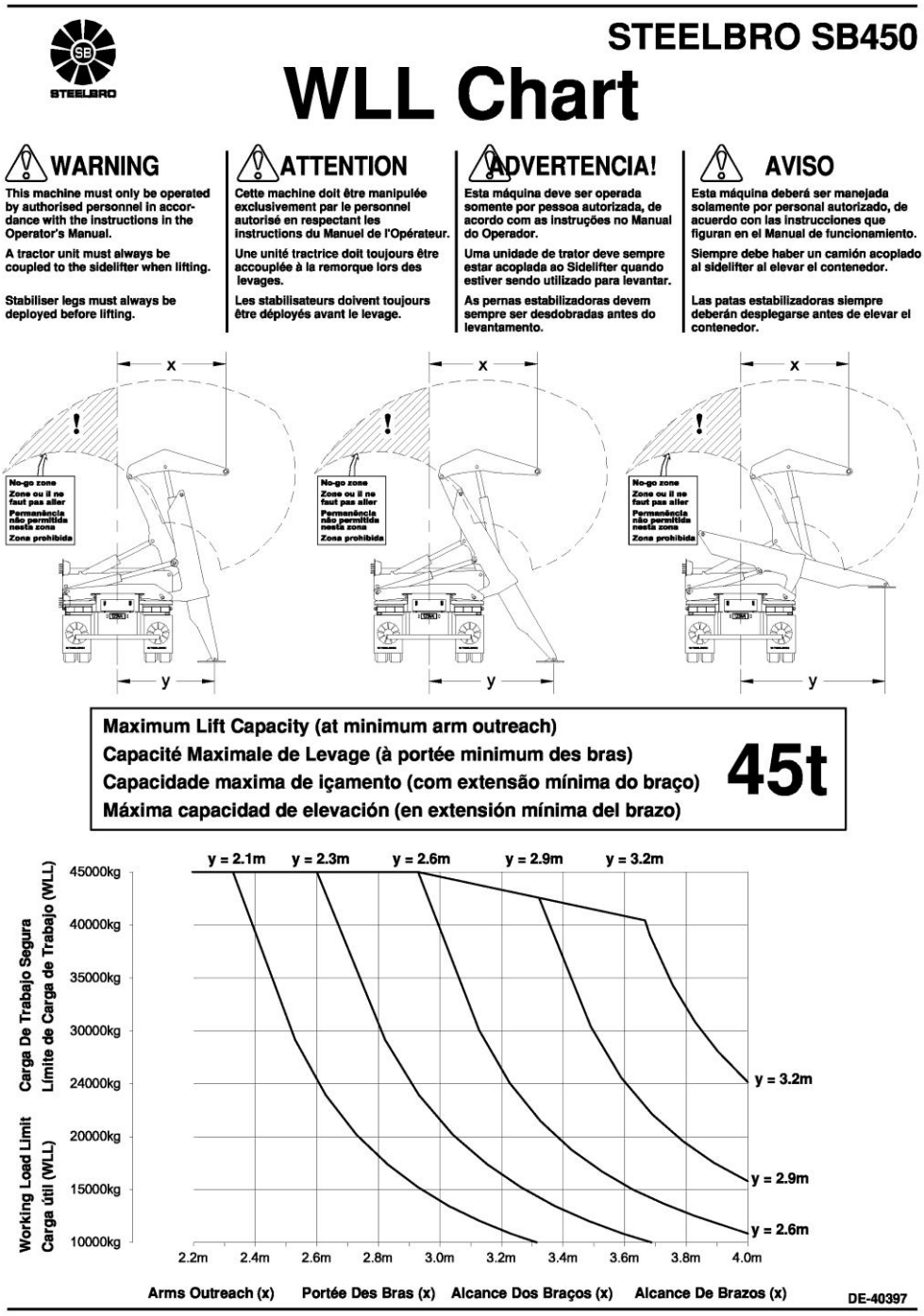
The maximum camber and elevation limits for Sidelifters are:

	40' CONTAINER	20' CONTAINER
Camber	+/- 6 degrees	+/- 6 degrees
Elevation	+/- 4 degrees	+/- 6 degrees

WLL Chart SB450

Never exceed the maximum capacity stated on the Working Load Limit chart for your Sidelifter.

The Working Load Limit Chart is located on the chassis of your Sidelifter.



Overhead Power Lines and Lightning Strikes

Overhead Power Lines

Do not operate the Sidelifter close to power lines or cables. See Operating Near Power Lines for further information on safe distances.

Lightning Strikes

Do not operate the Sidelifter during a lightning storm. If the Sidelifter should be struck during a lightning storm then a full functional test should be completed before using the Sidelifter to lift containers.

Driving Safety

Before Driving Away

Check that:

- Stabiliser legs are fully retracted
- Cranes are stowed in the low folding position
- Chains stowed safely
- Twistlocks are locked
- Nothing is protruding beyond the width of the vehicle

Driving Style

- Always pay attention to the road conditions and adapt driving style to suit.
- Take extreme care when approaching and taking turns. The huge inertia mass of a laden Sidelifter and its tendency to go straight could cause a sideways skid of the whole unit, particularly on a slippery road surface. Road train drivers should take special care.
- Take particular care when reversing the Sidelifter.

Other Important Points

- Never drive with a suspended load.
- Never use the cranes to drag a container along on the ground.
- Unladen Trombone machines should only be driven with the chassis in the retracted position.
- Never operate the Sidelifter cranes while the vehicle is moving.
- Know the physical dimensions and weight of your vehicle to ensure you do not exceed roadway limits such as bridge weight or height limits.

Crane Traverse Safety

Sidelifters that can handle different sized containers by moving the crane modules must have all arms and stabilisers in the stowed position when the crane modules are moved.

Never move the crane modules with modules loaded or the arms and stabilisers extended.

Emergency Stop Button

In an emergency, depress the emergency stop button on the remote control, until the engine has stopped.

As an extra precaution, and if it is safe to do so, turn off the engine key switch on the main control panel.

Modifications

No modification may be carried out on the Sidelifter without written authority from Steelbro.

Hydraulic System

Always ensure that when disconnecting hydraulic tubing and hoses there is no hydraulic pressure in the line before switching off the power supply to the system.

Getting Started

General Description

The Sidelifter is able to load ISO containers to and from:

- the ground
- truck decks
- other trailers
- railway wagons
- stacked containers (2 high)

Because the Sidelifter lifts the container using chains and lifting lugs attached to the bottom container corner castings, it is ideal for handling tanktainers and containers that do not have forklift pockets.

Operator Controls

STEELBRO Sidelifters have three types of control systems - Analogue, Digital and SMARTlift.

As an option the Sidelifter can be specified with radio remote control. Both the cable and radio controls are identical in function.

Sidelifter control valves have detachable manual levers. In the event of an electrical breakdown the operating cycle can be completed manually by using these levers. The levers are stored in tool box.All operator controls are on the remote control transmitter.

The control functions include:

- Two joystick controls which operate all lift arm and stabiliser leg operations
- A two position switch for high or low speed
- A positional rotary switch which selects Off, module traverse, stabiliser legs or lifting arms.
- A red "mushroom" Emergency Stop button.
- Remote Start
- Horn
- Worklamp On/Off
- Trombone function

Joystick Controls

The joysticks, together with the function selector switch, control all movements of the lifting arms and stabiliser legs.

Arms Mode:

Function	Movement
Top arm up	Joysticks up
Top arm down	Joysticks down
Bottom arm out	Joysticks out
Bottom arm in	Joysticks in

Stabiliser Mode:

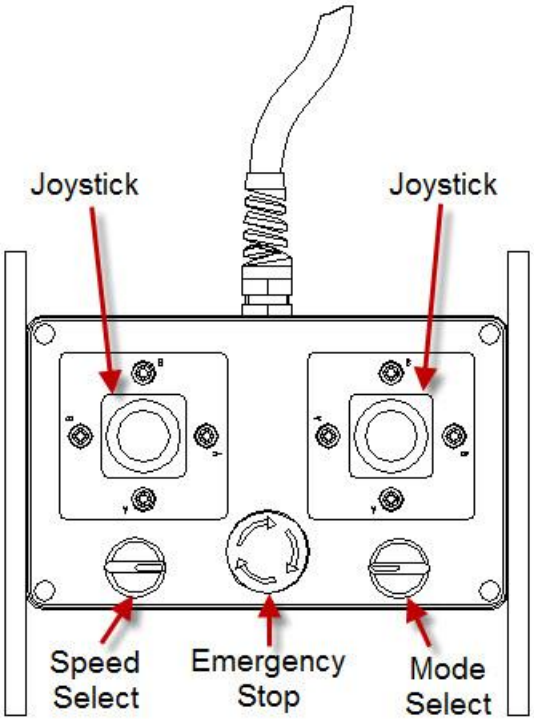
Function	Movement
Stabiliser out	Joysticks out
Stabiliser in	Joysticks in
Tilt ram up	Joysticks up
Tilt ram down	Joysticks down

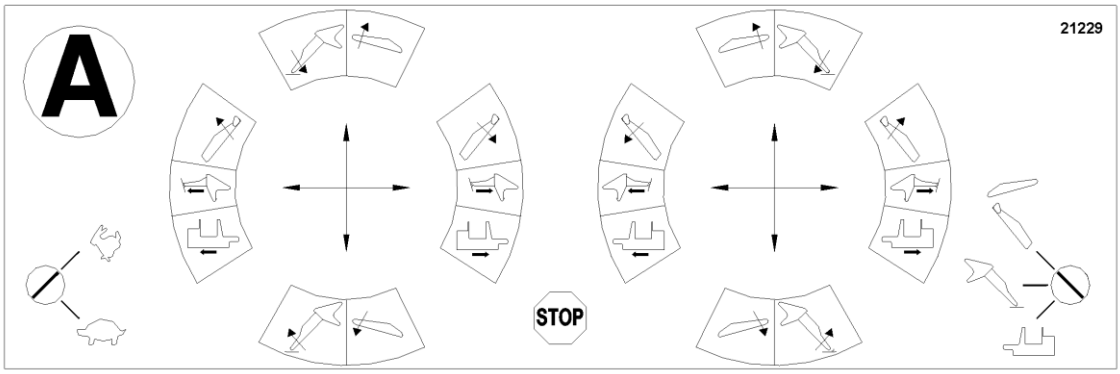
Traverse Mode:

Function	Movement
Module traverse to 40 foot position	Joystick out
Module traverse to 20 foot position	Joystick in

Operator Controls - Analogue

The operator controls for a standard analogue cable remote control are shown below.



