1465 LLAR System
Instruction Manual

MAN-1070 Rev F

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Model 1465
Load/Length/Angle/Radius/Height & ATB Indicator

Features

- Suits all crane types
- Compact powerful computer
- Backlit display for night operation
- Includes anti-two-block & over-ride
- On-board calibration
- Motion cut and audible outputs
- Plug-in cables
- Dual load sensing (main & aux. winches)
- Suits 12 and 24 VDC cranes
- Self diagnostic fault reporting (error codes)
- Simple calibration technique
- Fully tested against temperature, humidity, and vibration

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1. Important Safety Notice

The RCI-1465 System is a crane device which warns the operator of impending “out of set limit” conditions (e.g. Length, Angle, Radius, Boom Tip Height, and Load) and of overhoist (two-blocking) condition which could cause damage to property, crane and personnel.

The system is not a substitute for good operator judgement, experience and safe crane operation. The operator is solely responsible for the safe operation of the crane.

The operator must, prior to operation of the crane, read this Manual carefully and thoroughly and shall ensure that all operational instructions and warnings are understood and complied with.

Proper system operation requires the operator to correctly set the operational limits and parameters of the Systems to match the crane setup and working configuration.

The system is equipped with a Cancel button on the panel which bypasses alarms and motion cut function (if crane motion cut controls are installed) at which time the system can no longer warn of impending “out of limit” conditions and/or overshoist (two-blocking) condition and must only be operated strictly in accordance to the crane manufacturer’s setup and operation procedures. The operator shall be solely responsible for the use and operation of this button.

2. General Description

The 1465 is a member of the ROBWAY 1400 series Semi Automatic Indicators and is specifically designed for low-cost applications.

Refer to drawings DWG 3075 and 3076 “1465 GENERAL ARRANGEMENT FOR STRUT BOOM AND TELESCOPIC CRANES” at the back of the Manual for an overview of the System.

Please note that the 1465 is NOT a Rated Capacity Indicator.

The 1465 is a microprocessor controlled, semi-automatic indicator. It is suitable for strut boom or telescopic cranes with or without fly-jibs and allows for single or twin winch operation.

The 1465 is site-configurable and requires very little installation time and operator training. The 1465 is compatible with current ROBWAY sensor installations.

The 1465 has the following functions:

1. Length
2. Angle
3. Radius
4. Height (Boom Tip)
5. Load for Main and Auxiliary winches
6. Falls or Parts of Line
7. Anti-Two-Block (ATB)

Although not a Rated Capacity Indicator, the 1465 can be configured to give warnings and motion cut (if installed) on two-blocking condition and on reaching the operator settable limits of the above functions. These limits stay in effect until changed or cancelled by the operator and are remembered even after the 1465 has been switched off. Separate limits can be set for main and aux. winches for functions 1 to 6 above.

The 1465 activates both visual and audible alarms if these limits are reached or passed. Motion-cut can be separately enabled/disabled for ATB and for reaching/exceeding any of the above limits.

The 1465 continuously checks for hardware errors. If any fault is found with the hardware, it is treated the same way as the limit functions. That is, if the 1465 finds any problem with the hardware it will activate the audible and visual alarms, provided that the alarm cancel button has not been previously pressed. The flashing indicators will point to the source of the alarm.

In addition to these alarms an ERROR CODE will also be displayed on the top display window to distinguish hardware alarms from those caused by reaching limits. The error codes have the form Exxx, where xxx is a number. The list of possible error codes can be found in Section 7. “Troubleshooting” of this Manual.

3. Operating Instructions

The following sections explain how to operate the 1465 and make best use of its capabilities.

3.1. Turning On the Unit

Power to the unit is from the crane battery (nominal 12 or 24 volts dc) through the start-up or ignition key. In some applications an additional switch may be used to enable the operator to switch the unit on/off as required.

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

3.2. Turning OFF the Unit

The unit will stop working as soon as the power is removed from it by switching off any of the switches indicated in Section 3.1 above.

3.3. Display Functions

The 1465 has 2 display windows:

Functions for the **top display** window are selected by the push button labelled **SELECT**. The current function is indicated by the lamp next to its label being switched ON. The initial function of this window is set to displaying RADIUS.

Other functions can be selected by pressing the **SELECT** key once to activate the next function, or by pressing and holding the **SELECT** key to step through the functions in turn. The functions for the display window are as follows:

LENGTH

When the LENGTH function is selected, using the SELECT button, the display window shows the current length value. This length value indicates the current main boom length when the MAIN indicator is ON and it shows the main boom plus the fly jib length when the AUX indicator is ON.

Please note, that the main boom length must be set by the operator when the 1465 is configured for a strut boom crane. *Please refer to Crane configuration section for the correct procedure.*

If the 1465 is used on a telescopic crane then the length sensor must be calibrated by the user/installer before the 1465 is used. *Please refer to the CALIBRATION section for selecting strut boom or telescopic mode.*

The length and the offset angle of the fly jib are changed from the front panel through a simple menu system. *Please refer to Crane configuration section for the correct procedure.*

ANGLE

When the ANGLE function is selected, using the **SELECT** button, the display window shows the current angle value. This angle value indicates the main boom angle regardless of whether MAIN or AUX is selected.

Please note, that the main boom angle is automatically read by the 1465 from an angle sensor (which is mounted on the side of the main boom during installation time). The fly jib offset angle is set by the user/installer. *Please refer to Crane configuration section for the correct procedure.*

RADIUS

Radius is the horizontal distance (the distance measured on the ground) from the centre line of rotation to the hook-block.

When the RADIUS function is selected, using the **SELECT** button, the display window shows the current radius value. This radius value indicates the radius of the main boom when the MAIN indicator is ON and it indicates the radius of the fly jib when the AUX indicator is ON.

The 1465 allows the user/installer to correct for **laden** boom deflection. *Please refer to the CALIBRATION section for the correct procedure.*

HEIGHT

This refers to the Boom Tip Height which is the vertical distance measured from the ground to the main boom or fly jib sheaves.

When the HEIGHT function is selected, using the **SELECT** button, the display window shows the current height value. This height value indicates the height of the main boom tip sheave when the MAIN indicator is ON and it indicates the height of the fly jib tip sheave when the AUX indicator is ON.

The 1465 allows for change in tip heights, due to boom deflection, only if radius correction has been done.

FALLS

When the FALLS function is selected, using the **SELECT** button, the display window shows the current falls (parts of line) selected. This value indicates the falls for the main winch when the MAIN indicator is ON and it indicates the falls for the aux. winch when the AUX indicator is ON.

The user can change the falls for the main or aux. winches at any time, by using the UP/DOWN keys on the front panel, when the FALLS indicator is lit.

Make sure that the correct winch is selected before changing the falls display.

The maximum falls selectable for the individual winches can be set through a FUNCTION CODE, during calibration/commissioning time.

LOAD LIMIT

The 1465 allows the user to set load limits for the main and aux. winches, individually. These limits can be set from the front panel at any time. When the load lifted is approaching these limits the 1465 activates both visual and audible alarms and can also activate motion-cut, if

this function has been enabled. The 1465 will check for over-load on both winches regardless of which winch has actually been selected on the front panel.

The **bottom display** is shared between displaying the load and calibration/configuration functions.

In normal mode, that is non-calibration mode, this display shows the actual load lifted on the winch selected. When the MAIN winch is selected the MAIN indicator is ON and when the AUX. winch is selected the AUX indicator will be ON. The user can change the active winch by pressing the LOAD SELECT button at any time.

When configuring or calibrating the 1465, this window is used as a calibration display.

Note:
The 1465 can be configured to operate in single or twin winch mode through a function code (refer to the FUNCTION CODE listing at the end of this Manual).

In twin winch mode, when MAIN is selected the display will show the load currently on the MAIN winch and similarly when AUX is selected the display will show the load on the AUX winch.

In single winch mode, the load display will always show the load on the MAIN winch. In single winch mode the LOAD SELECT button is used to select when the winch is reeved, over the boom (MAIN) or over the fly (AUX).

4. Operator Configurable Options

The 1465 allows the user to review or change the crane configuration at any time. This is done through a simple menu system which is activated in normal mode by pressing the UP/DOWN arrow buttons on the front panel.

Please note that when the FALLS indicator is ON, the UP/DOWN buttons will only change the falls for the selected winch.

4.1. Crane Configuration

Once the menu system is activated *(see above)* the user can scroll through and change the crane configuration data. The options are as follows:

-BL-	**Boom length in metres** *(only available in Strut-Boom mode)*
-JL-	**Fly jib length in metres**
-JA-	**Fly jib offset angle in °**

As the user scrolls through the menu, the 1465 flashes the current value of the items in **the bottom display**. This allows for a quick and easy review of the current settings.

To change any of the settings, press the ENTER button when the appropriate menu option is displayed in the top display window; then use the UP/DOWN keys to ramp to the new value in the bottom display window. Once the bottom display shows the required new value press the ENTER key to accept and lock in the new value.

Once all required changes have been made, press the CANCEL key to exit the menu system and return to normal operating mode.

Please note that the values of SLEW-OFFSET , FOOT-PIN HEIGHT, BOOM OFFSET, JIB OFFSET and SHEAVE RADII can only be set during calibration/commissioning times, through FUNCTION CODES. Please refer to the CALIBRATION section.

4.2. Setting limits

The 1465 allows the user to set low/high limits for the following functions:

- Length
- Angle
- Radius
- Height *(boom tip)*
- Load *(high limit only)*

Separate limits can be set for MAIN and AUX winches. These limits can be reviewed or changed from the front panel at any time.

When any of the limits is reached, the 1465 does the following:

- **If the O/RIDE indicator is OFF** (indicating that the alarm cancel button has not been pressed before), the 1465 will switch on all indicators, audible alarms and motion-cut if it

has been enable during installation. To aid in finding the source of the alarm, the 1465 will flash the indicator for that function.

- **If the O/RIDE indicator is ON** (indicating that the alarm cancel button has been pressed), then the RED lamp at the top of the display will be activated, indicating the there is some form of alarm. To check what is causing the problem, you can turn the alarm cancel OFF to see all the problems at once or you can use the SELECT and LOAD SELECT buttons to change functions and check them one after the other.

To disable the alarms temporarily, press the alarm cancel button, (middle button at the bottom of the 1465), until the O/RIDE indicator comes on. It is recommended that the alarms not be turned off during normal operation.

To set a limit follow the procedure below:

1. Select the function you want to set a limit for, e.g. RADIUS,
2. Press and **hold** the LIMIT button. The **bottom display** should show the current low/high limits, in turn *(the low limit for load should show "----")*,
3. Select low or high limit by pressing the DOWN or UP keys respectively, until you hear two short beeps from the 1465, then release the UP/DOWN key (while still holding the LIMIT key). This will set the limit to the current measured value.
4. To set the limit to some other value use the UP/DOWN keys to ramp the bottom display to the required new limit,
5. Finally release the LIMIT key to accept and lock in the new value.

Make sure you continuously hold down the LIMIT button for the duration of the procedure above.

Speeding up limit-setting, using the crane:

1. Move the crane to the limit you want to set, e.g. 75° high angle,
2. Repeat steps 1 to 3 above,
3. Release the LIMIT key.

To check a limit follow the procedure below:

1. Select the function you want to check the limits for, e.g. RADIUS,
2. Press and hold the LIMIT button, the **bottom display** should show the current low/high limits, in turn *(the low limit for load should show "----")*,
3. Release the LIMIT button.

To clear a limit follow the procedure below:

1. Select the function you want to check the limits for, e.g. RADIUS,
2. Press and hold the LIMIT button, the bottom display should show the current low/high limits, in turn *(the low limit for load should show "----")*,
3. Press and hold the CANCEL button, until you hear two short beeps from the 1465.

Always check the limits after clearing/changing them, using the Check limit procedure above.

5. Installation

The following sections describe the recommended procedures for installing the 1465 system.

System Components

- ***1465 Display Module***
  The computerised display and control systems.

- ***Load Sensor(s)***
  Used to send a signal to the 1465 which is proportional to the load lifted.

- ***Electronic Angle Sensor (For Strut/Lattice Boom Cranes)***
  Used to send a signal to the 1465 which is proportional to the main boom angle.

- ***Recoil Drum (For Telescopic Cranes)***
  Only used for telescopic applications; it contains the length sensor which provides signal to the 1465 which is proportional to the main boom length, and the electronic angle sensor which provides signal proportional to the main boom angle. Please note, that the payout cable doubles as the signal return for the Anti-2-block switch, when used.

- ***Optional A2B Switch and Bobweight***
  Used for detecting Two-blocking.

