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HANDBOOK

Jib Cranes

S/N

Ref

- Type
- Freestanding
 - Face Fixing / Wall Mounting
 - Clamp Around / Column Mounting

 - Manual Slewing

 - Profile Track
 - Under Braced I-Beam
 - Over Braced I-Beam
 - Articulated / Knuckle

SWL (kg)

Jib Radius (mm)

Column height (mm)

Year of Manufacture

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INTRODUCTION

This handbook is to be sent with the supply of the machine. It is of interest for people who intend to install, maintain and use the machine. Users must be competent and follow the instructions detailed in this document. Once supplied with the machine, it is the responsibility of the owner to ensure that this book is kept safely in a dry, sheltered place, where it can be easily accessed for consultation.

Should this handbook be lost or damaged, a replacement handbook can be re-ordered by providing the information detailed on serial number plate/label, attached to the machine.

Warranties and responsibilities

The warranty is valid for 12 months from the date of delivery. This handbook corresponds to the machine and its characteristics at the date it was supplied. The warranty for this machine's use as determined at the time of delivery is dependent on the careful observance of the instructions in this handbook.

Therefore, the manufacturer retains the right to void the warranty for:

- uses other than those specified in this handbook
- non-authorized modifications or repairs to the machine
- the use of non-approved spare parts.

The responsibility of the manufacturer is not retained in the situation where the machine is transferred from the primary user to a secondary user. This responsibility can be re-established if the new user notifies the manufacturer and providing the correct procedures of installation and machine use are followed.

When the machine is sold to another user in a country with a different language, it is responsibility of the first customer to provide a copy of the present handbook, with an accurate translation.

1. MACHINE HANDLING

1.1 Packing

Columns and jibs are usually supplied shrink wrapped in plastic. Fragile parts along with any mounting brackets, electrical equipment, hoists and trolleys are usually packed in cardboard boxes.

Special packing can be supplied upon request.

The packing material can be disposed of with the normal urban waste.

1.2 Transport

The transport of the machine, packed as per chapter *Packing (1.1)*, must be carried out by qualified carriers, who are able to provide a proper handling of the materials.

Check that:

- The material hasn't been damaged in transit;
- No heavy article has been laid on the machine;
- The material hasn't been exposed to weather, frost or heat sources;
- Has not been stored in damp conditions;
- Is handled according to the instructions.

If the conditions aren't as specified above, contact the manufacturer within 1 working day of receipt.

Upon receipt, the packing and other materials must be complete, that is:

- They mustn't be dented, marked, damaged or broken;
- They mustn't be wet or have marks due to weather, frost or heat;
- They must not have been tampered with.

Any of the above must be marked on the delivery paperwork and the manufacturer must be notified within 1 working day.

2. MACHINE GENERAL CHARACTERISTICS

2.1 Marking

- CE mark
- Manufacturer's name and address
- Serial number
- Series/Type of machine
- Manufacturing year

The above information will be displayed on a permanent sticker, which must not be removed. This can usually be found on the kingpin part of the jib arm.

SWL stickers are usually supplied, but cannot be fitted to the jib until after it has been installed and commissioned.

2.2 Technical and constructive characteristics

This chapter describes the general characteristics of the jib cranes.

2.2.1 Freestanding Jib Crane

This is composed of a jib connected to the column. The column is fixed to the floor with anchor bolts or chemical anchors.

The jib can rotate manually to the limits of the column or to its own slewing limiters.

2.2.2 Face Fixing / Wall Mounting Jib Crane

This is composed of a jib connected to a support bracket fixed to the wall or to a support pillar with anchor bolts.

The jib can rotate manually to a certain degree, limited by its fixture or its own slewing limiters.

2.2.3 Clamp Around / Column Mounting Crane

This is composed of a jib connected to a support bracket fixed around a column to another bracket with anchor bolts.

The jib can rotate manually to a certain degree, limited by its fixture or its own slewing limiters

2.2.4 Jib Arms

Made from:

- a) Steel Profile Track Sections braced from above the track according to the safe working load (SWL).
- b) Steel I-Beams braced from above the beam according to the SWL.
- c) Steel I-Beams braced from under the beam according to the SWL
- d) Steel Articulated I-beams. The first I-beam is boxed in and under braced with pivot plates at the end. The second I-beam is fitted with a pivoting knuckle at one end and a fixed suspension point at the other. Both sections are designed according to the SWL.

They are mounted with a fixed pivot pin being fed through the kingpin, bushes/bearings, enabling the arm to rotate.

2.2.5 Jib Support Brackets

They are composed of reinforced plates, which the jib rotates in.

The brackets are either the fixed pivot on a freestanding jib column or separate top and bottom brackets that can be mounted to the face of wall/beam/structure or clamp around an existing column.

2.2.6 Columns

Self-supporting, made of steel box sections. At the bottom they have a base plate, which must be fixed directly to the floor via anchor bolts or on to an Anchor Frame set into a specially designed concrete base. At the top they have pivot plates to act as support brackets for the jib support.

2.2.7 Anchor Frame & Bolts

Supplied on request to fix the column into a concrete foundation plinth.

2.2.8 Face Fixing / Wall Mounting Brackets Kit

Comprises of a top and bottom bracket for mounting the pivot pin of the Jib arm inside. These brackets are supplied undrilled and require drilling/welding to suit the surface upon which the Jib will be mounted.