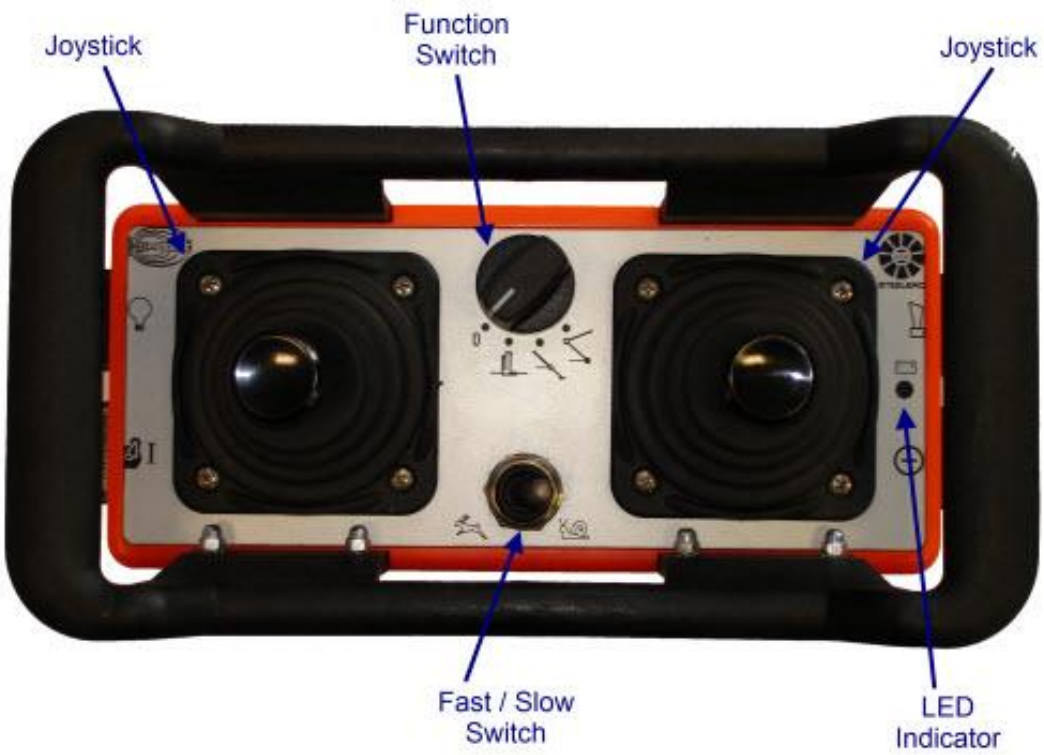


Top View Controls

Mode Select	Three position switch (std) for Traverse Mode / Stabiliser Mode / Arms Mode
Speed Select	Two position toggle switch to select hi or low speed hydraulic operation
Emergency Stop	Press to stop all operations. To restart operations the Emergency Stop button must be rotated clockwise to release it.

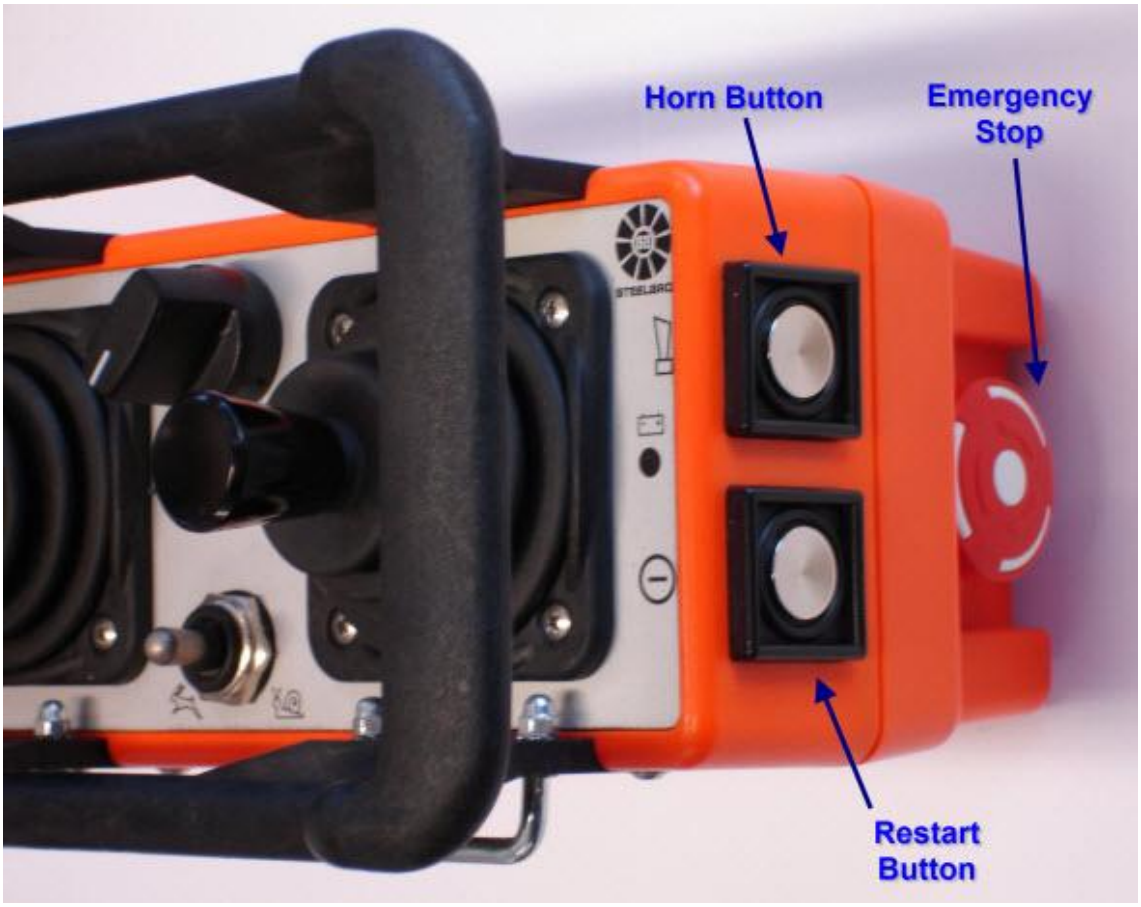
Operator Controls - HBC

The operator controls for the HBC remote control transmitter are shown below.



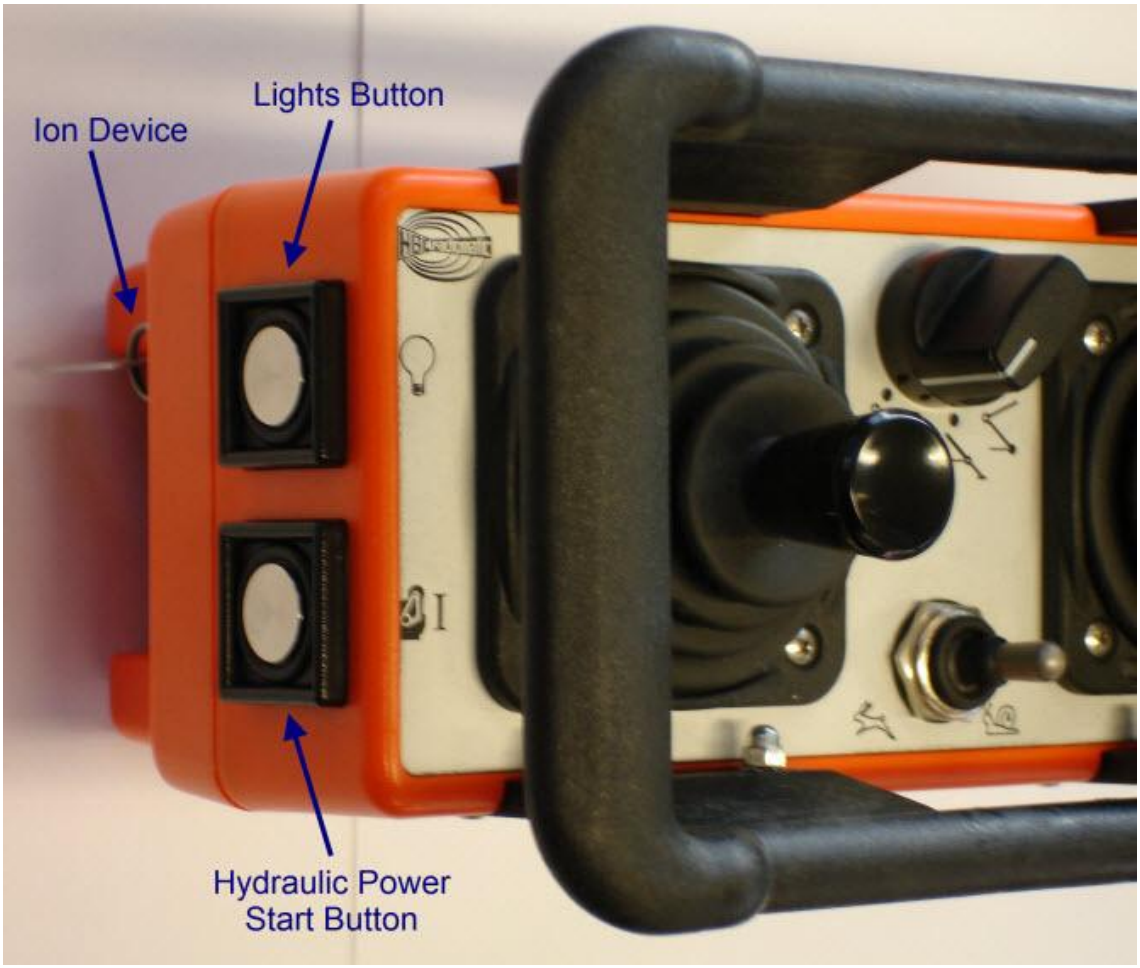
Top View Controls

Function Switch	4 position switch for Off / Traverse Mode / Stabiliser Mode / Arms Mode
Fast / Slow Switch	2 position toggle switch to select Hi or Low speed hydraulic operation
LED Indicator	Flashes red when battery requires charging. Flashes rapidly green when making contact with the receiver. Flashes slowly green when communicating with the receiver.



Right Side Controls

Horn Button	Press to sound the warning horn
Transmitter Restart	Start the remote control transmitter if it has powered down
Emergency Stop	Press to stop all operations. To restart operations the Emergency Stop button must be rotated clockwise to release it.



Left Side Controls

Light Switch	Turns on / off the lights on the lifter arms
Powerpack Start	Starts / stops the hydraulic power pack.
Ion Device	This screw-in plug identifies the remote control with the receiver and disables controller if removed.

Commissioning Checks

Prior to operation of your new Sidelifter, make the following checks:

- Examine the Sidelifter, checking that the specification is as ordered
- Check for any damage to exposed equipment that may have occurred during the delivery journey (lights, mudguards, bodywork etc.)
- If the battery and night work lamps have been stowed in the toolbox for security purposes during shipping, then these need to be fitted. Ensure that the battery has sufficient electrolyte and is fitted with negative terminal to earth
- Check tractor unit turntable compatibility to ensure safe coupling of the kingpin to the tractor unit and fitting of any kingpin blocks in the case of fifth wheel couplings mounted on oscillating 5th wheels
- Lubricate the tractor coupling,(i.e. trailer upper fifth wheel plate and kingpin with a good grease. Hub grease is ideal. Couple and uncouple the Sidelifter to ensure the coupling lock operates freely
- Connect up brake hoses and see that couplings are seating correctly. Listen for air leaks. Check brake operation. Ensure spring brakes have had the release bolts removed
- Check tractor unit electrical coupling and layout compatibility, ensuring proper operation of clearance marker lights, brake lights and indicator lights
- Ensure tyres are inflated to correct pressure
- Examine axle alignment for any damage during delivery journey
- Check axle oil level in hub sight glasses if oil filled hubs fitted
- Ensure landing legs wind up and down while trailer is coupled to tractor
- Check dry thread torque settings for wheels and suspension. Refer to manufacturers data for settings.
- Check that hydraulic oil level is between "Min" and "Max" levels as indicated on the hydraulic reservoir sight glass with all crane lifting modules and stabiliser legs fully stowed at the 20' position
- Ensure sufficient engine oil and engine coolant is in the Power Pack engine when fitted
- Check that fuel level on Power Pack diesel tank is above minimum sight glass level

Preparation and Startup

1. For cable remotes, connect the remote control lead from the Sidelifter control cabinet to the remote control box.
2. Clean down the area where the module slides over the chassis top flanges with a clean dry cloth.
3. Start the engine in the following sequence:

- Check the tractor unit is correctly coupled with the park brake applied

In tractor/trailer combinations where the trailer parks on spring brakes, the park brakes when applied stop the provision of air to the semi-trailer from the tractor. The Sidelifter requires an air supply to retract the crane module locking pins and operate the engine stop and speed control. There is normally enough air stored in the trailer system when it is parked to provide this for a reasonable number of applications. However it is essential that the Sidelifter brake system and piping are always free from air leaks, which waste the stored air. On systems where parking is performed by applying air pressure to the service lines this does not apply.