- ***Cabling***
  Allows the connection of system components in a convenient manner.

Please refer to the drawings and diagrams at the end of this Manual to see how the components are wired up.

5.1. Mounting the Display

Mount the display with the face directly towards the operator in an area where it does not obstruct normal view.

Supply 12/24VDC positive and negative from the crane instrument panel. The 1465 display is provided with an inline fuse of 0.5A. *Do not exceed this rating.* Should the fuse blow when power is applied, check the vehicle electrics, it may be using positive ground. If so, reconnect the display ensuring that the red wire is connected to the positive and the black wire is connected to the negative of the battery.

We recommend that the display be connected after the ignition switch. The ground side should be connected to the common grounding of other crane instruments to prevent a poor or high resistance ground causing the display to read erratically.

5.2. Load Sensor Installation

TENSION CELL (PLATE TYPE LOADCELL)

A tension eye/eye plate type loadcell of capacity to exceed the maximum permissible linepull can be fitted into the load hoist rope dead-end termination for hoist rope type installations. This loadcell will output an electrical signal proportional to the linepull representing the forces exerted on the rope.

Robway recommends fitting the loadcell between the sister plates (or side plates) supplied to further protect the tension cell from failure caused by bending and torsional forces. Suitable end termination items/brackets such as shackles, etc. for connecting the tension cell (with side plates) to the boom anchor point and hoist rope deadend (typically a wedge socket) are to be provided by the customer/installer. Alternatively, Robway can custom-manufacture these items at the time of order to suit specific requirements.

SINGLE SHEAVE DYNAMOMETER OR TENSIOMETER

Special attention should be given to the single sheave tensiometer load pin (if used) to ensure that the pin can be easily moved around, in and out by hand even while there may be a small amount of load applied to it by the weight of the hoist rope.

This simple test ensures that there is no residual loading of the pin by a distorted or misaligned tensiometer frame. This can adversely effect the load calibration.

THREE-SHEAVE DYNAMOMETER OR TENSIOMETER

Align the sheaves of the tensiometer with the main hoist rope head sheave, ensuring the tensiometer is upright. A mounting frame may be required to raise the tensiometer off the boom.

Move it back from the head sheave until it is situated near the end of the main boom and adjust its line so that the sheaves align with the centre of the main hoist drum. Tack weld bolts into position. High tensile booms require careful attention to welding procedure. Enlist the aid of specialised personnel and ensure that the welding procedure specification is compatible with the boom material. Remove load cells and cables from the weld zone. Remove tensiometer from bolts and finish welds. Refit the tensiometer, and bolt securely.

Remove front and back sheaves from tensiometer and place the hoist rope over the centre sheave and refit front and back sheaves.

Articulating Arm Installation

Some installations may require that the tensiometer be free to follow the natural hoist rope line entering the hoist drum. In these cases an articulating arm assembly should be used. The articulating arm may comprise a telescoping section. Set the arm length to suit both the crane boom lacings/fittings and to create a maximum 30 degree angle between the hoist rope and the boom top chords when the boom is at maximum boom angle. This is to prevent a short arm from 'turning' over itself. Solidly fix or weld the telescoping sections of the articulating arm. Ensure all pins are firmly fitted and secured.

Containment of the tensiometer should be ensured by a fixed bar on the boom. Another cross brace should be fitted to act as a 'landing' block for when the hoist rope is slack. *Timber impact pads are strongly suggested.*

CABLING

Load cell cables should be fixed firmly to the arctic arms/boom sections and routed along the boom chords to the cab ensuring freedom of movement around the boom pivot pin. Clip cables at 600mm intervals. Manual reeling drums are suggested cable storage devices for long booms or on cranes that require regular boom length changes.

5.3. Recoil Drum Installation (Telescopic Cranes Only)

When welding to the boom ensure that the crane manufacturers welding instructions are obtained and strictly adhered to.

The recoil drum is supplied ***for right hand side mounting*** unless ordered specifically for left hand side mounting. The recoil drum assembly supplied for telescopic cranes also contains the boom angle sensor. This angle sensor may be a pendulum based potentiometer type or an electronic angle sensor, depending on customer requirements.

The recoil drum comes complete with mounting bolts, payout wire 'eyes' and boom tip tie-off bracket.

On most applications the payout wire will be connected to the end of the boom (boom tip). On some special applications the payout wire will not attach to the end of the boom but rather to the end of the second to last boom section. This is a special case (refer to the boom length calibration section for more information about this case) but never-the-less on ALL installations the installer *must check* that *the extension* of the payout wire is sufficient to cover the extension range of the boom. In cases where the payout wire is found to be to short, then the length sensor is probably meant to attach to the second to last boom section rather than the boom tip (refer to the boom length calibration section to verify your crane is suitable for this arrangement).

Warning!
Failure to check the extension length of the payout wire is sufficient to cover the boom extension can lead to serious damage to the system and possible injury to surrounding personnel.

Mount the recoil drum in a convenient position to allow for alignment of the payout wire with the 'eyes' and the boom tip tie-off bracket. A string line strung from the intended position of the tie-off bracket to the intended position of the recoil drum will assist in the final positioning of these items.

When the position of the drum is finalised, have the bolts welded into position and mount the recoil drum. Tie off the string line from the drum payout wire storage area to the boom tip. Cut to length and weld the tie-off bracket to the boom tip. Tie off the string line to the tie off bracket and proceed to cut the 'eye' brackets to length and weld to the boom side. The payout wire should run through the centre of the eyes.

When the installation is complete, the recoil spring should be 'maximised' to ensure that maximum available tension is applied to the payout wire to prevent poor spooling onto the recoil drum. If possible, extend the boom fully at zero degrees and pull the recoil drum payout wire fully out by hand until the spring 'locks up'. Allow 2 metres of payout wire to return back onto the drum and cut off the excess. Remake the connection to the boom tip tie-off bracket. Remember to leave sufficient cable length for connection to the Anti-2-block switch if one is being fitted.

If it is not possible to safely extend the boom at zero degrees, then simulate by extending the payout by hand to a mark on the ground representing the full telescopic extension.

Fully retract the boom and remove the recoil drum cover plate. Extend the payout wire slightly and note the direction of rotation of the large gear wheel for an extending boom. Release the payout wire and allow it to retract to its' fully retracted position. Turn the large aluminium gear, by hand, in the opposite direction to that noted for an extending boom, until the gear stops. Turn the gear in the opposite direction (i.e. as if for extending) for ¾ of a turn or three clicks of the clutch. Safely extend

the boom to full extension ensuring continuous operation of the gear wheel and potentiometer. Fully retract the boom and again check operation. Refit the recoil drum cover and ensure all mounting nuts are tight.

Reversing Drum Mounting to Left Hand Side

When the electronic angle sensor is used, its alternative mounting position must be used by rotating the unit by 90°.

When a potentiometer type sensor is used, the potentiometer will need to be rotated so that when viewing the uncalibrated angle signal (refer to FUNCTION CODE listing), the signal lies within the normal 33 - 999 range over the full boom angle range.

Proceed to installing the interconnecting cable between the recoil drum and the display.

Note:
The slip-rings in the ROBWAY recoil drum are designed for use with ROBWAY Anti-2-block systems and are not for resistive or inductive circuits such as lights or bells. If you have a particular application that you feel may be applicable to the slip-ring facility, please contact ROBWAY for further advice.

5.4. Angle Sensor Installation (Strut Boom Cranes Only)

Fix the angle sensor to the side of the boom in a convenient position close to the operator's cabin by welding the angle sensor mounting plate to the butt section of the boom.

When welding to the boom ensure that the crane manufacturers welding instructions are obtained and strictly adhered to.

Mount the angle sensors on the bolts and route the cable carefully around the boom pivot to the cabin. Clip the cable to the boom and turret using adhesive clips provided ensuring that the cable is not pinched or stretched as the boom moves through its working angle range.

5.5. Connecting Cables

Commencing from the recoil drum, plug in the electrical plug. Route the cable back along the boom around the pivot and into the cabin. Ensure the route avoids possible damage to the cable during normal crane operation. Use cable fixings such as self-adhesive type or tie wraps (zip straps) to avoid potential damage areas. Pay particular attention to the foot pivot area to ensure the cable will not be stretched or pinched as the boom elevates to high boom angles. Excess cable can be coiled and tied out of the way inside the cabin area or under the cabin floor. Connect the cable to the display. Ensure this connection is done in an area to avoid damage during normal crane operation.

5.6. Anti-2-Block Installation (Optional Item)

Following the completion of the 1465 system installation, mount the Anti-2-block switch at the main boom tip and connect the switch to the recoil drum payout wire and a ground point according to the drawings at the back of this Manual. Ensure the Bobweight chain length is suitable for the winch speed, enabling the operator to react on alarm and stop the winch. Ensure the Bobweight will not cause damage to the hook-block in an over-hoist condition. A steel bracket may be required to prevent hook-block sheave damage.

Continue with the fly jib Anti-2-block switch if required. Install the switch, extension cable and Bobweight as shown on drawings.

Note:
The Anti-2-block switches are normally closed when NOT in over-hoist condition. Their electrical contacts open when the Bobweight is picked up and the switch operates.

5.7. Motion Cut Control Wiring (Optional Item)

The 1465 System provides an output signal that can be utilised for crane motion control if required.

The ampere rating of this signal is approx 1 ampere only and must not be used to directly operate hydraulic or mechanical solenoid devices or high capacity relays. For such devices a “slave” relay must be used to switch ampere ratings exceeding 1 ampere.

This signal is at ‘negative polarity’ when all is normal and no alarm state exists. In alarm, this signal will “float” causing the motion-cut switching device to drop out through loss of sufficient voltage potential across the coil.

If motion cut is required the client shall provide appropriate solenoids (or relay devices) to de-activate the appropriate function and wire them as shown per the drawings at the back of this Manual.

A typical automotive type relay (contact rating of 10 amperes) can be used as a “slave relay”. Most of these relays usually have 5 push-on spade type connections, 2 for coil +ve and –ve and 3 for the relay contacts, one for common (COM) , one for normally closed (NC) and one for normally open (NO) condition. The coil voltage must match the crane electrics. *Please refer to drawing DWG 1011 “1400 Series Motion Cut Control Wiring” at the back of the Manual for details.*

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.

6. Calibration Instructions

After installing the 1465 system modules, the 1465 must be calibrated to ensure accurate measurement. The following sections explain how it should be done.

Please note that only ROBWAY trained personnel should attempt any of the calibration procedures. Any misuse of the calibration functions can cause the 1465 to operate incorrectly.

Entering calibration mode and changing calibration data

Procedures in the following sections can only be used while in CALIBRATION MODE. To enter CALIBRATION MODE you have to SWITCH OFF the 1465 then press and hold the CANCEL button WHILE SWITCHING ON the 1465. Release the CANCEL button after seeing the test pattern 8.8.8.8 on the top display.

If CALIBRATION MODE is successfully entered the 1465 will show F-00 on the display. If the message does not show repeat procedure again.

Once in calibration mode, all procedures are activated by a FUNCTION CODE. Each FUNCTION CODE enables ONE procedure. A list of available FUNCTION CODES can be found at the end of this Manual in the Appendices.

Note that the FUNCTION CODE listing can be different from application to application and therefore the one supplied with this Manual must always be used.

To select a FUNCTION, use the UP/DOWN arrows to select its code then press the ENTER button in the lower right corner of the display. Once a function code is selected and the ENTER key pressed you can enter a new value for the function code selected.

Normally, the current value of the function is used as the starting value. You have the option of using the UP/DOWN arrow keys to change this value or can press the CANCEL or the ENTER keys.

If the CANCEL button is pressed the operation will be cancelled and previous calibration value will be retained, the 1465 should return to the F-xx prompt.

If the ENTER key is pressed, however, the last value shown in the window will be accepted and calibration data changed accordingly.

To exit calibration mode press CANCEL key when F-xx is displayed in the window.

6.1. Correct Order of Procedures

The following section describes the order of procedures to be used for the first time calibration. At subsequent calibration times only those procedures need be done which need fine tuning.

When calibrating the first time, or complete recalibration is required, the installer should follow the steps below:

- *Verifying crane configuration data*
- *Setting up motion cut options*
- *Calibrate angle*
- *Calibrate length*
- *Calibrate load*
- *Calibrate boom deflection*
- *Verify correct operation*

6.2. Verifying Crane Configuration Data

For accurate radius/height calculation, the 1465 needs certain crane dimensions. These are dimensions which do not change and only need to be entered into the 1465 once for a given crane.

If these dimensions are not entered into the 1465 or they are incorrect, the radius displayed on the 1465 will be inaccurate and unreliable.

