



RCI-1550 HRT Telescopic Boom System Instruction Manual

MAN-1077 Rev B



Management
System
ISO 9001:2008

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1 WELCOME TO LSI-ROBWAY PRODUCTS

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Robway Crane Safety Systems are pleased to have been selected to provide the RATED CAPACITY LIMITER fitted to this crane.



Note

The electronic load-charts in this system have been provided to assist the operator to drive the crane safely and productively. These load-charts have been provided to Robway by either the crane manufacturer or crane owner (or their representatives).

Robway dutifully re-represent these load-charts into memory.



Warning

Motion Limiters may have been fitted to stop those functions that will increase radius and hoist-up if the load-chart is exceeded. This feature is provided as an aid to safer crane operation.

In certain situations, such as crane setup, the crane operator may need to 'over-ride' the motion limiters. At these times, the system can no-longer warn of overload and the crane must only be used in strict accordance to the crane manufacturer's setup and operation procedures.

Proper system operation requires the operator to correctly program the Robway system to match crane setup and working configuration.



This Rated Capacity Indicator is fitted to assist the crane operator.

This Rated Capacity Indicator is not a substitute for operator judgement, experience or safe crane operation. At all times the driver is ultimately responsible for safe crane operation.

2 SPECIAL NOTES

2.1 Brandnames, Tradenames and Trade Marks.

All product, brand or trade names used in this publication are the trademarks of their respective owners and they are only mentioned to provide more accurate information for the reader.

2.2 Important Safety Notice

Notes, cautions and warnings are presented to aid in understanding and operating the equipment or to protect personnel and equipment. At all times, relevant codes applicable to location of service must be adhered to.

Safe, reliable operation of Robway systems require the systems to be maintained in a proper manner and serviced by technically trained personnel using trade (or profession) recognised service procedures and correct tools for the purpose.

Provided warnings are not exclusive, as Robway could not possibly know, evaluate and advise service people of all conceivable ways in which service might be performed or all possible associated hazardous consequences.

Accordingly, anyone who uses service procedures or tools which are not recommended by Robway must first satisfy themselves to their suitability and that neither personnel safety or equipment safety will be jeopardised by the selected method.

2.3 Limited Product Warranty

Robway Safety Systems P/L (RSS) warrants to the Buyer (Purchaser) of new products manufactured or supplied by RSS that such products were, at the time of delivery to the purchaser, compliant to RSS Quality Assurance documentation ISO 9001.

Any RSS product that has been repaired or altered in such a way, in RSS's judgement, as to affect the product adversely, including installation methods and procedures, negligence, accident or improper storage or use will be judged solely by RSS in regard to any partial or full warranty claim.

RSS's obligation under this warranty is limited to repairing or, at RSS's option, replacement of faulty parts. Any associated transportation or labour costs (other than those directly acceptable by RSS and consumed at RSS premises) shall not be part of the warranty claim and shall be at the originator's expense.

Associated re-installation costs shall be at the originator's expense.

Replaced (or repaired items) by RSS are warranted for the remainder of the warranty period of the originally supplied goods as if they were supplied with the original goods.

This above warranty period extends for 12 months from the original supply date to original purchaser from RSS.

2.4 Glossary of some used terms

Used in Manual	Alternative	Description
RSS	Robway	Robway Safety Systems P/L.
Tensiometer	Linerider	Measures hoist rope line-pull
Boom Angle sensor	BAS	Measures angle to horizon
Length sensor	Boom length	Measures telescoping boom sections
ATB	Over-hoist	Over-hoisting the hook into the boom tip.
RCI	LMI	same, being Rated Capacity Indicator or Load Moment Indicator.

3 INTRODUCTION

3.1 Manual Contents

This manual contains installation, operation, calibration, maintenance and parts information for the RCI-1550 Crane Rated Capacity Indicator system manufactured by Robway Safety Systems suitable for installation to fixed or mobile telescopic cranes.

3.2 Scope of Manual

Refer to Contents section. This section is an itemised list of sections with their corresponding section number and page number.

3.3 Intended Audience

This manual is intended for use by field engineering, maintenance, operation and repair personnel trained by RSS or familiar with RSS methods and application knowledge.

3.4 Personnel Qualifications

The procedures described in this manual should be performed only by persons who have read the safety notices in this manual, have read, and understood the relevant section and who are suitably qualified and trained to perform the procedures within.

4 SYSTEM DESCRIPTION

4.1 Application



Note

This RCI-1550 manual covers all Telescopic Cranes of either mobile or fixed installation.

This manual covers the use of Tensiometer (line rider) based sensors and calibration refer to cranes where the tensiometers are fitted to directly monitor the hook hoist line-pull.

4.2 Purpose

The RCI-1550 automatic Rated Capacity Indicator (RCI) is designed to assist the operator in the course of normal crane operation and consists of boom angle, length, slew and ATB sensors. Additionally, the system has load-cells to monitor the hook hoist line-pull OR boom pendant forces to more effectively warn the crane operator of;

- impending overload.
- actual overload
- and is designed to activate function motion-cut (if fitted/connected)

4.3 Capabilities

The RCI-1550 display provides the following capabilities:

- Multi-hoisting winch operation (4 winches maximum),
- Provides monitoring and display of;
 - Boom Length,
 - Boom Angle & Luffing fly jib Angle (as applicable)
 - Boom Tip Radius,
 - Boom Tip Height,
 - Lifted Load,
 - Selected Hook Falls,
 - Selected Crane configuration,
 - Crane configured S.W.L,
 - S.W.L. as a percentage of Crane configured SWL,
and
 - Restricted Slew zones,
 - Hoist/Luff direction (if required for friction compensation).
- Provides visual and audible warnings, motion-cut and Anti-Two blocking detection,
- Self-diagnosis and error codes,
- Unique simulated analogue display for visual feedback of S.W.L. percentage,
- Multi-line text character window to display messages,
- Built-in calibration and fault-finding tools.

4.4 Available Options

- Options for
 - slew-zone continuous monitoring encoder sensor
 - hook height
 - multiple switch/analogue input/output expansion
 - engine management
 - special alarms
 - on-site configurable user data,
 - data-logging (customer formats optional),
 - printing,



Note

LSI-Robway also cater for custom applications and special user requirements. Please contact your nearest LSI-Robway distributor or LSI-Robway directly.

5 OPERATING INSTRUCTIONS

5.1 The LCD Display

Please see “RCI-1550 Operator’s Display Functions” on previous page for details and description of each function.

5.1.1 The Bar Graph

This is the rectangular bar that is in the top centre of the LCD. This gives an “analogue” indication of the percentage the current load is of the Safe Working Load.

The bar will start to grow when the load is 50% of the SWL and reach the amber section at 85%. The start of the red section corresponds to 100% rated capacity.

5.1.2 SWL

The displayed S.W.L. is extracted from memorised look-up load-charts and will depend on the current crane configuration, duty, winch selected, the maximum line-pull and the falls selected.

5.1.3 Length

This is the current TOTAL boom length as read from the boom length sensor plus any attachments as specified by the current crane configuration duty.

eg. For a SINGLE WINCH CRANE with #1 winch selected for a MAIN BOOM configuration, the boom length will be the MAIN boom, however, for a fly-jib selected configuration the boom length will be the MAIN + FLY-JIB length.

eg. For a TWIN WINCH CRANE,

#1 winch selected will display MAIN BOOM length and,

#2 (or #3) winch selected will show TOTAL BOOM length inclusive of the Upper Boom Point (rooster sheave) OR inclusive of the FLY-JIB.

5.1.4 Angle

This is the current boom angle. This angle will be either the MAIN BOOM, OR the LUFFING FLY (when selected and in use)

5.1.5 Radius

Shows the operating radius for the CURRENT CONFIGURATION and DUTY and WINCH selection. The radius is calculated from the Boom Angle and Length sensors with compensation applied to include, slew offset distance, head sheave radius and boom deflection.

5.1.6 Load

This shows the current total lifted load for the selected winch. For endless/tandem reeving it will show the total load of both winches. Please note that this load value may contain some TARE value. The TARE lamp being on indicates this (*see TARE function later in this section*).

Use the WINCH button to switch between #1,# 2 or #3 selection.

INVALID WINCH SELECTIONS WILL BE DISABLED IN SOFTWARE.

Although the RCI-1550 will always check safe operation for all winches, you should make sure that the correct winch is selected as the winch selection affects the values shown on the displays.

When the ACTUAL LOAD exceeds the SWL for the current crane configuration the RCI-1550 will activate audible and visual alarms.

5.1.6.1 Hook Load selection

MAIN WINCH SELECTED #1

Main load displayed Main SWL
displayed Main falls displayed

Note: #3 winch selection is reserved
for cranes with 3 hook winches.

AUX. WINCH SELECTED #2

Aux. Load displayed
Aux. SWL displayed
Aux. falls displayed

PROGRAMME REVIEWS AT ALL TIMES

Main load - Main SWL
Main line pull
Aux. load - Aux. SWL
Aux. line pull

5.1.7 Error Codes

Additionally, the lower area display LCD is used to display ERROR codes when any errors are detected.

Should the operator press the ACK button with an error code number displayed, the text window will revert to normal until a different error condition arises, or the acknowledge timeout expires.

The original error code can be reviewed by simply pressing the ACK key a second time.

Please refer to the 'Trouble Shooting' section of this manual for the meaning of the displayed error codes.

5.2 The Display Keypad

This section describes the operation of the keypad and the associated LED indicators. Operationally, this window displays the selected crane configuration and provides warning lamps to visually indicate the reason for activation of the audible alarm.

5.2.1 Function Key (F1, F2, F3)

These are general-purpose keys that may be assigned a job specific use. Any special functions use will be listed in the appendix.

5.2.2 Soft Menu Keys

These are similar to the Function keys in that each one does not have a specific use. Their use can change depending on what state the display is in. The function of each key, if it is actually used at that time, will be listed above it on the bottom line of the LCD. Not all will have assigned uses at any one time. Take careful note of the LCD as their use can change as you navigate through menus. For example the right hand soft menu key is typically used to invoke the menus during normal operating mode. Once the menu is used the two right-hand buttons are used to scroll up and down the menu list.

Refer to the section titled "Menu Navigation" for more information on the functions of each menu

5.2.3 Alpha-Numerical Keys

Used for data entry in Calibration mode. When the display is expecting a numerical input the number assigned to each key will be used. If text data is required the first key-press will generate the first letter above the pressed key. If the key is pressed again in quick succession a

second time the letter will change to the second above the key and so on. If no key is pressed for approximately 1 second the character on the screen will be accepted as being correct and the display will move to the next character.

5.2.4 Ok (4) key

Used to 'accept' the currently displayed message or option on the LCD.

5.2.5 Cancel (5) Key

Used in Calibration mode to cancel incorrectly entered data or to escape out of various menus

5.2.6 Tare Key

The RCI-1550 allows the operator to TARE out the weight of the hook, rope and accessories of the selected winch if required. This is a toggle function that turns on or off depending on its current state and is a function of the currently winch selected.

If the TARE indicator is illuminated then the displayed load is the total weight minus the accessory weight. When TARE is next pressed, the displayed load reverts to the total.

If the TARE indicator is off then the actual load shown in the load window at the time of pressing the TARE button will be stored in the system as the tare load.



Note

Please note that when the TARE function is active, the %SWL is still determined by the total load, irrespective of what is currently displayed.

All tared weights are removed on system start-up.

5.2.7 Rigging Key

Rigging mode is operator selectable via the MENU button and scrolling to Rigging Mode, alternatively the rigging key on the front panel can be used to initiate rigging.

There are two forms of Rigging mode.

1. General Rigging mode, where motion-cut is over-ridden (if fitted) to luff down, hook up and tele-out (telescopic cranes). This mode is ONLY intended for use during crane lay-down or setup.

If after this function is initiated, the boom is raised more than 10 degrees, this function will reset to normal crane operation. This is necessary to ensure overall safe crane operation.

2. Temporary/ATB Rigging mode, which is essentially the same as normal rigging mode with the exception that it over-rides motion cuts for only a limited period or time. This mode is intended to allow the operator to over-ride the display in special circumstances (eg. need to raise through ATB switch to gain some height etc.)

This operator selectable mode is provided to enable crane hoist rope reeving which would otherwise cause alarms and motion-cut (if fitted). When selected, the display automatically chooses whether full rigging mode or temporary rigging mode is enabled. Full rigging mode will only be enabled when the crane is NOT positioned in a legal lifting position.

Rigging mode will be cancelled when the operator presses the cancel button. If errors become active in rigging mode they will not be displayed but the audible will sound. The ACK button can be used to silence them for approximately 5 minutes (according to the setting for the Acknowledge Timeout).

If normal crane operation is overridden the LCD will display a message indicating "Temporary Over-Ride" is occurring. The override will end if the operator presses cancel or 10 seconds have expired.

If an attempt is made to enter rigging mode but there is a load on the hook which exceeds the rigging threshold, or the boom length exceeds the rigging length threshold, then a message stating this will be displayed. The main menu will subsequently be displayed after approx. 3 seconds.



Important

ROBWAY recommends that the over-ride key-switch be switched off (ie, normal position) at all times and the over-ride key held by the site-supervisor.

5.3 LED Indicators

This section describes that operation of the 5 LED indicators that run along the tope edge of the RCI-1550 display.

5.3.1 Override LED

The Override Led is illuminated when the Override key switch is activated. Refer to the section on the Override key switch for more information. It is also activated during rigging modes.

5.3.2 Audible Alarm Disabled LED

Illuminated when the in cabin alarm has been cancelled. This occurs when the operator presses the ACK soft menu button to acknowledge an error. Acknowledging an error effectively cancels the alarm for that error for a period of time. The amount of time the error will remain acknowledged is determined by the setting for this option. If the Acknowledge Timeout value is set to zero the error will not re-sound unless a new error occurs or the same error re-occurs.

5.3.3 A.T.B. Indicator (anti-two-block or over-hoist)

The RCI-1550 can be supplied with an Anti-Two-Block sensor to prevent two-blocking of the main and aux winches. When the A.T.B. indicator on the front panel is lit, a two-blocking condition has occurred and further hoisting may be stopped by activation of the ATB motion cut relay if installed. An audible alarm also sounds a warning. If the Anti-Two-Block system is not required for the given application the two wires normally connected to the two-block sensor/s, should be connected together to avoid erroneous activation of motion cut (*refer to the drawing section of this manual*).

If in Over-ride OR Rigging mode.

During some operations (such as Over-Ride and rigging modes) the ATB LED will flash. This indicates that the ATB circuit has been over-ridden and the RCI unit can not actually sense the state of the ATB condition.

5.3.4 Approach to Rated Capacity LED

This is illuminated when 85% of rated capacity is exceeded. This corresponds to the bar graph being in the amber region.

5.3.5 100% Capacity Exceeded LED

This is illuminated when 100% rated capacity has been exceeded. This corresponds to the bar graph being in the red region.

5.3.6 Motion Cut LED

This illuminated when the RCI-1550 has activated the motion cut outputs and is preventing the crane from moving into a more hazardous state.

5.4 Over-ride Key-Switch (If fitted)

Should crane overload be reached (or other limitations exceeded, such as maximum radius, minimum angle, winch line-pull etc), the system will activate the motion cut relay, if installed. This will then stop further over-loading of the crane. To bypass or temporarily override motion cut, the operator can use the over-ride key which should be held by the site-supervisor. When the key is inserted and turned on, the O/RIDE indicator is illuminated as a reminder.



Note

The Master Over-ride key-switch is located on the Control Box Unit.

Turn on to deactivate motion lock-outs.

5.5 Disable Key Switch (If Fitted)

The purpose of the disable switch input is to bypass the RCI-1550 should a hardware fault develop. The override input simply signals to the software that if an overload is present to ignore it, hence is software controlled. The disable input is a hardware bypass, and in fact no software need to be running at all. Hence should the main processor fail, the disable input can be used to allow operation of the crane until the unit can be serviced.

Like the override key, this key should be held by the site supervisor.

5.6 Turning on the RCI-1550

Generally by the ignition key-switch OR as installed.

Power to the RCI-1550 can be derived from the automotive alternator DC supply, nominally 12V or 24V DC namely;

1. The crane electrical ignition circuit.
2. The crane electrical accessory circuit.



Important

For either DC supply, absolute voltage range is 10 - 40V DC.

As soon as power is applied to the RCI-1550, its display and other indicators should light up and the RCI-1550 should go through its self-test operation.

5.6.1 On Power Up

Upon power being supplied, a test pattern is written to the LCD that completely blackens it and all LEDs will be active. After approx. 5 seconds the test pattern will be replaced by Robway information for approx. 3 seconds on the graphical LCD. The message “Please Wait” will then be displayed until communication has been established with the control unit.

The LCD will then display the build information. The operator is required to press the OK button for the display to proceed to the normal operating mode.

The active “Crane Configuration” is then displayed, the operator is required to press the OK button if the crane configuration is correct or the Cancel button if incorrect.

Pressing cancel will allow the operator to change the duty and/or falls (a ‘PIN’ number may be required to be entered by the operator in order to effect changes). After the crane configuration has been confirmed the display will proceed to the normal operating mode.

5.7 Menu Navigation

During normal operation the soft menu key with the label “Menu” can be pressed. This will cause the lower section of the LCD to display the main menu screen.

By pressing the Up/Down soft menu keys the desired menu item can be selected. The currently selected menu item is highlighted by a solid bar, pressing the OK key will activate the selected item.

The main menu consists of 4 four main sections which are discussed below.

5.7.1 Config Change Menu

This selection is used when the operator wishes to change some aspect of the crane configuration. Upon selection of this item the “Config Menu” is displayed. The Config Menu typically allows the operator to change the following parameters:

- the currently selected duty,
- the falls (parts of line) for each winch,
- any special items for a particular job,

It is not possible to change the crane configuration when a lift is being performed. If the current load (on any winch) is greater than or equal to the Lift Threshold value (for the given

winch), the Lift in progress screen will be displayed. This inhibits the altering of configuration once a lift has begun. If it is imperative to change the configuration even though a lift is being monitored, it is possible to change the duty and or falls in calibration mode provided you have the correct access code.

When no lift is in progress it is possible to change any of the items that describe the crane configuration.

Selecting to change the duty will cause a series of screens to be displayed prompting the operator to select each aspect of the current crane configuration.

Once editing is complete, pressing the OK button changes the duty according to the selections made, if possible, else a message is displayed informing the operator that there is no duty provided that matches the selections made.

Selecting to change the falls will bring up the falls change screen, provided that no lift is currently in progress. This screen allows the operator to set the currently reeved falls *for the currently selected winch*.

The falls can be changed by either using the Up/Down keys or by using the numeric buttons. Once editing has been complete, pressing the OK button effects the change to the new edited value. If the cancel button is pressed the edit is discarded and the display returns to the main menu.

5.7.2 Function Codes

Refer to the Function listing at the rear of the manual for detailed information on the available function codes.

5.7.3 Display Options Menu

This menu contains the settings that are specific to the look and “feel” of the display unit itself. Such items include the units displayed, the volume of the buzzer and contrast of the display as well as the setting for the Acknowledge Timeout.

5.7.3.1 Acknowledge Time-Out

Sets the time for which the acknowledge soft menu button will silence the in cabin alarm and hide any errors.

5.7.3.2 Display Units

This option allows the operator to view information in either metric or imperial units according to personal preference. Selection of the “Change Units” item can be performed at any time (ie. even during a lift).

5.7.3.3 LCD Contrast

This allows the operator to adjust the LCD for optimum contrast. The contrast or ratio of black to “white” on the LCD depends on viewing angle and temperature. Temperature compensation is provided in hardware but variations in the individual LCD circuits mean this may not compensate perfectly. Hence the contrast may need to be adjust occasionally. The setting is retained when the unit is turned off. The LCD contrast can also be changed during display start-up by pressing using the rigging button BEFORE the first OK after the unit powers up.

5.7.3.4 Buzzer Volume

Allows the operator to set the in cabin audible alarm to an appropriate level. This setting is retained when the RCI-1550 is turned off.

5.8 Data Logging and Data Down-loading

Please refer to the Data Logging Manual supplied separately for more details.

6 INSTALLATION - GENERAL

6.1 Setting Up the Crane

Lower the crane boom to a safe and convenient position for installation of system components.



High tensile booms require proper welding procedure specifications. Obtain specialist assistance in these cases.



Please refer to the *General Arrangement* drawings at the rear of the manual for an overview of the configuration.

6.2 Angle Sensor (Telescopic boom cranes)

The telescopic crane Boom Angle Sensor is mounted on the electrical sub-plate within the recoil drum. Factory supply (unless ordered specifically) is for RH mounting. If mounting to LHS the BAS must be realigned. Refer next paragraph.

6.2.1 Changing from RHS to LHS mounting

The Boom Angle Sensor (BAS) is physically mounted within the recoil set for RHS boom mounting as standard. Should the recoil drum be mounted to the LHS of the boom, the BAS will need to be rotated to the LHS mount position.

Undo the 2 mount screws and rotate the BAS clockwise to the alternative mount position.

Refix the 2 mount screws.

6.3 Length Sensors

6.3.1 GENERAL

Fix the recoil drum and pay-out cable to the RHS side of the main boom (LH installations require the electronic angle sensor to be re-positioned on its mount, (refer to the above BAS section) by welding the mounting bracket provided.

Route the cable carefully from the recoil drum back around the boom pivot to the cab. Fix the cable to the boom and turret using adequate fixings ensuring that the cable is not pinched or stretched as the boom moves through its full luffing arc. Only connect the cable to the Control Unit when finished welding.

6.3.2 13m/26m/35m Recoil Drums

INSTALLATION- (Please read through before starting)

Ensure that the face onto which the unit is to be mounted is flat, vertical and parallel to the line of cable pay-out. The mounting position should allow free uninterrupted pay-out of cable.

The unit should be mounted with fixing brackets in the horizontal plane and be parallel with the crane boom. An anti-condensation filter unit is fitted to the unit close to cable entry glands, this should be at the lowest point when the reel is mounted.

Weldable pads are usually supplied with the units to provide stud fixings. These pads also act as stand offs, so that if they are not used for mounting, care should be taken to ensure that there is sufficient clearance between the reel barrel and the mounting face, to allow free rotation.

A cable anchor pulley must be mounted at the boom tip, in order to tie off the free end of cable securely.

Assuming now that the cable reeling drum is correctly mounted, setting up can proceed.

Remove cover from unit and, first ensure that, if fitted, drive gears for the potentiometer are disengaged.

With all cable wound on the reel, turn the reel in the direction of payout, say two full turns, when tension will be found to build up. These turns are called pre-load turns and provide for initial cable tension.

Have an assistant hold the reel from turning and unwind sufficient cable to reach the cable anchor while boom or travel is at minimum "Tie off cable to cable anchor securely."

Extend boom or travel machine slowly to the full extent of travel. Before reaching the limit of travel, haul off cable from the reel by hand, to ensure that the reel will not bind up before full travel is reached.

Check that at full extension there is at least one turn available at the reel before binding up. Whilst doing this, keep on turning the reel to bind up and note the number of turns still available.

Retract boom or travel to minimum extension while observing that the reel is working correctly. If more tension appears to be required, bearing in mind the turns available, more pre-load turns may be applied

The reel should now be set up mechanically.

Electrical connections for over-hoist system, & luffing fly angle sensors (where fitted), should now be made off and secured.

Potentiometer gear for length sensing may now be re-engaged into mesh with the driver gear. Ensure that all gear-locking screws are secure. Normally it is necessary to ensure that the boom is fully retracted or, that the machine is fully home. The pot gear should be turned by hand, in the direction driven when winding in cable, until the end stop is felt. Turn gears forward one quarter ($\frac{1}{4}$) turn, and allow to engage into mesh. Further adjustments will then relate to the length indication system.

Route the cable carefully from the recoil drum back around the boom pivot to the cab. Fix the cable to the boom and turret using adequate fixings ensuring that the cable is not pinched or stretched as the boom moves through its full luffing arc. Only connect the cable to the Control Unit when finished welding.

6.3.3 13m/26m/35m Recoil Drums

INSTALLATION- (Please read through before starting)

Ensure that the face onto which the unit is to be mounted is flat, vertical and parallel to the line of cable payout. The mounting position should allow free uninterrupted payout of the cable.

The unit should be mounted with fixing brackets in the horizontal plane. An anti-condensation filter is fitted to the unit close to cable entry glands, this should be at the lowest point when the reel is mounted.

Weldable pads are usually supplied with the units to provide stud fixings. These pads also act as stand offs, so that if they are not used for mounting, care should be taken to ensure that there is sufficient clearance between the reel barrel and the mounting face, to allow free rotation.

A cable anchor pulley now requires to be mounted at the boom tip, in order to tie off the free end of cable securely.

Assuming now that the cable reeling drum is correctly mounted, setting up can proceed.

Remove cover from unit and, first ensure that, if fitted, drive gears for potentiometer are disengaged.

With all cable wound on the reel, turn the reel in the direction of payout about two full turns or until tension starts to build up. These turns which provide the initial cable tension are called pre-load turns.

Have an assistant hold the reel from turning and unwind sufficient cable to reach the cable anchor while boom or travel is at minimum "Tie off cable to cable anchor securely."

Extend boom or travel machine slowly to the full extent of travel. Before reaching the limit of travel, haul off cable from the reel by hand, to ensure that the reel will not bind up before full travel is reached.

Check that at full extension there is at least one turn available at the reel before binding up. Whilst doing this, keep on turning the reel to bind up and note the number of turns still available. Also check that at full extension, at least one full turn of cable is on the reel.

Retract boom or travel to minimum extension while observing that the reel is working correctly. If more tension appears to be required, bearing in mind the turns available, more pre-load turns may be applied

The reel should now be set up mechanically.

Electrical connections for over-hoist system, (if fitted), should now be made off and secured.

The potentiometer gear for length sensing may now be re-engaged into mesh with the driver gear. Ensure that all gear locking screws are secure. Normally it is necessary to ensure that the boom is fully retracted or, that machine is fully home. The pot gear should be turned by hand, in the direction driven when winding in cable, until the end stop is felt. Turn gears forward one quarter ($\frac{1}{4}$) turn and allow to engage into mesh. Further adjustments will then relate to the length indication system.

6.3.4 Pay-out Cable

With the pay-out cable attached to the boom tip stand-off bracket, select positions for the intermediate cable guides provided, one for each telescoping section and one or more for the main boom allowing 9'-12' between the drum and the nearest cable guide. Measure the distance from the cable to the sides of the booms, record lengths and mark the positions for the guides. Cut and weld the guides to the boom after removing the cable. Refit the cable through the eyes and anchor to the post using the clamp provided. Adjust the position of each eye so that the cable passes through just touching the top of the ring. When booms deflect and pads wear the cable will take up a lower position in the eye.

6.4 Anti-Two-Block (if installed)

6.4.1 Rectangular type Anti-two Block switches

The switches require fitting at an offset angle to ensure correct operation throughout the full working angle range of the boom. Fix the switch to the bolt and lock the nuts. Consult installation drawings at the rear of this manual.

6.4.2 Tubular type Anti-two Block switches

Fix the anti-two-block switch mounting bolt by welding it to the boom head preferably so that the bob weight (when suspended from the switch) can be fitted to the static hoist rope below the rope anchor. Check that the switch works correctly as the boom luffs throughout its working range. Consult installation drawings at the rear of this manual.

6.4.3 Multiple Anti-two Block switches

Additional switches (for fly-jibs) can be added. Connection is via plug and socket at the Junction box adjacent to the main boom head.

Consult installation drawings at the rear of this manual.

6.4.4 Bob-weight (both types of switches)

Hang the bob weight assembly from the switch eye after cutting the chain to length if desired to suit winch line speed. Repeat the procedure if required for rooster or fly jib. Consult installation drawings at the rear of this manual.

6.5 Load-line (line-pull) based systems

6.5.1 Overview

Load-line (line-pull) based systems directly sense the line-pull generated to lift the load. Sensors by using tensiometers (line-riders).

6.5.1.1 Telescopic cranes

The tensiometers are usually rigidly mounted on top of the boom base section towards the outer end. Telescopic crane tensiometers are available in both single and twin winch versions. The mounting base consists of a pair of 1 1/2" x 1 1/2" x 1/4" angle irons complete with 4 off 5/8" hi-tensile black bolts, nuts and spring washers. It is usual to weld the bolt heads to the boom top. Consult layout drawings at the rear of this manual for more detail.

The load cell will output an electrical signal proportional to the hoist rope line-pull forces, the RCI-1550 will then convert this into hook-load weight in tons. Correctly following the calibration procedures is essential for accurately determining the hook load weight

6.6 Cabling and Glands

Load cell cables should be fixed firmly to the crane structure and routed to ensuring freedom of movement around the boom pivot pin and other moving parts etc. Clip cables at 2' intervals. Manual reeling drums are suggested cable storage devices for long lattice booms or on cranes that require regular boom length changes.

The gland types used are designed to trap the braid or screen (or armour in certain applications) within the braid for maximum EMI protection. Failure to terminate the screens in the glands will void the Electro Magnetic Compatibility (EMC) compliance which the system carries and will put the unit at risk of malfunction due to EMI. When armoured cable is used, then the armour must be trapped in the gland body, and the internal cable braid or screen must be terminated in the chassis terminals on the appropriate on board connectors. The gland termination of either armour or braid is also essential for protection of the inner conductors in the event of lightning or other transient effects. Failure to correctly terminate within the gland may also lead to destruction of the internal circuitry in such circumstances.