- Ensure all the Emergency stops are released and remote control (cable or radio) is working
- Insert the key into the Sidelifter start switch and turn to the preheat position. Hold the key in this position until the amber preheat lamp beside the key switch goes out

Pre-heating the engine is only necessary when the engine is cold.

- Turn the key to the start position. When the engine starts release the key

Chain Preparation and Shutdown

1. If the lifting chains are stowed in the toolbox then fit these as follows:

- On the remote control, select Legs, and place the feet on the ground
- Select High speed () and raise the bottom arms to their maximum
- For chains that use Clevis pins, attach the hammerlocks of the chains to the Clevis. For chains using an oblong link, fit the oblong link over the G pin on the end of the crane arm
- Raise the top arms until the chains hang freely in the air
- Check that the lifting lugs, which are left and right handed, are correctly positioned as per Lifting Lug Instructions (on page 38). Ensure that the left and right lifting lugs are in their correct positions. If not, lower the top arm, and reposition. Raise the top arm and check lug position is now correct
- Return the lifting arms to their stowed position ensuring the lifting chains are in the chain trays beside the twistlocks

2. Move each lifting module independently from the delivery position to the opposite end of its traverse. Clean down chassis surfaces along where the lifting module moves.

- Allow the powerpack engine to idle for a minute after working at full power to allow a gradual rate of cooling
- Shut down the engine by turning off the remote control or pressing any of the red emergency stop buttons on remote control box.
- Turn off the key ignition. Remove the key if the unit is to be left unattended for any time.
- Always turn off the radio control when not in use

Notes on Tractor/Semi Trailer Operation

Coupling and Uncoupling

Periodically check that coupling jaws or hook locks are free, working easily and are well lubricated. If the main plate is covered with road dirt and grit, clean off with solvent and re-lubricate with a good quality grease (hub grease is ideal).

Regularly inspect tractors and trailers for damage to couplers, kingpins and pick-up plates, caused by violent impact.

We recommend this, as it is the practice of some drivers to back up to trailers too fast, when coupling.

Undetected damage resulting from the careless and dangerous habit of backing up to the trailer too fast can endanger life and goods.

Experience Counts

Everyone connected with articulation is familiar with the sound of a tractor being coupled to a trailer - but it is difficult to draw a line between the firm, positive "clunk" and an impact between tractor and trailer severe enough to cause damage.

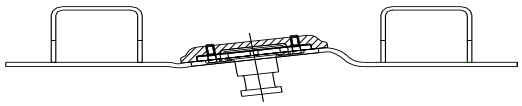
Chief Cause of Trouble

Coupling heights of loaded trailers when parked will vary due to many operating factors, such as difficult road or yard surfaces. Fleet surveys have shown that most damage is caused by attempting to couple up units that are unsuited in terms of coupling heights.

Many of the older tractors have rear springs with a high deflection rate, and when uncoupling a loaded trailer, the landing gear is wound down at the loaded height. As the tractor moves away from the trailer, the tractor springs rise to the unladen position. Thus, when re-coupling, the tractor springs have to be forced down to permit the fifth wheel to pass under the trailer plate. This action requires considerable effort, but if the driver uses too much power, an excessively violent coupling takes place. Damage is often caused to the trailer plate in this way and periodic checks should be made to ensure that the plate is not distorted and that the kingpin is square to the face of the trailer pick - up plate.

Damage can also be caused to the coupler throat, and spreading of the hook jaws, if the trailer is too high for the tractor unit. The surfaces of the trailer pick up plate and fifth wheel coupler should be in contact to obtain correct connection.

Drawing showing a typical damage and misalignment of kingpin caused by an excessively violent coupling of tractor and trailer:



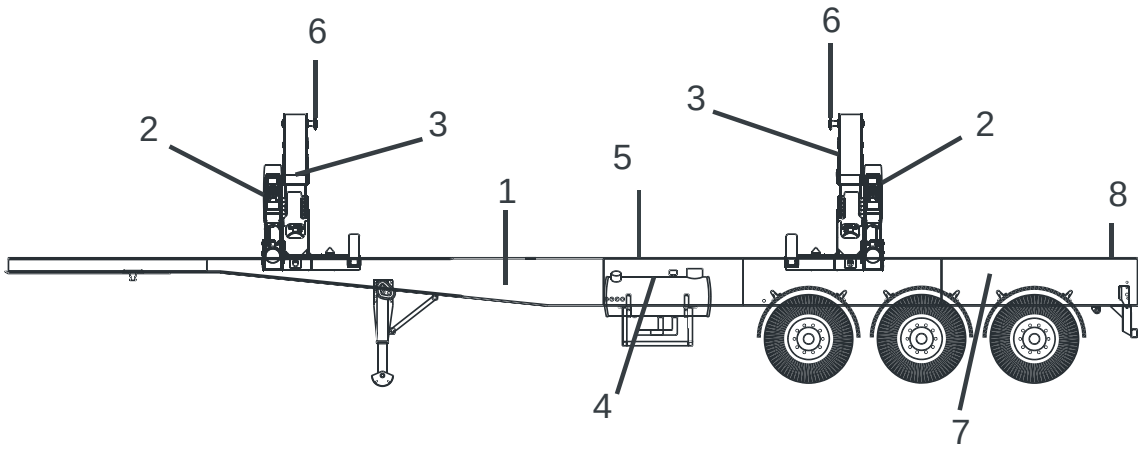
Simple Checking Devices for Semi Trailers

The plate and kingpin can be checked very quickly by using a straight edge. This can be any straight flat piece of metal or timber with an appropriate rectangular section cut out to clear the kingpin.

Place the straight edge across the trailer plate, first across the trailer and then longitudinally, and you will soon see any bow or distortion in the plate. Also by having a cut-away rectangular shape square to the flat edge, any damage or misalignment of the kingpin can be seen. The cut-away portion should be made to the correct depth - the same as the kingpin depth - thus serving to show that the kingpin has not been forced upwards, which would probably impair the coupling mechanism.

To check the tractor coupling, it's a good idea to use part of an old plate of convenient size with a kingpin mounted in position. This way the coupling action can be simulated. When coupled, the pin should be held firmly and snugly without slack.

Main Components



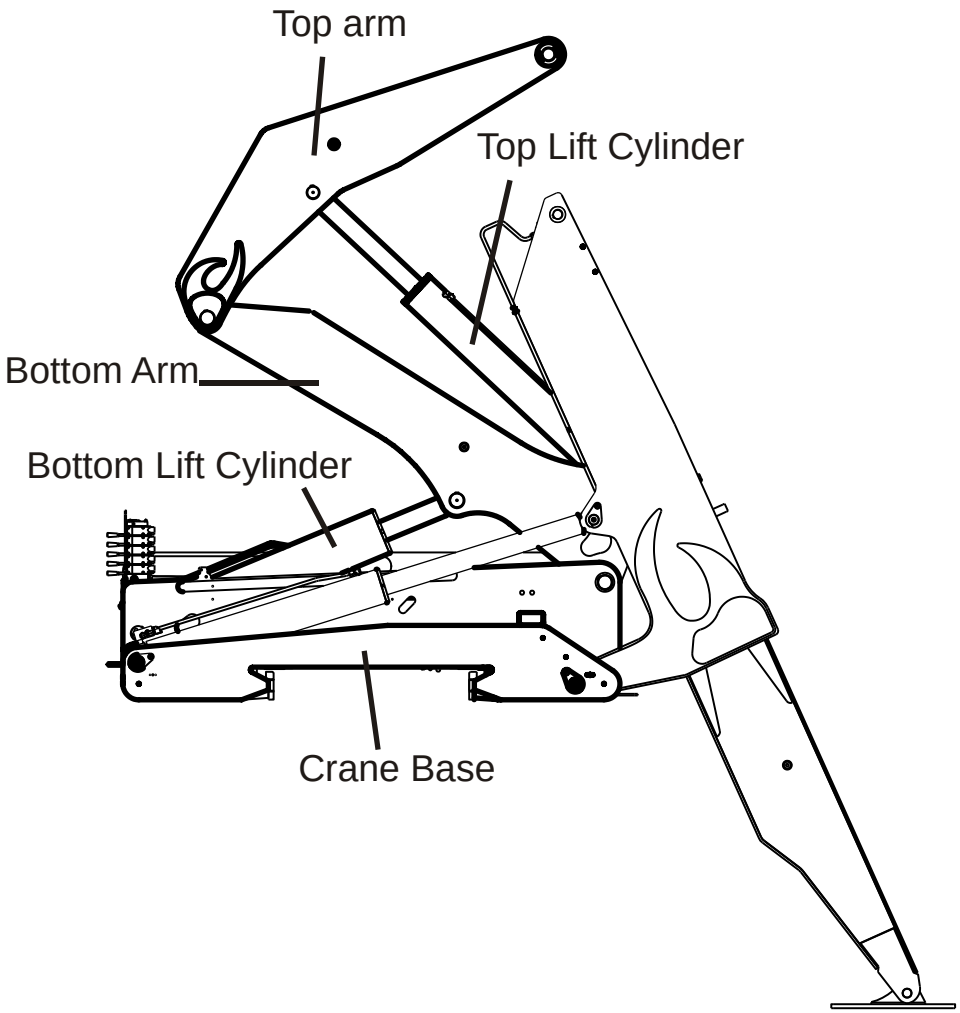
The main component systems of the Sidelifter are:

1. Chassis, Suspension and Axles
2. Stabiliser Legs
3. Crane Lifting Modules
4. Hydraulic System
5. Power Pack and Control System
6. Lifting Accessories
7. Pneumatic System
8. Electrical System

The Sidelifter has two traversing crane modules and can carry one 20 foot or one 40 foot container. Optional central twistlocks allow for carrying 2 x 20 foot containers.

All that is necessary for operating the Sidelifter is a tractor unit of sufficient size, with compatible braking, electrical and kingpin couplings.