2.2.9 Clamp Around / Column Mounting Bracket Kit

Comprises of a *Wall Mounting Bracket Kit (2.2.8)* along with top and bottom rear mounting plates, threaded rod, nuts and washers. All the brackets and plates are supplied undrilled and require drilling to suit the column they will mount around. The threaded rod, nuts and washers should join the front and rear brackets in order to create a pivot point for the arm. It is recommended that extra support is fixed to the column to ensure the brackets do not slide down the column.

2.2.10 Electric Kit

Usually to supply an electric chain hoist or other lifting device suspended from the jib arm. An electric supply kit comprises of:

- a) for Profile Track Jibs
 - Cable Trolley(s) that run inside the profile behind the load trolley
 - Cable Clamp to fix cable at the start point of the arm
 - 4core 1.5mm PVC Flat Cable with small tail to connect to supply
 - PVC Cable Glands to suit the cable
- b) For I-Beam Jibs
 - Cable Trolley(s) that run along I-Beam behind the load trolley
 - Cable Clamp to fix cable at the start point of the arm
 - 4core 1.5mm PVC Flat Cable with small tail to connect to supply
 - PVC Cable Glands to suit the cable
- c) For Articulated Jibs
 - A conduit is mounted along the length of both sections of the arm to feed the supply cable and ensure it doesn't get trapped at the articulated knuckle joint
 - A suitable cable with small tail to connect to supply
 - PVC cable glands to suit the cable

Upon request a third type of system can be supplied to suit profile arms and I-beam type arms. It comprises of an external c-track track with trolleys, an end clamp and a stop, that can be mounted directly off the jib arm and carries the supply cable along the length of the arm.

3. INSTALLATION AND TESTING.

3.1 Before Installation

3.1.1 Working Conditions

The temperature range of the environment and/or near the machine working area must be within the following:

max temperature +50°

min temperature -30°

Moisture 70%

Altitude 1000 m.

Machines mustn't be placed near heat sources.

The area must be free from:

- Steam, smoke or dust, and the atmosphere mustn't be corrosive or explosive;
- Magnetic fields.

No precautions are necessary if the machine is installed in a covered area, protected from weather.

When the machine is installed outside, exposed to weather, or in a sea environment:

- A fixed shelter is required for the hoist and the trolley;
- Protective covering should be placed over the electric parts.
- Standard powder coated finish is suitable for normal outdoor use, but may require treatment after 1 year.
- A hot dip galvanised finish is required for adverse outdoor weather conditions.
- A stainless steel pin is always required for unprotected outdoor use.
- Speak to the manufacture for advice if unsure on the working environment and conditions.

3.1.2 Classification

The machine should not be used outside its classification as described in BS7333 : 1990.

The class of the machine described in this handbook is: A3

Table 1 – Group Classification of the crane

State of loading	Nominal load spectrum factor, Kp	Class of utilization and maximum number of operating cycles of the crane			
		U1	U2	U3	U4
		3.2x10 ⁴	6.3x10 ⁴	1.25x10 ⁵	2.5x10 ⁵
Q1 Light	0.5	A1	A1	A2	A3
Q2 Moderate	0.63	A1	A2	A3	A4
Q3 Heavy	0.8	A2	A3	A4	A5
Q4 Very Heavy	1	A3	A4	A5	A6

Table 2 – State of loading for the crane

State of loading	Nominal load spectrum factor, Kp	Descriptive definition
Q1 Light	0.5	Normally moderate loads: cranes that hoist the safe working load very rarely
Q2 Moderate	0.63	Normally moderate loads: cranes that hoist the safe working load fairly frequently
Q3 Heavy	0.8	Normally heavy loads: cranes that hoist the safe working load frequently
Q4 Very Heavy	1	Normally near safe working loads: cranes that are normally loaded close to the safe working load

Table 1 and 2 are extracted from BS7333 : 1990.

Table 1 has been condensed to only show relevant information to the jibs described in this handbook.

3.1.3 Hoist Selection

When a hoist is installed on the crane, it must have the following characteristics:

- The capacity must not exceed the crane plate capacity;
- The capacity indications on plates or on the hook must not exceed the crane capacity;
- The lifting speed must not exceed 12mpm;
- The slewing speed must not exceed 20mpm;
- The centre of the hoist hook must coincide with the centre between the trolley wheels.

3.2 Preliminary Operations

Before proceeding with the assembly and installation it is necessary to carry out some checks in order to ensure safety throughout the assembly and after installation is complete.

So:

- CHECK that the characteristics of the machine are the same as indicated in the order and corresponding to its use;
- VERIFY that the nominal capacity is over or equal to the loads to be lifted and that the lifting height isn't less than the effective installation conditions;
- CHECK that the working area is congruent with the shape of the machine;
- VERIFY that there is nothing that could interfere with the machine and its fixing position, as well as the lifted and/or transported load;
- CHECK that the trajectory doesn't meet things or persons. If it does, be sure that proper safety devices are installed;
- CHECK that the charges the machine transmits to the structure it will be fixed to (floors, columns, walls, etc.) have been taken into account;
- CHECK that supports and suspensions of the machine are fit for the characteristics of the machine itself;
- CHECK the anchors;
- CHECK that the machine is complete, not damaged;
- CHECK that all parts are present;
- BE SURE that there aren't breakages, torn electric wires, dents, rust, jammed braking surfaces;
- CHECK that the insulation and the section of the feeding electric cables are fit for the installed voltage. Do not use temporary patch cords;

Ensure these checks are also carried out for machines put in service after a long storage period.