6.7 Display Unit



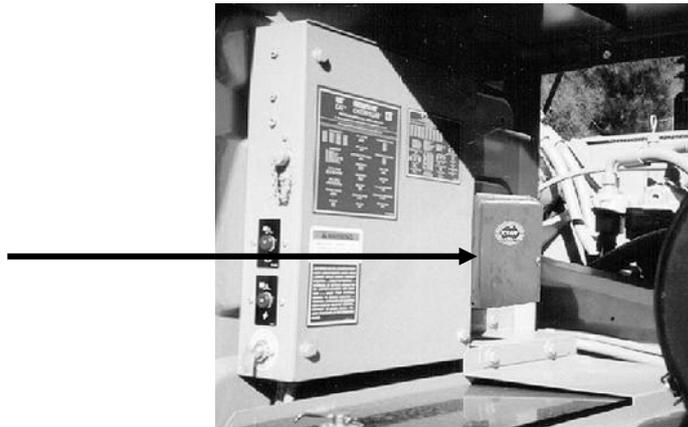
Fit the RCI-1550 Display Unit in a convenient position in the cab such that the operator can view the display and reach the push buttons comfortably



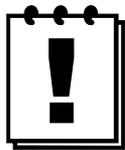
Important

Check bonding between enclosure and chassis. If a good bond cannot be ensured through the mounting bracket, then install earth strap. It is a condition of installation that equipotential bonding must be ensured between the display enclosure and the Control Unit enclosure.

6.8 Control Unit



The Control Unit (CU) contains the termination points for all modules within the RCI-1550 system. It also contains all the user interfaces, signal conditioning and processing circuitry required to satisfy the RCI/LMI functionality. The CU enclosure is a powder coated steel and carries an environmental protection rating of IP 65 which is suitable for internal or external mounting. All cable entries are via a gland plate mounted on the bottom of the enclosure.



Important

Check bonding between enclosure and chassis. If a good bond cannot be ensured through the mounting bracket, then install earth strap. It is a condition of installation that equipotential bonding must be ensured between the display enclosure and the Control Unit enclosure.

6.8.1 Power Supply (PS)

Also refer to drawings at the rear of this manual for this item.

The power supply is a 16W, triple output isolated power supply. The input connector has three terminals for each of the supply positive (V+); and supply negative (V-), allowing for looping if required.

The V+ is switched to the output connector via a single pole 5A relay only when the PS is running. The output connector contains two sets of power/RS-485 connections, one being for the display connection and the other for expansion modules. The front panel fuse protects power for this output connector.

The RS-485 signals are electrically isolated from the power and care must be taken to ensure that no short circuit is introduced between them, otherwise the unit's transient protection will be compromised.

Transient protection has been included on all inputs. All internal power rails are current limited and short circuit protected using re-settable fuses. These fuses will reset only when the fault has been corrected and the power to the unit has been removed for at least 30 seconds before re-application. There are no operator adjustments or settings on this board.

For complete wiring details refer to the installation drawings.

6.8.1.1 Specifications

Input supply:	10V - 40V dc @ 8W (max)
Input fuse:	5A slow blow
User output:	Switched V+ when PSU is running (5A max)
Internal outputs:	5V @ 500mA (max)
	12V @ 500mA (max)
	12V (2) @ 500mA (max)
	All supplies operate with 1mV p-p ripple.

6.8.1.2 Transient protection

Common mode to chassis	:	> 7kV on RS-485 signal, power input and outputs.
Differential (line-to-line):		> 7kV on RS-485 signal lines
		> 2kV on power input and outputs.

6.8.2 CPU Section

The processor is an 8051 derivative which contains a number of enhancements over the standard 8051, including an on-board 10 bit ADC. For most applications this degree of resolution is more than adequate.

The data memory is in the form of a single package which contains the memory device with real time clock (RTC) and integral lithium battery. This package has a guaranteed memory retention of 10 years, and when flat the whole package must be replaced.

The program memory may reside in either a 64kB EPROM or the Expansion EPROM package labelled as U5 (refer to the PCB overlay). When the program has been put into U5, it will be labelled with the application WA number, otherwise it will be labelled with an ID number. When it is labelled with a WA number, there must be no EPROM loaded in location U8 otherwise damage to the processor circuitry will result. The Expansion EPROM package must only be removed using the correct extraction tool otherwise either the package or the socket may be damaged.

The high capacity Flash memory has been added to the 1550 to contain three main blocks of information, being Load-charts, Load Moment (LM) calibration tables and Data-logging. The memory is contained in two plug-in SIMM cards and depending on the application, any number of these may be installed. Refer to the relevant software configuration sheets for more details.

The SIMM cards can only be inserted one way, however care must be taken during installation and removal. It is essential that the SIMM cards are installed in the correct sockets and that the correct sequence is followed.

To install a SIMM card, simply push the card into the socket at an angle of approximately 45 degrees (with the components facing toward the centre of the main circuit board). Once the gold pads on the leading edge of the card have entered the socket, gently push the card into the socket while rotating it to a vertical position. Installation is complete when the retaining clips on each end of the socket have captured the edges of the board and have fully returned to their original position.

To remove a SIMM card simply push the retaining clips at each end of the socket outwards until the SIMM card springs away from its vertical position. The card can then be gently withdrawn from the socket.

6.8.2.1 Specifications

Processor:	8051 derivative, operating at 18.4320MHz
Data Memory:	32kB of battery backed non-volatile SRAM
Program Memory:	64kB EPROM for program memory, expandable to 256kB

High Capacity Memory:	up to 4MB Flash.
RS-232:	9600 baud (8N1)
RS-485:	19,200 baud. (8N1)
On-board ADC:	10 bit
PWM output:	8 bit.

6.8.3 Analog Input Section

The analog section is takes advantage of the CPU's on board 10bit ADC. This board can support up to four load cells, three angle sensors and three length sensors.

6.8.3.1 Sensor Excitation Supply

The excitation supply provides power for all the sensors connected to the Analog section. The nominal output is 4v (or 12V for 4-20mA transducers). Do not connect either the +VEX or the -VEX outputs to any external supplies or chassis.

6.8.3.2 Load Cell Inputs

The analog input section is capable of accepting load cells with sensitivities of 1, 2 or 3mV/V. Load cells of different sensitivities can be used on the one RCI-1550 at the one time. The gain setting is controlled via software.

6.8.3.3 Angle Inputs

Either oil damped or electronic inclinometers can be connected to the RCI-1550's angle inputs. Note that all angle sensors must be the same type and may not be mixed. The analog section must be configured, via a single jumper link to accept the appropriate type of sensor.

See connection diagram in rear of manual.

6.8.3.4 Length Inputs

The length inputs are designed to accept a 500 Ω length sensor. No adjustments or configurations are required on these inputs.

Connect as per connection diagram in rear in manual.

6.8.4 Digital IO Section

Refer to drawings at the rear of this manual for this item.

The DIO section provides general-purpose inputs and output capable of sensing the state of 8 switch inputs and controlling 8 relay outputs. Connection is via plug-in Mini Combicon (R) screw terminals. The DIO section is very versatile and reference should be made to the installation drawings for details.

The digital section features LED indicators for input and output status. If the digital section detects an input signal (voltage) the corresponding LED will be illuminated. If an output LED is on then the given output relay is closed.

6.8.4.1 I/O Connections

Refer to drawings at the rear of this manual for this item.

6.8.4.2 Inputs



Note

Refer to RCI-1550 User Wiring Detail - DIO2.

The DIO section contains 8 isolated inputs that require an external voltage source to activate. This means that each input has two connections, a positive and a negative. This allows the digital section to sense either switched high or switch low signals. To sense a switched low signal, as would come from a switch with one side grounded, the output of the switch is connected to the negative of the desired input and the positive side of the input is tied to the supply. For a switched high signal as would come from a switch connected to the supply, take the switch output to the positive of the desired input channel and ground the negative side.

The DIO also contains a dedicated ATB input. This only requires a simple switch closure between the two associated pin. No voltage is require to be applied to this input

Finally the DIO section has a disable input which forces the outputs to a predefined state. This input has the same properties as the eight data inputs.

The function of the switch inputs is defined in software and reference should be made to the software configuration sheets for details.

6.8.4.3 Outputs

All eight outputs consist of normally open voltage free contacts that close when the output is on. Each output is isolated from all others. Hence to have an output switch high one side must be tied to the supply and the other is used to drive the load. The opposite applies for switch low output. Since all outputs are fully isolated from each other this allows some outputs to switch high and others to switch low.



Note: These outputs are not fuse protected through the RCI-1550, hence the protection must be provided by external means.

6.8.4.4 Snubber diode protection to crane fitted solenoids or relays

The use of snubbed inductive loads (ie solenoids and relays) is strongly recommended, however care must be taken to ensure correct polarity connection to these devices.

6.8.4.5 Defining the status of Outputs (normally closed OR open)

Provision has been added to the circuit to define the state of each output if there is an on-going fault in the CPU section. The reasoning for this provision is that the user may want one output to fault to an off position (ie Motion Cut) and another to fault to an on position (ie External audible alarm). The status is defined using DIP switch SW1 with the switch position number referring to the respective output. When the switch is “ON”, the corresponding output will be energised if the CPU fails, or alternatively when the switch is “OFF” the corresponding output will be de-energised if the CPU fails. This ‘fault state’ can be selected manually by the user by activating the disable input.

6.8.4.6 Specifications

Relay Outputs: 5 ampere @ 30 VDC

Switched Inputs: Input current approx. 6mA @ 24V DC

6.8.4.7 Anti-Two Block input

Refer to DIO connection drawing in the rear of the manual.

Provision has been made on the board for the direct activation of Output 1 via an external switch.

This produces an instantaneous output signal, avoiding the possibility of delays caused by software.

To use this facility, ensure that link P4 is in the "ON" position that allows the CPU to read the status of the switch. The user then has the choice of allowing the CPU to over-ride the condition (ie in Rigging mode) or to leave total control to the external switch. If CPU control is desired, then link P3 must be in the "ON" position, otherwise leave it "OFF".

If control has been given to the CPU, then the user must ensure that the fault status switch for Output 1 is in the "OFF" position, otherwise in a fault condition the output will be over-riden. Once this has been set up, the status of the output is defined by the status of the external switch connected as per the wiring detail, with the output relay being energised (ie closed contacts) when the external switch is closed.

6.8.4.8 Slewing Zone Switch/es input/s

Fit slewing zone indicator micro-switch (or proximity switch) provided at a convenient place near the centre of rotation providing run on and off ramps as required for the particular application. This switch will convey a signal to the Control Unit when the crane moves into a zone of restricted capacity rating. For correct wiring instruction refer to drawings at the back of this manual.



Important

The switch wiring requires a "voltage free" connection. Never connect the switch wiring into any other system/wiring loom unless the exact nature of the connection is known.

6.8.4.9 Motion Cut

If motion cut is required the client shall provide appropriate solenoid valves/devices to activate the function and wire them as shown in this manual.

6.8.4.10 Connections



1. Permanent display damage may occur if incorrect motion-cut connections are made.
2. **POWER MUST BE DISCONNECTED** before attempting connections.
3. **NEVER** insert larger capacity fuses than those originally supplied.
4. Obtain specialist assistance if you are unfamiliar with crane electrics.
5. The Robway relay contact ampere rating must not be exceeded when directly operating hydraulic or mechanical solenoid devices or high capacity relays. For such devices a "slave" relay must be used.

6.8.4.11 Main & Aux. Winch Hoist Direction Switches (if required)

(If required due to high reeving friction differential between hoist raise and lower, usually for greater than 14 parts-of-line)

Fit direction switches provided to control linkage for main and aux hoist functions. Connect switches as shown on drawings in this manual.

The normal convention is that a switch closure should represent a downward hoisting direction.



Important

The switch wiring requires a "voltage free" connection. Never connect the switch wiring into any other system/wiring loom unless the exact nature of the connection is known.

6.9 Upgrading to RCI-1550 from earlier Robway model displays.

The RCI-1550 display/controller utilises the same sensors as used on other RCI series systems.

However, it is recommended that;

1. On Tower cranes, that the integral Lightning Protector of the single sheave load-pin be disconnected and replaced by our latest stand-alone version.
2. All earlier version systems used negatively switched motion-cut output signals. The RCI-1550 can be configured for either negative or positive type outputs. Please ensure the preferred arrangement is connected via the digital section connector strips.

7 CALIBRATION

7.1 Calibration Purpose

The monitoring sensors (Load-cells, Boom angle, Boom length etc) require calibration (scaling) so that their output directly relates to the crane.

7.1.1 Entering Calibration Mode and Selecting calibration functions.

Make sure that the correct duty number, winch and falls are selected before entering Calibration mode. Verify the correct boom length is displayed.

To enter Calibration mode, press MENU then ARROW to “Function Codes”, press OK. You will be asked to enter a PIN NUMBER to confirm your Robway Training. Enter the correct pin number to gain access to Calibration Function Codes, an incorrect Pin Number will cause only VIEW mode to be accessed.

Once calibration mode is entered use the UP/DOWN keys to ramp through the calibration functions,

Pressing the Cancel button twice will return the system to Operator mode.

7.1.2 Function codes menu item

When the Function code item is selected from the main menu, the password entry screen will be displayed. A PIN is required to enter calibration mode.

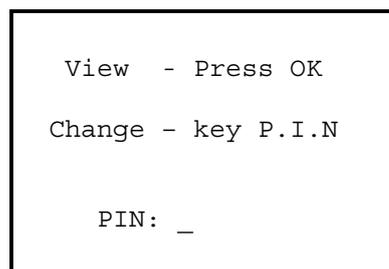


Diagram 7: password entry

Pressing the Cancel button returns the operator to the main menu.

If view mode is requested the message “View access granted” will be displayed.

If calibration mode is required the operator must enter a PIN and then press the OK button. If the PIN is correct and the controller enters calibration mode then the message “Cal access granted” will be displayed. An incorrect PIN will result in the message “Incorrect Password View access granted” being displayed.

When in calibration or view mode, the function code screen (Diagram 8) is used to select the desired function. The Up/Down data entry buttons or the numeric buttons can be used to scroll through the function codes. Pressing the Cancel button returns the operator to the main menu. By pressing the OK button the display enters the selected function.

Function code	
00	Exit Calibration
01	View Active Winch
02	Cal. Active Winch
03	Not Used
04	Not Used
05	Not Used

Diagram 8: Function code screen

7.1.3 General information regarding text editing

Function codes that require editing will have a blinking cursor indicating where the edit will take place. The numeric buttons are used to enter the new value (unless stated otherwise). The OK button should be pressed when the edit is complete to accept the new value. Pressing the cancel button aborts the edit and any changes made are discarded.

The “. / -“ button can be used to enter a decimal point or a negative value. If a negative number needs to be entered the “. / -“ button should be pressed before any numeric buttons. Pressing the “. / -“ button again before any other numeric button are pressed, results in the “ - “ being removed. If a number contains only a fractional part (ie. 0.123) the operator needs to press the button “0” before the “. / -“ button otherwise a “-“ will be displayed.

7.2 Calibration Functions Breakdown

7.2.1 EXIT CALIBRATION item

Returns the operator to the main menu.

7.2.2 VIEW MAIN LOAD and VIEW AUX LOAD items

Displays the Main load

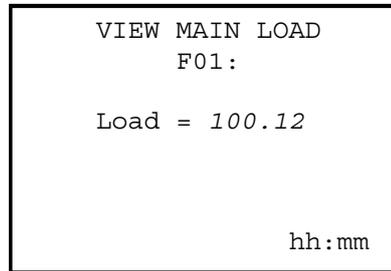


Diagram 9: view main load

7.2.2.1 CAL MAIN LOW and CAL AUX LOW items



Important

Read and do 'Set gain transducer 1' and 2 followed by 'Testing and Calibrating Transducers' before proceeding.

Allows the main winch and aux winch low load to be calibrated by using the numeric buttons. The current load value is displayed and below it the edited value. Once the edit is complete, pressing OK will result in the Display requesting the controller to do a calibration change. Pressing Cancel at any time will abort the edit and return the operator to the Function codes menu screen.

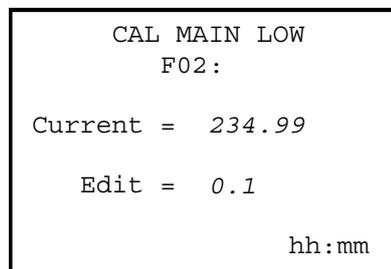


Diagram 12: Cal main low

7.2.2.2 CAL MAIN HIGH and CAL AUX HIGH items

Allows the main winch and aux winch high load to be calibrated by using the numeric buttons. The current load value is displayed and below it the edited value. Once the edit is complete pressing OK will result in the Display request the controller to do a calibration change. Pressing Cancel at any time will abort the edit and return the operator to the Function codes menu screen.

The Graphical LCD will appear similar to CAL MAIN LOW.

7.2.3 VIEW BOOM ANGLE item

Displays the calibrated and un-calibrated values.

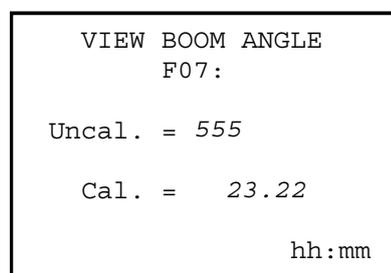


Diagram 13

7.2.3.1 CAL LOW BOOM ANGLE item

Allows the low end of the selected item to be calibrated using the numeric buttons. The current raw value and calibrated value are displayed and below it the edited value. Once the edit is complete, pressing OK will result in the Display request the controller to do a calibration change. Pressing Cancel at any time will abort the edit and return the operator to the Function codes menu screen.

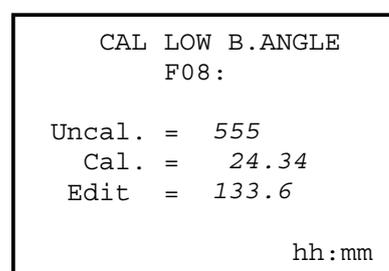


Diagram 14

7.2.3.2 CAL HIGH BOOM ANGLE item

The graphical LCD will appear similar to CAL LOW BOOM ANGLE.

7.2.4 VIEW JIB ANGLE item

This function code item is only available for Luffing fly systems.

The graphical LCD will appear similar to VIEW BOOM ANGLE.

7.2.4.1 CAL LOW J.ANGLE item

This function code item is only available for Luffing fly systems.

The graphical LCD will appear similar to CAL LOW B.ANGLE.

7.2.4.2 CAL HIGH JIB ANGLE item

This function code item is only available for Luffing fly systems.

The graphical LCD will appear similar to CAL LOW B.ANGLE.

7.2.5 VIEW LENGTH item

The graphical LCD will appear similar to VIEW BOOM ANGLE.

7.2.5.1 CAL SHORT LENGTH item

The graphical LCD will appear similar to CAL LOW B.ANGLE.

7.2.5.2 CAL LONG LENGTH item (Telescopic cranes)

The graphical LCD will appear similar to CAL LOW B.ANGLE.

7.2.6 SET GAIN TRANS 1 item

This function code allows the transducer gain to be input by software. The numeric buttons “1”, “2” “3” and “4” or the Up/Down buttons can be used to alter the gain for the selected transducer. The graphical will appear as shown:

```
SET GAIN TRANS 1
      F13:

Uncal.: 555
Gain : 2 mV/V

                        hh:mm
```

Diagram 15

7.2.6.1 VIEW TRANS 1 item

Allows viewing of the raw, calibrated, and health signal for transducer 1. The graphical LCD will appear as shown:

```
VIEW TRANS 1
      F14:

Uncal. = 555
Health = 500 approx
Cal. = 22.11

                        hh:mm
```

Diagram 16

7.2.7 SET GAIN TRANS 2 item

This function code is exactly the same as the “Set Gain Trans 1” item except it of course operates on the transducer 2 gain.

7.2.7.1 VIEW TRANS 2 item

The graphical LCD will appear similar to VIEW TRANS 1 item.

7.2.8 SET MUX. DELAY item

Editing this value alters the multiplexer delay. The multiplexer delay is the settling time (in ms) for the analogue hardware. To edit the numeric buttons can be used or the Up/Down buttons.

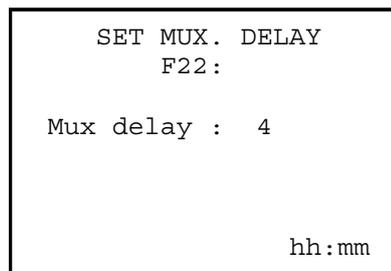


Diagram 17

7.2.9 NO. OF SAMPLES item

This menu item is used to stabilise the display in the event that the numbers are changing erratically.

The graphical LCD will show the number of samples currently being used to average the sensor inputs.

This value can be edited by either using the numeric or the Up/Down buttons. If the numeric buttons are used and the value entered is larger than then maximum allowed the message “Max Sample = ” will be displayed.

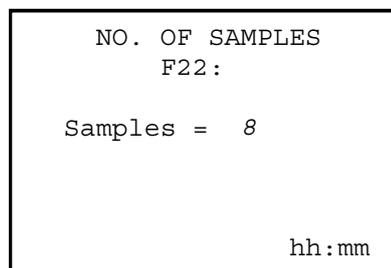


Diagram 18

7.2.10 SET LIFT VALUE (Threshold) item

A lift of a load is said to have commenced when the load is greater than or equal to the lift value. During a load lift it is not possible to change the crane configuration (duty, falls etc.). There is one lift value setting for each winch being monitored. When setting the lift value the load entered should be slightly greater than the weight of the hook block for the winch.

The lift threshold value can be edited by using the numeric buttons. On the graphical LCD both the current lift threshold value and the edited value are shown.

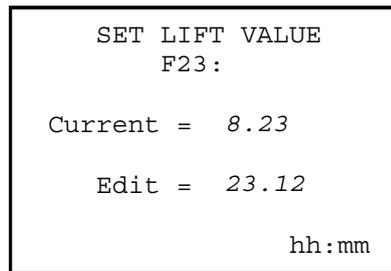


Diagram 19

7.2.11 SET RIGGING LOAD Threshold item

Rigging the crane often requires that the boom be positioned outside of the normal operating regions of the load chart. It is not generally safe practice for the crane to be placed in such positions however, at times such actions are necessary. The “Rigging Load” value is set by the system installer to allow the crane to be manoeuvred off of the load chart. This value represents the highest load that can be seen by the system during a rigging operation. If the load on either hook (or indeed, the combination of loads) exceeds the setting for this function code then rigging mode is automatically disabled and the display will return to a normal operating mode thus generally causing motion cut to the crane.

Setting this value to 0 will effectively disable the rigging mode operation. Any positive setting for this value will allow rigging mode to be activated as long as the combination of loads does not exceed the setting.

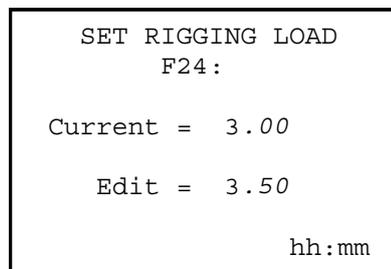


Diagram 20



The installer must satisfy themselves that any value entered here is in accordance with the crane manufacturer or their agents.

7.2.12 SET RIGGING LENGTH Threshold item

This item is, once again, used for rigging. The rigging length is the maximum length allowed during rigging operations. If the boom length is less than the “Rigging Length” then the display can be placed in the rigging mode. If rigging mode can’t be entered because of the rigging length threshold a message is shown on the graphical LCD informing the operator. Generally this is only used on telescopic cranes however, in some cases it may also apply to lattice boom scenarios.

7.2.13 CORRECT RADIUS (Unladen boom) item

This function code allows the installer to calibrate the system to account for unladen boom deflection. As such it should only be used when the displayed load radius is less than the true operating radius of the crane. In such a case the installer should measure the physical load radius at a position where boom deflection is seen to have the maximum effect on the load radius.

Maximum boom deflection occurs when the boom is fully telescoped and is positioned at about 45-60 degrees. On duties where the winches are both assumed to be reeved over the main boom head it is necessary to calibrate only for the main winch (winch 1). However, when a jib is installed it is possible to calibrate boom deflection both for the main boom head and for the head of the jib.

To calibrate, select the desired winch, fully extend the boom and position it for worst case deflection. Measure the physical radius, confirm it is greater than the displayed radius, and then enter it against the Unladen radius correction function code. Repeat this procedure for any winch that is reeved over a job.

7.2.14 CORRECT RADIUS (laden boom) item

This function code allows the installer to calibrate the system to account for laden boom deflection. As such it should only be used when the displayed load radius is less than the true operating radius of the crane AND unladen correction has already been employed. In such a case the installer should measure the physical load radius at a position where boom deflection is seen to have the maximum effect on the load radius.

Maximum boom deflection occurs when the boom is fully telescoped and a load, which approaches the SWL, is suspended on the hook. On duties where the winches are both assumed to be reeved over the main boom head it is necessary to calibrate only for the main winch (winch 1). However, when a jib is installed it is possible to calibrate boom deflection both for the main boom head and for the head of the jib.

When editing the radius correction the LCD display should appear as in diagram 21. If the load is less than the “Lift Threshold” setting, the message “No Lift in progress” is displayed.

```
CORRECT RADIUS
F24:
Radius = 34.43
Edit = 11.4
hh:mm
```

Diagram 21

7.2.15 VIEW DIRECTIONS item

The Hoist directions for winch 1, 2 and 3 can be viewed (if installed) and the Luff direction of the boom is displayed in this function code (see diagram 37).

Note 1: N/A represents **Not Applicable**

Note 2: Stat represents **Stationary**

7.2.16 VIEW LOAD-CHART item

This function code is intended to allow easy viewing of the SWL over the operating range of the crane. This mode should NOT be used to actually monitor a lift, however, it is useful for determining whether a specific load will be tolerated at the desired operating position.

The main and auxiliary (if there is more than one hook) safe working loads can be viewed. The main and auxiliary radii are also displayed.

```
VIEW LOADCHART
F25:

Main SWL:    34.43
Aux SWL:     23.23
Main Rad.:   32.45
Aux Rad.:    31.13
                hh:mm
```

Diagram 22

7.2.17 VIEW DIGITAL I/P item

The state of the digital inputs can be viewed on the graphical LCD by using this function code. To determine what a particular digital input signal is being used for in the software, please refer to the “System Configuration Sheets.”

```
VIEW DIGITAL I/P
F26:

IN 1: OFF  IN 5: OFF
IN 2: ON   IN 6: OFF
IN 3: OFF  IN 7: ON
IN 4: OFF  IN 8: OFF

Card : 1   hh:mm
```

Diagram 23

7.2.18 SET DATE item

When changing the date, the graphical LCD will appear as shown in the following diagram. The date displayed is in the ISO format (YYYY-MM-DD). An invalid date will cause an error message to appear.

```
SET DATE
F27:

1998-11-24

YYYY-MM-DD
                hh:mm
```

Diagram 24

7.2.19 SET TIME item

When changing the time, the graphical LCD will appear as shown in the following diagram. The time displayed is in the format HH:MM:SS. An invalid time will cause an error message to appear.

Note: The seconds can't be edited and will always be "00". The seconds will begin incrementing once the OK button is pressed

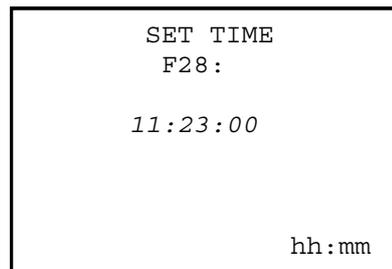


Diagram 25

7.2.19.1 VIEW DATE / TIME item

When viewing the date and time, the graphical LCD will appear as shown:

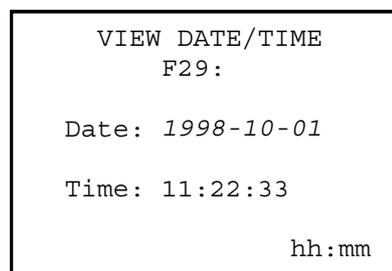


Diagram 26

7.2.20 DOWNLOAD LOGGER item

Please refer to the Data Logging Manual supplied separately for more details.

7.2.21 VIEW CAL-DATA item

This function code is for the manual recording of calibration data just in case the calibration is lost or a display needs to be replaced. This is to be used in conjunction with the alter calibration data function code when inputting pre-recorded cal data.

The Cal data item of interest needs to be selected before viewing can occur. This is achieved in a similar method to selecting main menu items (see diagram 27).

```
VIEW CAL-DATA
F32 :
Angle
Length
Radius
Amplifier1
Load1 (up)
Load1 (down)  hh:mm
```

Diagram 27

Once the Cal data item of interest has been selected and OK is pressed the graphical display should be showing the following information.

```
VIEW CAL-DATA
F32 :
Raw Lo = 123.0
Raw Hi = 222.0
Cal Lo = 222.23
Cal Hi = 12.99
A = 22.5
B = 33.4  hh:mm
```

Diagram 28

7.2.21.1 ALTER CAL-DATA item

The Cal data item of interest needs to be selected before editing can occur. This is achieved in a similar method to selecting main menu items. When the OK button is pressed the following screen should be displayed.

```
ALTER CAL-DATA
F33 :

Raw Lo = 123.0
Raw Hi = 222.0
Cal Lo = 222.23
Cal Hi = 12.99
hh:mm
```

Diagram 29

To edit an item, use the Up/Down buttons to move the cursor to the item you wish to edit. Then use the numeric buttons as in previous edits to enter the new values. The Ok button should be pressed to set the new values or use cancel to abort the edit.

Warning, incorrect settings may cause the display to operator incorrectly.

7.2.22 CHANGE DUTY item

This function code is the same as if change duty was selected from the Config Change menu with the exception that the duty can be changed even if a lift has commenced. This feature is only provided in Calibration mode.

7.2.23 CHANGE FALLS item

This function code is the same as if change falls was selected from the Config change menu with the exception that the falls can be changed even if a lift has commenced. This feature is only provided in Calibration mode.

7.2.24 BACK UP CAL-TABLE item

A backup of the entire calibration data can be made through the use of this function code. The backup is stored on the display and can be used to quickly restore the previous calibration if an incorrect modification to calibration has been made or if calibration is lost/corrupted. Calibration backup should be performed after commissioning, when the system is operating well. On load moment systems a calibration backup will also back up load calibration data. Upon completion, the message screen will indicate the success / failure of this process, as well as that of the calibration data.

7.2.25 RESTORE CAL-TABLE item

The backup calibration data can be restored by using “Restore Cal-Table” function code.

Pressing the OK button will start the restore processes and the LCD will display “Executing ...”. The calibration data is copied from backup memory to the calibration data that is used at run time. The success of the calibration backup and the optional backup of load calibration data (LM systems only) will be reported.