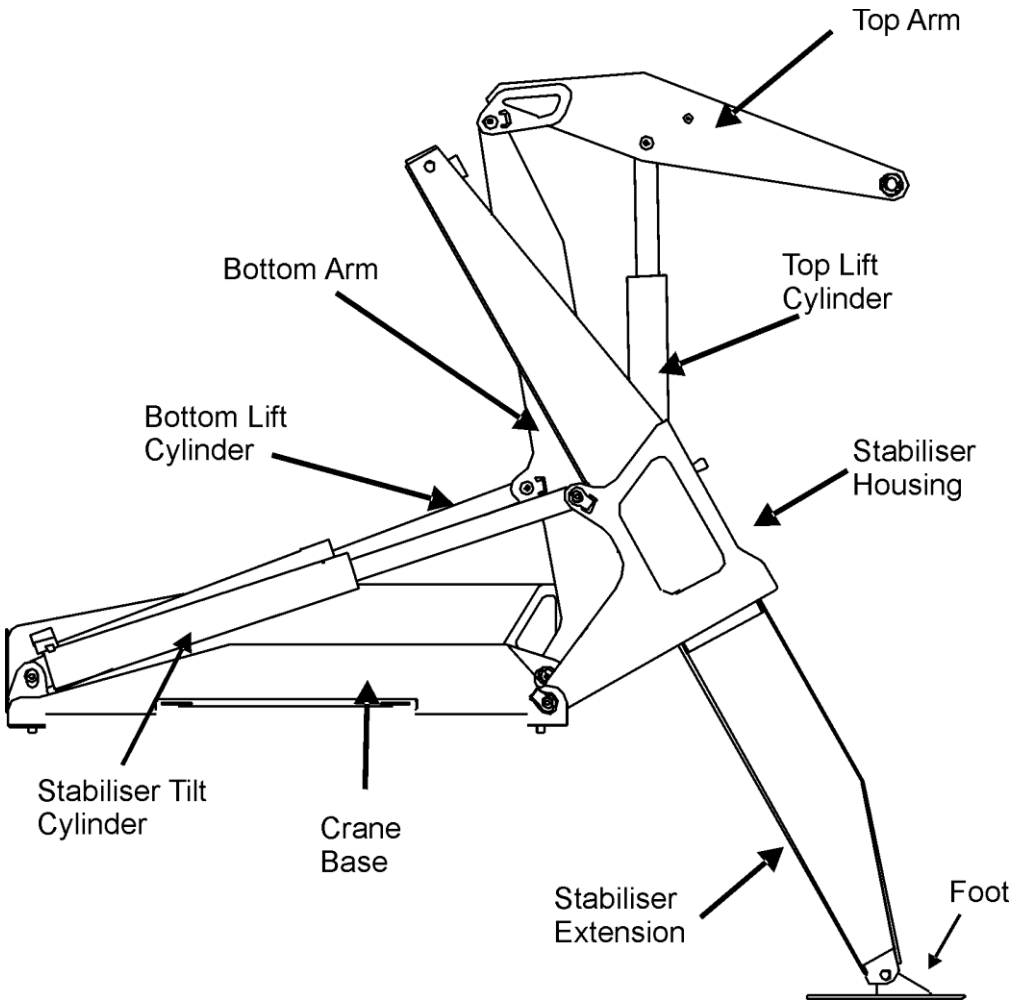
Crane Lifting Modules



The crane modules and lifting arms are continuously welded box sections constructed from high tensile steel.

The pins are mounted in replaceable lubricated glacier bearings.

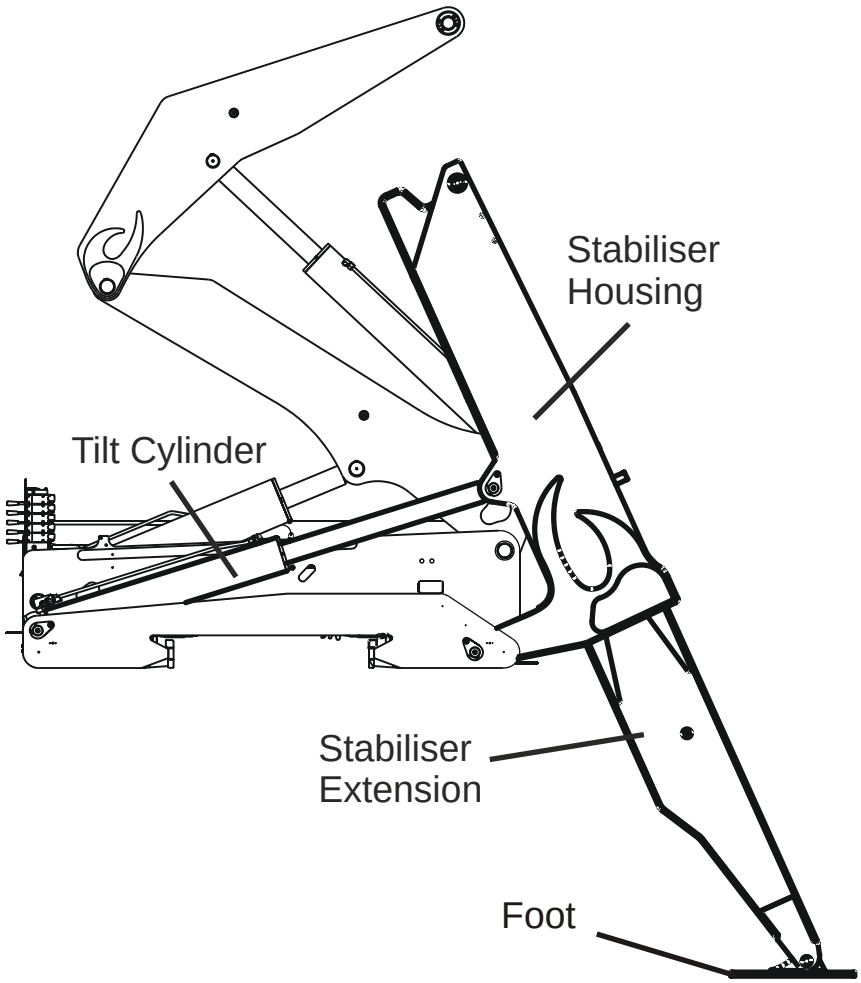
Crane Base and Lifting Arms



The crane modules and lifting arms are continuously welded box sections constructed from high tensile steel.

The pivot pins are mounted in replaceable lubricated glacier bearings.

Stabiliser Legs



The stabiliser legs are continuously welded box sections constructed from high tensile steel. The pins are mounted in glacier bearings.

The versatility of the Steelbro Sidelifter stabiliser legs greatly assists the transfer of containers to or from other vehicles.

Stabiliser legs can be operated simultaneously in tilt and extension and can be placed in any of these positions:

- At maximum outreach
- In a close-in position
- Underneath the deck of a companion vehicle
- On the deck of a companion vehicle.

Never operate the Sidelifter without first deploying the stabiliser legs.

Ground Pressure

Working ground pressure figures are based on the Maximum Load Lifting Capacity of the Sidelifter. Designers should take into account the fact that Sidelifters can lift heavier loads than their Maximum Lifting Capacity because of their built-in safety margins. The strength of surfaces on which a Sidelifter will operate should allow for this. Based on the Maximum Load Lifting Capacity of the Sidelifter, ground pressures and loading per square foot are:

Weight of box at Max MLC*:	Max. Load per Foot	Ground Pressure
45 tonnes	28.5 tonnes	1.8 MPa

*MLC= Maximum Lifting Capacity.

Max. Ground Pressure = Max. Load per foot / area of stabiliser foot.

Where the pre-operational risk assessment reveals the presence of cellars, underground services, ducts or the like, a competent person must assess whether the ground is stable enough to support the load of the stabiliser foot.

Stabiliser Interlock System

The Stabiliser Interlock system prevents lifts from being attempted without the stabilisers being deployed. A plunger switch fitted to the stabiliser housing is activated when the foot has positive downward pressure. Until that time the lifting arms are disabled.

Never move the stabilisers with any load on the arms. This is highly dangerous. If the stabilisers lift off the resting place during a loading operation, the correct action is to move the load back over the stabilisers before manoeuvring the load back over the trailer, keeping the distance between the bottom of the load and the twistlocks as small as practicably possible. If the stabilisers continue to lift then first return the load to the ground before deploying the stabilisers further in order to increase foot pressure.

Operation

On units fitted with analogue controls, on startup a warning beeper sounds and a warning light on the crane illuminates until both stabilisers are deployed.

The ‘top arm up’ and ‘bottom arm down’ functions are disabled until there is a positive downward pressure on the stabiliser foot.

Never move the stabilisers with any load on the arms. This is highly dangerous. If the stabilisers lift off the resting place during a loading operation, the correct action is to move the load back over the stabilisers before manoeuvring the load back over the trailer, keeping the distance between the bottom of the load and the twistlocks as small as practicably possible. If the stabilisers continue to lift then first return the load to the ground before deploying the stabilisers further in order to increase foot pressure.

System Logic	Warning Buzzer and Light	Relay (no)	Top Arm Up	Top Arm Down	Bottom Arm Up	Bottom Arm Down
Both Stabilisers touching the ground	NO	CLOSED	YES	YES	YES	YES
Either or both Stabilisers off the ground	YES	OPEN	NO	YES	YES	NO

Lifting Components

This section describes the chains and lifting lugs for use on the crane arms.

Care of Chains

Chain slings play a very important part in performing lifting operations **SAFELY**. A chain sling is made up of chains, clevis or oblong ring, shorteners and lugs. A certified chain sling has had each component individually tested and then the whole sling is tested and certified. Note these important points about chain slings:

- Only use chain slings that have been tested and certified.
- Never weld any part of a chain sling.
- If a chain sling shows any signs of distortion, excessive wear or damage send it to an approved testing facility, for replacement of all damaged parts and to be re-certified. Alternatively replace the chain sling with a new certified chain sling.

Chains should be proof tested annually. **STEELBRO** recommends that all inspection certificates be retained.

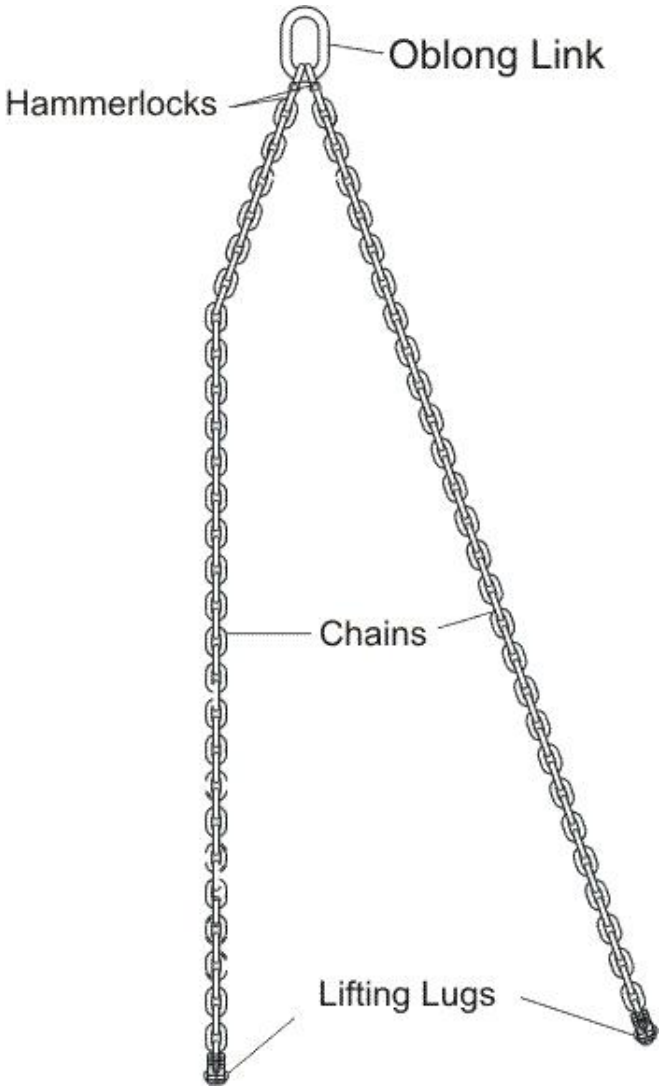
Hammerlocks

Hammerlocks have a stress pin linkage. If a hammerlock will not fully fold then it is likely that chain sling has been over-stressed. Send over-stressed chain slings to an approved testing facility for replacement of all damaged parts and to be re-certified.