Call the manufacturer immediately if there are problems and don't install the machine.

3.3 Freestanding Column Assembly

The crane is fixed to the floor via a foundation frame set into a concrete plinth or via chemical anchors or expanding mechanical fixings.

3.3.1 Assembling the Anchor Frame in a Concrete Foundation

- a) Prepare the Anchor Frame by positioning the anchor bolts into the template and fastening the top and bottom bolts.
- b) Place the frame in the foundations, take care that the bent side is under the rods of the iron reinforcement in the plinth and that the upper side of the frame is at the same level of the floor. The frame must be perfectly levelled: use a level, as necessary.
- c) Fill the plinth, protecting the external part of the anchor bolts and nuts to avoid covering them with concrete.

The foundation plinth should be designed by a suitably qualified technician provided by the customer to accommodate the jib stresses, and the nature of the ground and filling material.

3.3.2 Mounting the Column on the Anchor Frame

- a) Ensure that the concrete floor/plinth is set correctly
- b) Before assembling the column, remove the nuts from the anchor frame bolts.
- c) Lift the column without the jib and place it with its base plate locating to the anchor bolts and fix with the nuts and washers.
- d) Check with a level, placed on the jib pivot pin, that the column is square. **It may be necessary to put shims on the anchor bolts under the base plate.**
- e) Tighten the nuts and repeat this operation after a few working days to eliminate any clearance due to the plinth settling.

3.3.3 Mounting the Column with Chemical Fixings or Expandable Mechanical Fixings

- a) Check that the stretch of floor where the column will be installed is perfectly level.
- b) Lift the column without the jib and keep it vertical, fixing it to the floor temporarily by bracing it with weights.
- c) Bolt the base to the ground using either chemical fixings or expandable mechanical fixings. Follow the instructions supplied with the fittings for installation method.
- d) Check with a level, placed on the jib pivot pin, that the column is square. **It may be necessary to put shims on the anchor bolts between the base plate and the floor.**
- e) Tighten the nuts and repeat this operation after a few working days to eliminate any clearance due to the plinth settling.

3.4 Face Fixing / Wall Mounting Brackets Assembly

This can be mounted to any suitable flat surface for example a wall or the face of a column. The mounting surface must be approved by a suitable qualified person (provided by the customer) to sustain the loadings inflicted by the jib crane.

Both top and bottom jib arm fixing brackets are supplied undrilled, to be drilled/welded on site to suit the structure it is being fastened on to. It is the responsibility of the installer to provide suitable fixings to sustain the loadings inflicted by the jib crane.

Ensure the top and bottom bracket assemblies are tight to the jib arm kingpin, bushes/bearings and clutch plate, but loose enough to allow the arm to pivot. The recommended tolerance is 2mm +/- 0.5mm.

3.5 Clamp Around / Column Mounting Brackets Assembly

This can be clamped around or through any suitable column/wall with a flat and level mounting surface at the front and rear. This could be an I-beam, steel box section, iron pillar, concrete pillar or equivalent alternative. The mounting structure must be approved by a suitable qualified person (provided by the customer) to sustain the loadings inflicted by the jib crane.

Upper Brackets Assembly

- a) Drill both front brackets and back plates to suit the column width or through holes in wall
- b) Position threaded rod through front brackets and back plates using nuts and washers to tighten and lock in position

Lower Brackets Assembly

- a) Drill both front brackets and back plates to suit the column width or through holes in wall

- b) Position threaded rod through front brackets and back plates using nuts and washers to tighten and lock in position

Ensure the top and bottom bracket assemblies are tight to the jib arm kingpin, bushes/bearings and clutch plate, but loose enough to allow the arm to pivot. The recommended tolerance is 2mm +/- 0.5mm.

After the brackets are fitted into place an anti-slide device must be fitted to ensure the brackets can not slip out of position. This is not supplied with the Clamp Around / Column Mounting Bracket Kit and would usually be welded/bolted directly below the bottom bracket.

3.6 Jib Arm Assembly

3.6.1 Bushes Installation

If the whole jib arm kingpin is made from square hollow section it is designed to fit bushes.

- a) Bushes are designed to fit squarely into the kingpin part of the arm evenly spaced the whole way around.
- b) They should be fitted by positioning them into the kingpin and lightly tapping them until they are fully in position.
- c) Do not force bushes as this can cause them to crack or break.
- d) If the bushes are cracked or damaged in any way they must be replaced.

It may be necessary to file down the part of the bush that fits into the kingpin to suit the tolerance of steel in the kingpin.

3.6.2 Bearings Installation

If the kingpin has a bearing housing fitted at the top and bottom it is designed to fit bearings

- a) A roller bearing should fit squarely into the bearing housing located at the top of the kingpin.
- b) It should be fitted by evenly and lightly tapping it to position.
- c) A taper bearing should fit squarely into the bearing housing located at the bottom of the kingpin.
- d) The taper bearing is in 2 parts. The outer race should be fitted into the kingpin by evenly and lightly tapping it in to position.
- e) The taper bearing inner race fits into the outer race and should be carefully positioned at the same time the arm is being fitted between the jib support brackets.
- f) Do not force any of the bearings into position as this can damage the bearings.
- g) If the roller bearings or taper bearings are damaged in any way they must be replaced.