If the Cancel button is pressed the restore process will not start and the current calibration data will be retained.

7.2.26 ERASE CAL-TABLE! item

The Display will prompt the operator to press OK if he wishes to erase the Cal Table .



Pressing OK here will clean out the memory system and default back to hard coded software. Any on-site changes made will be lost.

Proceed with extreme caution...

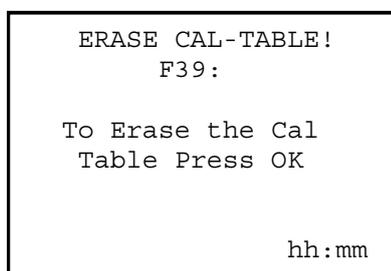


Diagram 30

7.2.27 User Variables

ROBWAY stores the load-charts and crane geometry in the memory of the RCI-1550 at the time of manufacture. As this information may vary from crane to crane, even if they are of the same model, the RCI-1550 allows the installer to change crane information on site. These user variables include dimensions such as slew-offset, maximum falls for main/aux winches, maximum line-pulls, sheave diameters etc. (*refer to function code listing at the end of this manual*)

The actual value of these variables are printed on a configuration sheet which is supplied with the system and a copy of it is also attached to this manual.

To verify or change the current value of any of these user variables follow the procedure below:

- Enter calibration mode,
- Select the correct function code from the listing then using the UP/DOWN keys ramp to that function code and press ENTER,
- If you want to change the value use the UP/DOWN key to select the new value then press the ENTER key,

- If you only want to verify the current value press the CANCEL key when finished viewing,
- Now you should be back at the F-xx prompt and can continue on with the next operation.



Important

Please note that the value of these variables is very important as they affect the safe operation of the RCI-1550 indicator. Therefore the values of the user variables must be checked and corrected if necessary before proceeding with further calibration or operation.

7.2.28 Viewing Errors

If errors exist they will automatically be displayed when the display is in normal operating mode (ie. provided no other menu displays are active). The graphical LCD will display an error code followed by a short description.

Pressing the ACK button will temporarily silence the cabin buzzer and hide the error report from the screen. The fact that there are “acknowledged” errors in the system will be indicated by the ACK LED illuminating. Any acknowledged errors will be re-reported after a certain amount of time that can be altered in the Display Option menu. Errors are also re-reported if any new error conditions arise.

Once errors have been acknowledged, they can be re-viewed by simply pressing the acknowledge button once more to “un-acknowledge” the errors.

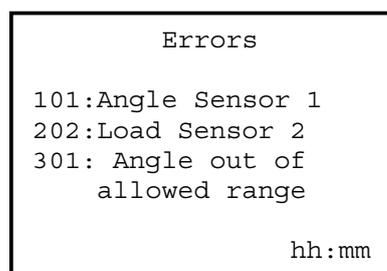


Diagram 32

7.2.29 Verifying Operation Of Sensors



Important

Before you start calibrating the RCI-1550, make sure that the sensors are working correctly and their signals reach the RCI-1550.

The RCI-1550 'sees' the crane and its surroundings through sensors. The signals from these sensors are represented as numbers inside the RCI-1550. The range of possible numbers is 0 to 1023 when an 8 bit analogue to digital converter is used (which is the most common type).

The RCI-1550 allows the user to view both the UNCALIBRATED or the CALIBRATED signal from a given sensor (*refer to function code listing at the back of this manual*).

When viewing the UNCALIBRATED signal from a sensor, make sure the number displayed is less than 999 and is more than 32 as you work the sensor through its working range. This is the correct operating range. Also make sure that the numbers displayed in the window are changing in a nice, smooth manner. If you find that the number is too unstable, that is changes by more than 10, then you should check the connections to the RCI-1550 (*refer to troubleshooting at the end of this manual*).

If the signal is less than 32, suspect a short circuit somewhere on that input channel. Eg. the cable to the RCI-1550 has been crushed and has an internal short circuit in it. Moisture inside the plugs can look like short circuit too.

If the count displayed in the window is more than 1,000, look for an open circuit on that input channel. Eg. disconnected lead. If the sensors check out then you can continue on and start with the calibration procedure. If you find any problems, check the troubleshooting guide at the end of this manual or seek help from your nearest ROBWAY distributor.

7.3 Tools Required for Calibration

To ensure correct calibration, you will require the following;

- an accurate 100' measuring tape
- an accurate boom angle finder tool
- a Robway RCI simulator tool is recommended
- a notepad to record results
- the correct Robway system manual for the crane

7.4 Map of Calibration (suggested order)

1. Set date and Time
2. Verify the raw counts stay within 33-999 for full working range of all sensors.
3. Ensure all digital inputs (switched) are wired correctly, incl. ATB.
4. Ensure all digital outputs (switched) are wired correctly.
5. Review all geometry Function code settings for correctness
6. Check / Set the following function codes
 - No. of Samples (amount of averaging applied to sensor inputs)
 - Set Lift Value (enter a weight slightly larger than the selected winch hook block)
 - Set Rigging Load (enter the maximum allowable load allowed during rigging)
 - Set Rigging Length (enter the maximum boom length allowed during rigging)
 - Set % SWL trip points (nominally set to 85, 100 and 110%)
 - Set Data-logger recording points (if supplied)
7. Calibrate lo/hi boom angle sensor.
8. Calibrate short/long boom length sensor (telescopic cranes only)
9. Calibrate lo/hi luffing fly angle sensor (if fitted)
10. Set Amplifier gain for Transducer 1 to suit load-cell m/volt output.
11. Set Amplifier gain for Transducer 2 to suit load-cell m/volt output.
12. Calibrate Main winch – main (line-pull based systems only).
13. Calibrate Aux winch – aux, (line-pull based systems only).
14. Calibrate Unladen boom radius correction
15. Calibrate Laden boom radius correction
16. Once happy the system is operating correctly, perform a “Cal-Table Backup” to ensure the calibration data can be restored if necessary.
17. Use the “View Cal-Data” function code to manually record (pen and paper) the sensor calibration data as an extra safeguard.

7.5 CALIBRATING BOOM ANGLE

7.5.1 Calibrating a low boom angle

- Safely luff the boom down to a low angle, eg. 30°,
- Enter calibration mode and select the correct function code for calibrating low boom angle,
- Accurately measure the actual boom angle using an angle finder,
- Use the UP/DOWN keys to ramp the display to the required value then press ENTER to accept this value.

7.5.2 Calibrating a high boom angle

- Safely luff the boom up to a high angle, eg. 65°,
- Enter calibration mode and select the correct function code for calibrating high boom angle,
- Accurately measure the actual boom angle using an angle finder,
- Use the UP/DOWN keys to ramp the display to the required value then press ENTER to accept this value.



Important

Verify that the boom angle is accurately measured, using the VIEW BOOM ANGLE function.

7.6 CALIBRATING JIB ANGLE (luffing fly jibs only)

7.6.1 Calibrating low Jib angle

- Ensure that the angle sensor is mounted on the luffing fly and the cable is connected,
- Safely luff the jib down to a low angle (eg. 30° to the horizon),
- Enter calibration mode and select the correct function code for calibrating low jib angle,
- Accurately measure the actual jib angle using an angle finder,
- Use the UP/DOWN keys to ramp the display to the required value then press ENTER to accept this value.

7.6.2 Calibrating high Jib angle

- Safely luff the jib up to a high angle (eg 65° to the horizon),
- Enter calibration mode and select the correct function code for calibrating high jib angle,
- Accurately measure the actual jib angle using an angle finder,
- Use the UP/DOWN keys to ramp the display to the required value then press ENTER to accept this value.



Important

Verify that the jib angle is accurately measured, using the VIEW JIB ANGLE function.

7.7 CALIBRATING BOOM LENGTH

- Fully retract the boom,
- Enter calibration mode and select the correct function code for calibrating SHORT (LO) boom length,
- Use the UP/DOWN keys to ramp the display to the required value then press ENTER to accept this value.
- Safely fully extend the boom,
- Enter calibration mode and select the correct function code for calibrating LONG (HI) boom length,
- Use the UP/DOWN keys to ramp the display to the required value then press ENTER to accept this value.



Important

Verify that the boom length is accurately measured, using the VIEW BOOM LENGTH function.

7.8 CALIBRATING TENSIO METER BASED SYSTEMS

7.8.1 Calibrate the Main Winch with light load.

(Ensure the correct winch and falls are selected)

Note: This procedure assumes that the following has already been done, if not then load calibration will be incorrect.

- Boom angle and length has been calibrated and verified.

1. Select the correct Function code number from the Function code list at the rear of this manual. Use the up/down arrows to enter the correct weight of the light load.
2. Enter data to represent the lifted weight for MAIN ROPE LIGHT LOAD. This may be the hook block.
3. If all is well, proceed to calibrate for a heavy load using the correct function number.

7.8.2 Calibrate the Main Winch with heavy load.

(known test weight is required)

(where direction switches are employed, both UP & DOWN require calibration)

Note: This procedure assumes that the following have been done, if not then load calibration may be incorrect.

- Boom Angle and boom length (for telescopic cranes) has been calibrated and verified,

- Light load has been calibrated and verified.

1. Safely lift a heavy load and hold just above the ground and enter calibration mode.

(at least 75% of line-pull is suggested for best results)

2. Select the correct Function code number from the Function code list at the rear of this manual. Use the up/down arrows to enter the correct numerical data.
3. Enter data to represent the lifted weight for MAIN ROPE HEAVY LOAD.

If the crane has an Aux. winch fitted and has been included in the RCI-1502 load charts, proceed to calibrate the Aux. winch in the same manner as for the Main winch.

7.8.3 Calibrate the Aux winch with light load.

(ensure the aux winch is selected, this must be done outside calibration mode)

where direction switches are employed, both UP & DOWN require calibration)

1. If the crane has an Aux. winch fitted and has been included in the RCI-1502 load charts, proceed to calibrate the Aux. winch in the same manner as for the Main winch.

7.8.4 Calibrate the Aux winch with heavy load.

(ensure the aux winch is selected, this must be done outside calibration mode)

(where direction switches are employed, both UP & DOWN require calibration)

1. If the crane has an Aux. winch fitted and has been included in the RCI-1502 load charts, proceed to calibrate the Aux. winch in the same manner as for the Main winch.

8 MAINTENANCE

When maintenance is to be performed on the RCI-1550 system, care must be taken to ensure that the level of safety is not reduced. Such a reduction in the level of safety can easily be done by the careless use of tools or test equipment, either directly or by damage to safety components, wiring or clearances. Therefore it is essential that maintenance be performed by competent personnel only.

The following are recommendations from the standard on maintenance procedures.

8.1 CHECK LIST

It is recommended that a checklist similar to the one below be prepared prior to maintenance.

Maintenance Checklist

Pre-maintenance	<ul style="list-style-type: none"> Necessary documents are available All records have been examined. Test gear is available and is satisfactory for use in hazardous areas if applicable. Permission to commence work has been granted. The area is safe to work. Any necessary precautions have been taken.
Maintenance	<ul style="list-style-type: none"> All re-connections have been made. Equipment is functional. Malfunctions have been reported. Installation conforms to drawings and documentation. Any modifications have been approved. Earthing requirements are still valid. General check in accordance with an Inspection and Test Schedule completed.
Post-maintenance	<ul style="list-style-type: none"> Documentation is completed and filed. Inspection report is complete. Company and operator requirements have been satisfied.

8.2 In-cabin items

Ensure the display unit mounting is solid and vibration free and that the display cable connection is firmly connected.

Ensure the display cable is not pinched or caught or may become suspect to damage on route from the Display Unit to the Controller Unit outside the cabin.

A water dampened cloth is preferred for cleaning general dirt items from the display. Wipe off any build-up of grease and oils. A light mixture of detergent may be used to remove stubborn stains. **DO NOT USE SOLVENTS.**

Additional detail

The RCI-1550 Display case is made of Stainless Steel - Grade 316 and powder coated with high quality DULUX powder coat. High adhesion between metal surface and powder layer ensures excellent resistance to scratches and similar mechanical damages.

Powder coat has increased resistance to chemical agents and UV light. The Stainless steel case ensures resistance to even most aggressive environments such as offshore installations or chemical plants, even when the paint layer is damaged

The unit as whole, is designed to comply with the latest EMI and ESD standards.

The front membrane switch panel is made from tough high quality textured polyester film. It offers enhanced chemical resistance and dramatically improved flex life (>5 million switch cycles).

The Acrylic layer is made of CHEMCAST. Acrylic sheet can be used up to 90 °C. It should be cleaned only with household grade detergents or methyl alcohol (30%).

The unit as whole could be used in very hostile environment in temperature range -20 °C to +70 °C

8.3 ELECTRICAL EQUIPMENT

When any electrical equipment is removed for maintenance, any exposed conductors that remain must be mechanically and electrically secured in a manner to prevent the occurrence of an unsafe condition.

8.4 RECOIL DRUM

GENERAL

In normal use little attention to maintenance is required.

8.4.1 DRUKO413/25/35

Periodically, simply observe that reel behaves correctly when extending and, retracting cable without hesitation. Check wound cable for damage at anchor pulley and generally.

At major machine service intervals, remove reel cover and check that interior is clean and dry. Check slip rings are clean with no signs of arcing. Check collector brushes are correctly located on rings and, that brush spring pressure is being maintained. Replace cover making sure that seal is located correctly all round.

8.4.1.1 Rewind Spring Mechanism

In the unlikely event of rewind spring failure, the reel will require to be removed from the machine on which it is fixed.

With the reel on the bench, remove cover and disconnect potentiometer from engagement, tie back spring loaded arm, disconnect wiring which passes through the reel shaft.

Turn unit over to stand on its 4 cover studs and withdraw cable from shaft.

Release socket screws, 2 at 90°, holding cable compartment onto shaft and withdraw compartment, complete with cable.

The spring compartment is now exposed and, the 4 nyloc nuts and the cover may be removed.

The rewind spring will now be visible and seen to be held in a captive band. A broken spring normally occurs close to the arbor, as this is at the point of maximum flexing. If this is seen to be the case, the spring may be lifted out, *“BEING VERY CAREFUL TO ENSURE THAT THE COILS REMAIN WITHIN THE CAPTIVE BAND.”*

Tie the spring with soft iron wire or stout cord, as seen on the replacement spring. Alternatively box up securely and label danger, for disposal.

Remove broken portion of spring from arbor, check for any foreign bodies, apply grease to the arbor and fit replacement spring.

Replace spring cover making sure that seal is correctly located.

Re-assemble reel in reverse order, paying particular attention to correctly locating cable compartment boss onto shaft and that socket screws are correctly located in shaft dimples. Use Loctite “Screwlock.”

Unit may now be fully re-assembled and full setting up procedure, (installation may be completed.

8.4.1.2 Replacing the Payout cable

Reading through the instructions for changing a spring will help with fitting a replacement cable.

You can save time and effort if, when removing a damaged cable, having disconnected at the slip-ring, the old cable is used to pull a drawstring through the shaft. The drawstring can be fixed to the end of the new cable to draw through the shaft.

Ensure that cable glands or seals are all correctly fitted and that reel rotates freely.

8.4.1.3 Safety

At all times, when handling spring operated cable reeling drums, keep full control of rotation.

Be very careful, when handling loose rewind springs, to ensure that all of the coils remain within the captive band.

8.4.2 13m/26m/35m Recoil Drums

In normal use little attention is required.

Periodically, simply observe that reel behaves correctly when extending and, retracting cable without hesitation. Check wound cable for damage at anchor pulley and generally.

At major machine service intervals, remove reel cover and check that interior is clean and dry. Check sliprings are clean with no signs of arcing. Check collector brushes are correctly located on rings and, that brush spring pressure is being maintained. Replace cover making sure that seal is located correctly all round.

8.4.2.1 Rewind Spring Mechanism

In the unlikely event of rewind spring failure, the reel will require to be removed from the machine on which it is fixed.

With the reel on the bench, remove cover and disconnect potentiometer from engagement, tie back spring loaded arm, disconnect wiring which passes through the reel shaft.

Turn unit over to stand on its 4 cover studs and withdraw cable from shaft.

Release socket screws, 2 at 90°, holding cable compartment onto shaft and withdraw compartment, complete with cable.

The spring compartment is now exposed and, the 4 nyloc nuts and the cover may be removed.

The rewind spring will now be visible and seen to be held in a captive band. A broken spring normally occurs close to the arbor, as this is at the point of maximum flexing. If this is seen to be the case, the spring may be lifted out, “BEING VERY CAREFUL TO ENSURE THAT THE COILS REMAIN WITHIN THE CAPTIVE BAND.”

Tie the spring with soft iron wire or stout cord, as seen on the replacement spring. Alternatively box up securely and label danger, for disposal.

Remove broken portion of spring from arbor, check for any foreign bodies, apply grease to the arbor and fit replacement spring.

Replace spring cover making sure that seal is correctly located.

Re-assemble reel in reverse order, paying particular attention to correctly locating cable compartment boss onto shaft and that socket screws are correctly located in shaft dimples. Use Loctite “Screwlock.”

Unit may now be fully re-assembled and full setting up procedure, (installation may be completed).

8.4.2.2 Replacing the Payout Cable

Reading through the instructions for changing a spring will help with fitting a replacement cable.

It can save time and effort if, when removing a damaged cable, having disconnected at the slipping, the old cable is used to pull a drawstring through the shaft. The drawstring can be fixed to the end of the new cable to draw through the shaft.

Ensure that cable glands or seals are all correctly fitted and that reel rotates freely.

8.4.2.3 Safety

At all times, when handling spring operated cable reeling drums, keep full control of rotation.

Be very careful, when handling loose rewind springs, to ensure that all of the coils remain within the captive band.

8.5 INSPECTION AFTER MAINTENANCE

Robway consider it essential by that a detailed Inspection is performed following any maintenance to ensure that the equipment and installation continue to comply with the documentation. Any deviations to supplied documentation should be updated to inform any future service attendance.

8.6 RECORDS

Any details of defects found should be recorded in the crane log book.

9 ELECTRICAL SPECIFICATIONS

Controller Automotive alternator DC supply, nominally 12V or 24V DC.

Power Consumption Approximately 20VA (Watts).

Operating Temperature Range -20°C to +60°C
tested to (-30°C to + 70°C)

Expected Resistance Values

Load Cells Should have the following nominal resistance values, for a standard 350 ohm cell (*note that these values may vary slightly from cell to cell*).

RED-BLACK 400 ohms

RED-GREEN 290 ohms

RED – WHITE 290 ohms

BLACK-GREEN 290 ohms

BLACK-WHITE 290 ohms

WHITE-GREEN 350 ohms

SHIELD to any other wire must be open circuit

Oil Dampened Angle Sensor (When Used) Across the excitation wires: 1k or 5k ohms
Between the signal and each
of the excitation wires varying between 0 and 1k or 5k ohms

between any of the wires and

chassis or shield high ohms, or open circuit

Electronic Angle Sensor Between any of the wires and chassis or shield high ohms, or open circuit

Length Sensor Across the excitation wires: 500 ohms

Between the signal and each
of the excitation wires varying between 0 and 500
ohms

Between any of the wires
and chassis or shield high ohms, or open circuit

Voltage Levels	Load cell excitation	4.0V	
	Angle excitation	4.0V	
	Length excitation	4.0V	
	Between the chassis and shield		0V

Electronic Angle Sensor Specifications:

Total range:	120 deg
Linear range:	90 deg
Threshold and resolution:	0.001 deg
Linearity:	+/- 1% of angle
Null repeatability:	0.05 deg
Operating Temperature range:	-40C – 65C
Temperature coefficient –	null: 0.008 deg/C
	scale: 0.1%/C
	scale: 0.1%/C

10 APPENDICES

10.1 General Arrangement Drawings

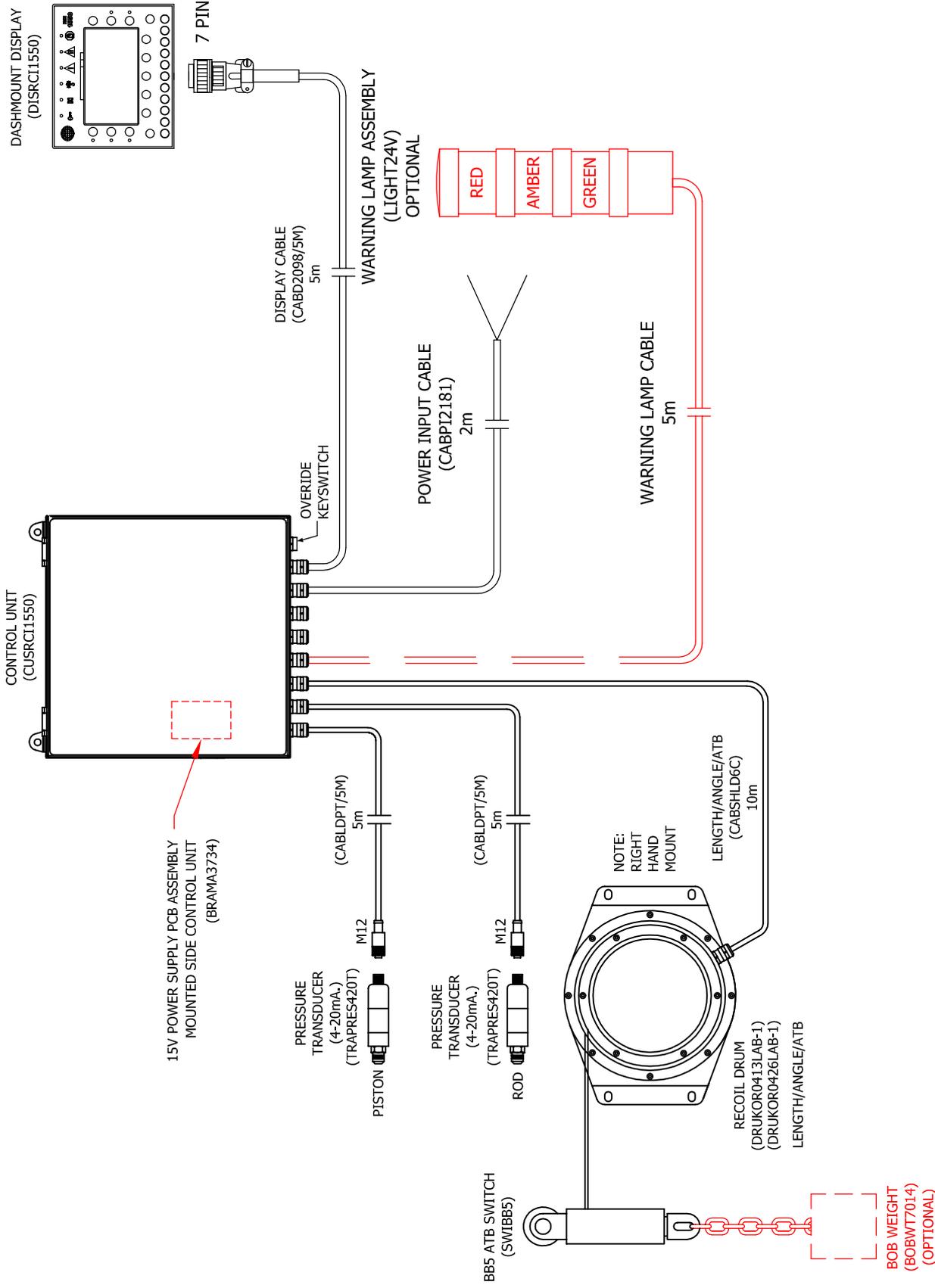
Where required (e.g. Special Systems), a set of General Arrangement drawings and specific wiring details are supplied on separate sheets, in addition to the standard drawings contained in this manual. These extra drawings are not supplied on standard systems.

INSTALLATION & HARDWARE

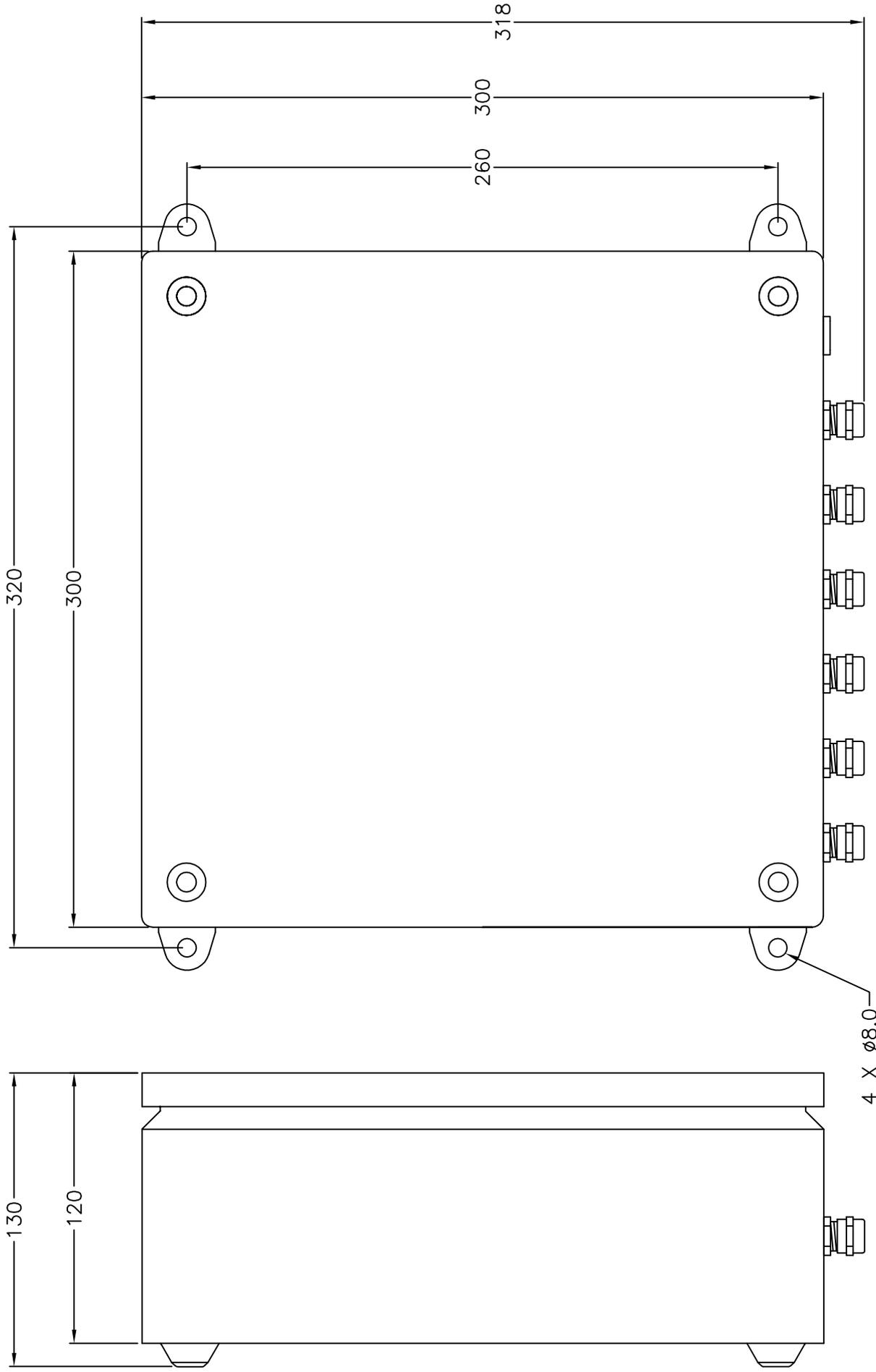
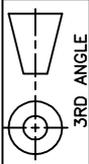
DIMENSIONAL DRAWINGS

The following are the General Arrangement and basic dimensional drawings of the System.