Lifting Chains

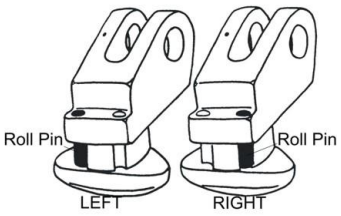
The lifting chain assembly is illustrated below. When handling the oblong link, take care to place it on the lifting pin with the left and right chain legs in their correct position, and facing towards the container.

Never switch chains from one machine to another as they may vary between one Sidelifter and another in length and size.



Lifting Chain Assembly

Lifting Lug Instructions

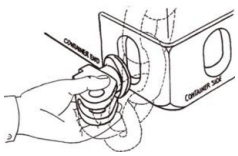


The only real difference between a left-hand Lug and a right-hand Lug is the position of the roll-pin which is marked in black in the above diagram. The roll-pin prevents the lug from accidentally falling out of the container corner casting. When facing the end of a container, the container corner casting at your left hand side is the Left Hand Container Corner Casting. The other one on the right is the Right Hand Container Corner Casting.

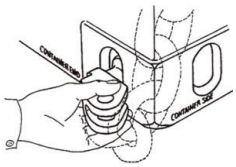
Always use the left lug in the left corner casting and the right lug to the right corner casting. Using a lug in the wrong corner casting can result in the container coming loose during a lift with potentially fatal results.

Using the Container Lifting Lugs

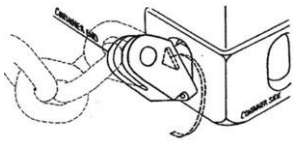
1. With the clevis facing away from the container, insert the lug into the container casting hole.



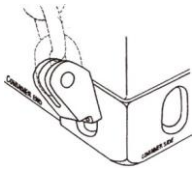
2. Rotate the lug so the clevis moves towards the centre line of the container and until the roll-pin prevents it from rotating any further.



3. The clevis now points inwards at an angle of approximately 60 degrees to the horizontal. The roll-pin prevents the lug from accidentally falling out of the container corner casting.



4. When the container is lifted, the lug will slide to the top of the container corner casting hole and rotates backwards slightly to the angle of the supporting chain. This removes any load from the roll-pin.



The angle of support chains ensures that the lifting lugs stay locked inside the container castings while the container is suspended.

Using the Sidelifter lifting chains instead of appropriate lifting accessories for handling non-ISO container items, or for top lifting of ISO containers, will cause severe damage to the machine, and place personnel at risk. Any such action will void our warranty.

Electrical System

The electrical system consists of the following:

- A 12-volt supply from the engine alternator system
- A main junction box mounted in a cabinet located at the rear of the chassis
- 2 crane module mounted junction boxes.
- One chassis mounted junction box adjacent to the power pack
- Cable Remote Control.

System Lay Out

Electrical power is supplied from the Kubota alternator system to the main junction box. The cable remote is plugged into this junction box. The main junction box is connected to the chassis mounted junction box and the two crane mounted junction boxes.

System Operation

The main control box is equipped with a key/starter switch, oil and alternator warning lamps, water temperature gauge, glow plug indicator lamp and an hour meter.

When you turn the key, the 12 volt system is energised and the run stop control (solenoid pneumatic actuated air cylinder) moves to the run position, providing the trailer air system is fully charged. When the joysticks are returned to their neutral position the engine speed returns to idle after approximately three seconds. (A timer unit is fitted in the main junction box and set to three seconds to give this delay).

The remote control is equipped with two joysticks to operate all hydraulic functions. A function selector switch allows selection of stabiliser legs, crane arms, and for units with crane traverse function, crane traverse. This allows joystick signals to be transmitted via relays in the main junction box directed to the Danfoss control valves via the crane mounted junction boxes. The joysticks also incorporate micro switches that independently signal the "PVEM power relay" (powers up the Danfoss control valve coils). There are more details on how to use the remote control to operate the cranes in the Section: Crane Operations (on page 45).

Also mounted in the remote control is a two-position switch for "High Speed" and "Low Speed" selection. When "High Speed" is selected, two relays in the main junction box are activated, one to direct joystick signals to the Danfoss control valve coils, the other to activate the "High speed load sensed unloader valve" solenoid coils. When "Low Speed" is selected these unloader valve relays are de-energised. An emergency stop button is fitted to the remote control to shut down all systems in an emergency.

Dangerous Goods Specifications

Sidelifters with dangerous goods specification are fitted with a dual pole battery isolation switch.

Never turn the battery isolation switch off while the Kubota powerpack is running!

This will cause a Load Dump solenoid to turn off which may damage the electrical system.

Hydraulic System

The hydraulic system consists of the following;

- Hydraulic oil reservoir with return oil filter and a breather assembly
- Direct coupled tandem hydraulic pump
- A High-pressure oil filter.
- High Speed load-sensed unloader valve assembly.
- Two Danfoss proportional control valves.
- Four hydraulic cylinders fitted with double check valves operating the stabiliser legs
- Two hydraulic cylinders fitted with single over-centre valves operating the top lifting arms
- Two hydraulic cylinders fitted with double over-centre valves operating the bottom arms
- Two hydraulic cylinders to traverse the cranes
- A Hydraulic pressure gauge.

Overcentre Valves

The hydraulic system is fitted with pilot operated over-centre valves on the crane arm cylinders which are factory preset to cope with all foreseen shock loads or attempts to lift more than the crane's maximum lifting capacity.

The over-centre valves:

- Prevent the arms from moving unless there is a pressure signal from the main hydraulic valve.
- Help keep the movement of the load controlled and constant when being lowered, regardless of the pressure that may be in the cylinder.
- Ensure that the cylinders are held in position, should the hydraulic system lose pressure. This stops the arms from dropping and thus preventing any run away of the load in the event of a hose failure.

System Control

The system is controlled by a remote control. The controls comprise a pair of two axis joysticks, a function selector switch and an emergency stop button.

System Operation

The tandem pump delivers oil to the high speed load sensed unloader valve, where the two flows can be combined to give high speed operation, or split to give low speed with the second pump flow returning to the oil reservoir.

Also fitted to this valve is a solenoid operated dump valve that is activated by the joystick controllers and the emergency stop buttons.

The pump flow from the high speed Load Sensor (LS) unloader valve passes through the high pressure filter and is divided and supplied to the front and rear control valves. These valves are connected to each other with a load sense line. This helps to maintain synchronisation of the crane lifting arms when unequal loads are handled.

A hydraulic gauge is fitted into the LS line and indicates the pressure in the system.

The crane control valves are Danfoss PVG 32 proportional type and are signalled from the joysticks for directional control. High or low speed can be selected at the remote control. The low speed function only applies to the lifting arms. The stabiliser legs are always in high speed irrespective of the position of the high/ low speed selector switch.

When "Low Speed" is selected only one pump is supplying the system and the joystick signals pass via an electronic hydraulic flow (EHF) control and the function speed is reduced by 50% to allow fine control under heavy and difficult loading conditions.

Pneumatic System

This system comprises the following elements:

- A hold back protection valve
- An engine speed control cylinder
- An engine stop control cylinder

Hold Back Protection Valve

This valve protects the trailer brake system and isolates the auxiliary pneumatic system if the trailer air system drops below a predetermined level as shown in the auxiliary circuit drawing provided.

Engine Speed Control

An ON/OFF air solenoid valve when activated by either remote joystick supplies system air pressure to the base end of the speed control cylinder to obtain maximum engine speed (2800rpm). Retracting the cylinder returns the engine to the idle speed (approximately 1400rpm).

Engine Run/Stop Control

An engine RUN/STOP control solenoid activated by the key switch and deactivated by the emergency stop buttons. This solenoid requires power to be on to run the engine. If power is removed, the engine will stop.

Power Pack

The power pack is a Kubota. The specification of the Power Pack depends on the model of Sidelifter:

Kubota Model	H.P.	@ RPM
V2203	40	2800
V2403	42	2600

The motor speed is governed to the required pump speed of 2800 rpm.

The power pack control panel is within a weatherproof cabinet, located on the rear of the machine.

The electric start key and switch are situated on the control panel, as are the following:

- Hour meter, water temperature and oil pressure gauges,
- Generator and pre-heat warning lamps,
- E-stop circuit lamp and a glow lamp.

Chassis, Suspension and Axles

Parts of this chassis are fabricated from high tensile steel and must not be welded without authority from Steelbro or its authorised service representative.

The standard Kingpin is a 2" S.A.E. removable (bolt in) type.

Two-speed wind up landing legs are fitted behind the gooseneck.

The make and model of this Sidelifters axles and suspension are detailed in a separate section of this manual together with the maintenance and service information of those components.

Crane Operations

This section covers how to operate the cranes when performing different kinds of lifts.

Operating Near Power Lines

Do not operate a Sidelifter close to power lines.

Electricity supply bodies in each State/Country may have issued regulations or guidelines for the use of cranes in the vicinity of overhead conductors (power lines). The Sidelifter operator must be familiar with these regulations and carry out a site-specific risk assessment prior to the start of any operation where working within close proximity to power lines is required.

All power lines must be treated as live unless the electricity distributor or transmission line operator has stated otherwise. Such a statement must be in writing and include date and time frame of the isolation of the power lines.

The Sidelifter, the lifting arms and the load must be kept at least the listed distances from any power lines during operation:

Voltage	Minimum Distance Required
Up to 500	2.0 metres
500 to 40 000	4.0 metres
40 000 to 133 000	6.4 metres
Over 133 000	10 metres

Where the above stated minimum distances cannot be achieved, the electricity distributor must be notified in writing and the Sidelifter must not be operated within the minimum distance until the following requirements are satisfied:

For Power lines up to and including 133 000 V

- Written permission from the electricity distributor has been obtained
- All conditions specified by the electricity distributor are complied with.
- The electricity distributor is notified before work commences.
- A ‘Spotter’ performs spotting duties.
- A pre-start site/job meeting has been convened and a risk assessment completed.

For power lines greater than 133 000 V

- The electricity distributor has provided an easement entry permit.
- Written permission from the electricity distributor has been obtained
- All conditions specified by the electricity distributor are complied with.
- The electricity distributor is notified before work commences.
- A 'Spotter' performs spotting duties.
- A pre-start site/job meeting has been convened and a risk assessment completed.

Contact with Power Lines

If the Sidelifter or load contacts power lines, the relevant electricity distributor must be notified immediately. The Sidelifter operator must warn other personnel not to touch any part of the Sidelifter or load and if possible without anyone approaching operate the Sidelifter to break contact.

When unable to move or untangle the Sidelifter from the power line, no further action must be taken until the power is isolated and conditions are confirmed safe.

When a Sidelifter has been in contact with a power line, it must be checked by a suitably competent person and must not be returned into service until all recommended repairs have been completed.

