SB121 Sidelifter

Operation, Maintenance & Service Manual

V1209

STEELBRO

Container Handling Solutions

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.

Contents

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 Safe Working Load 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 rated 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 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.

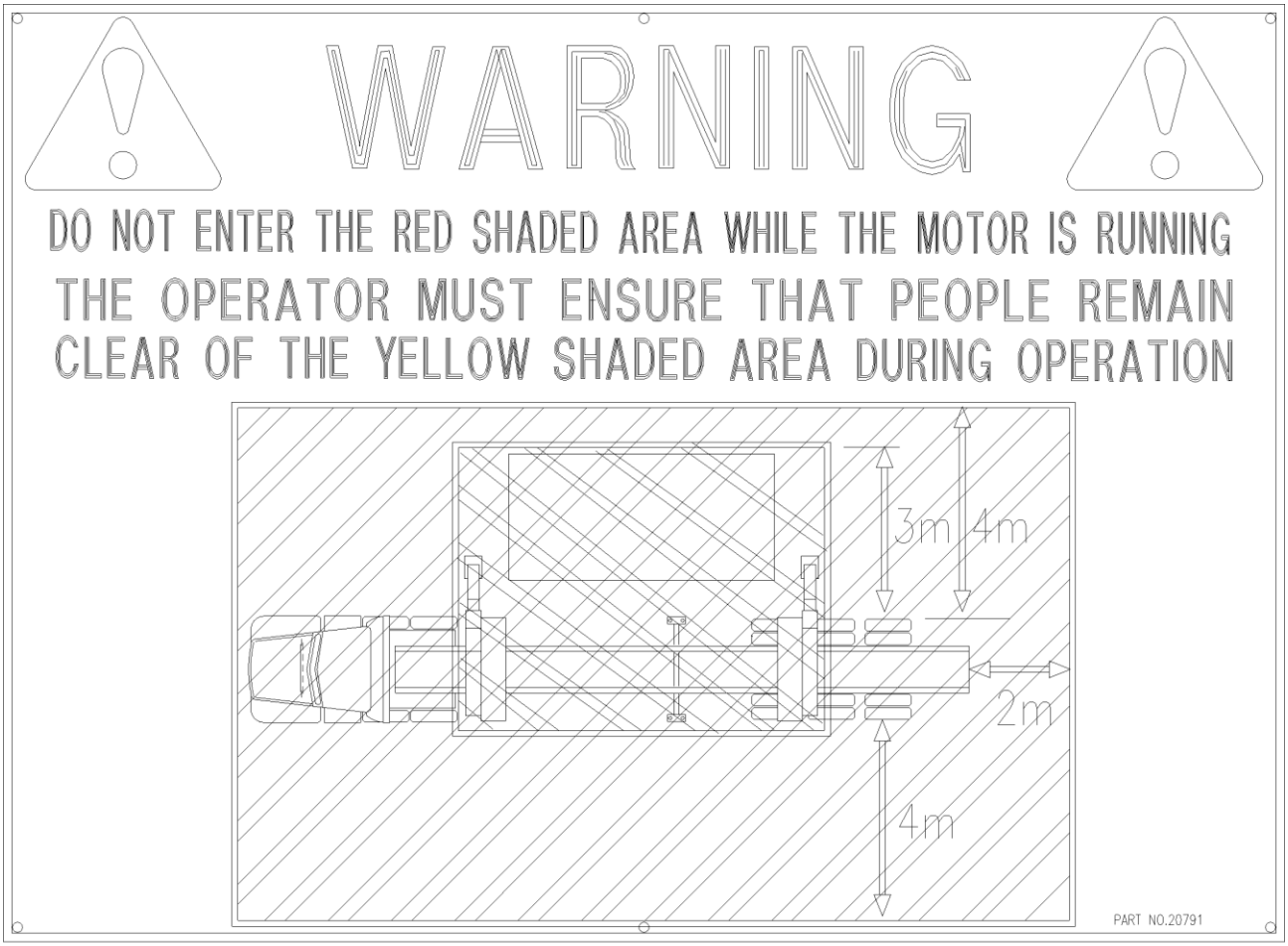
When some tractor unit park brakes are applied they stop providing air to the Sidelifter. Sidelifters with a powerpack need an air supply to operate the pneumatic throttle control on the powerpack. If this is the case then apply the Sidelifter park brake rather than the tractor unit park brake.

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



= Yellow Area

= Red Area

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 9) for more information on the recommended operating areas.

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.

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 Safe Working Load 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 28).

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

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.

Getting Started

General Description

STEELBRO Sidelifters are able to load ISO containers to and from:

- The ground
- Truck decks
- Other trailers
- Rail wagons
- Stacked two high (units with chain shorteners)

Because the STEELBRO 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.

Sidelifters are available with different lifting capacities and also in different mounting configurations.

Operator Controls

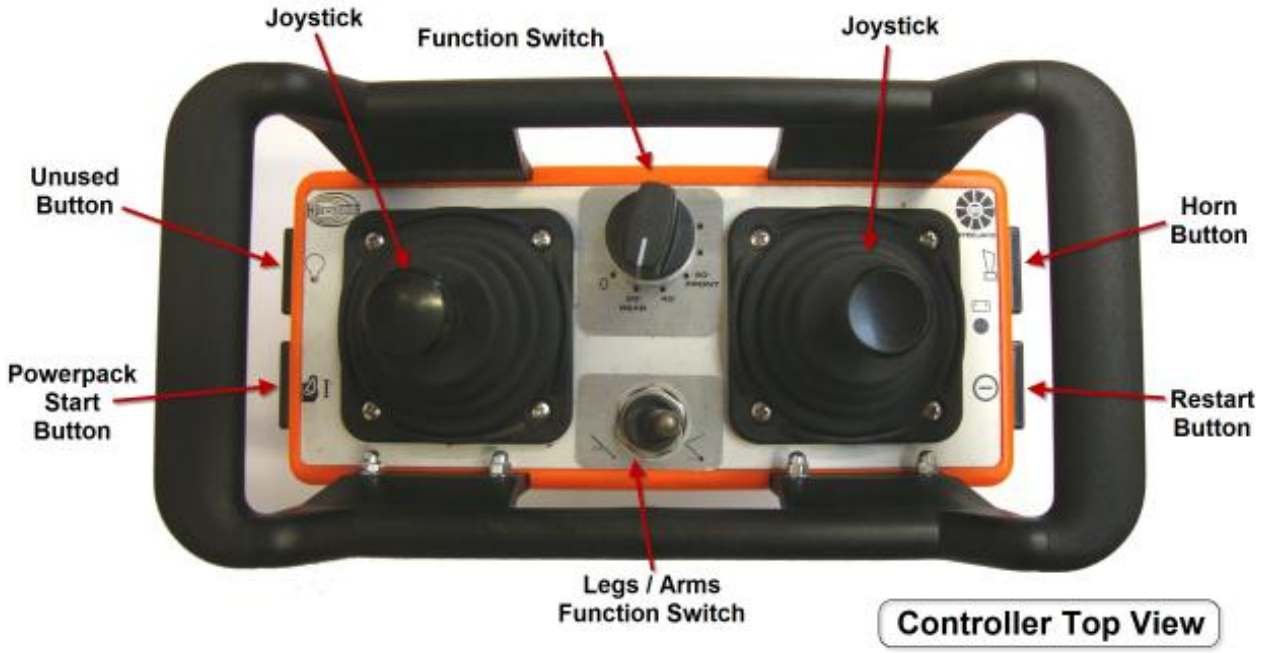
The Steelbro SB121 Sidelifter has an analogue radio remote controller.