Please note that dimensions which increase radius should be entered as positive numbers, dimensions which decrease radius should be entered as negative numbers.

Crane dimensions which effect radius/height calculations are

- Slew offset (F-45),
- Foot pin height from ground (F-54),
- Main sheave radius (F-49),
- Jib sheave radius (F-53),
- Distance between foot pin and centre of main boom sheave (F-48),
- Distance between boom centre line and centre of jib sheave (F-52).

Refer to the drawings in Section 9.4. "Appendices – System Configuration Sheets & Function Codes" for a detailed description of these dimensions.

Those dimensions which need to be set more frequently, e.g. jib length or offset angle, are set from the front panel in normal mode *(refer to Section 4. "Operator Configurable Options" earlier in this Manual for instructions).*

To verify or change these dimensions, look up the FUNCTION CODE for the dimension you want. Enter calibration mode and select the function. If you only want to check the number press CANCEL when finished viewing it. If you want to change the number, use the UP/DOWN arrow keys to ramp to the new value then press ENTER key to lock in the new value.

6.3. Setting Up Motion Cut Options

The 1465 can activate motion cut on Two-blocking and on reaching any limits set by the operator.

The motion cut options are controlled by the functions:

- Motion-cut on anti-2-block On/OFF (F-55), and
- Motion-cut on limits ON/OFF (F-56).

When you activate these functions the 1465 will display their current status, On or OFF. To change the status press the ENTER key; to leave the status as it is, press the CANCEL key.

You must end this operation with the CANCEL key.

6.4. Selecting Single or Twin Winch Operation

The 1465 can be configured to monitor either 1 or 2 winches

The number of winches being monitored by the 1465 can be selected as either 1 or 2 by use of the appropriate Function code:

- Number of winches (can be entered as 1 or 2) – F-57.

In twin winch mode, when MAIN is selected the display will show the load currently on the MAIN winch and similarly when AUX is selected the display will show the load on the AUX winch.

In single winch mode, the load display will always show the load on the MAIN winch. In single winch mode the LOAD SELECT button is used to select when the winch is reeved, over the boom (MAIN selected) or over the fly (AUX selected).

6.5. Calibrating Angle

Once the system is installed, you need to verify that the angle sensor is working correctly and then you need to calibrate it so that it measures the main boom angle accurately.

Testing the angle sensor is done by using the function

- View uncalibrated angle input (F-07).

This function allows you to view the actual signal strength *(or raw counts)* from the angle sensor.

The value displayed will be between 0 and 1023. For correct operation this value must be between 33 and 999.

If it is less than 33 or greater than 999, the 1465 will report an error code of E101, indicating a suspected short circuit or open circuit. If this happens you should check for short or open circuits in the wiring from the angle sensor to the 1465.

Please also verify that, as you boom up and down, this number varies (increases or decreases) through the working angle range BUT never goes outside the range of 33 and 999.

Once you have finished checking the angle sensor signal press the CANCEL button to exit viewing mode and return to the function code display.

Please note that while you are in viewing mode the ENTER key acts as a toggle switch to turn ON/OFF the angle sensor input. This function can be useful for applications where you only what to use the length input to measure length or distance. If the 1465 shows "OFF " while viewing the angle sensor input (see above) or when the ANGLE function is selected in normal mode then the angle input has been turned off. If you see a number then the angle sensor input is ON.

To toggle the angle sensor input ON/OFF, all you need to do is activate either one of the angle view functions ("View uncalibrated angle input" or "View calibrated angle input") and then press the ENTER key.

If the angle sensor signal is functioning correctly then you need to calibrate a known low angle and a known high angle. Recommended angles are approximately 20°-30° for the low angle and 60°-80° for the high angle.

To calibrate the main boom angle use the functions

- Calibrate low angle (F-09), and
- Calibrate high angle (F-10).

Select the function code required, then using an angle finder MEASURE the actual main boom angle. Using the UP/DOWN buttons enter this angle into the 1465, then press the ENTER key to lock in this angle value.

After calibrating the main boom angle verify the accuracy of the angle measurement using function

- View calibrated angle input (F-08).

Select the correct function code and press ENTER. The 1465 should now display the calibrated main boom angle, in degrees. Using an angle finder check the main boom angle at 3-5 different positions against that displayed in the 1465 window. If the values are not accurate enough you need to repeat the calibration procedure above.

6.6. Calibrating Length

NOTES FOR STRUT BOOM APPLICATION

Please note that if you are installing for a strut boom crane, you MUST DISABLE the length sensor so that the 1465 can enter strut boom mode.

To disable the length sensor and change to strut boom mode do the following:

Select the function code for function

- View uncalibrated boom length input (F-11), or
- View calibrated boom length input (F-12).

If the display shows OFF then press the CANCEL button as the 1465 is already in strut boom mode.

If a number is displayed in the window press the ENTER key to turn off the length sensor and then press the CANCEL key to exit view mode.

Setting the actual boom length for strut boom operation is done in normal operating mode as described in the Crane configuration section, earlier in this Manual.

TELESCOPIC CRANE APPLICATION

Once the system is installed, you need to verify that the length sensor is working correctly and then you need to calibrate it so that it measures the main boom length accurately.

Testing the length sensor is done by using the function

- View uncalibrated boom length input (F-11).

This function allows you to view the actual signal strength *(or raw counts)* from the length sensor.

The value displayed will be between 0 and 1023. For correct operation this value must be between 33 and 999.

If it is less than 33 or greater than 999, the 1465 will report an error code of E110, indicating a suspected short circuit or open circuit. If this happens you should check for short or open circuits in the wiring from the length sensor to the 1465.

Please also verify that, as you boom in and out, this number varies (increases or decreases) through the working length range BUT never goes outside the range of 33 and 999.

If the length sensor signal checks out then you need to calibrate a known short boom length and a known long boom length. Recommended lengths are fully retracted and fully extended boom, respectively.

To calibrate the main boom length use the functions

- Calibrate short boom length (F-13), and
- Calibrate long boom length (F-14).

Select the function code required, then using a tape measure, MEASURE the actual main boom length (if you are using fully retracted or fully extended boom then you can obtain their lengths from the load chart of the crane). Using the UP/DOWN buttons enter this length into the 1465, then press the ENTER key to lock in this length value.

After calibrating the main boom length verify the accuracy of the length measurement using function

- View calibrated boom length input (F-12).

Select the correct function code and press ENTER. The 1465 should now display the calibrated main boom length, in metres. Using a tape measure check the main boom length at 3-5 different positions against that displayed in the 1465 window.

If the values are not accurate enough you need to repeat the calibration procedure above.

Please note that while you are in viewing mode the ENTER key acts as a toggle switch. This function is used to toggle STRUT/TELESCOPIC crane mode. To toggle STRUT/TELESCOPIC crane mode activate either one of the length view functions ("View uncalibrated length input" or "View calibrated length input") and then press the ENTER key.

If you see OFF then the 1465 is in STRUT mode, if you see a number then the 1465 is in telescopic mode.

IMPORTANT

The Function Code (F-58) "LENGTH OF BOOM UP TO END OF SEQUENTIAL SECTIONS" must be set to 0.0 when the length sensor payout cable is attached to the boom tip. It can only be set to a non-zero value when using the special sensor calibration described over-page.

NOTE: Special Case Booms and Short Length Sensors

On some systems the recoil drum provided will not allow the payout wire to reach the boom tip. This is a very special case and can only be done when boom extension is partly sequential and partly proportional, i.e.

1. The *boom sections extend sequentially **until** the LAST TWO SECTIONS* extend.
2. The LAST TWO SECTIONS of the boom **are equal length** and **extend proportionally**.

For this sort of boom the payout cable may be attached to the end of the first of the proportional section instead of the boom tip as usual. Calibration of the length sensor should then proceed as outlined previously with the following changes / additional steps:

1. When calibrating the *long boom length*, enter the length only up to the boom tie of point, i.e. the end of the first proportional section.

2. After calibrating the low and high end of the length sensor, select the **Function Code**

   - **Length of boom up to end of sequential sections (F-58).**

   Enter the *length of the boom up to the end of the sequentially extending sections*.

When normal operation resumes the true length of the boom will be displayed.

NOTE

Because the payout wire is not connected to the boom tip it is not possible to use th payout wire as the signal wire for the anti-two-block switch. In this case a seperate signal wire needs to be laid for anti-two-block.

IMPORTANT

The Function Code (F-58) "LENGTH OF BOOM UP TO END OF SEQUENTIAL SECTIONS" must be set to 0.0 when the length sensor payout cable is attached to the boom tip. It can only be set to a non-zero value when using the special sensor calibration describe above.

6.7. Calibrating Load

Once the system is installed, you need to verify that the load sensors are working correctly and then you need to calibrate them for accurate load measurement.

For testing/calibrating the load channels you will need at least two known test weights. To ensure best accuracy, ROBWAY recommends test weights which will produce 10% and 75% of the maximum linepull allowed for the winches. Please note that NO LOAD or the hook-block may not be the best test load to calibrate the light load with as it may not make the sensors work hard enough.

Testing the MAIN winch load sensor is done by using the function

- View uncalibrated transducer 1 input (F-15).

This function allows you to view the actual signal strength *(or raw counts)* from the main winch load sensor.

The value displayed will be between 0 and 1023. For correct operation this value must be between 33 and 999.

If it is less than 33 or greater than 999, the 1465 will report an error code of E201, indicating a suspected short circuit or open circuit. If this happens you should check for short or open circuits in the wiring from the main winch load sensor to the 1465.

Please also verify that, as you lift your test loads, this number increases, from lifting the light test weight to lifting the heavy test weight, BUT never goes outside the range of 33 and 999.

If the main winch load sensor signal checks out then you need to calibrate the load.

To calibrate the main winch load use the functions

- Calibrate light main load (F-02), and
- Calibrate heavy main load (F-03).

CALIBRATE LIGHT MAIN LOAD

1. Lift up the light test load safely,

2. Select function code (F-02),

3. Once the load is lifted off the ground and free of any objects, you should use the UP/DOWN arrow keys to ramp to the actual value of the test weight,

4. Press the ENTER key to lock in the new value for the light load. The 1465 should then return to the F-02 prompt.

You may press the CANCEL key any time if you want to stop re-calibrating the light load *before pressing the ENTER key*.

CALIBRATE HEAVY MAIN LOAD

1. Lift up the heavy test load safely,

2. Select function code (F-03),

3. Once the load is lifted off the ground and free of any objects, you should use the UP/DOWN arrow keys to ramp to the actual value of the test weight,

4. Press the ENTER key to lock in the new value for the heavy load. The 1465 should then return to the F-03 prompt.

You may press the CANCEL key any time if you want to stop re-calibrating the heavy load *before pressing the ENTER key*.

Testing the AUX winch load sensor is done by using the function

- View uncalibrated transducer 2 input (F-19).

This function allows you to view the actual signal strength *(or raw counts)* from the aux. winch load sensor.

The value displayed will be between 0 and 1023. For correct operation this value must be between 33 and 999.

If it is less than 33 or greater than 999, the 1465 will report an error code of E202, indicating a suspected short circuit or open circuit. If this happens you should check for short or open circuits in the wiring from the aux. winch load sensor to the 1465.

Please also verify that, as you lift your test loads, this number increases, from lifting the light test weight to lifting the heavy test weight, BUT never goes outside the range of 33 and 999.

If the aux. winch load sensor signal checks out then you need to calibrate the load.

To calibrate the aux. winch load use the functions

- Calibrate light auxiliary load (F-05), and
- Calibrate heavy auxiliary load (F-06).

CALIBRATE LIGHT AUXILIARY LOAD

1. Lift up the light test load safely,

2. Select function code (F-05),

3. Once the load is lifted off the ground and free of any objects, you should use the UP/DOWN arrow keys to ramp to the actual value of the test weight,

4. Press the ENTER key to lock in the new value for the light load. The 1465 should then return to the F-05 prompt.

You may press the CANCEL key any time if you want to stop re-calibrating the light load *before pressing the ENTER key*.

CALIBRATE HEAVY AUXILIARY LOAD

1. Lift up the heavy test load safely,
2. Select function code (F-06),
3. Once the load is lifted off the ground and free of any objects, you should use the UP/DOWN arrow keys to ramp to the actual value of the test weight,
4. Press the ENTER key to lock in the new value for the heavy load. The 1465 should then return to the F-06 prompt.

You may press the CANCEL key any time if you want to stop re-calibrating the heavy load *before pressing the ENTER key*.

6.8. Calibrating Boom Deflection (Telescopic Cranes Only)

The following section describes how to test radius and how to correct for boom deflection.