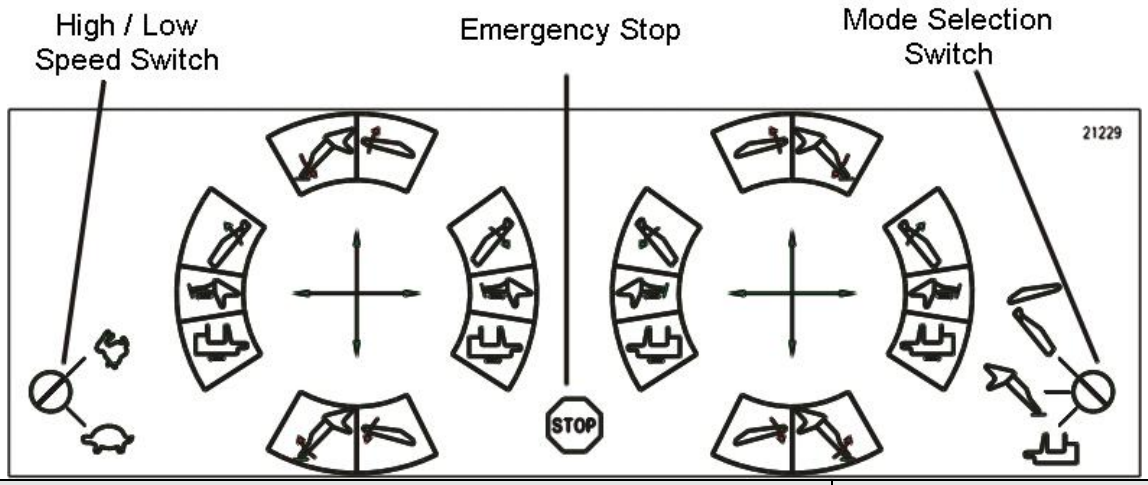
Crane Module Operation

All operator controls are on the remote control box. This remote control box contains:

- Two joystick controls that operate all lift arm and stabiliser leg operations.
- A two position stay put switch for High  /Low  Speed
- A three position stay put switch to select module traverse  , stabiliser leg  and lifting arm  operations.
- A Red "Mushroom" type stop button for Emergency Stop.

As an option the Sidelifter can be specified with radio remote control. Both the cable and radio controls are identical in function.

Sidelifter control valves have detachable manual levers. In the event of an electrical breakdown the operating cycle can be completed manually by using these levers. The levers are stored inside a cylindrical plastic container, located inside the chassis, near the power pack.



Arms:	
Top Arm Up	Joysticks Up
Top Arm Down	Joysticks Down
Bottom Arm Out	Joysticks Out
Bottom Arm In	Joysticks In

Stabilisers:	
Stabiliser Out	Joysticks Out
Stabiliser In	Joysticks In
Tilt Ram Up	Joysticks Up
Tilt Ram Down	Joysticks Down

Traverse:	
Module Traverse to 40' position	Joystick Out
Module Traverse to 20' position	Joystick In

Positioning the Lifting Cranes

The process of positioning the lifting cranes should happen in this order:

1. Position the Lifting Cranes in the appropriate positions for the size of container.

   a) Select Traverse ( ).

   b) To move modules out to 40' position, push joysticks out. To move to 20' position, push joysticks in.

2. Position the Sidelifter trailer for lifting the container. Do this second so that, in the instance of lifting a container onto the Sidelifter, it is easier to line the cranes up beside the container.

The furthest apart the Cranes can be positioned is 40 feet, and the closest is 20 feet.

Lifting a Container from the Ground

On a Sidelifter with bending leg stabilisers, refer to the section on how to deploy them before reading the instructions below:

Before performing a lift, ensure the following conditions are met:

Sidelifter must be attached to the tractor unit.

Sidelifter park brake is applied.

Check that the lifting area complies with safety zones recommended on the decal and is clear of any obstructions.

Ensure that the strength of the ground surface is sufficient to withstand a 29 tonne maximum point loading. If in any doubt, place hardwood timber packing of at least 50mm thick and 200mm x 500mm under each stabiliser foot.

If the stabiliser feet have been placed into a hollow or downward slope then sufficient timber packing will need to be placed under the feet to lift them back up to a level position, if you wish to handle a loaded container.

Park the Sidelifter alongside the container with approximately 300mm clearance between the container and the Sidelifter

Perform the following checks:

a) Sidelifter twistlocks are directly opposite the container corner castings.

b) Sidelifter parking brake is applied.

c) No hazards and obstructions such as overhanging building awnings, electric power lines or telephone cables.

d) Nothing is in the way of the Stabiliser Legs and/or Feet and surface is solid enough to bear them.

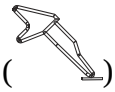
e) Twistlocks on the Sidelifter are in the raised position and unlocked.

- Start the hydraulic system supply (Powerpack or PTO). If the powerpack engine is cold then allow it to warm up for 2-3 minutes.
- Move to the safe operating zone as shown on the decal.
- Select **HIGH SPEED** () operation on the remote control if this option is available.
- On multicrane units, select the Front 20', 40', or rear 20' option on the 3-way switch.
- Select **STABILISERS** ( or ). Extend the stabiliser leg extensions to their maximum then tilt the legs until the feet touch the ground. Do not load feet - additional pressure will not give additional stability
- Set the mode selection switch on the remote control to Arms (). Manoeuvre the top and bottom arms until the chains are positioned centrally to the ends of the container, and fit the lifting lugs into the corner castings of the container, ensuring that there are no twists or tangles in the chains and that the left and right hand lifting lugs are in their correct positions

Do not try to force the cranes alongside a container. If the lifting arms will not clear the container, the lifting equipment and stabiliser legs should be returned to the stowed position and the Sidelifter positioned so it will clear the container.

- Take an initial strain on the chains by raising the top arms upwards. Ensure that the lift pins of the crane are in the centre of the container. Use the movement of the top and bottom arms to centralise the lift pins. Take the weight of the container and check that the Sidelifter is stable with the weight being lifted
- Select **LOW SPEED** ( or ) on the remote control if this option is available.
- Lift the container approximately 150mm (6in) off the ground by raising the top arms. In the event that the container is lifting unevenly it may be necessary to operate one end only to bring the lower end of the container up to a level position. Move the container, just above the ground, towards the Sidelifter, until it is about 300 mm from the side of the Sidelifter
- Raise the top arms until the bottom of the container is level with the top of the Sidelifter chassis
- Lower the bottom arms until the container corner fittings are above their respective twistlocks

Rapid starting and stopping movements are stressful on the equipment, and may cause the container to swing, which may damage the cranes and twistlocks. To ensure smooth movement, operate the controls gently avoiding any sharp movements.

- Lower the container down onto the twistlocks by locating either front corner onto a Twistlock cone, and then the rear visible corner onto its Twistlock cone. With practice operators will be able to land the containers onto the twistlocks in one smooth operation
- Select **HIGH SPEED** () if this option is available
- Lower the lifting arms to their stowed position
- Select Stabilisers () and return the stabiliser legs to their stowed position. It is also good practice to fully stow cranes when transporting containers between facilities
- Let the hydraulic system supply (powerpack or PTO) engine to idle for at least 1 minute to allow it to cool down gradually.
- Stop the engine, turn the key off and stow the controls With cable remotes avoid twisting and knotting the cable.
- Lock the twistlocks

The Sidelifter can now be driven to the unloading site.

Placing a Container on the Ground

Before performing a lift, ensure the following conditions are met:

Sidelifter must be attached to the tractor unit.

Sidelifter park brake is applied.

Check that the lifting area complies with safety zones recommended on the decal and is clear of any obstructions.

Ensure that the strength of the ground surface is sufficient to withstand a 29 tonne maximum point loading. If in any doubt, place hardwood timber packing of at least 50mm thick and 200mm x 500mm under each stabiliser foot.

If the stabiliser feet have been placed into a hollow or downward slope then sufficient timber packing will need to be placed under the feet to lift them back up to a level position, if you wish to handle a loaded container.

Park the Sidelifter alongside the area where the container is to be placed, ensuring that conditions above are all met

Attach the lifting chains to the container. Ensure there are no twists or tangles.

Unlock the twistlocks

Ensure the twistlocks are unlocked prior to lifting

- Start the engine. Select High Speed () on the High/Low Speed Switch
- Allow the powerpack engine to warm up for 2-3 minutes if starting from cold.
- Fully extend the stabiliser legs and place the feet on the ground. Do not load the feet as additional pressure will not give additional stability.
- Raise the top and bottom arms until the chains are evenly tensioned
- Select low speed ( or ) on the remote control
- Raise the top arms to lift the container clear of twistlocks on the liftside.
- Move the container across the chassis by raising the bottom arms until the container is 300mm clear of the side of the Sidelifter
- Lower the top arms to place the container on the ground. If it is necessary to move the container further out from the Sidelifter, do this with the container no more than 150mm, (6in) above the ground
- Once the container is placed firmly on the ground, set the remote control to mode "0" for safety.
- Remove the lifting lugs from the container
- Return to the safe operating area and switch the remote control to Arms mode

- Switch to high-speed operation () and return the lifting arms to the stowed position, ensuring the lifting chains are in the chain trays beside the twistlocks
- Return the stabiliser legs to the stowed position. It is also good practice to fully stow cranes when transporting containers between facilities
- Let the powerpack engine idle for at least 1 minute to allow it to cool down gradually.
- Stop the engine, turn the key off and stow the controls With cable remotes avoid twisting and knotting the cable.

Transferring Containers to and from a Truck or Trailer

Ensure that the spacing between the vehicles is such that the stabiliser foot is able to reach the centre line of deck on companion truck or trailer. Always refer to stability chart before commencing lift.

Follow the procedure as described previously for loading to and from the ground:

Stabiliser leg placed on deck or chassis

Where the deck length permits, legs should be placed on top of the companion truck or trailer. If the deck of the companion truck or trailer has been designed for operating with a Steelbro Sidelifter, position the stabiliser foot in the designated area. Alternatively place the stabiliser feet with care, ensuring that the point of contact is strong and stable enough to bear the weight of the lift. Timber dunnage may help to distribute the load.

Stabiliser leg placed on ground

If there is insufficient room to place the stabiliser on the deck they can be placed on the ground.

Park the two vehicles approximately 600mm apart. Place one leg on the ground as far as possible under the rear of the companion truck. Place the other leg as far as possible under the front of the companion truck on the ground. Longer truck decks can be treated as per transferring 20' containers onto 40' trailers.

Transferring 20' Containers to and from 20' Trailers or 40' Containers to and from 40' Trailers

Follow the loading to and from the ground procedure except:

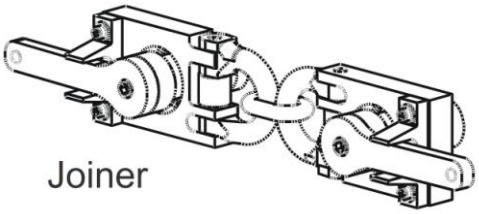
- Park the two vehicles approx 600mm apart, with twistlocks aligned
- Place one stabiliser leg on the ground as far as possible under the rear of the companion truck.
- Place the other stabiliser leg on the ground under the tractor unit chassis, if it can be placed there fully extended without obstruction. If not, jack-knife the companion tractor unit to 45 degrees enabling the stabiliser leg to be placed on the ground fully extended in front of the companion trailer

Always ensure the twistlocks on both vehicles are unlocked before commencing transfers.

Lifting 2 x 20' Containers using Container Joiners

ENSURE that container joiners are attached to both sides of the containers BEFORE lifting the containers.

Do not use container joiners with flat racks.



Container joiners can join two 20-foot containers so that they may be lifted together as if they were one 40-foot container.

Fit the joiners into the bottom corner castings on both sides of the containers and lock them.

When not being used, store the container joiners on their chassis mounting brackets or in the toolbox.