3.6.3 Fitting pivot pin from above (standard method)

Standard method of installing jib arm, with the pin fitted from above (see Annex A).

- a) Remove the pivot pin from the column or arm.
- b) Check that the bushes/bearings are fitted into the kingpin part of the jib arm. If not fit them in accordance with 3.6.1 bushes installation or 3.6.2 bearings installation.
- c) Sling the jib arm with nylon slings, ensuring that it is well balanced and lift it. If it is not possible to use a proper lifting device or if the space isn't large enough, lift the jib arm with a forklift truck, tying it to the forks and ensuring that the load is well balanced and doesn't exceed the capacity of the forklift truck.
- d) Position the jib kingpin with fitted bushes/bearings between the jib support brackets. Bracket holes must line up with the bush/bearing holes.

- e) Insert the pivot pin from above through the jib support bracket, clutch plate, bushes/bearings and the kingpin part of the arm.
- f) Secure the pin with 3 bolts through the pin plate into the corresponding tapped holes in the jib support bracket and down onto the clutch plate. The ease/difficulty of the slewing motion can be controlled by how tight/loosely the bolts are fastened onto the clutch plate. Use lock nuts on the bolts to fix them into position and enable the required slewing force.
- g) Check that the jib is perfectly horizontal using a level and fully rotating the jib to the right and left.

3.6.4 Fitting pivot pin from below (alternative method)

Bottom fixing kits are not normally supplied, but are available as an optional extra upon request. They enable the pin to be fitted from below (see Annex B).

- a - d) as per standard method (see 3.6.3)
- e) Insert the pivot pin from below through the jib support bracket, bushes/bearings, kingpin part of the arm and the clutch plate.
- f) Secure the pin with 3 bolts through the pin plate into the corresponding tapped holes in the bottom jib support bracket. Ensure that the fixing bolts do not interfere with the lower bush/bearing. Use lock nuts to secure the bolts into position.
- g) Place the lock pin through the corresponding hole at the top of the pin, which should be protruding from the top jib support bracket.
- h) Screw 3 bolts through the top jib support bracket and down onto the clutch plate. The ease/difficulty of the slewing motion can be controlled by how tight/loosely the bolts are fastened onto the clutch plate. Use lock nuts on the bolts to fix them into position and enable the required slewing force.
- i) Check that the jib is perfectly horizontal using a level and fully rotating the jib to the right and left.

3.6.5 Load Trolley Installation

Used to suspend and traverse a hoist/manipulator along the length of the jib arm.

For profile track jib arms the trolley(s) slides in from the open end of the track. If power feed is required, the clamp and cable/hose trolleys must be installed before the load trolley (see 3.7.1). An end stop and ultimate stop cross bolt must also be fitted immediately after the load trolley is installed (see 3.6.6.1).

For I-beam jib arms the trolley must be installed in accordance with the trolley/hoist manufacturers guidelines.

3.6.6 End Stop Installation

These are an integral safety feature and must be fitted to all jib cranes prior to commission.

3.6.6.1 End stop for profile track jib arms:

- a) End stops are L-shaped brackets with a buffer that fit inside the profile track to stop the trolley from passing. It must be bolted to a matching plate on the underside of the track profile and tightened to a torque of:

Bolt (grade 8.8)	M6	M8	M10	M12	M16	M20	M24	M30
Torque (Nm)	10	25	50	87	210	412	711	1422

- b) The ultimate stop cross bolt must also be fitted though the end of the track and fastened with a nyloc nut. If the fixing hole for this is missing, it must be drilled and the ultimate

stop cross bolt fitted prior to commissioning the jib crane. Speak to the manufacturer of the jib crane for details on how to do this.

3.6.6.2 End stop for I-beam jib arms:

- a) End stops are a pair of L-shaped brackets that bolt through the web of the beam and stop the trolley from crashing into the jib bracing or crushing the festoon supply equipment. The jib arm should be drilled to suit the brackets, which are fixed with two bolts, washers and nuts. The bolts should be tightened to a torque as detailed in 3.6.6.1.
- b) The cantilevered end of the jib crane is fitted with a permanent welded end plate to ensure that the trolley/hoist cannot fall off the end.

3.6.3 Slewing Limit Installation

Slewing limits are not normally supplied, but are available as optional extras upon request.

3.6.3.1 Fixed Slewing Limits

These are usually mounted onto the column or arm during fabrication and do not require any extra assembly during installation.

3.6.3.2 Adjustable Slewing Limits

Adjustable slewing limits usually comprise of an alternative type of jib support bracket with 2 curved slots. The slots are used to bolt through and fasten angled brackets with buffers into a position where they stop the slewing of the jib arm.

Once the required slewing arc has been achieved the brackets should be locked into position by fastening the nuts and bolts.

3.6.3.3 Adjustable Slewing Limits (retro fitted)

Jibs that were not built with slewing locks or adjustable slewing locks can usually be retro-fitted with adjustable slewing limits.

For freestanding jib cranes this comprises of a plate that is mounted on top of the column and fixed with 4 corresponding plates that clamp it onto the top jib support bracket. It then works in exactly the same method as the adjustable slewing limits 3.6.3.2.

For face fixing / wall mounting jib cranes and clamp around / column mounted jib cranes the method of limiting the slewing arc will be dependent on how the jib crane is installed. The manufacturer will need to know specific details of the installation, before they can advise whether this is possible for a specific application.

