RCI-1550XV LATTICE BOOM SYSTEM
Instruction Manual

Make	
Model	
Serial Number	
Crane Type	
Hoist ropes	
WA	

MAN-1119 Rev C

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CONTENTS

1. Important Safety Notice

 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 LSI Robway by either the crane manufacturer or crane owner (or their representatives). LSI 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 LSI Robway system to match crane setup and working configuration.

 Warning	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. Brand names, Tradenames and Trademarks.

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 LSI 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 LSI 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 LSI Robway must first satisfy themselves to their suitability and that neither personnel safety nor equipment safety will be jeopardised by the selected method.

2.3. Limited Product Warranty

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

Any LSI Robway product that has been repaired or altered in such a way, in LSI Robway'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 LSI ROBWAY in regard to any partial or full warranty claim.

LSI Robway's obligation under this warranty is limited to repairing or, at LSI Robway's option, replacement of faulty parts. Any associated transportation or labour costs (other than those directly acceptable by LSI Robway and consumed at LSI Robway 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 LSI Robway 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 LSI Robway.

2.4. Glossary of some used terms

Used in Manual	Alternative	Description
Tensiometer	Line rider	Measures hoist rope line-pull
Boom Angle sensor	BAS	Measures angle to horizon
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-1550XVXV Crane Rated Capacity Indicator system manufactured by LSI Robway suitable for installation to a lattice boom crane.

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 LSI ROBWAY or familiar with LSI ROBWAY 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

The RCI-1550XVXV is designed to suit Lattice Boom Cranes of either mobile or fixed installation.

This manual covers the use of tension based (line rider/load pin/tension cell) based sensors and calibration refer to cranes where the load sensors are fitted to directly monitor the hook hoist line-pull.

4.2. Purpose

The RCI-1550XVXV automatic Rated Capacity Indicator (RCI) is designed to assist the operator in the course of normal crane operation and consists of boom angle, 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-1550XVXV display provides the following capabilities:

- Suitable for mobile, crawler and fixed type lattice-boom or telescopic-boom cranes, load-moment or tensiometer (line-rider) sensor based,
- Multi-hoisting winch operation,
- Provides monitoring and display of;
  - Lifted load,
  - Current RC,
  - Lifted load as a percentage of current RC,
  - Boom Length,
  - Boom Angle & Luffing fly jib Angle (as applicable)
  - Radius,
  - Boom Tip Height,
  - Selected Hook and Falls,
  - Selected Crane configuration,
  - Crane configured Rated Capacity (RC),
  - Restricted Slew zones, and
  - Wind speed.

- 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 RC percentage,
- Multi-line text character window to display messages,
- Built-in calibration and fault-finding tools.

4.4. Available Options

- Options for
  - Continuous monitoring of slew-zone using slew encoder
  - Hook height
  - Special alarms
  - On-site configurable user data,
  - Data-logging.

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

5. INSTALLATION - GENERAL

5.1. Setting Up the Crane

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

 Warning	**High tensile booms require proper welding procedure specifications. Obtain specialist assistance in these cases.**
 Information	**Please refer to the General Arrangement drawings at the rear of the manual for an overview of the configuration.**

5.2. Angle Sensors

Fix the Boom Angle Sensor mounting plate orientated to the RHS side of the boom in a convenient position close to the operator's cab by bolting/welding the mounting bracket provided (vertical and parallel) to the boom centre-line with the electrical connection to the bottom.

It is usual to mount the Boom Angle Sensor to the ‘inside’ of the LHS boom butt section, this provides more mechanical protection but maintains RHS orientation.

 Note	**Ensure the ‘arrow label’ on the top of the BAS points to the boom tip.**

Mount the Boom Angle Sensor on the bolts and route the cable carefully around the boom pivot to the cab. Note that the 'stick-on' arrow label faces towards the boom tip. 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.

5.3. Anti-Two-Block (if installed)

5.3.1. 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.

5.3.2. 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.

5.3.3. 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.

5.3.4. 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.

5.4. Load Sensors

5.4.1. Overview

Tension based systems directly sense the line-pull generated to lift the load. Sensors can be dynamometers/tensiometers (line-riders, either multi sheave using beam cells or single sheave using load pins) or tension plate type load-cells fitted into the dead-end of the hoist reeving. Load-pin type load-cells may also be used at the dead-end termination fitting or.

 Note	**Load sensors can be combinations of;** **Dynamometers/Tensiometers (line-riders) using beam cells or load pins,** **Tension load-cells,** **Load-pins.**

5.4.2. Tensiometers (line-riders)

5.4.2.1. Lattice Boom cranes

For cranes without fly-jibs, the dynamometers/tensiometers are usually rigidly mounted on the boom tip section. Fabricated brackets may be required to attach the tensiometer to the boom top and align it to the hoist rope. Consult layout drawings at the rear of this manual for more detail.

For cranes with fly jibs, the fly-jib mast aux winch idler sheave necessitates using an articulating arm mounting to allow the tensiometer to follow the aux rope natural line over the mast idler sheave. Alternatively, the tensiometer may be mounted on the fly-jib tip section, or, off the boom butt section using an articulating arm if the aux and main winches are side by side. 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, the RCI-1550XVXV will then convert this into hook-load weight in tons. Correctly following the calibration procedures is essential for accurately determining the hook load weight

5.4.3. Tension Load-line Plate Type Load-cell

A dead-end tension plate type load-cell may be fitted into the attachment of the hoist rope at the termination socket at the boom tip to sense the load-line line-pull.

LSI Robway specified 'safety plates' must be fitted to the tension plate-cell before using in sub-zero temperatures. *(Usually supplied ex stock from LSI Robway)*.

Any specially prepared safety plates should provide for the existing rope wedge socket and pin to be re-used.

 Important	Cranes working in Sub-zero temperatures MUST have overload plates. LSI Robway safety-plates are designed to allow the plate load-cell to react to the imposed forces but, should a failure in the load-cell occur, then the forces will be supported by the overload plates. LSI Robway designed Safety-plates use high alloy steel to minimise weight. LSI Robway stock various sizes and types to assist with a variety of cranes. LSI LSI ROBWAY can supply specific adaptors if dimensions are provided. **The safety-plate assembly may require modification to fit the rope fittings unless fitting knowledge was provided prior to system dispatch.** The Safety-Plate assembly is fabricated from Bisalloy 80 (Sumiten 80) plate and the pins are 4140-grade materials. If safety-plate modifications are performed ensure they meet sound engineering practice and the end product provides the minimum required structural safety factors.

5.5. 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.

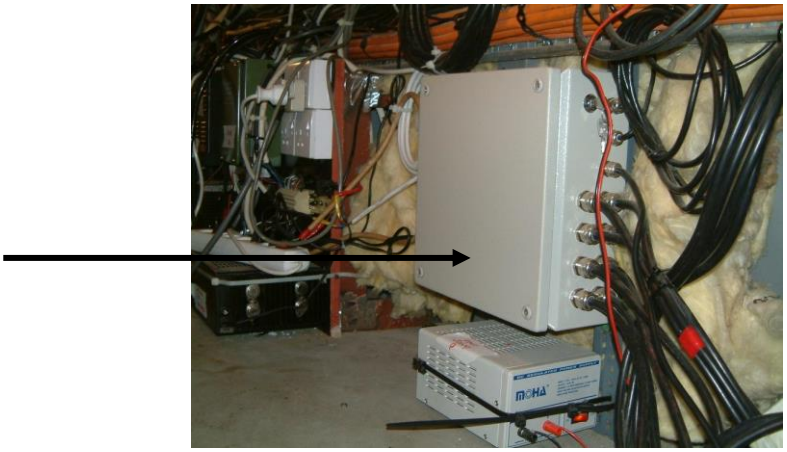
The gland types used are designed to trap the braid or screen (or armour in certain applications) within the braid for maximum EMI protection. Failure to terminate the screens in the glands will void the Electro Magnetic Compatibility (EMC) compliance which the system carries and will put the unit at 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.

5.6. Display Unit

Fit the RCI-1550XV 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.**

5.7. Control Unit



The Control Unit (CU) contains the termination points for all modules within the RCI-1550XV system. It also contains all the user interfaces, signal conditioning and processing circuitry required to satisfy the RCI 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.**

5.7.1. Power Supply (PS)

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

The RCI-1550XVXV internal power supply is a 16W, triple output isolated power supply. The input connector (P204) has three terminals for each of the supply positive (V+); and supply negative (V-), allowing for looping if required.

The output connector (P208) 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.

5.7.1.1. Specifications

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

5.7.1.2. 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.

5.7.2. 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.

5.7.2.1. 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:	2MB Flash.
RS-232:	9600 baud (8N1)
RS-485:	19,200 baud. (8N1)
On-board ADC:	10 bit

5.7.3. Analog Input Section

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

5.7.3.1. 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.

5.7.3.2. Load Cell Inputs

The analog input section is capable of accepting load cells with sensitivities of 1, 2, 3mV/V or 4-20mA. Load cells of different sensitivities can be used on the one RCI-1550XV at the one time. The gain setting is controlled via software.

5.7.3.3. Angle Inputs

Either oil damped or electronic inclinometers can be connected to the RCI-1550XV'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.

5.7.4. 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 switched 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 and software configuration sheet 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.

5.7.4.1. I/O Connections

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

5.7.4.2. Inputs

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. Note that digital inputs are normally pre-wired with negative inputs connected to RCI-1550XVXV negative supply.

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.

5.7.4.3. 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 a fully isolated from each other this allows some outputs to switch high and others to switch low.
Note that digital outputs (except external lights) are normally pre-wired with one side connected to RCI-1550XVXV positive supply.

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

5.7.4.4. Snubber diode protection to crane fitted solenoids or relays

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

5.7.4.5. 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 (i.e. Motion Cut) and another to fault to an on position (i.e. 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.

5.7.4.6. Specifications

Relay Outputs:	5 ampere @ 30 VDC
Switched Inputs:	Input current approx. 6mA @ 24V DC

5.7.4.7. 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 (i.e. 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-ridden. 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 (i.e. closed contacts) when the external switch is closed.

5.7.4.8. Slew Zone Switch(es) input(s)

Fit slew 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.**

5.7.4.9. Motion Cut

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

5.7.4.10. Connections

 Warning	**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 LSI 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.**

5.7.4.11. 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 2 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.

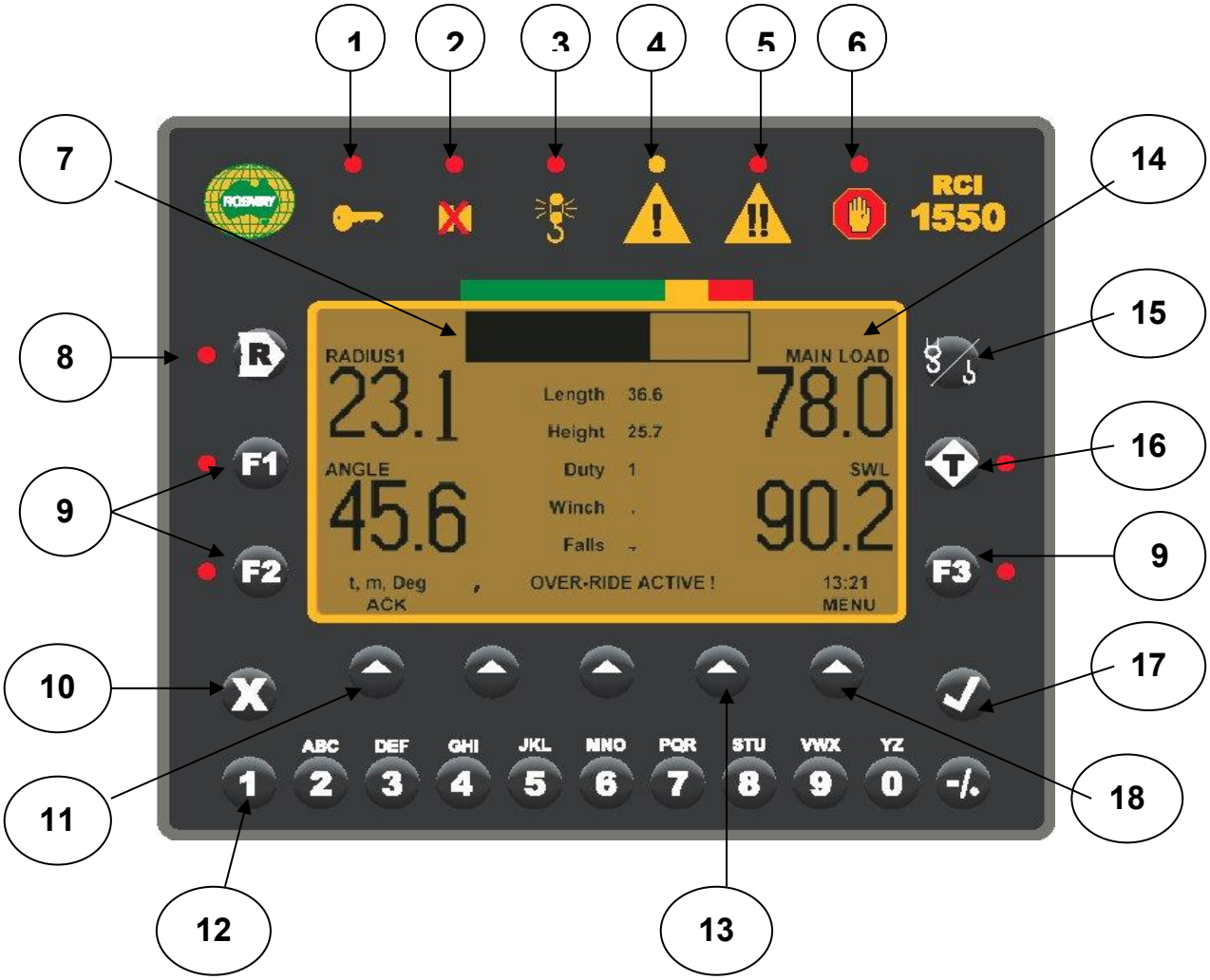
 Important	**The switch wiring requires a "voltage free" connection. Never connect the switch wiring into any other system/wiring loom unless the exact nature of the connection is known.**

5.8. Upgrading to RCI-1550XV from earlier LSI Robway model displays

The RCI-1550XV display/controller utilises the same sensors as used on other RCI series systems. The RCI-1550XV can be configured for either negative or positive type outputs.

6. OPERATING INSTRUCTIONS

6.1. The LCD Display



1. Over-ride active indicator

2. Audible alarm disabled LED

3. Two Block Indicator

4. Approach to rated capacity LED

5. 100% capacity exceeded LED

6. Motion Cut activated LED

7. Bar Graph: - % of rated capacity

8. Rigging mode button

9. Function Buttons: - refer manual

10. Cancel button

11. Soft menu buttons: - refer manual

12. Alpha-numeric buttons: refer manual

13. “Up” button when Menu selected: - see also 18

14. LCD Display: - refer manual

15. Winch Select Button

16. Tare on/off button

17. OK or accept button

18. MENU button (also “Down” button when MENU selected - see 13

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

6.1.2. RC

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

6.1.3. Length

This is the current TOTAL boom length as selected from the Crane Duty Listing provided for each System. TOTAL boom length includes any attachment/s as specified by the current crane configuration duty.

6.1.4. Angle

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

6.1.5. Radius

Shows the operating radius for the CURRENT CONFIGURATION and DUTY and WINCH selection. The radius is calculated from the Boom Angle sensor(s), selected boom length with compensation applied to include, slew offset distance, head sheave radius and boom deflection.

6.1.6. 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-1550XV 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 RC for the current crane configuration the RCI-1550XV will activate audible and visual alarms.

6.1.6.1. Hook Load selection

MAIN WINCH SELECTED #1	**AUX. WINCH SELECTED #2**
Main load displayed Main RC displayed Main falls displayed	Aux. Load displayed Aux. RC displayed Aux. falls displayed
Note: #3 winch selection is reserved for cranes with 3 hook winches.	**PROGRAMME REVIEWS AT ALL TIMES**
	Main load - Main RC Main line pull Aux. load - Aux. RC Aux. line pull

6.1.7. Error Codes

Additionally, the 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.

6.2. 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.

6.2.1. 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 software configuration and function code documents.

6.2.2. 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

6.2.3. 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.

6.2.4. Ok (√) key

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

6.2.5. Cancel (x) Key

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

6.2.6. Tare Key

The RCI-1550XV 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 %RC is still determined by the total load, irrespective of what is currently displayed. All tared weights are removed on system start-up.

6.2.7. 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.

- General Rigging mode, where motion-cut is over-ridden (if fitted) to luff down and hook up. 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.

- 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 of time. This mode is intended to allow the operator to over-ride the display in special circumstances (e.g. 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	LSI ROBWAY recommends that the over-ride key-switch be switched off (i.e., normal position) at all times and the over-ride key held by the site-supervisor.

6.3. LED Indicators

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

6.3.1. 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.

6.3.2. 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.

6.3.3. ATB Indicator (anti-two-block or over-hoist)

The RCI-1550XV can be supplied with an Anti-Two-Block sensor to prevent two-blocking of the main and aux winches. When the ATB 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 cannot actually motion cut if the crane is two-blocked.

6.3.4. 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.

6.3.5. 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.

6.3.6. Motion Cut LED

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

6.4. 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 motion cut. 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.**

6.5. Turning on the RCI-1550XV

Generally by the ignition key-switch OR as installed.
Power to the RCI-1550XV can be derived from the automotive alternator DC supply, nominally 12V or 24V DC namely;

- The crane electrical ignition circuit.
- 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-1550XV, its display and other indicators should light up and the RCI-1550XV should go through its self-test operation.

6.5.1. 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 LSI 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 be confirmed the display will proceed to the normal operating mode.

6.6. 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.

6.6.1. 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.

6.6.2. Function Codes

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

6.6.3. 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.

6.6.3.1. Acknowledge Time-Out
Sets the time for which the "Acknowledge" soft menu button will silence the in cabin alarm and hide any errors.

6.6.3.2. 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 (i.e. even during a lift).

6.6.3.3. 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 adjusted 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.

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

6.7. Data Logging and Data Down-loading

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

7. CALIBRATION

7.1. Calibration Purpose

The monitoring sensors (Load-cells, Boom angle 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 LSI 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. Contact LSI Robway if the PIN is not known.

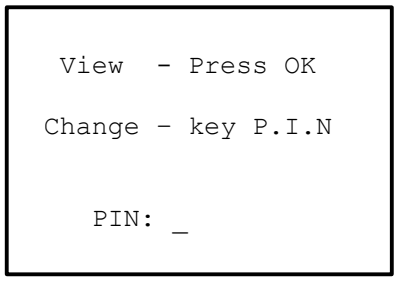


Diagram 7: password entry

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.

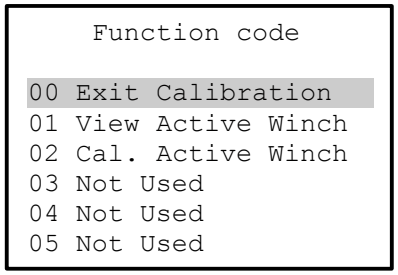


Diagram 8: Function code screen

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 (i.e.. 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. Calibration menu can also be exited by pressing the "Cancel" button until normal operators screen appears.

7.2.2. View Main Load and View Aux Load items

Displays the Main load

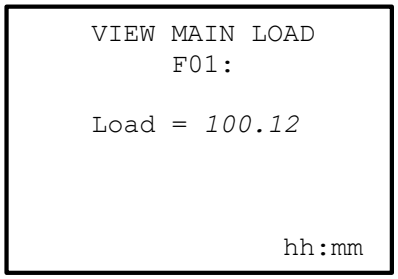


Diagram 9: view main load

7.2.2.1. CAL MAIN LOW and CAL AUX LOW items

Allows the main winch and aux winch light 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.

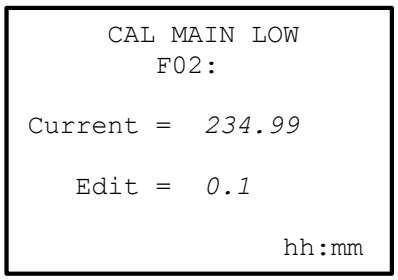


Diagram 12: Cal main low

7.2.2.2. CAL MAIN HIGH and CAL AUX HIGH items

Allows the main winch and aux winch heavy 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.

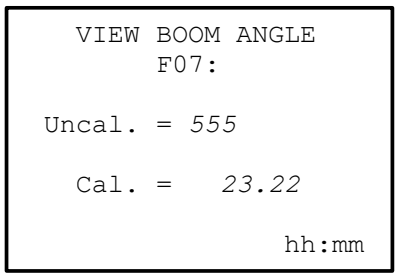


Diagram 13

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.

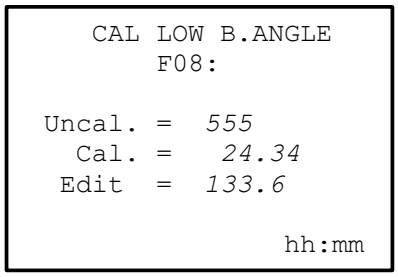


Diagram 14

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 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.

7.2.4.2. 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. 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:

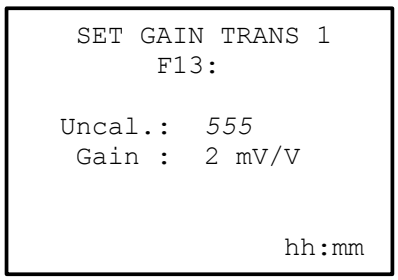


Diagram 15

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

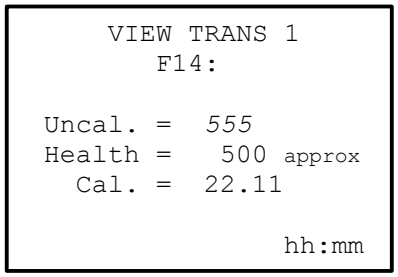


Diagram 16

7.2.6. 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.

7.2.6.1. VIEW TRANS 2 item
The graphical LCD will appear similar to VIEW TRANS 1 item.

7.2.7. Set MUX. Delay item

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

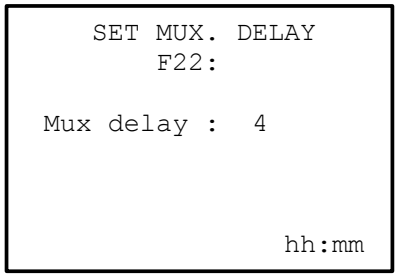


Diagram 17

7.2.8. 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.

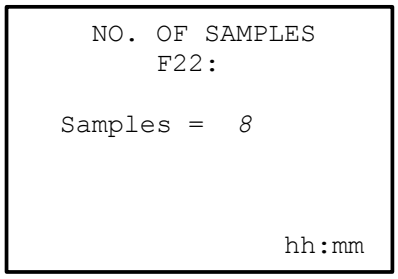


Diagram 18

7.2.9. 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.

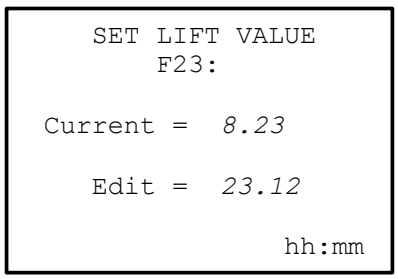


Diagram 19

7.2.10. Set Rigging Load Threshold item

Rigging the crane often requires that the boom be positioned outside 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, for example if the crane needs to be re-configured. 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.

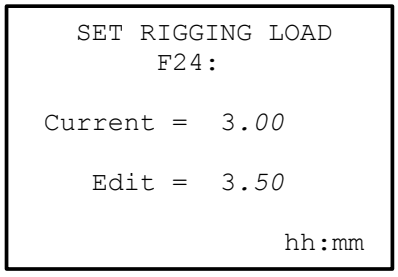


Diagram 20

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

7.2.11. 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.

7.2.12. 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**

7.2.13. View Load-Chart item

This function code is intended to allow easy viewing of the RC 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) rated capacities can be viewed. The main and auxiliary radii are also displayed.

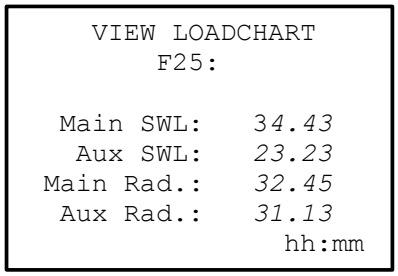


Diagram 22

7.2.14. 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."

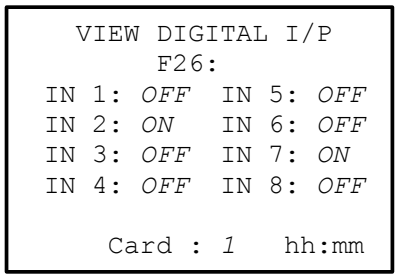


Diagram 23

7.2.15. 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.

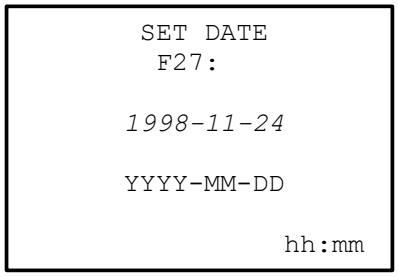


Diagram 24

7.2.16. 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

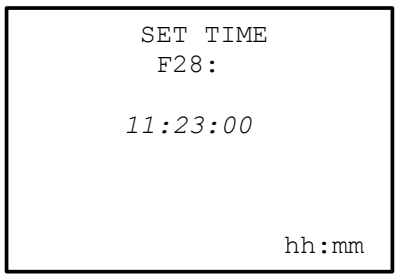


Diagram 25

7.2.16.1. VIEW DATE / TIME item

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

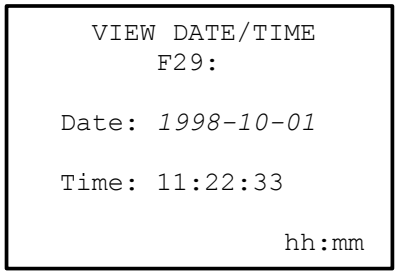


Diagram 26

7.2.17. Download Logger item

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

7.2.18. 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 below).

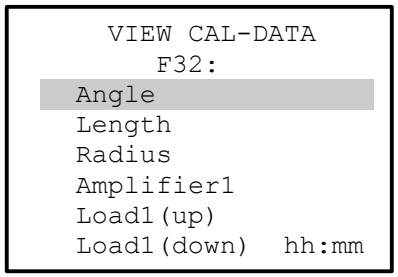


Diagram 27

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

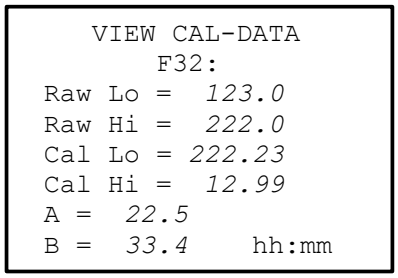


Diagram 28

7.2.18.1. 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.

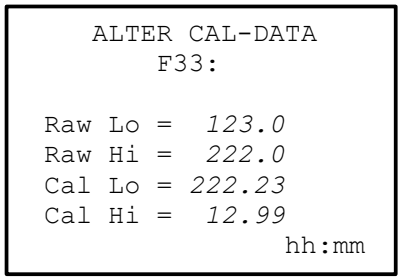


Diagram 29

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.

7.2.19. 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.

7.2.20. 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.

7.2.21. 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 or 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.

7.2.22. 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.

7.2.23. 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…

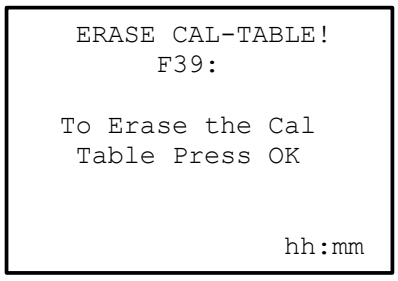


Diagram 30

7.2.24. User Variables

LSI ROBWAY stores the load-charts and crane geometry in the memory of the RCI-1550XV at the time of manufacture. As this information may vary from crane to crane, even if they are of the same model, the RCI-1550XV 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 values 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.

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

7.2.25. Viewing Errors

If errors exist they will automatically be displayed when the display is in normal operating mode (i.e.. 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.

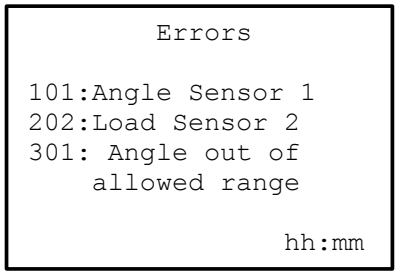


Diagram 32

7.2.26. Verifying Operation of Sensors

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

The RCI-1550XV 'sees' the crane and its surroundings through sensors. The signals from these sensors are represented as numbers inside the RCI-1550XV. The range of possible numbers is 0 to 1023 when an 10 bit analogue to digital converter is used (which is the most common type).

The RCI-1550XV allows the user to view both the UNCALIBRATED and 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 5, you should check the connections to the RCI-1550XV *(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. E.g. the cable to the RCI-1550XV 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. E.g. 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 LSI Robway distributor.

 Note	Please note that while in view mode, that is using either "VIEW UNCALIBRATED ..." or "VIEW CALIBRATED ..." functions, the **ENTER** key works as a toggle switch to turn that channel ON or OFF. This function allows the user to temporarily turn a sensor off if it is not needed. E.g. if you want to use the main winch only on a twin winch system; normally, if you have not connected the auxiliary sensor up, the RCI-3100 will report an error and activate motion cut. To prevent this you can press the ENTER key, while in "VIEW UNCALIBRATE TRANSDUCER 2 function", to turn the auxiliary channel off. To turn a channel back on, you have to re-enter the same VIEW UNCALIBRATED... function and press the ENTER key again.
 Important	**Remember that you must always end a view function by pressing the CANCEL key.**

7.3. Tools Required for Calibration

To ensure correct calibration, you will require the following;

- an accurate 30m measuring tape
- an accurate boom angle finder tool
- a LSI Robway RCI simulator is recommended
- a notepad to record results
- the correct LSI Robway system manual for the crane

7.4. Map of Calibration (suggested order)

- Set date and Time
- Verify the raw counts stay within 33-999 for full working range of all sensors.
- Ensure all digital inputs (switched) are wired correctly, incl. ATB.
- Ensure all digital outputs (switched) are wired correctly.
- Review all geometry Function code settings for correctness
- 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 % RC trip points (nominally set to 85, 100 and 110%)
  - Set Data-logger recording points (if supplied)

- Calibrate lo/hi boom angle sensor.
- Calibrate lo/hi luffing fly angle sensor (if fitted)
- Check Radius
- Calibrate Main winch
- Calibrate Aux winch
- Perform Load/Angle correction if required.
- Once happy the system is operating correctly, perform a “Cal-Table Backup” to ensure the calibration data can be restored if necessary.
- 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, e.g. 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, e.g. 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.

	**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 (e.g. 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.

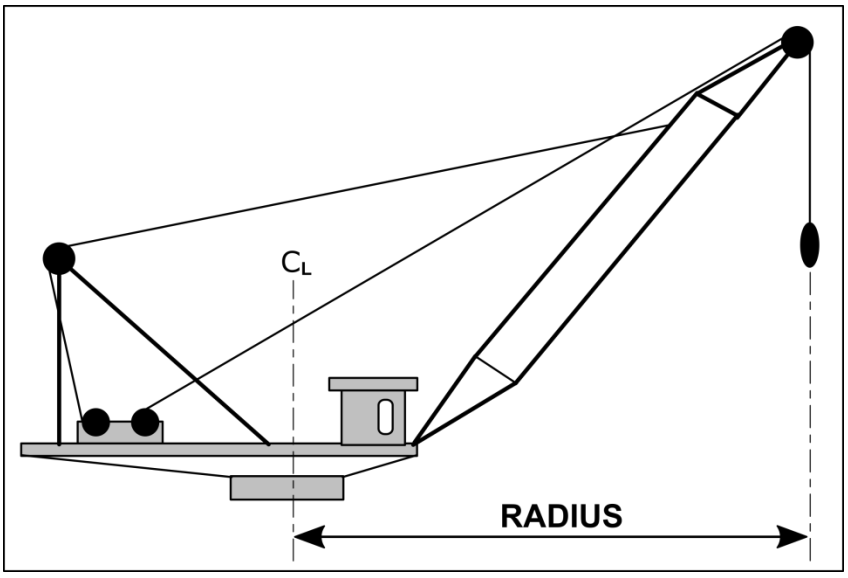
7.6.2. Calibrating high Jib angle

- Safely luff the jib up to a high angle (e.g. 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.**

7.6.3. Check Radius

After calibrating angle sensor(s) displayed radius should be checked against actual radius. Radius is measured from centre of crane slew to the centre of the hook.



Radius should be checked at a high angle, and at a low angle.

7.7. LOAD CALIBRATION

7.7.1. Main Winch Light Load Calibration

(Ensure the correct winch and falls are selected)

- Safely lift a light, known test load. The load should be heavy enough to produce approximately 10% of the maximum main winch line-pull.
- The total weight of the hook block and any lifting gear or tackle under the hook block (such as slings, lifting frames, etc.) must be added to the weight of the light test load.
- If a light test load is not available, raise the empty hook block off the ground/platform and use the weight of the block as light load.
- For some cranes where the hook block is considered part of the crane, raise the empty hook block off the ground/platform and use the value “0.0t” as light load.
- Select “Calibrate Light Main Load” Function code from the Function code list at the rear of this manual. Use the up/down arrows to enter the actual total weight of the light load.

7.7.2. Main Winch Heavy Load Calibration

(Known test weight is required)
(Where direction switches are employed, both UP & DOWN require calibration)

- Safely lift a heavy, known test load. The load should be heavy enough to produce at least 70% of the maximum main winch line-pull.
- The total weight of the hook block and any lifting gear or tackle under the hook block (such as slings, lifting frames, etc.) must be added to the weight of the light test load.
- Select “Calibrate Heavy Main Load” Function code from the Function code list at the rear of this manual. Use the up/down arrows to enter the actual total weight of the heavy load.

7.7.3. Aux Winch Light Load Calibration

(Ensure the aux winch is selected, this must be done outside calibration mode)
(Where direction switches are employed, both UP & DOWN require calibration)

- Safely lift a light, known test load. The load should be heavy enough to produce approximately 10% of the maximum aux winch line-pull.
- The total weight of the hook block and any lifting gear or tackle under the hook block (such as slings, lifting frames, etc.) must be added to the weight of the light test load.
- If a light test load is not available, raise the empty hook block off the ground/platform and use the weight of the block as light load.
- For some cranes where the hook block is considered part of the crane, raise the empty hook block off the ground/platform and use the value “0.0t” as light load.
- Select “Calibrate Light Aux Load” Function code from the Function code list at the rear of this manual. Use the up/down arrows to enter the actual total weight of the light load.

7.7.4. Aux Winch Heavy Load Calibration

(Ensure the aux winch is selected, this must be done outside calibration mode)
(Where direction switches are employed, both UP & DOWN require calibration)

- Safely lift a heavy, known test load. The load should be heavy enough to produce at least 70% of the maximum aux winch line-pull.
- The total weight of the hook block and any lifting gear or tackle under the hook block (such as slings, lifting frames, etc.) must be added to the weight of the light test load.
- Select “Calibrate Heavy Aux Load” Function code from the Function code list at the rear of this manual. Use the up/down arrows to enter the actual total weight of the heavy load.

7.8. Load / Angle Correction

If you are not familiar with the standard calibration routine operations, please refer to the Calibration section of this manual prior to completing Load / Angle Correction.

When is Load / Angle Correction necessary?

Load/Angle correction function is designed for use in cases where the displayed load is seen to change by a noticeable amount as the boom is luffed up and down through its operating range. This phenomenon is particularly apparent when a single sheave dynamometer is used with the hoist winch not mounted on the boom but may also be apparent in other situations.