Please note that these are basic System parts, some parts shown may not have been ordered and supplied



REV	DATE	DESCRIPTION OF CHANGE	APPRD	TOL:	DRAWN	APPROVED	PART OF ASSY	CUSTOMER:	PROJECT:							
				X: +/- 1	J.HART	-		-	SYS1550-27							
				X.X +/- 0.2	31-10-12	-										
				X.XX AS STATED												
				DRAFTING STANDARD: AS1100	 LSI-ROBBY 32 WEST THEBARTON RD THEBARTON 5031 SOUTH AUSTRALIA PHONE +61 8 8352 6055 FAX +61 8 8352 1684					SCALE	N/A					
				DO NOT SCALE DRAWING						GA, RCI-1550 GA, GENERIC LOAD MOMENT, TELE SYSTEM					SHEET	1 OF 4
				ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED											DRAWING No:	4749

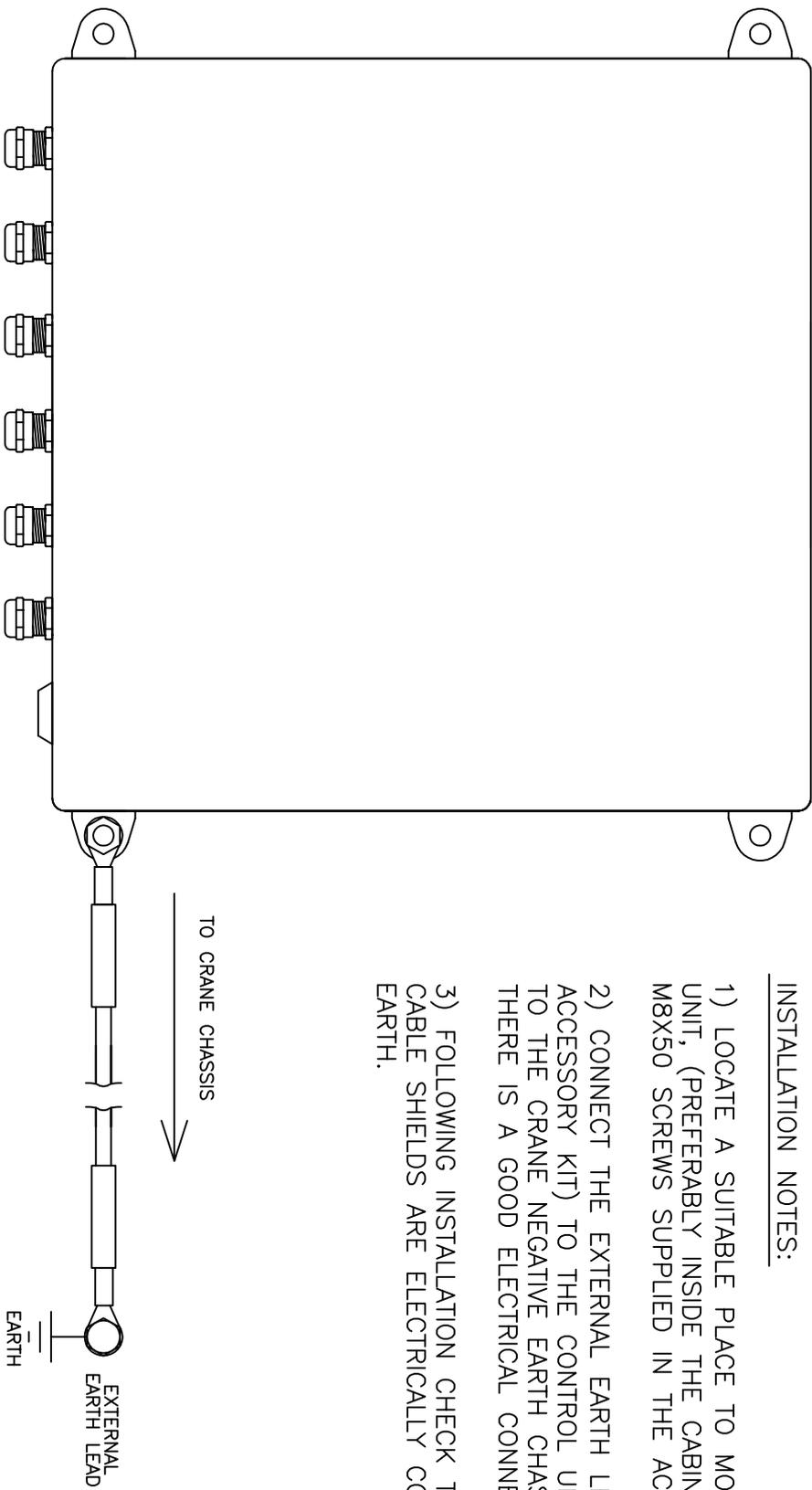


REV	DATE	DESCRIPTION OF CHANGE	APPR'D	DRAWN	APPROVED	PART OF ASSY	PART No:	PROJECT:	SCALE	SHEET	REV
				S. CHAMBERS				RCI-1550 CONTROL UNIT	N/A	1 OF 1	A
				21/11/00							
							TITLE: DIMENSIONAL DETAILS DRAWING No: DWG 2057 FILE No: 205701A.DWG				
							LSI-ROBWAY 32 WEST THEBARTON RD THEBARTON 5031 SOUTH AUSTRALIA PHONE +61 8 8352 6055 FAX +61 8 8352 1684				
							LSI ROBWAY A Division of Load Systems International				
							TOL: X: +/- 1 X.X +/- 0.2 X.XX AS STATED DO NOT SCALE DRAWING ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED				

RCI-1550 CONTROL UNIT

INSTALLATION NOTES:

- 1) LOCATE A SUITABLE PLACE TO MOUNT THE CONTROL UNIT, (PREFERABLY INSIDE THE CABIN) USING THE M8X50 SCREWS SUPPLIED IN THE ACCESSORY KIT.
- 2) CONNECT THE EXTERNAL EARTH LEAD (REFER ACCESSORY KIT) TO THE CONTROL UNIT AND TERMINATE TO THE CRANE NEGATIVE EARTH CHASSIS, ENSURING THERE IS A GOOD ELECTRICAL CONNECTION.
- 3) FOLLOWING INSTALLATION CHECK THAT THE LOAD CABLE SHIELDS ARE ELECTRICALLY CONNECTED TO EARTH.



REV	DATE	DESCRIPTION OF CHANGE	APPR'D	DRAWN		APPROVED		PART OF ASSY		PART No:		PROJECT:		SCALE	
				S. CHAMBERS		A. CANLAS		-		CUSRCI1550		RCI-1550 CONTROL UNIT		N/A	
				21/11/01		21/11/01				TITLE:		INSTALLATION DETAIL		SHEET	
										DRAWING No:		DWG 2566		FILE No:	
														256601AA.DWG	
														REV	
														1.0	

TOL: X +/- 1
 XX +/- 0.2
 X:XX AS STATED

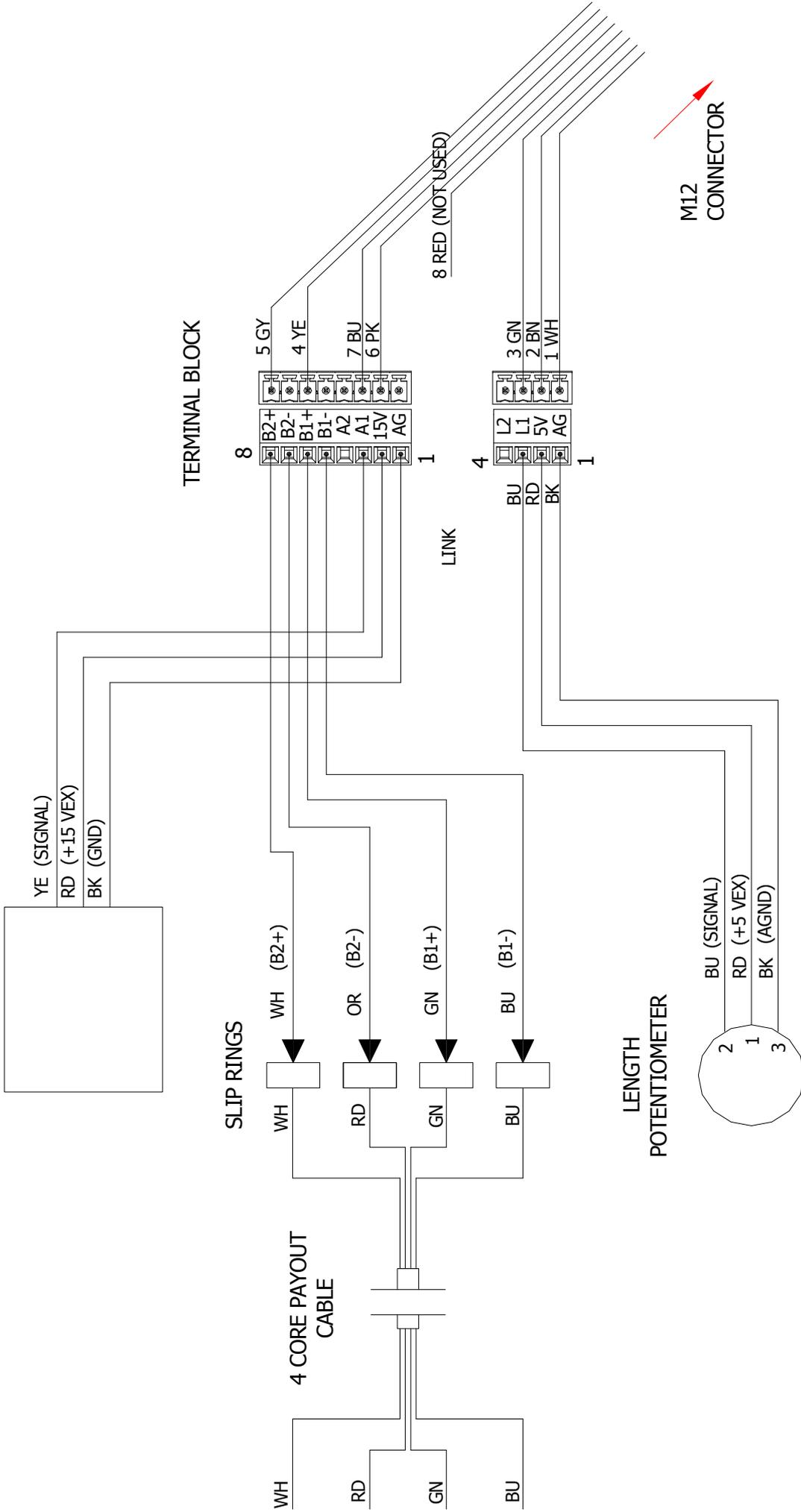
DO NOT SCALE DRAWING
 ALL DIMENSIONS ARE IN MILLIMETERS
 UNLESS OTHERWISE STATED

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 32 WEST THEBARTON RD
 THEBARTON 5031
 SOUTH AUSTRALIA
 PHONE +61 8 8352 6055
 FAX +61 8 8352 1684

**ELECTRONIC
ANGLE SENSOR**



REV	DATE	DESCRIPTION OF CHANGE	APPRVD	DRAWN BY	APPROVED BY	PART OF ASSY	PROJECT:
				J. CHOI	J. HART		DRUKOR0426LAB
				20/01/2012	31/01/2012		RECOIL DRUM
							TITLE:
							TOP ASSY, 2.6m RECOIL DRUM, LENGTH, ANGLE & 4 CORE PAYOUT CABLE
							PROJECT:
							RECOIL DRUM
							A4
							SHEET 6 OF 6
							REV 1.0
							DRAWING No: 4581
							FILE No: 458101AA.idw

32 West Thebarton Rd
THEBARTON
SOUTH AUSTRALIA 5031
web : www.isirobway.com.au
PHONE : +61 8 8238 3500
FAX : +61 8 8352 1684

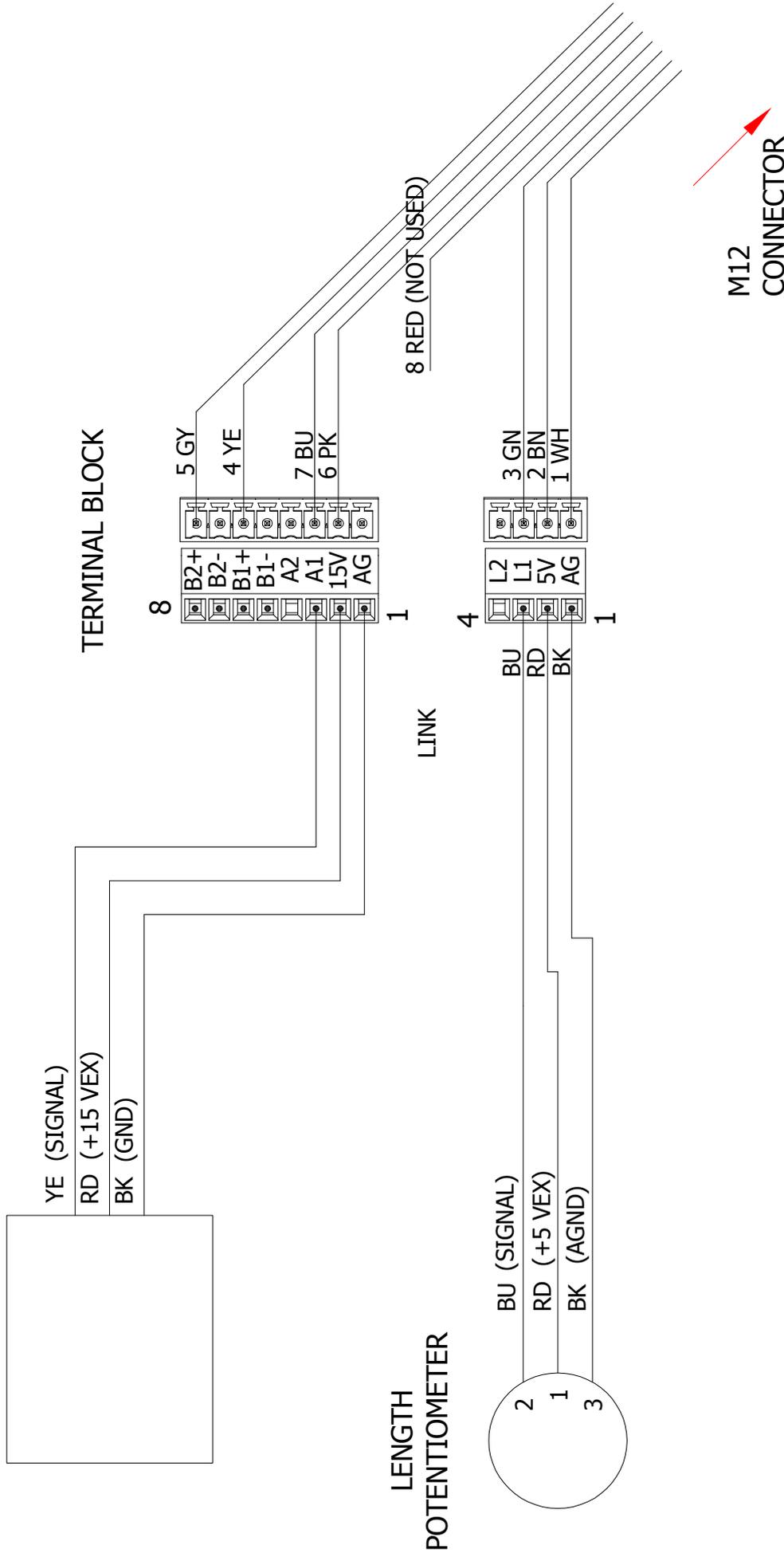
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TOL: X. +/-1
X.X +/-0.2
X.XX +/-0.02

DRAFTING STANDARD: AS1100

DO NOT SCALE DRAWING
ALL DIMENSIONS ARE IN MILLIMETERS
UNLESS OTHERWISE STATED

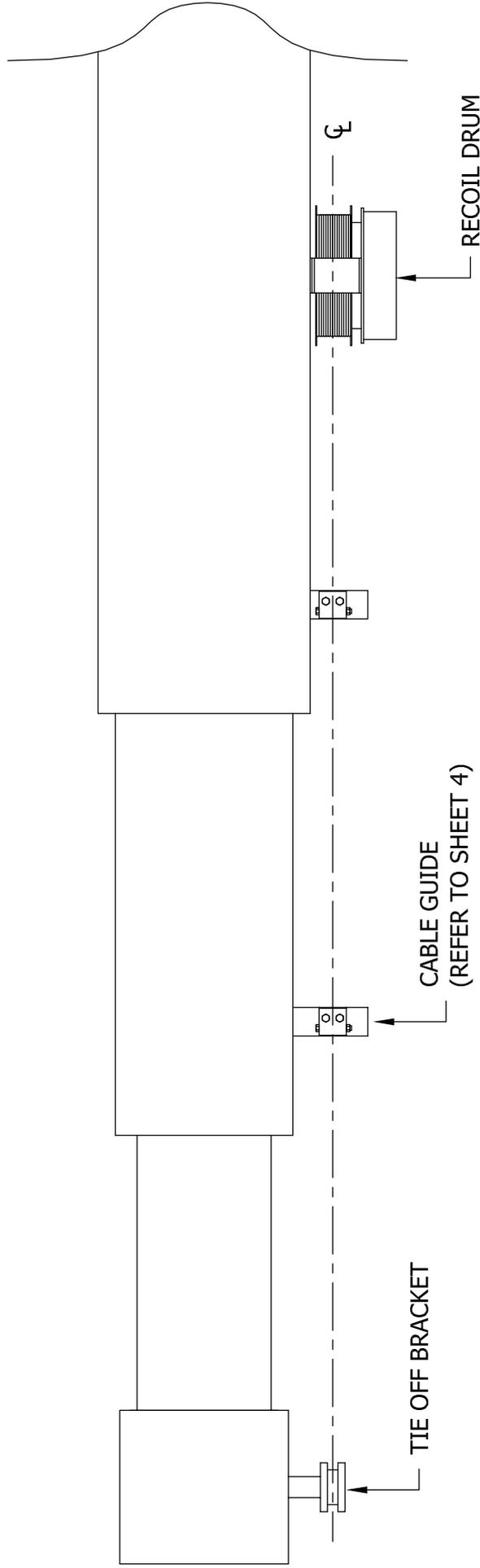
ELECTRONIC ANGLE SENSOR



REV	DATE	DESCRIPTION OF CHANGE	APPRVD	TOL:	DRAWN BY	APPROVED BY	PART OF ASSY	PROJECT:	FILE NO:	REV
				X: +/-1 X.X: +/-0.2 X.XX: +/-0.02	johnh			DrukOR0113LA-1R	4772	A
				DRAFTING STANDARD: AS1100	24/01/2013			TOP ASSY, 13m RECOIL DRUM, LENGTH, ANGLE & SINGLE WIRE PAYOUT	4772-A.idw	6
				DO NOT SCALE DRAWING ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED						6 OF 6
										A

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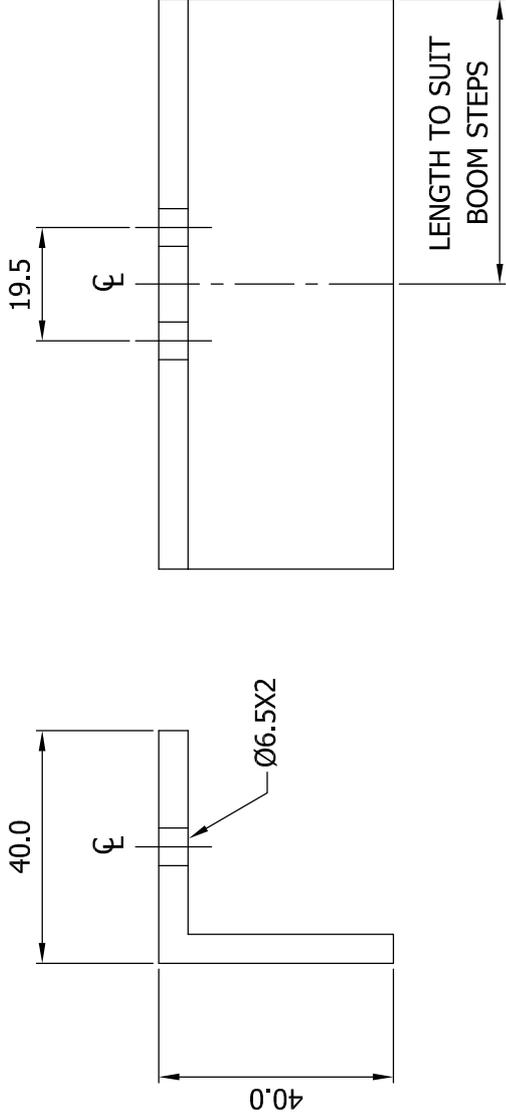


NOTE:
 TO ENSURE CABLE FLEETS EVENLY OVER DRUM WIDTH, THE CENTRE OF THE CABLE GUIDES MUST BE FITTED ON THE CENTRE LINE OF THE CABLE DRUM AS SHOWN.

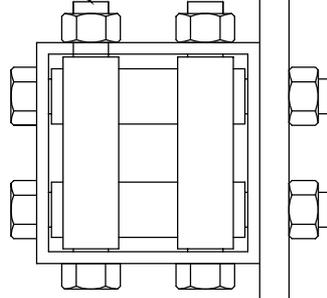
WARNING:
 IF THE ABOVE NOTE IS NOT SATISFIED, THE CABLE MAY OVER SPILL SIDES OF THE DRUM FLANGE.

REV	DATE	DESCRIPTION OF CHANGE	APPRD	TOL:	DRAWN	APPROVED	PART OF ASSY	PART NO.:	PROJECT:		
				X. +/- 1 X.X +/- 0.2 X.XX AS STATED	S. CHAMBERS 31/10/2007	J. KOVAL 1/11/07	-	-	RECOIL DRUM		
				DRAFTING STANDARD: AS1100	32 West Thebarton Rd THEBARTON SOUTH AUSTRALIA 5031 web : www.lsirobway.com.au PH: +61 8 8238 3500 FX: +61 8 8352 1684					SCALE N/A	
				DO NOT SCALE DRAWING ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED						TITLE: INSTALLATION DETAILS	
					DRAWING No: DWG 3718					FILE No: 371801AA.DWG	REV 1.0





CABLE GUIDE ASSEMBLY

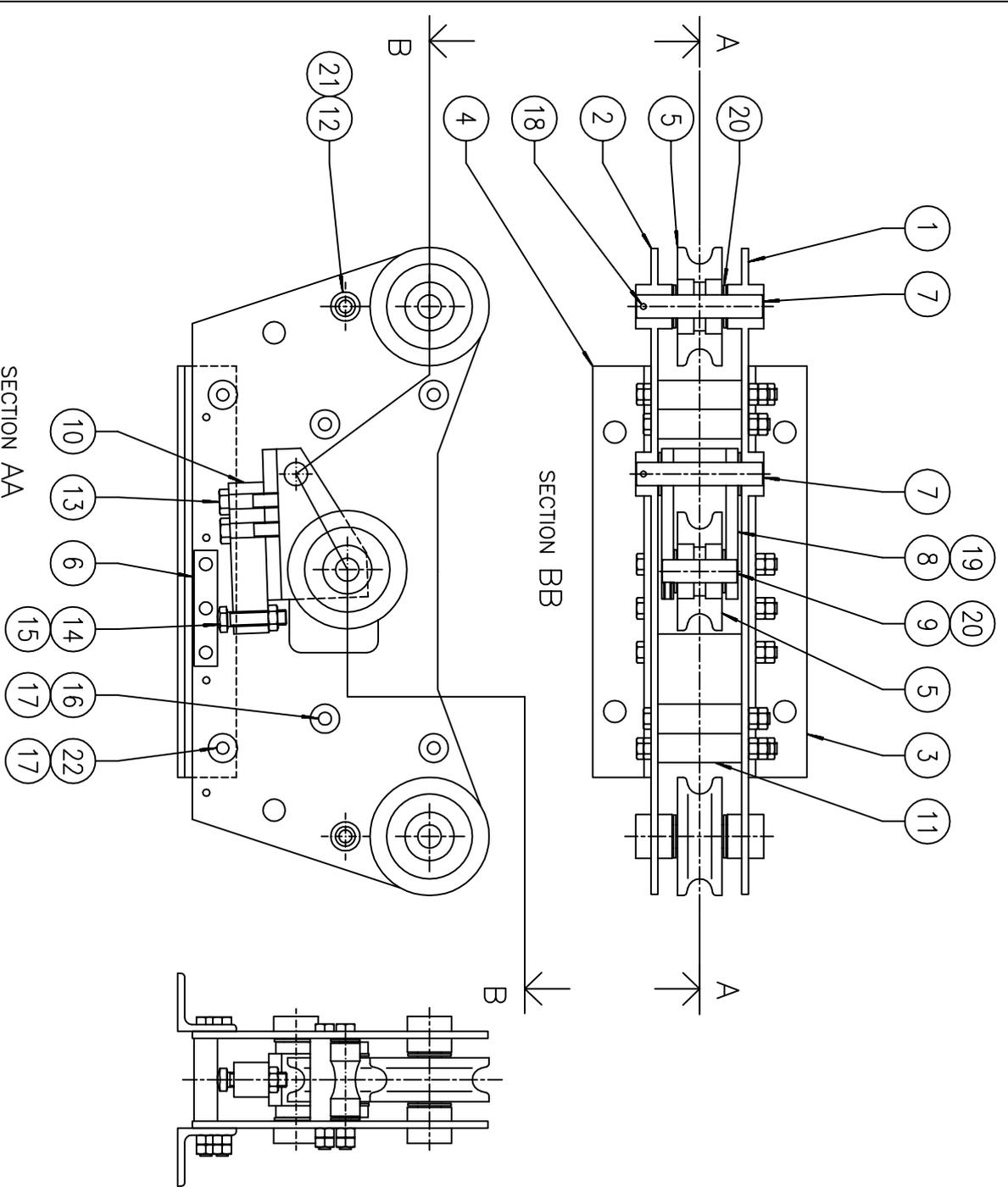


CABLE GUIDE MOUNTING BRACKET
(SUPPLIED BY CUSTOMER)

NOTES:

1. RECOMMENDED MATERIAL 40X40X5mm RIGHT ANGLED STEEL PLATE.
2. WELD THE MOUNTING BRACKET TO THE CRANE BOOM, ENSURING THAT THE LOCATION MEETS THE CRITERIA OUTLINED ON SHEET 2.
3. BOLT THE CABLE GUIDE ASSEMBLY TO THE MOUNTING BRACKET.

REV	DATE	DESCRIPTION OF CHANGE	APPR'D	TOL:	DRAWN	APPROVED	PART OF ASSY	PART NO.:	PROJECT:	SCALE
				X: +/- 1 X.X +/- 0.2 X.XX AS STATED	S. CHAMBERS 31/10/2007	J. KOVAL 1/11/07	-	-	RECOIL DRUM	N/A
				DRAFTING STANDARD: AS1100			32 West Thebarton Rd THEBARTON SOUTH AUSTRALIA 5031 web : www.lsirobway.com.au PH: +61 8 8238 3500 FX: +61 8 8352 1684		INSTALLATION DETAILS	SHEET 4 OF 4
				DO NOT SCALE DRAWING ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED				DRAWING No:	FILE No:	REV
								DWG 3718	371801AA.DWG	1.0

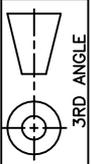


ITEM	QTY	MATERIAL/DESCRIPTION	DWG No.	STOCK CODE (STANDARD)	STOCK CODE (MARINE S/S)
1	1	SIDE PLATE-RIGHT	DWG0203	PLAHR10	PLAHR10SS
2	1	SIDE PLATE-LEFT	DWG0203	PLAHR13	PLAHR13SS
3	1	MOUNT ANGLE BRACKET RIGHT HAND	DWG0299	BRARHT04	BRARHT04SS
4	-	MOUNT ANGLE BRACKET LEFT HAND	DWG0299	BRARHT03	BRARHT03SS
5	3	SHEAVE ASSY #14 CABLE	DWG0345	SHEH32014	-
	3	OR #16 CABLE	DWG0345	SHEH32016	-
	3	OR #20 CABLE	DWG0345	SHEH32020	-
	3	OR #26 CABLE	DWG0345	SHEH32026	-
	3	OR #29 CABLE	DWG0345	SHEH32029	-
6	1	LOAD PLATE	DWG0302	PLAHR08	PLAHR08SS
7	3	SHAFT-SHEAVE	DWG0225	SHAHR12	-
8	1	ROCKER BOX	DWG0346	ROC3MAR	ROC3MARRS
9	1	SHAFT-SHEAVE-ROCKER BOX	DWG0289	SHAHR11	-
10	1	LOAD CELL ASSY-5K-WITH PLUG	-	CELRTD5P	-
11	1	SPACERS	-	CELRTD5	-
12	2	KEEPER-CABLE	DWG0301	SPAHR06	SPAHR06SS
13	2	BOLT-CELL MOUNTING 1/2"x1 3/4" SS	DWG0300	KEHRHT02	KEHRHT02SS
14	1	LOADING BOLT 1/2"x2" SS	DWG0287	SCR122CZP	-
15	1	LOCK NUT 1/2" UNF SS	-	NUT12HLS	-
16	6	M10X100 HEX HEAD BOLT	-	BOLM1010DHG	BOLM1010DHSS
17	22	M10 HALF SIZE LOCK NUT	-	NUTM10HLG	NUTM10HSS
18	3	SPLIT PIN #4X50 SS	-	PINCOIT03	-
19	1	SOC GRUB SCREW M6X12 CUP PT	-	SCR0612SG	-
20	8	M20 FLAT WASHER	-	WASM20FZP	WASM20FSS
21	26	M10 FLAT WASHER	-	WASM10FZP	WASM10FSS
22	5	M10X120 HEX HEAD BOLT	-	BOLM10120HG	BOLM10120HSS

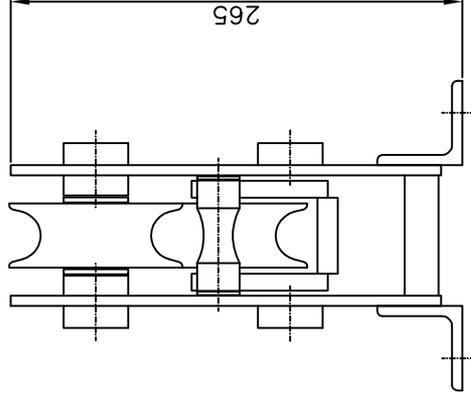
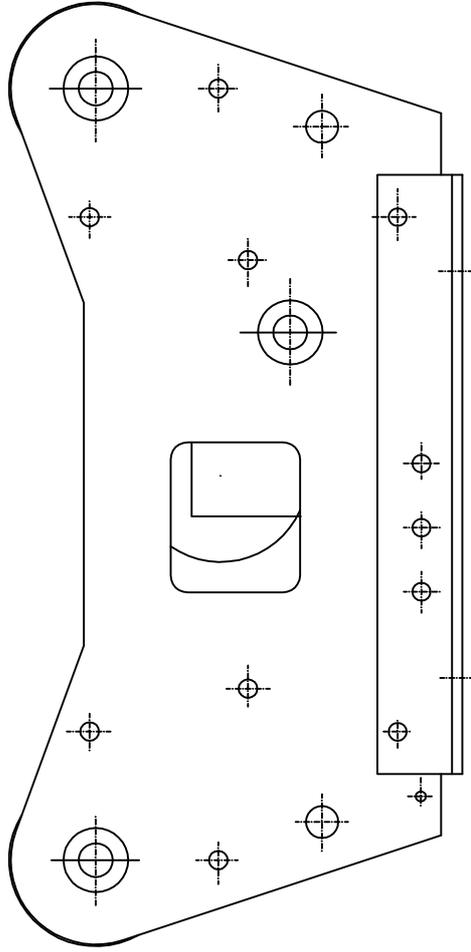
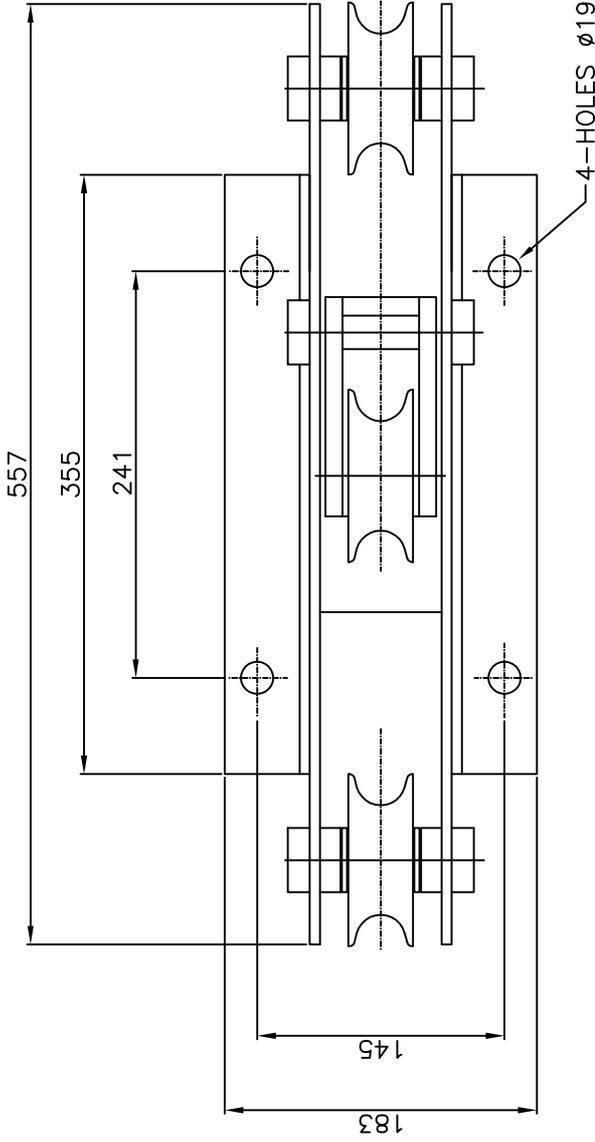
DYNHRT3 - STANDARD (NO SHEAVES)
 DYNHRT3 - STANDARD (INCLUDING SHEAVES)
 DYNHRT3SS - STAINLESS STEEL MARINE (NO SHEAVES)