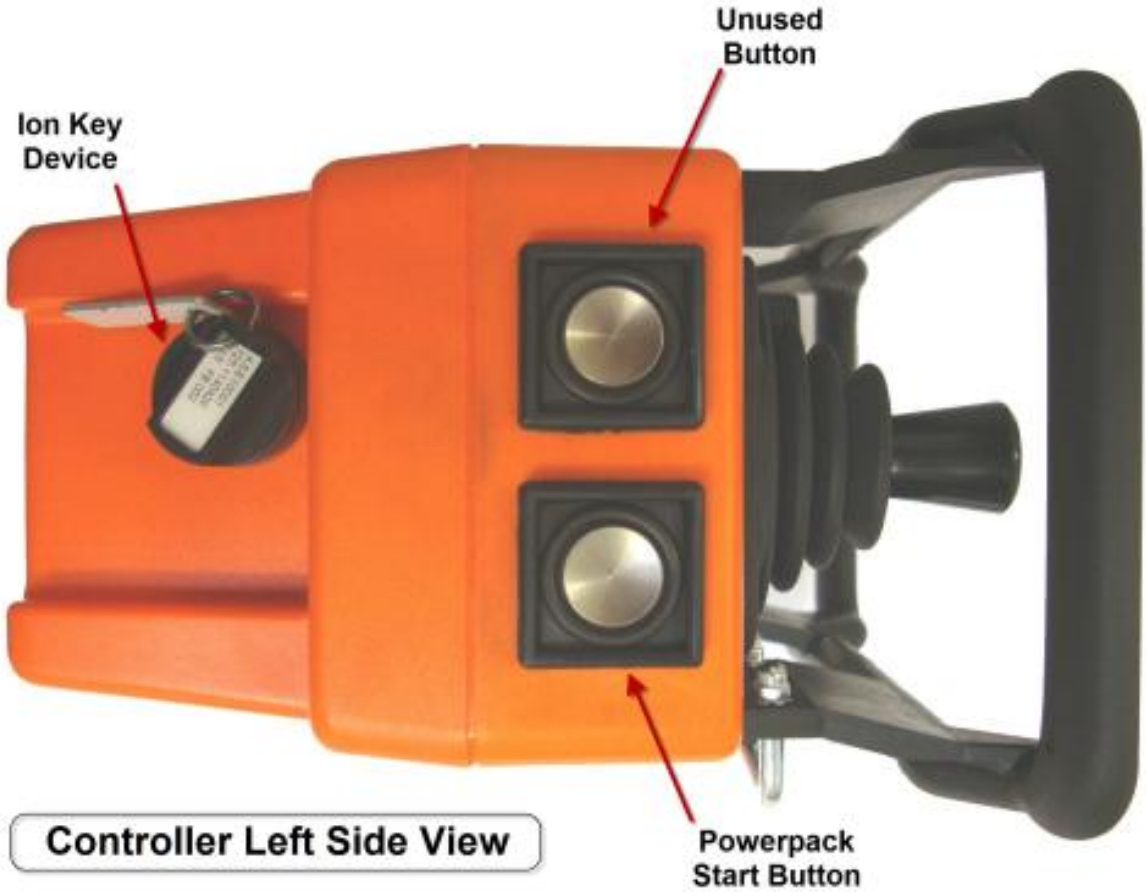
Older models of the SB121/122 Sidelifter have manual control valves. On these models in the event of an electrical breakdown the operating cycle can be completed manually by using these levers.

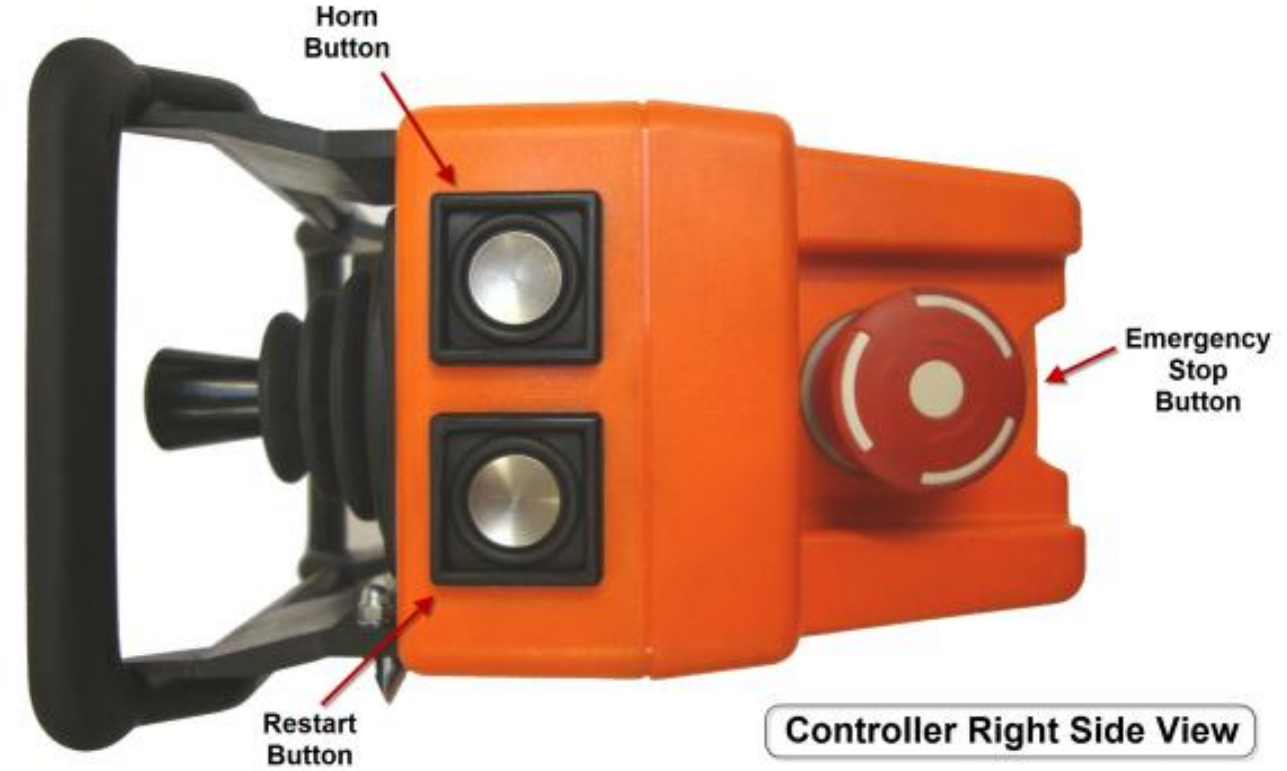
The control functions include:

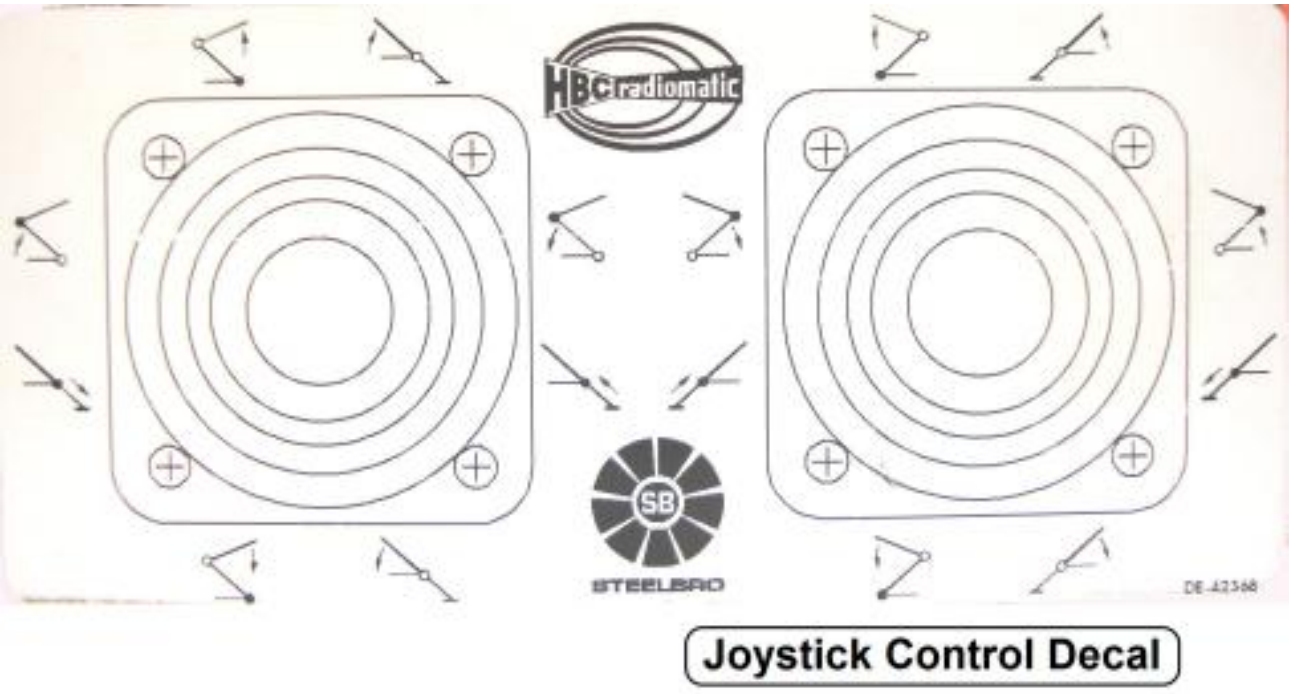
- Two joystick controls which operate all crane arm and stabiliser leg operations
- A two position Legs/Arms switch to select stabiliser legs or crane arm control
- A positional rotary switch which selects the front or rear pair of cranes for 20' containers, or the frontmost and rearmost cranes as a pair for lifting 40' containers (the centre crane is folded flat with the deck of the trailer in this case)
- A red "mushroom" Emergency Stop button.
- Remote Start

- Horn


Joystick
Function Switch
Joystick
Unused Button
Horn Button
Powerpack Start Button
Restart Button
Legs / Arms Function Switch
Controller Top View


Unused
Button
Ion Key
Device
Controller Left Side View
Powerpack
Start Button





Controls when lifting a 20' Container to the front position on the Sidelifter.

1. Select the **20' FRONT** position on the function switch on the controller.
2. Use the two joysticks in unison to move the **MIDDLE** and **FRONT** crane arms to manouver the container. The left joystick controls the left crane of the selected pair of cranes.

Controls when lifting a 20' Container to the rear position on the Sidelifter.

1. Select the **20' REAR** position on the function switch on the controller.
2. Use the two joysticks in unison to move the **REAR** and **MIDDLE** crane arms to manouver the container. The left joystick controls the left crane of the selected pair of cranes.

Controls when lifting a 40' Container to the Sidelifter.

1. If the middle crane is not stowed then select the **20' FRONT** position on the function switch on the controller and use the left joystick to stow the crane arm.
2. Select the **40'** position on the function switch on the controller.
3. Use the two joysticks in unison to move the **REAR** and **FRONT** crane arms to manouver the 40' container. The left joystick controls the left crane of the selected pair of cranes.

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

Commissioning the Sidelifter

General Preparation & 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 & Shutdown

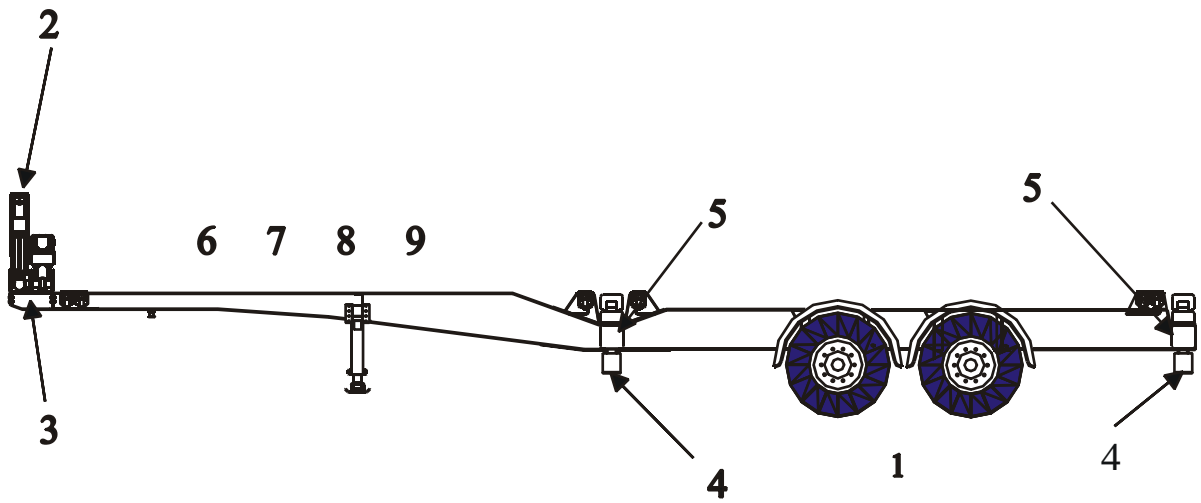
1. If the lifting chains are stowed in the toolbox then fits these as follows:

- On the remote control, select Legs, and place the feet on the ground
- Attach the hammerlocks of the chains to the top arm lifting pins. Ensure correct chain slings are fitted to the appropriate cranes arms. The chain with a swivel fitting goes on the middle crane arm. The chains for the front and rear crane arms are almost identical to each other but the longer chain fits on the front 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 28). 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. Allow the powerpack engine to idle for a minute after working at full power to allow a gradual rate of cooling
3. Shut down the engine by turning off the remote control or pressing any of the red emergency stop buttons on remote control box.
4. Turn off the key ignition. Remove the key if the unit is to be left unattended for any time.
5. Always turn off the radio control when not in use

Main Components



The main component systems of the SB121 Sidelifter are:

1. Chassis, Suspension and axles
2. High Crane Stabiliser Leg
3. High Crane Base
4. Low Crane Stabiliser Leg
5. Low Crane Base
6. Hydraulic System
7. Electrical System
8. Pneumatic System
9. Lifting Accessories