 Note	**To employ this correction successfully, you must first accurately calibrate the hook load at high boom angle, that is, perform the normal load calibration routines but be sure to position the boom at (or as close to) the highest boom angle the crane can luff to when lifting the test loads.**

There are four function codes that are used to apply this correction:

- Low Angle for Load Correction - Applies to both Main & Aux winch
- High Angle for Load correction - Applies to both Main & Aux winch
- Load / Angle Correction Factor for Main Winch
- Load / Angle Correction Factor for Aux Winch

These function codes allow the installer to enter the low and high angles where load starts, and stops varying, and the change in load (in tonnes) that is observed over this range.
If the correction is required though the entire angle range, the low angle entered should be the lowest angle the crane can actually luff to in operation, and the high angle should be set to the highest angle the crane can be luffed to.

This procedure should be completed as follows:

- Luff the boom to a low angle and pick up a weight of at least 10% line pull (if possible – if not then a weight as close to current RC as possible) on the main hook.
- Record the displayed load.
- Slowly luff up to maximum angle and watch the displayed load, record at which angles the load starts changing, and stops changing.
- Enter the angle at which the loads starts changing as “Low Angle for Load Correction”
- Enter the angle at which the loads stops changing “High Angle for Load Correction”
- Enter the displayed load difference as “Load / Angle Correction Factor for Main Winch”.
- Luff down and up and ensure displayed load stays consistent.
- Repeat for the Aux winch.
- Enter the displayed load difference as “Load / Angle Correction Factor for Aux Winch”.
- Luff down and up and ensure displayed load stays consistent.

8. MAINTENANCE

When maintenance is to be performed on the RCI-1550XV 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	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	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	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.

8.2.1. Additional detail

The RCI-1550XV 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. INSPECTION AFTER MAINTENANCE

LSI 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.

8.5. RECORDS

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

9. TROUBLESHOOTING

A trouble-shooting or fault-finding section is always a difficult document to write because things that are obvious to one person can be anything but obvious to another. One the other hand, most times when you read such a guide the fault you are trying to solve happens to be the very fault that has been left out! The main purpose of this section is to help both us at LSI Robway and you the reader to find the problem and solve it quickly. Sometimes this takes patience, which isn't always easy when are you on the site, your customer is angry because you haven't fixed it yet, and the LSI Robway guy at the other end of the phone wants you to tell him all over again what you just did!! What we have found many times is that when a situation is described by the service person a couple of times extra details come out in the conversation that are vital to solving the problem. It seems that the more trouble we have finding the faults, the more simple the cause was!

The RCI-1550XV system incorporates a number of software features that are designed to help the service person quick identify a fault, **however** it must be stressed that these features cannot identify everything. They can only be used as a guide to identify additional checks that can be made. Some notes are provided below, followed by some example faults and possible causes.

Identify the symptoms. Take time to find out exactly what is happening to indicate a problem. If possible have the problem demonstrated so you can "describe it in your own words". Sometimes what someone else has told you is only part of the story.

Leave the calibration alone! Too many times a re-calibration has been attempted in order to rectify a problem before that problem has been correctly identified. This leads to added confusion as the perspective is generally moved from the real fault to "calibration problems'. We have often received a message indicating that our display has "not accepted the calibration data". Most times this is due to a fault in a cable or sensor which was not identified prior to re-calibration. Re-calibration must only be performed when all physical inputs have been verified for correct operation, and in actual fact is rarely ever needed.

Do you have your simulator with you? A simulator is a very quick way to verify if the fault is external to the display and will save you a lot of heartache. A simulator is purely resistive and hence considered simple apparatus and can be used freely in a hazardous area.

Have you read the manual! When all else fails, read the manual! Your answer may actually be in there.

Know what information you need to gather. If you collect the correct information from the display the job is half done. Before you begin to suspect faults with the system, you must satisfy yourself that the display is correctly configured for the crane environment. In other words, check that the correct duty, falls, slew zone etc. have been selected. Are all of the sensors connected? In general if sensors have been supplied with the system, they must always be connected. The display will check them continuously and issue an error if that sensor cannot be detected. Check your length, angle and radius against the chart to verify that the equipment is permitted to be in that situation. If there is still a problem once these have been checked, then you will need to check the hardware.

The main pieces of useful information obtainable from the displays are the **raw counts**. The raw counts shows what the actual inputs are doing (i.e.. like a signal strength indication). These raw counts are manipulated in software according to the calibration data stored in the display to produce the readouts on the Display Unit. If the calibration has been done incorrectly, or the configuration is incorrect, or something else is wrong, then the Display Unit readouts (e.g. The LOAD or ANGLE values) may provide you with misleading information.

 Note	**YOU MUST USE THE "VIEW" FUNCTION CODES TO DETERMINE THE CORRECT OPERATION OF THE EXTERNAL SENSORS.** **For correct operation the "raw signal" values must be in the range 33 to 999. Anything outside of this range will produce an error. Refer to the manual for how to access these raw counts.**

Check the obvious. Once you have found a problem with a sensor for example, check all of the obvious things to do with that sensor such as making sure all of the connectors are tight. Be systematic – make notes about what you have done and what you found. You will find that under pressure you can easily forget what you have checked and it becomes very easy to miss things.

9.1. Error Code List

9.1.1. Example Errors & Possible Causes

Code	Description on LCD	Fault Description
101	Angle Sensor 1	Sensor is open or short circuit
102	Angle Sensor 2	Sensor is open or short circuit
104	Angle Sensor 3	Sensor is open or short circuit
108	Angle Sensor 4	Sensor is open or short circuit
201	Load Sensor 1	Sensor is open or short circuit
202	Load Sensor 2	Sensor is open or short circuit
204	Load Sensor 3	Sensor is open or short circuit
208	Load Sensor 4	Sensor is open or short circuit
210	Digital Input	Digital input error detected
220	ATB	Crane is two-blocking
240	Overload	Current load exceeds rated capacity
280	Line pull	Current load exceeds line pull
301	Angle out of allowed range	Angle is off the load chart or limit is exceeded
304	Radius out of allowed range	Radius is off the load chart or limit is exceeded
308	Height out of allowed range	Height is off the load chart or limit is exceeded
310	Slew out of allowed range	Crane has been positioned in a non-lifting area

9.1.2. Problems That Do Not Produce Error Codes

The load does not vary when I lift a weight.

Determine which winch you are looking at. If you are looking at the main winch, then view the UNCALIBRATED TRANSDUCER 1 INPUT and noting that the value shown in the LOAD display while lifting a weight and see if it is varying. If not, then view the UNCALIBRATED TRANSDUCER 2 INPUT. If this is varying, then the load cables have been swapped. If neither are moving then the most probable cause is;

The load sensor is faulty. Check the resistance values. This does not give the complete story. Even if the resistances are correct, there is still a chance that a fault exists.

If the UNCALIBRATED values did vary when a load is lifted, then check the calibration data. If you entered the same value of load for both the light load and the heavy load, then the display will assume that any input represents the same load. If this is the case, then re-calibrate.

The display works OK, but when I lift above a certain load I get an Error code.

View the UNCALIBRATED TRANSDUCER 1 and 2 INPUT's while lifting a load and check that the value is increasing with increasing load. If the value is decreasing with load then the load cell signal wires are swapped or the load cell has been installed upside-down.

The load display is very erratic and displays massive changes in value.

Check the view UNCALIBRATED TRANSDUCER INPUT for that channel. If the values are flickering by 2-3 counts while the display is changing by say a number of tonnes, then the cause is most probably calibration. One common cause of this is if different load values were entered for the high and low calibration without the actual load being altered (or of course there was an error in a load channel while you were calibrating). In other words you forgot to lift the heavy load! (It happens often) In this situation the display is confused because the calibration data is telling it that the signal it is seeing represent both the low load value and the high load value simultaneously. Correct the calibration.

This can also occur if only part of the calibration procedure has been completed. You should expect strange results if you have not completed the calibration of that sensor.

When the system starts in the morning the displays are erratic, but settle during the day.

This is a common sign of moisture ingress into either the display, the connectors, the sensors or the cable. These should be checked, dried and sealed.

The display does not start.

You should check the power supply. Refer to the manual for allowable voltage ranges. If these are correct you may need to open the Control Unit and check the fuses.

10. 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

Voltage Levels

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

11. Electronic Angle Sensor Specifications:

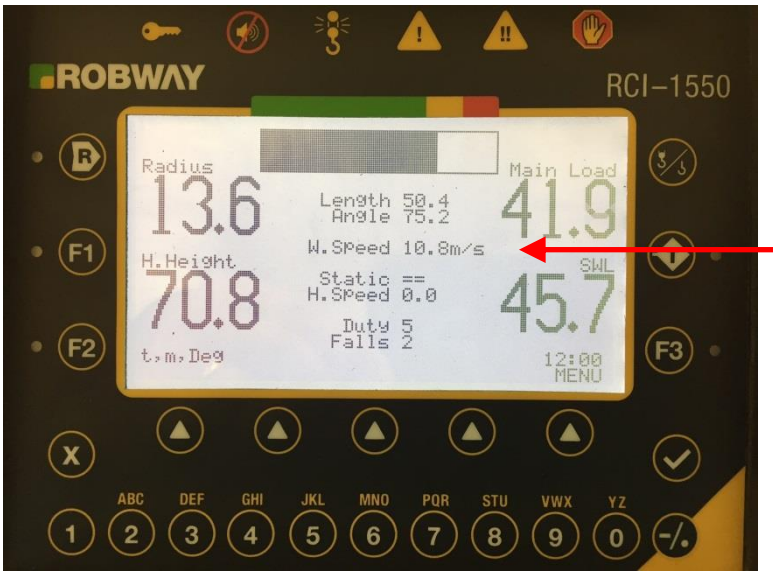
Total range:	120 deg
Linear range:	90 deg
Threshold and resolution:	0.001 deg
Linearity:	+/- 1% of angle
Null repeatability:	0.05 deg
Operating Temperature range:	-40C – 65C
Temperature coefficient – null:	0.008 deg/C
scale:	0.1%/C

12. Wind Speed Monitoring Option

12.1. Description

The RCI-1550XVXV system can be used to monitor and display wind speed by integrating a wind speed sensor. Please refer to the system General Arrangement Drawing DWG 4798 for wiring details.

The RCI-1550XVXV displays the wind speed in the centre of the Display in metres per second (m/s) as shown on the illustration below:



Wind speed indication in metres per second

12.2. Wind Speed Monitoring System Options

Wind speed monitoring can be included in the RCI-1550XVXV system with the following options:

Basic Wind Speed Monitor

This option provides continuous monitoring and display of the wind speed but without alarms on warning and maximum limit.

Wind Speed Monitor with Alarm Limit

This option provides continuous monitoring and display of the wind speed as well as function codes to set warning alarm and maximum wind speed limit alarm.

12.3. Wind Speed Ordering Information

Part Number	U/M	Description
ANEMOMETER3	EACH	WIND SPEED SENSOR
CABWS4473	EACH	C/A, ANEMOMETER3, PLUG 2P
CABSHLD4C	METER	CABLE, 4-CORE BLACK
CROSSARM	EACH	CROSSARM ASSY, SPEED, DIRECTION

13. APPENDICES

13.1. Drawings Part A - System Components

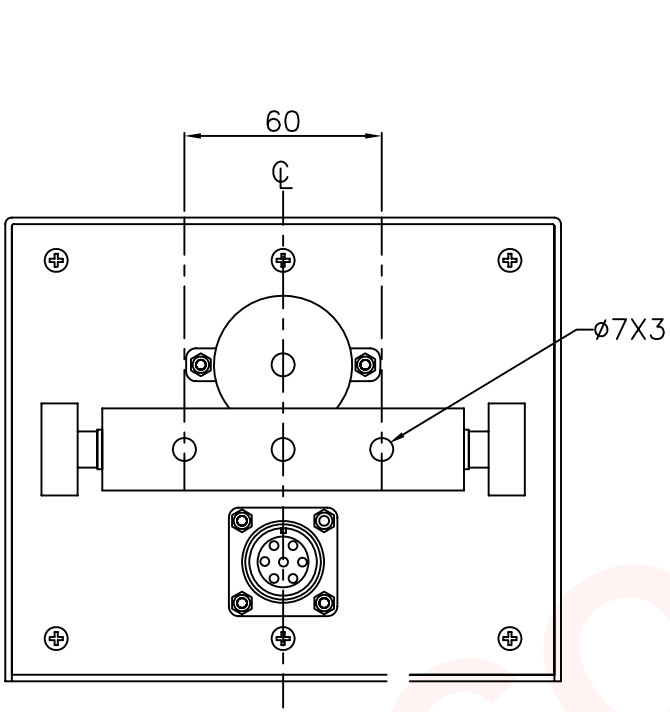
13.2. Drawings Part B - General Arrangements

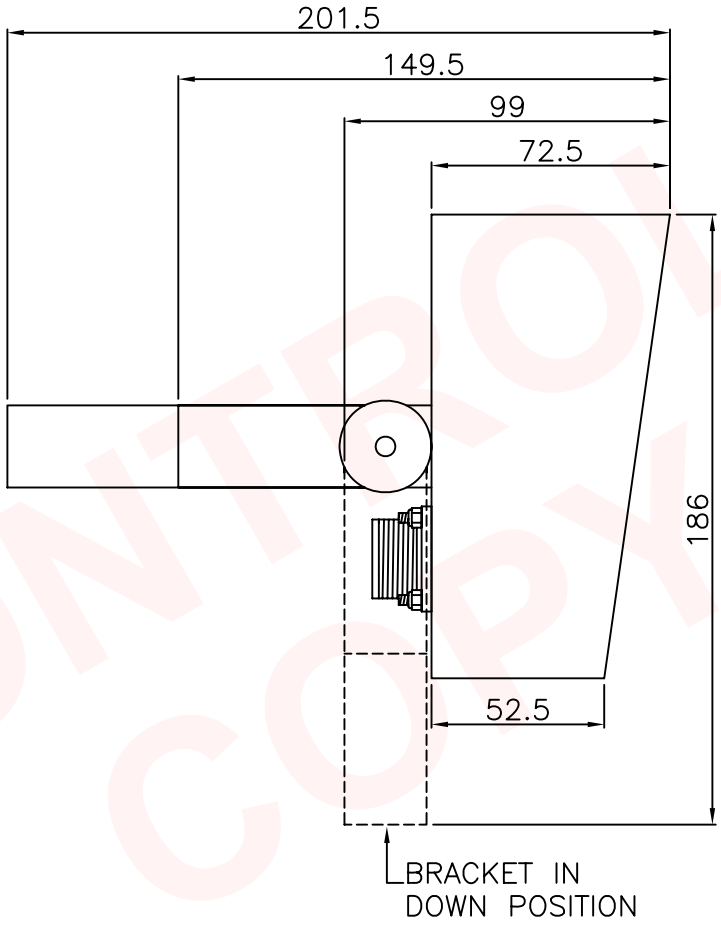
13.3. Software Documents (plastic sleeve)

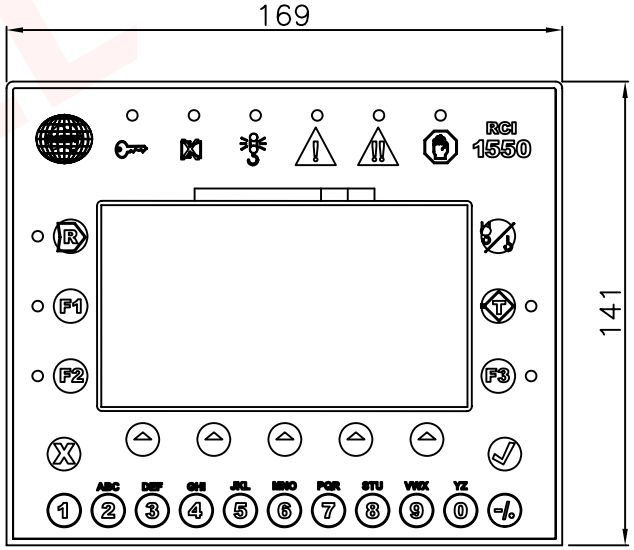
13.1 APPENDIX

Drawings Part A - System Components

3RD ANGLE







NOTE:
TWO BRACKET LENGTHS ARE AVAILABLE

REV	DATE	DESCRIPTION OF CHANGE	APPR'D

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

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

DRAWN	APPROVED	PART OF ASSY
C. HOBBY	D. PLANTHABER	–
28/07/99	15/11/00	

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32 WEST THEBARTON RD
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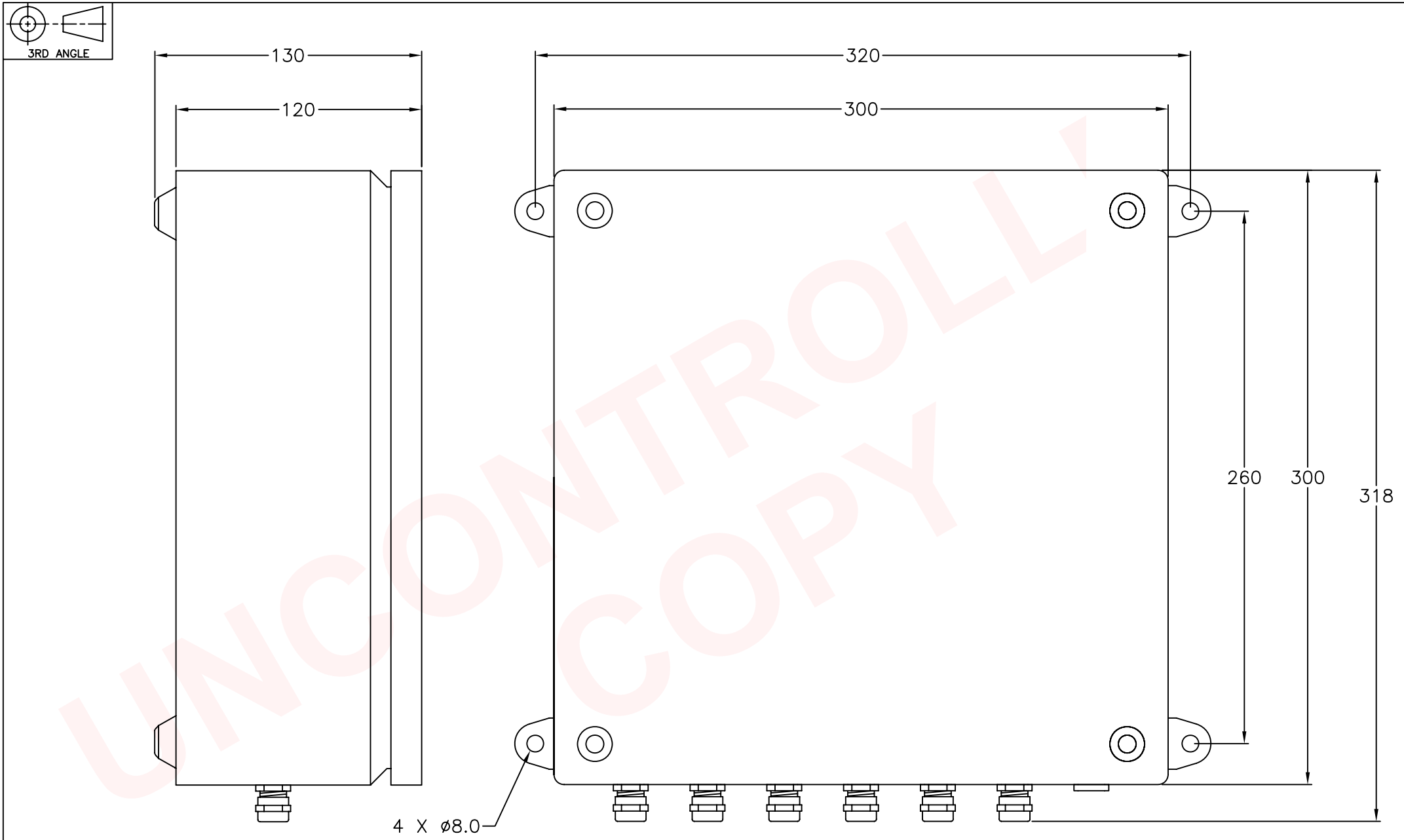
PART No: –
PROJECT: RCI–1550 DISPLAY
TITLE: DIMENSIONAL DETAILS
SCALE N/A
SHEET 1 OF 1
DRAWING No: DWG 2046
FILE No: 204601AA.DWG
REV 1.0



REV	DATE	DESCRIPTION OF CHANGE	APPR'D

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

DO NOT SCALE DRAWING
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UNLESS OTHERWISE STATED

DRAWN	APPROVED	PART OF ASSY
S. CHAMBERS		–
21/11/00		

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PART No: –

PROJECT: RCI–1550 CONTROL UNIT

TITLE: DIMENSIONAL DETAILS

SCALE N/A

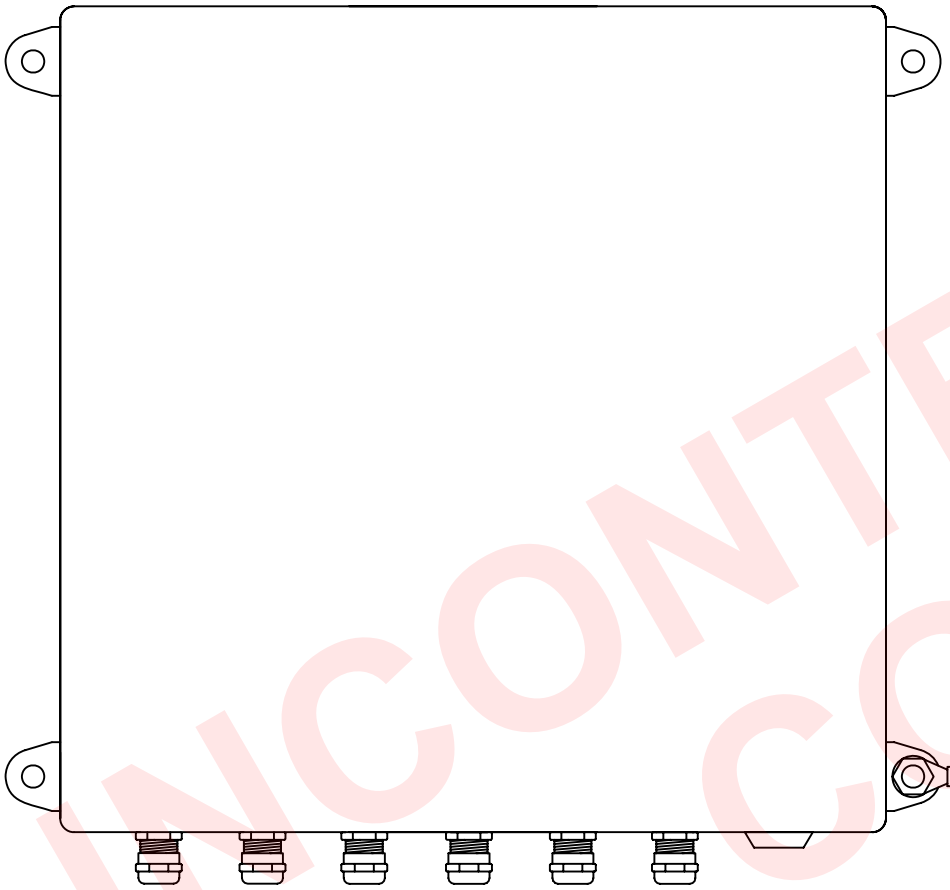
SHEET 1 OF 1

DRAWING No: DWG 2057

FILE No: 205701A.DWG

REV A

RCI–1550 CONTROL UNIT

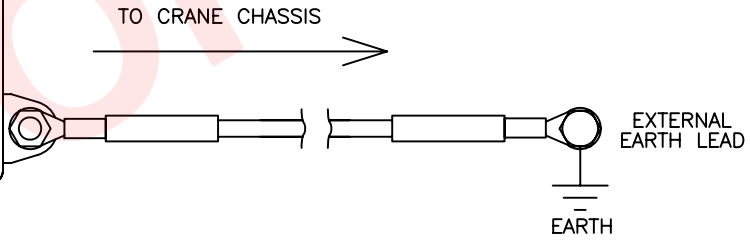


INSTALLATION NOTES:

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

TOL: X. +/– 1
X.X +/– 0.2
X.XX AS STATED

DO NOT SCALE DRAWING
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UNLESS OTHERWISE STATED

DRAWN	APPROVED	PART OF ASSY
S. CHAMBERS	A. CANLAS	–
21/11/01	21/11/01	

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PART No: CUSRCI1550

PROJECT: RCI–1550 CONTROL UNIT

TITLE: INSTALLATION DETAIL

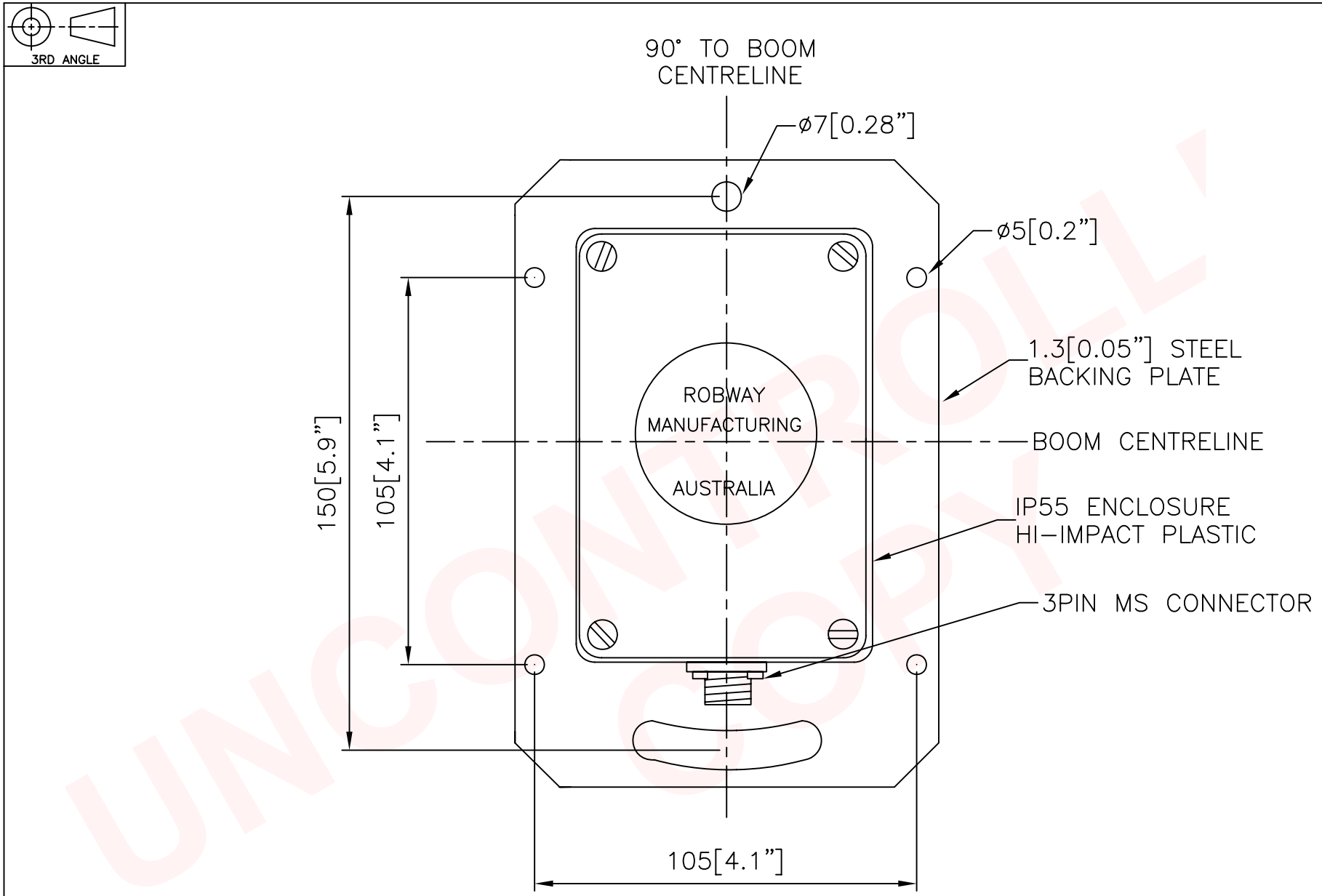
SCALE N/A

SHEET 1 OF 1

DRAWING No: DWG 2566

FILE No: 256601AA.DWG

REV 1.0



REV	DATE	DESCRIPTION OF CHANGE	APPR'D
1.1	04/11/98	REFER TO DR#564	M.O.

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

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

DRAWN	APPROVED	PART OF ASSY
M. TURNER	M. OBST	–
27/02/97	27/02/97	

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PART No:	PROJECT:
–	–

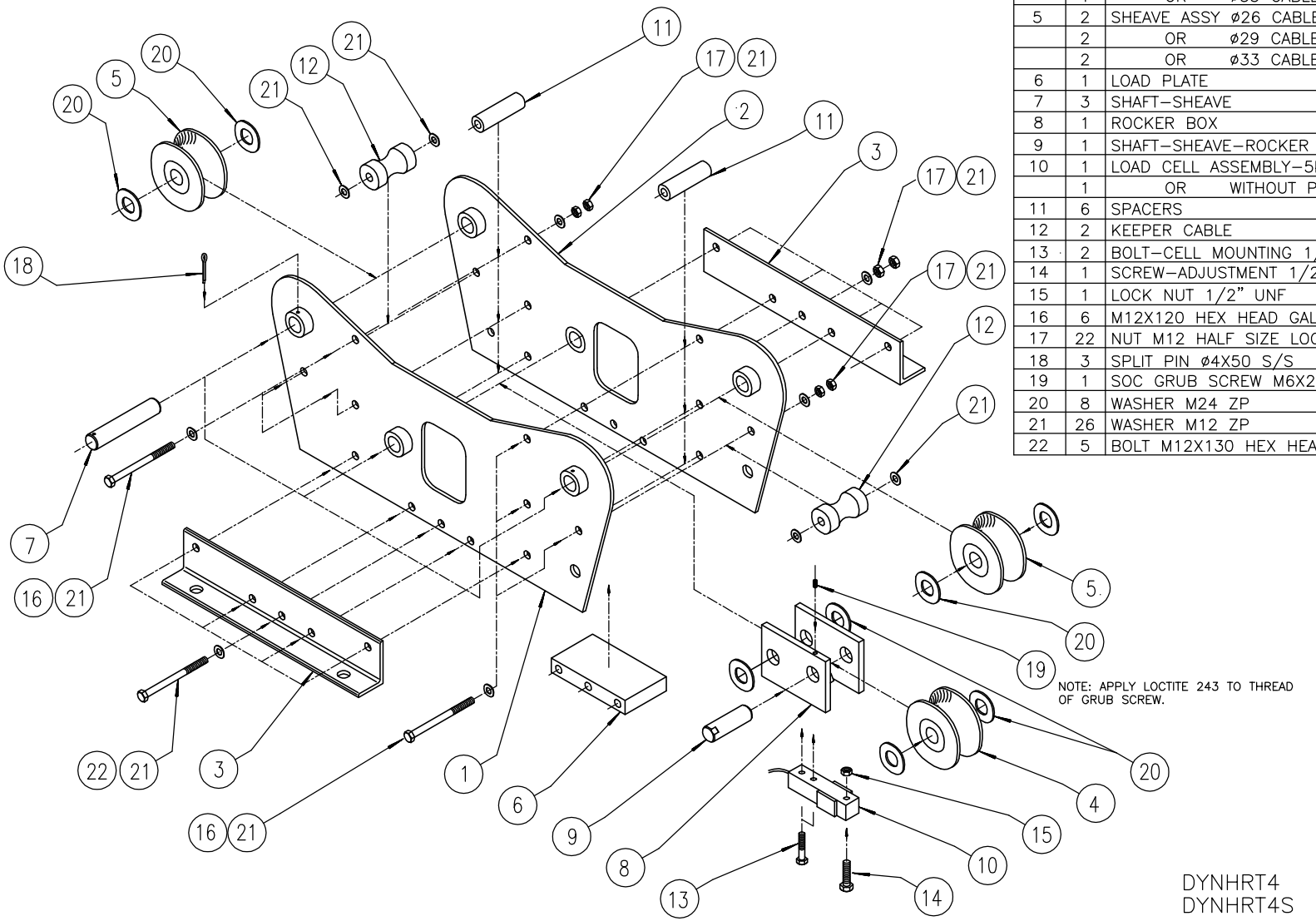
TITLE: ELECTRONIC ANGLE SENSOR DIMENSIONAL DRAWING

SCALE N/A

SHEET 1 OF 1

DRAWING No:	FILE No:	REV
DWG 1099	109901AB.DWG	1.1

3RD ANGLE



ITEM	QTY	MATERIAL/DESCRIPTION	DWG No.	STOCK CODE (STANDARD)	STOCK CODE (MARINE S/S)
1	1	SIDE PLATE RIGHT	DWG0272	PLAHRT4RH	PLAHRT4RHSS
2	1	SIDE PLATE LEFT	DWG0272	PLAHRT4LH	PLAHRT4LHSS
3	2	MOUNT ANGLE BRACKET	DWG0273	BRAHRT4V	BRAHRT4VSS
4	1	SHEAVE ASSY ø26 CABLE	DWG0348	SHEH4C2526	–
	1	OR ø29 CABLE	DWG0348	SHEH4C2529	–
	1	OR ø33 CABLE	DWG0348	SHEH4C2533	–
5	2	SHEAVE ASSY ø26 CABLE	DWG0348	SHEH4E2526	–
	2	OR ø29 CABLE	DWG0348	SHEH4E2529	–
	2	OR ø33 CABLE	DWG0348	SHEH4E2533	–
6	1	LOAD PLATE	DWG0350	PLAHRT4LD	PLAHRT4LDSS
7	3	SHAFT–SHEAVE	DWG0280	SHASH4	–
8	1	ROCKER BOX	DWG0349	ROCHRT4	ROCHRT4SS
9	1	SHAFT–SHEAVE–ROCKER BOX	DWG0347	SHARBSH4	–
10	1	LOAD CELL ASSEMBLY–5K–WITH PLUG	–	CELBTD5P	–
	1	OR WITHOUT PLUG	–	CELBTD5	–
11	6	SPACERS	DWG0352	SPAHRT4	SPAHRT4SS
12	2	KEEPER CABLE	DWG0351	KEEHRT4	KEEHRT4SS
13	2	BOLT–CELL MOUNTING 1/2"X1 3/4"	–	BOL1213HHSS	–
14	1	SCREW–ADJUSTMENT 1/2"X2"	–	SCR122CSS	–
15	1	LOCK NUT 1/2" UNF	–	NUT12HLSS	–
16	6	M12X120 HEX HEAD GALV	–	BOLM12120HG	BOLM12120SS
17	22	NUT M12 HALF SIZE LOCK NUT GALV	–	NUTM12HLG	NUTM12HSS
18	3	SPLIT PIN ø4X50 S/S	–	PINCOTT03	–
19	1	SOC GRUB SCREW M6X20 CUP PT S/S	–	SCRM620SG	–
20	8	WASHER M24 ZP	–	WASM24FZP	WASM24FSS
21	26	WASHER M12 ZP	–	WASM12FZP	WASM12FSS
22	5	BOLT M12X130 HEX HEAD GALV	–	BOLM12130HG	BOLM12130HSS

DYNHRT4 – STANDARD (NO SHEAVES)
DYNHRT4S – STANDARD (INCLUDING SHEAVES)
DYNHRT4SS – STAINLESS STEEL MARINE (NO SHEAVES)

REV	DATE	DESCRIPTION OF CHANGE	APPR'D
1.1	29/03/99	REFER TO DR#551	D.P.
1.2	27/01/05	REFER TO DR#345	G.C.
1.3	01/08/05	REFER TO DR#409	S.C.
1.4	01/08/07	REFER TO PCR#24	S.C.