Testing the load radius

1. Luff up to an angle of about 60°,
2. Fully extend the boom, safely,
3. Lift a test load safely, which is close to the maximum S.W.L. for the current configuration,
4. Using a tape measure, measure the actual radius,
5. If the radius displayed on the 1465 is different from that measured, you need to apply boom deflection correction as described below.

Correcting for boom deflection

1. Luff up to an angle of about 60°,
2. Fully extend the boom, safely,
3. Lift a test load safely, which is close to the maximum S.W.L. for the current configuration,
4. Using a tape measure, measure the actual radius,
5. Enter calibration mode,
6. Select function code (F-29) for boom radius correction,
7. Using the UP/DOWN key, dial up the actual radius value measured in is Step 4 above,
8. Press the ENTER key to accept the new value.

Clearing Calibration for boom deflection

If radius correction has been performed incorrectly or the result is inaccurate, the correction of the radius can be cleared.

1. Select the winch for which radius correction is to be cleared, enter Calibration Mode,
2. Select function code (F-29) for boom radius correction,
3. Press ENTER to clear the correction, a message of "OFF" appears if the correction was successfully cleared, if the message does not appear, repeat this procedure.

6.9. Verifying Correct Operation

Once installation AND calibration have been completed you should check the 1465 for accuracy and correct operation.

To check the 1465 exit calibration mode. If you have done the installation and calibration correctly there will not be any alarms or error codes displayed by the 1465.

If on the other hand there is any error, the 1465 will sound alarms and activate motion cut *(if this option has not been disable beforehand)*.

In either case you should verify the following:

1. The correct length is being displayed by the 1465.
   Use a tape measure to check actual length against that displayed by the 1465.
2. The correct angle is being displayed by the 1465.
   Use an angle finder to check actual boom angle against that displayed by the 1465.
3. Check that the radius displayed by the 1465 is accurate.
   Use a tape measure to check actual radius against that displayed by the 1465.
4. Check that the height displayed by the 1465 is accurate.
5. Check whether or not any limits are set for length, angle, radius or height.
   If limits are required, set them as described in Setting limits
6. Test the operation of the Anti-2-block system.
   Manually activate the anti-2-block switch at the boom head. Make sure that the alarms and motion cut are activated. If no alarms or motion cut is activated check that the audible cancel function is not active, as indicated by the O/RIDE indicator, and that the Motion cut option is enabled
7. Test MAIN / AUX selection.
   Make sure that as you press the MAIN button the indicator changes accordingly. Check that as you change MAIN / AUX mode the length, radius and height are also changing accordingly.

7. Troubleshooting

The 1465 system incorporates a number of software features that are designed to help the service person quickly 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.

1. ***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.

2. ***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.

3. ***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.

4. ***Have you read the Manual?*** When all else fails, read the Manual! Your answer may actually be in there.

5. ***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, 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 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.

6. ***The main pieces of useful information*** obtainable from the displays are the **raw counts**. The raw count 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. **YOU MUST USE THE "VIEW UNCALIBRATED...." FUNCTION CODES TO DETERMINE THE CORRECT OPERATION OF THE EXTERNAL SENSORS, NOT THE "CALIBRATED" VALUES**. It should be noted here that for load related problems, the **"VIEW UNCALIBRATED TRANSDUCER"** function code must be used, and not **"VIEW CALIBRATED LOAD"**. For correct operation these values must be in the range 32 to 999. Anything outside of this range will produce an error. *Refer to Section 6. “Calibration Instructions” on how to access these raw counts*.

7. ***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.

EXAMPLE PROBLEMS AND POSSIBLE CAUSES

Problems That Produce Error Codes:

Error code E101.

This is indicating that the signal from the angle sensor is too low or too high. This should be confirmed by viewing the UNCALIBRATED ANGLE INPUT and noting that the value shown in the LOAD display is less than 33, or higher than 999.

Possible causes:

- Angle sensor incorrectly mounted. This is especially critical for the Electronic Angle Sensor. Refer to Section 5. “Installation” of the Manual for installation of the angle sensor.
- The angle sensor signal wire is short circuited to the shield or to the angle 0V.
- The angle sensor signal wire is shorted to the excitation positive wire.
- The angle sensor is not connected or there is an open circuit in either the angle sensor signal wire or the angle excitation positive wire.
- The angle sensor excitation voltage is shorted. If this is the case it will also affect the length and load channels.
- The angle sensor 0V wire is open circuit.

Error code E110.

This is indicating that the signal from the length sensor is too low or too high. This should be confirmed by viewing the length raw counts and noting that the "r" value is less than 33, or greater than 999.

Possible causes:

- The length potentiometer may not have been set up as per the Manual. Refer to the Manual for the installation of the length sensor, particularly the initial rotation of the gear wheel by 1/8 of a turn.
- The length sensor signal wire is short-circuited to the shield or to the length 0V.
- The length sensor signal wire is short-circuited to the excitation positive wire.
- The length sensor is not connected or there is an open circuit in either the length sensor signal wire, the length excitation positive wire, or the length 0V wire.
- Payout cable may have broken.
- The length sensor excitation voltage is shorted. If this is the case, it will also affect the angle channel.

Error code E201.

This is indicating that the signal from the main load sensor is too low or too high. This should be confirmed by viewing the UNCALIBRATED TRANSDUCER 1 INPUT and noting that the value shown in the LOAD display is lower than 33, or higher than 999.

Possible causes:

- Load cell signal wires shorted together.
- The signal + is shorted to the shield.
- The excitation - is shorted to the shield.
- The excitation + wire is open circuit.

- The excitation supply is shorted together. This will obviously affect all of the external sensors. Measure the excitation voltage and compare it with the expected value. If this is the cause, the UNCALIBRATED value will generally be non-zero, but below 33.
- The load cell is disconnected or there is an open circuit in one of the signal wires.
- The signal - is connected to the shield.
- The signal + and the excitation + are swapped.
- The signal - and the excitation - are swapped.
- The excitation - wire is open circuit.

Error code E202.

This is indicating that the signal from the aux. load sensor is too low or too high. This should be confirmed by viewing the UNCALIBRATED TRANSDUCER 2 INPUT and noting that the value shown in the LOAD display is lower than 33, or higher than 999.

Possible causes:

- Load cell signal wires shorted together.
- The signal + is shorted to the shield.
- The excitation - is shorted to the shield.
- The excitation + wire is open circuit.
- The excitation supply is shorted together. This will obviously affect all of the external sensors. Measure the excitation voltage and compare it with the expected value. If this is the cause, the UNCALIBRATED value will generally be non-zero, but below 33.
- The load cell is disconnected or there is an open circuit in one of the signal wires.
- The signal - is connected to the shield.
- The signal + and the excitation + are swapped.
- The signal - and the excitation - are swapped.
- The excitation - wire is open circuit.

Error code E240.

This is indicating that an overload has been detected. This error generally accompanies most other errors simply because most other errors will place the display into an overload condition. This being the case, you need to check what other errors are present and correct them first. Once these have been addressed the E240 error generally takes care of itself. The exception is of course, when the equipment has been put into a genuine overload situation which has not been caused by any external faults.

Possible causes:

- A genuine overload condition exists.
- There is a load on the auxiliary winch in a duty that does not allow anything on that winch.
- It has been caused by another Error code condition.

Error code E280.

This is indicating that the rated line pull has been exceeded.

Possible causes:

- A genuine line pull error exists.
- The number of falls selected is incorrect for the load being lifted, or does not match the actual falls reeved.

Error code E301.

This is indicating that the angle being measured is outside of its allowed range.

Possible causes:

- A genuine violation of the angle limits has occurred.
- The angle sensor mounting may have loosened allowing the sensor to move.
- Check the angle displayed against the actual angle of the boom.

Error code E302.

This is indicating that the length being measured is outside of its allowed range.

Possible causes:

- A genuine violation of the length limits has occurred.
- The length potentiometer mounting may have loosened allowing the sensor to move.
- Check the length displayed against the actual boom length.
- Payout cable may have fallen off the reeling drum.
- Payout cable may have been broken or become tangled.

Error code E304.

This is indicating that the radius being measured is outside of its allowed range.

Possible causes:

- A genuine violation of the radius limits has occurred.
- Check as per Error Code E301 and E302.

Error code E308.

This is indicating that the height being measured is outside of its allowed range.

Possible causes:

- A genuine violation of the height limits has occurred.
- Check as per Error Code E301 and E302.

Problems That Do Not Produce Error Codes:

The load does not vary when weight is lifted.

- Determine the winch being used.
- If it is the main winch, then check the transducer 1 raw counts (F-15) while lifting a weight and check variation.
- If it is not moving, then check the transducer 2 raw counts (F-19).
- If the raw counts did vary when a load was lifted, then check the calibration data. If the value entered was the same 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.
- If it is moving, then the MAIN and AUX load cables have been swapped.
- If neither are moving then there may be a number of causes;
    1. There may be an open circuit in one or both of the load cell excitation wires,
    2. One or more fuses may be blown in the amplifier. Check the excitation voltages,
    3. 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.

When a certain load is lifted an Error Code E201 and/or E202 appears.

- View the transducer 1 and/or transducer 2 raw counts (F-15 and/or F-19) 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.

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 represents 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.

The unit is on alarm, but no error code on display.

- Check for Two blocking condition.
- If no Two Blocking condition exist but the ATB LED on display is ON, check the “earth lead” from the display for proper grounding to crane chassis.
- If “earth lead” is OK, check the ATB switch and cable for faults.

8. Electrical Specifications

8.1. General

Power Supply Input (VDC)
Range: 10 VDC - 40 VDC

Power Consumption
Approximately 15 VA (W)

Temperature Range:
Storage: -20°C to +60°C (tested to -20°C to +70°C)
Operating: above -20°C to +60°C

Digital Inputs
3 switch inputs. Open circuit switch voltage = 3VDC approximately.
Closed circuit switch current = 3mA
Require simple switch closure between terminal pairs for activation.

Motion Cut Output
The ampere rating of this signal is approx. 1 ampere only and must not be used to directly operate hydraulic or mechanical solenoid devices or high capacity relays. For such devices a “slave” relay must be used to switch ampere ratings exceeding 1 ampere.

This signal is at ‘negative polarity’ when all is normal and no alarm state exists. In alarm, this signal will “float” causing the motion-cut switching device to drop out through loss of sufficient voltage potential across the coil.

If motion cut is required the client shall provide appropriate solenoids (or relay devices) to de-activate the appropriate function and wire them as shown per the drawings at the back of this Manual.

A typical automotive type relay (contact rating of 10 amperes) can be used as a “slave relay”. Most of these relays usually have 5 push-on spade type connections, 2 for coil +ve and –ve and 3 for the relay contacts, one for common (COM) , one for normally closed (NC) and one for normally open (NO) condition. The coil voltage must match the crane electrics. *Please refer to drawing DWG 1011 “1400 Series Motion Cut Control Wiring” at the drawing section (rear pages) of the Manual for details.*

10.1 Load Cell

General Specification:

Linearity:	0.15% nominal
Repeatability:	>0.10%
Hysteresis:	<0.10%
Creep:	<0.10%
Output:	2 mv/V nominal
Excitation:	15 V DC rec. Max.
Isolation:	>2000 MegOhms at 50V DC

Overload:

No Electrical Damage	150%
Ultimate	>400%

Temperature Effects:

On Zero	<0.006% / degree C.
On Span	<0.005% / degree C.
Compensated Range:	-10 to +70 degree C.
Sealing:	IP 68 Fully Encapsulated

Integral Cable Colour Code

Red	Positive Excitation
Black	Negative Excitation
White	Negative Signal
Green	Positive Signal
Screen and Drain	Isolated

10.2 Boom Angle Transducer (located inside recoil drum)
4.0V DC input provided by Display/Control unit. Analogue signal out.

Operating range:	+/- 45 degrees. (offset mounted to accommodate 0-90)
Accuracy:	+/- 0.2 degrees.
Dimensions:	50mmD
Cable entry:	rubber grommet.
Mounting:	via threaded screws into electrical backplate bracket.
Weight:	0.25 kg

10.3 Boom Length Transducer
4.0V DC input provided by Display/Control unit. Analogue signal out.

Operating range:	0-30 metres
Accuracy:	+/- 0.05 metres.
Dimensions:	Height -300mm, Width 330mm, Depth -200mm
Cable entry:	Military Spec. plug/socket connector.
Mounting:	Via threaded studs to side of boom.
Weight:	20.0 kg

Optional ATB signal out
Via recoil drum payout wire to sensor switch at boom tip. Additional switches on fly to wired in series with main, (sensor switch is normally closed when NOT in alarm state).