REV	DATE	DESCRIPTION OF CHANGE	APPR'D	TOL:	DRAWN	APPROVED	PART OF ASSY	PART No:	PROJECT:	SCALE
1.0	14/09/95	ISSUED FOR MANUFACTURE		X	F. LOCKER	M. OBST	-	AS ABOVE	HRT-3 DYN0	N/A
1.1	04/01/96	ITEMS 3&4 CHANGED AS PER DR#124		XX						
1.2	27/08/97	REFER TO DR#318		X:XX						
1.3	29/03/99	REFER TO DR#561		AS STATED						
1.4	27/01/05	REFER TO DR#345								

DO NOT SCALE DRAWING UNLESS OTHERWISE STATED		LSI-ROBWAY 32 WEST THEEBARTON RD THEEBARTON 5031 SOUTH AUSTRALIA PHONE +61 8 8352 6055 FAX +61 8 8352 1684	
DRAWING No: DWG 0422		FILE No: 042201AE.DWG	
TITLE: GENERAL ARRANGEMENT		SHEET 1 OF 2	
REV 1.4		SCALE N/A	



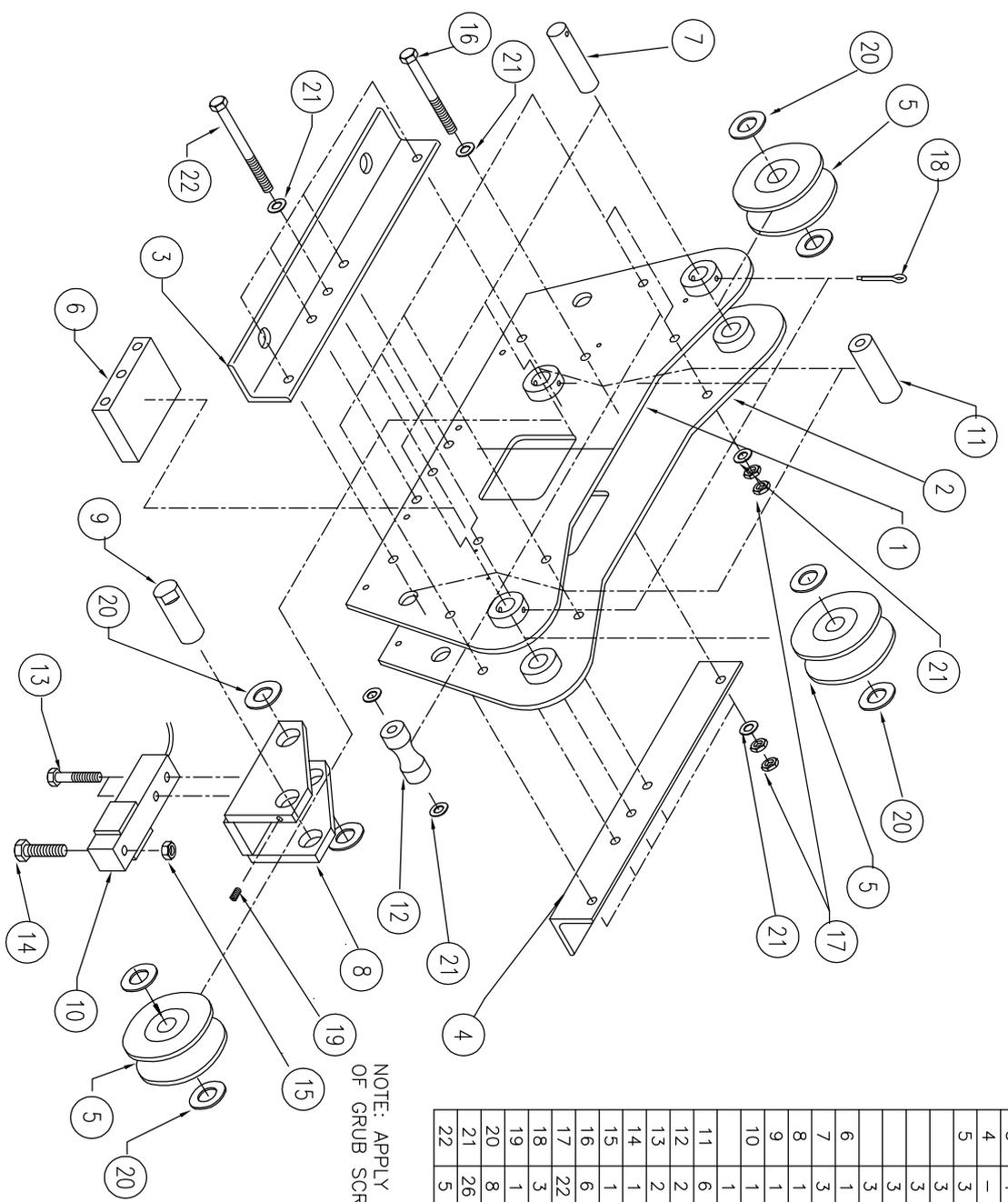
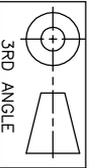
3RD ANGLE



REV	DATE	DESCRIPTION OF CHANGE	APPR'D	TOL:	DO NOT SCALE DRAWING ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED	DRAWN	APPROVED	PART OF ASSY	PART No:	PROJECT:	SCALE	SHEET
1.0	14/09/95	ISSUED FOR MANUFACTURE		X: +/- 1 X.X: +/- 0.2 X.XX: AS STATED		F. LOCKER 14/09/95	M. OBST 14/09/95	—	AS ABOVE	HRT-3 DYNO	N/A	2 OF 2
1.1	04/01/96	ITEMS 3&4 CHANGED AS PER DR#124	M.O.									
1.2	27/08/97	REFER TO DR#318	M.O.									
1.3	29/03/99	REFER TO DR#551	M.G.									
1.4	27/01/05	REFER TO DR#345	G.C.									
									DWG 0422	FILE No: 042201AE.DWG		REV 1.4
									TITLE: GENERAL ARRANGEMENT			
									DRAWING No: 042201AE.DWG			
									LSI-ROBWAY 32 WEST THEBARTON RD THEBARTON 5031 SOUTH AUSTRALIA PHONE +61 8 8352 6055 FAX +61 8 8352 1684			



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ITEM	QTY	MATERIAL/DESCRIPTION	DWG No.	STOCK CODE (STANDARD)	STOCK CODE (MARINE S/S)
1	1	SIDE PLATE-RIGHT	DWG0203	PLAHR10	PLAHR10SS
2	1	SIDE PLATE-LEFT	DWG0203	PLAHR13	PLAHR13SS
3	1	MOUNT ANGLE BRACKET RIGHT HAND	DWG0299	BRAHR104	BRAHR104SS
4	-	MOUNT ANGLE BRACKET LEFT HAND	DWG0299	BRAHR103	BRAHR103SS
5	3	SHEAVE ASSY Ø14 CABLE	DWG0345	SHEH32014	-
	3	OR Ø16 CABLE	DWG0345	SHEH32016	-
	3	OR Ø20 CABLE	DWG0345	SHEH32020	-
	3	OR Ø26 CABLE	DWG0345	SHEH32026	-
	3	OR Ø29 CABLE	DWG0345	SHEH32029	-
6	1	LOAD PLATE	DWG0302	PLAHR108	PLAHR108SS
7	3	SHAFT-SHEAVE	DWG0225	SHAHR12	-
8	1	ROCKER BOX	DWG0346	ROC3MAR	ROC3MARSS
9	1	SHAFT-SHEAVE-ROCKER BOX	DWG0289	SHAHR11	-
10	1	LOAD CELL ASSY-5K-WITH PLUG	-	CELBTD5P	-
	1	LOAD CELL ASSY-5K-NO PLUG	-	CELBTD5	-
11	6	SPACERS	DWG0301	SPAHR106	SPAHR106SS
12	2	KEEPER-CABLE	DWG0300	KEHR102	KEHR102SS
13	2	BOLT-CELL MOUNTING 1/2"x1 3/4" SS	-	BOL1213HSS	-
14	1	LOADING BOLT 1/2"x2" SS	DWG0287	SCR122CZP	-
15	1	LOCK NUT 1/2" UNF SS	-	NUT12HLSS	-
16	6	M10X100 HEX HEAD BOLT	-	BOLM10100HG	BOLM10100HSS
17	2	M10 HALF SIZE LOCK NUT	-	NUTM10HLG	NUTM10HSS
18	3	SPLIT PIN Ø4X50 SS	-	PINCO1103	-
19	1	SOC GRUB SCREW M6X12 CUP PT	-	SCRM612SG	-
20	8	M20 FLAT WASHER	-	WASM20FZP	WASM20FSS
21	26	M10 FLAT WASHER	-	WASM10FZP	WASM10FSS
22	5	M10X120 HEX HEAD BOLT	-	BOLM10120HG	BOLM10120HSS

NOTE: APPLY LOCTITE 243 TO THREAD OF GRUB SCREW.

REV	DATE	DESCRIPTION OF CHANGE	APPR'D
1.1	04/01/96	CORRECT PART NO 3 & 4 AS PER DR#124	M.O.
1.2	22/07/97	REFER TO DR#318	M.O.
1.3	20/07/98	REFER TO DR#494	M.O.
1.4	29/03/99	REFER TO DR#551	M.G.
1.5	27/01/05	REFER TO DR#345	G.C.
1.6	01/08/05	REFER TO DR#409	S.C.

TOL: X +/- 1
 XX +/- 0.2
 XXX AS STATED

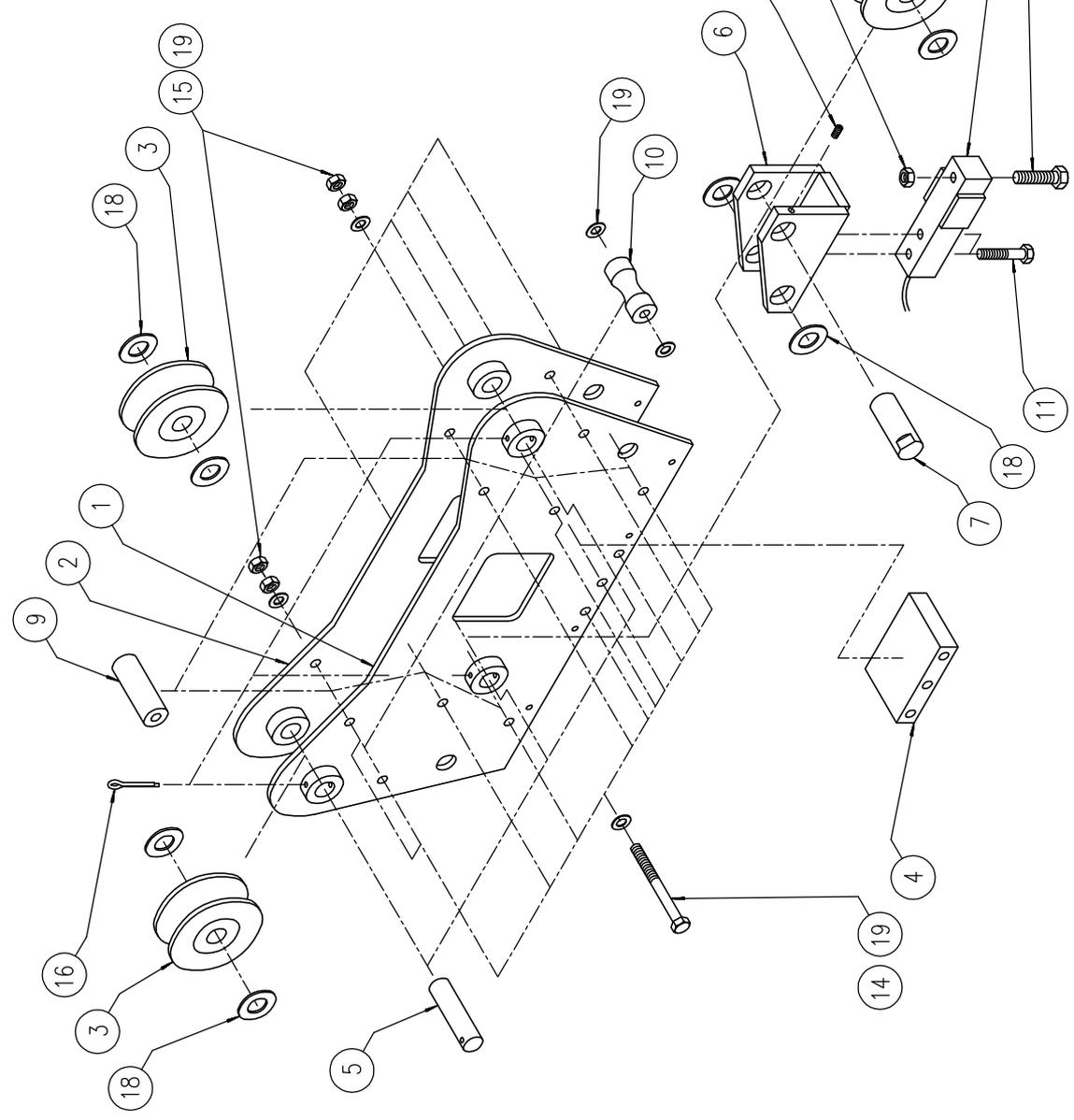
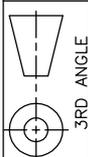
DO NOT SCALE DRAWING
 UNLESS OTHERWISE STATED

DRAWN	APPROVED	PART OF ASSY
F. LOCKER 15/09/95	M. OBST 15/09/95	-

TITLE:	PART No.:	PROJECT:	SCALE
EXPLODED VIEW AND PARTS LIST FOR HRT-3 DYNO (VERTICAL MOUNT)	AS ABOVE	HRT-3 DYNO	N/A
DRAWING No: DWG 0104		FILE No: 010401AG.DWG	SHEET 1 OF 1
			REV 1.6



DYNHRT3 - STANDARD (NO SHEAVES)
 DYNHRT3 - STANDARD (INCLUDING SHEAVES)
 DYNHRT3SS - STAINLESS STEEL MARINE (NO SHEAVES)

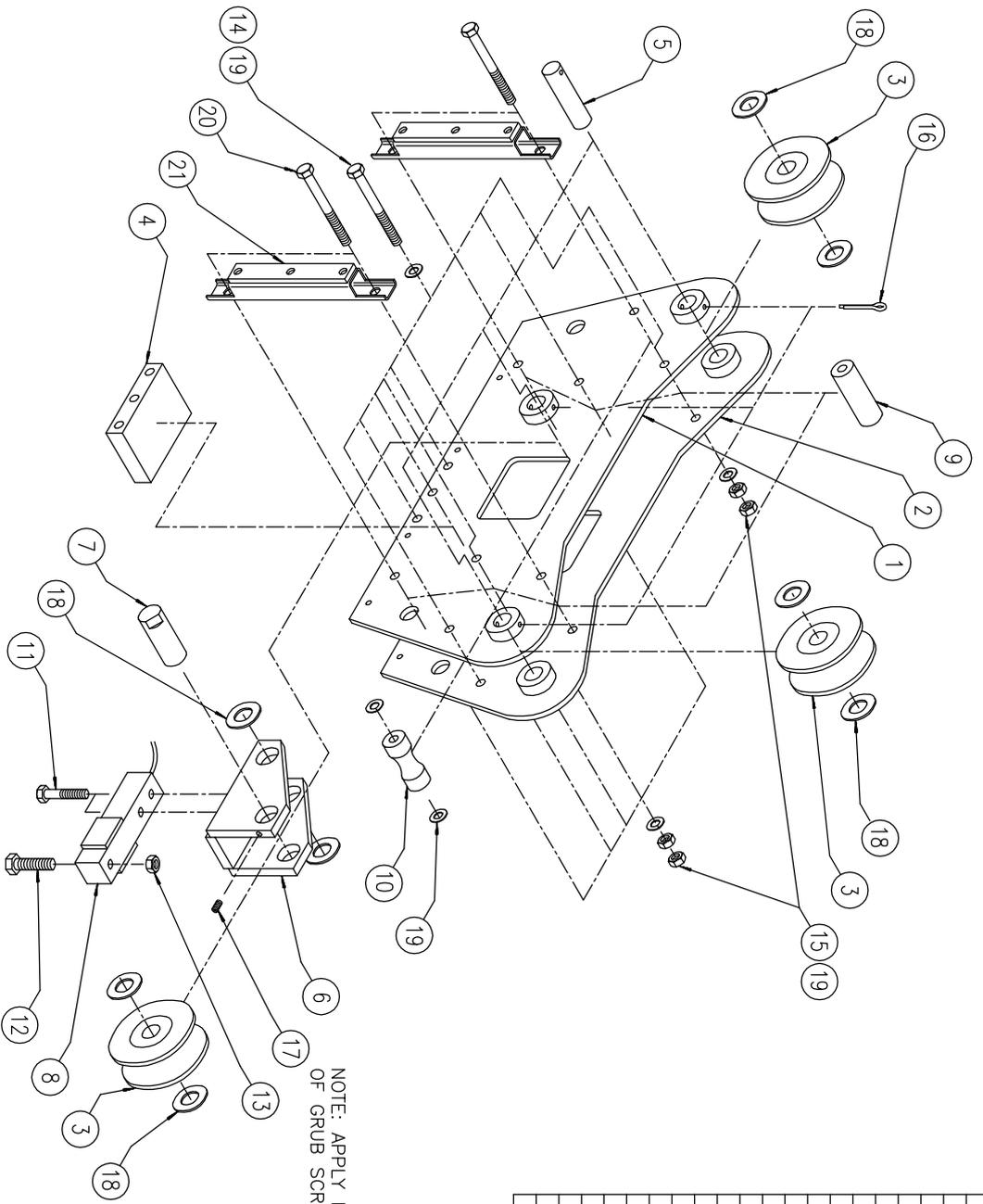
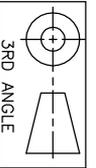


NOTE: APPLY LOCTITE 243 TO THREAD OF GRUB SCREW.

DYNHRT3 - STANDARD (NO SHEAVES)
 DYNHRT3 - STANDARD (INCLUDING SHEAVES)
 DYNHRT3SS - STAINLESS STEEL MARINE (NO SHEAVES)

ITEM	QTY	MATERIAL/DESCRIPTION	DWG. No.	STOCK CODE (STANDARD)	STOCK CODE (MARINE S/S)
1	1	SIDE PLATE-RIGHT	DWG0203	PLAHR110	PLAHR110SS
2	1	SIDE PLATE-LEFT	DWG0203	PLAHR113	PLAHR113SS
3	3	SHEAVE ASSY Ø14 CABLE	DWG0345	SHEH32014	-
3	3	OR Ø16 CABLE	DWG0345	SHEH32016	-
3	3	OR Ø20 CABLE	DWG0345	SHEH32020	-
3	3	OR Ø26 CABLE	DWG0345	SHEH32026	-
3	3	OR Ø29 CABLE	DWG0345	SHEH32029	-
4	1	LOAD PLATE	DWG0302	PLAHR08	PLAHR08SS
5	3	SHAFT-SHEAVE	DWG0225	SHAHRT12	-
6	1	ROCKER BOX	DWG0346	ROC3WAR	ROC3MARSS
7	1	SHAFT-SHEAVE-ROCKER BOX	DWG0289	SHAHRT11	-
8	1	LOAD CELL ASSY-5K-WITH PLUG	-	CELBTD5P	-
1	1	LOAD CELL ASSY-5K-NO PLUG	-	CELBTD5	-
9	6	SPACERS	DWG0301	SPAHR06	SPAHR06SS
10	2	KEEPER-CABLE	DWG0300	KEEHR02	KEEHR02SS
11	2	BOLT-CELL MOUNTING 1/2"x1 3/4" SS	-	BOL1213HHSS	-
12	1	LOADING BOLT 1/2"x2" SS	DWG0287	SCR122CZP	-
13	1	LOCK NUT 1/2" UNF SS	-	NUT12HLSS	-
14	6	M10X100 HEX HEAD BOLT	-	BOLM10100HG	BOLM10100HSS
15	22	M10 HALF SIZE LOCK NUT	-	NUTM10HLG	NUTM10HSS
16	3	SPLIT PIN Ø4X50 SS	-	PINCOIT03	-
17	1	SOC GRUB SCREW M6X12 CUP PT	-	SCRM612SG	-
18	8	M20 FLAT WASHER	-	WASM20FZP	WASM20FSS
19	26	M10 FLAT WASHER	-	WASM10FZP	WASM10FSS

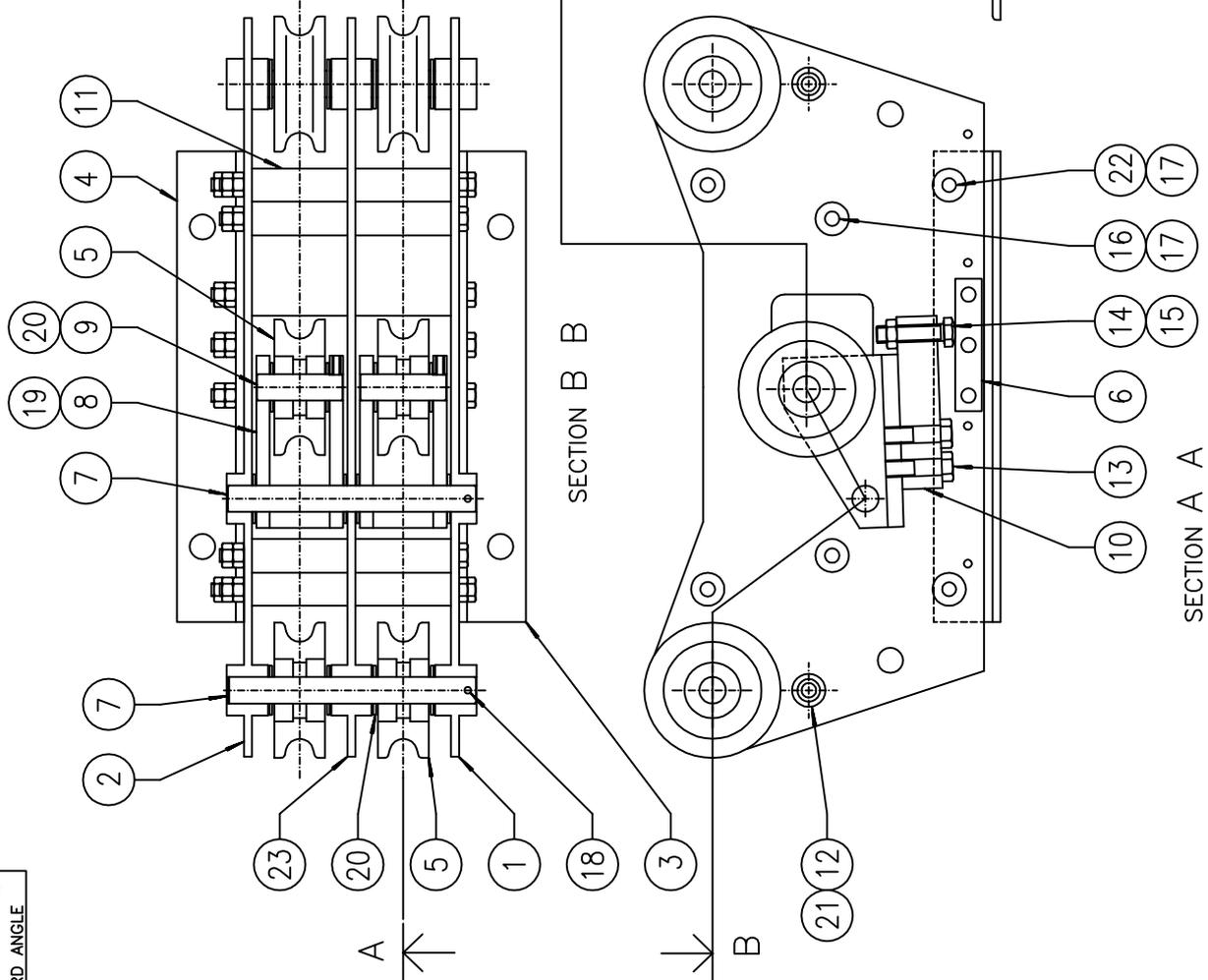
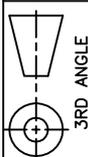
REV	DATE	DESCRIPTION OF CHANGE	APPR'D	DRAWN	APPROVED	PART OF ASSY	PART No:	PROJECT:	SCALE	SHEET	REV	
1.1	11/01/96	CORRECT PART NO 14 AS PER DR#125	M.O.	F. LOCKER	M. OBST	-	AS ABOVE	HRT-3 DYNO	N/A	1 OF 1	1.5	
1.2	22/07/97	REFER TO DR#318	M.O.	15/09/95	15/09/95							
1.3	26/03/99	REFER TO DR#551	M.G.									
1.4	27/01/05	REFER TO DR#345	G.C.									
1.5	01/08/05	REFER TO DR#409	S.C.									
<p>TOL: X +/- 1 X.X +/- 0.2 X.XX AS STATED</p> <p>DO NOT SCALE DRAWING ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED</p>							<p>LSI-ROBWAY 32 WEST THEBARTON RD THEBARTON 5031 SOUTH AUSTRALIA PHONE +61 8 8352 6055 FAX +61 8 8352 1684</p>		<p>EXPLODED VIEW AND PARTS LIST FOR HRT-3 DYNO (HORIZONTAL MOUNT)</p>		<p>DRAWING No: DWG_0786 FILE No: 078601AF.DWG</p>	



NOTE: APPLY LOCTITE 243 TO THREAD OF GRUB SCREW.