TOL: X. +/– 1
X.X +/– 0.2
X.XX AS STATED

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

DRAWN	APPROVED
F. LOCKER	M. OBST
07/09/95	03/11/97

PART OF ASSY
–

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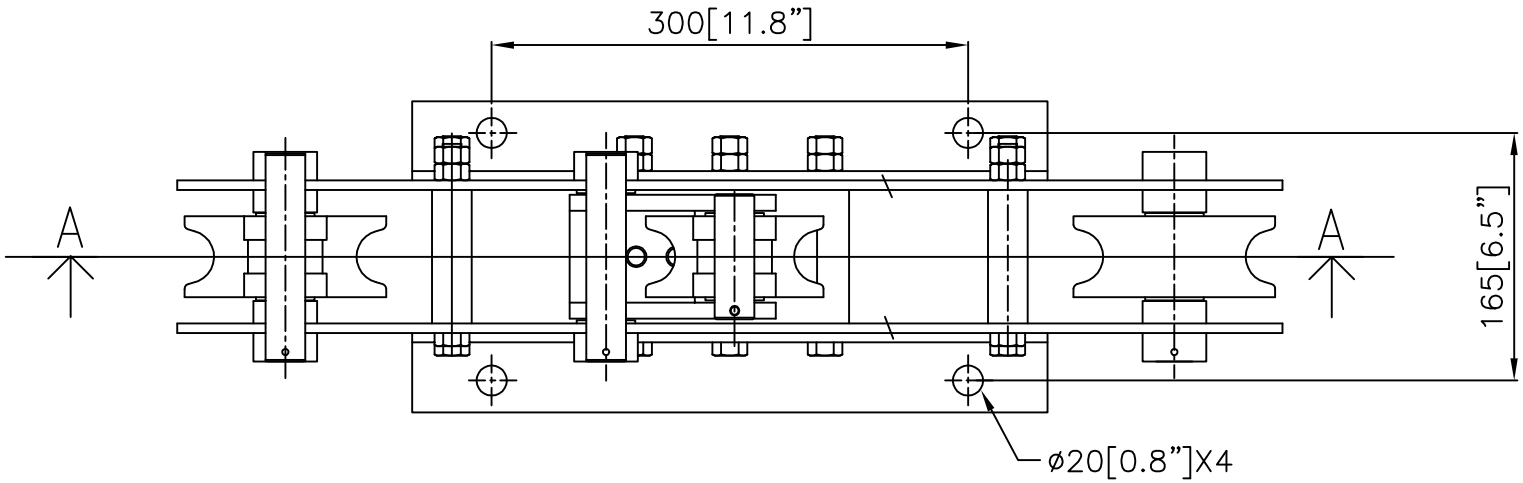
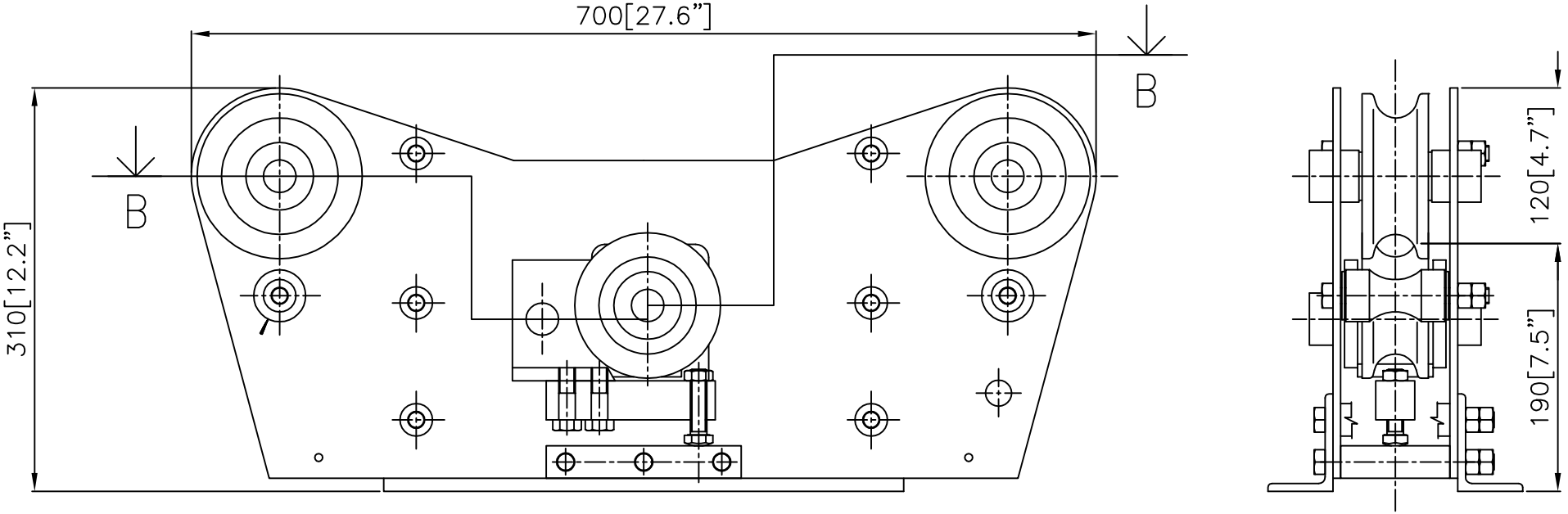
PART No: SEE ABOVE
PROJECT: HRT–4 DYNO
TITLE: EXPLODED VIEW AND PARTS LIST FOR HRT–4 DYNO (VERTICAL MOUNT)
SCALE N/A
SHEET 1 OF 1
DRAWING No: DWG 0340
FILE No: 034001AE.DWG
REV 1.4

3RD ANGLE

SECTION B B





SECTION A A

REV	DATE	DESCRIPTION OF CHANGE	APPR'D

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

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

DRAWN	APPROVED
C. HOBBY	
05/11/98	

PART OF ASSY
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FAX +61 8 8352 1684

PART No: –

PROJECT: HRT–4 DYNO

TITLE: HRT–4 DYNAMOMETER DIMENSIONAL DETAIL

SCALE N/A

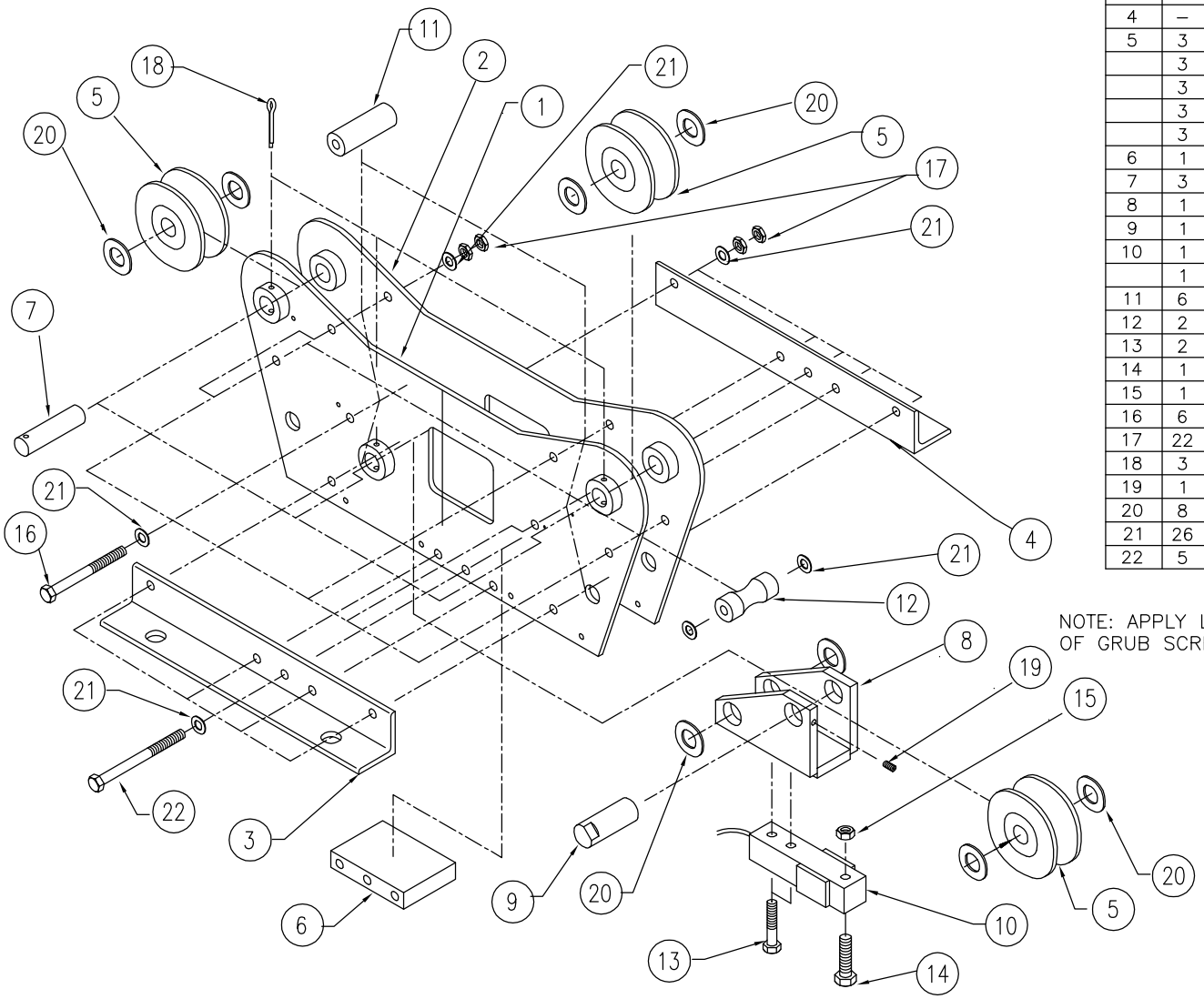
SHEET 1 OF 1

DRAWING No: DWG 1795

FILE No: 179501AA.DWG

REV 1.0

3RD ANGLE



ITEM	QTY	MATERIAL/DESCRIPTION	DWG No.	STOCK CODE (STANDARD)	STOCK CODE (MARINE S/S)
1	1	SIDE PLATE–RIGHT	DWG0203	PLAHRT10	PLAHRT10SS
2	1	SIDE PLATE–LEFT	DWG0203	PLAHRT13	PLAHRT13SS
3	1	MOUNT ANGLE BRACKET RIGHT HAND	DWG0299	BRAHRT04	BRAHRT04SS
4	–	MOUNT ANGLE BRACKET LEFT HAND	DWG0299	BRAHRT03	BRAHRT03SS
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	PLAHRT08	PLAHRT08SS
7	3	SHAFT–SHEAVE	DWG0225	SHAHRT12	–
8	1	ROCKER BOX	DWG0346	ROC3MAR	ROC3MARSS
9	1	SHAFT–SHEAVE–ROCKER BOX	DWG0289	SHAHRT11	–
10	1	LOAD CELL ASSY–5K–WITH PLUG	–	CELBTD5P	–
	1	LOAD CELL ASSY–5K–NO PLUG	–	CELBTD5	–
11	6	SPACERS	DWG0301	SPAHRT06	SPAHRT06SS
12	2	KEEPER–CABLE	DWG0300	KEEHRT02	KEEHRT02SS
13	2	BOLT–CELL MOUNTING 1/2"X1 3/4" SS	–	BOL1213HHSS	–
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	22	M10 HALF SIZE LOCK NUT	–	NUTM10HLG	NUTM10HSS
18	3	SPLIT PIN ø4X50 SS	–	PINCOTT03	–
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.

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

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
X.X +/– 0.2
X.XX AS STATED

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

DRAWN	APPROVED
F. LOCKER	M. OBST
15/09/95	15/09/95

PART OF ASSY
–

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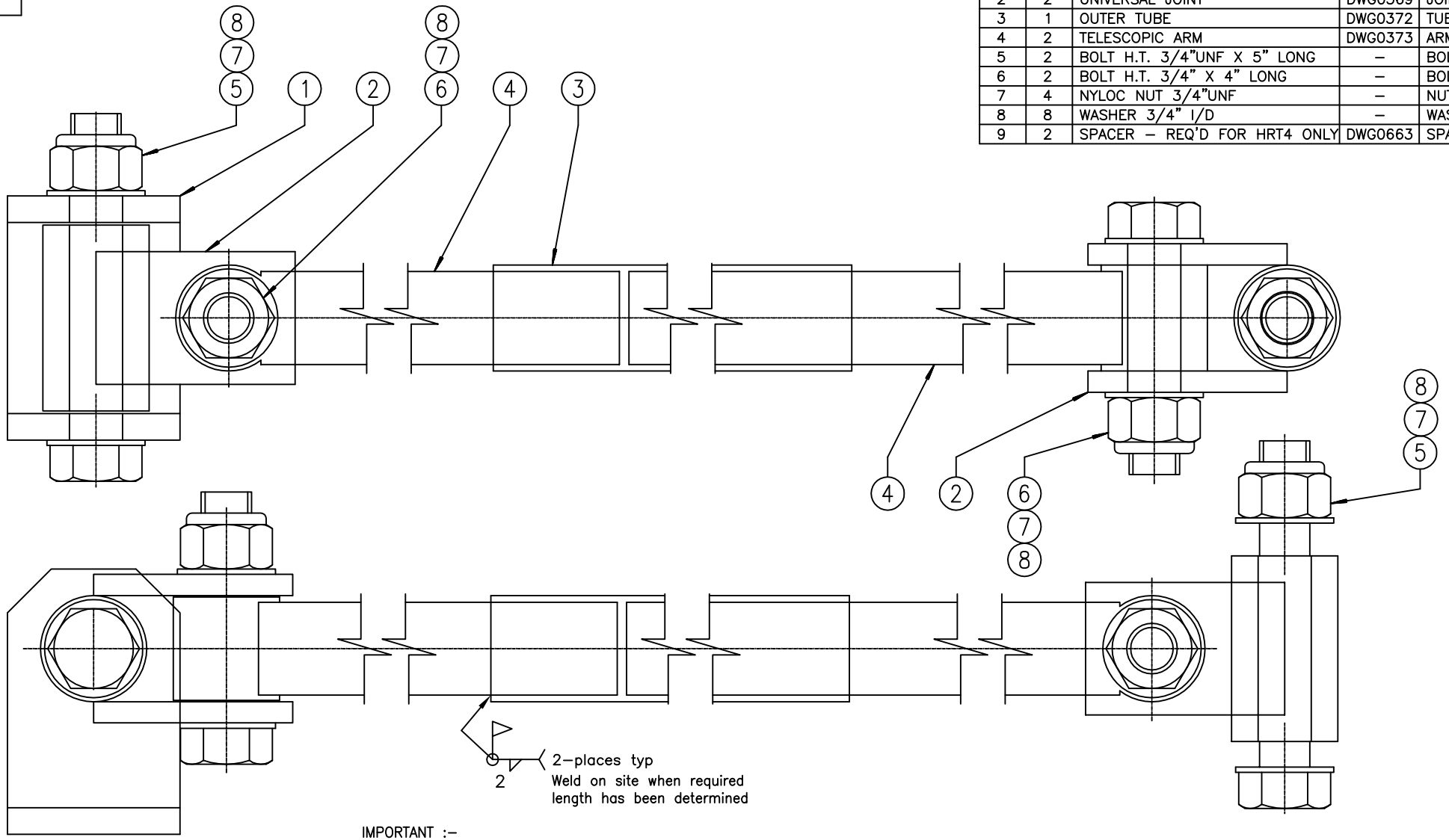
PART No: AS ABOVE
PROJECT: HRT–3 DYNO
TITLE: EXPLODED VIEW AND PARTS LIST FOR HRT–3 DYNO (VERTICAL MOUNT)
SCALE N/A
SHEET 1 OF 1
DRAWING No: DWG 0104
FILE No: 010401AG.DWG
REV 1.6

3RD ANGLE

ITEM	QTY	MATERIAL/DESCRIPTION	DWG No.	STOCK CODE
1	1	MOUNTING BRACKET	DWG0368	BRAMAA0368
2	2	UNIVERSAL JOINT	DWG0369	JOINU0369
3	1	OUTER TUBE	DWG0372	TUB00372
4	2	TELESCOPIC ARM	DWG0373	ARMTAA0373
5	2	BOLT H.T. 3/4"UNF X 5" LONG	–	BOL34U5ZP
6	2	BOLT H.T. 3/4" X 4" LONG	–	BOL34U4ZP
7	4	NYLOC NUT 3/4"UNF	–	NUTNYU34ZP
8	8	WASHER 3/4" I/D	–	WAS34FZP
9	2	SPACER – REQ'D FOR HRT4 ONLY	DWG0663	SPAAA0663



IMPORTANT :–
When altering this drawing ensure that the changes are also included on drawing DWG0371

FINISH – PRIMER – POLYZINC 660
COATING – INTERPRON 610 MATT BLACK

REV	DATE	DESCRIPTION OF CHANGE	APPR'D
1.0	16/10/01	CONVERTED TO AUTOCAD FORMAT	S.C.
1.1	25/08/03	REFER TO DR#186	S.C.

TOL: X. +/– 1
X.X +/– 0.2
X.XX AS STATED

DO NOT SCALE DRAWING
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DRAWN	APPROVED	PART OF ASSY
F. LOCKER	M. OBST	–
10/11/94	10/11/94	

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PART No:	PROJECT:
ARMART0370	ARTICULATED ARM

TITLE: GENERAL ARRANGEMENT

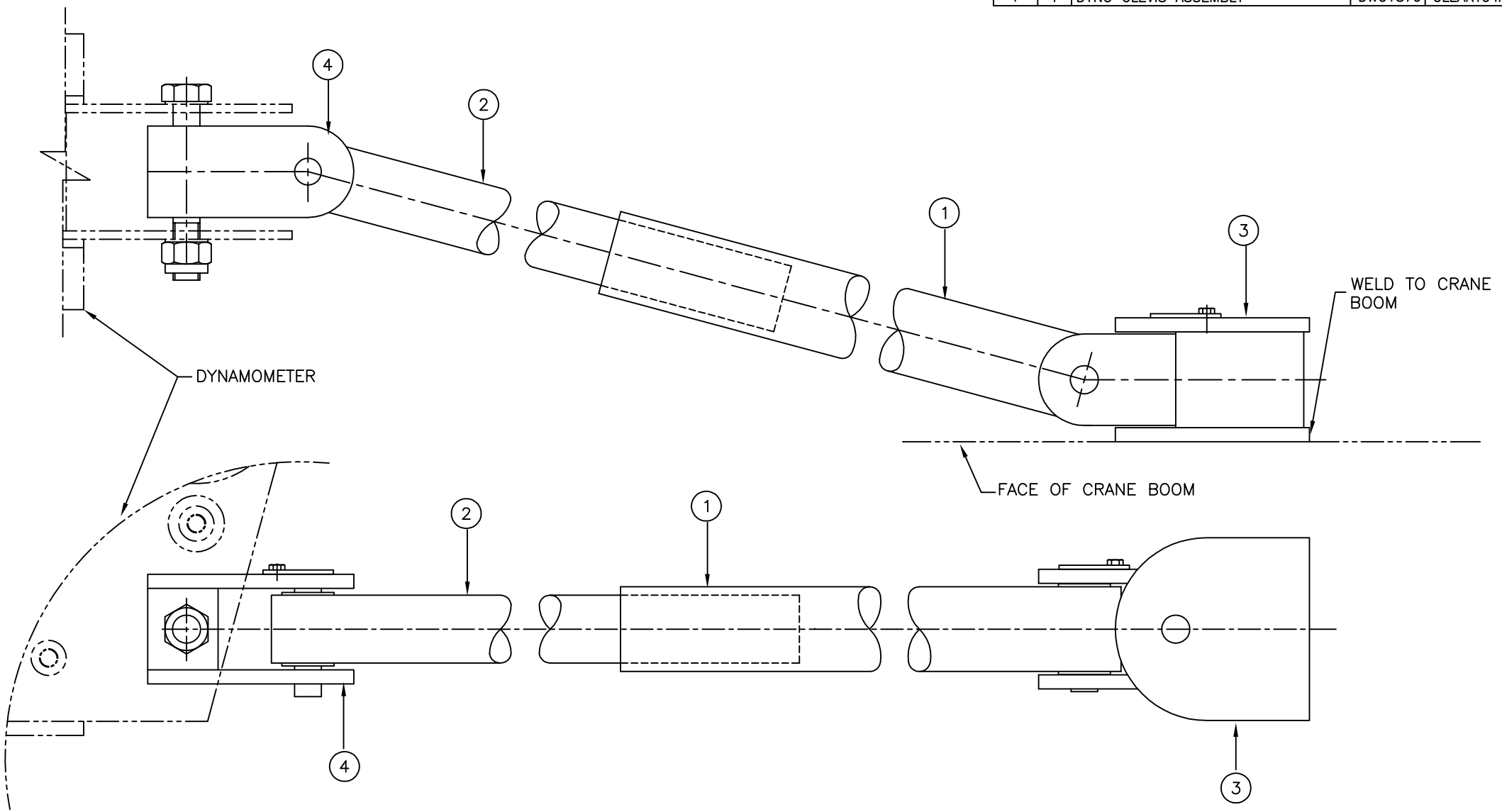
SCALE N/A

SHEET 1 OF 1

DRAWING No:	FILE No:	REV
DWG 0370	037001AB.DWG	1.1

3RD ANGLE

ITEM	QTY	MATERIAL/DESCRIPTION	DWG No.	STOCK CODE
1	1	OUTSIDE TUBE	DWG0807	TUBART04
2	1	INSIDE TUBE	DWG0808	TUBART03
3	1	BOOM CLEVIS ASSEMBLY	DWG1878	CLEART03
4	1	DYNO CLEVIS ASSEMBLY	DWG1879	CLEART04A



REV	DATE	DESCRIPTION OF CHANGE	APPR'D
1.0	19/09/95	ISSUED FOR MANUFACTURE	
1.1	23/02/99	REFER TO DR#541	M.O.

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

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

DRAWN	APPROVED	PART OF ASSY
F. LOCKER	M. OBST	—
19/09/95	19/09/95	

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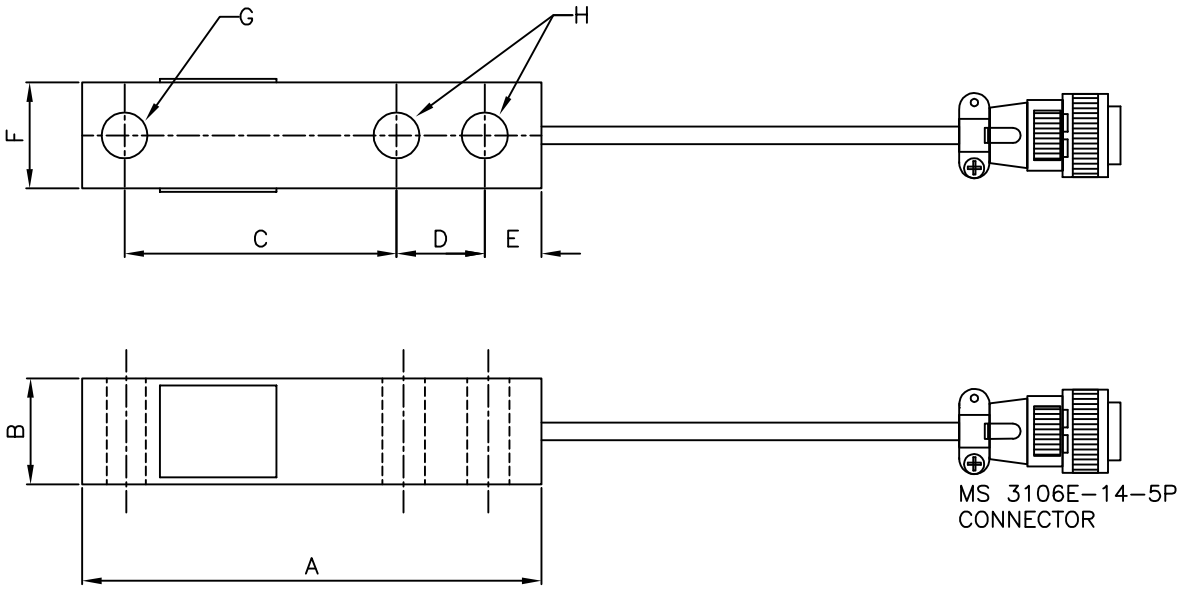
FAX +61 8 8352 1684

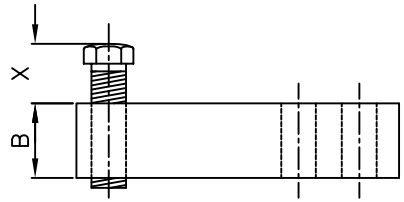
PART No: ARMARTIC02	PROJECT: ARTIC ARM – H/D
TITLE: GENERAL ARRANGEMENT	SCALE N/A
	SHEET 1 OF 1
DRAWING No: DWG 0805	FILE No: 080501AB.DWG
	REV 1.1

3RD ANGLE

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





STANDARD HEIGHT POSITION
OF SCREW IN LOAD CELL

DYNO	"B"		"X"	
	MM	INCHES	MM	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

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

REV	DATE	DESCRIPTION OF CHANGE	APPR'D
1.1	05/11/98	REFER TO DR#564	M.O.

TOL: X. +/− 1
X.X +/− 0.2
X.XX AS STATED

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

DRAWN	APPROVED	PART OF ASSY
M. TURNER	M. OBST	—
08/03/96	14/04/97	

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PART No:	PROJECT:
—	—

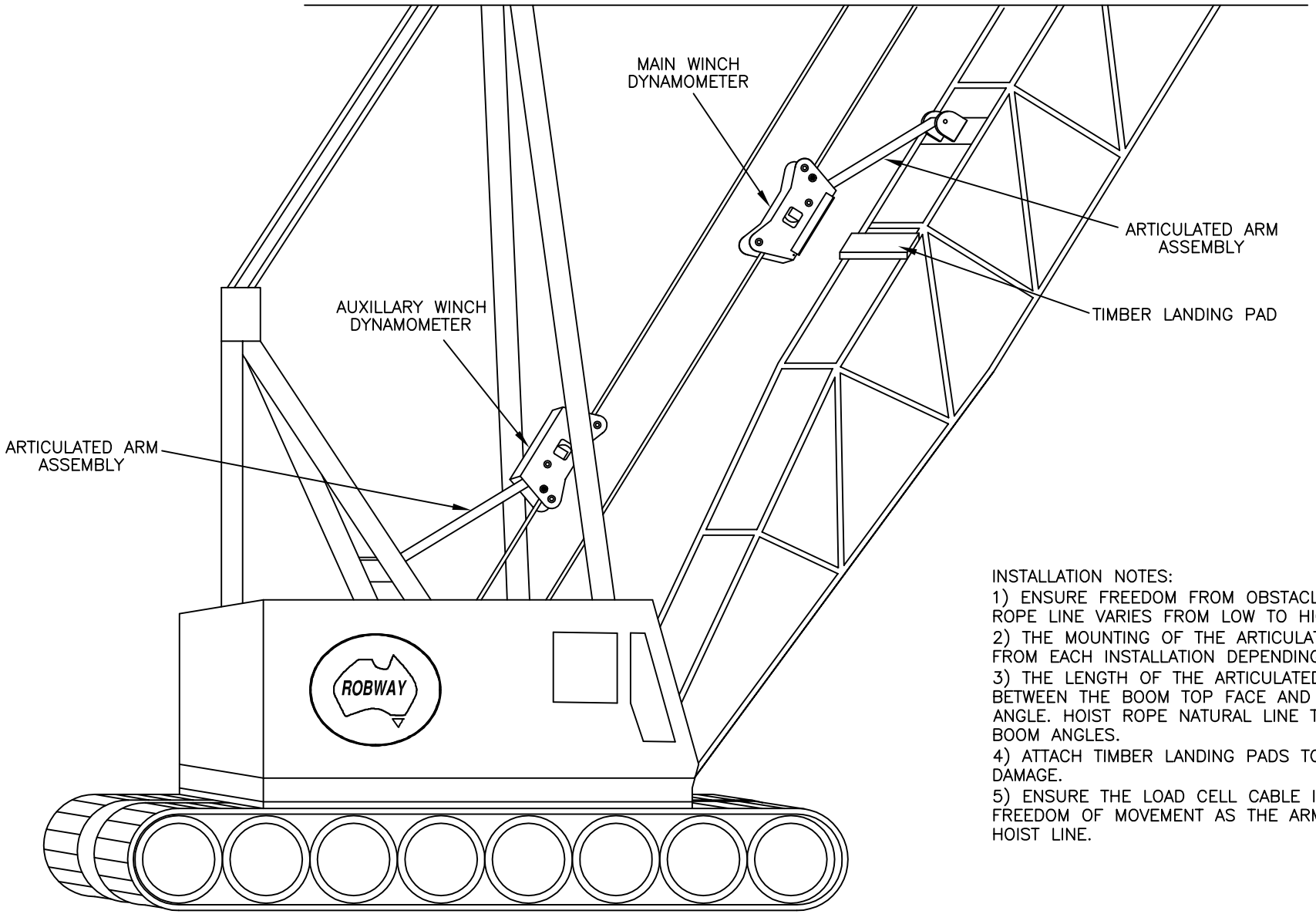
TITLE: DIMENSIONS FOR 2.2 AND 5MT BRIDGE BEAMS

SCALE N/A

SHEET 1 OF 1

DRAWING No:	FILE No:	REV
DWG 0989	098901AB.DWG	1.1

ARTICULATED ARM MOUNTED DYNAMOMETERS AT BOOM BUTT



INSTALLATION NOTES:

1) ENSURE FREEDOM FROM OBSTACLES THROUGH OUT ARC AS ROPE LINE VARIES FROM LOW TO HIGH BOOM ANGLE.

2) THE MOUNTING OF THE ARTICULATED ARM ASSEMBLY CAN VARY FROM EACH INSTALLATION DEPENDING ON THE BOOM CONSTRUCTION.

3) THE LENGTH OF THE ARTICULATED ARM MUST SUIT THE DISTANCE BETWEEN THE BOOM TOP FACE AND THE ROPE WHEN AT MAXIMUM ANGLE. HOIST ROPE NATURAL LINE TO BE MAINTAINED FOR ALL BOOM ANGLES.

4) ATTACH TIMBER LANDING PADS TO THE BOOM TO PROTECT FROM DAMAGE.

5) ENSURE THE LOAD CELL CABLE IS FITTED SAFELY SECURED WITH FREEDOM OF MOVEMENT AS THE ARM ASSEMBLY FOLLOWS THE HOIST LINE.

REV	DATE	DESCRIPTION OF CHANGE	APPR'D

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

DO NOT SCALE DRAWING
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UNLESS OTHERWISE STATED

DRAWN	APPROVED	PART OF ASSY
S. CHAMBERS	A. CANLAS	–
13/07/01	13/07/01	

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PART No:	PROJECT:
–	–

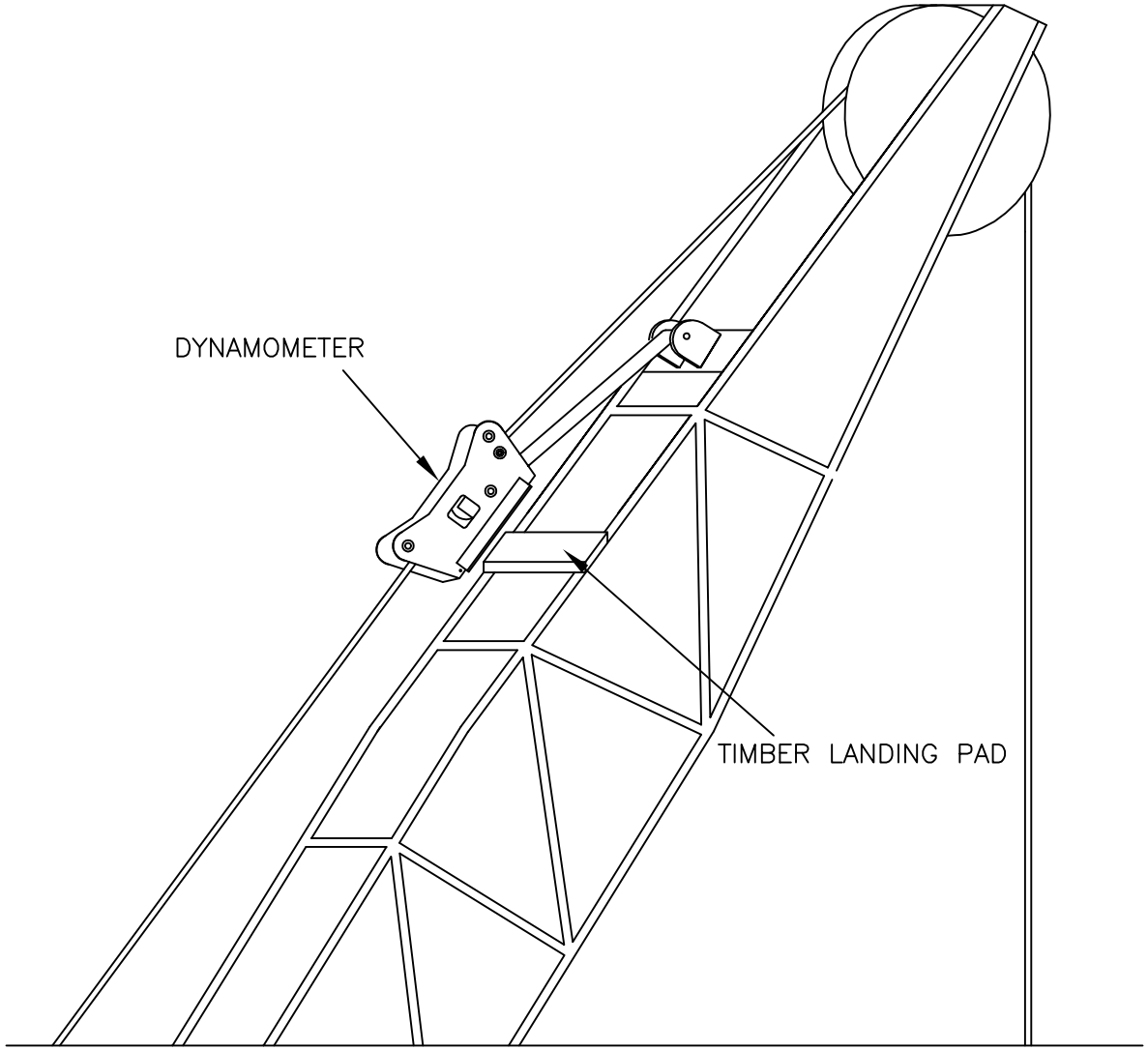
TITLE: TYPICAL DYNAMOMETER INSTALLATION TO SUIT STRUT BOOM CRANES

SCALE N/A

SHEET 1 OF 4

DRAWING No:	FILE No:	REV
DWG 2468	246801AA.DWG	1.0

ARTICULATED ARM MOUNTED DYNAMOMETERS AT BOOM TIP



REV	DATE	DESCRIPTION OF CHANGE	APPR'D

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

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

DRAWN	APPROVED
S. CHAMBERS	A. CANLAS
13/07/01	13/07/01

PART OF ASSY: –

LSI ROBWAY
A Division of Load Systems International

LSI–ROBWAY
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FAX +61 8 8352 1684

PART No: –

PROJECT: –

TITLE: TYPICAL DYNAMOMETER INSTALLATION TO SUIT STRUT BOOM CRANES

SCALE: N/A

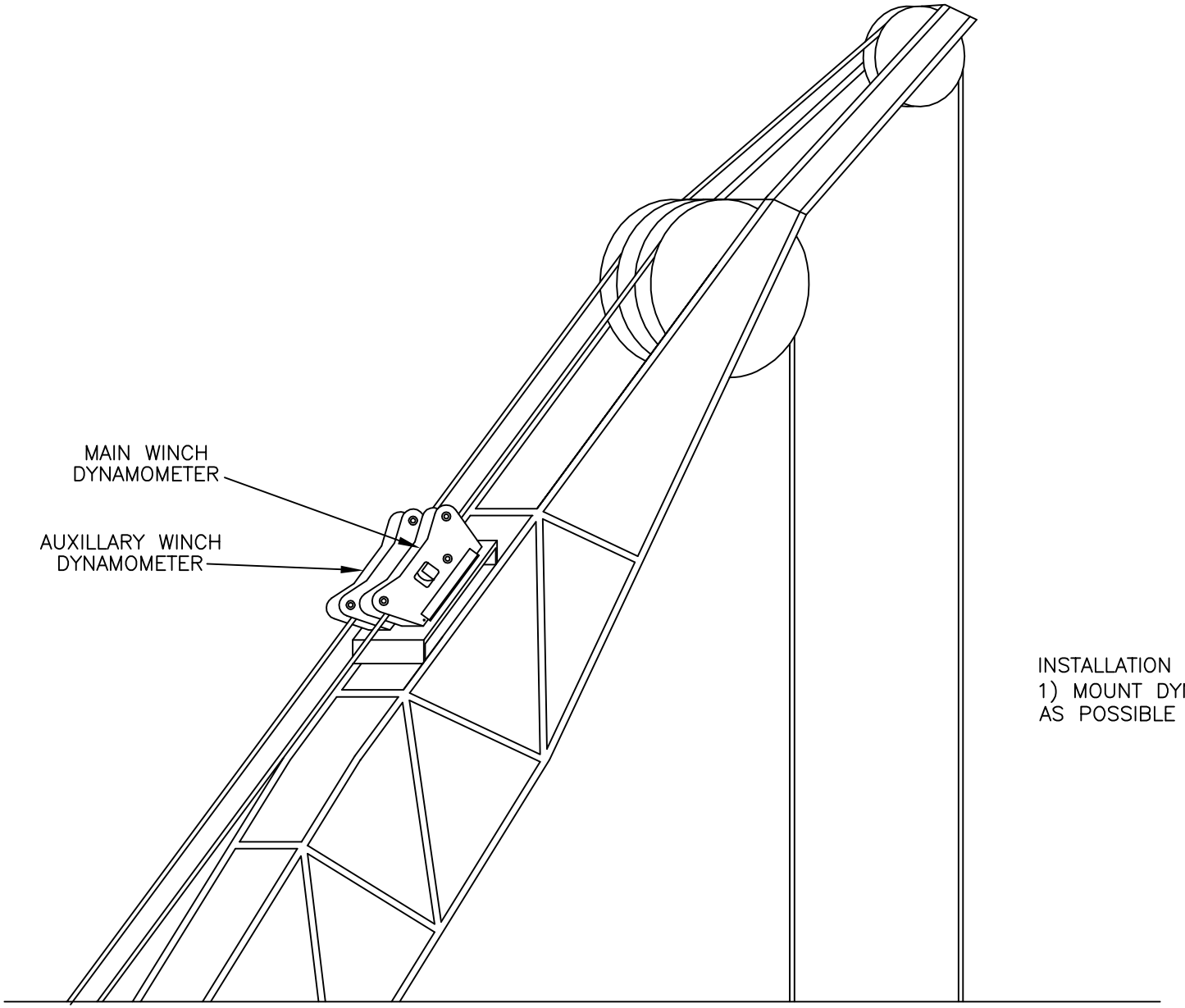
SHEET: 2 OF 4

DRAWING No: DWG 2468

FILE No: 246801AA.DWG

REV: 1.0

FIXED MOUNTED DYNAMOMETERS AT BOOM TIP



INSTALLATION NOTES:

1) MOUNT DYNAMOMETERS AS CLOSE AS POSSIBLE TO THE BOOM TIP.