10.4 1465 Display Unit.

Number of maximum duties	~50
Total ROM capacity	64k bytes
Total RAM capacity	64k bytes
Built-in calibration module	YES
On-board fault finding/servicing tools	YES
"Fast, easy calibration technique"	YES
Load channel inputs	2
Length input	1
Angle input	1
Opto isolated switch inputs	5
Opto isolated solid state outputs	2
Easy interface to crane electric's	YES
Compact display/computer	YES
Backlit displays	YES
Quick change over facility of display/computer	YES
Supply voltages from 12Vdc to 35Vdc	YES
Open/short circuit detection (analogue)	YES
R.F.I. protection	YES
Protection against reverse polarity	YES
Fuse protection	YES
Watchdog	YES

8.2. Expected Resistance Values

Load Cells
Should have the following nominal resistance values, for a standard 350-Ω cell:

RED-BLACK	300 - 600 Ω
RED-GREEN	200 - 400 Ω
RED - WHITE	200 - 400 Ω
BLACK-GREEN	200 - 400 Ω
BLACK-WHITE	200 - 400 Ω
WHITE-GREEN	350 Ω ± 2 Ω

SHIELD to any other wire must be open circuit

Electronic Angle Sensor

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

8.3. Voltage Levels

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

9. Appendices

9.1. General Arrangement Drawings (1465)

DWG 3075	*1465 General Arrangement For Strut Boom HRT System*
DWG 3076	*1465 General Arrangement For Telescopic HRT System*

9.2. Drawings (Sensors and Parts)

DWG 0876	*Dimensional Details, 14XX Display*
DWG 1099	*Electronic Angle Sensor, Dimensional Drawing*
DWG 2488 (2)	*RW-10 Recoil Drum (No ATB), General Arrangement*
DWG 1539 (2)	*RW-10 Recoil Drum (with ATB), General Arrangement*
DWG 2159	*RW-10 (No ATB) Wiring Diagram*
DWG 1239	*RW-10 (with ATB) Wiring Diagram, G. A.*
DWG 1198 (2)	*RW-100 Recoil Drum, General Arrangement*
DWG 1199	*RW-100 Wiring Diagram, General Arrangement*
DWG 0688 (4)	*Recoil Drum Installation Instructions*
DWG 0990	*Tension Plate Cell Dimensions*
DWG 2533 (1 of 5)	*Assembly Details, 6t Overload Plate*
DWG 3092 (2)	*Dimensional Detail, 10/15t Overload Plate*
DWG 1723	*Dimensional Detail, 30t Overload Plate*
DWG 1938	*Dimensional Detail, RW1500 Load Pin*
DWG 0991	*General Details, Single Sheave Dynamometer*
DWG 1393	*Overall Dimensions, HRT-3MM Micro-Mini Dynamometer*
DWG 0875	*General Arrangement, HRT-3MM Dynamometer*
DWG 0422 (2)	*General Arrangement, HRT-3 Dyno*
DWG 1795	*Dimensional Detail, HRT-4 Dynamometer*
DWG 0796	*General Arrangement, HRT-4 Dynamometer*
DWG 0370	*General Arrangement, Standard Articulated Arm for Dyno*
DWG 0805	*General Arrangement, Heavy Duty Artic. Arm for Dyno*
DWG 2468	*Typical Installation of Dyno on Strut Boom Cranes*
DWG 2934	*Dimensional Detail, BB5 Anti-Two-Block Switch*
DWG 0667	*ATB Switch Installation Details*

9.3. Motion Cut Connection

DWG 1011	*1400 Series Motion Cut Control Wiring*

9.4. System Configuration Sheets & Function Codes

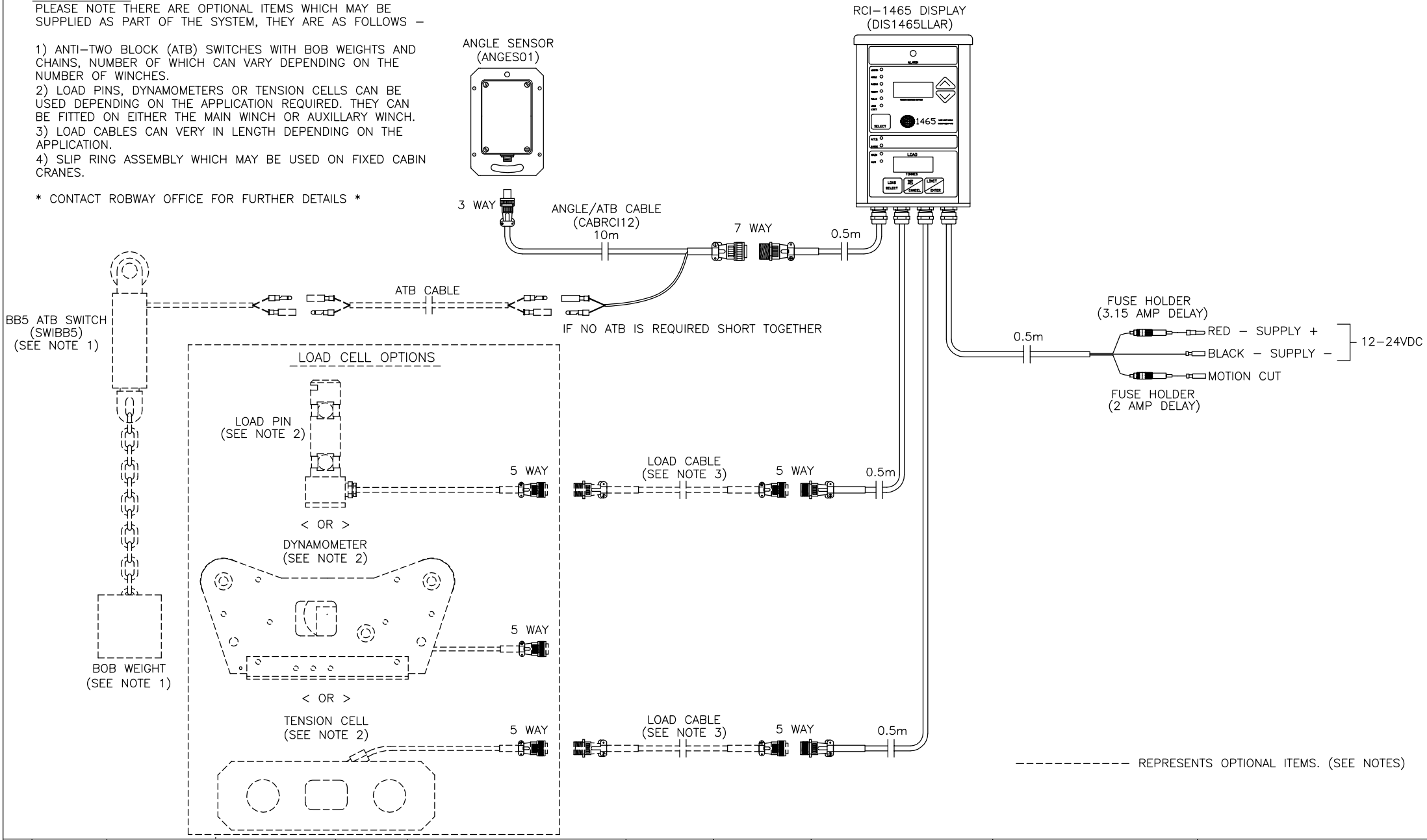
Appendix 9.1.

General Arrangement Drawings

SYSTEM NOTES:
PLEASE NOTE THERE ARE OPTIONAL ITEMS WHICH MAY BE SUPPLIED AS PART OF THE SYSTEM, THEY ARE AS FOLLOWS –

1) ANTI–TWO BLOCK (ATB) SWITCHES WITH BOB WEIGHTS AND CHAINS, NUMBER OF WHICH CAN VARY DEPENDING ON THE NUMBER OF WINCHES.
2) LOAD PINS, DYNAMOMETERS OR TENSION CELLS CAN BE USED DEPENDING ON THE APPLICATION REQUIRED. THEY CAN BE FITTED ON EITHER THE MAIN WINCH OR AUXILLARY WINCH.
3) LOAD CABLES CAN VERY IN LENGTH DEPENDING ON THE APPLICATION.
4) SLIP RING ASSEMBLY WHICH MAY BE USED ON FIXED CABIN CRANES.

* CONTACT ROBWAY OFFICE FOR FURTHER DETAILS *



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

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18/06/04	18/06/04	

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PART No:

PROJECT:

TITLE:
DIS–1465 GENERAL ARRANGEMENT FOR TYPICAL STRUT BOOM HOIST ROPE TENSION (HRT) SYSTEM

SCALE N/A

SHEET 1 OF 1

DRAWING No: DWG 3075

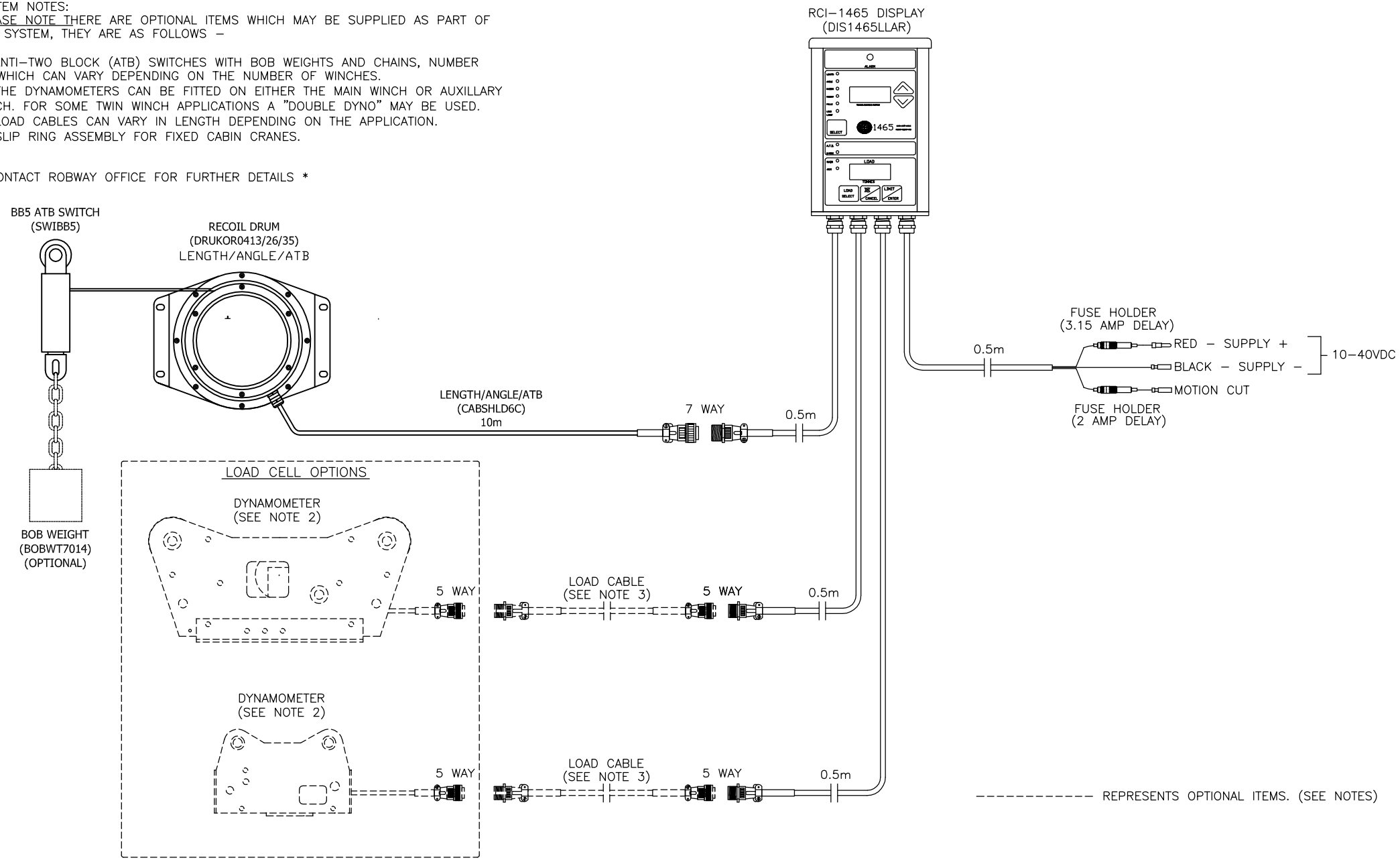
FILE No: 307501AA.DWG

REV 1.0

SYSTEM NOTES:
PLEASE NOTE THERE ARE OPTIONAL ITEMS WHICH MAY BE SUPPLIED AS PART OF THE SYSTEM, THEY ARE AS FOLLOWS –

1) ANTI–TWO BLOCK (ATB) SWITCHES WITH BOB WEIGHTS AND CHAINS, NUMBER OF WHICH CAN VARY DEPENDING ON THE NUMBER OF WINCHES.
2) THE DYNAMOMETERS CAN BE FITTED ON EITHER THE MAIN WINCH OR AUXILLARY WINCH. FOR SOME TWIN WINCH APPLICATIONS A "DOUBLE DYNO" MAY BE USED.
3) LOAD CABLES CAN VARY IN LENGTH DEPENDING ON THE APPLICATION.
4) SLIP RING ASSEMBLY FOR FIXED CABIN CRANES.