3.7 Power Feed Equipment Assembly

3.7.1 Power feed for profile track jib arms:

- a) Insert cable/hose clamp into profile track and position as close to the pivot pin as possible, without hindering the slewing arc.
- b) Insert cable/hose trolleys in track profile.
- c) Loosen the bolts fastening the formers to the trolleys and clamps.
- d) Feed the cable/hose through the clamp and trolleys and spread so the cable/hose festoons evenly.
- e) Connect the cable/hose to the hoist and isolator.

- f) To reduce the risk of damage to cable/hose trolleys through collision with the load trolley in the festoon bunchup area, it is recommended that the track is drilled and a locking bolt put through in such a position that stops the load trolley, while allowing the cable trolleys to pass under. The bolt should be located directly after the final cable/hose trolley, when the jib is slewed to its most extreme point and the cable clamp and trolleys are positioned as close to the pivot pin as is reasonably possible.

3.7.2 Power feed for I-beam jib arms:

- a) Loosen the girder clamps on the cable/hose clamp and position it as close to the pivot pin as possible without hindering the slewing arc. Then tighten the girder clamps around the I-Beam.
- b) Loosen the wheel clamping brackets on the cable/hose clamps and position the wheels so they will fit around the I-Beam. Once in position tighten the wheel brackets, ensuring that the trolleys can run freely along the beam without catching or slipping off.
- c) Feed the cable/hose through the clamp and trolleys and spread so the cable/hose festoons evenly
- d) Connect the cable/hose to the hoist and isolator.

3.7.3 Power feed for articulated jib arms

- a) Feed the cable/hose through the conduit on both arm sections, leaving enough slack for the articulated knuckle joint and the slewing pivot.
- b) Connect the cable/hose to the hoist and isolator.

3.7.4 C-rail festoon power feed for jib arms

This power feed system is not normally supplied, but is available as an optional extra upon request.

- a) Girder clamp adjustable support brackets to top of jib arm
- b) Feed c-rail track through the support brackets so that it runs parallel to the jib arm. Ensure it is far enough away from the jib arm that it does not interfere with the hoist travel or slewing arc of the jib arm.
- c) Fix cable/hose clamp at starting end by bolting it into c-rail
- d) Feed the cable/hose trolleys in the c-rail.
- e) Feed the towing trolley into the c-rail.
- f) Fix end stop at far end of the c-rail to stop trolleys leaving the track.
- g) Feed cable hose through clamp, trolleys and tow trolley and spread so the cable/hose festoons evenly.
- h) Tighten the bolts to clamp the cable/hose in to the trolleys and clamps
- i) Connect the cable/hose to the hoist and isolator.
- j) Use a connecting bracket (not usually included) to join the hoist to the tow trolley.

3.8 After Installation

After installation, check:

- That the line voltage is as expected for the crane working;
- That the voltage at the motor terminals is within -10% of the nominal value;
- That all expected safety devices have been installed;
- That the crane run is free from obstacles;
- That any needed stops for crane rotation and for trolley travel are installed;

3.9 Use after Long Period of Storage

The machine should be subjected to regular maintenance to ensure suitable and safe operations whenever required.

When the machine is used after long storage:

- Check the condition of the machine as per chapter *After installation* (3.8);
- Carry out thorough maintenance as per chapter *Periodic maintenance* (5.2);
- Carry out the working tests as per chapter *Test* (4).

4. TEST

The testing procedure verifies the correct working conditions and performance of the crane. These procedures should also be carried out on machines put in service after a long storage period.

Should any potentially dangerous condition arise, or bad or incorrect running of the machine, stop the test and ascertain the reasons with the aid of this handbook; or inform the manufacturer, asking for their prompt intervention.

4.1 Visual Inspection

Ensure that:

- The supporting structure and connections are sufficient to sustain the loadings inflicted by the jib crane.
- That the jib crane is assembled correctly as described in this handbook.
- There is no possibility of collision during rotation.
- The crane must be level and not slew or the hoist load trolley run away without operator intervention.
- There is no visible damage to the crane, which may affect its performance and safe use.
- All breaks, mechanical stops and limits are functioning correctly.
- That any power feed equipment is isolated.

4.2 Deflection Test

During the test the examiner should be looking for the load trolley running away, jib slewing out of control, bounce and excessive effort to bring the trolley back along the arm.

- a) Ensure the criteria of visual inspection (4.1) have been fully met.
- b) Measure the height at the far end of the jib arm to a fixed datum point.
- c) Slew the arm to its extremities and re-measure.
- d) Apply a calibrated load equal to the SWL at the far point of the cantilever and measure the deflection.
- e) Slew the arm fully through its path taking various relevant deflection measurements where appropriate.
- f) Calculate the true deflection of the cantilever and span, by subtracting the deflection in the support structure/column from the measured deflection.
- g) Check that the cantilever and span deflections are correct according to the relevant industry standard.

4.3 Dynamic Test

- a) Ensure the criteria of the deflection test (4.2) have been fully met
- b) Apply dynamic tests with a calibrated load equal to the SWL suspended from the crane
- c) Slew the arm fully through its rotation arc
- d) Move the hoist trolley through its full travel path
- e) Ensure that the maximum slewing and travel speeds are not exceeded during this operation

Check:

- Minimal noise or vibrations occur during rotation or hoist trolley travel.
- That all stops, limits and breaking devices function correctly

- All safety devices functions correctly.
- That the jib crane meets the criteria detailed its handbook.
- That the hoist and trolley meet the criteria detailed in their relevant handbooks
- That no there are no permanent deformations after the load is released and the crane returns to its original state.