REV	DATE	DESCRIPTION OF CHANGE	APPR'D

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

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

DRAWN	APPROVED
S. CHAMBERS	A. CANLAS
13/07/01	13/07/01

PART OF ASSY: –

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FAX +61 8 8352 1684

PART No: –

PROJECT: –

TITLE: TYPICAL DYNAMOMETER INSTALLATION TO SUIT STRUT BOOM CRANES

SCALE: N/A

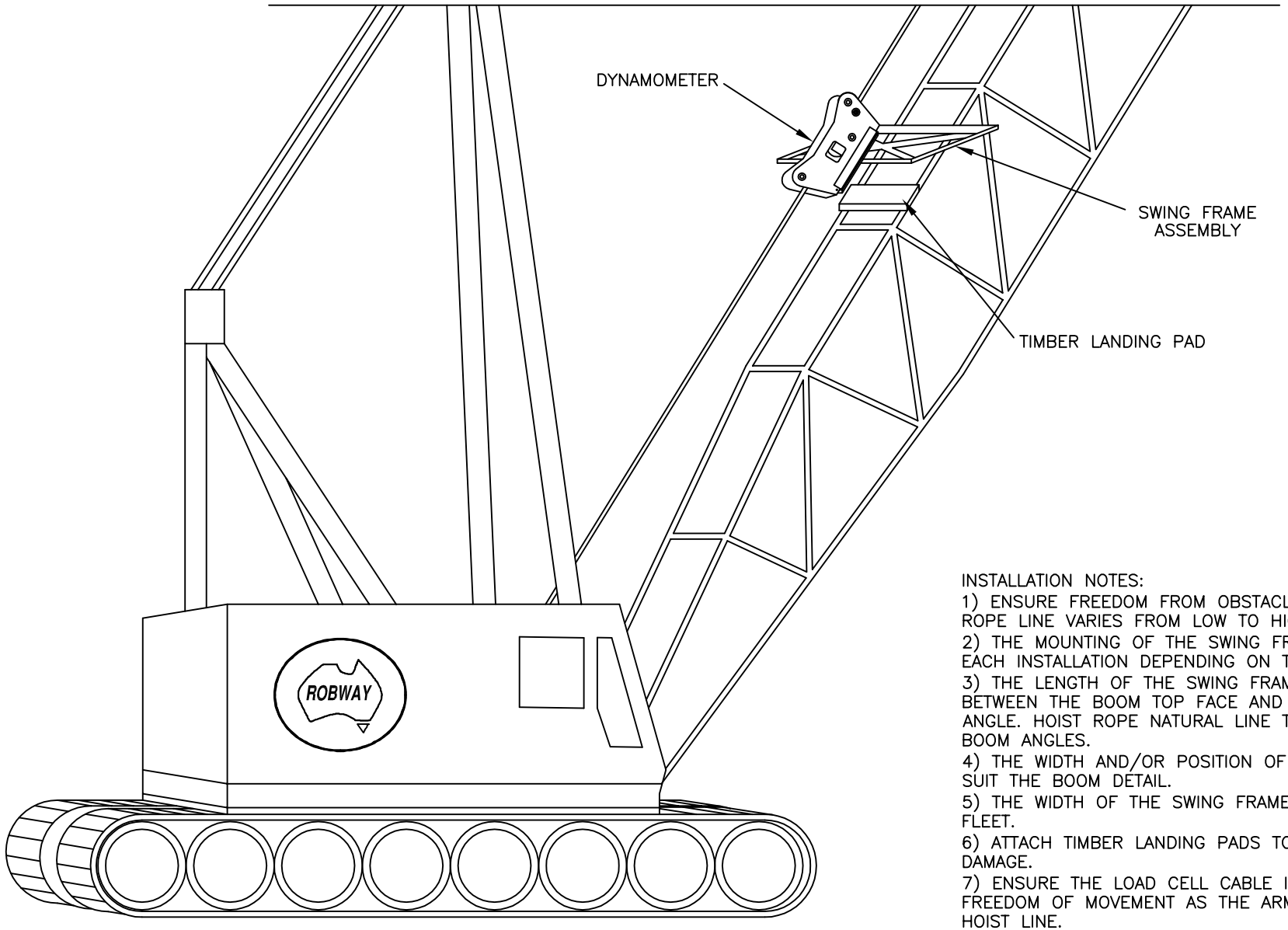
SHEET: 3 OF 4

DRAWING No: DWG 2468

FILE No: 246801AA.DWG

REV: 1.0

SWING FRAME MOUNTED DYNAMOMETERS AT BOOM BUTT



INSTALLATION NOTES:

1) ENSURE FREEDOM FROM OBSTACLES THROUGH OUT ARC AS ROPE LINE VARIES FROM LOW TO HIGH BOOM ANGLE.

2) THE MOUNTING OF THE SWING FRAME ASSEMBLY CAN VARY FROM EACH INSTALLATION DEPENDING ON THE BOOM CONSTRUCTION.

3) THE LENGTH OF THE SWING FRAME MUST SUIT THE DISTANCE BETWEEN THE BOOM TOP FACE AND THE ROPE WHEN AT MAXIMUM ANGLE. HOIST ROPE NATURAL LINE TO BE MAINTAINED FOR ALL BOOM ANGLES.

4) THE WIDTH AND/OR POSITION OF THE SWING FRAME BASE MUST SUIT THE BOOM DETAIL.

5) THE WIDTH OF THE SWING FRAME TO SUIT THE HOIST DRUM FLEET.

6) ATTACH TIMBER LANDING PADS TO THE BOOM TO PROTECT FROM DAMAGE.

7) ENSURE THE LOAD CELL CABLE IS FITTED SAFELY SECURED WITH FREEDOM OF MOVEMENT AS THE ARM ASSEMBLY FOLLOWS THE HOIST LINE.

REV	DATE	DESCRIPTION OF CHANGE	APPR'D

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

DO NOT SCALE DRAWING
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UNLESS OTHERWISE STATED

DRAWN	APPROVED
S. CHAMBERS	A. CANLAS
13/07/01	13/07/01

PART OF ASSY: –

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SOUTH AUSTRALIA
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FAX +61 8 8352 1684

PART No: –

PROJECT: –

TITLE: TYPICAL DYNAMOMETER INSTALLATION TO SUIT STRUT BOOM CRANES

SCALE: N/A

SHEET: 4 OF 4

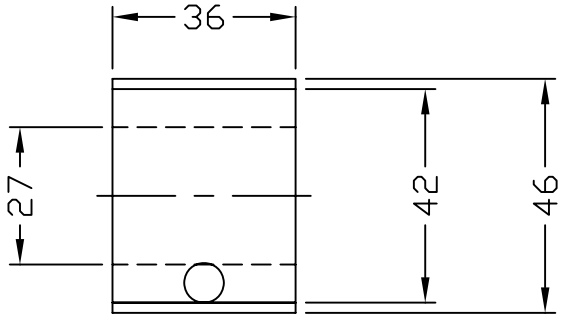
DRAWING No: DWG 2468

FILE No: 246801AA.DWG

REV: 1.0

3RD ANGLE

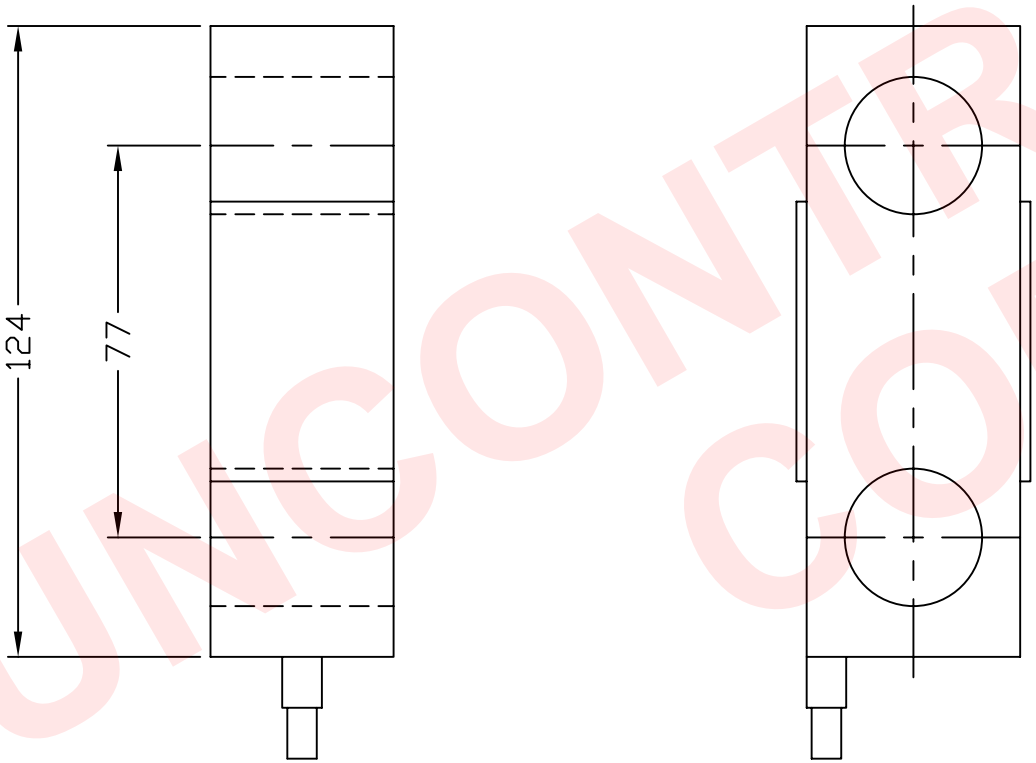
ITEM	QTY	MATERIAL/DESCRIPTION	DWG No.	STOCK CODE
1	-	-	-	-



CAPACITY 6,000 kg
OUTPUT 1 mV/V
ACCURACY BETTER THAN 0.2%
TEMPERATURE COMPENSATED

THE RW SERIES LOADCELLS ARE
USED IN CRANE AND HOIST APPLICATIONS

THESE UNITS MUST BE USED WITH MACHINED
PIN TO ENSURE THAT THERE IS A CORRECT
LOAD APPLICATION TO LOADCELL RIGGING HOLE



4 CONDUCTOR SCREENED CABLE (2M)

REV	DATE	DESCRIPTION OF CHANGE	APPR'D

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

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

DRAWN	APPROVED	PART OF ASSY
C. HOBBY	M. OBST	
28/01/97	28/01/97	

ROBWAY SAFETY SYSTEMS PTY LTD
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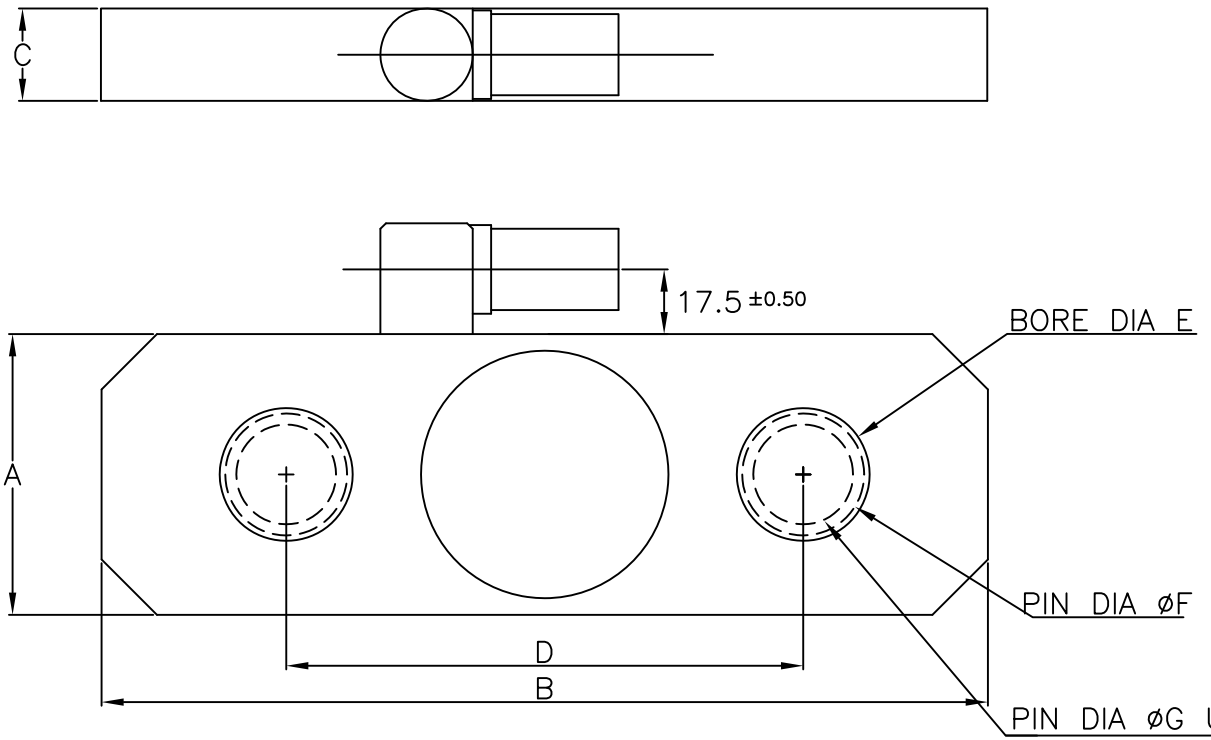
PART No: CELTPK6P
PROJECT:
TITLE: 6T TENSION LOADCELL
SCALE N/A
SHEET 1 OF 1
DRAWING No: DWG 1200
FILE No: 120001AA.DWG
REV 1.0

3RD ANGLE



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	
NO ELECTRICAL DAMAGE	150%
ULTIMATE	>400%
TEMPERATURE EFFECTS	
ON ZERO	<0.005% /DEG C
ON SPAN	<0.005% /DEG C
COMPENSATION RANGE:	−10 TO +70 DEG C
SEALING:	IP68 FULLY ENCAPSULATED

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	
1.1	06/05/98	REFER TO DR#480	M.O.
1.2	05/11/98	REFER TO DR#564	M.O.
1.3	05/01/06	ADD 20T TENSION CELL & SPACER DETAIL	S.C.
1.4	30/5/13	REFER PCR 489	J.H.
1.5	18/7/13	17.5±0.5 was 16.0	J.H.

TOL: X. +/− 0.5
X.X +/− 0.2
X.XX AS STATED

DO NOT SCALE DRAWING
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UNLESS OTHERWISE STATED

DRAWN	APPROVED	PART OF ASSY
M. TURNER	M. OBST	—
08/03/96	15/01/97	

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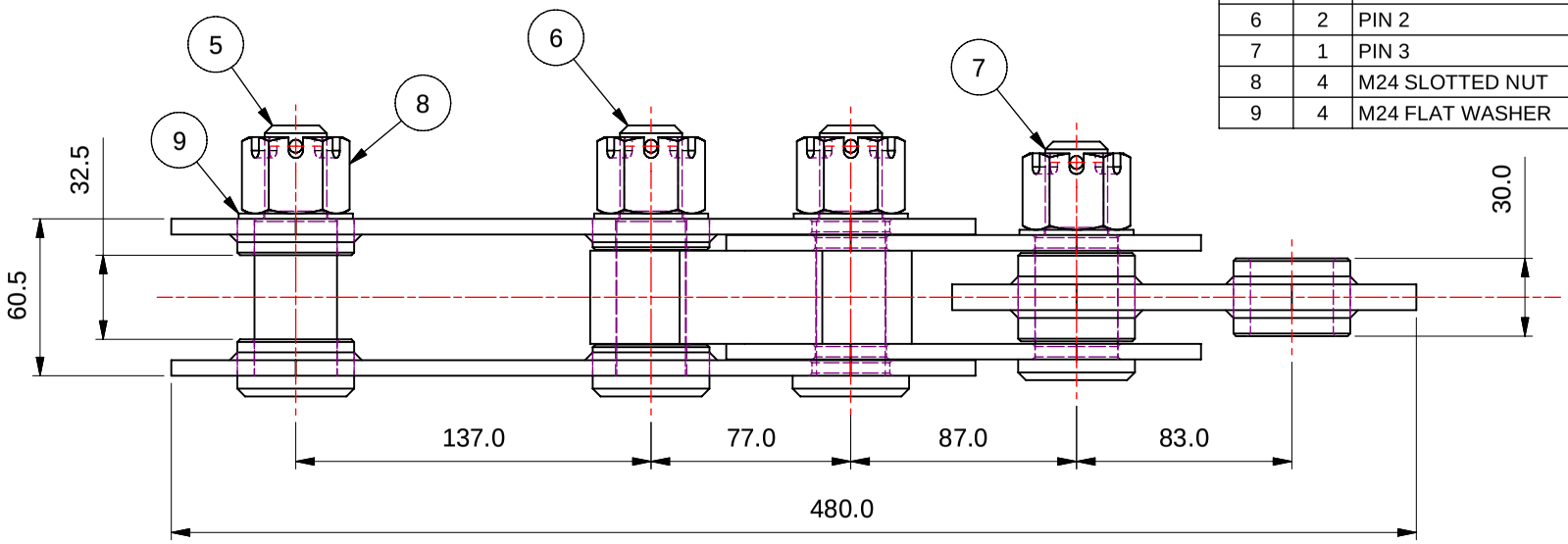
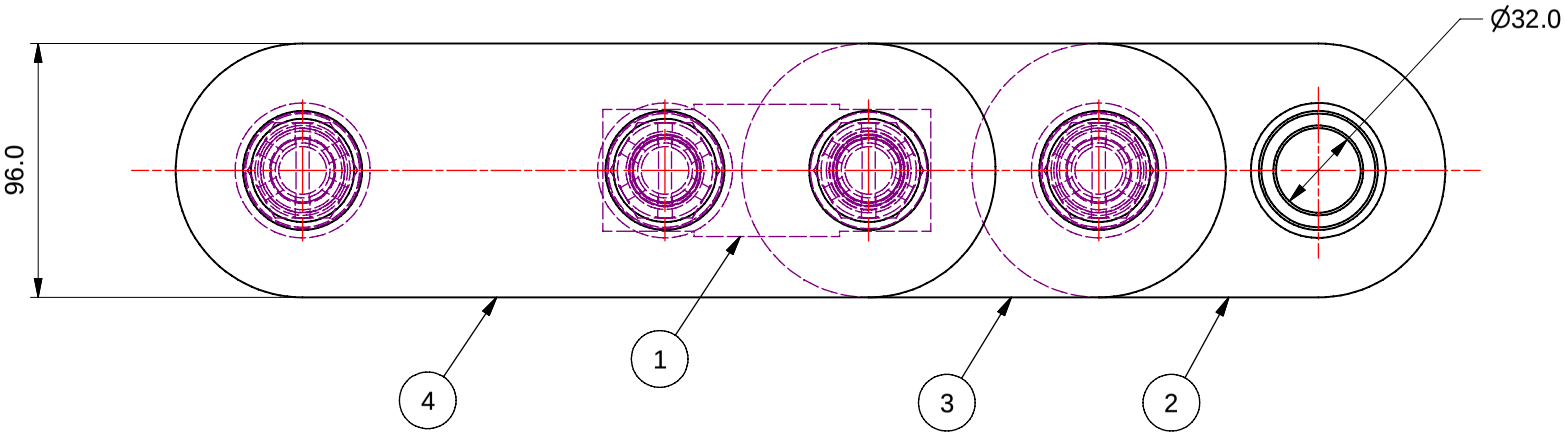
FAX +61 8 352 1684

PART No: —
PROJECT: —
TITLE: TENSION PLATE CELL DIMENSIONS TO SUIT 10, 15, 20, 30, CELLS
SCALE N/A
SHEET 1 OF 1
DRAWING No: DWG 0990
FILE No: 099001AF.DWG
REV 1.5

3RD ANGLE

Parts List			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	6T TENSION CELL	CELTPK6P
2	1	REDUCER PLATE	
3	2	INTERMEDIATE HANGER PLATE	
4	2	MAIN OVERLOAD PLATE	
5	1	PIN 1	
6	2	PIN 2	
7	1	PIN 3	
8	4	M24 SLOTTED NUT	AS 1112 - M24
9	4	M24 FLAT WASHER	AS 1237 - 24 mm





REV	DATE	DESCRIPTION OF CHANGE	APPRV'D

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

DRAWN BY	APPROVED BY	PART OF ASSY
S. CHAMBERS	A. CANLAS	-
7/09/2001	7/09/2001	

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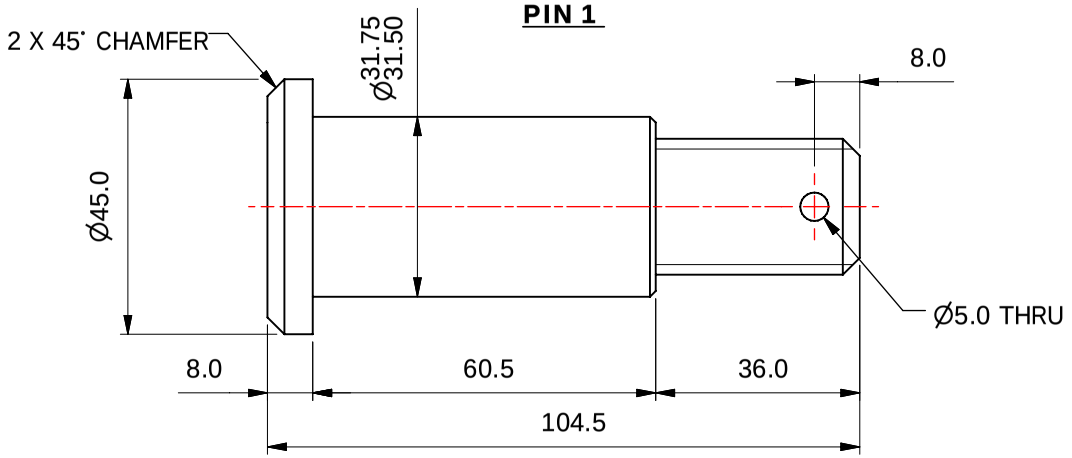
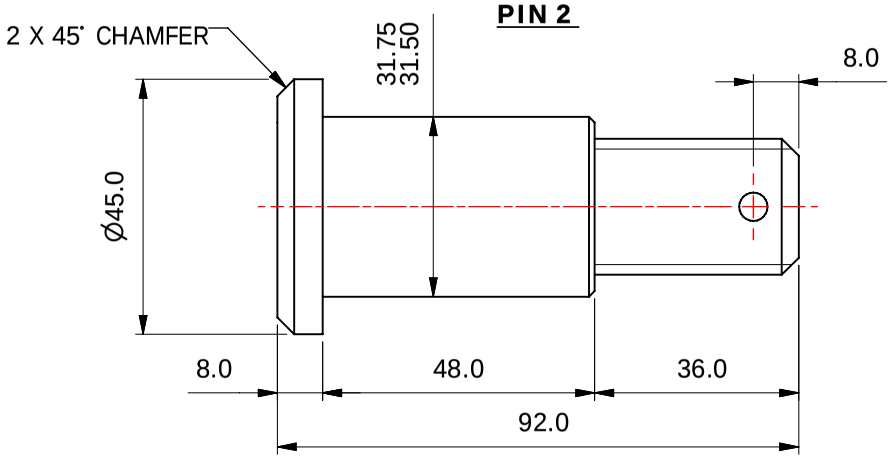
PART No: PLAOL6T
PROJECT: -
TITLE: 6T OVERLOAD PLATE
A4
SHEET 1 OF 5
DRAWING No: DWG 2533
FILE No: 253301AA.idw
REV 1.0

3RD ANGLE

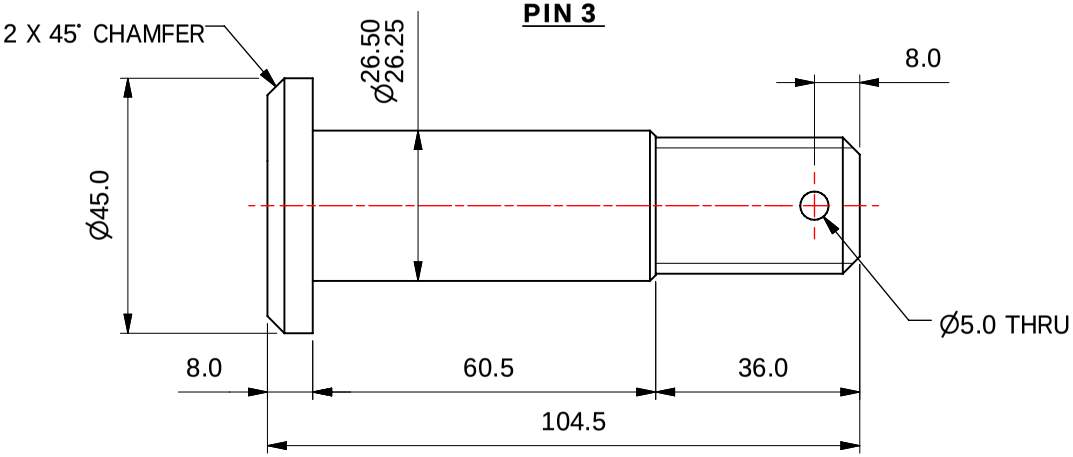
PIN 1



PIN 2



PIN 3



MATERIAL: 4140 HIGH TENSILE
FINISH: ZINC PLATED

REV	DATE	DESCRIPTION OF CHANGE	APPRV'D

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

DRAWN BY	APPROVED BY	PART OF ASSY
S. CHAMBERS	A. CANLAS	-
7/09/2001	7/09/2001	

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PHONE: +61 8 8238 3500
FAX: +61 8 8352 1684

PART No:	PROJECT:
PLAOL6T	-

TITLE: 6T OVERLOAD PLATE

A4

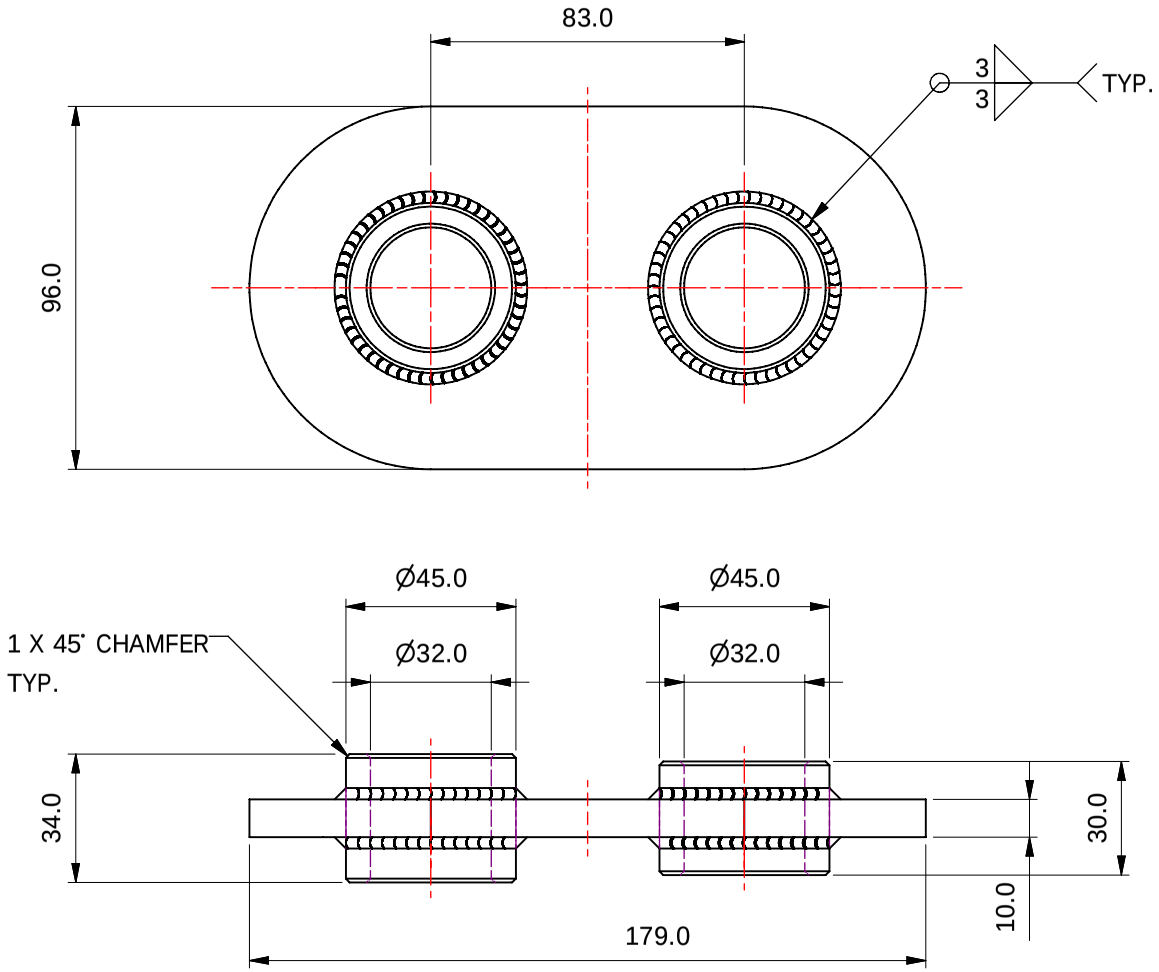
SHEET 2 OF 5

DRAWING No:	FILE No:	REV
DWG 2533	253301AA.idw	1.0

3RD ANGLE

REDUCER PLATE

MATERIAL: 10mm BISALLOY 80, Ø45mm MILD STEEL
FINISH: ZINC PLATED, POWDER COAT BLACK



REV	DATE	DESCRIPTION OF CHANGE	APPRV'D

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

DRAWN BY	APPROVED BY	PART OF ASSY
S. CHAMBERS	A. CANLAS	-
7/09/2001	7/09/2001	

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PHONE: +61 8 8238 3500
FAX: +61 8 8352 1684