* CONTACT ROBWAY OFFICE FOR FURTHER DETAILS *



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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17/06/04	17/06/04

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PART No:

PROJECT:

TITLE:
DIS–1465 GENERAL ARRANGEMENT FOR TYPICAL TELESCOPIC BOOM HOIST ROPE TENSION (HRT) SYSTEM

SCALE N/A

SHEET 1 OF 1

DRAWING No: DWG 3076

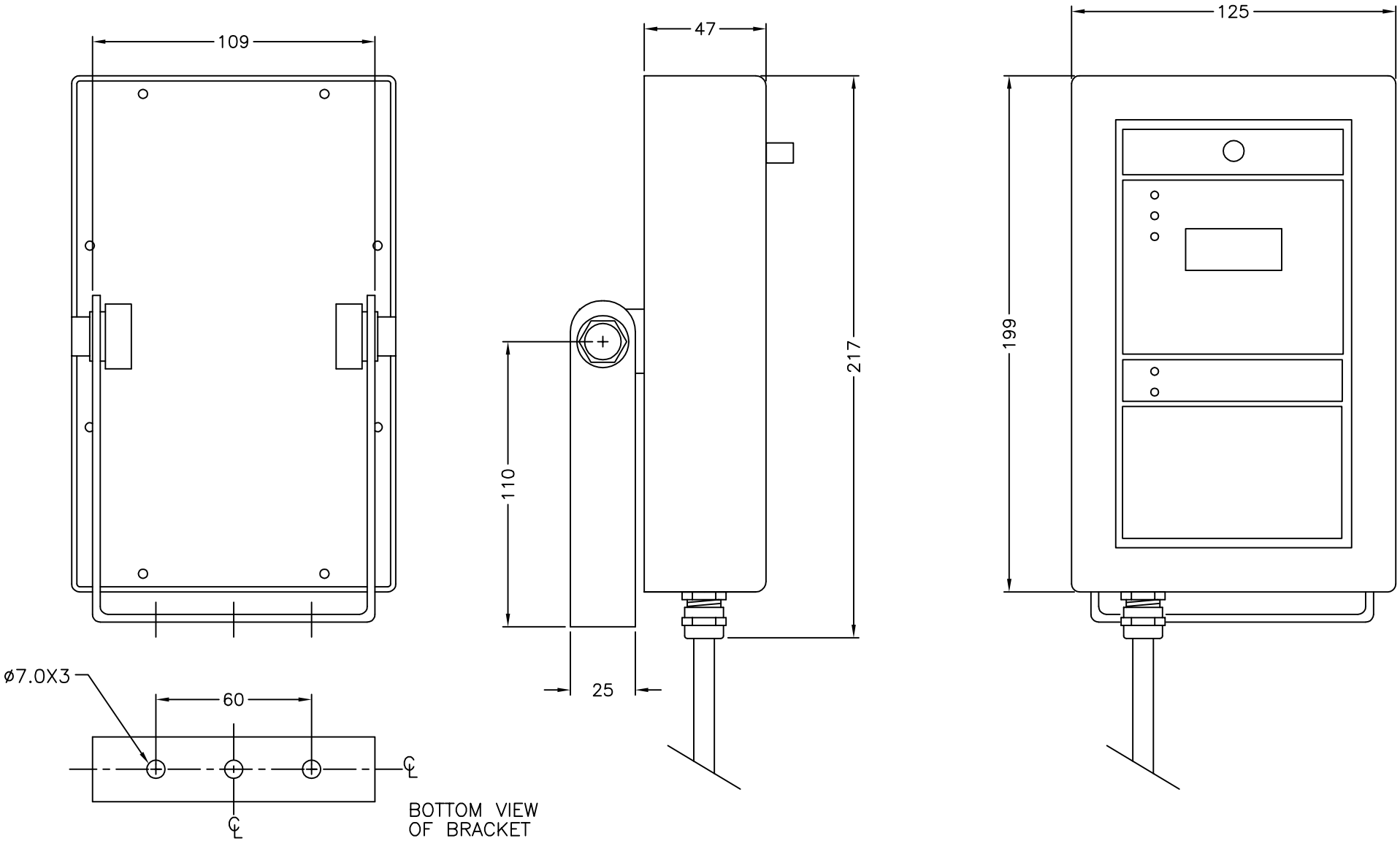
FILE No: 307601AA.DWG

REV 1.0

Appendix 9.2.

Drawings (Sensors and Parts)

3RD ANGLE



NOTE: ALL DIMENSIONS IN MILLIMETERS AND FOR REFERENCE ONLY

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

DO NOT SCALE DRAWING
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UNLESS OTHERWISE STATED

DRAWN	APPROVED
M. TURNER	M. OBST
09/11/95	09/11/95

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PART No: —

PROJECT: 14XX DISPLAY

TITLE: DIMENSIONAL DETAILS

SCALE N/A

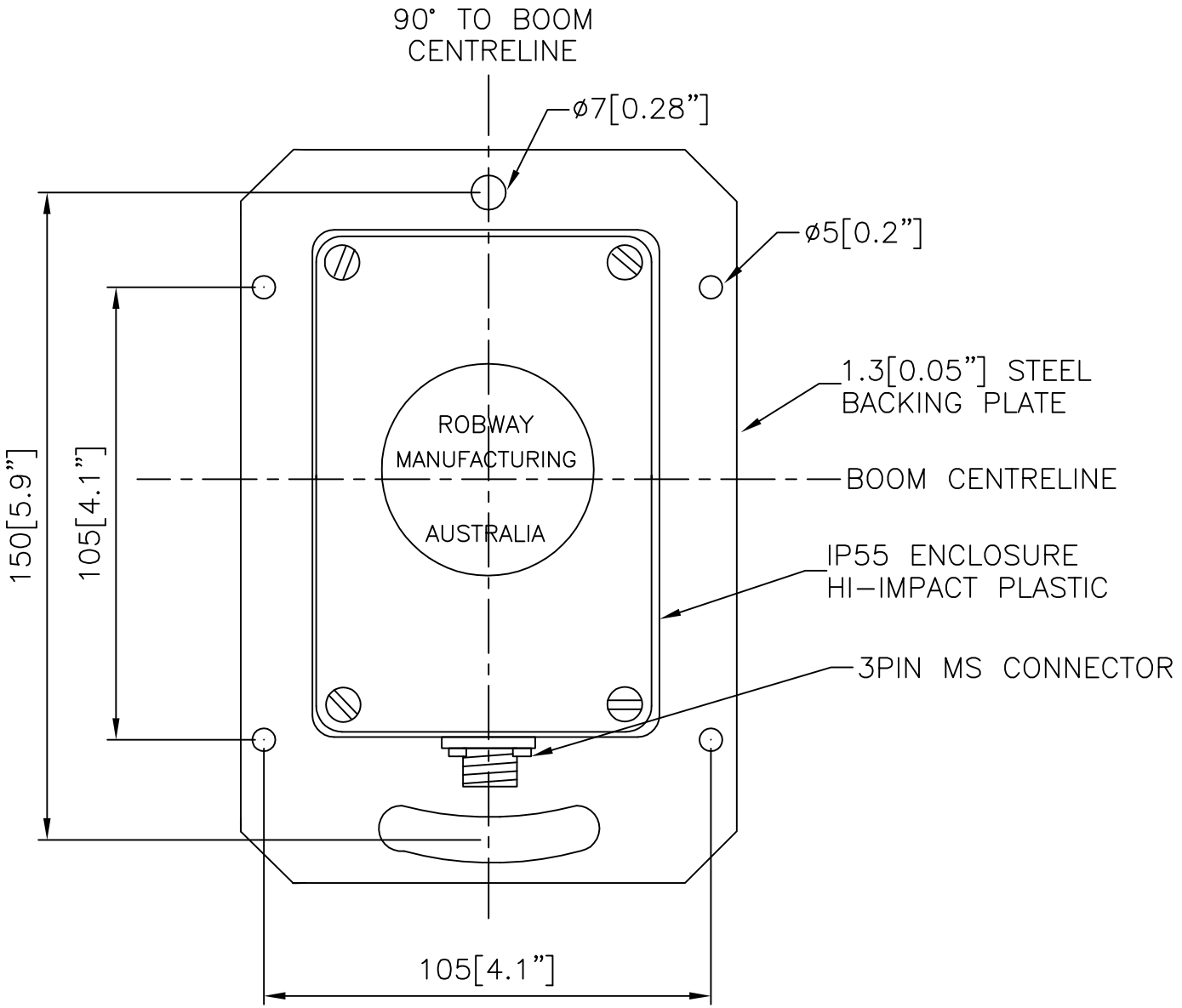
SHEET 1 OF 1

DRAWING No: DWG 0876

FILE No: 087601AB.DWG

REV 1.1

3RD ANGLE



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

DO NOT SCALE DRAWING
ALL DIMENSIONS ARE
IN MILLIMETERS[INCHES]
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27/02/97	27/02/97	

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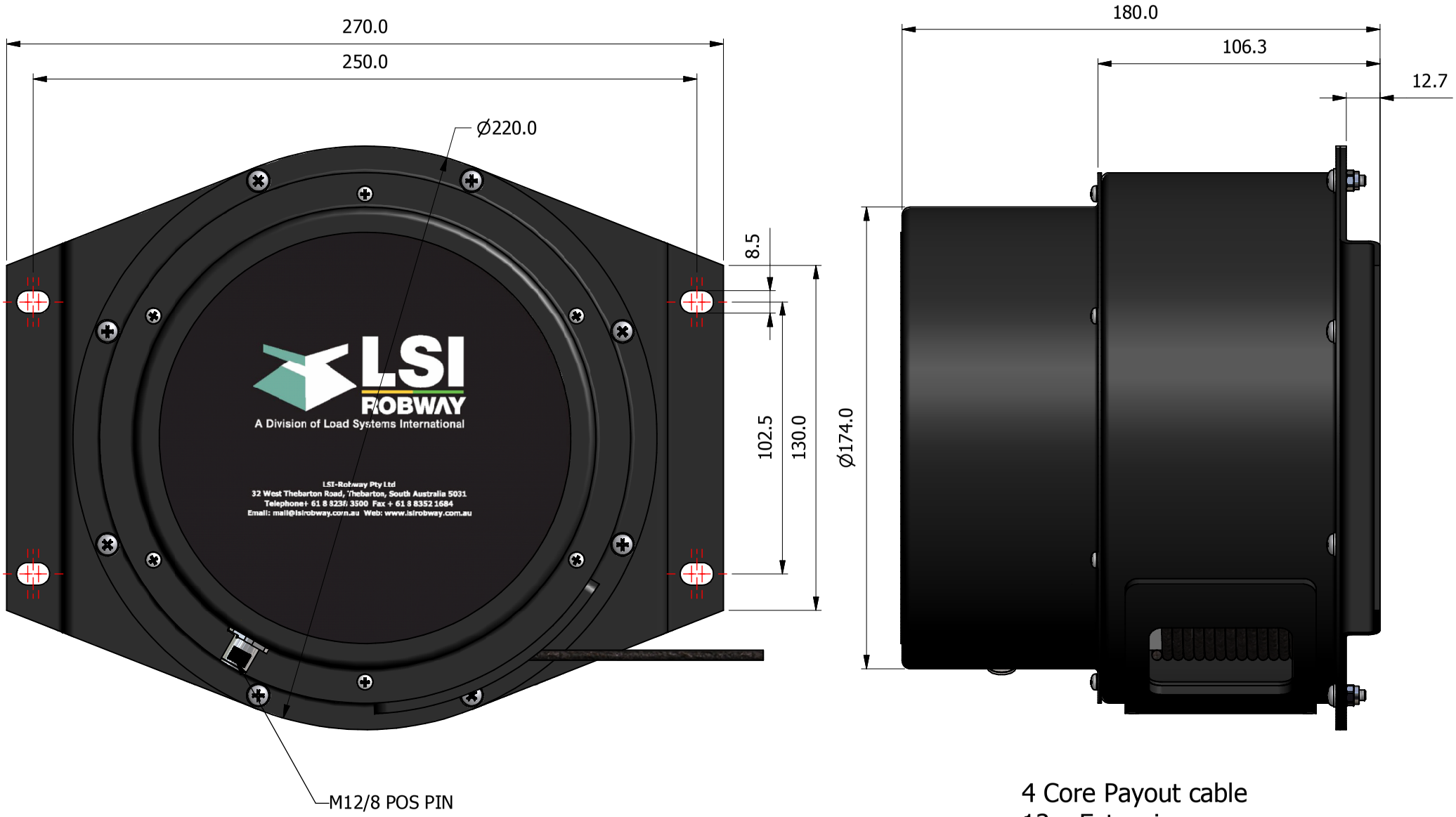
PART No:	PROJECT:
–	–