4.3 Proof Load Test

- a) Ensure the criteria of dynamic test (4.3) have been fully met
- b) Apply a calibrated proof load weight equal to the SWL+25% at the far point of the cantilever
- c) Slew the arm fully through its rotation arc
- d) Move the hoist trolley through its full travel path
- e) Ensure that the maximum slewing and travel speeds are not exceeded during this operation

Check:

- Minimal noise or vibrations occur during rotation or hoist trolley travel.
- That all stops, limits and breaking devices function correctly
- All safety devices functions correctly.
- That the jib crane meets the criteria detailed its handbook.
- That the hoist and trolley meet the criteria detailed in their relevant handbooks
- That no there are no permanent deformations after the load is released and the crane returns to its original state.

5. MAINTENANCE, REPLACEMENTS AND ADJUSTMENTS

To provide long lasting efficiency, a proper maintenance of the machine parts must be implemented.

If concerns arise pertaining to the hoist and the trolley or other equipment installed on the crane, follow the instructions contained in their handbooks.

Any service or repair of the machine must be carried out by qualified personnel.

When qualified personnel are not available, the user should inform the manufacturer, who will either attend the machine or recommend a reliable firm operating in the customer area.

5.1 Routine Maintenance

Refers to the maintenance that may be done by qualified personnel or directly by the operator and which doesn't require the use of special instruments and equipment.

Weekly:

- Check the efficiency of the power feed supply and any of its components;
- Check that all safety devices are working correctly;
- Check that any fixed stops are working correctly;
- Check the efficiency of brackets and tie rods for face fixing / wall mounting and clamp around / column mounting cranes, ensuring that no sliding has occurred.

5.2 Periodic Maintenance

Refers to checks for any necessary adjustments or replacement of parts. These should only be carried out by qualified personnel.

During the maintenance both of mechanical and electrical parts, it is necessary to switch off the machine at the mains and put up a "machine undergoing maintenance" sign.

Periodic maintenance must be carried out every 12 months. This may need to be carried out sooner if a situation occurs requiring urgent attention or it is deemed necessary by the qualified personnel who commissions and examines the equipment.

Check the crane:

- For any cracks and/or paint flaking on the welding. In case of anomalies, examine the welding with penetrating liquid or an equivalent method;
- Check that the structure hasn't deformed;
- Check that the fixing tie rods of clamp around / column mounting jib cranes or anchor bolts of freestanding jib cranes to the foundation plinth are well tightened;
- Check the bushes/bearings to ensure there are no cracks, bends or deformities.
- Check that the jib is always perfectly horizontal
- Check the tightness of all bolts.
- Check for slip on clamp around / column mounting bracket kits

These checks should also be carried out on machines put in service after a long storage period.

5.3 Check Book

A check book should be kept to record the machine's service history. It is duty of the person in charge of servicing to keep this register accurate with full technical details.

The name of worker and the date of service must be clearly indicated.

In the event of testing showing insufficient security or unreliable functioning, DO NOT HESITATE to substitute parts and/or components during the examination.

Please find check sheets at the end of this handbook.

5.4 Faults

We have attempted to cover possible reasons for the machine ceasing to function, along with suggested causes and remedies. However, damage can often be prevented by paying attention to any unusual vibrations, noises, crashes, sparks and excessive clearances, which are an indication of arising trouble and if ignored can cause serious problems.

The trouble check and remedy must be executed by qualified personnel with a proper understanding of the safety controls that should be in place during the work. Any tools used should be in good condition.

In case of lack of qualified personnel or doubts about the precautions to be adopted, call the manufacturer.

Faults, components and remedies

The rotation movement is blocked.

- Bush/Bearing breakage: replace bush/bearing.

Unsteadiness of the jib positioning.

- Excessive slope of the rotation axis: check the crane is vertical and the anchorage system is firmly tightened.

5.5 Replacements

5.5.1 Replace of Bushes/Bearings

- a) Sling the jib with nylon slings to a hook of a lifting device or to the forks of a forklift truck.
- b) Remove the rotation pin of the jib
- c) Lay/Secure the jib on the floor or suitable alternative.
- d) Remove bushes/bearings, by pushing them out from the inside of the kingpin (access via opposite side).
- d) Reassemble the jib as per chapter Jib Assembly (see 3.6).

5.5.2 Replace Load Trolley

5.5.2.1 Replace load trolley from profile jib arm

- a) Remove the plastic end cap (not on all models), end stop and ultimate stop cross bolt from the end of the profile track.

- b) Remove and replace the load trolley.

- c) Replace the end stop, ultimate stop cross bolt and end cap.

5.5.2.2 Replace load trolley from I-beam jib arm

Remove and replace as per the guidelines of the new/old trolley/hoist manufacture(s).

5.5.3 Replace Power Feed Components

Disconnect the machine from the power feeding line.