Chassis, Suspension and Axles

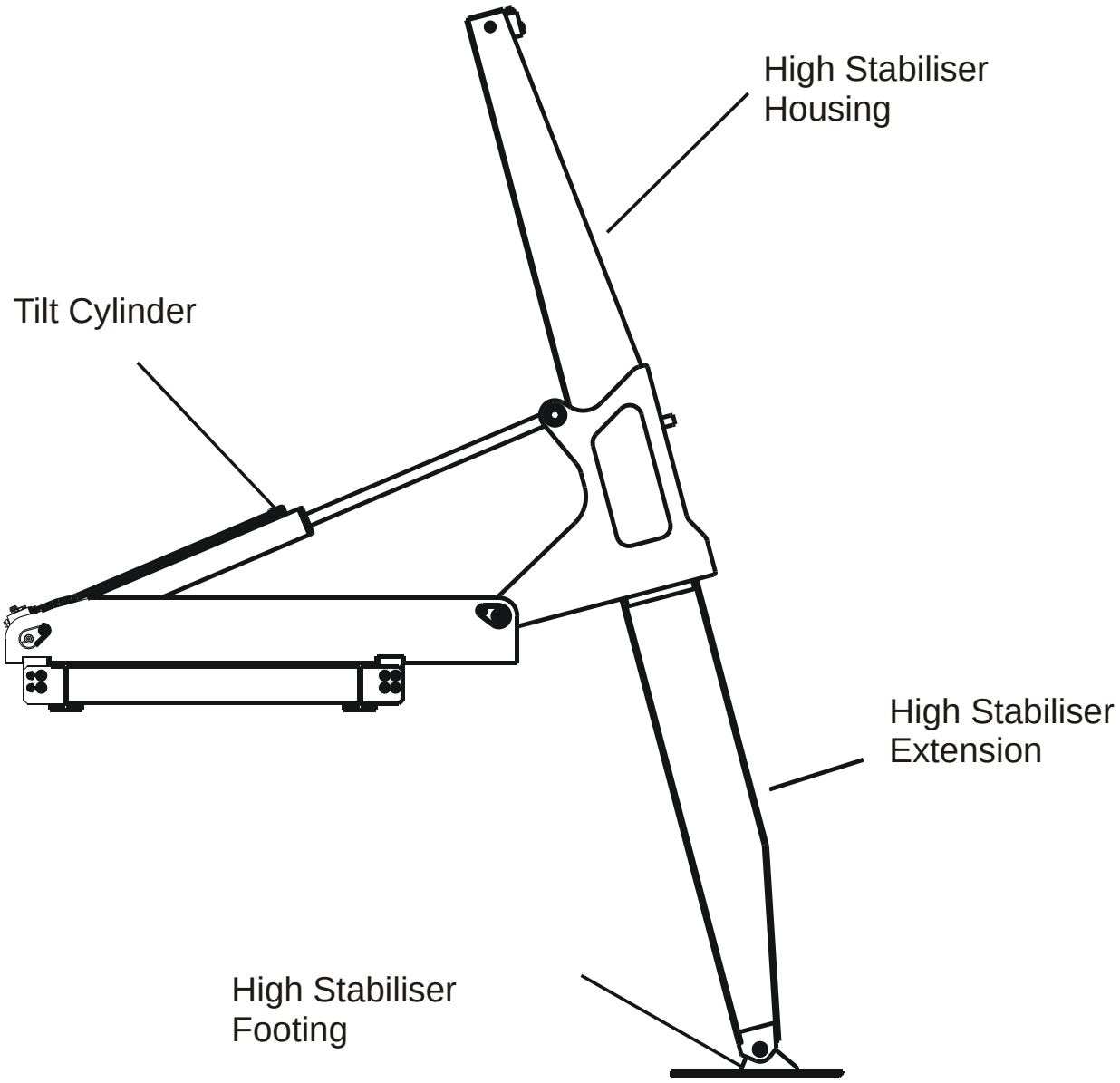
Parts of this chassis are fabricated from high tensile steel and must not be welded without authority from Steelbro or its authorised service representative.

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

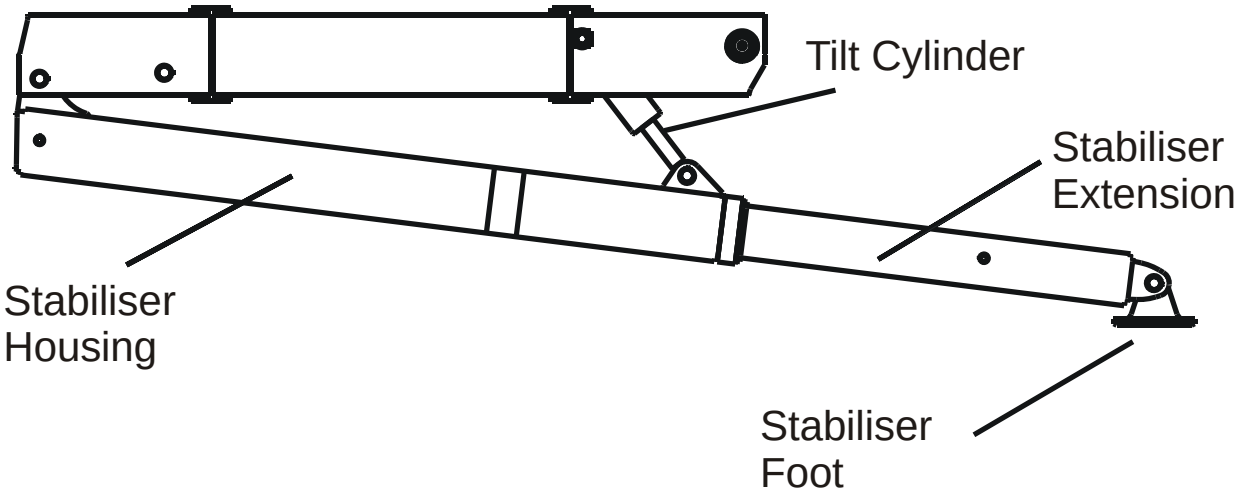
Two-speed wind up landing legs are fitted behind the gooseneck.

The brand, style, maintenance and servicing of this Sidelifter's axles and suspensions are detailed in separate sections of this manual.

High Crane Stabiliser Leg



Low Crane Stabiliser Leg

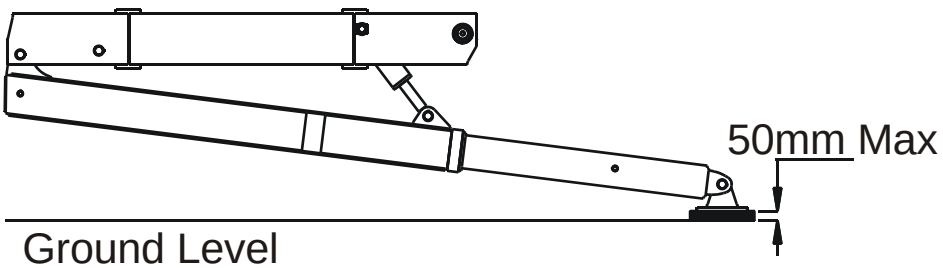


The high stabiliser leg is fabricated box section constructed from medium tensile steel (Grade 350 MPa). The low crane legs are also made from 350 Grade box section. The pins are fitted in glacier bearings that provide reliable and sound mounting of the stabilisers. The versatility of the Steelbro Sidelifter stabiliser legs greatly assists the transfer of containers to or from other vehicles. By being able to extend the leg, then tilt the leg, or tilt the leg, then extend the leg, gives the operator several options.

- The legs should be placed on the ground at maximum outreach.
- The legs can be placed on the ground, underneath the deck of a companion vehicle

If the stabiliser foot is placed into a hollow or on a descending slope. In such cases it is necessary to build up the ground level by placing timber (dunnage) under the relevant stabiliser foot to restore full lifting capability. Failure to do this can result in damage to the cranes

Take care when placing dunnage under the low crane stabiliser foot. The tilt cylinder should be extended as far as possible in order to limit the induced loads on it. The recommended maximum thickness of dunnage is 50mm. More than 50mm may damage the cylinder.



NEVER under ANY circumstances, operate the Sidelifter WITHOUT first deploying the STABILISERS.