ITEM	QTY	MATERIAL/DESCRIPTION	DWG No.	STOCK CODE (STANDARD)	STOCK CODE (MARINE S/S)
1	1	SIDE PLATE-RIGHT	DWG0203	PLAHR10	PLAHR10SS
2	1	SIDE PLATE-LEFT	DWG0203	PLAHR13	PLAHR13SS
3	3	SHEAVE ASSY ϕ 14 CABLE	DWG0345	SHEH32014	-
3	3	OR ϕ 16 CABLE	DWG0345	SHEH32016	-
3	3	OR ϕ 20 CABLE	DWG0345	SHEH32020	-
3	3	OR ϕ 26 CABLE	DWG0345	SHEH32026	-
3	3	OR ϕ 29 CABLE	DWG0345	SHEH32029	-
4	1	LOAD PLATE	DWG0302	PLAHR108	PLAHR108SS
5	3	SHAFT-SHEAVE	DWG0225	SHAHR112	-
6	1	ROCKER BOX	DWG0346	ROCM3AR	ROCM3ARSS
7	1	SHAFT-SHEAVE-ROCKER BOX	DWG0289	SHAHR111	-
8	1	LOAD CELL ASSY-5K-WITH PLUG	-	CELBTD5P	-
8	1	LOAD CELL ASSY-5K-NO PLUG	-	CELBTD5	-
9	6	SPACERS	DWG0301	SPAHR106	SPAHR106SS
10	2	KEEPER-CABLE	DWG0300	KEHR102	KEHR102SS
11	2	BOLT-CELL MOUNTING 1/2"x1 3/4" SS	-	BOL1213HSS	-
12	1	LOADING BOLT 1/2"x2" SS	DWG0287	SCRI122CZP	-
13	1	LOCK NUT 1/2" UNF SS	-	NUT12HSS	-
14	7	M10X100 HEX HEAD BOLT	-	BOLM10100HG	BOLM10100HSS
15	22	M10 HALF SIZE LOCK NUT	-	NUTM10HLG	NUTM10HSS
16	3	SPLIT PIN ϕ 4X50 SS	-	PINCOT103	-
17	1	SOC GRUB SCREW M6X12 CUP PT	-	SCRM612SG	-
18	8	M20 FLAT WASHER	-	WASM20FZP	WASM20FSS
19	22	M10 FLAT WASHER	-	WASM10FZP	WASM10FSS
20	4	M10X120 HEX HEAD BOLT	-	BOLM10120HG	BOLM10120HSS
21	2	LANDING PAD	DWG0303	PADHRT01	-

REV	DATE	DESCRIPTION OF CHANGE	APPR'D	TOL:	DRAWN	APPROVED	PART OF ASSY	PART No.:	PROJECT:	SCALE
1.1	11/01/96	CORRECT PART NO 14 AS PER DR#125	M.O.	X +/- 1	F. LOCKER	M. OBST	-	AS ABOVE	HRT-3 DYN0	N/A
1.2	30/10/97	REFER TO DR#318	M.O.	XX +/- 0.2	15/09/95	15/09/95	-	EXPLODED VIEW AND PARTS LIST FOR HRT-3	DYNO (HORIZONTAL MOUNT WITH LANDING PADS)	SHEET N/A
1.3	26/03/99	REFER TO DR#551	M.G.	X:XX AS STATED	LSI-ROBWAY 32 WEST THEBARTON RD THEBARTON 5031 SOUTH AUSTRALIA PHONE +61 8 8352 6055 FAX +61 8 8352 1684		-	DYN0	FILE No: 078701AF.DWG	1 OF 1
1.4	27/01/05	REFER TO DR#345	G.C.	ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED			-	DYNHRT3 - STANDARD (NO SHEAVES)		REV 1.5
1.5	01/08/05	REFER TO DR#409	S.C.				-	DYNHRT3SS - STANDARD (INCLUDING SHEAVES)		
							-	DYNHRT3SS - STAINLESS STEEL MARINE (NO SHEAVES)		



ITEM	QTY	MATERIAL/DESCRIPTION	DWG. No.	STOCK CODE
1	1	SIDE PLATE-RIGHT	DWG0203	PLAHR110
2	1	SIDE PLATE-LEFT	DWG0203	PLAHR113
3	1	MOUNT ANGLE BRACKET-RH	DWG0299	BRAHRT04
4	1	MOUNT ANGLE BRACKET-LH	DWG0299	BRAHRT03
5	6	SHEAVE ASSEMBLY Ø14 CABLE	DWG0345	SHEH32014
6	6	OR Ø16 CABLE	DWG0345	SHEH32016
6	6	OR Ø20 CABLE	DWG0345	SHEH32020
6	6	OR Ø26 CABLE	DWG0345	SHEH32026
6	6	OR Ø29 CABLE	DWG0345	SHEH32029
6	2	LOAD PLATE	DWG0302	PLAHR108
7	3	SHAFT-SHEAVE	DWG0290	SHAHR115
8	2	ROCKER BOX	DWG0346	ROC3MAR
9	2	SHAFT-SHEAVE-ROCKER BOX	DWG0289	SHAHR111
10	2	LOAD CELL ASSY-5K-WITH PLUG	-	CELBTD5P
2	2	LOAD CELL ASSY-5K-NO PLUG	-	CELBTD5
11	12	SPACERS	DWG0301	SPAHR106
12	4	KEEPER-CABLE	DWG0300	KEEHR102
13	4	BOLT-CELL MOUNTING 1/2"x1 3/4" ZP	-	BOL1213HHZP
14	2	LOADING BOLT 1/2"x2" ZP	-	SCR122CZP
15	2	LOCK NUT 1/2" UNF ZP	-	NUT12HLZP
16	6	M10X180 BOLT HEX HEAD GALV	-	BOLM10180HG
17	22	M10 HALF SIZE LOCK NUT	-	NUTM10HLG
18	3	SPLIT PIN Ø4X50 SS	-	PINCOIT03
19	2	SOC GRUB SCREW M6X12 CUP PT SS	-	SCRM612SG
20	16	M20 FLAT WASHER ZP	-	WASM20FZP
21	8	M10 FLAT WASHER ZP	-	WASM10FZP
22	5	M10X200 BOLT HEX HEAD GALV	-	BOLM10200HG
23	1	CENTRE PLATE	DWG0367	PLAHR118

FOR THE HEAVY DUTY MARINISED MODEL THE FOLLOWING ALTERATIONS TO THE ABOVE PARTS LIST ARE TO BE MADE.

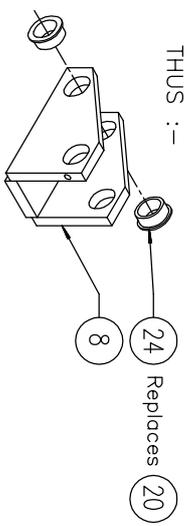
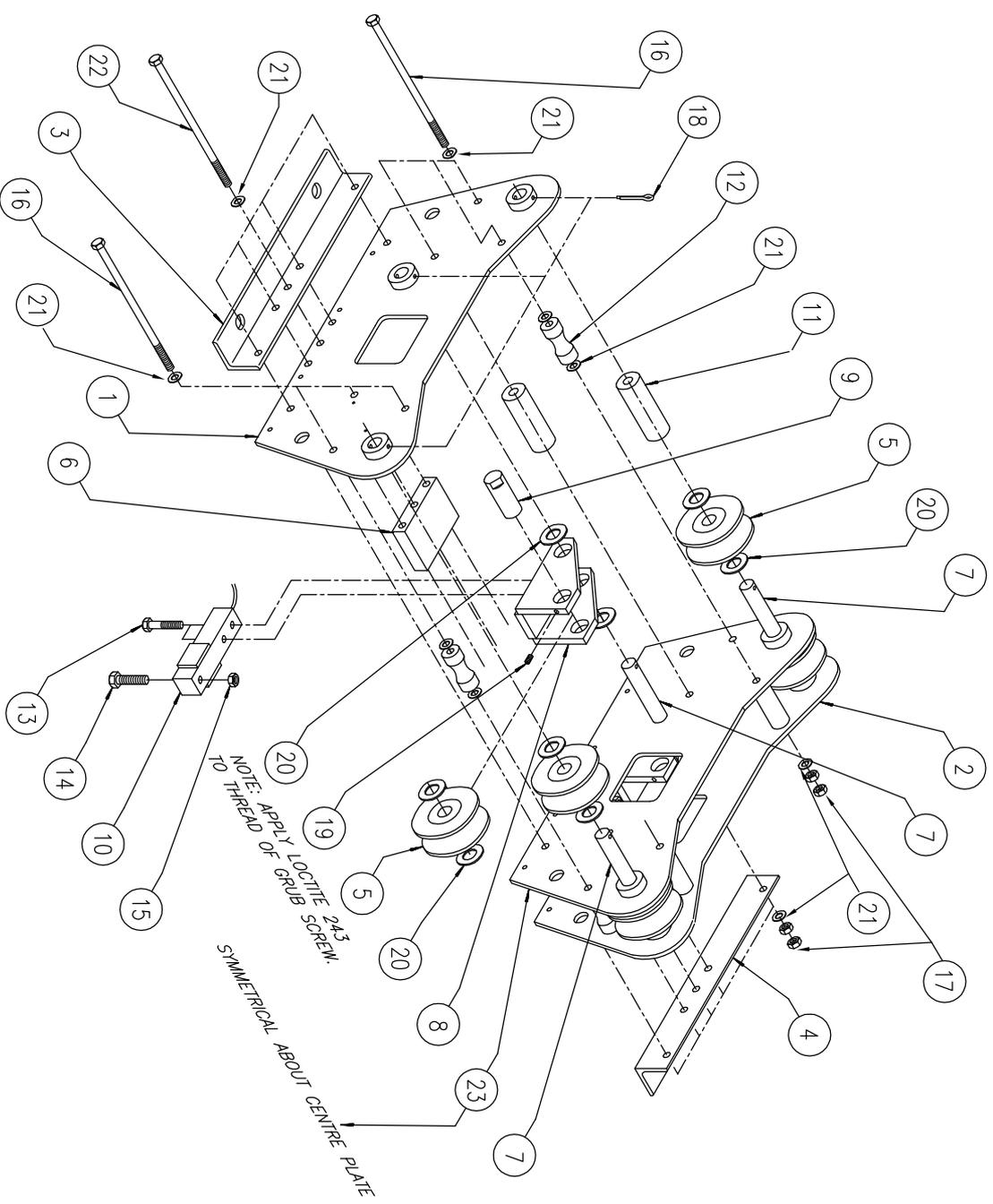
8	2	ROCKER BOX	DWG0823	ROCH3M0823
20	12	M20 FLAT WASHER SS	-	WASM20SS
24	4	BUSH-SHOULDERED	DWG0824A	BUSHHRT03

REV	DATE	DESCRIPTION OF CHANGE	APPR'D	DRAWN	APPROVED	PART OF ASSY	PART No:	PROJECT:	SCALE	SHEET	REV	
1.0	14/09/95	ISSUED FOR MANUFACTURE		F. LOCKER	M. OBST	-	AS ABOVE	HRT-3-2 DYNO	N/A	1 OF 1	1.2	
1.1	07/01/96	CORRECT AS PER DR#124		14/09/95	14/09/95							
1.2	29/03/99	REFER TO DR#551										
							TITLE:	DYNHRT32 DYNHRT32S DYNHRTM32	GENERAL ARRANGEMENT			
							DRAWING No:	DWG 0552	FILE No:	055201AC.DWG		
							LSI-ROBWAY 32 WEST THEBARTON RD THEBARTON 5031 SOUTH AUSTRALIA PHONE +61 8 8352 6055 FAX +61 8 8352 1684					

TOL: X +/- 1
XX +/- 0.2
XXX AS STATED

DO NOT SCALE DRAWING
ALL DIMENSIONS ARE IN MILLIMETERS
UNLESS OTHERWISE STATED





ITEM	QTY	MATERIAL/DESCRIPTION	DWG No.	STOCK CODE
1	1	SIDE PLATE-RIGHT	DWG0203	PLAHR10
2	1	SIDE PLATE-LEFT	DWG0203	PLAHR13
3	1	MOUNT ANGLE BRACKET RIGHT HAND	DWG0299	BRARHT04
4	1	MOUNT ANGLE BRACKET LEFT HAND	DWG0299	BRARHT03
5	6	SHEAVE ASSEMBLY Ø14 CABLE	DWG0345	SHEH32014
6	OR	Ø16 CABLE	DWG0345	SHEH32016
6	OR	Ø20 CABLE	DWG0345	SHEH32020
6	OR	Ø26 CABLE	DWG0345	SHEH32026
6	OR	Ø29 CABLE	DWG0345	SHEH32029
6	2	LOAD PLATE	DWG0302	PLAHR108
7	3	SHAFT-SHEAVE	DWG0290	SHAHR15
7	2	ROCKER BOX	DWG0346	ROCG3MAR
8	2	SHAFT-SHEAVE-ROCKER BOX	DWG0289	SHAHR11
10	2	LOAD CELL ASSY-5K-WITH PLUG	-	CELBTD5P
2	2	LOAD CELL ASSY-5K-NO PLUG	-	CELBTD5
11	2	SPACERS	DWG0301	SPAHR106
12	4	KEEPER-CABLE	DWG0300	KEEHR102
13	4	BOLT-CELL MOUNTING 1/2"x1 3/4" ZP	-	BOLT1213HHZP
14	2	LOADING BOLT 1/2"x2" ZP	-	SCR122CZP
15	2	LOCK NUT 1/2" UNF GALV	-	NUT12HLZP
16	6	M10X180 BOLT HEX HEAD GALV	-	BOLM10180HG
17	22	M10 HALF SIZE LOCK NUT GALV	-	NUTM10HLG
18	3	SPLIT PIN Ø4X50 SS	-	PINCOT103
19	2	SOC GRUB SCREW M6X12 CUP PT SS	-	SCRM612SG
20	16	M20 FLAT WASHER ZP	-	WASW20FZP
21	30	M10 FLAT WASHER ZP	-	WASW10FZP
22	5	M10X200 BOLT HEX HEAD GALV	-	BOLM10200HG
23	1	CENTRE PLATE	DWG0367	PLAHR118
8	2	ROCKER BOX	DWG0823	ROCH3M0823
20	12	M20 FLAT WASHER SS	-	WASW20SS
24	4	BUSH-SHOULDERED	DWG0824A	BUSHRT03

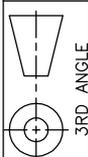
FOR THE HEAVY DUTY MARINESED MODEL THE FOLLOWING ALTERATIONS TO THE ABOVE PARTS LIST ARE TO BE MADE:

REV	DATE	DESCRIPTION OF CHANGE	APPR'D
1.0	12/09/95	ISSUED FOR MANUFACTURE	
1.1	08/01/96	CORRECT PART NO 3 & 4 AS PER DR#124	M.O.
1.2	22/07/97	REFER TO DR#318	M.O.
1.3	02/10/98	REFER TO DR#494	D.P.
1.4	29/03/99	REFER TO DR#551	G.C.
1.5	01/08/05	REFER TO DR#409	S.C.

TO:	+	-	1
X			
XX			0.2
XXX			AS STATED

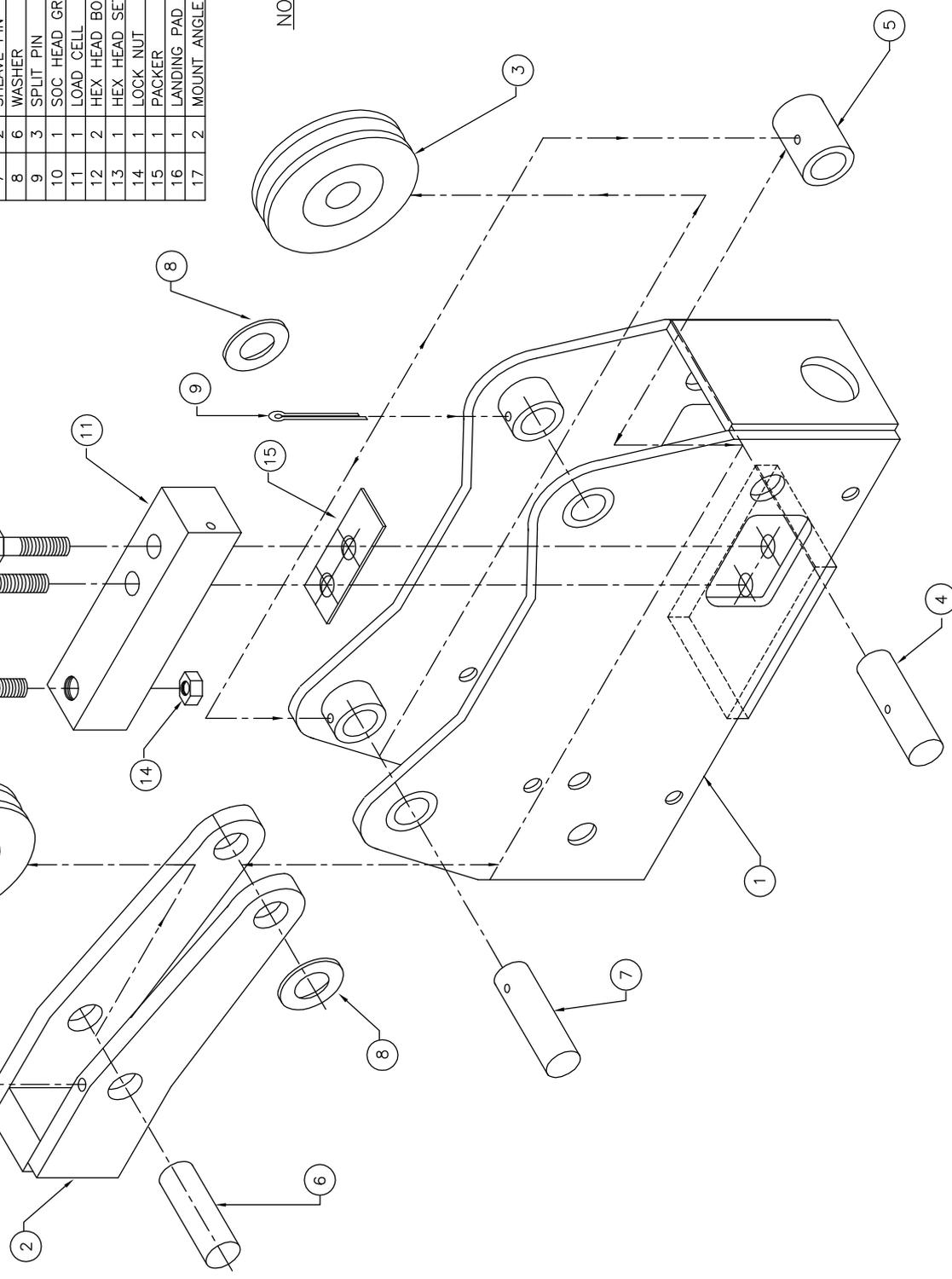
DO NOT SCALE DRAWING UNLESS OTHERWISE STATED

DRAWN	APPROVED	PART OF ASSY	TITLE:	PROJECT:	SCALE
F. LOCKER	M. OBST	-	EXPLODED VIEW AND PARTS LIST FOR HRT3-2 DYNO (VERTICAL MOUNT)	HRT-3-2 DYNO	N/A
04/08/94	04/08/94		DRAWING No: DWG 0353	FILE No: 035301AF.DWG	SHEET 1 OF 1
			LSI-ROBBY 32 WEST THEBARTON RD SOUTH AUSTRALIA 5031 PHONE +61 8 8352 6055 FAX +61 8 8352 1684		

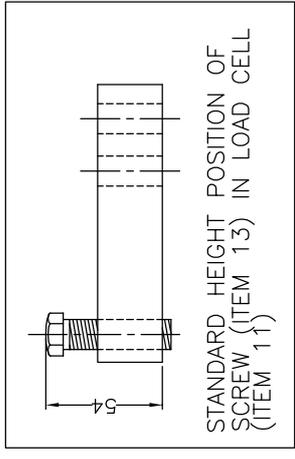


3RD ANGLE

NOTE: APPLY LOCTITE 243 TO THREAD OF GRUB SCREW.



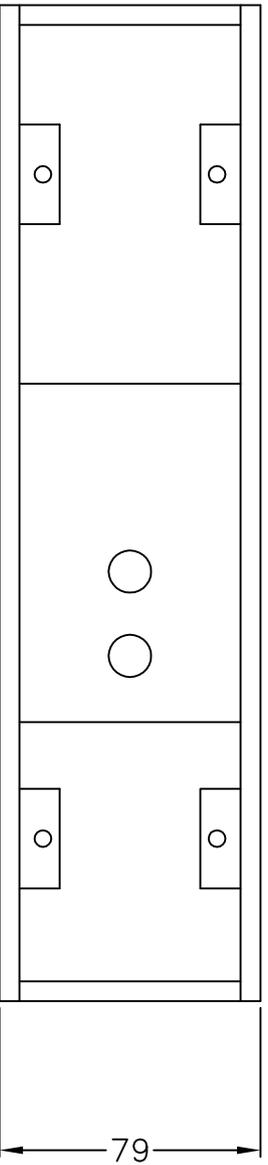
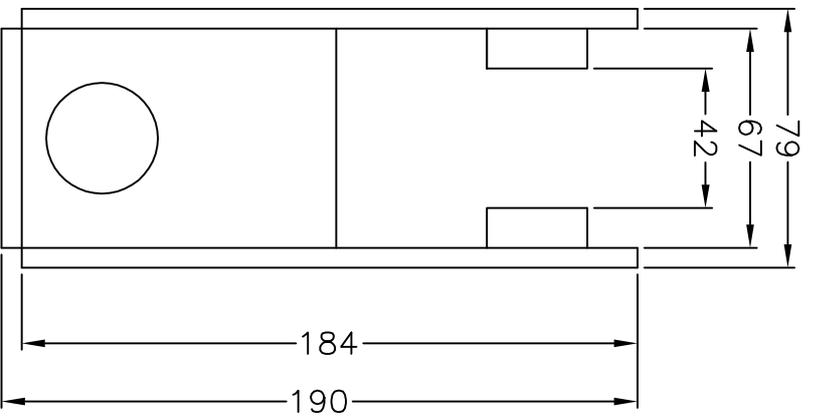
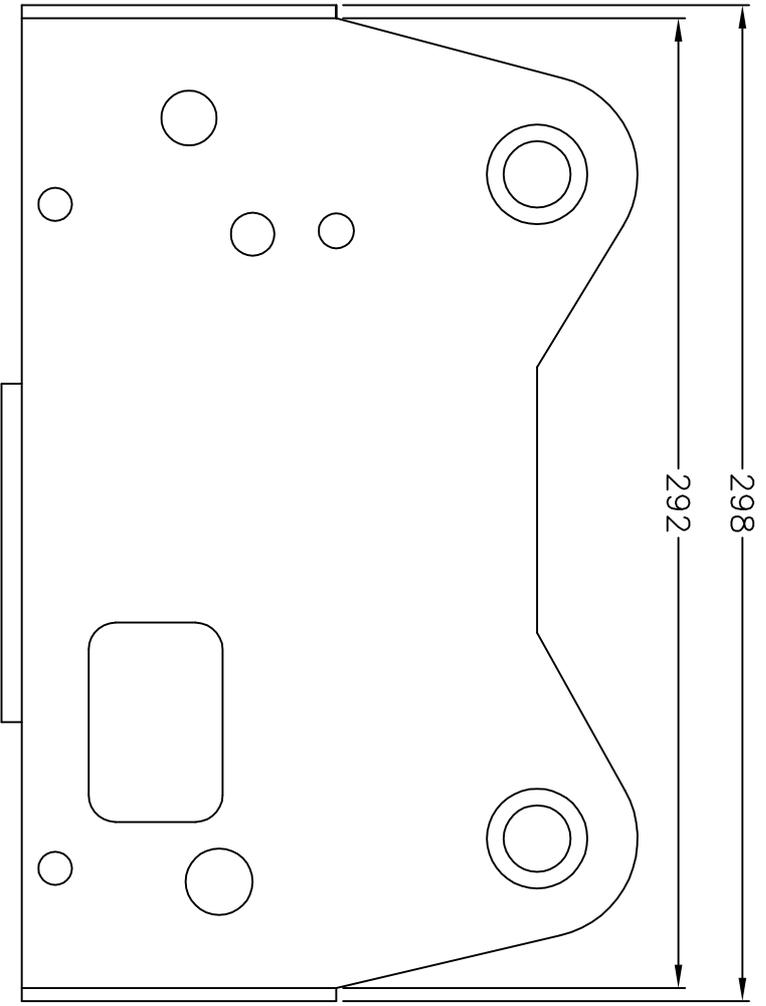
NOTE: ITEMS 16 & 17 ARE NOT SHOWN ON DRAWING



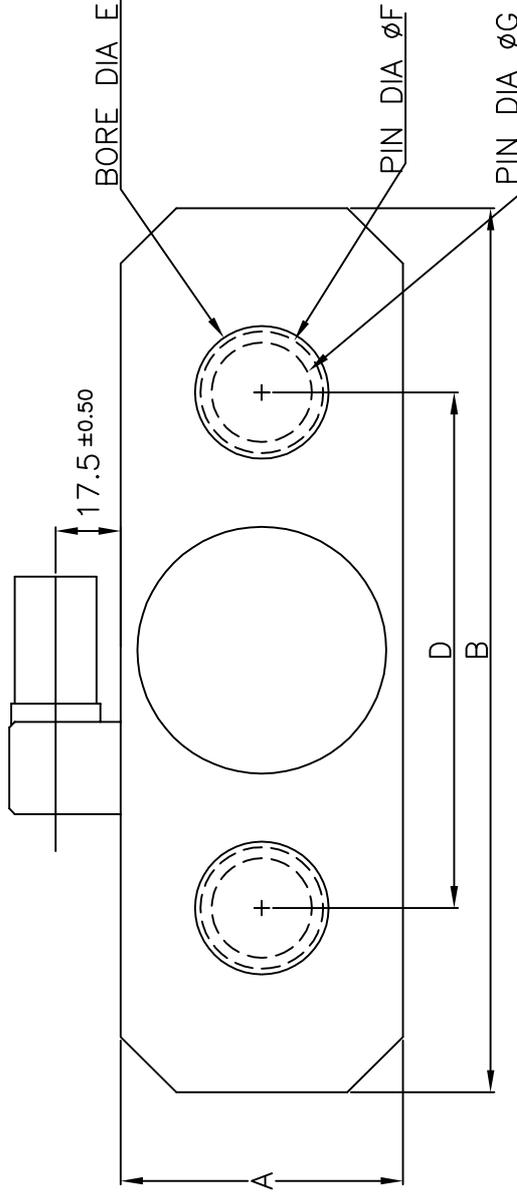
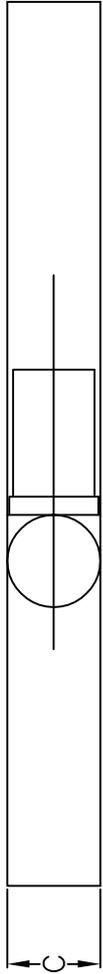
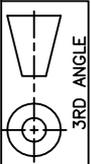
STANDARD - DYNHRT3MM
MARINE S/S - DYNHRT3MMSS

ITEM	QTY	MATERIAL/DESCRIPTION	DWG No.	STOCK CODE (STANDARD)	STOCK CODE (MARINE S/S)
1	1	MOUNTING FRAME	DWG0885	FRADYN01	FRHRT3MMSS
2	1	ROCKER ARM	DWG0880	ROC3MM	ROC3MMSS
3	3	SHEAVE	DWG0892	SHEH3MM###	---
4	1	PIVOT PIN	DWG0882	SHAHRT01	---
5	1	SPACER	DWG0883	SPAHRT08	SPAHRT3MMSS
6	1	PIVOT SHEAVE PIN	DWG0881	SHAHRT03	---
7	2	SHEAVE PIN	DWG0882	SHAHRT02	---
8	6	WASHER	---	WAS20F	---
9	3	SPLIT PIN	---	PINCOIT03	---
10	1	SOC HEAD GRUB SCREW M6X20	---	SCRM620SG	---
11	1	LOAD CELL	---	CELBTD5P	---
12	2	HEX HEAD BOLT	---	BOL1213HHZP	---
13	1	HEX HEAD SET SCREW	DWG0287	SCR122CZP	---
14	1	LOCK NUT	---	NUJ12HLZP	---
15	1	PACKER	DWG0884	PAGHRT01	---
16	1	LANDING PAD	DWG0887	PADHRT01	---
17	2	MOUNT ANGLE BRACKET	DWG0886	BRAMHRT3MMU	BRAMHRT3MMSS

REV	DATE	DESCRIPTION OF CHANGE	APPR'D	DRAWN	APPROVED	PART OF ASSY	PART No:	PROJECT:	SCALE	SHEET	REV	
1.2	11/01/96	REFER TO DR#125	M. OBST	ER	M. OBST	-	SEE ABOVE	HRT-3MM DYNO	N/A	1 OF 1	1.7	
1.3	11/02/97	REFER TO DR#229	M. OBST	07/10/89	20/11/95							
1.4	28/05/98	REFER TO DR#451	M. OBST	<p>LSI-ROBWAY 32 WEST THEBARTON RD THEBARTON 5031 SOUTH AUSTRALIA PHONE +61 8 8352 6055 FAX +61 8 8352 1684</p> <p>LSI ROBWAY A Division of Load Systems International</p>								
1.5	29/03/99	REFER TO DR#551	D.P.									
1.6	27/01/05	REFER TO DR#345	G.C.									
1.7	01/08/05	REFER TO DR#409	S.C.									
<p>TOL: X +/- 1 X.X +/- 0.2 X.XX AS STATED</p> <p>DO NOT SCALE DRAWING ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED</p>							<p>TITLE: GENERAL ARRANGEMENT</p>		<p>DRAWING No: DWG 0875</p>		<p>FILE No: 087501AH.DWG</p>	



REV	DATE	DESCRIPTION OF CHANGE	APPR'D	DRAWN		APPROVED		PART OF ASSY	PART No:	PROJECT:	SCALE	
1.1	28/05/98	REFER TO DR#451		C. HOBBY	D.G.	-	-	-	HRT3MM		N/A	
				10/09/97	10/09/97						SHEET	
											1 OF 1	
											REV	
											1.1	
				TOI: X +/- 1 XX +/- 0.2 XXX AS STATED				DO NOT SCALE DRAWING ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED				
								LSI-ROBBY 32 WEST THEBARTON RD THEBARTON 5031 SOUTH AUSTRALIA PHONE +61 8 8352 6055 FAX +61 8 8352 1884				
				A Division of Local Systems International				OVERALL DIMENSIONS DRAWING No: DWG 1393 FILE No: 139301AB.DWG				



GENERAL SPECIFICATIONS

- LINEARITY: 0.15% NOMINAL
 REPEATABILITY ERROR: <0.10%
 HYSTERESIS: <0.10%
 CREEP: <0.10%
 OUTPUT: 2MV/V NOMINAL
 EXCITATION: 15VDC. REC MAX.
 ISOLATION: >2000 MEGOHMS AT 50VDC
 OVERLOAD: 150%
 ULTIMATE: >400%
 TEMPERATURE EFFECTS: <0.005% /DEG C
 ON ZERO: <0.005% /DEG C
 ON SPAN: -10 TO +70 DEG C
 COMPENSATION RANGE: IP68 FULLY ENCAPSULATED
 SEALING:

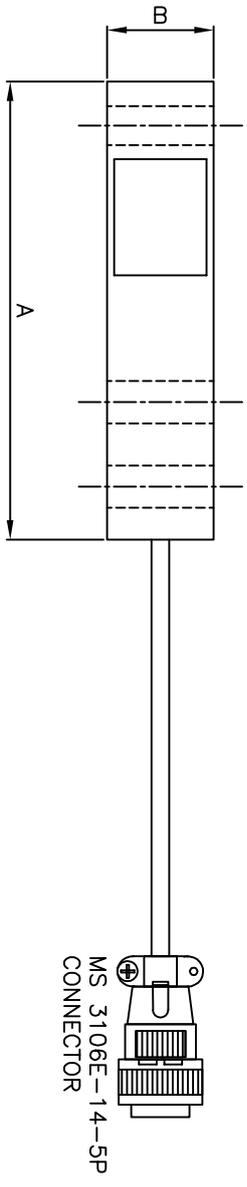
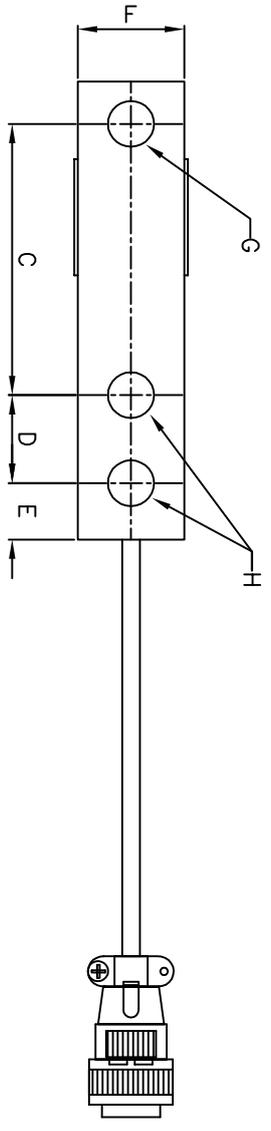
PIN DIA ØG USING REDUCING BUSH (BUSHR1015)

LOAD CELL TYPE	A		B		C		D		E H12 (+0.250 / 0.000)		F d10 (-0.080 / -0.180)		G d10 (-0.080 / -0.180)	
	MM	INCHES	MM	INCHES	MM	INCHES	MM	INCHES	MM	INCHES	MM	INCHES	MM	INCHES
10MT	78	3.1	260	10.2	25	1.0	158	6.2	42	1.7	41	1.6	30	1.2
15MT	78	3.1	260	10.2	25	1.0	158	6.2	42	1.7	41	1.6	30	1.2
20MT	78	3.1	260	10.2	25	1.0	158	6.2	42	1.7	41	1.6		
30MT	102	4.0	300	11.8	38	1.5	168	6.6	42	1.7	41	1.6		

REV	DATE	DESCRIPTION OF CHANGE	DRAWN		APPROVED		PART OF ASSY		PART No:		PROJECT:	
1.1	06/05/98	REFER TO DR#480	M. TURNER	M. OBST								
1.2	05/11/98	REFER TO DR#564	08/03/96	15/01/97								
1.3	05/01/06	ADD 20T TENSION CELL & SPACER DETAIL	TOL: X +/- 0.5 XX +/- 0.2 XXX AS STATED DO NOT SCALE DRAWING ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED									
1.4	30/5/13	REFER PCR 489	LSI-ROBWAY 32 WEST THEBARTON RD THEBARTON 5031 SOUTH AUSTRALIA PHONE +61 8 8352 6055 FAX +61 8 8352 1684									
1.5	18/7/13	17.5±0.5 was 16.0	TITLE: TENSION PLATE CELL DIMENSIONS TO SUIT 10, 15, 20, 30, CELLS DRAWING No: DWG 0990 FILE No: 099001AF.DWG									
											SCALE N/A	
											SHEET 1 OF 1	
											REV 1.5	



3RD ANGLE

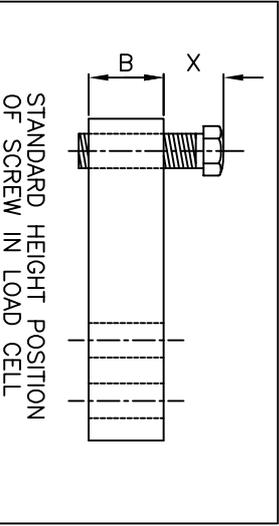


BRIDGE BEAM TYPE	A		B		C		D		E		F		G		H	
	MM	INCHES	MM	INCHES	MM	INCHES	MM	INCHES	MM	INCHES	MM	INCHES	MM	INCHES	MM	INCHES
2.2MT	130	5.1	30/32	1.2/1.3	76	2.9	26	1	16	0.63	30/32	1.2/1.3	12	0.47	13	0.51
5MT	171	6.7	39-42	1.5-1.7	95	3.7	38	1.5	19	0.75	39-42	1.5-1.7	21	0.82	21	0.82

GENERAL SPECIFICATIONS

LINEARITY: 0.03% NOMINAL
 REPEATABILITY ERROR: <0.03%
 HYSTERESIS: <0.03%
 CREEP: <0.03%
 ZERO BALANCE: +/- 1%
 OUTPUT (2.2MT): 3.00mV/V @FS
 OUTPUT (5MT): 2.00mV/V @FS
 EXCITATION: 15VDC. REC MAX.