Rating

Steelbro container joiners (Part Number LF-20020) are rated to be used to lift 2 containers each with a maximum gross mass of 15,000 kg.

Lifting onto the Sidelifter

1. Place both containers on firm ground and spaced correctly to allow the fitting of the container joiners.
2. Install the container joiners correctly with the engaging handles horizontal and retained by the red locator fingers.
   Start lifting the containers, taking care to take up chain tension slowly and evenly.
3. Once the containers are clear of the ground, check to ensure the container joiners and separators are secure in their original location.
4. Place the two containers onto the Sidelifter centre pair of twistlocks then onto the crane base twistlocks. Lock twistlocks.

It is fine to travel with the joiners left in place, but before lifting the containers off the Sidelifter, ensure the joiners and spacers are still locked in place.

Lifting onto the Ground

1. Ensure all eight twistlocks are unlocked.
2. If necessary, refit container joiners as described in previous section. If already fitted, check that they are still in place.
3. Ensure lugs are still in place in the corner castings.
4. Start lifting both ends of containers, taking up chain tension evenly. Raise both containers, ensuring they lift clear of the centre pair of twistlocks.
5. Before moving the containers off the Sidelifter, check again to ensure the container joiners and separation pads are secure in their original location.

Transferring 2 x 20' Containers to a 40' Trailer

If not using container joiners to transfer 2 x 20 foot containers onto a 40 foot trailer, two separate transfers are required, from the 20-foot position on the Sidelifter onto two different positions on the companion trailer. With some models of Sidelifters the companion trailer needs to be designed for wide spaced 20 foot carrying. This is not necessary when using container joiners.

This does not work in reverse i.e. it is not possible to unload two x 20 foot containers from a Sidelifter using its own cranes, as two separate lifts. To achieve this, use the container joiners.

Follow loading from the ground procedure except:

1. Load the first container onto the front of the 40 foot trailer in the most forward position achievable and lock all the twistlocks.
2. Load the 2nd container onto the rear set of twistlocks of the 40 foot trailer

Transferring Containers to and from Rail Wagons

If there is sufficient room at either end to place the stabiliser leg onto the rail wagon and there is access to the bottom corner castings, then these transfers can be done in the same manner as trailer transfers.

If there is insufficient access to the corner castings of the containers to allow the lifting lugs to be attached then a top lift frame must be used.

If the stabiliser legs cannot be placed onto the rail wagon, it is necessary to park the Sidelifter to allow the stabiliser feet to be as far as possible underneath the wagon, with the legs extended to their maximum.

Do not place stabiliser feet on rail tracks. Feet must be placed on level surface.

Double Stacking Containers

Double stacking is where one container is placed on top of another, to save floor or ground space. We recommend that operators receive training in this technique before attempting it themselves.

This topic explains how to double stack and unstack.

If attempting to double stack containers after sunset or before sunrise, use extra lighting to ensure you can clearly see the containers you are moving.

Do not place a 20' box on top of a 40' box or a 40' box on top of a 20' box.

No anti slip protection is provided on the legs. If you use them as an access platform you do so at your own risk.

Do not use Sidelifter lifting chains in the top castings of the ISO container as this may cause severe damage to the machine, and place personnel at risk. Any such action will void our warranty. Top lifting should only be attempted with a top-lifting frame.

Before performing a lift, ensure the following conditions are met:

Sidelifter must be attached to the tractor unit.

Sidelifter park brake is applied.

Check that the lifting area complies with safety zones recommended on the decal and is clear of any obstructions.

Ensure that the strength of the ground surface is sufficient to withstand a 29 tonne maximum point loading. If in any doubt, place hardwood timber packing of at least 50mm thick and 200mm x 500mm under each stabiliser foot.

If the stabiliser feet have been placed into a hollow or downward slope then sufficient timber packing will need to be placed under the feet to lift them back up to a level position, if you wish to handle a loaded container.

Double Stacking - lifting container from Sidelifter to place on top of another container

The table below shows the trailer to container positioning limits for different heights of the container on the ground.

Height of container on ground	Maximum distance between Trailer and Container on ground
Standard 8'6" (2591 cm)	500 mm (~20 inches)
High Cube 9'6" (2896 cm)	250 mm (~ 10 inches)

Double stacking and unstacking a High Cube 9'6" container (see table above) requires a trailer twistlock height (measuring from twistlock base to ground) of at least 1350mm.

1. Shorten the chain assemblies in accordance with the relevant "Chain Shortening Instructions"
2. Park the Sidelifter away from (see table above) and parallel to the side of the container on the ground with the container ends level with each other.
3. Fully extend the stabiliser legs and place the feet on the ground. Packing needs to be placed under the feet in soft or doubtful ground.
4. Connect the lifting chains.
5. Raise the container off the Sidelifter to clear the top of the container on the ground. To do this, follow these steps:
   a) Move the bottom arms OUT until the lifted container almost touches the container on the ground.
   b) Raise the container vertically until the lifted container clears the top of the container on the ground. Be very careful not to allow the container to move over the offside/non lift side.
6. Keeping the lifted container as low as possible above the top of the container on the ground, move it out across the top of the container on the ground.
7. Align the corner castings of the bottom and the top containers, then lower the container onto the container on the ground.
8. Remove and unshorten the lifting chains. Use a ladder to reach up to remove the lugs from top container; do not walk on the crane arms or legs!
9. Return the stabiliser legs to the stowed position. It is also good practice to fully stow cranes when transporting containers between facilities
10. Let the powerpack engine idle for at least 1 minute to allow it to cool down gradually.
11. Stop the engine, turn the key off and stow the controls. With cable remotes avoid twisting and knotting the cable.

Unstacking - lifting top container back onto Sidelifter

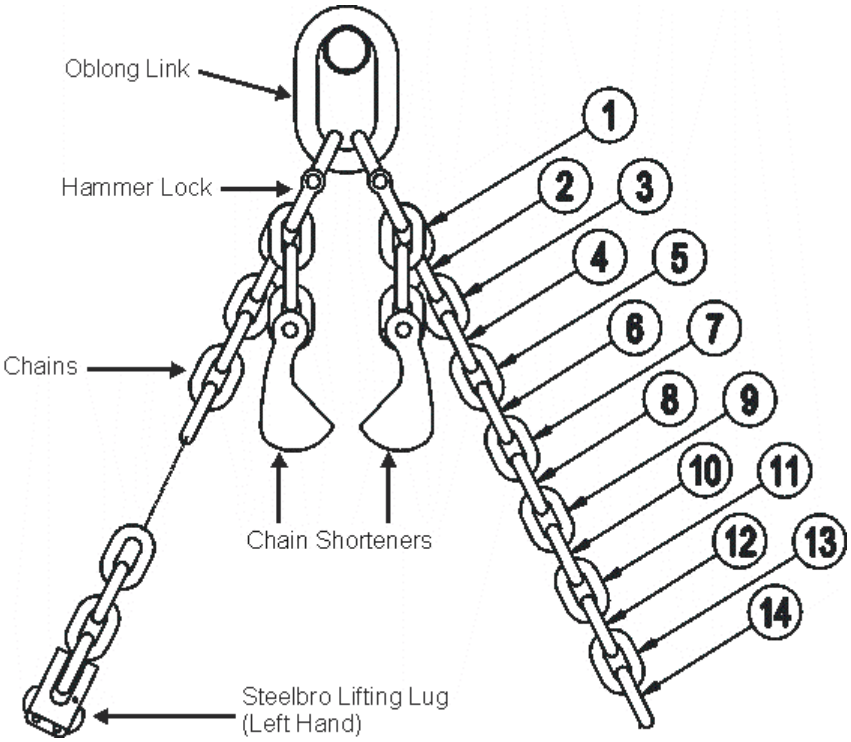
1. Shorten the chain assemblies in accordance with the relevant "Chain Shortening Instructions"
2. Park the Sidelifter away from (see table above) and parallel to the side of the container on the ground with the container ends level with each other.

3. Fully extend the stabiliser legs and place the feet on the ground. Packing needs to be placed under the feet in soft or doubtful ground.
4. Connect the lifting chains using a ladder to reach up to attach the lugs to the container. Do not walk on the crane arms or legs!
5. Lift the container no more than 150mm (6 inches) above the container on the ground. Lift it gently as it may swing a little when first lifted. Once the container is lifted and is stable, move it towards the Sidelifter across the top of the container on the ground.
6. Bring the lifted container in towards the Sidelifter until it is just clear of the container under it. Manoeuvre the container over the twistlocks on the Sidelifter. **BE VERY CAREFUL NOT TO ALLOW THE CONTAINER TO MOVE OVER THE OFFSIDE/NON LIFT SIDE.**
7. Once the container is above the twist locks, completely lower the top arms and then the bottom arms, to sit the container on the twist locks.
8. Remove and unshorten the lifting chains.
9. Return the stabiliser legs to the stowed position. It is also good practice to fully stow cranes when transporting containers between facilities
10. Let the powerpack engine idle for at least 1 minute to allow it to cool down gradually.
11. Stop the engine, turn the key off and stow the controls. With cable remotes avoid twisting and knotting the cable.

The Sidelifter is ready to be transported or the container can be removed as per procedure for unloading a container from the Sidelifter to the ground.

Chain Shortening Instructions 20mm Chain - SB450

Counting the link that is attached to the hammerlock, place link 14 in the slot provided in the chain shortener.



20mm oblong loop style chain shorteners

Check all four chains are equally shortened before lifting the container.

Maintenance

Safety First

When carrying out any maintenance or service task, ensure that you adhere strictly to the safety practices detailed in this manual.

These include the safety instructions referred to in Safety Instructions (on page 10) but also the specific warnings and cautions highlighted throughout the manual.

Why Genuine Parts?

When you or your service workshop carry out service or repair work on your STEELBRO Sidelifter, it is important that you only fit genuine STEELBRO Sidelifter spare parts.

The STEELBRO Sidelifter is manufactured to a high technical specification. To guarantee a long and trouble free product life ensure that your Sidelifter is regularly serviced.

Preventative Maintenance

The following section describes the service and maintenance requirements of the Sidelifter. All components must be checked regularly for proper functioning and adjustments made only if necessary. Before the Sidelifter left the factory, every valve in the hydraulic system was thoroughly tested and properly adjusted and the complete unit was test operated at full lifting capacity. A duly competent person must carry out all servicing and any subsequent adjustment.

When using a steam cleaner on the Sidelifter, avoid cleaning near hydraulic cylinder shafts, electrical control boxes or junction boxes and switches. While the latter are fully water proofed, they may not tolerate hot steam cleaning jets.

Grease and Oil Specifications

The hydraulic system and the hydraulic fluid are matched in respect of lubricating performance, effect on seals, and non-compatibility with other materials. For this reason do not mix different types of hydraulic fluid, such as mineral oils, synthetic fluids and water based fluids, and never mix or contaminate your hydraulic fluid with diesel oils or alcohol based products.

We recommend the use of non-molybdenum based greases as these do not deteriorate the crane bushings.

Use	Recommended Product
Hydraulic Oil	Castrol Hyspin AWS46 or equivalent*
Bearing Grease	Shell Alvania EP or equivalent
Hub Grease	Shell Alvania EP2 or equivalent
Hub Oil	Castrol Multitrax 80w/140 or equivalent
Wheel Stud Grease	Shell Alvania EP2 or equivalent

* May vary for different markets depending on temperature range:

Temperature Range	Recommended Product
From -20°C to +30°C	Castrol Hyspin AWS 32
From -10°C to +40°C	Castrol Hyspin AWS 46
From 0 to 50°C	Castrol Hyspin AWS 68

For units fitted with a Kubota Powerpack refer to the Kubota manual for details of recommended engine fluids.