Ground Pressure

Steelbro can only give figures based on the Rated Load Lifting Capacity of the Sidelifter. The fact that Sidelifters can lift heavier loads because of their built in Safety Margins must also be considered by designers when designing surfaces on which a Sidelifter will stand during its operations. Based on the Rated Load Lifting Capacity of the Sidelifter, and allowing for the 60/40-ratio load imbalance of containers, the ratings are:

Model	Weight of box at Max SWL*:	Load per Foot (tonne)	Ground Pressure (MPa)
SB300	30	21	1.3
SB330	33	22.5	1.3
SB360	36	24	1.3
SB361	36	24	1.3
SB401	40	26	1.7
SB121	12	12	0.85
SB180	18	15	0.85
SB200	20	16	0.85
SB250	25	18	0.85
SE400	40	26	1.5
SB362	36	24	1.7
SB450	45	28.5	1.8

*SWL= Safe Working Load.

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.

Crane Modules

All lifting arms are constructed from continuously welded high tensile steel. The high base is also constructed from high tensile steel. The low base is fabricated from medium tensile steel.

The pins are mounted in replaceable lubricated glacier bearings.

The two low crane modules can be stowed in a low folded position. This enables Sidelifters to be loaded at ports or container terminals by other equipment with the minimum of obstruction or damage. This also reduces wear and tear on the cranes when in transport mode. The low cranes stow below the deck height, i.e. under the container. This feature makes opening container doors possible when a low crane is fitted at the rear.

The crane modules are designed to lift containers and must not be used to drag containers along the ground.

The lifting chains must not be attached to the top of containers, or to non-standard length containers, as this imposes a sideways loading on the crane modules beyond their designed purpose.

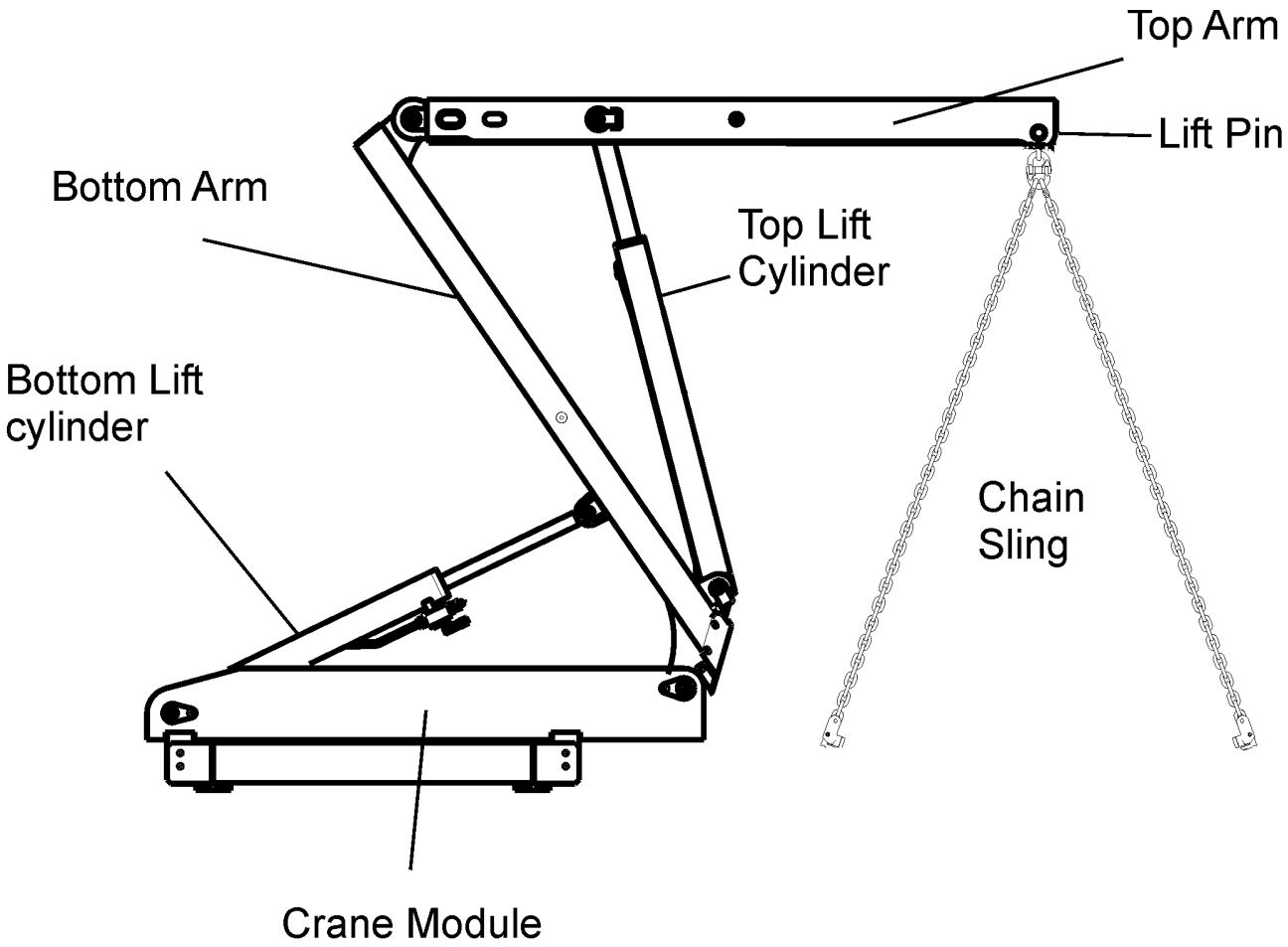
Hydraulic Cylinders

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 rated Safe Working Load.

The over-centre valves:

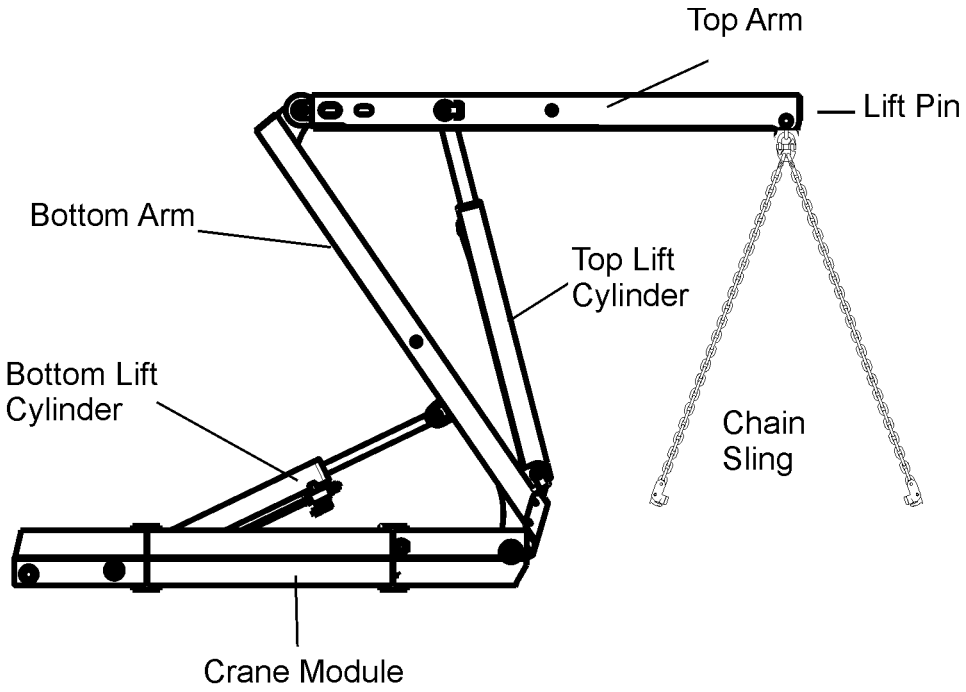
- Prevent the arms from moving unless there is a pressure signal from the main hydraulic valve.
- Help keep the movement of the load controlled and constant when being lowered, regardless of the pressure that may be in the cylinder.
- Ensure that the cylinders are held in position, should the hydraulic 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.