5.5.3.1 Replace cable/hose trolley from profile jib arms

- 1) Remove the plastic end cap (not on all models), end stop and ultimate stop cross bolt from the end of the profile track. Remove the load trolley and hoist. If possible remove the cable/hose trolleys from the track without unclamping the cable.
- 2) Undo the bolts that clamp the former around the cable/hose and remove the trolley from the cable/hose.
- 3) Replace the cable/hose trolley with a new one.
- 4) Refit the cable trolleys in order, load trolley and hoist, end stop, ultimate stop cross bolt and end cap. If necessary re-clamp the cable into the trolleys.

5.5.3.2 Replace cable/hose trolley from I-beam jib arm

- 1) Loosen the nut supporting the wheel carrying brackets on the trolley enough to remove the trolley from jib arm beam.
- 2) Remove the trolley from the beam, take off the cable and insert a new trolley. Replace it by reversing the method of removing it.

5.5.3.3 Replace cable from jib arm

- 1) Disconnect the cable from the hoist, cable trolleys and from the isolator.
- 2) Insert a new cable making it go through the supports of the trolleys so that the festoon is evenly distributed.
- 3) Connect the cable to the hoist and to the isolator.

5.5.3.4 Replace c-rail festoon power feed components

Isolate the power and then disassemble by following the steps detailed in the 3.7.4 in reverse. Replace the faulty component and reinstall following the steps detailed in 3.7.4 in the correct order.

6. OUT OF SERVICE OR SCRAPPING

When the machine

- Is dangerous when working;
- Needs maintenance;
- Is no longer necessary

It must be put out of service as follows:

- Disconnect the machine from the feeding line;
- Place it where it cannot cause trouble or danger and it cannot be used;
- Put an "Out of service" sign onto the machine;
- Fix the machine into a static position that will not be affected by vibrations or crashes;
- Disassemble the machine and store it or scrap it.

When the machine has to be scrapped, take into account the different materials (metal, oil, plastic, rubber, etc.) its parts are made of, if possible utilizing a specialist firm and always respecting the laws regarding industrial waste disposal.

7. USE INSTRUCTIONS

7.1 Operator Instructions

The operators of the machine should be:

- Adult;
- Able bodied;
- Have appropriate technical ability;
- Careful and responsible workers;
- Able to react appropriately in dangerous situations.
- Adequately trained

7.2 Safety Rules for the Operators

The operators have to:

- Be aware of and understand the contents of the chapters *Restricted use of* and *Safety rules*;
- Respect the signs placed by the user, showing "safety rules" and instructions, that must be well visible where the machine is working;
- Inform the all other users about any abnormality, damage or inefficiency of the machine, which may occur during its use, and stop all operations immediately;
- Know the procedures to be taken in dangerous situations;
- Make use of devices recommended for their personal safety.

7.3 Restrictions of Use

- DON'T attach accessories or equipment or lift loads exceeding the maximum capacity.
- DON'T make any reverse manoeuvre. Don't start an opposite manoeuvre if the dynamic effects of the previous manoeuvre haven't finished.
- DON'T lift loads with surfaces exposed to the wind, which aren't according to the standard used for the calculation.
- DON'T use the machine if it is not completely efficient and/or if doubts arise about the integrity of some components, accessories included.
- DON'T tamper with the machine
- DON'T make the machine work in cycles and load conditions over the ones foreseen for the use.
- DON'T modify the machine in order to change its original use without the manufacturer's permission.
- The use of the machine is NOT ALLOWED to untrained operators;
- DON'T lift and/or transport persons or animals.

7.4 Safety Rules

- TAKE CARE not to knock against people or obstacles in the working area.
- AVOID any dangerous abnormal strain to the structure, rough tension of the chains, motors being overcharged etc.
- CHECK that the machine support (beam, fixed point etc.) is in good condition and is permanent.
- CHECK that all safety systems are installed.
- CHECK that the contact between machine and electric feeding line is fitted, permanent and not precarious in any way
- CHECK that the control board and the out going cables are complete and without breakages, abrasions, uncovered or cut wires.
- OBEY the instructions on the machine.
- CHECK the condition of the lifting device and follow the instructions or its handbook.

Check Book

See chapter (5.3).

Three monthly tests

Give an indication such as: very good, good, fairly good, worn, to be replaced, replaced on...

Date
Welds
Deformations
Bolts and tie rods
Bushes/Bearings/Clutch plates
Jib arm
Electric equipment
Remarks
Inspector's signature

Date
Welds
Deformations
Bolts and tie rods
Bushes/Bearings/Clutch plates
Jib arm
Electric equipment
Remarks
Inspector's signature

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Remarks
Inspector's signature