OVERLOAD: <200%
 NO ELECTRICAL DAMAGE: >400%
 ULTIMATE TEMPERATURE EFFECTS: <0.005% /DEG C
 ON ZERO: <0.005% /DEG C
 ON SPAN: -10 TO +70 DEG C
 COMPENSATION RANGE: IP68 FULLY ENCAPSULATED
 SEALING:



DYNO	MM	"B"	INCHES	MM	"X"	INCHES
HRT3	30/32MM	1.2/1.3	16	0.63		
HRT4	30/32MM	1.2/1.3	20	0.78		

NOTE: THE ABOVE IS ONLY APPLICABLE FOR THE 2.2MT BRIDGE BEAM

REV	DATE	DESCRIPTION OF CHANGE	APPR'D	TOL:	DO NOT SCALE DRAWING UNLESS OTHERWISE STATED	DRAWN	APPROVED	PART OF ASSY	PART No:	PROJECT:	SCALE
1.1	05/11/98	REFER TO DR#564	M.O.	X +/- 1 XX +/- 0.2 X:XX AS STATED		M. TURNER	M. OBST				N/A
											SHEET 1 OF 1
											REV 1.1

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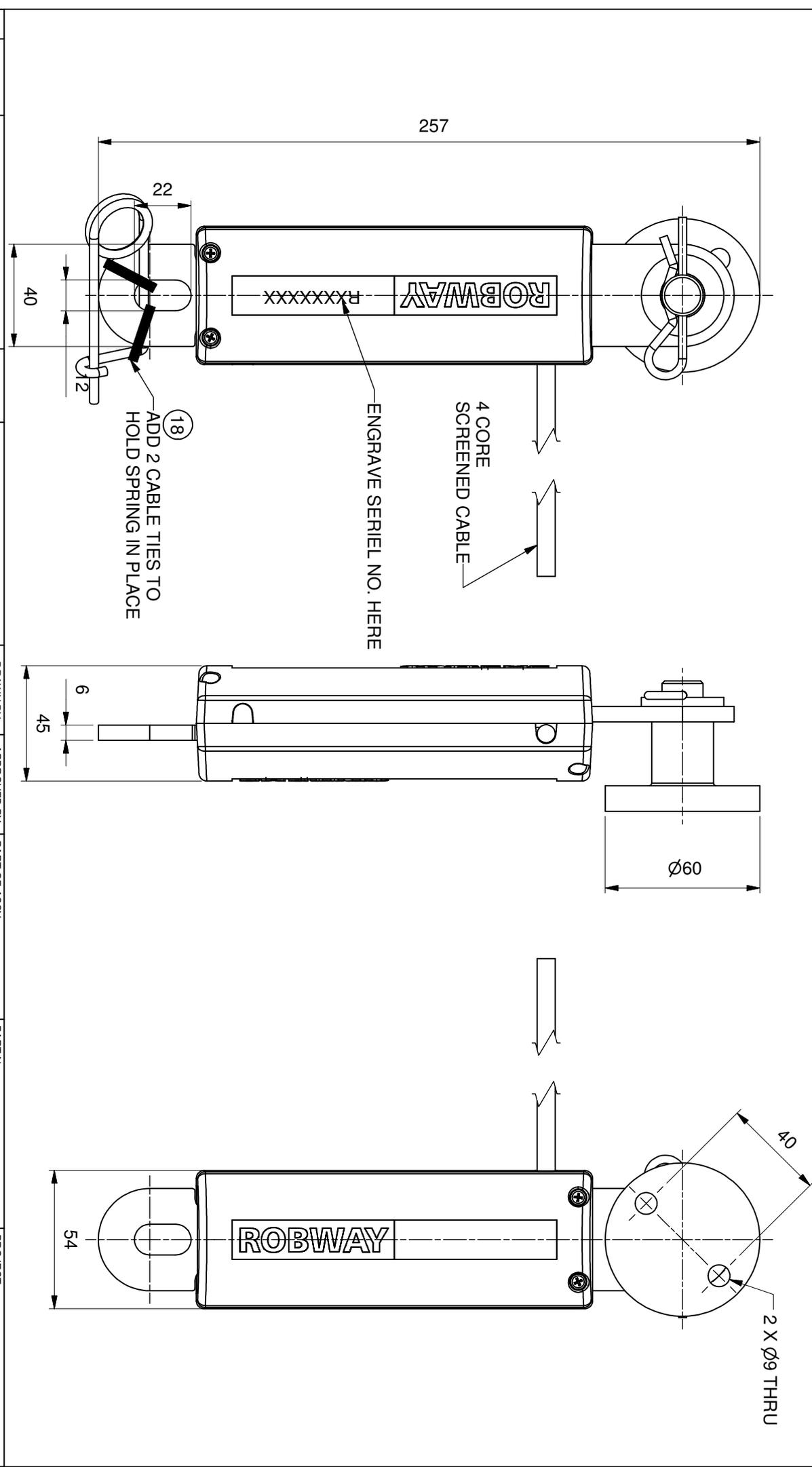
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TITLE: DIMENSIONS FOR 2.2 AND 5MT BRIDGE BEAMS

DRAWING No: DWG 0989 FILE No: 098901AB.DWG



Parts List			DWG No.	PART NUMBER
ITEM	QTY	DESCRIPTION		
18	2	CABLE TIES		TIE200BK



REV	DATE	DESCRIPTION OF CHANGE	APPRV'D
1.1	16/07/10	EXPLORED VIEW ADDED REFER PCR#322	A.A.
1.2	14/01/2011	REFER TO PCR#366	A.A.
1.3	24-1-14	REFER TO ECN 543	J.H

TOL:	X	+/-1
	XX	+/-0.2
	XXX	+/-0.02

DO NOT SCALE DRAWING
UNLESS OTHERWISE STATED

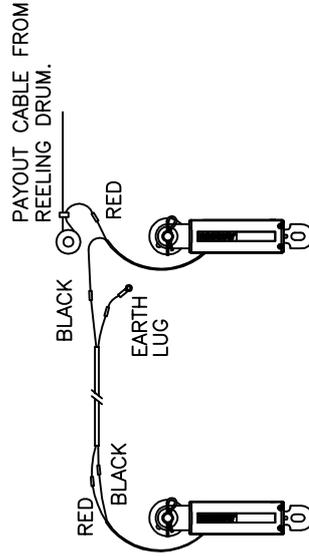
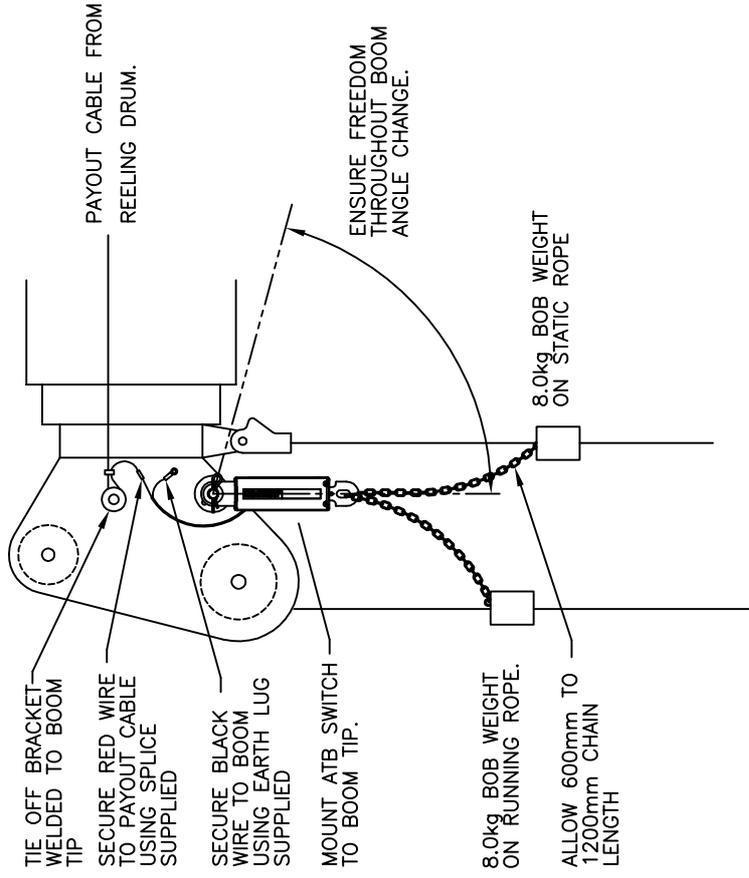
©copyright robway 2005

DRAWN BY	APPROVED BY	PART OF ASSY
S. CHAMBERS	A. CANLAS	-
19/04/2005	19/04/2005	

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PART No.:	PROJECT:
SWIBB5	BB5 ATB SWITCH
TITLE:	SCALE
ASSY, BB5 DIMENSIONAL DETAIL	N/A
DRAWING No.:	SHEET
2934	1 OF 2
FILE No.:	REV
293401AD.idw	1.3

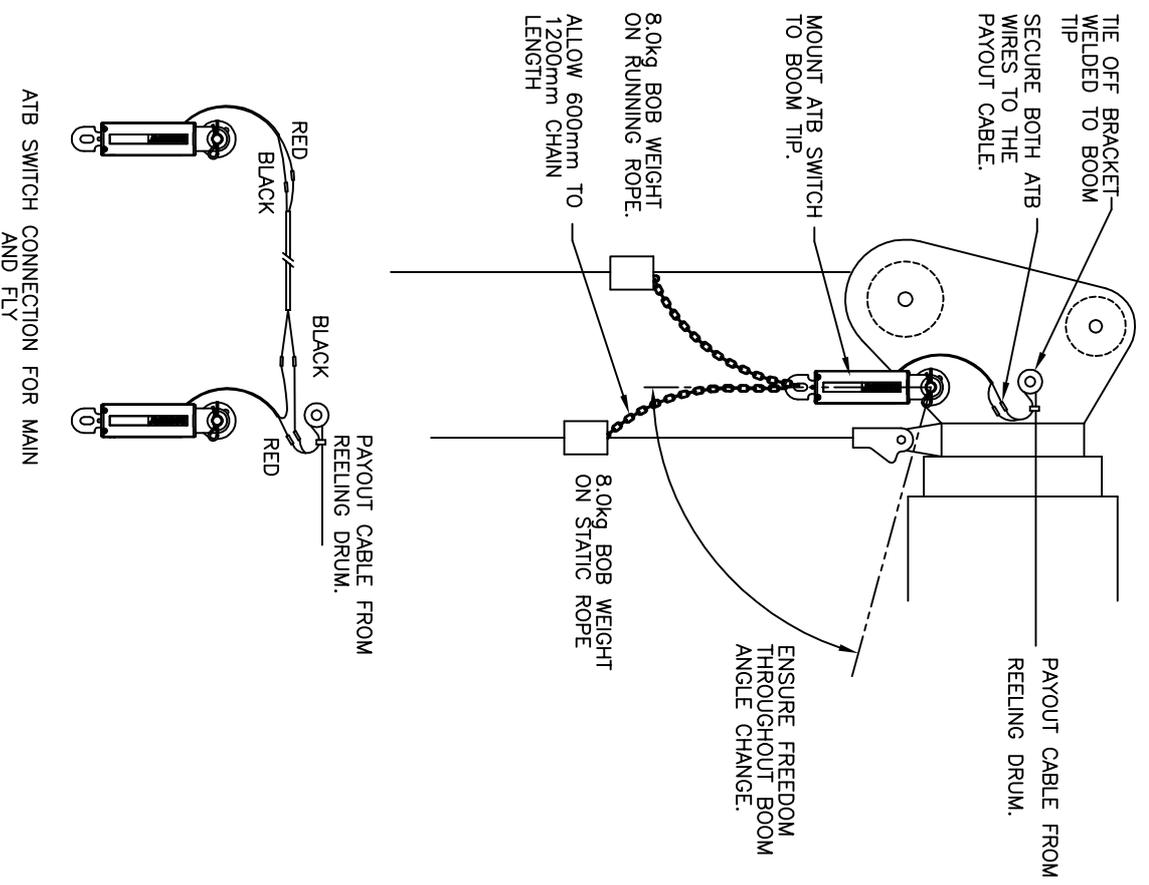
TELESCOPIC BOOM SINGLE CORE PAYOUT CABLE APPLICATION



ATB SWITCH CONNECTION FOR MAIN AND FLY

REV	DATE	DESCRIPTION OF CHANGE	APPR'D	DRAWN	APPROVED	PART OF ASSY	PART No:	PROJECT:
1.1	03/08/05	REFER TO DR#421	A.C.	S. CHAMBERS	A. CANLAS	—	—	—
				10/07/01	10/07/01			
				LSI-ROBWAY 32 WEST THEBARTON RD THEBARTON 5031 SOUTH AUSTRALIA PHONE +61 8 8352 6055 FAX +61 8 8352 1684				
								
				DO NOT SCALE DRAWING ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED				
				TITLE: ATB SWITCH INSTALLATION DETAILS				
				DRAWING No: DWG_0667				
				FILE No: 066701AB.DWG				
				SCALE N/A				
				SHEET 1 OF 3				
				REV 1.1				

TELESCOPIC BOOM TWO CORE PAYOUT CABLE APPLICATION

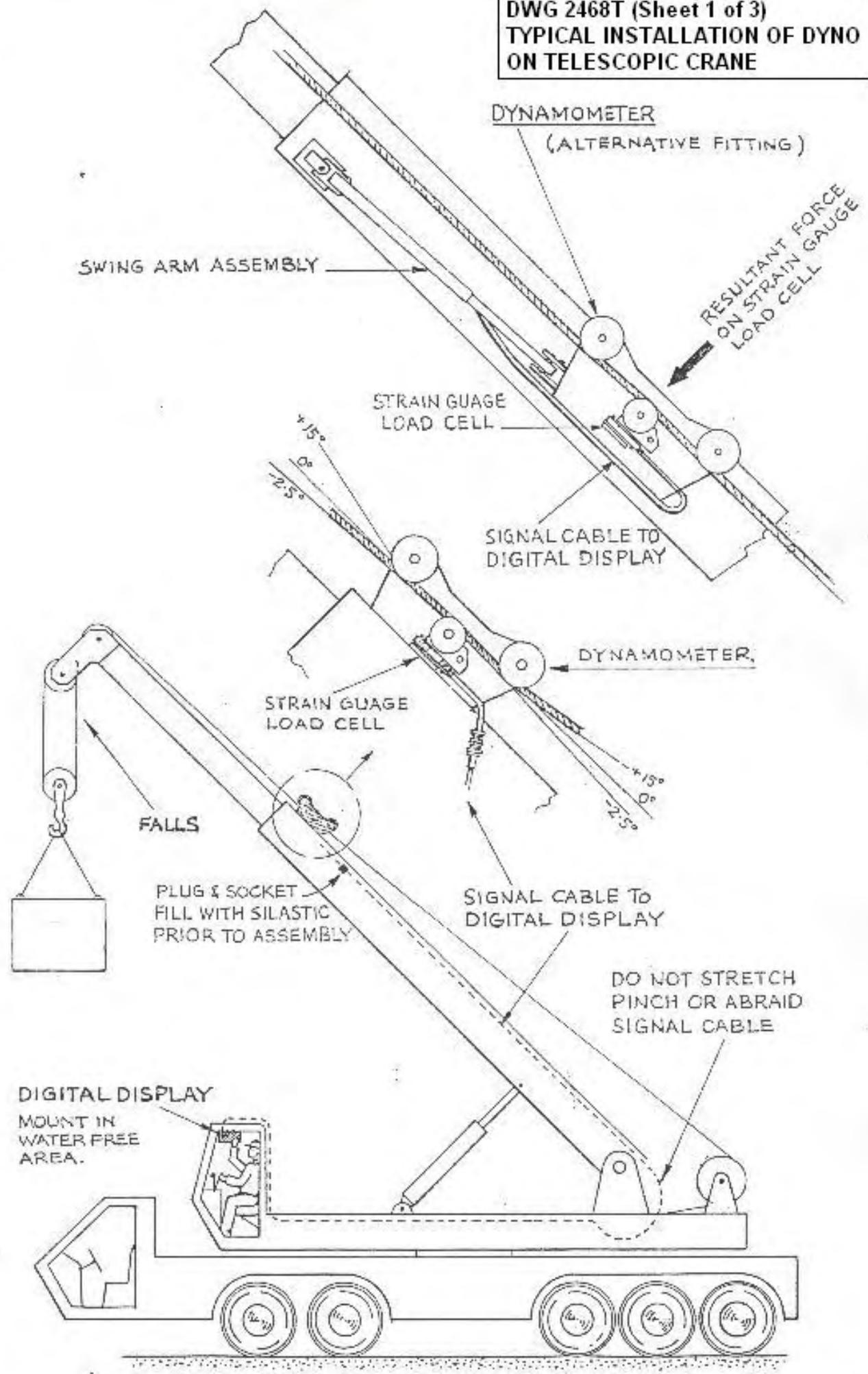


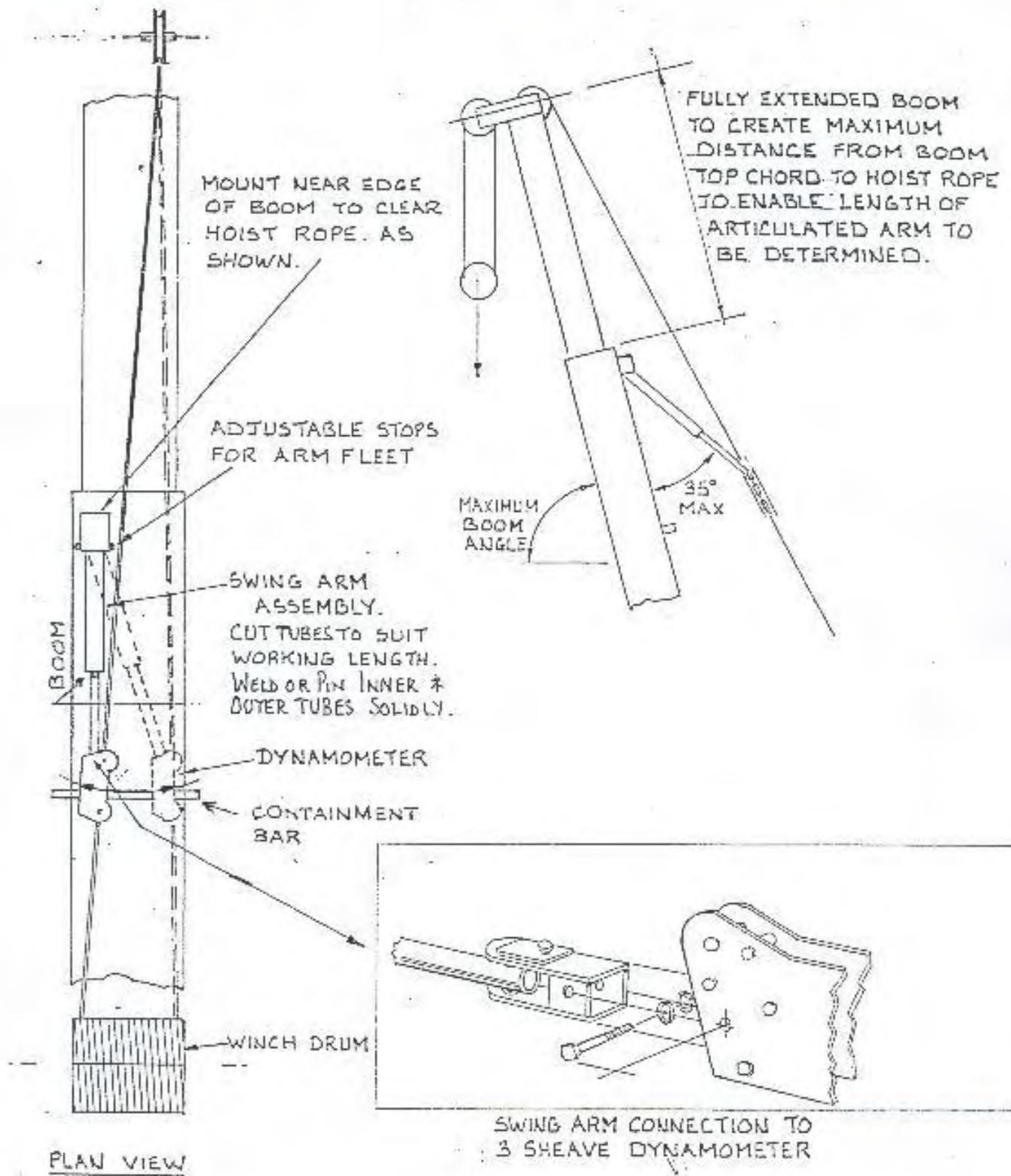
REV	DATE	DESCRIPTION OF CHANGE	APP'R'D	TOL: X XX X:XX	+/- 1 +/- 0.2 AS STATED	DO NOT SCALE DRAWING UNLESS OTHERWISE STATED	DRAWN	APPROVED	PART OF ASSY	PART No:	PROJECT:	SCALE
1.1	03/08/05	REFER TO DR#421	A.C.				S. CHAMBERS	A. CANLAS	-	-	-	N/A
							10/07/01	10/07/01		ATB SWITCH	ATB SWITCH	SHEET
										INSTALLATION DETAILS	INSTALLATION DETAILS	2 OF 3
												REV
												1.1

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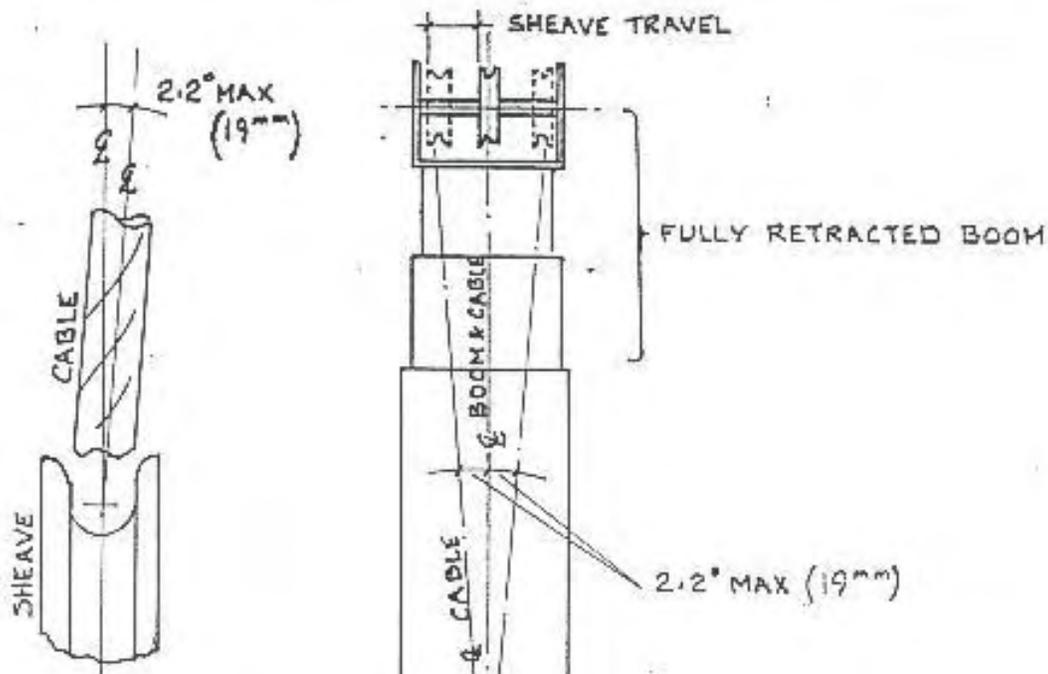
DRAWING No: DWG 0667
 FILE No: 066701AB.DWG

DWG 2468T (Sheet 1 of 3)
TYPICAL INSTALLATION OF DYNO
ON TELESCOPIC CRANE

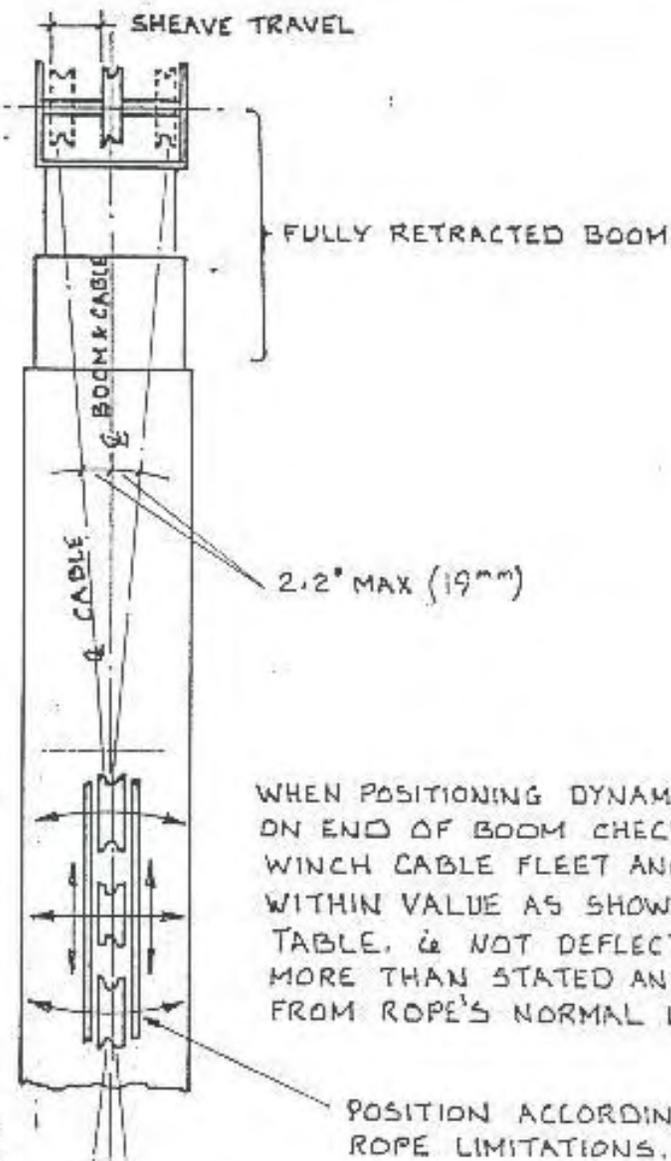




DWG 2468T (Sheet 2 of 3)
TYPICAL INSTALLATION OF DYNO
ON TELESCOPIC CRANE

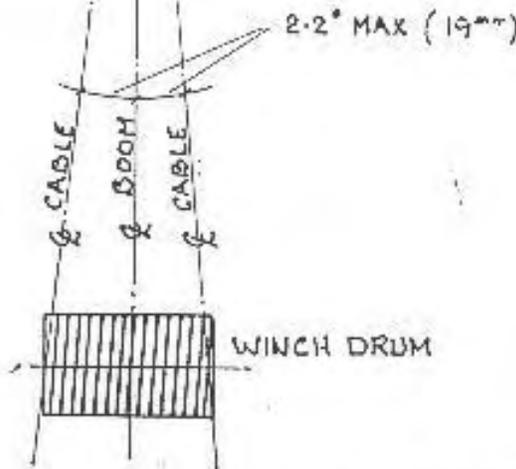


1. REFERED ANGLES OF THIS DRAWING ARE FOR 19mm ROPE . REFER TO TABLE BELOW FOR ALTERNATIVE ROPE DIAMETERS.
2. ϕ OF DYNAMOMETER DOES NOT HAVE TO BE ONE OF BOOM
3. IF FLEET ANGLES CANNOT BE KEPT WITHIN THE PRESCRIBED TOLERANCES THEN THE ARTICULATED ARM DESCRIBED IN THIS MANUAL SHOULD BE FITTED



WHEN POSITIONING DYNAMOMETER ON END OF BOOM CHECK THAT WINCH CABLE FLEET ANGLE IS WITHIN VALUE AS SHOWN IN TABLE. ϕ NOT DEFLECTED MORE THAN STATED ANGLE FROM ROPE'S NORMAL LINE.