PART No:	PROJECT:
PLAOL6T	-

TITLE: 6T OVERLOAD PLATE

A4

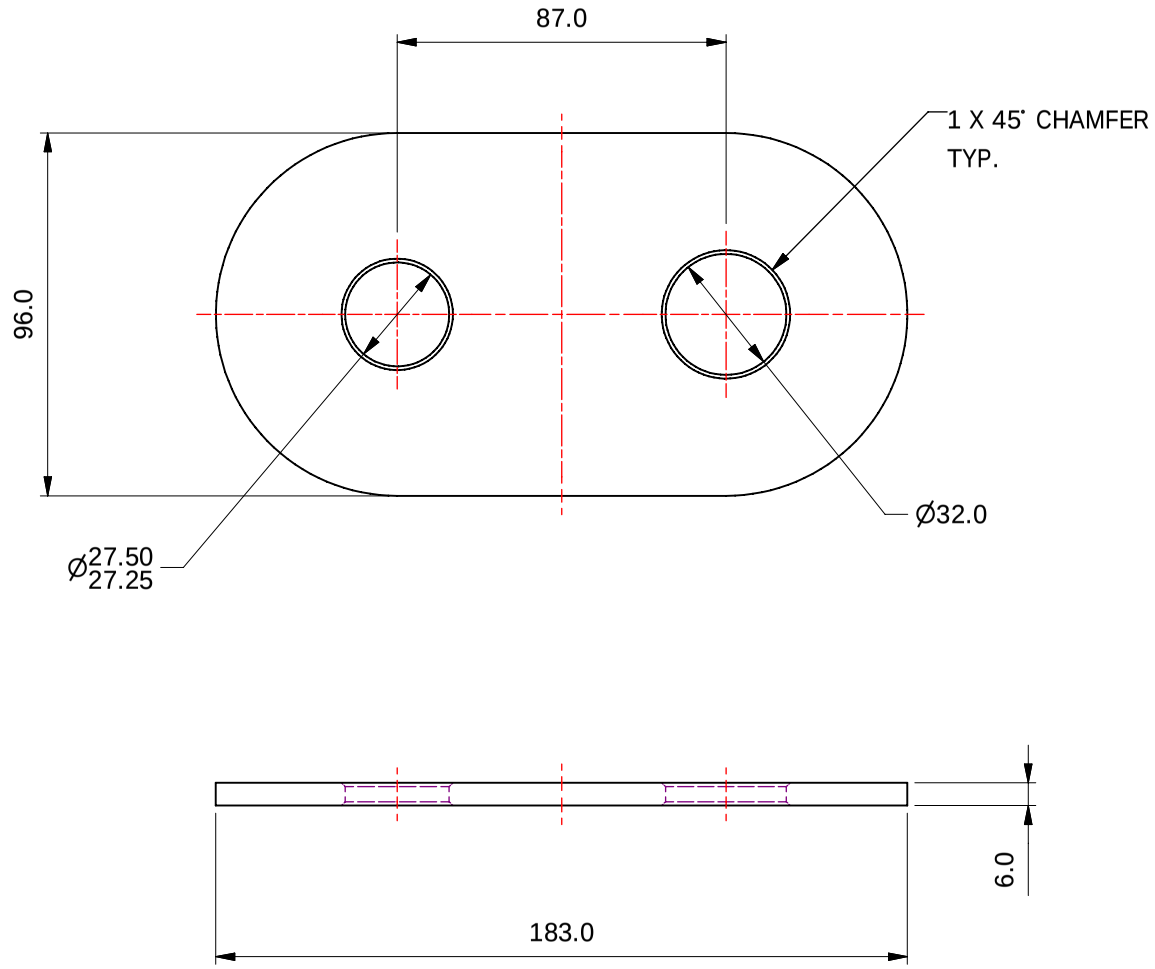
SHEET 3 OF 5

DRAWING No:	FILE No:	REV
DWG 2533	253301AA.idw	1.0

3RD ANGLE

INTERMEDIATE HANGER PLATE

MATERIAL: 6mm BISALLOY 80
FINISH: ZINC PLATE, POWDER COAT BLACK



REV	DATE	DESCRIPTION OF CHANGE	APPRV'D

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

DRAWN BY	APPROVED BY
S. CHAMBERS	A. CANLAS
7/09/2001	7/09/2001

PART OF ASSY: -

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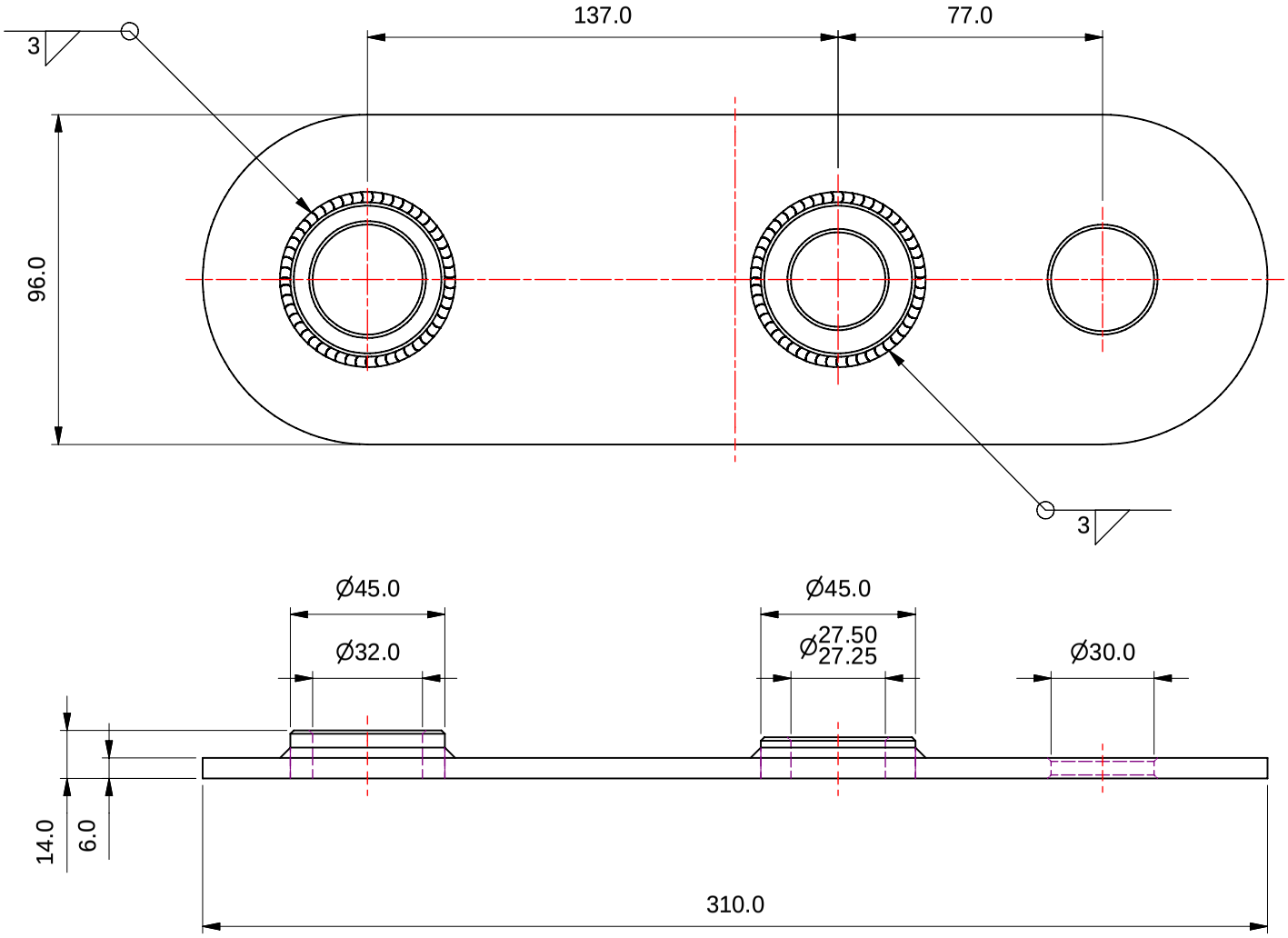
PART No: PLAOL6T
PROJECT: -
TITLE: 6T OVERLOAD PLATE
A4
SHEET 4 OF 5
DRAWING No: DWG 2533
FILE No: 253301AA.idw
REV 1.0

MAIN LOAD PLATE

MATERIAL: 6mm BISALLOY 80, Ø45mm MILD STEEL
FINISH: ZINC PLATED, POWDER COAT BLACK



REV	DATE	DESCRIPTION OF CHANGE	APPRV'D

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

DRAFTING STANDARD: AS1100

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UNLESS OTHERWISE STATED

DRAWN BY	APPROVED BY	PART OF ASSY
S. CHAMBERS	A. CANLAS	-
7/09/2001	7/09/2001	

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PHONE: +61 8 8238 3500
FAX: +61 8 8352 1684

PART No:	PROJECT:
PLAOL6T	-

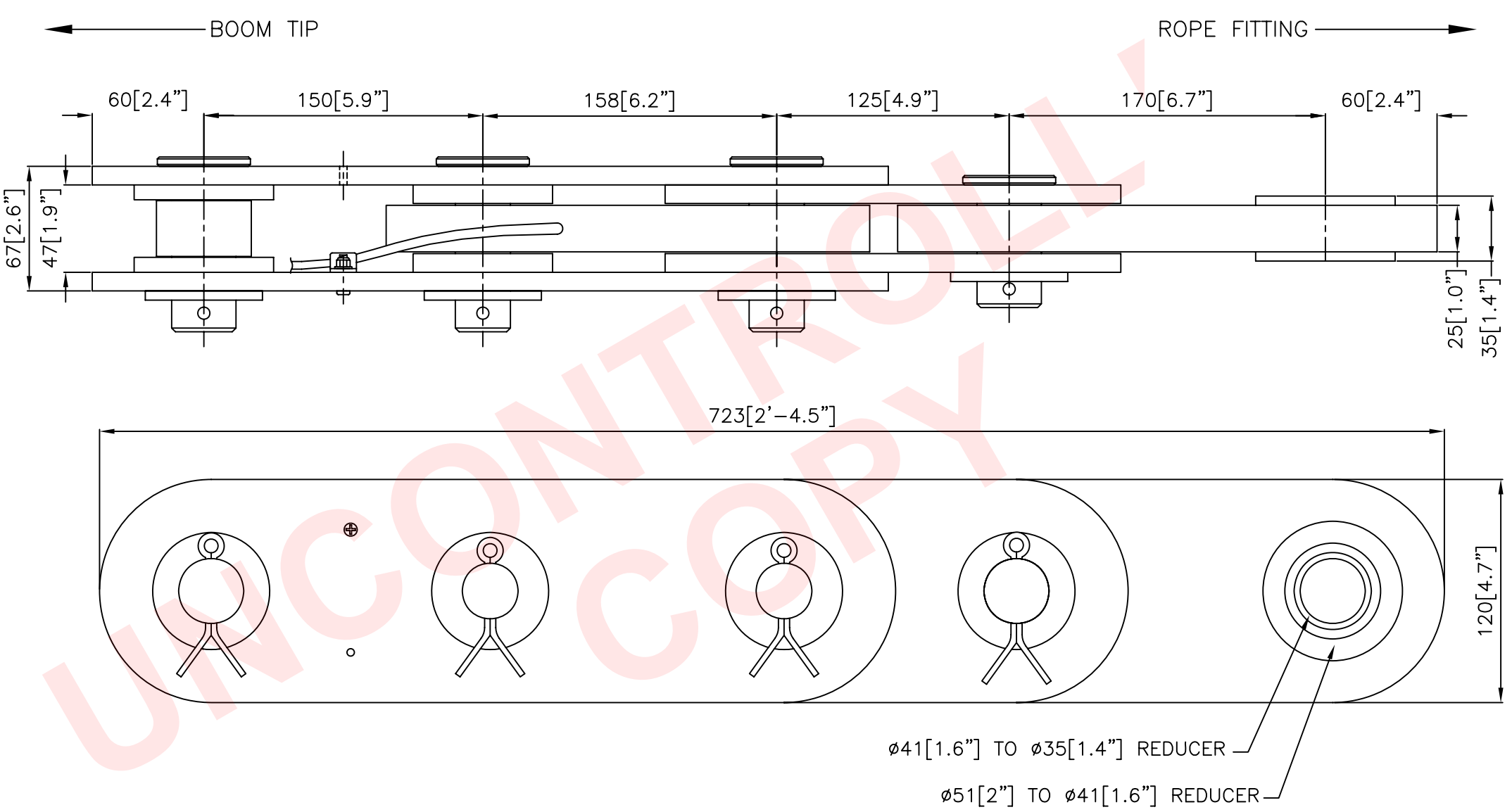
TITLE: 6T OVERLOAD PLATE

A4

SHEET 5 OF 5

DRAWING No:	FILE No:	REV
DWG 2533	253301AA.idw	1.0

3RD ANGLE



REV	DATE	DESCRIPTION OF CHANGE	APPR'D
1.1	04/11/98	REFER TO DR#564	M.O.

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

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

DRAWN	APPROVED	PART OF ASSY
C. HOBBY	M. OBST	—
10/09/98	18/09/98	

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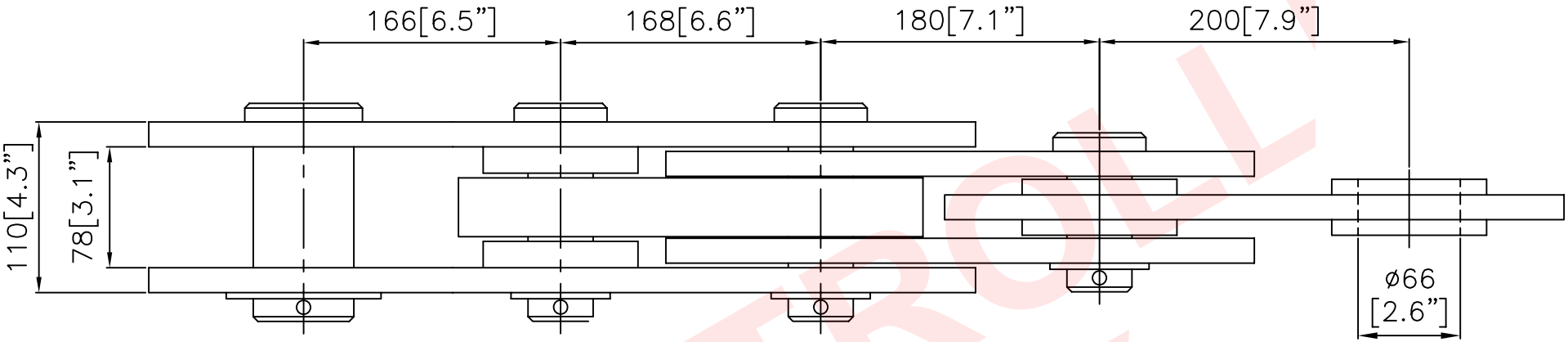
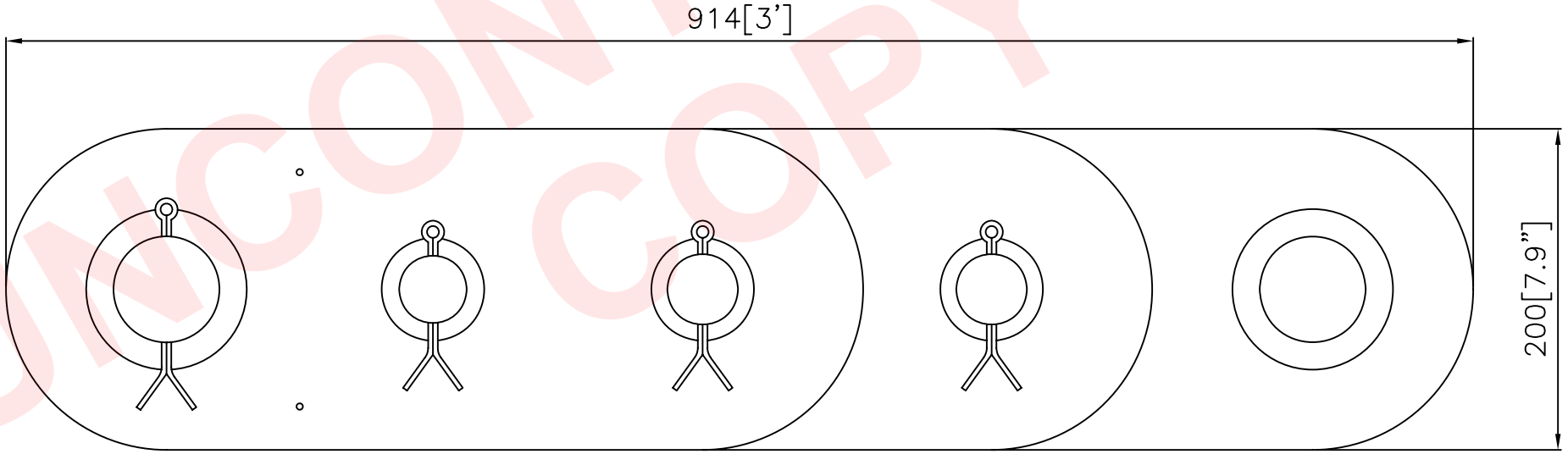
PART No: PLAOL1015
PROJECT: OVERLOAD PLATES
TITLE: DIMENSIONAL DETAIL FOR 10/15T OVERLOAD PLATE ASSEMBLY
SCALE N/A
SHEET 1 OF 1
DRAWING No: DWG 1722
FILE No: 172201AB.DWG
REV 1.1

3RD ANGLE

BOOM TIP

ROPE FITTING





REV	DATE	DESCRIPTION OF CHANGE	APPR'D
1.1	04/11/98	REFER TO DR#564	M.O.

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

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

DRAWN	APPROVED	PART OF ASSY
C. HOBBY	M. OBST	—
16/01/98	18/09/98	

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PART No: PLAOL30T

PROJECT: OVERLOAD PLATES

TITLE: DIMENSIONAL DETAIL FOR 30 TONNE OVERLOAD PLATE ASSEMBLY

SCALE N/A

SHEET 1 OF 1

DRAWING No: DWG 1723

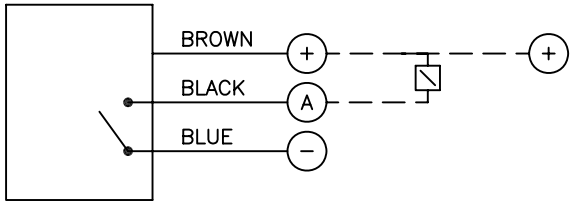
FILE No: 172301AB.DWG

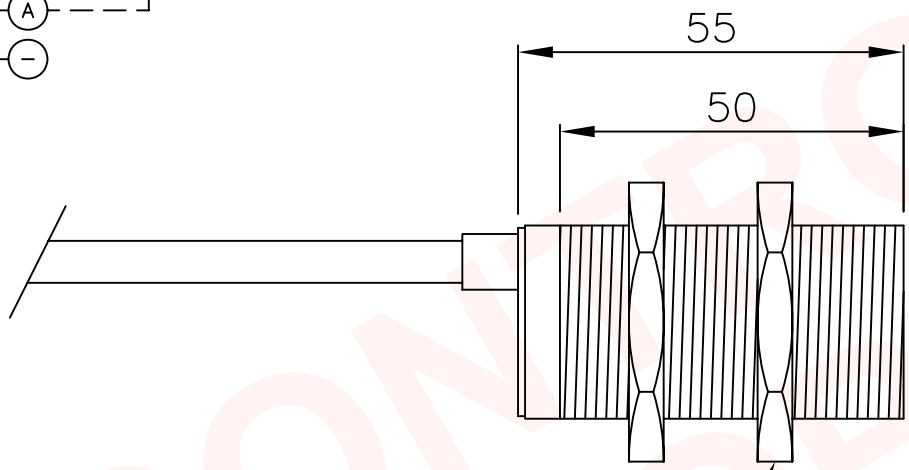
REV 1.1

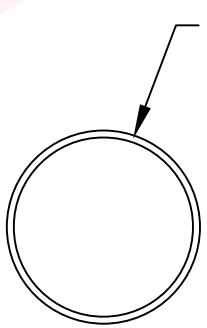
3RD ANGLE

WIRING DETAIL

(NPN – NORMALLY OPEN)







2 X LOCKNUTS SUPPLIED WITH PROX. SWITCH.

REV	DATE	DESCRIPTION OF CHANGE	APPR'D

TOL: X. +/– 1
X.X +/– 0.2
X.XX AS STATED

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

DRAWN	APPROVED	PART OF ASSY
S. CHAMBERS	A. CANLAS	–
10/07/01	10/07/01	

ROBWAY SAFETY SYSTEMS PTY LTD
32 WEST THEBARTON RD
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SOUTH AUSTRALIA
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FAX +61 8 8352 1684

PART No: SWIPROX02

PROJECT: PROXIMITY SWITCH

TITLE: DIMENSIONAL DETAILS

SCALE N/A

SHEET 1 OF 1

DRAWING No: DWG 2461

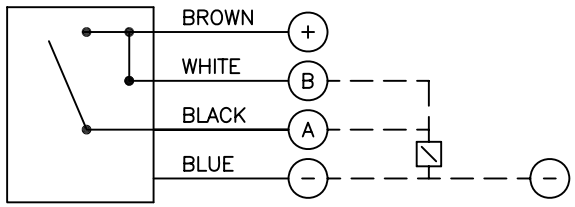
FILE No: 246101AA.DWG

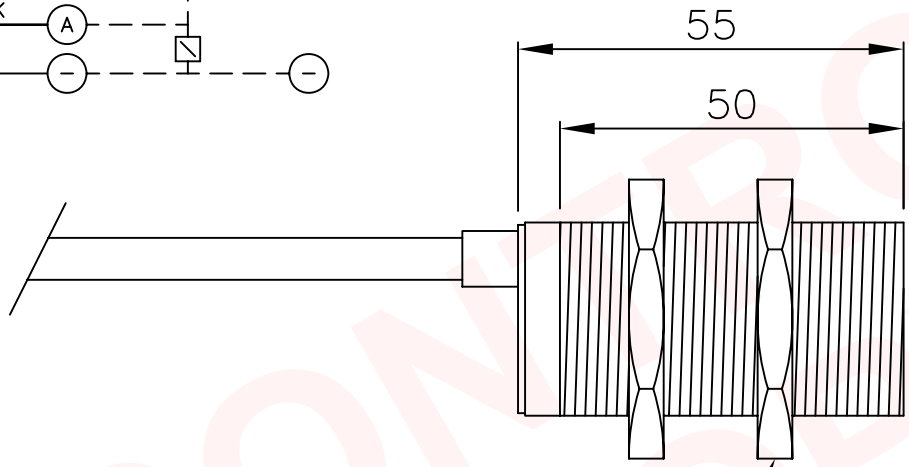
REV 1.0

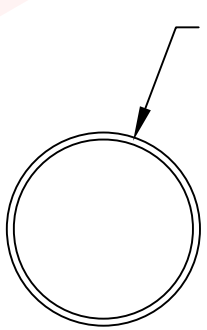
3RD ANGLE

WIRING DETAIL

(PNP – NORMALLY OPEN / NORMALLY CLOSED)







2 X LOCKNUTS SUPPLIED WITH PROX. SWITCH.

REV	DATE	DESCRIPTION OF CHANGE	APPR'D

TOL: X. +/– 1
X.X +/– 0.2
X.XX AS STATED

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

DRAWN	APPROVED	PART OF ASSY
S. CHAMBERS		–
10/07/01		

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

PART No: SWIPROX03

PROJECT: PROXIMITY SWITCH

TITLE: DIMENSIONAL DETAILS

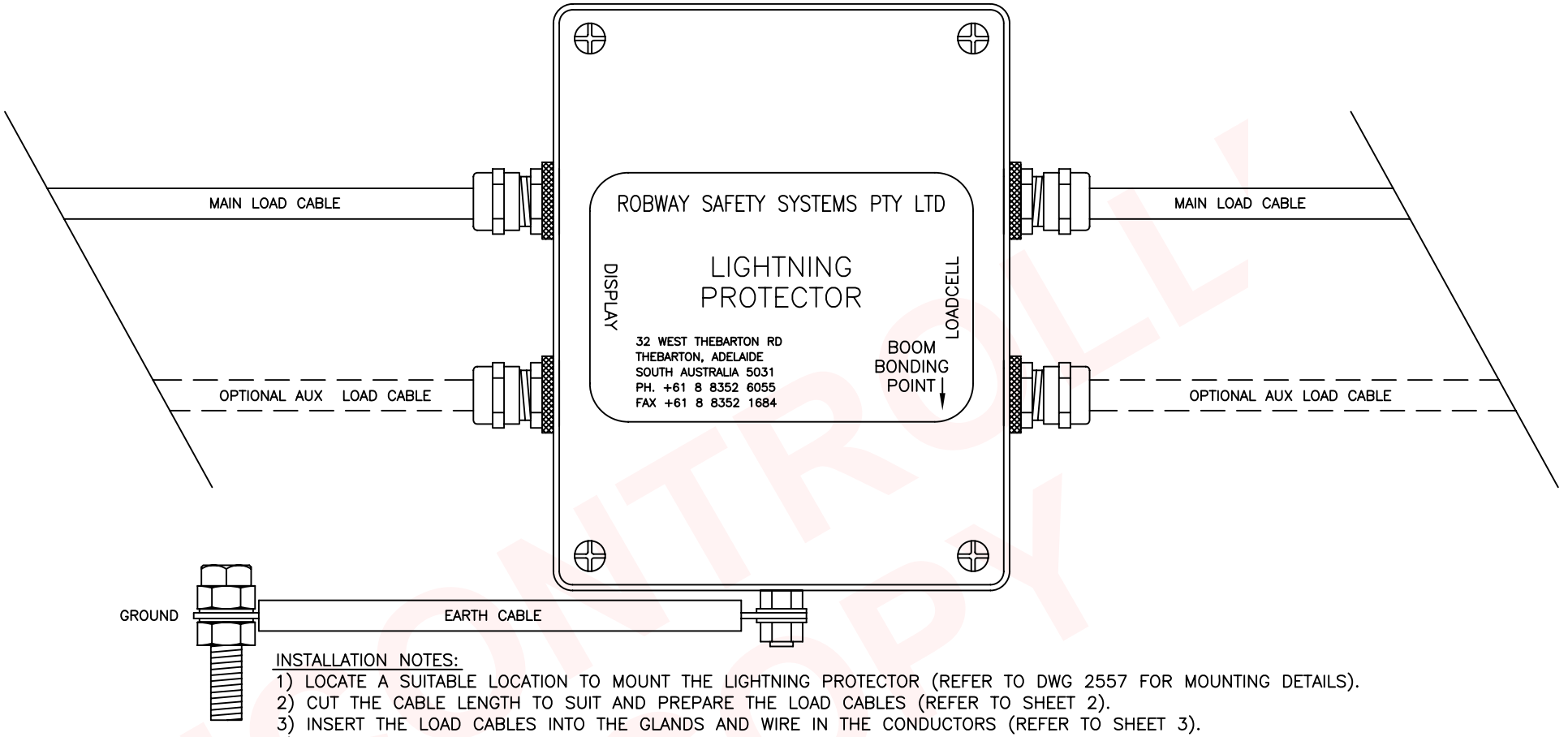
SCALE N/A

SHEET 1 OF 1

DRAWING No: DWG 2462

FILE No: 246201AA.DWG

REV 1.0



INSTALLATION NOTES:

1) LOCATE A SUITABLE LOCATION TO MOUNT THE LIGHTNING PROTECTOR (REFER TO DWG 2557 FOR MOUNTING DETAILS).
2) CUT THE CABLE LENGTH TO SUIT AND PREPARE THE LOAD CABLES (REFER TO SHEET 2).
3) INSERT THE LOAD CABLES INTO THE GLANDS AND WIRE IN THE CONDUCTORS (REFER TO SHEET 3).
4) SECURE ALL CABLES TO THE BOOM LACING USING THE CABLE TIES SUPPLIED IN THE KIT.
5) KEEP ALL EARTH LEADS AS SHORT AS POSSIBLE.
6) ATTACH THE EARTH CABLE TO THE HOSE CLAMP SUPPLIED IN THE KIT AND SECURE TO THE BOOM LACING (NOTE: MUST BE ATTACHED TO BARE METAL) <OR> ATTACH THE EARTH CABLE DIRECTLY TO THE BOOM USING THE M8 SCREW PROVIDED BY EITHER WELDING THE HEAD OF THE SCREW OR TAPPING AN M8X1.25 THREAD. IN ALL CASES THERE MUST BE A GOOD ELECTRICAL CONNECTION.
7) IF ARTICULATED ARMS ARE BEING USED ENSURE THE LOAD CABLE HAS ENOUGH FREEDOM TO MOVE AS THE ASSEMBLY FOLLOWS THE HOIST LINE.
8) FOLLOWING INSTALLATION CHECK THAT THE LOAD CABLE SHIELDS ARE ELECTRICALLY CONNECTED TO THEMSELVES AND TO THE BOOM CHASSIS.
9) THE USE OF A LIGHTNING ROD AT THE BOOM TIP WHICH IS CONNECTED TO AN EARTH BONDING CONDUCTOR IS STRONGLY RECOMMENDED, AS IS BONDING BETWEEN BOOM SECTIONS, ACROSS THE BOOM PIVOT, BETWEEN THE MACHINERY DECK AND THE TOWER, AND BETWEEN THE TOWER AND EARTH.
10) IT IS CRITICAL TO THE OPERATION OF THE PROTECTION TECHNIQUE THAT THE ABOVE INSTRUCTIONS ARE FOLLOWED PRECISELY.

REV	DATE	DESCRIPTION OF CHANGE	APPR'D
1.1	27/04/05	REFER TO DR#329	A.C.

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

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

DRAWN	APPROVED
S. CHAMBERS	G. HUBZCENKO
29/10/01	05/11/01

PART OF ASSY: —

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SOUTH AUSTRALIA
PHONE +61 8 352 6055
FAX +61 8 352 1684

PART No: —

PROJECT: DUAL LOAD LIGHTNING PROTECTOR

TITLE: TYPICAL INSTALLATION DETAILS

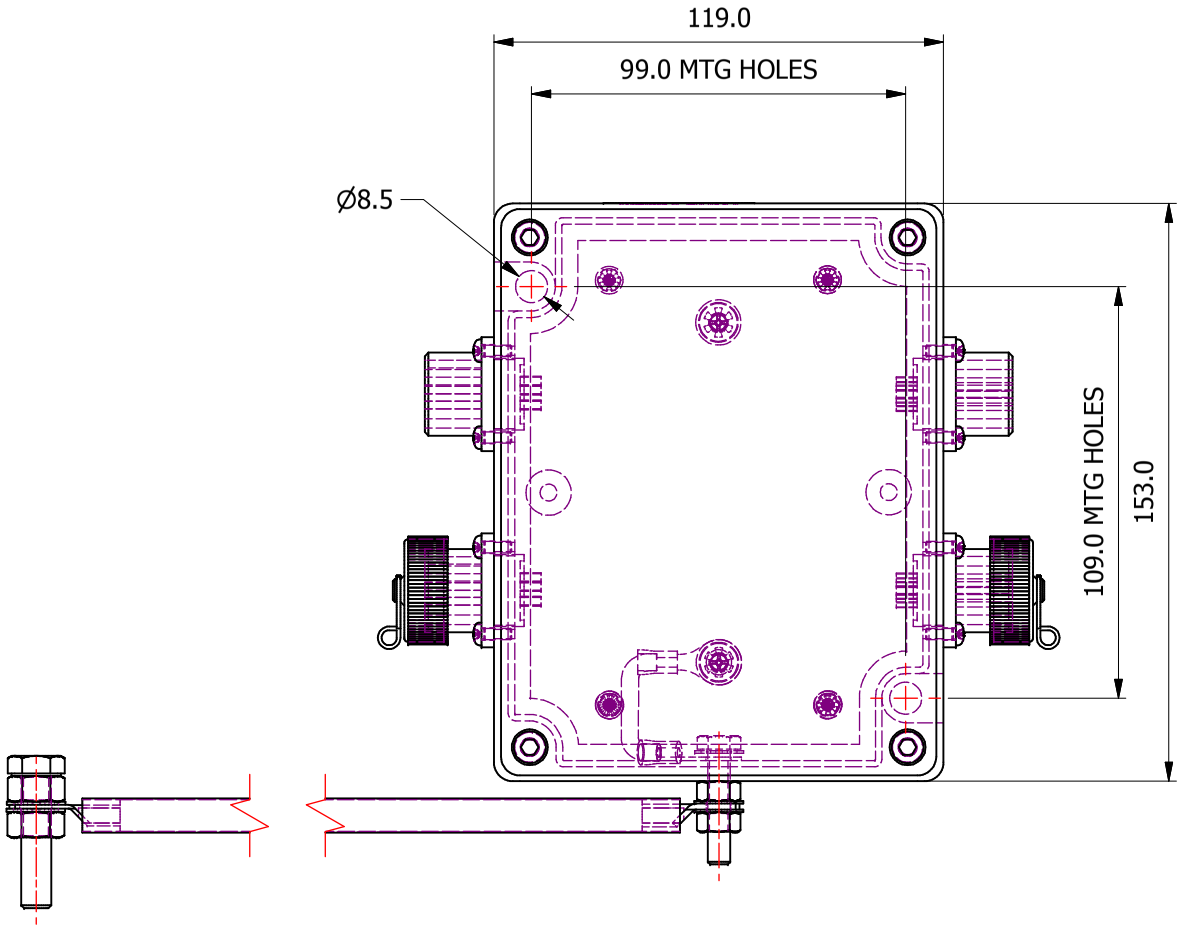
SCALE N/A

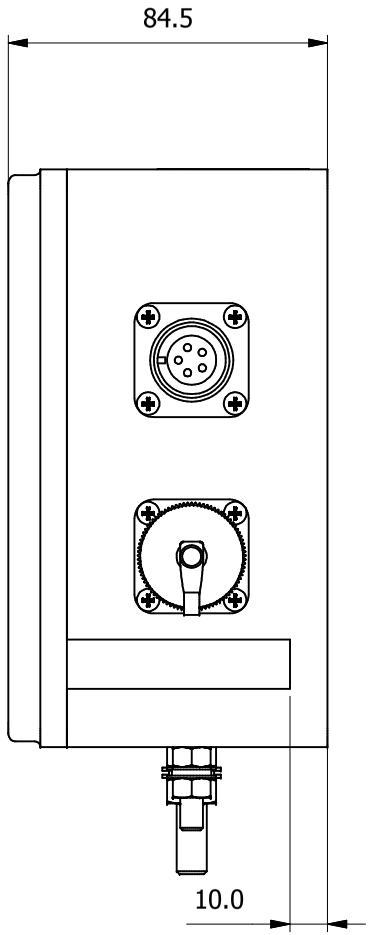
SHEET 1 OF 3

DRAWING No: DWG 2554

FILE No: 255401AB.DWG

REV 1.1





REV	DATE	DESCRIPTION OF CHANGE	APPRV'D

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

DRAFTING STANDARD: AS1100

DO NOT SCALE DRAWING
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UNLESS OTHERWISE STATED

DRAWN BY	APPROVED BY	PART OF ASSY
J.Hart		
8/11/2016		

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web : www.lsirobway.com.au
PHONE: +61 8 8238 3500
FAX: +61 8 8352 1684

PART No: LPDLT4472

PROJECT:

TITLE: ASSY, DUAL LOAD LIGHTNING PROTECTOR

A4

SHEET 1 OF 2

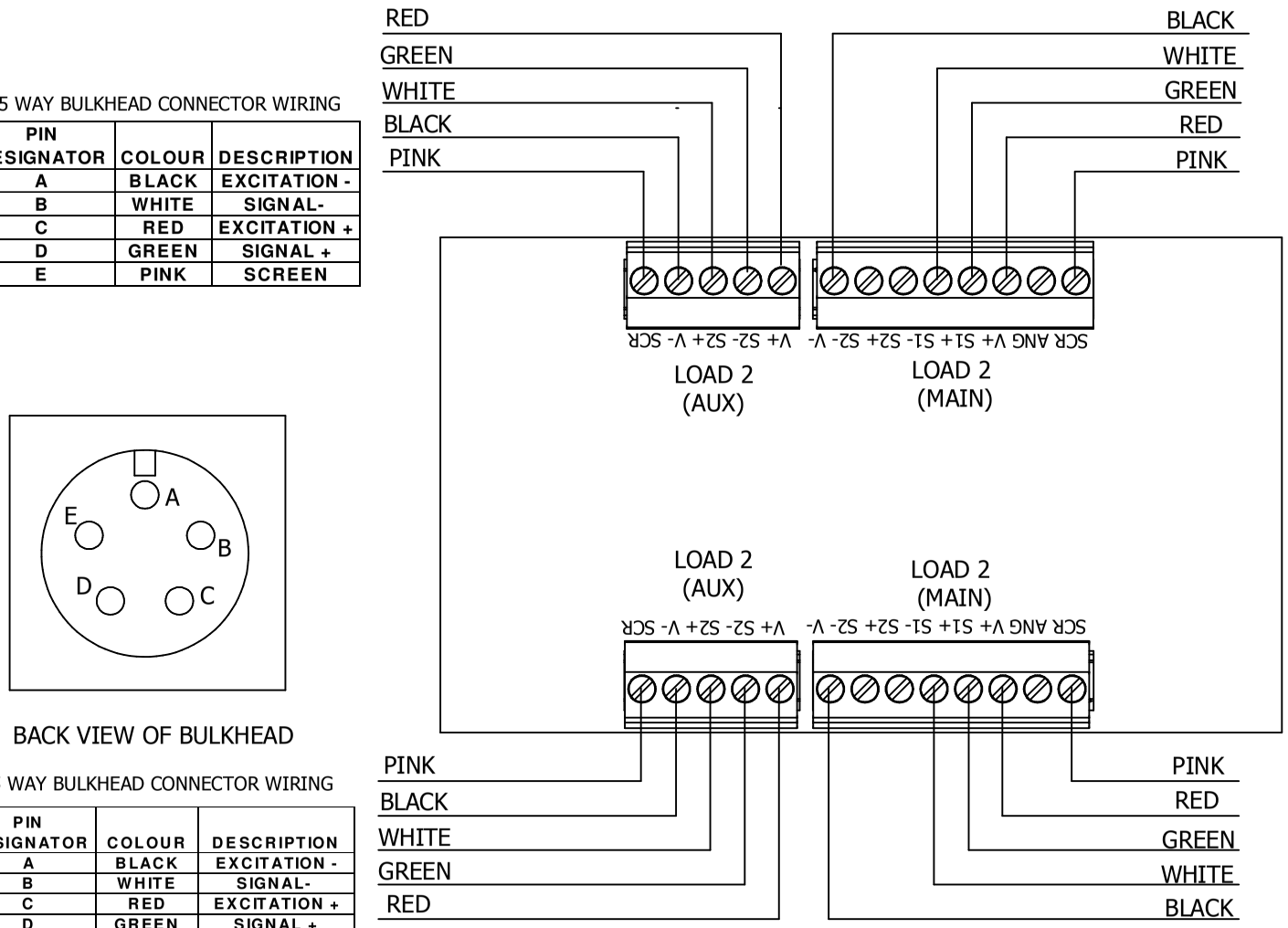
DRAWING No: 4472

FILE No: 4472-1-A.idw

REV 1.1

5 WAY BULKHEAD CONNECTOR WIRING

PIN DESIGNATOR	COLOUR	DESCRIPTION
A	BLACK	EXCITATION -
B	WHITE	SIGNAL-
C	RED	EXCITATION +
D	GREEN	SIGNAL +
E	PINK	SCREEN



5 WAY BULKHEAD CONNECTOR WIRING

PIN DESIGNATOR	COLOUR	DESCRIPTION
A	BLACK	EXCITATION -
B	WHITE	SIGNAL-
C	RED	EXCITATION +
D	GREEN	SIGNAL +
E	PINK	SCREEN

BACK VIEW OF BULKHEAD

5 WAY BULKHEAD CONNECTOR WIRING

PIN DESIGNATOR	COLOUR	DESCRIPTION
A	BLACK	EXCITATION -
B	WHITE	SIGNAL-
C	RED	EXCITATION +
D	GREEN	SIGNAL +
E	PINK	SCREEN

5 WAY BULKHEAD CONNECTOR WIRING

PIN DESIGNATOR	COLOUR	DESCRIPTION
A	BLACK	EXCITATION -
B	WHITE	SIGNAL-
C	RED	EXCITATION +
D	GREEN	SIGNAL +
E	PINK	SCREEN

REV	DATE	DESCRIPTION OF CHANGE	APPRV'D

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

DRAFTING STANDARD: AS1100

DO NOT SCALE DRAWING
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UNLESS OTHERWISE STATED

DRAWN BY	APPROVED BY	PART OF ASSY
J.Hart		
8/11/2016		

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web : www.lsirobway.com.au
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FAX: +61 8 8352 1684

PART No: LPDLT4472

PROJECT:

TITLE: ASSY, DUAL LOAD LIGHTNING PROTECTOR

A4

SHEET 2 OF 2

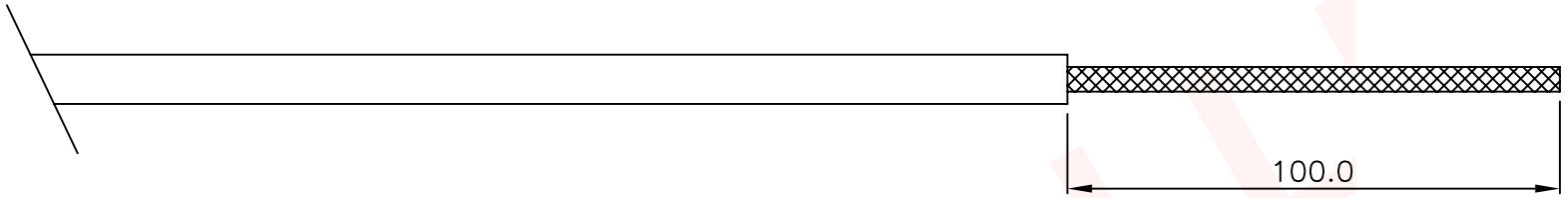
DRAWING No: 4472

FILE No: 4472-1-A.idw

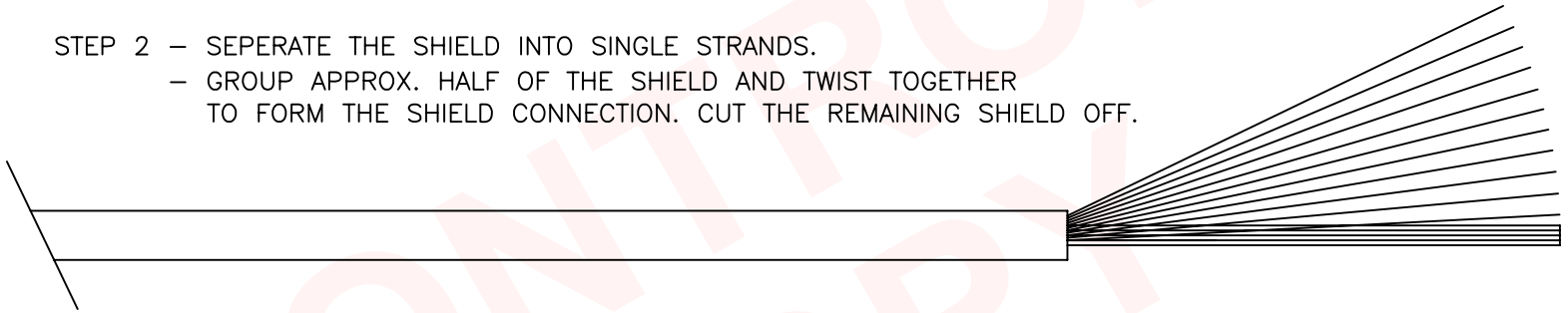
REV 1.1

LOAD CABLE PREPERATION

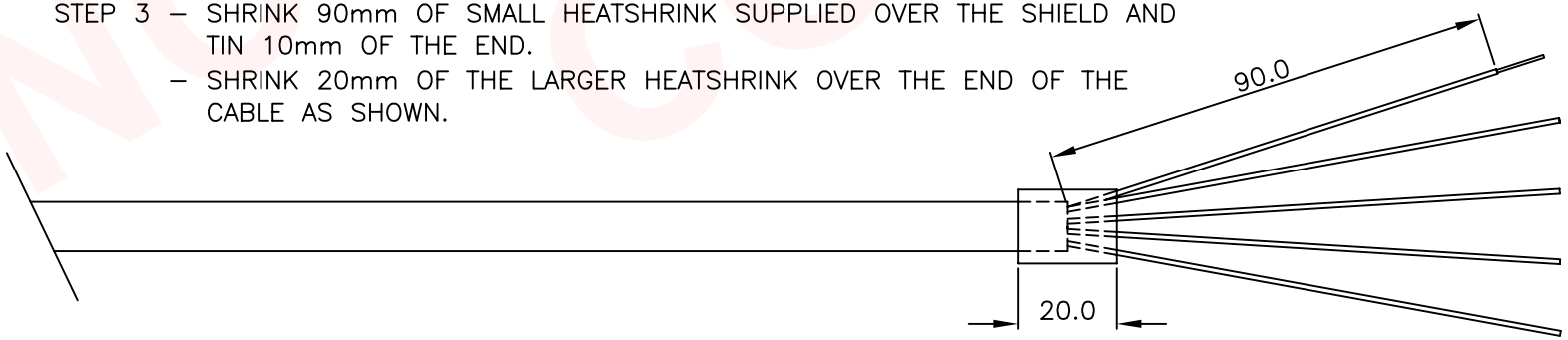
STEP 1 – STRIP OUTER SHEATH BACK 100MM.



STEP 2 – SEPERATE THE SHIELD INTO SINGLE STRANDS.
– GROUP APPROX. HALF OF THE SHIELD AND TWIST TOGETHER TO FORM THE SHIELD CONNECTION. CUT THE REMAINING SHIELD OFF.



STEP 3 – SHRINK 90mm OF SMALL HEATSHRINK SUPPLIED OVER THE SHIELD AND TIN 10mm OF THE END.
– SHRINK 20mm OF THE LARGER HEATSHRINK OVER THE END OF THE CABLE AS SHOWN.



REV	DATE	DESCRIPTION OF CHANGE	APPR'D
1.1	27/04/05	REFER TO DR#329	A.C.

TOL: X. +/– 1
X.X +/– 0.2
X.XX AS STATED

DO NOT SCALE DRAWING
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UNLESS OTHERWISE STATED

DRAWN	APPROVED
S. CHAMBERS	G. HUBCZENKO
29/10/01	05/11/01

PART OF ASSY: –

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SOUTH AUSTRALIA
PHONE +61 8 352 6055
FAX +61 8 352 1684

PART No: –

PROJECT: DUAL LOAD LIGHTNING PROTECTOR

TITLE: TYPICAL INSTALLATION DETAILS

SCALE N/A

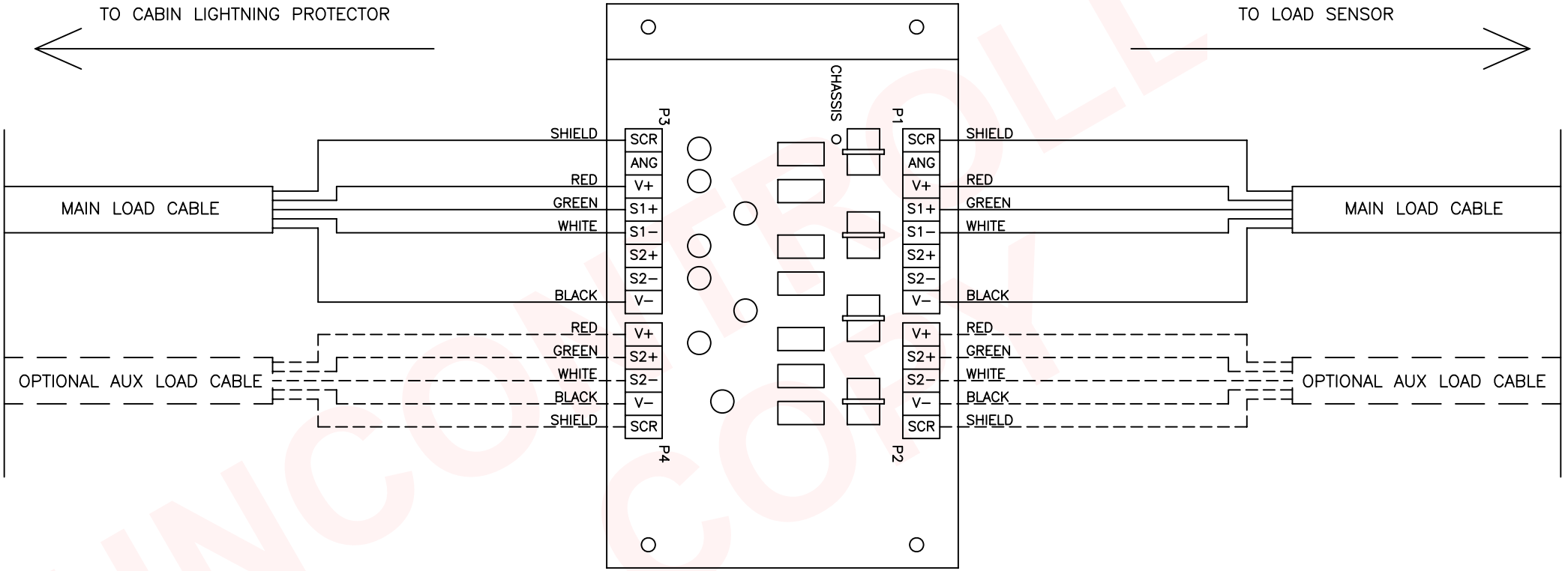
SHEET 2 OF 3

DRAWING No: DWG 2554

FILE No: 255401AB.DWG

REV 1.1

LOAD CABLE WIRING DIAGRAM



CABLE	WIRE COLOUR	DESCRIPTION
LOAD CABLE	RED	+VE EXCITATION
	BLACK	−VE EXCITATION
	GREEN	SIGNAL +VE
	WHITE	SIGNAL −VE

REV	DATE	DESCRIPTION OF CHANGE	APPR'D
1.1	27/04/05	REFER TO DR#329	A.C.

TOL: X. +/− 1
X.X +/− 0.2
X.XX AS STATED

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ALL DIMENSIONS ARE IN MILLIMETERS
UNLESS OTHERWISE STATED

DRAWN	APPROVED	PART OF ASSY
S. CHAMBERS	G. HUBCZENKO	—
29/10/01	05/11/01	

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PART No: —

PROJECT: DUAL LOAD LIGHTNING PROTECTOR

TITLE: TYPICAL INSTALLATION DETAILS

SCALE N/A

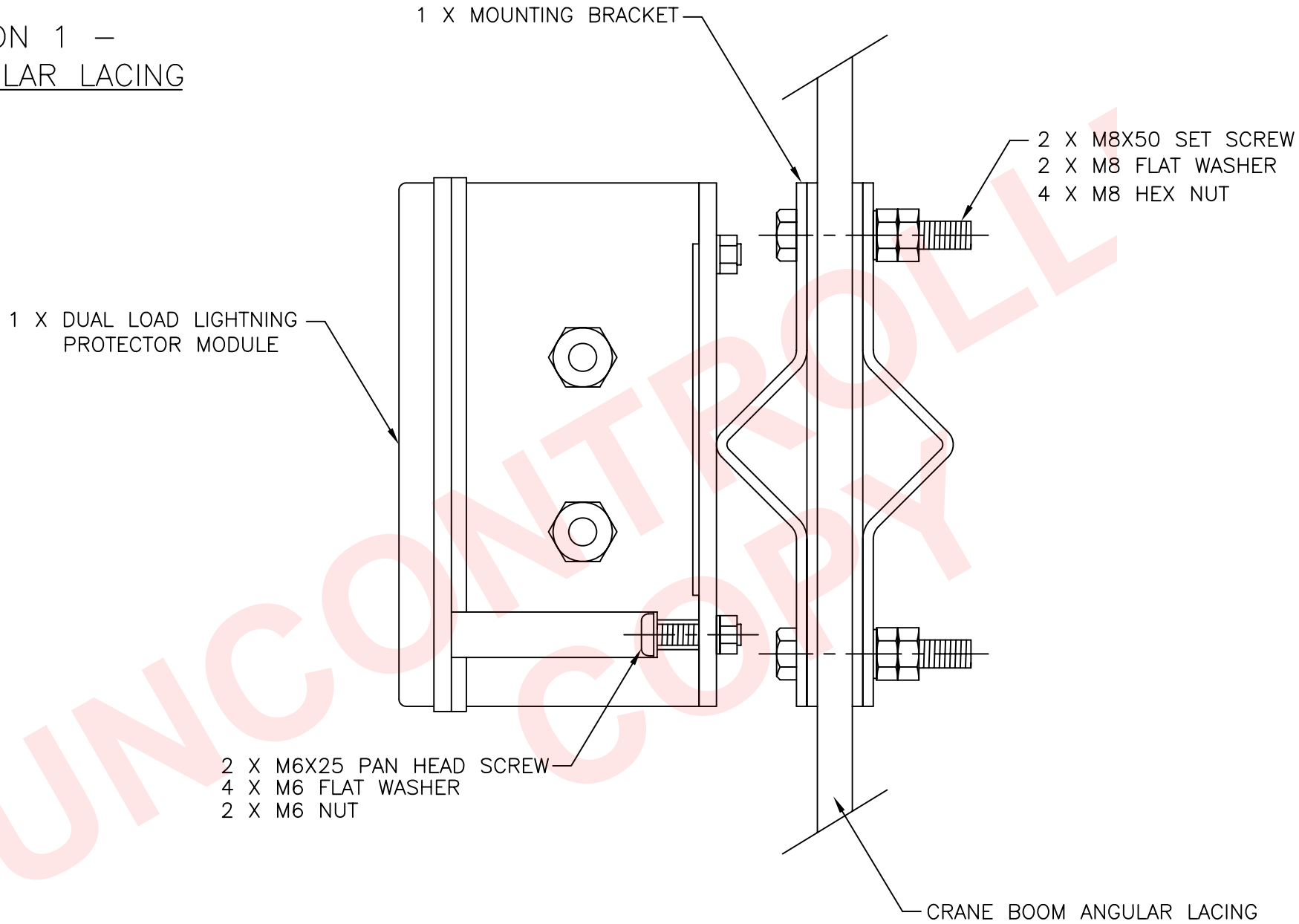
SHEET 3 OF 3

DRAWING No: DWG 2554

FILE No: 255401AB.DWG

REV 1.1

OPTION 1 – ANGULAR LACING



REV	DATE	DESCRIPTION OF CHANGE	APPR'D

TOL: X. +/– 1
X.X +/– 0.2
X.XX AS STATED

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

DRAWN	APPROVED	PART OF ASSY
S. CHAMBERS		–
31/10/01		

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PHONE +61 8 8352 6055
FAX +61 8 8352 1684

PART No: –

PROJECT: DUAL LOAD LIGHTNING PROTECTOR

TITLE: MOUNTING BRACKET ASSEMBLY DETAIL

SCALE N/A

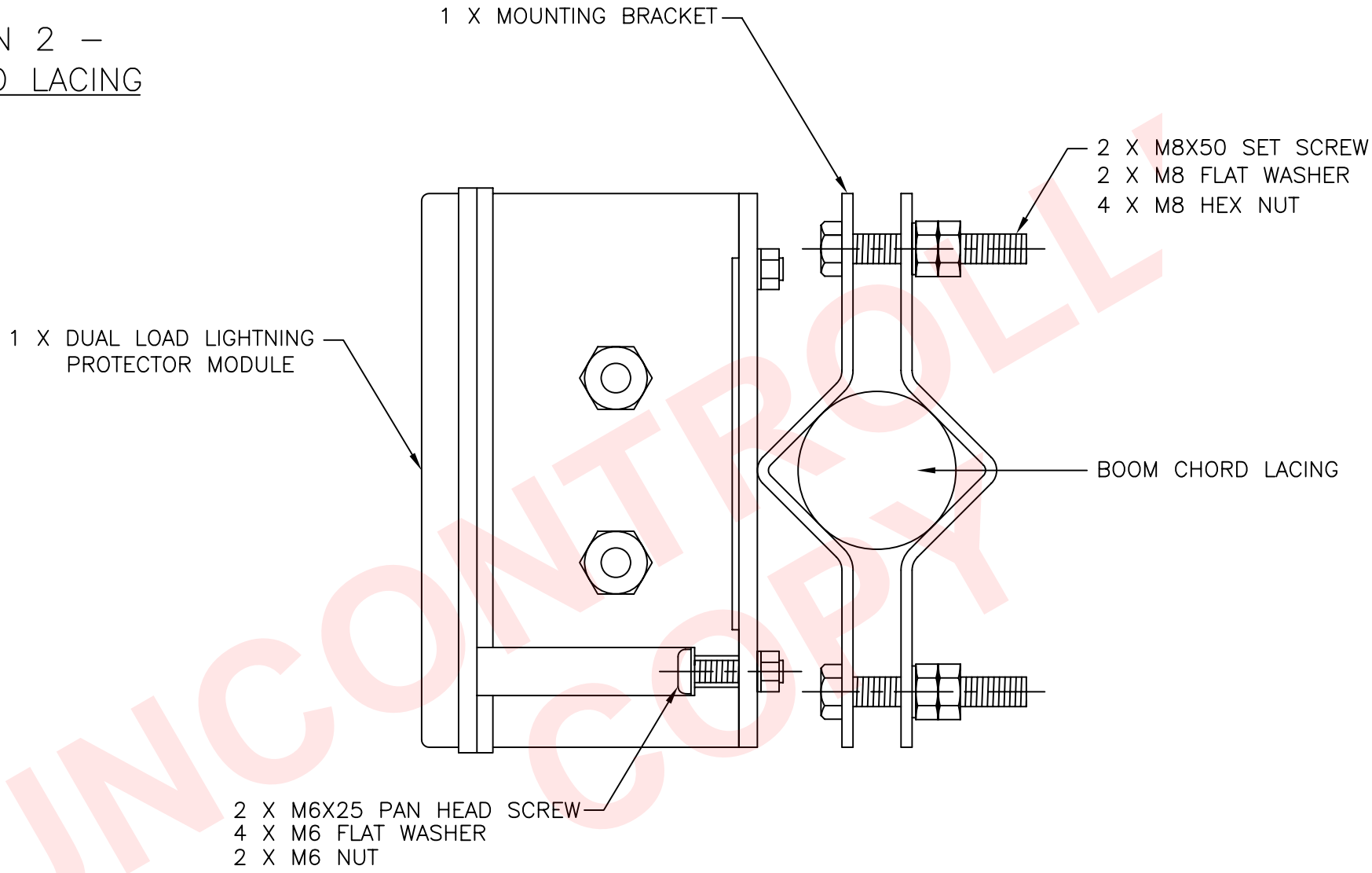
SHEET 1 OF 4

DRAWING No: DWG 2557

FILE No: 255701AA.DWG

REV 1.0

OPTION 2 – CHORD LACING



REV	DATE	DESCRIPTION OF CHANGE	APPR'D

TOL: X. +/– 1
X.X +/– 0.2
X.XX AS STATED

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

DRAWN	APPROVED	PART OF ASSY
S. CHAMBERS		–
31/10/01		

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FAX +61 8 8352 1684

PART No: –

PROJECT: DUAL LOAD LIGHTNING PROTECTOR

TITLE: MOUNTING BRACKET ASSEMBLY DETAIL

SCALE N/A

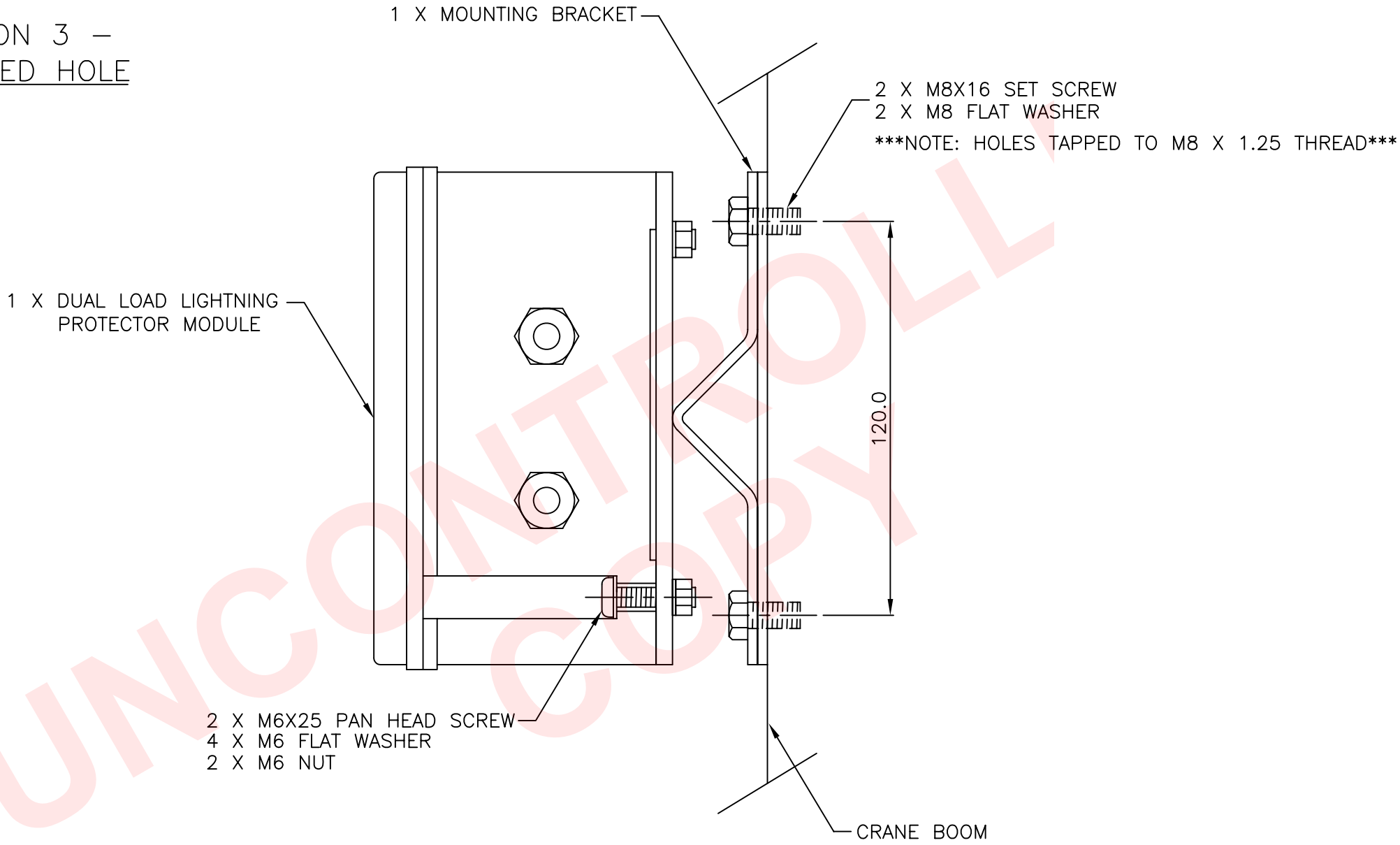
SHEET 2 OF 4

DRAWING No: DWG 2557

FILE No: 255701AA.DWG

REV 1.0

OPTION 3 – TAPPED HOLE



REV	DATE	DESCRIPTION OF CHANGE	APPR'D

TOL: X. +/– 1
X.X +/– 0.2
X.XX AS STATED

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ALL DIMENSIONS ARE IN MILLIMETERS
UNLESS OTHERWISE STATED

DRAWN	APPROVED	PART OF ASSY
S. CHAMBERS		–
31/10/01		

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FAX +61 8 8352 1684

PART No: –

PROJECT: DUAL LOAD LIGHTNING PROTECTOR

TITLE: MOUNTING BRACKET ASSEMBLY DETAIL

SCALE N/A

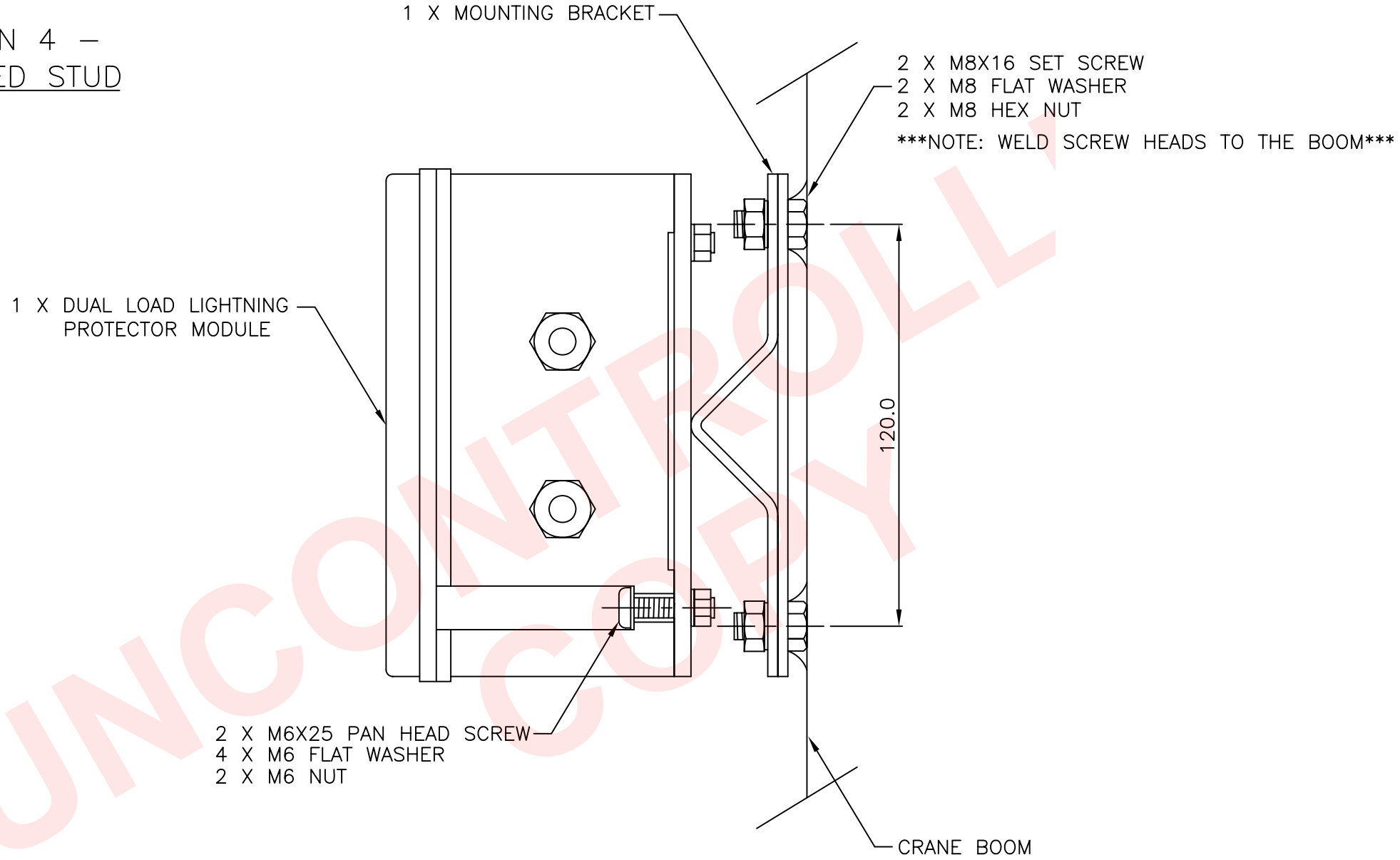
SHEET 3 OF 4

DRAWING No: DWG 2557

FILE No: 255701AA.DWG

REV 1.0

OPTION 4 – WELDED STUD



REV	DATE	DESCRIPTION OF CHANGE	APPR'D

TOL: X. +/– 1
X.X +/– 0.2
X.XX AS STATED

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

DRAWN	APPROVED	PART OF ASSY
S. CHAMBERS		–
31/10/01		

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FAX +61 8 8352 1684

PART No:	PROJECT: DUAL LOAD LIGHTNING PROTECTOR
–	

TITLE: MOUNTING BRACKET ASSEMBLY DETAIL

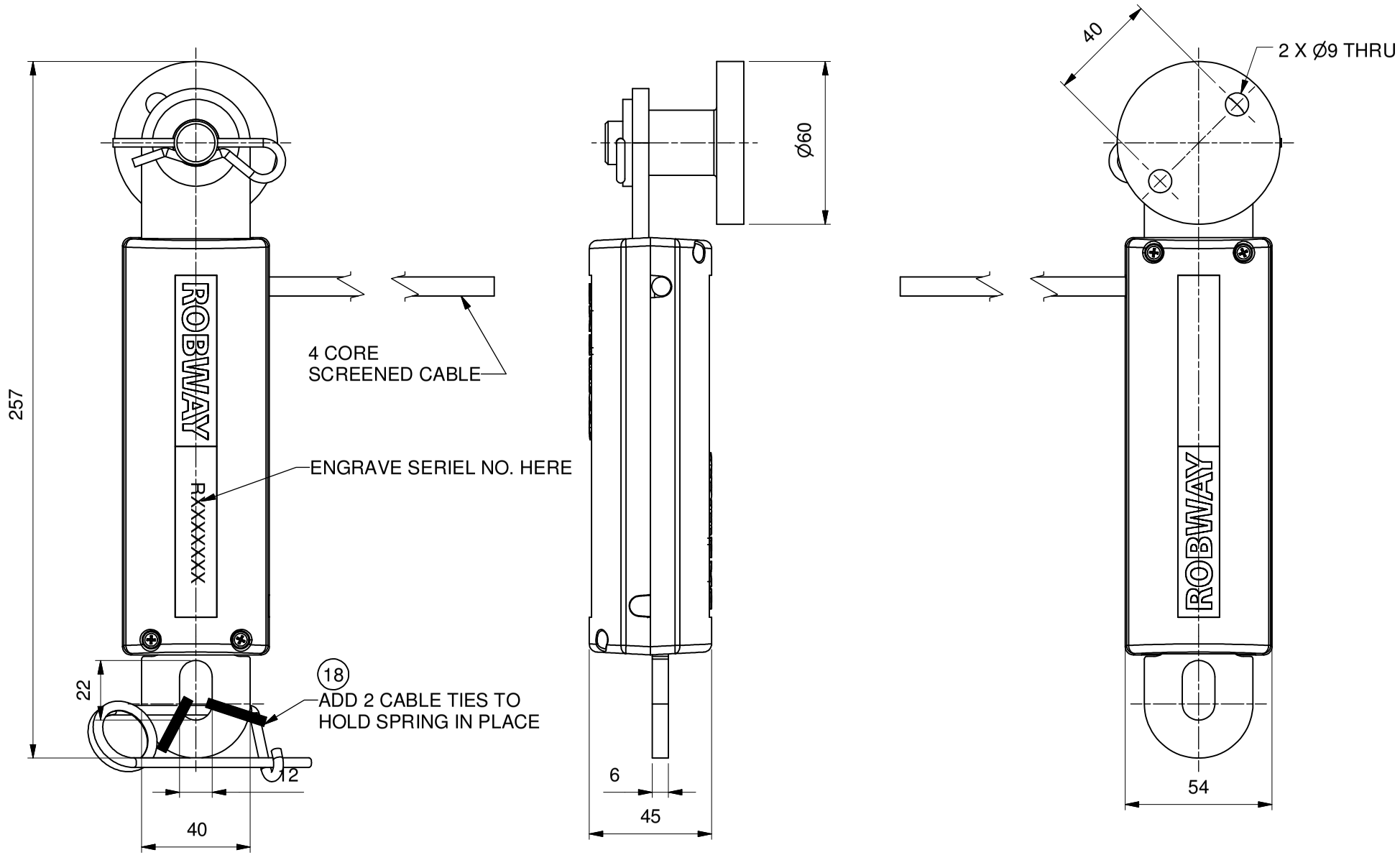
SCALE N/A

SHEET 4 OF 4

DRAWING No:	FILE No:	REV
DWG 2557	255701AA.DWG	1.0

3RD ANGLE

Parts List				
ITEM	QTY	DESCRIPTION	DWG No.	PART NUMBER
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
X.X +/-0.2
X.XX +/-0.02

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

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FAX: +61 8 8352 1684

PART No: SWIBB5

PROJECT: BB5 ATB SWITCH

TITLE: ASSY, BB5 DIMENSIONAL DETAIL

SCALE: N/A

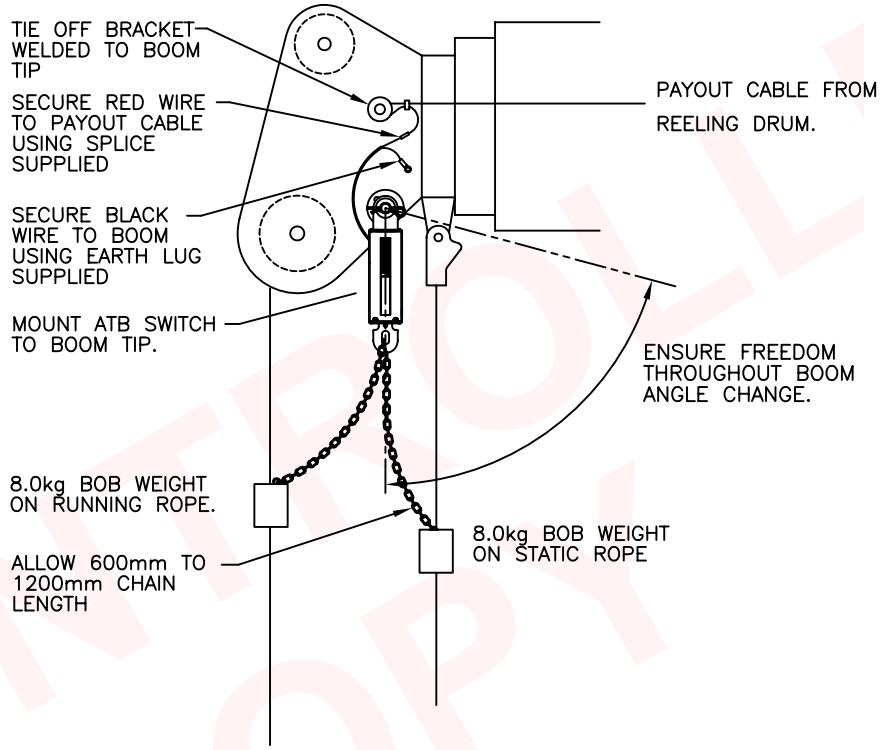
SHEET: 1 OF 2

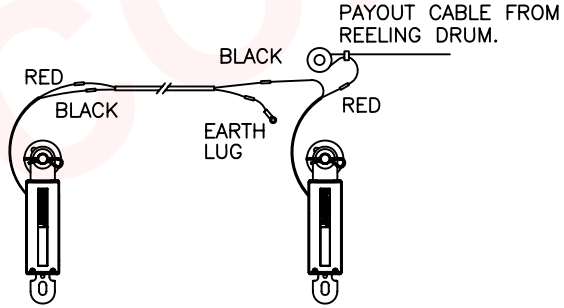
DRAWING No: 2934

FILE No: 293401AD.idw

REV: 1.3

TELESCOPIC BOOM SINGLE CORE PAYOUT CABLE APPLICATION





ATB SWITCH CONNECTION FOR MAIN AND FLY

REV	DATE	DESCRIPTION OF CHANGE	APPR'D
1.1	03/08/05	REFER TO DR#421	A.C.