Servicing Trailer Running Gear

For servicing detail refer to the **SUSPENSION** and **AXLE MANUALS**.

Records

All checks, adjustments, replacement of parts, repairs and inspections performed, and all irregularities or damage potentially effecting the Sidelifter's safety should be recorded in an orderly manner. In some countries this is mandatory.

A comprehensive STEELBRO service programme is available through your distributor. As this is designed specifically to support the safety, operation and maintenance requirements of your Sidelifter, we recommend that you contact your distributor for more information if you do not already this programme in place.

For your convenience, a service programme summary logbook is provided.

Daily Inspection Requirements

Hydraulics System

- Check the engine oil and water levels
- Check the oil level in the hydraulic reservoir. The oil level needs to be between the "Max" and "Min" levels on the sight glass when the Sidelifter is in the stowed position. Check pump suction line shut off valves are open.

- Check that the lifting arms and stabiliser legs can be operated with ease and that the controls automatically return to the neutral position
- Inspect the hydraulic lines, connections and other components to detect any oil leakage or damage. Tighten any loose or leaking connections

Ensure that when connecting Quick Release Couplings, the low-pressure line is always correctly fitted before fitting the high-pressure line.

When disconnecting hydraulic tubing and hoses, always ensure that no hydraulic pressure has been retained in the line after the power supply to the system has been switched off. Operate the manual levers on the valve bank to relieve any residual hydraulic pressure.

Refer to Precautions with Over-Centre Valves and Check Valves (on page 70).

Lifting Gear and Chassis

- Check the lifting chains, lifting lugs, hammerlocks and other components of the chain assemblies to ensure that they are not damaged. The hammerlocks should be able to fold otherwise they have been overstressed and are in need of replacement
- Check the Sidelifter, chassis and twistlocks for damage. For example, check that the container guides on the "non-lifting" side of the crane bases are present and not unduly bent or deformed.
- Inspect the lifting module sliding areas on top of the main chassis for cleanliness.

Brakes - Air Pressure Systems

- Run the truck engine to achieve maximum air system pressure. Stop the truck engine and check the truck air gauge does not show a rapid loss of pressure that would indicate an air leak
- Apply and release the brake pedal twice. Air pressure should not drop abnormally when brakes are applied. Check that the brakes release immediately. Check that the slack adjusters on the trailer axle camshafts do not have excess movement that indicates brake adjustment is required
- Check that all hoses are firmly connected and are not damaged
- Vent air reservoirs to expel condensate by using the drain valves

Lights

- Inspect switches and lights for broken brackets, fused bulbs and cracked lenses. Check for loose wiring connections - usually indicated by flickering, dull or intermittent lights
- Clean light lenses and reflectors

Wheels and Tyres

- Check tyre pressures are correct, check that the valves are not damaged and trailer axle dust covers are in place

- Remove all objects trapped in the tyre tread and ensure tread depth complies with road regulations
- Ensure tyres have no cuts or bulges
- Examine all wheels for damage caused by "kerbing" or severe road shock
- Check that the wheel nuts are properly seated and show no signs of running loose
- Check oil level in the axle hubs is between the minimum and maximum levels if the axles are of the oil filled type

After any removal and refitting of any wheel with ISO wheel nuts, ensure nuts are re-tightened within 50 to 100km of travel. Neglecting to do so could result in loss of a wheel.

Suspension

- Check springs for shifting or missing leaves, loose or missing clips and any damage.
- Check suspension U- bolt, bearings and bushes for security and condition.
- Check that airbags are not damaged or scuffed.

Weekly Inspection and Service Requirements

Perform all activities required for daily and weekly inspections and in addition carry out the following service procedures.

Chassis

- Grease all grease nipples on the chassis, brake slack adjusters and landing legs with the recommended grease
- Grease semi trailer rub plate and kingpin with a good quality hub grease
- Clean any lifting module sliding areas on top of main chassis and then wipe over with clean cloth

Grease points are detailed on the lubrication chart in this manual.

Lifting Modules

- Grease all lifting arms and cylinder pivot bearings at front and rear
- Check all pivot pin keeper plates and circlips for security

Landing Legs

- Check landing legs for damage and serviceability

Monthly Inspection and Service Requirements

Perform all activities required for daily and weekly inspections and in addition carry out the following service procedures.

Lifting Chains & Accessories (Monthly)

Visually inspect the lifting chains, lifting lugs, hammerlocks and crane lifting pins for any signs of damage or excessive wear.

Hydraulic System and Chassis

- Check all bolts on the Sidelifter. If a power pack is fitted then check the pin keeper plates and the combined hydraulic reservoir/fuel tank mounting. Tighten any loose bolts.
- Check that the Sidelifter operator notices are in place
- Check the lifting arms and stabiliser legs to detect any visual signs of damage, deformation or wear in the bearings
- Service engine air filter and change as required
- Check the Emergency Stop button and the electrical safety devices

Brakes - Air Pressure Systems

- Check that the linkages on the trailer axle camshafts do not have excessive movement. If so adjust brakes in accordance with brake servicing instructions
- Listen to the air system for evidence of any air leaks and tighten any loose connections. Use soapy water to locate a suspected air leak.

Lights

- Check all cables are firmly connected and not damaged by scuffing or pinching

Wheels and Tyres

- Check wheel bolt/nut torque settings as detailed in the **AXLE MANUAL**

WARNING: After any removal and refitting of any wheel with ISO wheel nuts, ensure nuts are re-tightened within 50 to 100km of travel. Neglecting to do so could result in loss of a wheel.

Six Monthly Inspection and Service Requirements

Perform all activities required for daily, weekly and monthly inspections and in addition carry out the following service procedures.

Hydraulic System

- Check all hydraulic hoses and pipe work for wear, scuffing and fretting
- Check the mountings of the hydraulic reservoir for condition and security
- Change the following filters where applicable:
  - Engine oil
  - Engine fuel
  - Hydraulic oil tank
  - Hydraulic oil pressure
- Change the oil in the power pack engine
- Clean the hydraulic tank breather element
- Change the hydraulic oil if required. If water contamination is present oil should be changed. See hydraulic oil change guide at the end of the maintenance section of this manual
- Check fan belt tension
- Check condition of radiator hoses.
- Check engine coolant for condition as detailed in Kubota Operators Manual. If you need to refill the coolant then ensure the air is bled from the coolant system after filling:
  - After filling run the engine at a low idle with the radiator cap removed until the engine reaches normal operating temperature.
  - Replace the cap and let the engine cool
  - Check coolant level in the radiator after the engine has cooled and top up if necessary.
- Check battery fluid levels

For detailed instructions on power pack routine required maintenance, refer to The Kubota Engine Operators Manual.

Chassis

- Disconnect the tractor unit from the trailer and check the king pin for wear and security of attachment
- Thoroughly clean the Sidelifter
- Check chassis components for signs of stress, damage, cracking, corrosion etc

Avoid spraying the chrome shafts of the hydraulic cylinders with a water blaster or system cleaner.

Suspension and Axles (As detailed in the suspension and axle manuals)

- Carry out brake servicing
- Check out suspension servicing
- Check axle alignment
- Check nut torque settings

Annual Inspection and Testing

Perform all activities required for daily, weekly and six monthly inspections and in addition carry out the following service procedures.

King Pin

The king pin connecting the Sidelifter to the tractor unit should be crack tested or renewed. The latter is often the cheaper alternative. This check is required by automotive testing stations in New Zealand, and is recommended to all Sidelifter owners because of the stresses applied when lifting loads.

Lifting Chains & Accessories

Remove lifting chain slings and inspect all components for any damage or excessive wear. You must comply with all local regulations regarding inspection and testing of lifting chain slings. Chains should be proof tested annually. **STEELBRO** recommends that all inspection certificates be retained.

Lifting Equipment

Carry out a full monthly and six monthly inspection, and pay particular attention to the lifting arms, stabiliser legs, and their mountings for any signs of cracking, or other damage. Check top arm lifting pins for wear by ensuring the pins can be rotated in their bearings. Check the emergency stop and the electrical safety devices.

Maximum Load Test

After all other checks have been completed, carry out a Maximum Load Test:

- The load should be the maximum load shown on the Working Load Limit chart.
- When lifting off the Sidelifter, keep the test load close to the Sidelifter
- Carry out test at 300mm clearance between the Sidelifter side rail and the container.

Testing After Repairs to the Cranes

No modification may be carried out on the Sidelifter without written authorisation from Steelbro. Unauthorised modifications automatically void all warranties and service agreements.

After repairs on the crane and before putting it back into use, a **MAXIMUM LOAD TEST** must be carried out as described in the previous section.

Maintenance Notes

Pressure Line Filter

This filter is of the full flow type with a bypass valve fitted. It has a replaceable element and this should be changed after the first 50 hrs of operation and thereafter at every 200 hours or six months.

Return Line Filter

This filter is of the full flow type with bypass and should be changed at the same intervals as the pressure filter.

Filler Breather

One filler breather is on the hydraulic oil reservoir.

The filler cap breather gauze of this unit needs washing out with cleaning solvent and blown dry with compressed air every 500 hrs or 6 months or as required particularly if operating in dusty conditions.

The strainer gauze in the tank aperture should be checked for condition and cleaned as required. Ensure the gauze is intact and no splits or damage is evident.

Emergency Instructions in Case of Electrical Faults

The PVG control valves are fitted with manual operating handles for emergency or servicing use. In the event of an electrical fault in the control system, they can be used independently to complete the loading or unloading of a container.

The plug on the affected solenoid will have to be disconnected before manual control can be operated as the valves are held in neutral with the electrical system connected.

Precautions with Over-Centre Valves and Check Valves

Cylinders, fitted with Check Valves and or Over-centre Valves, can remain pressurised. The pipes connecting the ‘B’ port to the Check/Over-centre Valve Block Assembly, mounted to the ‘A’ port, can remain pressurised.

To relieve the pressure in these systems, carry out the following steps:

(For units fitted with Over-Centre Cartridges)

- Slacken the adjustment lock nut and relieve the cylinder pressure by turning the adjustment screw anticlockwise until no resistance is noticeable (about 5 full turns)
- The Over-Centre Cartridge can now be screwed outward to a point where the sealing surfaces are separated, thus guaranteeing no pressure remains trapped in the cylinder or pipe work

Recommended Companion Vehicles

The following points should be considered if purchasing future companion vehicles;

1. When buying 12.5 metre or longer semi-trailers we recommend an extra set of twistlocks to allow wide spacing of two 20' containers i.e. An extra set of twistlocks at the front or rear outside the existing 40' set to give Sidelifter arm access when two 20' containers are carried.
2. When specifying truck flat-decks we recommend a space of 215mm between the twistlock centres and the headboard. This allows sufficient room to fit the lifting lugs to the container. A further consideration is that if you buy a mini-Sidelifter for handling empty containers then a space of 800mm will be required.
3. When buying drop deck container trailers, we recommend a space of 215mm between the drop in deck, and the twistlock centres, to allow sufficient room to fit the lifting lugs to the container.
4. When setting up tractor units for use with a semi-trailer to be loaded or unloaded by the Sidelifter, appropriate reinforcing across the chassis rails of the tractor unit enables the Sidelifter to put a leg on this reinforcing rather than uncoupling or jack-knifing the tractor unit.

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