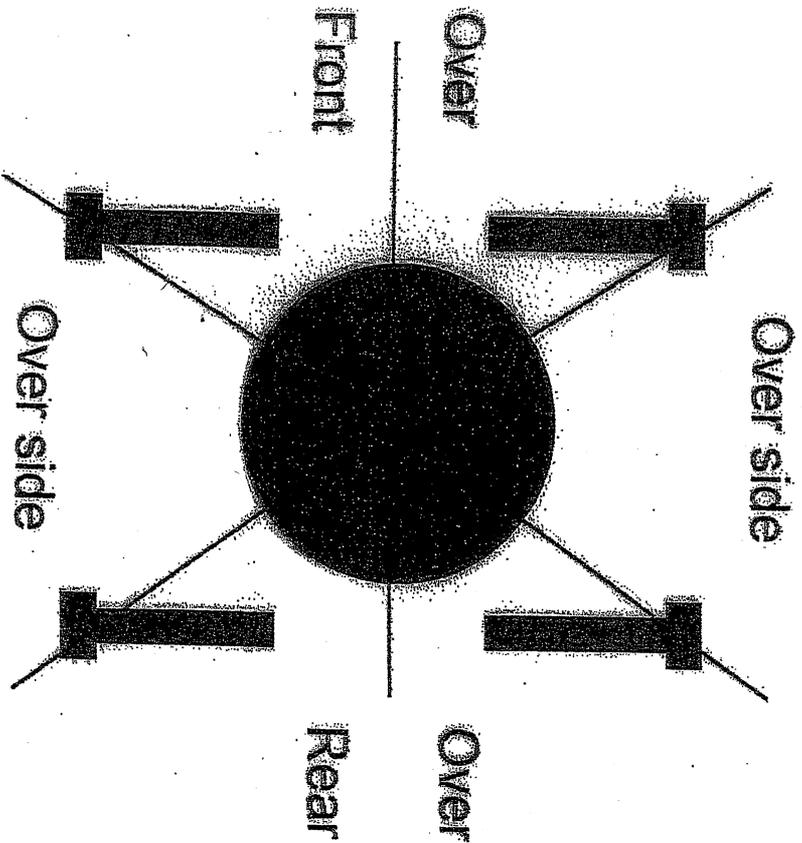
ROPE	FLEET ANGLE
13mm	4.7°
14.5mm	4.2°
16mm	3.7°
19mm	2.2°
20mm	1.8°
25mm	1.2°
28mm	1.1°
32mm	1.0°



PLAN VIEW

DWG 2468T (Sheet 3 of 3)
TYPICAL INSTALLATION OF DYNO
ON TELESCOPIC CRANE

Typical Slew/Proximity Switch Application



Switch 1 ———●———●——— opens
when over-front

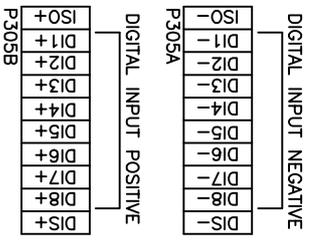
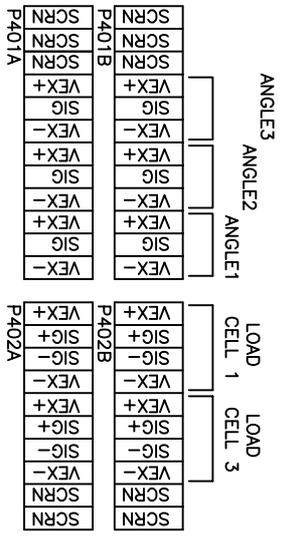
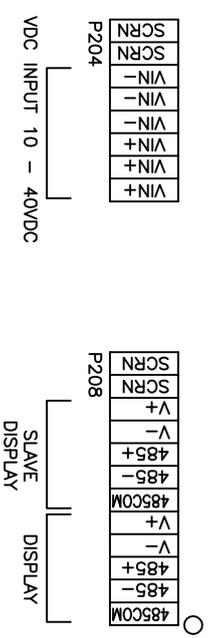
Switch 2 ———●———●——— opens
when over-side

Therefore a truth table is:

sw1	sw2	condition
c	c	over-rear
c	o	over-side
o	o	over-front
broken cables over-front, least capacity.		

SERVICE DRAWINGS

**The following drawings are mainly electrical connection diagrams
inside the RCI-1550 Control Unit for service reference only.**



LENGTH1
LENGTH2
LENGTH3

REV	DATE	DESCRIPTION OF CHANGE	APPR'D	TOL.	DRAWN	APPROVED	PART OF ASSY	PART No:	PROJECT:	SCALE
1.1	31/05/01	REFER TO DR#800	A. C.	X +/- 1	D. PLANTHABER	D. PLANTHABER	-	RCI-1550	RCI-1550	N/A
1.2	24/01/03	REFER TO PR#132	A. C.	XX +/- 0.2	02/09/99	22/06/00		RCI 1550 ELECTRICAL CONNECTIONS		SHEET
1.3	12/07/04	REFER TO DR#264	G. C.	XXX AS STATED						1 OF 3
1.4	17/01/06	REFER TO DR#443	A. C.							REV
										1.4

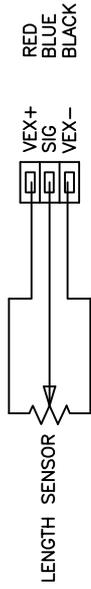
DD NOT SCALE DRAWING
UNLESS OTHERWISE STATED



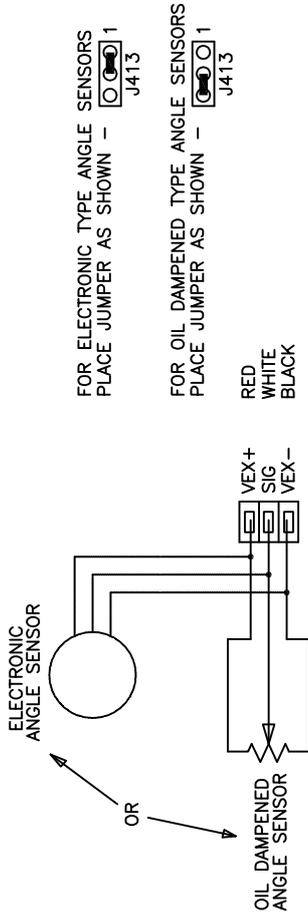
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DRAWING No: DWG 2078
FILE No: 207801AE.DWG

LENGTH



ANGLE



NOTE: ONLY ONE TYPE OF ANGLE SENSOR CAN BE USED PER CONTROLLER.

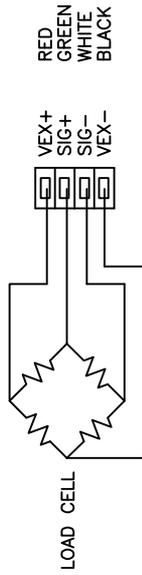
GAIN ADJUSTMENT



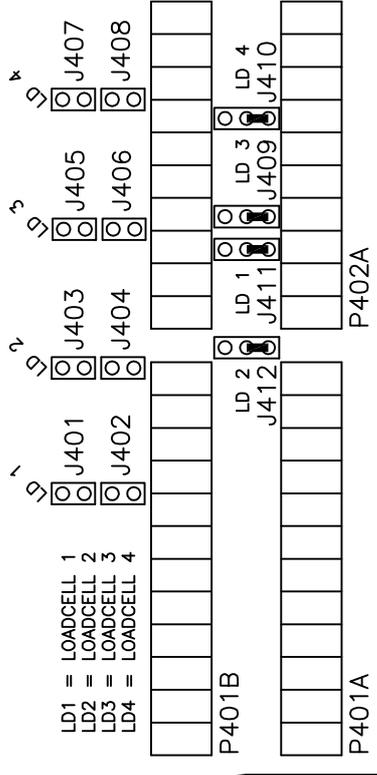
VR401 = 4-20mA GAIN ADJUST
 VR402 = 3mV/V GAIN ADJUST
 VR403 = 2mV/V GAIN ADJUST
 VR404 = 1mV/V GAIN ADJUST

THESE ADJUSTMENTS ARE TO BE MADE BY ROBWAY AUTHORIZED PERSONNEL ONLY

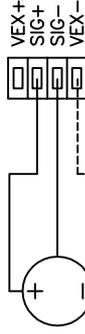
LOAD



FOR VOLTAGE TYPE SENSORS (mV/V)
 PLACE JUMPERS AS FOLLOWS -

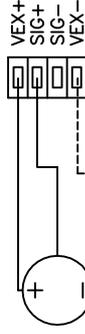


"ACTIVE" 4-20mA TRANSDUCER



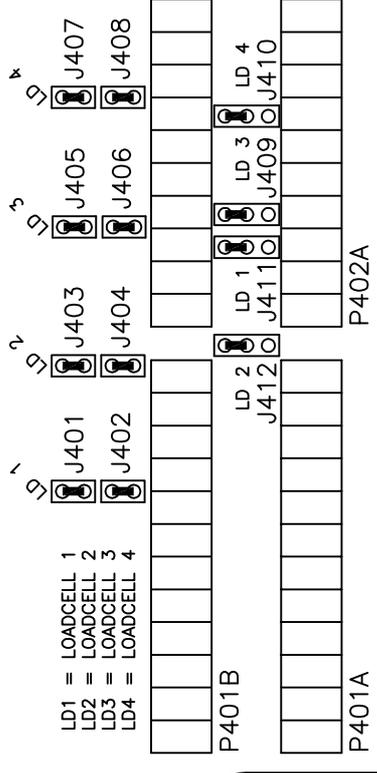
(IF 3 WIRE, VEX- IS NOMINAL GROUND)

"PASSIVE" 4-20mA TRANSDUCER



(IF 3 WIRE, VEX- IS NOMINAL GROUND)

FOR CURRENT TYPE SENSORS (4-20mA)
 PLACE JUMPERS AS FOLLOWS -



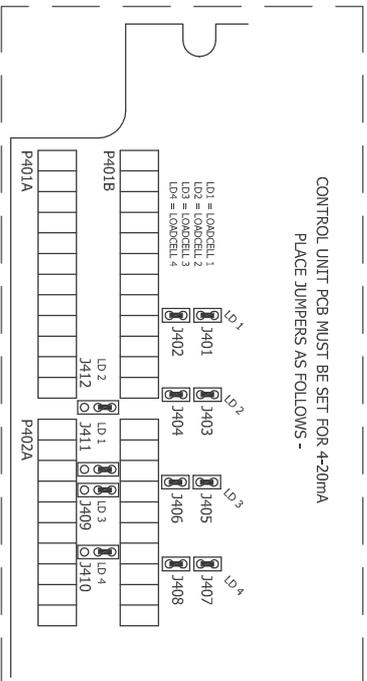
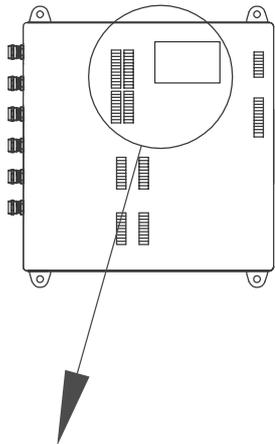
REV	DATE	DESCRIPTION OF CHANGE	APPR'D	TOL	X	+/- 1	XX	+/- 0.2	XXX	AS STATED
1.1	31/05/01	REFER TO DR#800	A. C.							
1.2	24/01/03	REFER TO PR#132	A. C.							
1.3	12/07/04	REFER TO DR#264	G. C.							
1.4	17/01/06	REFER TO DR#443	A. C.							

DRAWN		APPROVED		PART OF ASSY		PROJECT:	
D. PLANTHABER		D. PLANTHABER		-		RCI-1550	
02/09/99		22/06/00		-		TITLE:	
						RCI 1550 ELECTRICAL CONNECTIONS	
				DRAWING No:		FILE No:	
				DWG 2078		207801AE.DWG	
				SCALE		SHEET	
				N/A		2 OF 3	
				REV		1.4	

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(TRAPP642FA) 4-20mA/A ANALOGUE SENSOR WIRING



CONTROL UNIT PCB MUST BE SET FOR 4-20mA
PLACE JUMPERS AS FOLLOWS -

4-20mA TRANSDUCER 3

4-20mA TRANSDUCER 1 (FORCE)

LENGTH 1/ANGLE 1/ATB

ANGLE 2
AS REQUIRED PER APPLICATION

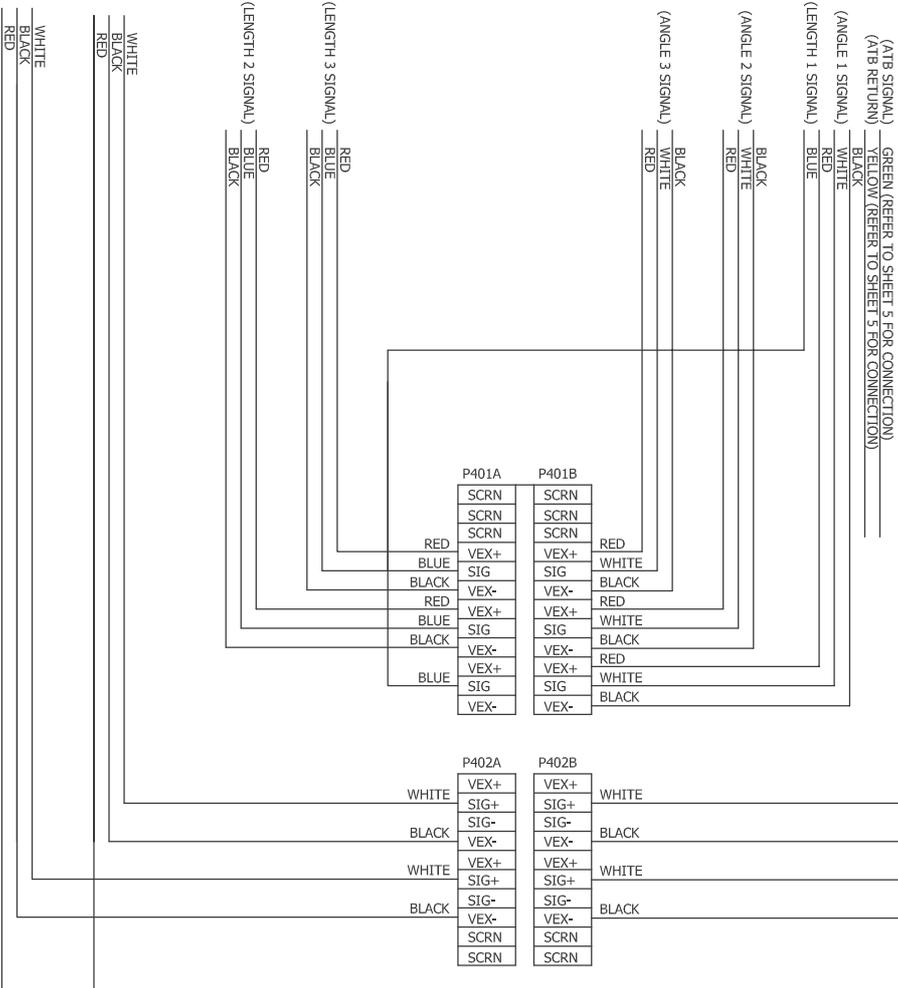
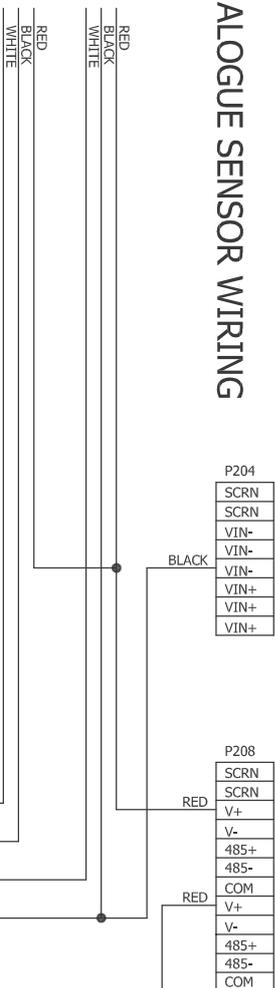
ANGLE 3
AS REQUIRED PER APPLICATION

LENGTH 3
AS REQUIRED PER APPLICATION

LENGTH 2
AS REQUIRED PER APPLICATION

4-20mA TRANSDUCER 2 (ROD)

4-20mA TRANSDUCER 4



REV	DATE	DESCRIPTION OF CHANGE	APPRD
1.2	30/05/01	REFER TO DR#799	A.C
1.3	19/06/01	REFER TO DR#805	A.C
1.4	03/03/03	REFER TO DR#137	G.H
1.5	10/02/06	ADD 4-20mA WIRING DETAIL	S.C
1.6	23/08/07	REFER TO PQR#31	J.K
1.7	31/12/2010	REFER TO PQR#359	-

DRAWN	APPROVED	PART OF ASSY
S.CHAMBERS	D.PLANTHABER	-
08/02/01	12/02/01	

TITLE:	PROJECT:	SCALE
STANDAND WIRING DIAGRAM FOR TELESCOPIC BOOM CRANES	RCI-1550 CONTROLLER	N/A
DRAWING No: 2354	FILE No: 235401AH.DWG	SHEET 3 OF 5
		REV 1.7

TOL: X, +/-1
XX, +/-0.2
X,XX AS STATED

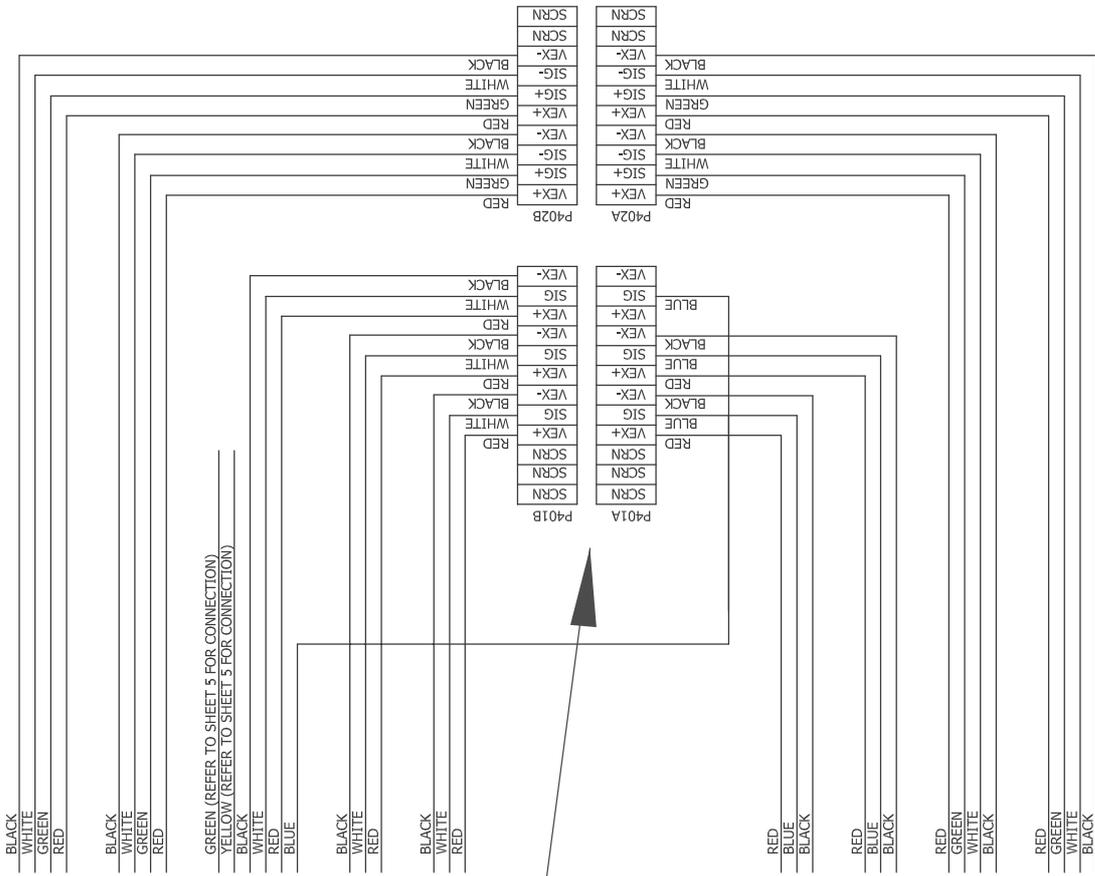
DRAFTING STANDARD: AS1100

DO NOT SCALE DRAWING
UNLESS OTHERWISE STATED

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mV/V ANALOGUE SENSOR WIRING



LOAD SENSOR 3
AS REQUIRED PER APPLICATION
(FOR 4-20ma SEE SHEET 3 & 4)

LOAD SENSOR 1 (MAIN LOAD)
(FOR 4-20ma SEE SHEET 3 & 4)

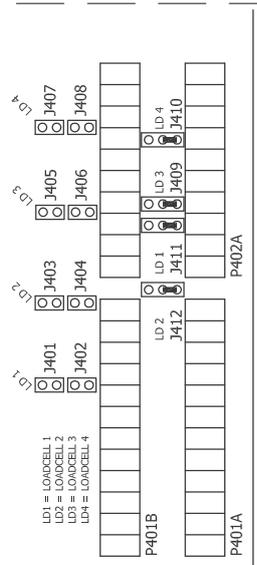
(ATB SIGNAL)
(ATB RETURN)
(ANGLE 1 SIGNAL)
(LENGTH 1 SIGNAL)

LENGTH 1/ANGLE 1/ATB

ANGLE 2
AS REQUIRED PER APPLICATION

ANGLE 3
AS REQUIRED PER APPLICATION

CONTROL UNIT PCB MUST BE SET FOR mV/V
PLACE JUMPERS AS FOLLOWS -

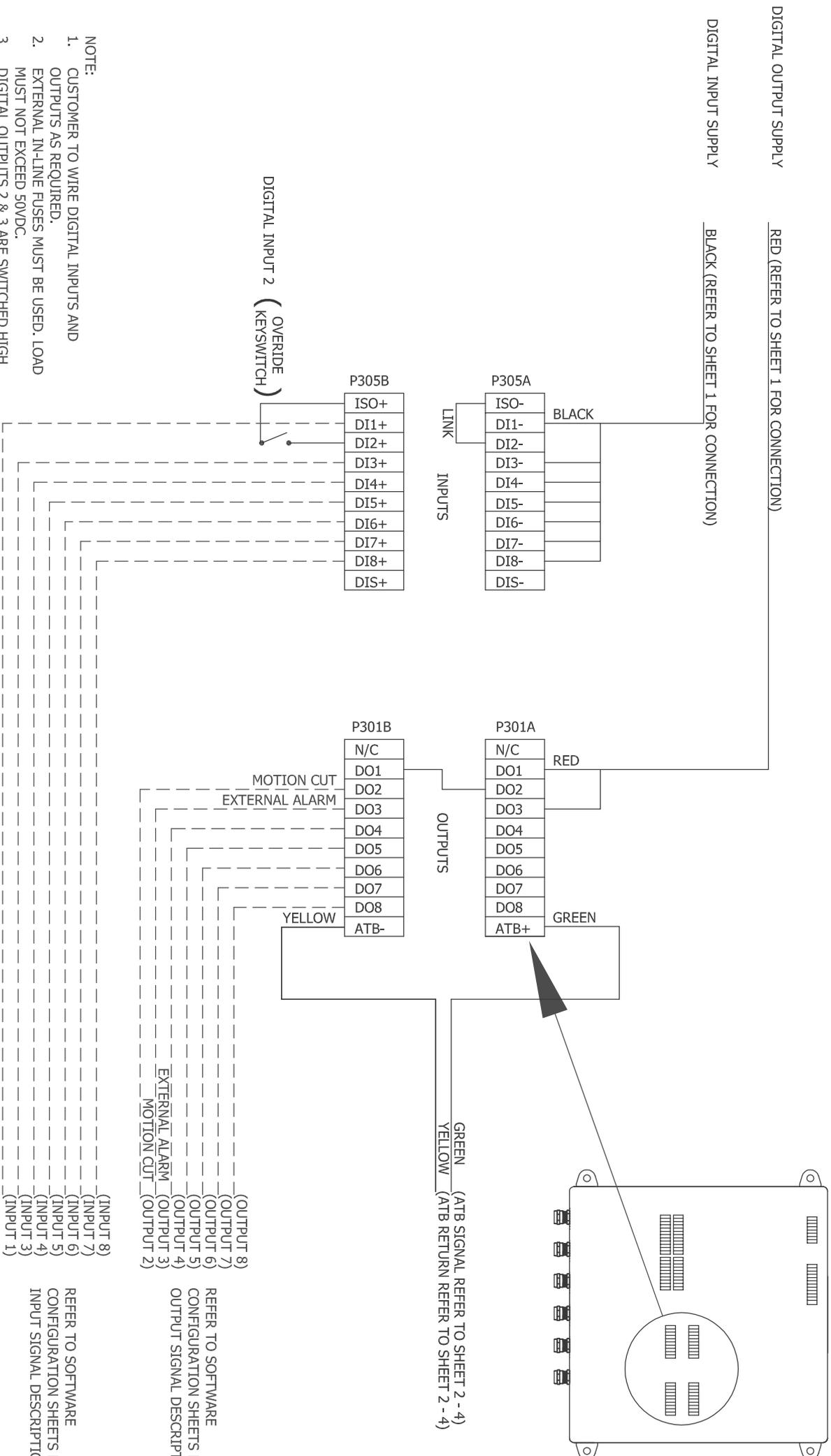


REV	DATE	DESCRIPTION OF CHANGE	APPRD	TOL:	DRAWN	APPROVED	PART OF ASSY	PART NO.:	PROJECT:
1.2	30/05/01	REFER TO DR#799	A.C	X: +/- 1	S.CHAMBERS	D.PLANTHABER	-	-	RCI-1550 CONTROLLER
1.3	19/06/01	REFER TO DR#805	A.C	X.X +/- 0.2	08/02/01	12/02/01	-	-	STANDAND WIRING DIAGRAM FOR
1.4	03/03/03	REFER TO DR#137	G.H	X.XX AS STATED					TELESCOPIC BOOM CRANES
1.5	10/02/06	ADD 4-20ma WIRING DETAIL	S.C	DRAFTING STANDARD: AS1100					
1.6	23/08/07	REFER TO PCR#31	J.K	DO NOT SCALE DRAWING ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED					
1.7	3/12/2010	REFER TO PCR#359	-						
								DRAWING No:	2354
								FILE No:	235401AH.DWG
								SCALE	N/A
								SHEET	2 OF 5
								REV	1.7



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DIGITAL INPUT/OUTPUT WIRING



- NOTE:
1. CUSTOMER TO WIRE DIGITAL INPUTS AND OUTPUTS AS REQUIRED.
 2. EXTERNAL IN-LINE FUSES MUST BE USED. LOAD MUST NOT EXCEED 50VDC.
 3. DIGITAL OUTPUTS 2 & 3 ARE SWITCHED HIGH AS STANDARD.

REV	DATE	DESCRIPTION OF CHANGE	APPRD	TOL:	DRAWN	APPROVED	PART OF ASSY	PART NO.:	PROJECT:	SCALE
1.2	30/05/01	REFER TO DR#799	A.C	X X.X X.XX	S.CHAMBERS	D.P.LANTHABER	-	-	RCI-1550 CONTROLLER	N/A
1.3	19/06/01	REFER TO DR#805	A.C							
1.4	03/03/03	REFER TO DR#137	G.H							
1.5	10/02/06	ADD 4-20mA WIRING DETAIL	S.C							
1.6	23/08/07	REFER TO PQR#31	J.K							
1.7	3/12/2010	REFER TO PQR#359	-							

DRAFTING STANDARD: AS1100		DO NOT SCALE DRAWING UNLESS OTHERWISE STATED	
TOL: X, X.X, X.XX		+/- 1, +/- 0.2 AS STATED	
DRAWN: S.CHAMBERS		APPROVED: D.P.LANTHABER	
08/02/01		12/02/01	
32 West Thebarton Rd THEBAROTON SOUTH AUSTRALIA 5031		PH: +61 8 8238 3500	
www.lsirobway.com.au		PH: +61 8 8238 3500	
FX: +61 8 8352 1684		FX: +61 8 8352 1684	
DRAWING No: 2354		FILE No: 235401AH.DWG	
TITLE: STANDAND WIRING DIAGRAM FOR TELESCOPIC BOOM CRANES		SHEET 5 OF 5	
REV 1.7		REV 1.7	