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

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UNLESS OTHERWISE STATED

DRAWN	APPROVED	PART OF ASSY
S. CHAMBERS	A. CANLAS	—
10/07/01	10/07/01	

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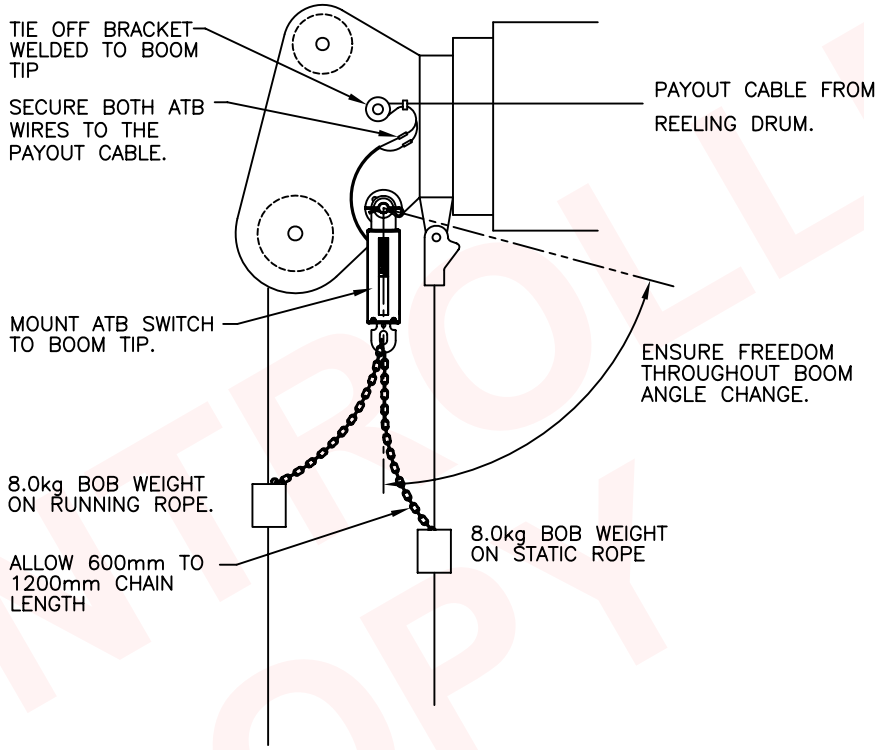
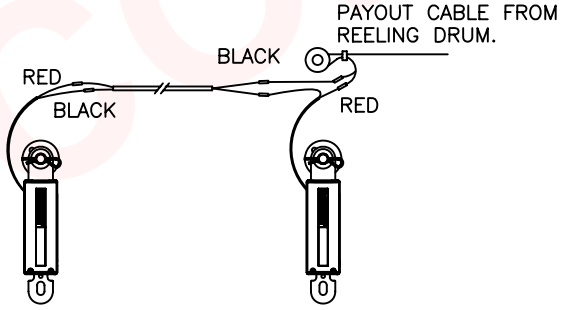
FAX +61 8 8352 1684

PART No: —
PROJECT: —
TITLE: ATB SWITCH INSTALLATION DETAILS
SCALE N/A
SHEET 1 OF 3
DRAWING No: DWG 0667
FILE No: 066701AB.DWG
REV 1.1

TELESCOPIC BOOM TWO CORE PAYOUT CABLE APPLICATION





ATB SWITCH CONNECTION FOR MAIN AND FLY

REV	DATE	DESCRIPTION OF CHANGE	APPR'D
1.1	03/08/05	REFER TO DR#421	A.C.

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

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DRAWN	APPROVED	PART OF ASSY
S. CHAMBERS	A. CANLAS	—
10/07/01	10/07/01	

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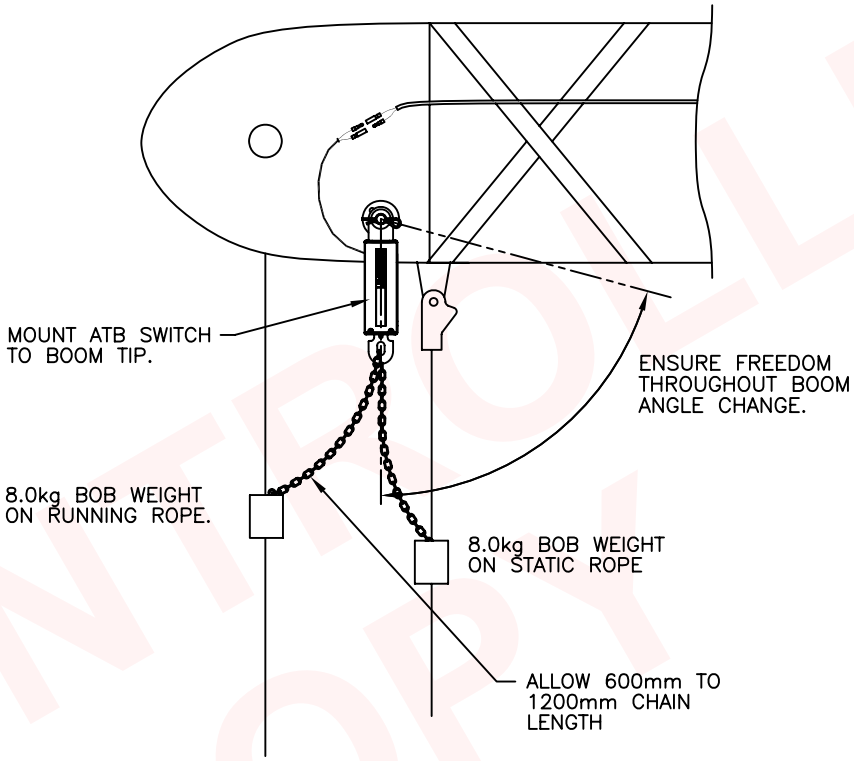
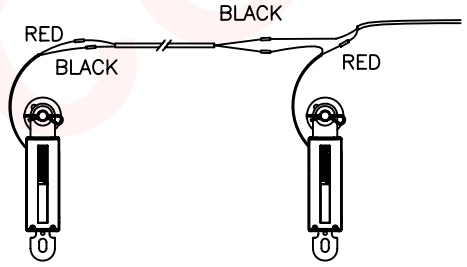
FAX +61 8 8352 1684

PART No: —
PROJECT: —
TITLE: ATB SWITCH INSTALLATION DETAILS
SCALE N/A
SHEET 2 OF 3
DRAWING No: DWG 0667
FILE No: 066701AB.DWG
REV 1.1

STRUT BOOM SINGLE CORE PAYOUT CABLE APPLICATION





ATB SWITCH CONNECTION FOR MAIN
AND FLY

REV	DATE	DESCRIPTION OF CHANGE	APPR'D
1.1	03/08/05	REFER TO DR#421	A.C.

TOL: X. +/− 1
X.X +/− 0.2
X.XX AS STATED

DO NOT SCALE DRAWING
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UNLESS OTHERWISE STATED

DRAWN	APPROVED	PART OF ASSY
S. CHAMBERS	A. CANLAS	—
10/07/01	10/07/01	

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SOUTH AUSTRALIA
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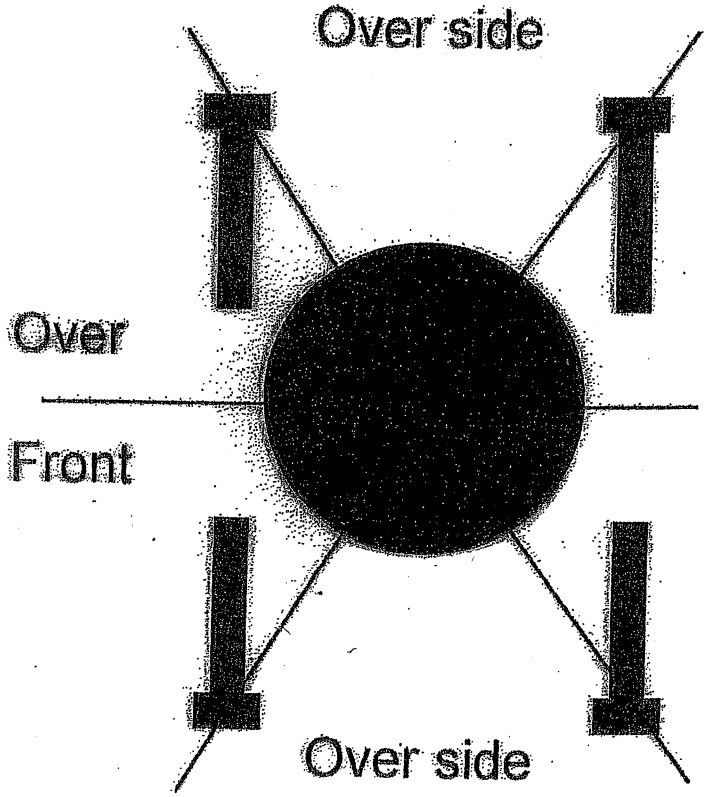
FAX +61 8 8352 1684

PART No: —
PROJECT: —
TITLE: ATB SWITCH INSTALLATION DETAILS
SCALE N/A
SHEET 3 OF 3
DRAWING No: DWG 0667
FILE No: 066701AB.DWG
REV 1.1

Typical Slew/Proximity Switch Application



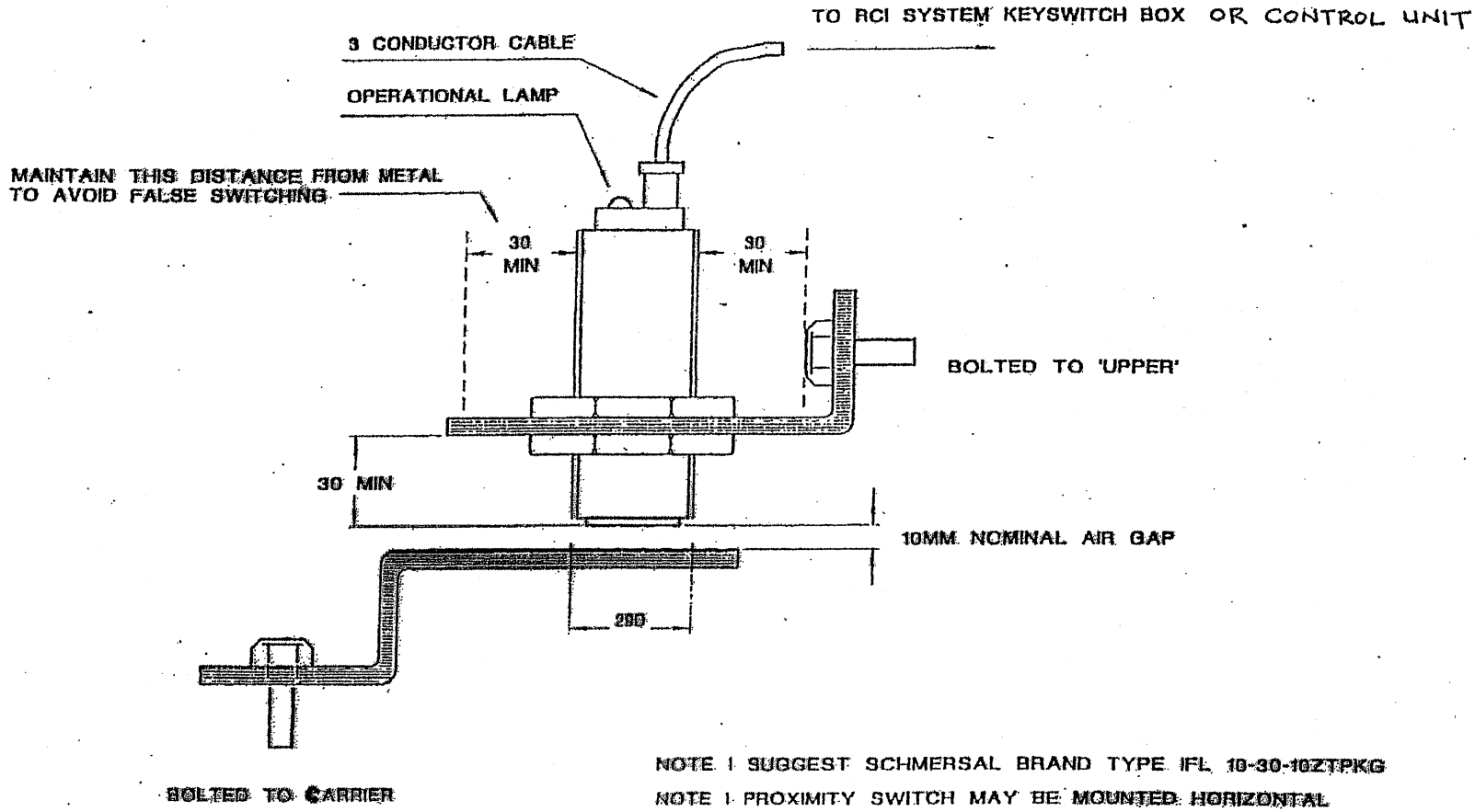
Switch 1 — opens when over-front

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.

RCI SLEW SWITCH MOUNTING (WHERE REQUIRED)



NOTE 1 SUGGEST SCHMERSAL BRAND TYPE IFL 18-30-18ZTPKG

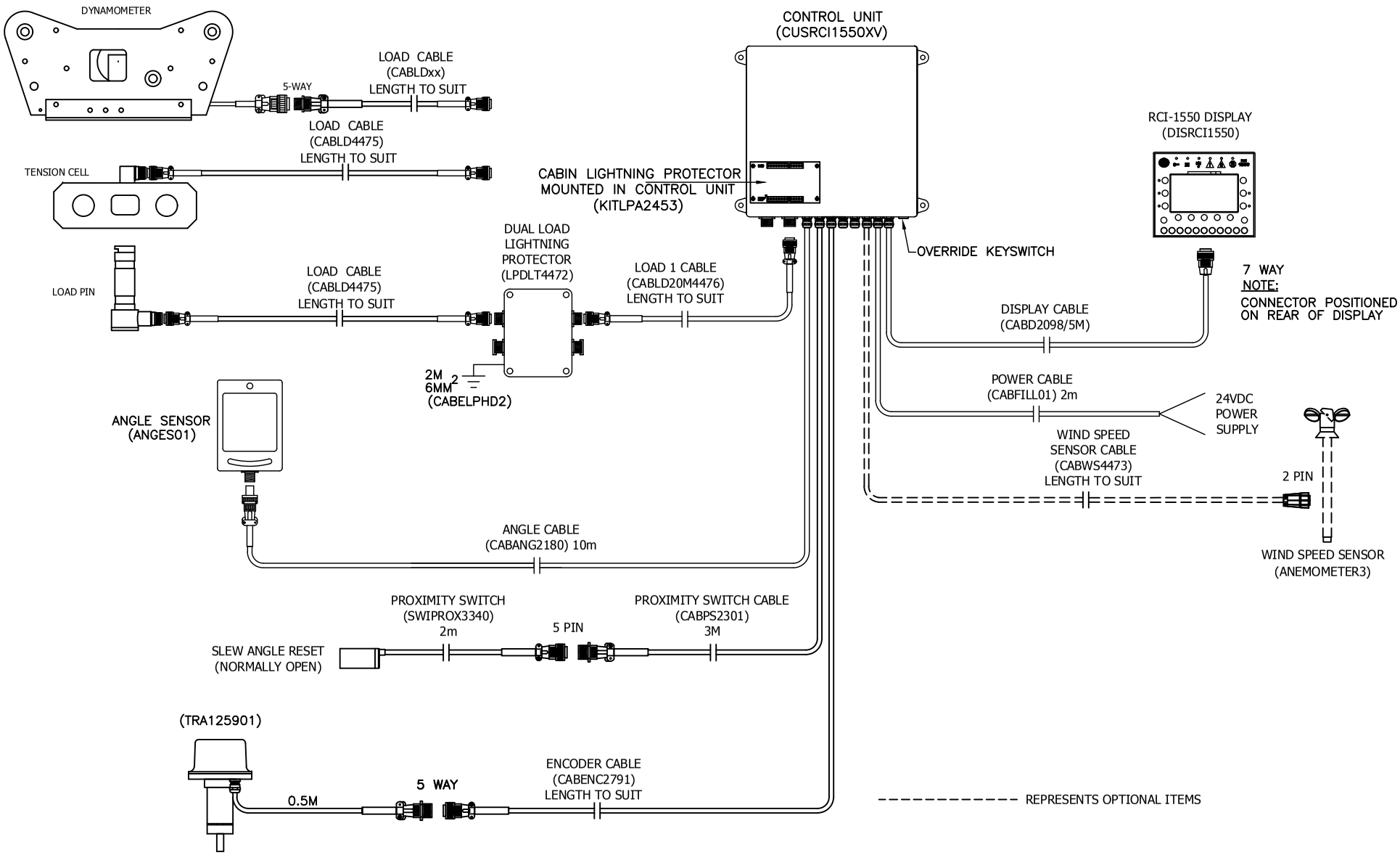
NOTE 1 PROXIMITY SWITCH MAY BE MOUNTED HORIZONTAL

DRAWN: IAW	CHECKED:	DATE 9.11.98
CUSTOMER: RCI MANUALS		FAB/ASSY/NEG
RCI SLEW SWITCH MOUNTING		
		DWG 930050
FILE No:930050		REV No:

ROBWAY SAFETY SYSTEMS P/L 08 352 6055

13.2 APPENDIX

Drawings Part B - General Arrangements



REV	DATE	DESCRIPTION OF CHANGE	APPR'D

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

DRAFTING STANDARD: AS1100

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

DRAWN	APPROVED	PART OF ASSY
J.HART	J.HART	-
4/6/2011	19-8-2011	

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SOUTH AUSTRALIA 5031

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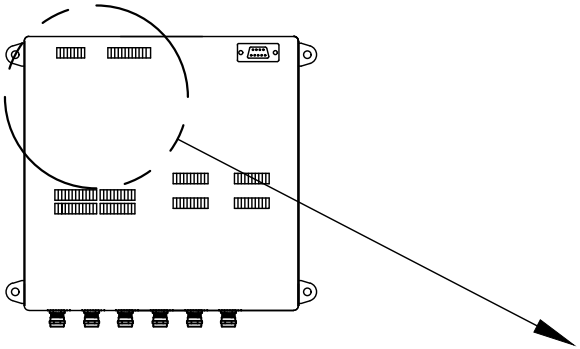
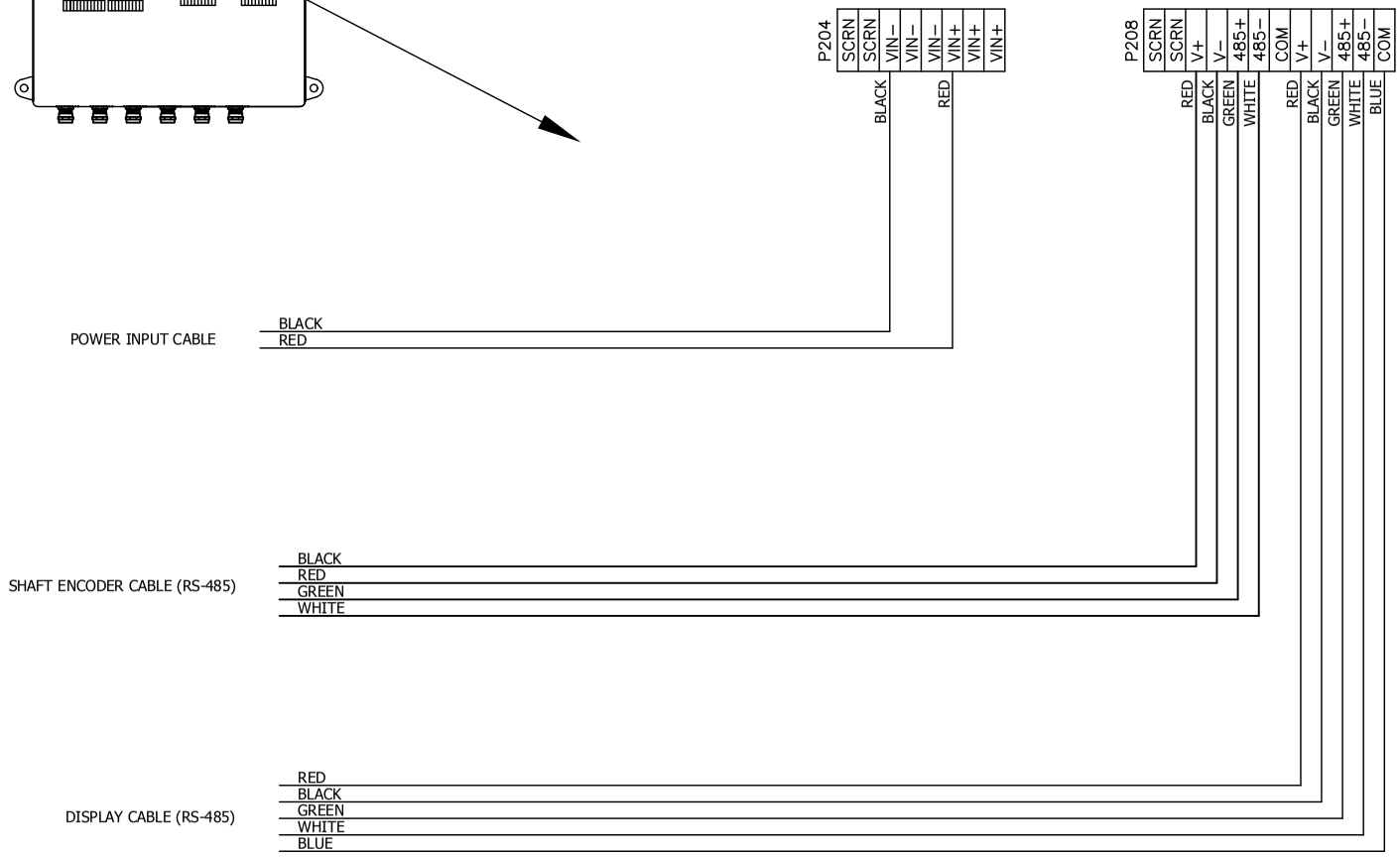
FX: +61 8 8352 1684

CUSTOMER:	PROJECT: -	
TITLE: GA, RCI1550XV, TYPICAL FAVCO TOWER CRANE		SCALE N/A
		SHEET 1 OF 4
DRAWING No: 4798	FILE No: 4798-A.DWG	REV A

POWER INPUT/DISPLAY WIRING





REV	DATE	DESCRIPTION OF CHANGE	APPR'D

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

DRAFTING STANDARD: AS1100

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UNLESS OTHERWISE STATED

DRAWN	APPROVED
J.HART	-
4/6/2011	-

PART OF ASSY: -

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PH: +61 8 8238 3500
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CUSTOMER: FAVCO	PROJECT: -
TITLE: GA, RCI1550XV, TYPICAL FAVCO TOWER CRANE	SCALE N/A
	SHEET 2 OF 4
DRAWING No: 4798	FILE No: 4798-A.DWG
	REV A

ANALOGUE SENSOR WIRING

90° ANGLE SENSOR (ANGESO1)

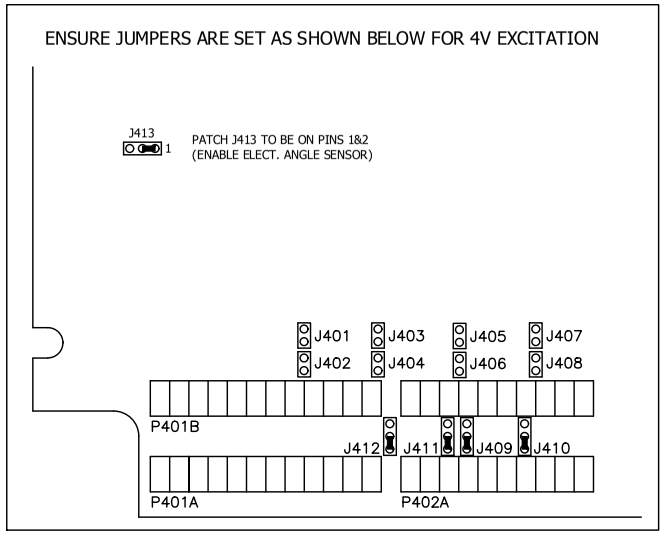
PIN	DESCRIPTION	WIRE COLOUR
A	EXCITATION +VE	RED
B	90° ANGLE SIGNAL	WHITE
C	EXCITATION -VE	BLACK

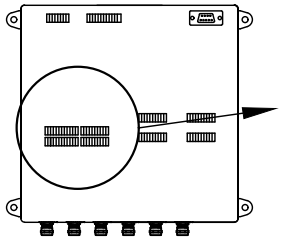
NOTE: WIRE COLOURS BASED ON TYPICAL ROBWAY 4 CORE SCREENED CABLE

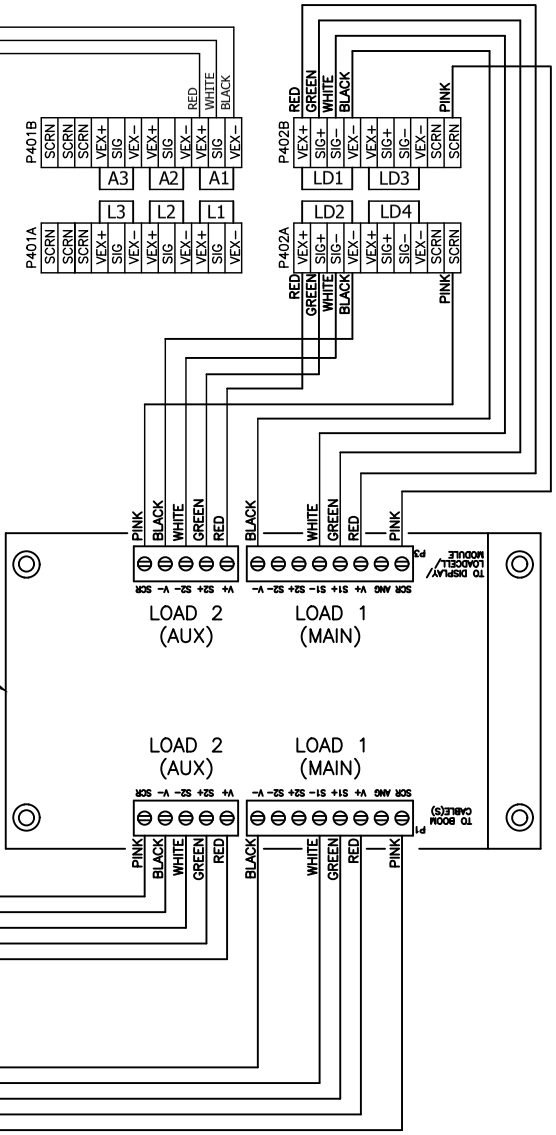
3 WAY CONNECTOR

EXCITATION -VE (BLACK)
0-90° ANGLE INPUT (WHITE)
EXCITATION +VE (RED)

FIGURE 1.







5 WAY BULKHEAD WIRING DETAIL

PIN DESIGNATOR	COLOUR	DESCRIPTION
A	BLACK	EXCITATION –
B	WHITE	SIGNAL –
C	RED	EXCITATION +
D	GREEN	SIGNAL +
E	PINK	SCREEN

PINK
BLACK
WHITE
GREEN
RED

5 WAY BULKHEAD WIRING DETAIL

PIN DESIGNATOR	COLOUR	DESCRIPTION
A	BLACK	EXCITATION –
B	WHITE	SIGNAL –
C	RED	EXCITATION +
D	GREEN	SIGNAL +
E	PINK	SCREEN

BLACK
WHITE
GREEN
RED
PINK

REV	DATE	DESCRIPTION OF CHANGE	APPR'D

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

DRAFTING STANDARD: AS1100

DO NOT SCALE DRAWING
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UNLESS OTHERWISE STATED

DRAWN	APPROVED	PART OF ASSY
J.HART	-	-
4/6/2011	-	

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SOUTH AUSTRALIA 5031
PH: +61 8 8238 3500
FX: +61 8 8352 1684

CUSTOMER:	PROJECT:
FAVCO	-

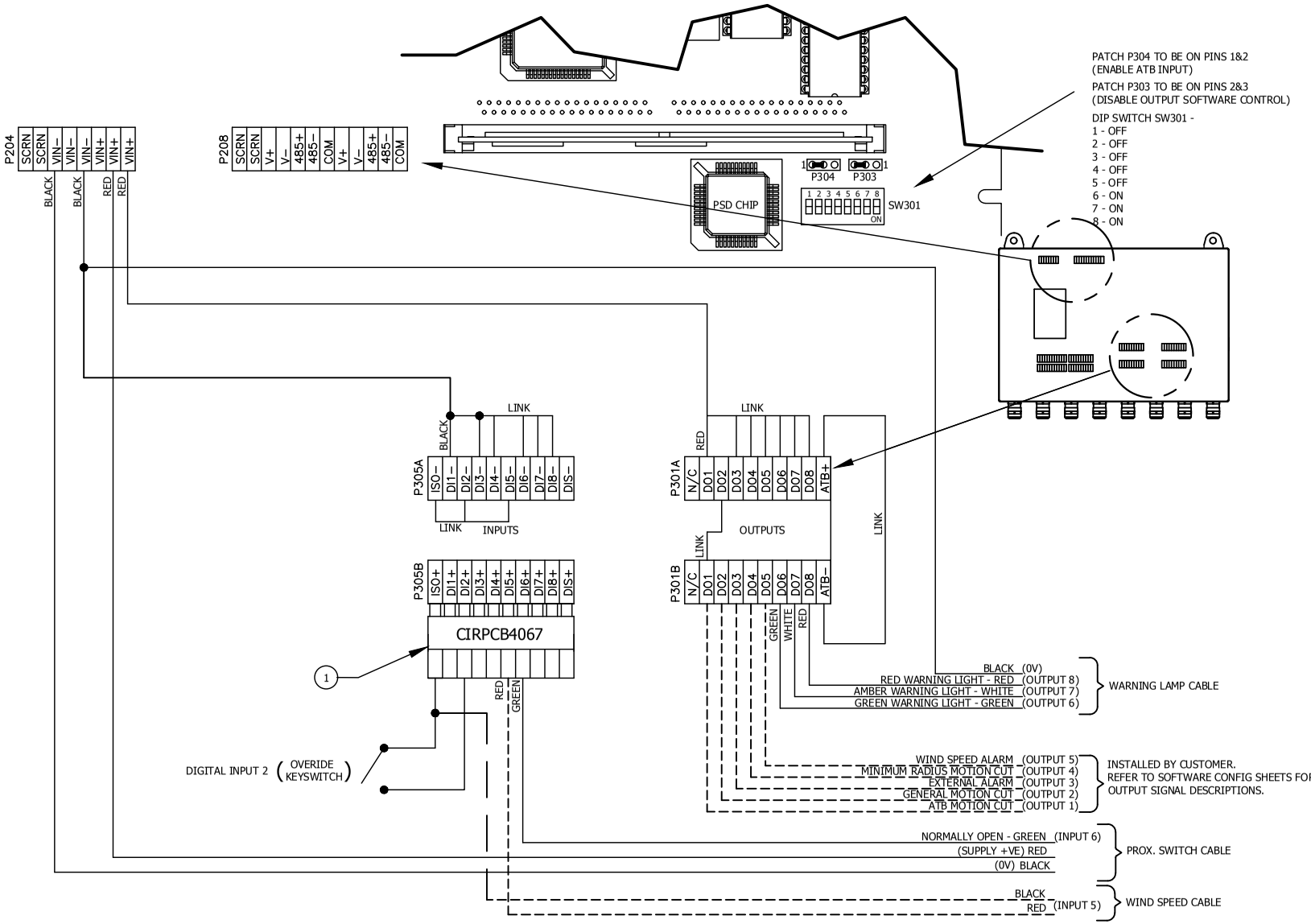
TITLE: GA, RCI1550XV, TYPICAL FAVCO TOWER CRANE