TITLE:
ELECTRONIC ANGLE SENSOR
DIMENSIONAL DRAWING

SCALE N/A
SHEET 1 OF 1

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



4 Core Payout cable
13m Extension

REV	DATE	DESCRIPTION OF CHANGE	APPRV'D

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

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J.Hart		
18/01/2012		

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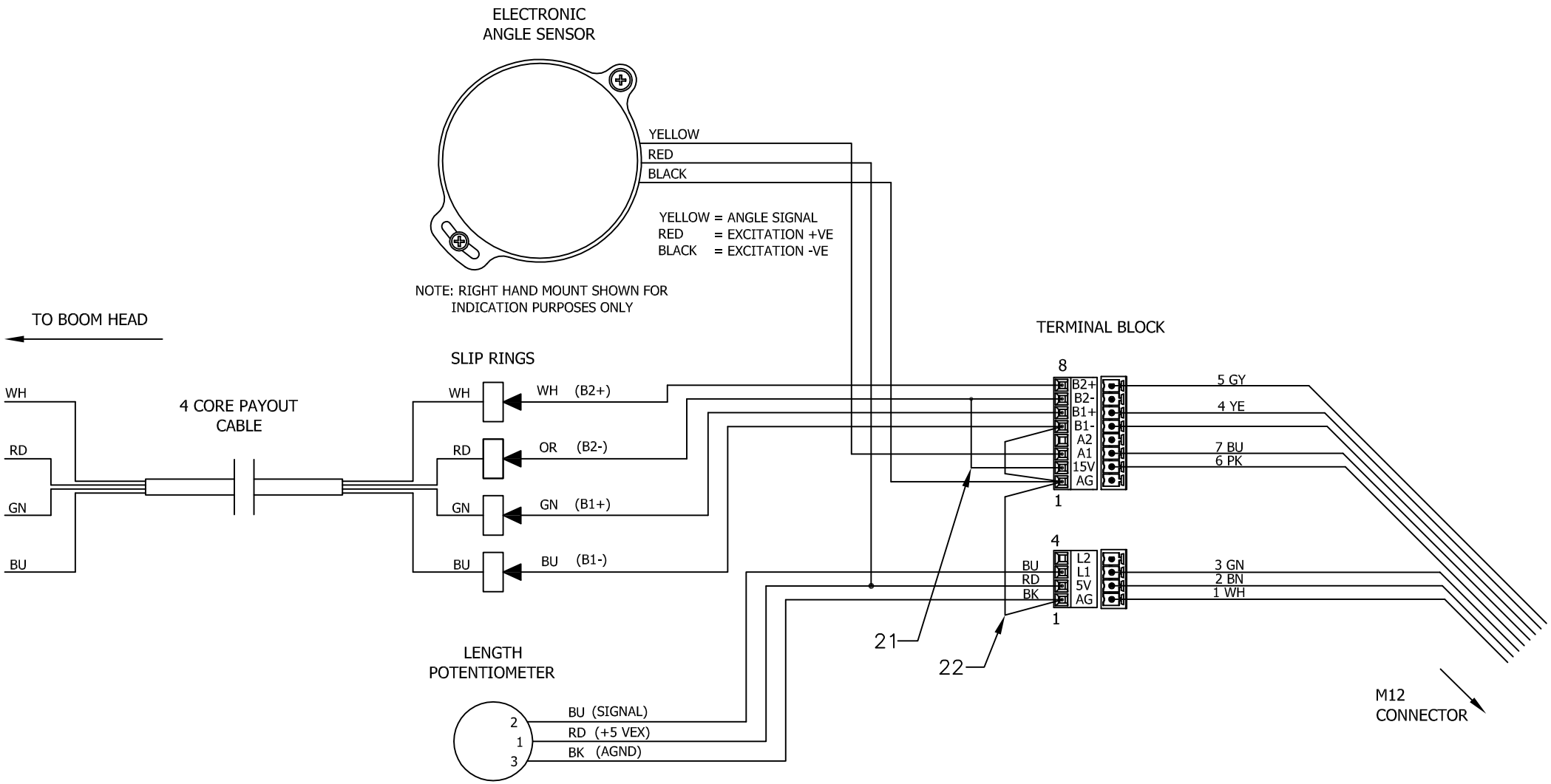
PART No: DRUKOR0413LAB
PROJECT:
TITLE: Overall Dimensions and Mounting Centers
A4
SHEET 1 OF 1
DRAWING No: 4576
FILE No: 457601AA.idw
REV 1.0



DRUKOR0413LAB-1
DRUKOR0426LAB-1
DRUKOR0430LAB-1

REV	DATE	DESCRIPTION OF CHANGE	APPR'D

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

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j.hart	-	-
-	-	

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PART NO:	PROJECT:
	-

TITLE: WIRING DETAILS

SCALE N/A

SHEET 1 OF 1

DRAWING No:	FILE No:	REV
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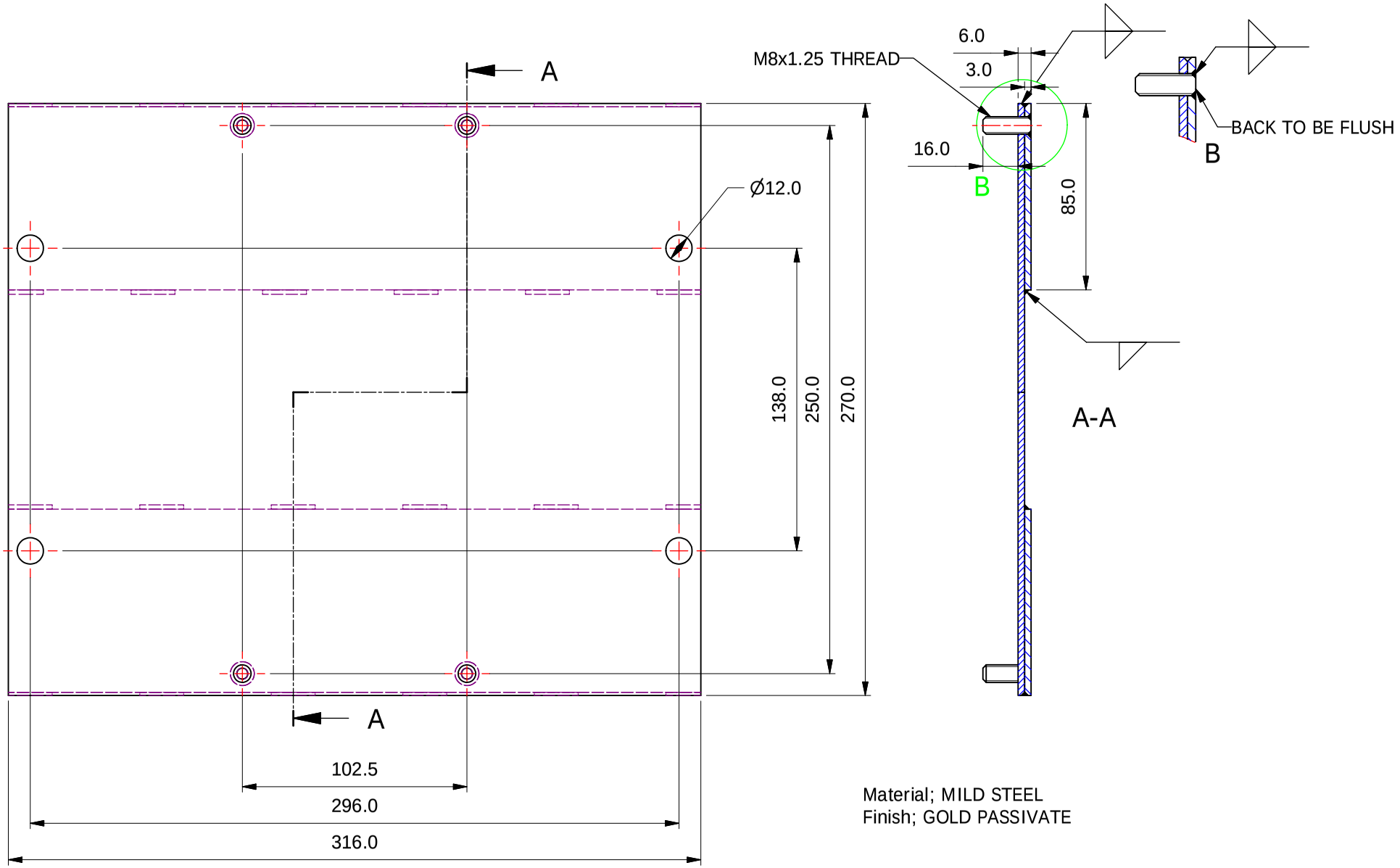

Material; MILD STEEL
Finish; GOLD PASSIVATE

REV	DATE	DESCRIPTION OF CHANGE	APPRV'D

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

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johnh		
19/04/2013		

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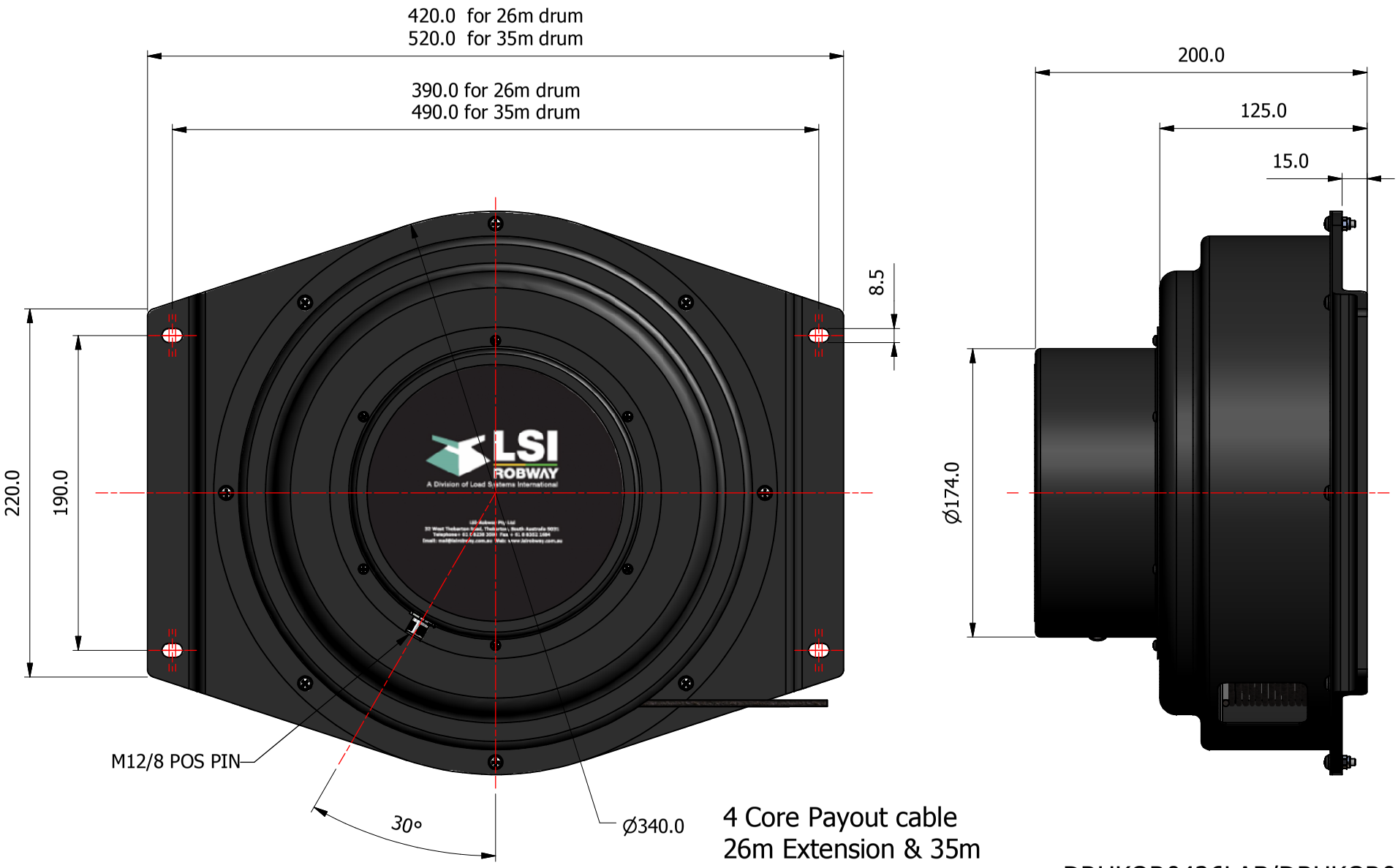
PART No: PLAM4807
PROJECT:
TITLE: MOUNTING PLATE TO SUIT RW10 TO DRUKOR0413
A4
SHEET 1 OF 1
DRAWING No: 4807
FILE No: 4807-A.idw
REV A