High Crane Module



The top and bottom arms and base of the High Crane Module are constructed from continuously welded high tensile steel. The pins are mounted in replaceable lubricated glacier bearings.

Low Crane Modules



All lifting arms on the Low Crane Modules are constructed from continuously welded high tensile steel (Grade 690 MPa). The low base is fabricated from medium tensile steel (Grade 350 MPa). The pins are mounted in replaceable lubricated glacier bearings.

The low crane modules can be stowed in a low folded position which is below the deck height. This means that:

- The SB121 Sidelifter can also be loaded at a port or container terminal by a crane with the minimum of obstruction or damage.
- Wear and tear on the cranes is minimal when in transport mode.
- It is possible to open the container doors when the rear crane is stowed.

The crane modules are designed to lift containers and must not be used to drag containers along the ground.

The lifting chains must not be attached to the top of containers, or to non-standard length containers, as this imposes a sideways loading on the crane modules beyond their designed purpose.

Lifting Chains

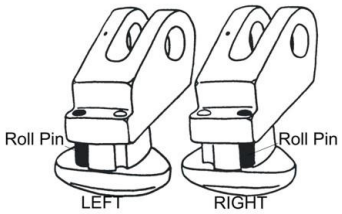
The chains and lugs are all individually tested then the whole sling is tested and certified. They should never be welded in any way and should be replaced should there be any sign of distortion, excessive wear or damage.

The Hammerlocks are equipped with a stress pin linkage. Any sign of the hammerlocks not being able to fold fully, means that the chain assembly has been subjected to excessive stress. In such cases the chain should be sent to an approved testing faility, for re-certification and replacement of all damaged parts.

Chains should not be switched from one macine to another as they may vary between one unit and another in length and size.

Chains should be proof tested annually. Steelbro recommends that inspection certificates be retained for history.

Lifting Lug Instructions

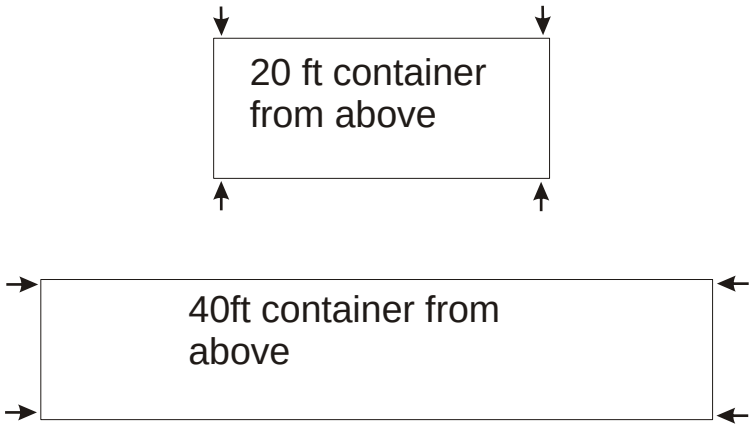


The only significant difference between a left-hand Lug and a right-hand Lug is the position of the roll-pin which is marked in black in the above diagram. The roll-pin prevents the lug from accidentally falling out of the container-corner-casting. When standing in front of the end of the container,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

Only ever use the correctly handed lifting lug to corner casting i.e. the left lug to the left corner casting and the right lug to the right corner. Failure to do this may result in the container coming loose during a lift with obvious potentially fatal results.

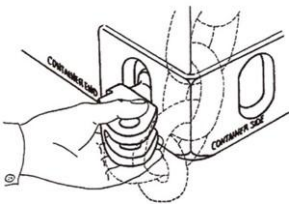
Lifting Lug Positions

On the SB121 Sidelifter, the lifting lugs are fitted in different positions for different container sizes, as shown by the arrows in the diagram below. For a 40 foot container (if unit is designed for 40 foot containers)), fit the lugs into the corner pockets on each end of the container. For a 20' container, fit the lugs to the corner pockets on the long sides of the container.



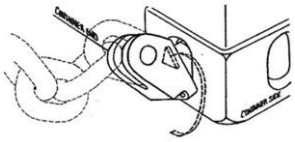
Using the Container Lifting Lugs

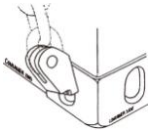
1. With the clevis of the lug facing out from the container, position the lug in the corresponding container-corner-casting-cavity.



2. Rotate the Lifting Lug over the top of the lug until the roll-pin prevents it from rotating any further.

3. The clevis is now pointing IN-wards, under an angle of approximately 60 degrees “UP”. The roll-pin prevents the lug from accidentally falling out of the container-corner-casting.





4. When lifting the container, the lug will slide to the top of the container-corner-casting-opening, and in a slightly steeper angle (this to prevent the roll-pin from taking any real load), before lifting the container.

The slope of chain legs ensures that the lifting lugs stay locked inside the container castings during the lift cycle.

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 Power Pack Version

The electrical system consists of the following:

- A 12-volt supply from the engine alternator system
- A main control box
- Two crane module mounted junction boxes
- A chassis mounted junction box for the SMARTlift Control system where fitted
- Remote control - cable, radio or both according to customer specification

System Lay Out

Electrical power is supplied from the engine generator system to the main junction box. The cable remote is plugged into this junction box. (for radio control the receiver unit 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. If the safety system option is fitted, it is located on the chassis between the main junction box and the crane mounted junction boxes.

System Operation

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

When you turn the key, the 12 volt system is energised and the run stop control solenoid. The engine can now be started. Movement of the joysticks signals the engine speed control (solenoid pneumatic actuated air cylinder) to maximum speed. When the joysticks are returned to their neutral position the engine speed returns to low 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. The two-function selector switch allows selection of stabiliser legs or crane arms. The three-function selector switch allows crane combination selections of front 20', 40' and rear 20'(where applicable). This allows joystick signals to be transmitted via relays in the main junction box directed to the Danfoss control valves. The joysticks also incorporate micro switches that independently signal the dump solenoid relay and the "PVEM power relay" (powers up the Danfoss control valve coils and sends signal to truck).

An emergency stop button "Mushroom" type is fitted to the remote control to shut down all systems in an emergency.

There are more details on how to use the remote control to operate the cranes in the Section: Crane Operations (on page 34).

Hydraulic System

Hydraulic System - Power Pack Version

The hydraulic system consists of the following:

- Hydraulic oil reservoir with return oil filter and a breather assembly
- Direct coupled hydraulic pump(s)
- High speed load sensed unloader valve assembly (except 121 and manual control models)
- High-pressure oil filter
- Danfoss proportional control valve(s)
- Two hydraulic cylinders fitted with double check valves operating each stabiliser leg
- One hydraulic cylinder fitted with single over-centre valves operating each top arm
- One hydraulic cylinder fitted with double over-centre valves operating each bottom arm
- Two hydraulic cylinders or four hydraulic motors to traverse the cranes (except on truck mounted and fixed crane units)
- A solenoid operated dump valve connected to the load sense system (optional)
- A hydraulic pressure gauge (or 2 for manual control version)

Hydraulic System - PTO Version

The hydraulic system consists of the following:

- High pressure supply coupling and low pressure return coupling on the front chassis services panel
- High Pressure Filter
- Two Danfoss proportional control valves
- Two hydraulic cylinders fitted with two check valves operating each stabiliser leg
- One hydraulic cylinder fitted with one overcentre valves operating each top lifting arm
- One hydraulic cylinder fitted with two overcentre valves operating each bottom arm
- A solenoid operated dump valve connected to the load sense line
- A hydraulic pressure gauge

Pneumatic System

This system consists of the following:

- A hold back protection valve
- Operation of Power Pack throttle

- Auxiliary air tank.

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.