ANNEX A - FITTING PIVOT PIN FROM ABOVE

EXPLODED VIEW

- (1) M8 X 40MM BOLTS
- (2) M8 LOCK NUTS

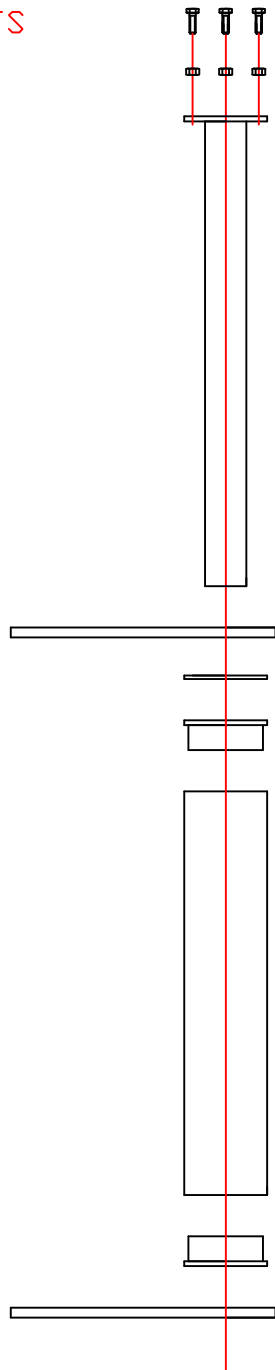
(3) PIVOT PIN

- (4) PIVOT PLATE
- (5) CLUTCH PLATE

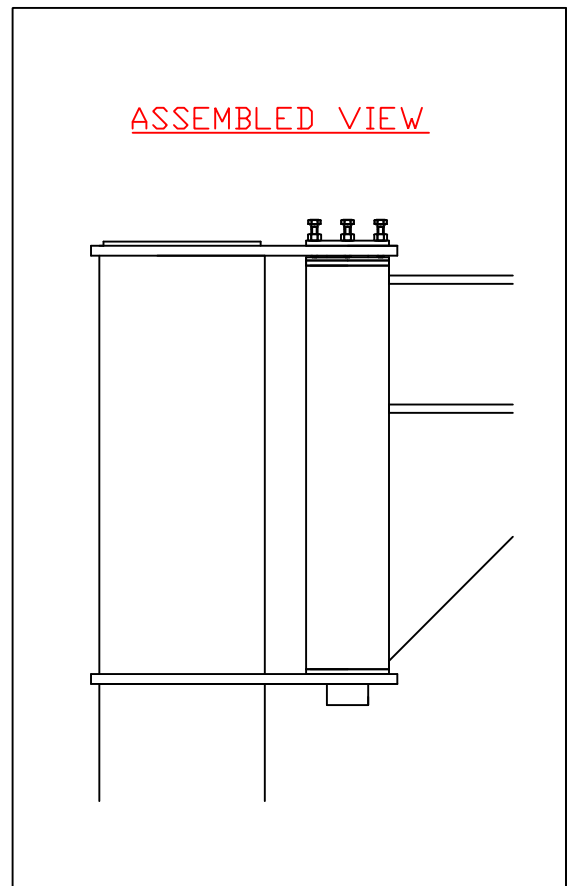
(6) BUSH/BEARING

(7) KING PIN

- (6) BUSH/BEARING
- (4) PIVOT PLATE



ASSEMBLED VIEW



ANNEX B - FITTING PIVOT PIN FROM BELOW

EXPLODED VIEW

(1) M8 X 40MM BOLTS

(2) M8 LOCK NUTS

(3) PIVOT PLATE

(4) CLUTCH PLATE

(5) BUSH/BEARING

(6) KING PIN

(5) BUSH/BEARING

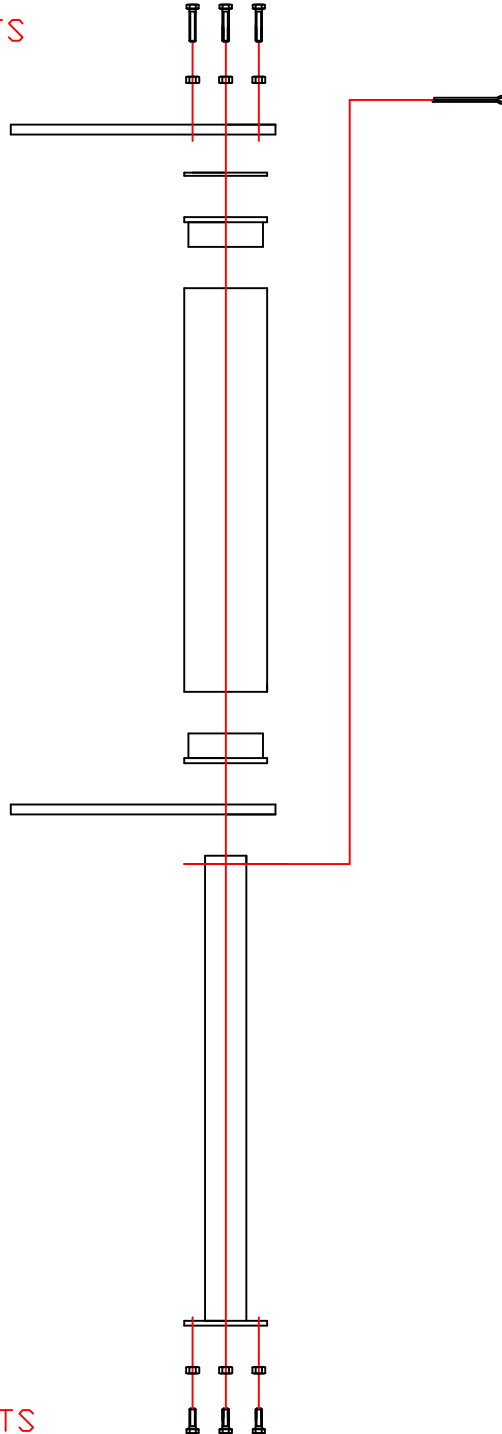
(4) PIVOT PLATE

(7) PIVOT PIN

(2) M8 LOCK NUTS

(8) M8 X 25MM BOLTS

(9) SPLIT PIN



ASSEMBLED VIEW