SCALE N/A

SHEET 3 OF 4

DRAWING No:	FILE No:	REV
4798	4798-A.DWG	A

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	APPR'D

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

DRAFTING STANDARD: AS1100

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

DRAWN	APPROVED	PART OF ASSY
J.HART	-	-
4/6/2011	-	

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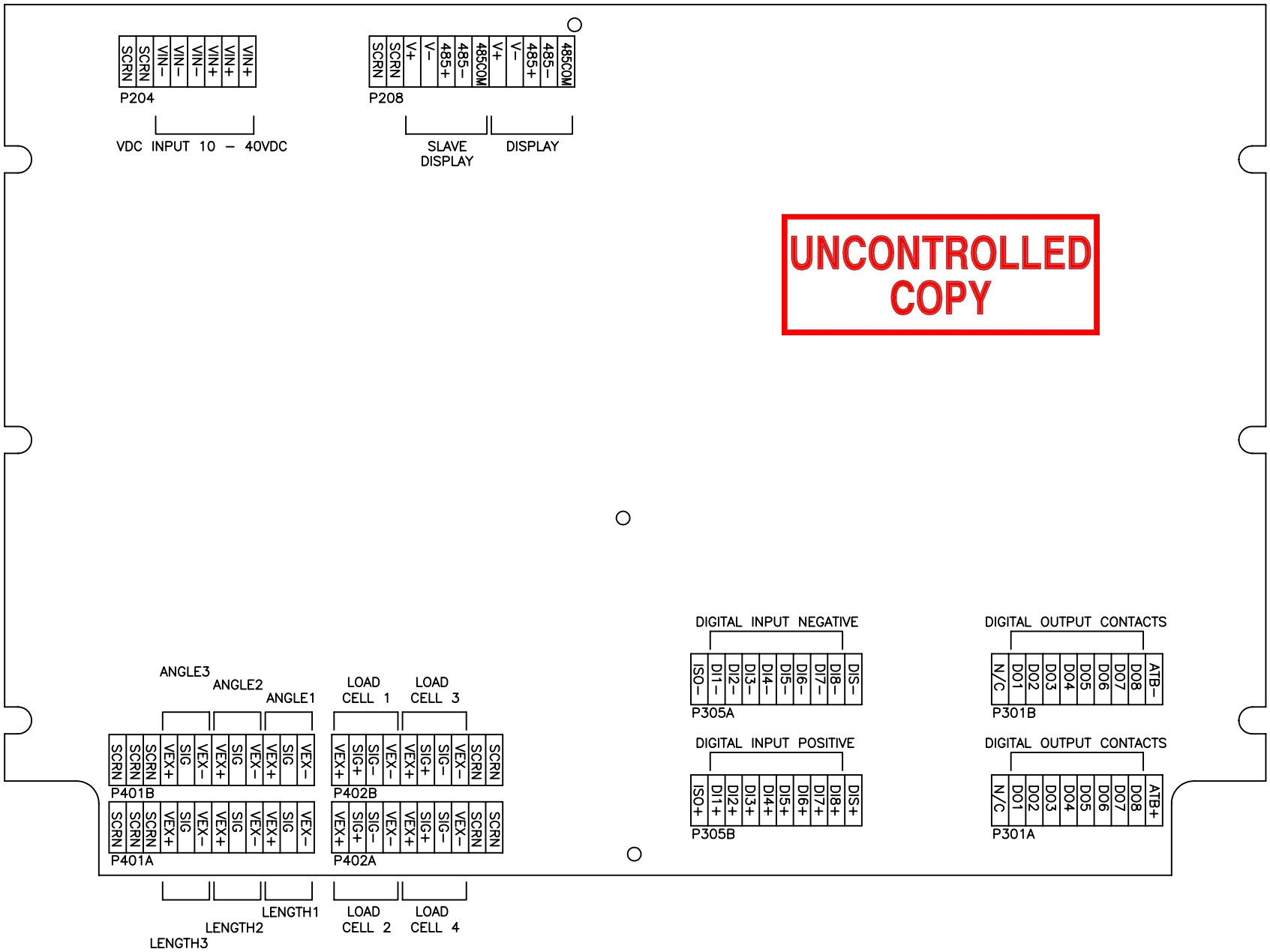
FX: +61 8 8352 1684

CUSTOMER:	PROJECT:	
FAVCO	-	
TITLE: GA, RCI1550XV, TYPICAL FAVCO TOWER CRANE		SCALE N/A
		SHEET 4 OF 4
DRAWING No: 4798	FILE No: 4798-A.DWG	REV A



REV	DATE	DESCRIPTION OF CHANGE	APPR'D
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	

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

DO NOT SCALE DRAWING
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UNLESS OTHERWISE STATED

DRAWN	APPROVED	PART OF ASSY
D. PLANTHABER	D. PLANTHABER	–
02/09/99	22/06/00	

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32 WEST THEBARTON RD PHONE +61 8 352 6055
THEBARTON 5031 FAX +61 8 352 1684
SOUTH AUSTRALIA

PART No: –

PROJECT: RCI-1550

TITLE: RCI 1550 ELECTRICAL CONNECTIONS

SCALE N/A

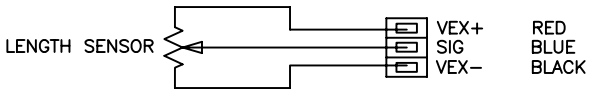
SHEET 1 OF 3

DRAWING No: DWG 2078

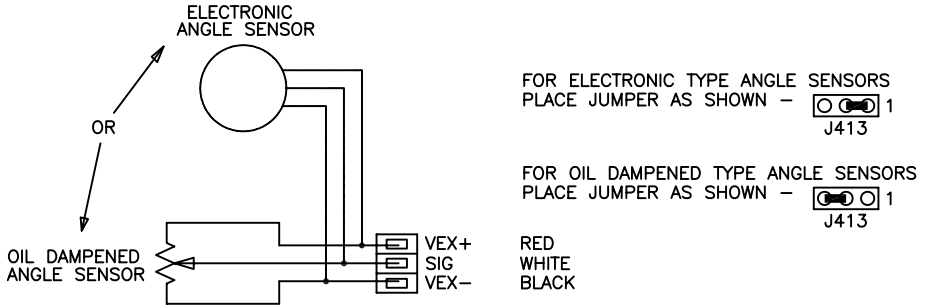
FILE No: 207801AD.DWG

REV 1.3

LENGTH



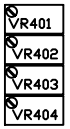
ANGLE



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

GAIN ADJUSTMENT

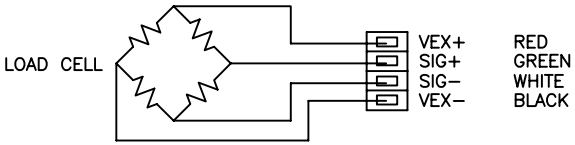
VR401 = 4–20mA GAIN ADJUST
VR402 = 3mV/V GAIN ADJUST
VR403 = 2mV/V GAIN ADJUST
VR404 = 1mV/V GAIN ADJUST



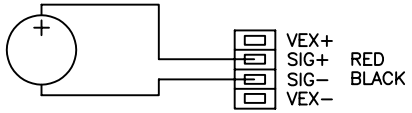
THESE ADJUSTMENTS ARE TO BE MADE BY ROBWAY AUTHORIZED PERSONNEL ONLY

UNCONTROLLED COPY

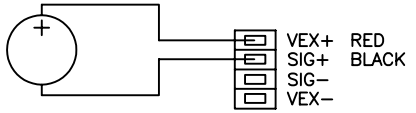
LOAD



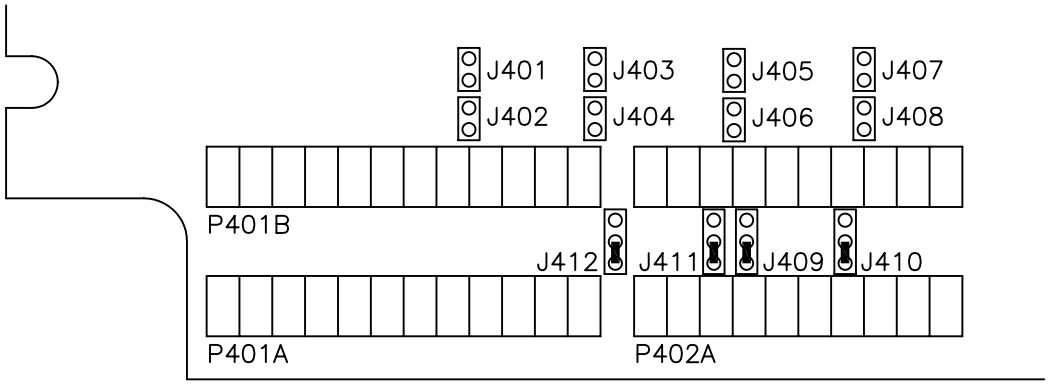
"ACTIVE" 4–20mA TRANSDUCER



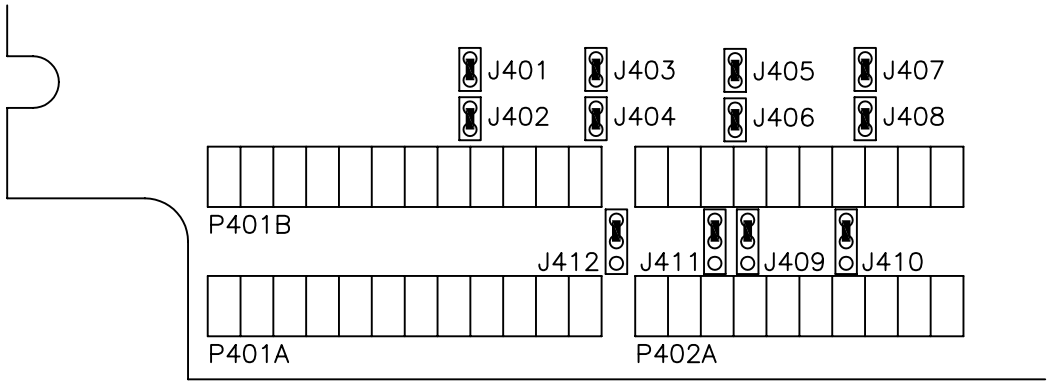
"PASSIVE" 4–20mA TRANSDUCER



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



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



REV	DATE	DESCRIPTION OF CHANGE	APPR'D
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	

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

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

DRAWN	APPROVED	PART OF ASSY
D. PLANTHABER	D. PLANTHABER	–
02/09/99	22/06/00	

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THEBARTON 5031 FAX +61 8 352 1684
SOUTH AUSTRALIA

PART No: –
PROJECT: RCI-1550
TITLE: RCI 1550 ELECTRICAL CONNECTIONS
SCALE N/A
SHEET 2 OF 3
DRAWING No: DWG 2078
FILE No: 207801AD.DWG
REV 1.3

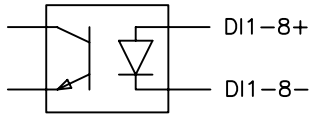
DISABLE INPUT	DIS−	P305A	DIS+
INPUT 8	DI8−		DI8+
INPUT 7	DI7−		DI7+
INPUT 6	DI6−		DI6+
INPUT 5	DI5−		DI5+
INPUT 4	DI4−		DI4+
INPUT 3	DI3−		DI3+
INPUT 2	DI2−		DI2+
INPUT 1	DI1−		DI1+
ISOLATED 12V SUPPLY	ISO−		ISO+

P305B

INPUTS ARE ARRANGED AS PAIRS OF FLOATING TERMINALS WHICH REQUIRE AN EXTERNAL VOLTAGE SOURCE FOR OPERATION

THE POWER SUPPLY FOR EXTERNAL PROXIMITY SWITCHES TO BE TAKEN FROM THE INCOMING POWER SUPPLY LINE.

WHEN ACTIVATED, THE DISABLE INPUT FORCES ALL THE OUTPUTS TO ASSUME THE STATE DEFINED BY THE CARD'S RESET DIP SWITCH SETTINGS.



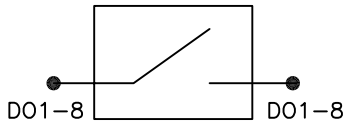
ATB INPUT (INPUT 1)	ATB−	P301B	ATB+
OUTPUT 8	DO8		DO8
OUTPUT 7	DO7		DO7
OUTPUT 6	DO6		DO6
OUTPUT 5	DO5		DO5
OUTPUT 4	DO4		DO4
OUTPUT 3	DO3		DO3
OUTPUT 2	DO2		DO2
ATB RELAY OUTPUT (OUTPUT 1)	DO1		DO1
NOT CONNECTED	N/C		N/C

P301A

OUTPUTS ARE ARRANGED AS VOLTAGE FREE RELAY CONTACTS WITH SEMICONDUCTOR SNUBBER. ENSURE LOAD SUPPLY DOES NOT EXCEED 50V DC.

NOTE: OUTPUTS ARE NOT FUSE PROTECTED. USER MUST UTILIZE SUITABLE EXTERNAL PROTECTION SUCH AS IN−LINE FUSES.

ATB SWITCH INPUT REQUIRES SIMPLE SWITCH CLOSURE BETWEEN ATB+ AND ATB−.



REV	DATE	DESCRIPTION OF CHANGE	APPR'D
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	

TOL: X. +/− 1
X.X +/− 0.2
X.XX AS STATED

DO NOT SCALE DRAWING
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DRAWN	APPROVED	PART OF ASSY
D. PLANTHABER	D. PLANTHABER	−
02/09/99	22/06/00	

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SOUTH AUSTRALIA

PART No: −

PROJECT: RCI−1550

TITLE: RCI 1550 ELECTRICAL CONNECTIONS

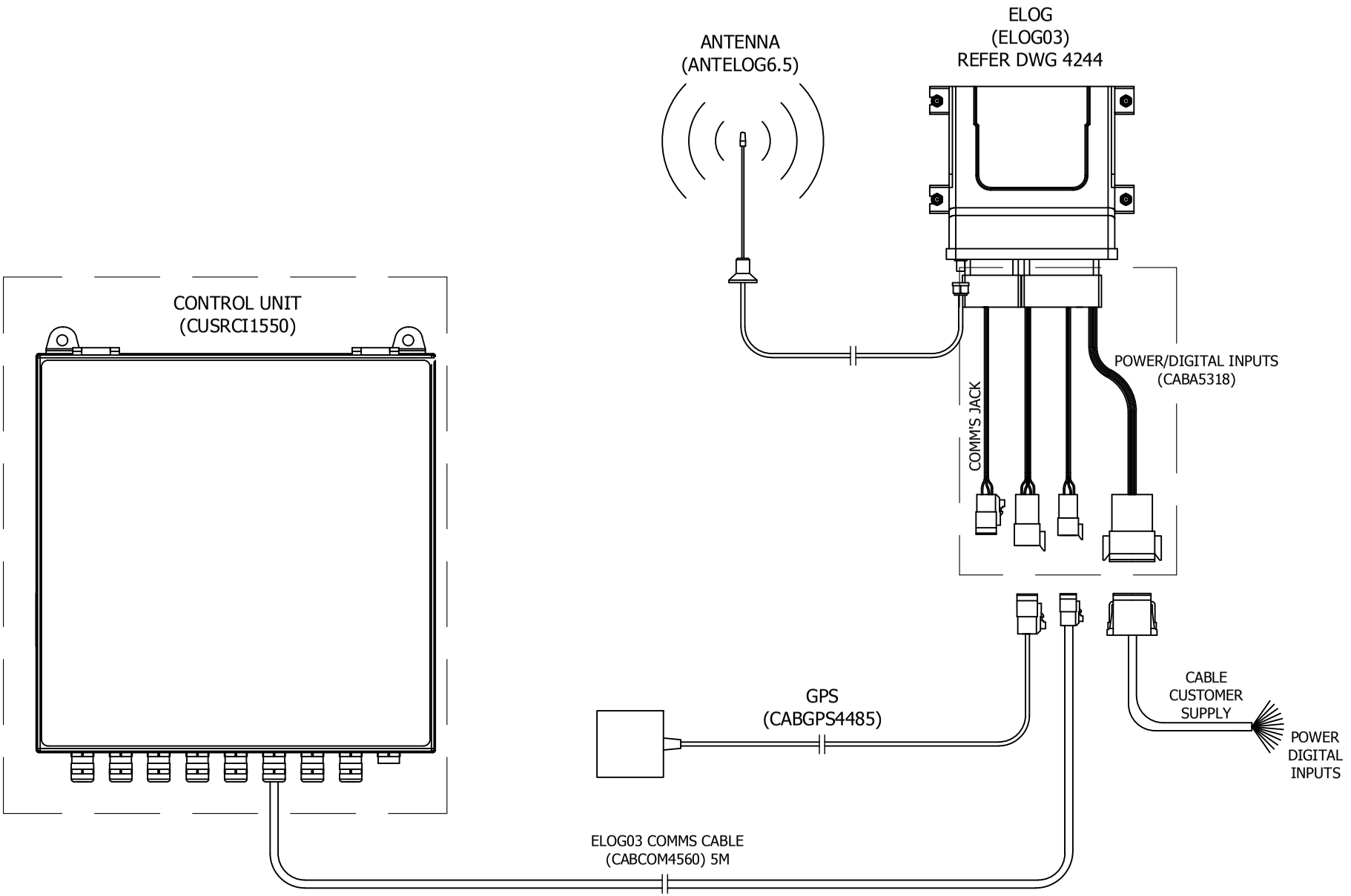
SCALE N/A

SHEET 3 OF 3

DRAWING No: DWG 2078

FILE No: 207801AD.DWG

REV 1.3



REV	DATE	DESCRIPTION OF CHANGE	APPR'D
A	6-3-16	RELEASED FOR MANUFACTURE	J.H
B	12-9-16	DT 12 WAY WAS DTM 12 WAY	J.H

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

DRAFTING STANDARD: AS1100

DO NOT SCALE DRAWING
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DRAWN	APPROVED	PART OF ASSY
J.HART	J.KOVAL	-
4/3/2016	5-3-16	

Trimble Lifting Solutions

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SOUTH AUSTRALIA 5031
web : www.lsirobway.com.au
PH: +61 8 8238 3500
FX: +61 8 8352 1684

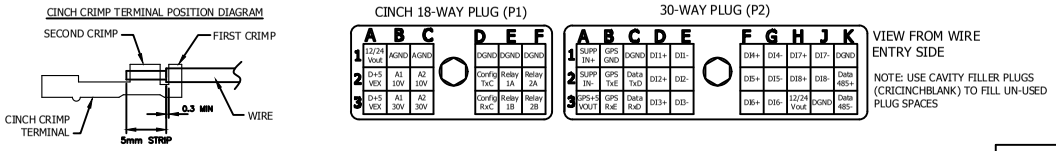
PART NO.:	PROJECT:
-	SYSELOG03-19

TITLE: GA, ELOG03 TO SUIT FAVCO SYSTEM, FACTORY FITTED

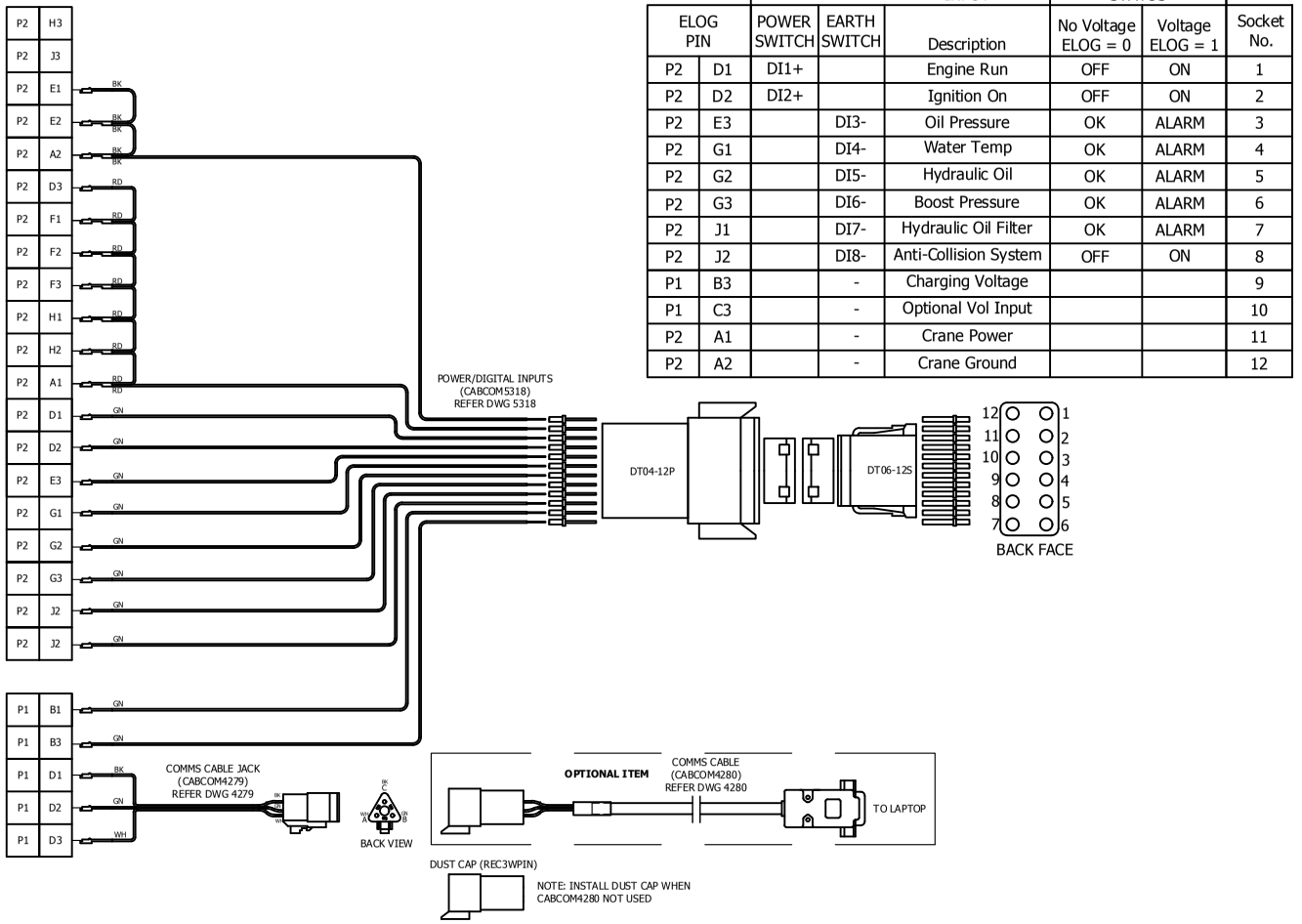
SCALE N/A

SHEET 1 OF 5

DRAWING No:	FILE No:	REV
5317	5317-B.DWG	B



ELOG PIN		INPUT: POWER SWITCH	INPUT: EARTH SWITCH	Description	STATUS: No Voltage ELOG = 0	STATUS: Voltage ELOG = 1	Socket No.
P2	D1	DI1+		Engine Run	OFF	ON	1
P2	D2	DI2+		Ignition On	OFF	ON	2
P2	E3		DI3-	Oil Pressure	OK	ALARM	3
P2	G1		DI4-	Water Temp	OK	ALARM	4
P2	G2		DI5-	Hydraulic Oil	OK	ALARM	5
P2	G3		DI6-	Boost Pressure	OK	ALARM	6
P2	J1		DI7-	Hydraulic Oil Filter	OK	ALARM	7
P2	J2		DI8-	Anti-Collision System	OFF	ON	8
P1	B3		-	Charging Voltage			9
P1	C3		-	Optional Vol Input			10
P2	A1		-	Crane Power			11
P2	A2		-	Crane Ground			12



REV	DATE	DESCRIPTION OF CHANGE	APPR'D

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

DRAFTING STANDARD: AS1100

DO NOT SCALE DRAWING
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UNLESS OTHERWISE STATED

DRAWN	APPROVED	PART OF ASSY
J.HART	J.KOVAL	-
14/09/2016	5-3-16	

PART NO.: -

PROJECT: SYSELOG03-19

TITLE: GA, ELOG03 TO SUIT FAVCO SYSTEM, FACTORY FITTED

SCALE N/A

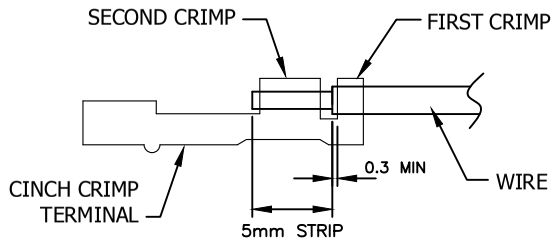
SHEET 2 OF 5

DRAWING No: 5317

FILE No: 5317-B.DWG

REV B

CINCH CRIMP TERMINAL POSITION DIAGRAM



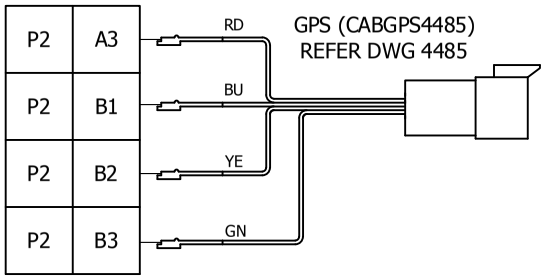
CINCH 18-WAY PLUG (P1)

	A	B	C	D	E	F
1	12/24 Vout	AGND	AGND	DGND	DGND	DGND
2	D+5 VEX	A1 10V	A2 10V	Config TxC	Relay 1A	Relay 2A
3	D+5 VEX	A1 30V	A2 30V	Config RxC	Relay 1B	Relay 2B

30-WAY PLUG (P2)

	A	B	C	D	E	F	G	H	J	K
1	SUPP IN+	GPS GND	DGND	DI1+	DI1-	DI4+	DI4-	DI7+	DI7-	DGND
2	SUPP IN-	GPS TxE	Data TxD	DI2+	DI2-	DI5+	DI5-	DI8+	DI8-	Data 485+
3	GPS+5 VOUT	GPS RxE	Data RxD	DI3+	DI3-	DI6+	DI6-	12/24 Vout	DGND	Data 485-

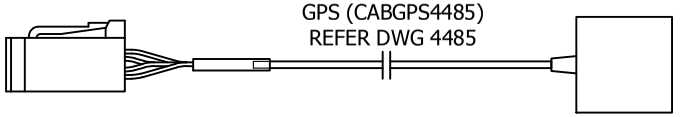
VIEW FROM WIRE ENTRY SIDE



GPS (CABGPS4485)
REFER DWG 4485

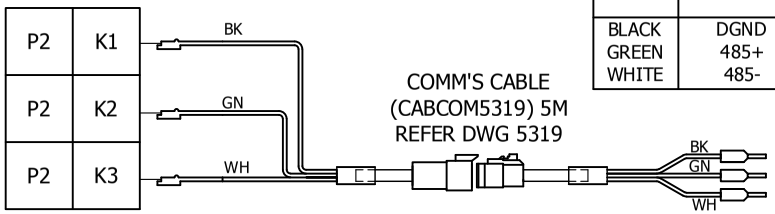
COLOUR	DESCRIPTION	PIN
RED	+5V	1
YELLOW	TxE	2
GREEN	RxE	3
BLUE	GROUND	4

BACK OF PLUG



GPS (CABGPS4485)
REFER DWG 4485

COLOUR	DESCRIPTION	PIN
RED	+5V	1
WHITE	TxE	2
GREEN	RxE	3
BLACK	GROUND	4



COMM'S CABLE
(CABCOM5319) 5M
REFER DWG 5319

COLOUR	DESCRIPTION	PIN
BLACK	DGND	1
GREEN	485+	2
WHITE	485-	3

TO P208
CONNECTOR
RCI-1550
SEE SHEET 4

REV	DATE	DESCRIPTION OF CHANGE	APPR'D

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

DRAFTING STANDARD: AS1100

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

DRAWN	APPROVED
J.HART	J.KOVAL
14/09/2016	5-3-16

PART OF ASSY
-

N:\robway logos\ROBWAY (new).png

web : www.robway.com.au

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THEBARTON
SOUTH AUSTRALIA 5031

PH: +61 8 8238 3500
FX: +61 8 8352 1684

PART NO.: -

PROJECT: SYSELOG03-19

TITLE: GA, ELOG03 TO SUIT FAVCO SYSTEM, FACTORY FITTED

SCALE N/A

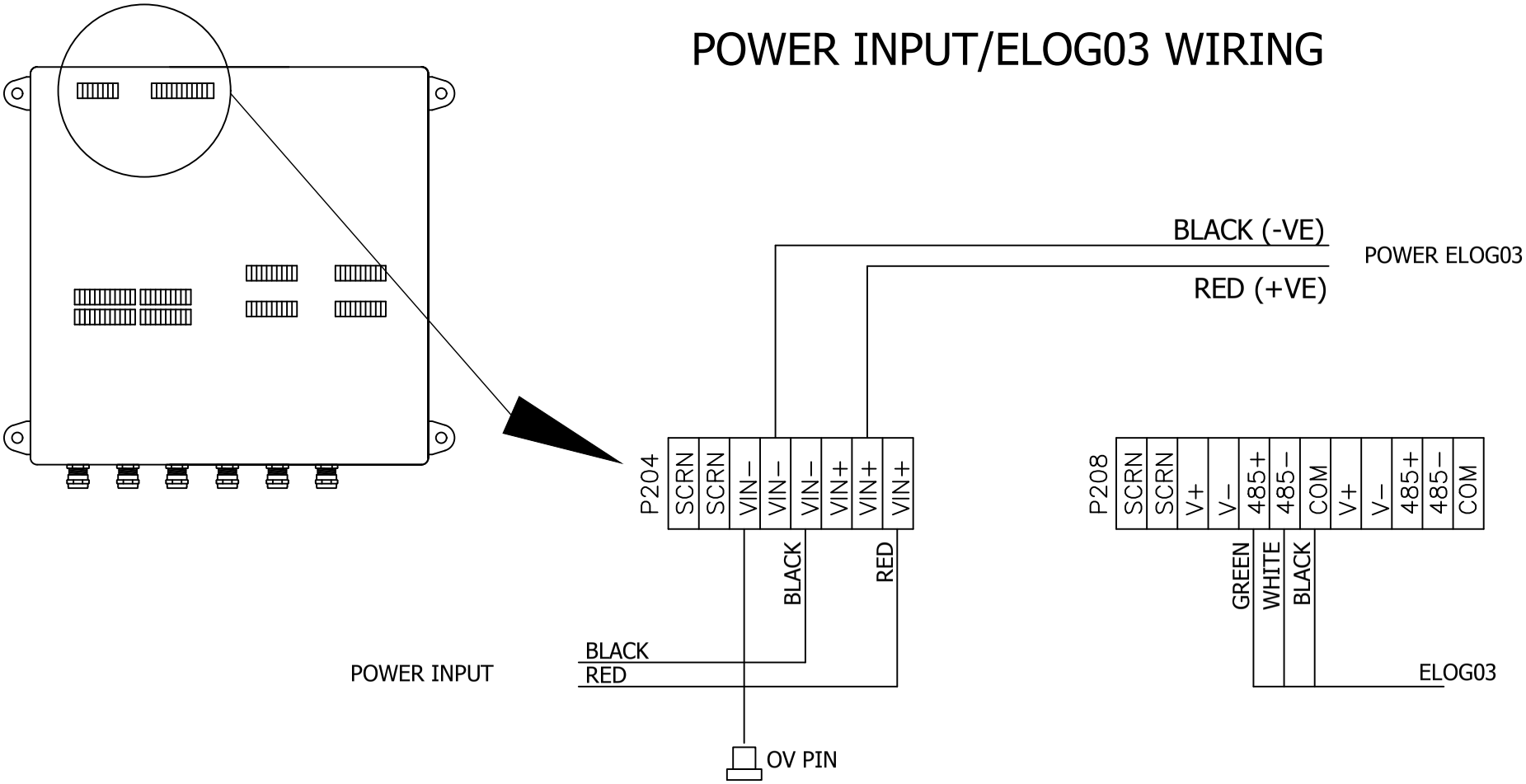
SHEET 3 OF 5

DRAWING No: 5317

FILE No: 5317-B.DWG

REV B

POWER INPUT/ELOG03 WIRING



FOR POSITION OF ZERO VOLTAGE PIN (OV)
REFER TO SHEET 5 OF 5

REV	DATE	DESCRIPTION OF CHANGE	APPR'D

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

DRAFTING STANDARD: AS1100

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

DRAWN	APPROVED
J.HART	J.KOVAL
14/09/2016	5-3-16

PART OF ASSY
-

N:\robway logos\ROBWAY (new).png

web : www.robway.com.au

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PART NO.: -

PROJECT: SYSELOG03-19

TITLE: GA, ELOG03 TO SUIT FAVCO SYSTEM, FACTORY FITTED

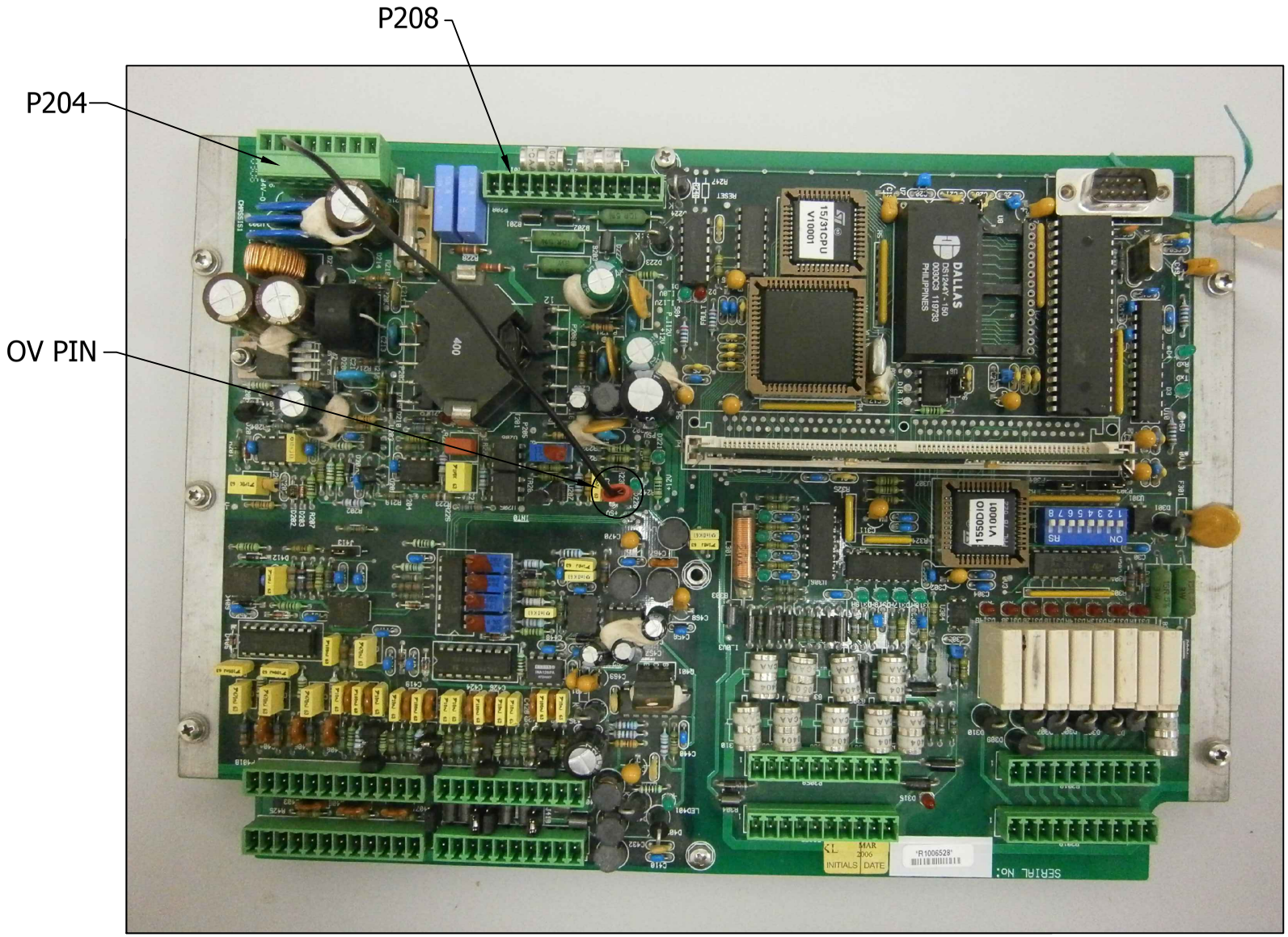
SCALE N/A

SHEET 4 OF 5

DRAWING No: 5317

FILE No: 5317-B.DWG

REV B



REV	DATE	DESCRIPTION OF CHANGE	APPR'D

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

DRAFTING STANDARD: AS1100

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

DRAWN	APPROVED	PART OF ASSY
J.HART	J.KOVAL	-
14/09/2016	5-3-16	

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PART NO.:	PROJECT:
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SCALE N/A

SHEET 5 OF 5

DRAWING No:	FILE No:	REV
5317	5317-B.DWG	B

13.3 APPENDIX

Software Documents