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

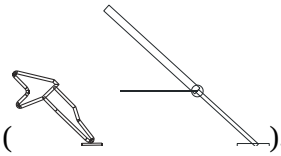
If the Sidelifter or load contacts power lines, the relevant electricity distributor must be notified immediately. The Sidelifter operator must warn other personnel not to touch any part of the Sidelifter or load and if possible without anyone approaching operate the Sidelifter to break contact.

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.

Lifting a Container from the Ground

Step	Action
	**It is essential to follow the practices recommended in this section. It is not acceptable to assume that because an action is possible, it is best practice. Incorrect usage can result in damage to the equipment and service resulting from such usage will not be covered by any warranty or service agreement.**

Step	Action
1	Park the Sidelifter alongside the container with approximately 300mm clearance between the container and the Sidelifter.
2	Complete the following checks: ▪ Sidelifter twistlocks are fitted to the corner castings according to the size of the container - see Lifting Lugs. ▪ Sidelifter Brake is applied! ▪ No hazards and obstructions such as overhanging building awnings, electric power lines or telephone cables. ▪ Nothing is in the way of the Stabiliser Feet and surface is solid enough to bear them. ▪ Twistlocks on the Sidelifter are in the raised position and unlocked
3	Start the engine (or PTO) and Sidelifter controls. On multi crane units, select the Front 20', 40', or rear 20' option on the three-way switch.
4	Select the mode selection switch on the right hand side of the remote control to Stabilisers (). Extend the stabiliser leg extensions to their maximum then tilt the legs until the feet touch the ground. **NOTE: Ensure that the strength of the ground surface is sufficient to withstand a 11 tonne maximum point loading. If you are in doubt as to this, then pack with 50mm thick hardwood timber of at least 200mm x 500mm under each stabiliser foot.**
	**WARNING: If the Ground is lower under one stabiliser leg than the other, DO NOT attempt a lift until this has been corrected using dunnage under that leg. Failure to do this can result in excessive container swing, which can damage the crane.**
5	Select the mode selection switch on top of the right hand end of the remote control to Arms (). Manoeuvre the top and bottom arms until the chains are positioned centrally allowing the lifting lugs to be fitted into the container corner fittings, ensuring that there are no twists or tangles in the chains.
	**WARNING: 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 moved so it will clear the container.**
6	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. This can be verified readily by checking that the top chain hoops take the strain in a vertical position. Choose between 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.
7	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,

Step	Action
	towards the Sidelifter, until it is about 300 mm from the side of the Sidelifter.
8	Raise the top arms until the bottom of the container is level with the top of the Sidelifter chassis.
9	Lower the arms until the container corner fittings are above their respective twistlocks.
	**WARNING: Rapid starting and stopping movements are stressful on the equipment, and may cause the container to swing.** **The controls should be feathered in and out of operation to give smooth movement.**
10	Lower the container down onto the twistlocks by locating either front corner onto a Twistlock anvil, and then the rear visible corner onto its Twistlock. With practice operators will be able to land the containers onto the twistlocks in one smooth operation.
11	Lower the lifting arms to their stowed position.
12	Select Stabilisers () and return the stabiliser legs to their stowed position. Shut down the controls by switching off the remote. Stow remote in truck cab and deactivate engine (or PTO).
13	Lock the twistlocks.
14	The Sidelifter can now be driven to the unloading site.

Placing a Container on the Ground

Step	Action
	**It is essential to follow the practices recommended in this section. It is not acceptable to assume that because an action is possible, it is best practice. Incorrect usage can result in damage to the equipment and service resulting from such usage will not be covered by any warranty or service agreement.**
1	Park the Sidelifter alongside the area where the container is to be placed Ensure that the area is clear of obstructions and the Sidelifter park brake is applied.
	**WARNING: If placing the container alongside another container, position the container by moving the trailer. Do not attempt to align the container by lifting one end high then dropping it. This practice can damage the crane.**
2	Unlock the twistlocks.
	**Take care to ensure the twistlocks are unlocked prior to lifting.**
3	Start the engine (or PTO) and Sidelifter controls. On Multicrane models, select the Front 20', 40', or rear 20' option on the three-way switch.
4	Fully extend the stabiliser legs and place the feet on the ground. As per the previous instructions: "To lift a container from the ground", packing may need to be placed under the feet on soft or doubtful ground. Select arm mode () on the remote control.
5	Raise the top and bottom arms until the chains are evenly tensioned. This can be verified readily by checking that the top chain hoops take the strain in a vertical position.
6	Raise the top and bottom arms to lift the container clear of twistlocks.
7	Move the container across the chassis until the container is 300mm clear of the side of the Sidelifter.
8	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.
9	Slacken the lifting chains and remove the lifting lugs from the container.
10	Return the lifting arms to the stowed position ensuring the lifting chains are in the chain trays beside the twistlocks.
11	Return the stabiliser legs to the stowed position.
12	Shut down the controls by switching off the remote. Stow remote in truck cab and deactivate engine (or PTO).

Transferring Containers to and from Truck or Trailer

Steelbro would like to remind operators that it is essential to follow the practices recommended in this section. It is not acceptable to assume that because an action is possible, it is best practice. Incorrect usage can result in damage to the equipment and service resulting from such usage will not be covered by any warranty or service agreement.

Note: 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:

High Crane Stabiliser:

1. **STABILISER LEG PLACED ON DECK OR CHASSIS**

   Where the deck length permits, high stabiliser 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 high stabiliser foot in the designated area. Alternatively place suitable timber dunnage under the Stabiliser foot to spread the load over the two chassis rails.

2. **STABILISER LEG PLACED ON GROUND**

   If there is insufficient room to place the high stabiliser foot on the deck it can be placed on the ground by tilting the stabiliser steeply before fully extending. If not, jack-knife the companion tractor unit to 45 degrees enabling the stabiliser leg to be placed on the ground fully extended.

Low Crane Stabiliser:

The stabiliser leg can be placed underneath the companion truck or trailer.

Park the two vehicles less than one metre apart. Place one leg on the ground at the rear of the companion truck at maximum extension. 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 40' Containers To And From 40' Trailers

Steelbro would like to remind operators that it is essential to follow the practices recommended in this section. It is not acceptable to assume that because an action is possible, it is best practice. Incorrect usage can result in damage to the equipment and service resulting from such usage will not be covered by any warranty or service agreement.

Follow the loading to and from the ground procedure except:

1. Park the two vehicles 500mm apart, with twistlocks aligned.
2. Place the low crane's stabiliser leg fully extended on the ground at the rear of the companion trailer.
3. Place the high stabiliser leg on the ground beside the truck, if it can be grounded without obstruction while fully extended. If not, jack-knife the companion tractor unit to 45 degrees enabling the stabiliser leg to be placed on the ground fully extended.

Take care: always ensure the twistlocks on both vehicles are unlocked before commencing transfers.

Transferring 20' Containers To And From 40' Trailers

Steelbro would like to remind operators that it is essential to follow the practices recommended in this section. It is not acceptable to assume that because an action is possible, it is best practice. Incorrect usage can result in damage to the equipment and service resulting from such usage will not be covered by any warranty or service agreement.

Follow loading to and from the ground procedure except:

1. Fit the Lifting Lugs into the OUTSIDE holes of the container corner fittings.
2. Park the two vehicles with the twistlocks aligned. If both sets of twistlocks cannot be aligned at the same time, align the front 20' set only.
3. Load the container onto the front of the 40' trailer in the forward 20' position with the lifting lugs fitted to the outside of the corner fittings.
4. Lock the trailer twistlocks.
5. Realign twistlocks by moving the companion vehicle, or by stowing the crane arms and moving the Sidelifter.
6. Load the 2nd container onto the rear set of twistlocks of the 40’ trailer, with the lifting lugs fitted to the outside of the corner fittings as described above, and lock the twistlocks.

Warning: If, when unloading two 20’ containers, you wish them to rest closer together than the distance between them as they come off the trailer, align the second one by moving the trailer. Do not attempt to align them by lifting the near end high then dropping it. This practice can result in damage to the crane.

Maintenance

As the owner of a Steelbro Sidelifter you will expect it to satisfy your demands for operational safety and profitability. In order for us, the manufacturers, to fulfill these demands we must ask you, the owner, to observe our requirements as to maintenance and service.

In this section we detail these requirements. We also expect that you do not alter or in any other way modify the Sidelifter construction.

Safety Instructions

Before carrying out any maintenance work read the safety instructions and make sure to follow them carefully. Failure to do so can lead to serious accidents or damage.

Equipment

- Wear appropriate clothing and safety equipment such as a hard hat, gloves, eye-protection, etc, as required.
- Keep a first aid kit and fire extinguisher handy at all times.
- Always use proper tools that are in good condition.

Operation

- Make sure that the Prime Mover is switched off and the keys are removed before starting any maintenance, servicing or cleaning work on the Sidelifter.
- When it is required to operate the Sidelifter for inspection or maintenance make sure other personnel are warned and are clear of any hazardous areas (eg. moving or rotating parts, exhaust gases, loud noise, etc.)
- Do not work under the influence of alcohol, medication or other drugs.
- Do not use a mobile phone or wear radio or music headphones while operating the Sidelifter for maintenance or inspection.
- 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 stop the Prime Mover before refuelling.
- Whenever a supporting component is removed adequate alternative support must be provided to the balance of the structure.

Inspection and Maintenance

- When cleaning any parts only use regular cleansers.
- Only suitably qualified and authorized personnel should carry out inspection and maintenance.

- Do not smoke when working around the battery or when refuelling.
- Always ensure when disconnecting hydraulic tubing and hoses, that no hydraulic pressure has been retained in the line when the power supply to the system has been switched off.
- Always ensure when connecting Quick Release Coupling, that the low-pressure line is correctly fitted before fitting the high-pressure line.
- Observe the relevant environmental protection regulations when disposing of oil, fuel, coolant brake fluid, filters and batteries.

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 53).

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.

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 air bags for damage, chaffing etc

Weekly Inspection And Service Requirements

Perform all activities required for daily inspection and in addition carry out the following service procedures:

Chassis

- Grease all grease nipples on the chassis, brake slack adjusters and landing legs with Shell Alvania E.P. grease.
- Grease semi trailer rub plate and kingpin with a good quality hub grease.

Crane 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.

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 as required.
- 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

Remove both lifting chain assemblies, and inspect and measure, as per the RUD Chain Recommendations. Each country has its own requirement for inspection and testing of lifting chains and slings. These must be adhered to. Steelbro recommends that chains are proof tested annually and that the records are retained for history.

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.

Overload Test

After all other checks have been completed, carry out a 10% Overload Test:

- The load should be the maximum load + 10% shown on the lifting chart, eg.12,000kg +1, 200kg = 13, 200kg.
- 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 this Sidelifter without written authorisation from Steelbro. Unauthorised modifications of any sort will result in the immediate termination of all warranty and service agreements between the Owner and Steelbro.

After repairs on the crane: Before putting the crane back into use, carry out an overload test as described in Overload Test (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

Fault Finding For Trailer Brakes

The trailer braking system is completely dependent on the satisfactory functioning of the tractor system, both for the air pressure supply and the control. Therefore it is advisable to ensure that the tractor system is working correctly before condemning the trailer braking system. For further information on brakes, refer to Bedding in the Running Gear.

Brakes inefficient

- Brakes need adjustment, relining or lubrication.
- Brake valve output pressure, on tractor vehicle, below normal.
- Defective relay emergency valve, giving low delivery pressures.
- Low air pressure in tractor and / or trailer system.

Brakes apply slowly

- Brakes need adjustment, or lubricating.
- Brake valve output, on tractor vehicle below normal.
- Low air pressure in tractor and / or trailer system.
- Damaged airline or hose, restricting airflow.
- Excessive leakage when brakes applied.

Brakes release slowly

- Brakes need correct adjustment.
- Brakes or linkage binding requiring lubrication.
- Exhaust port or relay emergency, or quick release valves obstructed.
- Restricted hose, or damaged airline.

Brakes not functioning

- Cut out cock on "service" line closed.
- Service line coupling disconnected, or excessive leakage in line.
- Shut off cock on "emergency" line closed and no pressure in trailer reservoir. "Emergency" line coupling disconnected, or excessive leakage.
- Obstructed airline or hose.
- Leakage in brake operating units, or air lines.

Brakes do not release

- "Emergency" line coupling disconnected, or excessive leakage.

	▪ Handbrake valve in applied position. ▪ Relay emergency valve in emergency position. ▪ Cutout cocks closed. ▪ Obstructed airline or hose. ▪ Brake assemblies binding.
Brakes grab	▪ Grease or oil on brake linings. ▪ Brake assemblies or linkage binding. ▪ Defective relay emergency valve, or brake valve.
Uneven braking	▪ Brakes need adjustment, relining or lubricating. ▪ Grease, or oil, on brake linings. ▪ Brake assembly damaged, or springs broken. ▪ Return spring broken in brake operating unit. ▪ Defecting diaphragm, or seal, in brake operating unit.
Air leakage with brakes released	▪ Relay emergency valve leaking. ▪ Leaking airline, or hose.
Air leakage with brakes fully applied	▪ Relay emergency valve, or tractor brake valve, leaking. ▪ Leaking airline or hose. ▪ Defective diaphragm, or seal, in brake operating unit.
Excessive oil and water present in the system	▪ Reservoirs, on tractor and trailer, not being drained often enough. ▪ Air compressor, on tractor, passing excessive oil.

Recommended Companion Vehicles

Steelbro have noticed that many Sidelifter operators are not aware of the ways in which specifying other transport equipment can help their Sidelifter operations.

We have therefore set out some points that may be helpful when you are purchasing other equipment.

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.

1. 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-lifter for handling empty containers then a space of 800mm will be required.
2. When buying drop deck container trailers, we recommend a space of 215mm between the drop in the deck, and the Twistlock centres, to allow sufficient room to fit the lifting lugs to the container.
3. 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.

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.

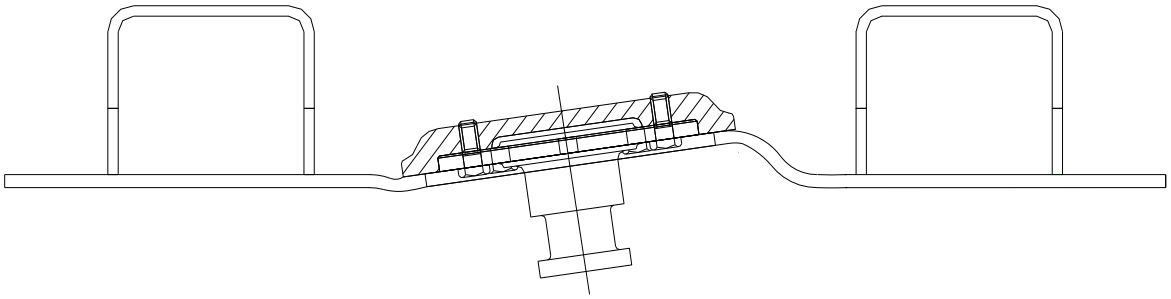
Chief Cause of Trouble

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.

Index

R

S

T

U

W