4 Core Payout cable
26m Extension & 35m Extension

DRUKOR0426LAB/DRUKOR0435LAB

REV	DATE	DESCRIPTION OF CHANGE	APPRV'D

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

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J.CHOI		
19/01/2012		

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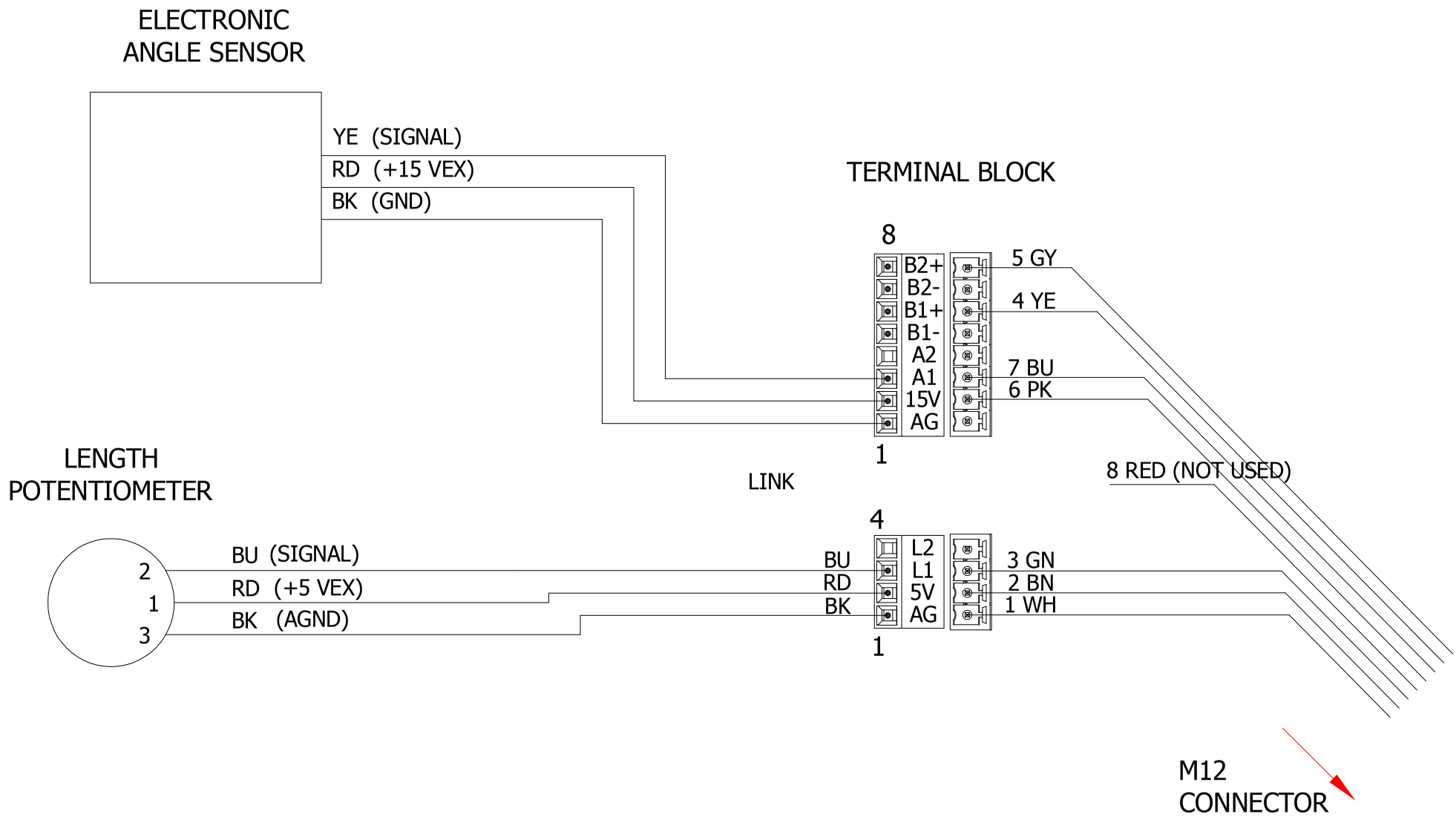
PART No:	PROJECT:	
-		
TITLE: OVERAL SIZE & MOUNTING DETAILS		A4
		SHEET 1 OF 1
DRAWING No: 4577	FILE No: 457701AA.idw	REV 1.0



REV	DATE	DESCRIPTION OF CHANGE	APPRV'D

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X.X +/-0.2
X.XX +/-0.02

DRAFTING STANDARD: AS1100

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johnh		
24/01/2013		

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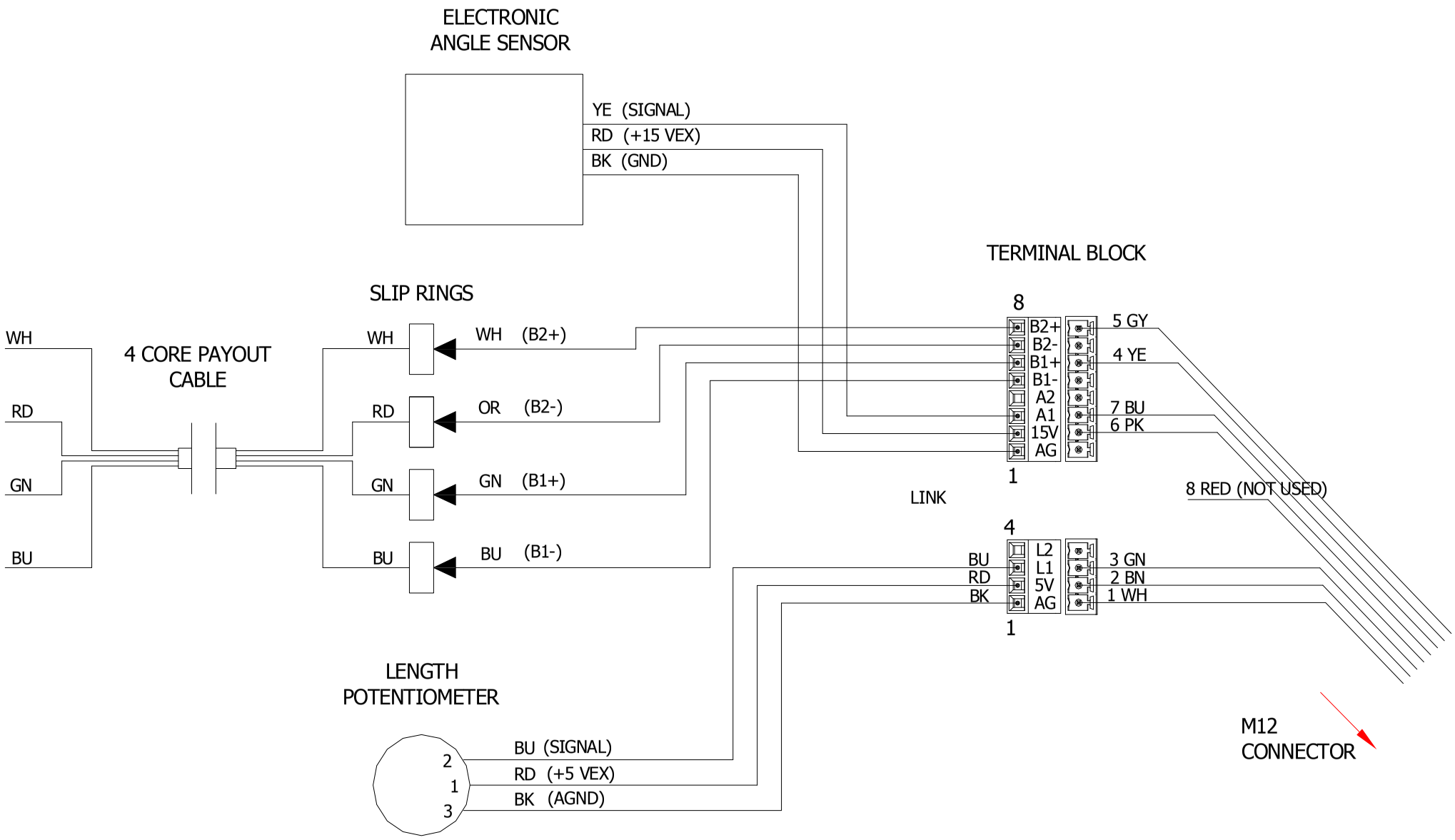
PART No: DRUKOR0113LA-1R
PROJECT:
TITLE: TOP ASSY, 13m RECOIL DRUM, LENGTH, ANGLE & SINGLE WIRE PAYOUT
A4
SHEET 6 OF 6
DRAWING No: 4772
FILE No: 4772-A.idw
REV A



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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DRAWN BY	APPROVED BY	PART OF ASSY
J.CHOI	J.HART	
20/01/2012	31/01/2012	

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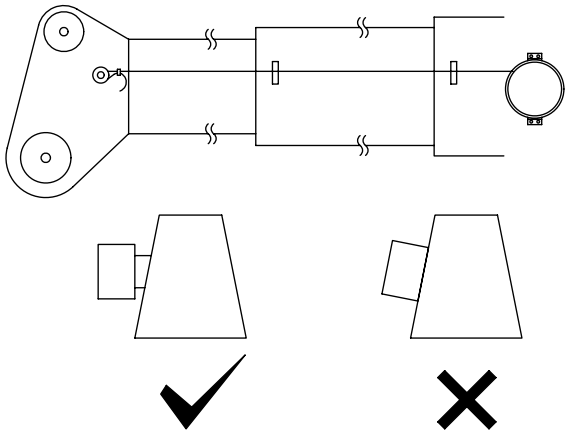
FAX: +61 8 8352 1684

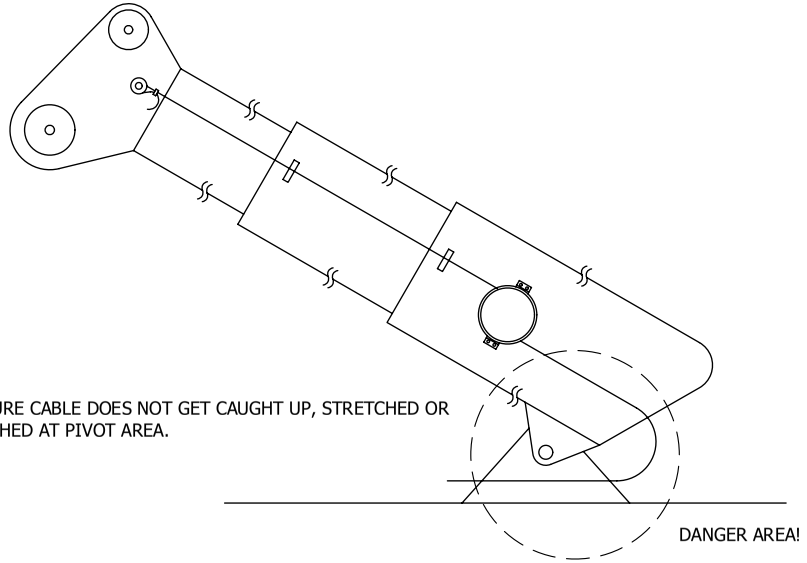
PART No: DRUKOR0426LAB
PROJECT: RECOUL DRUM
TITLE: TOP ASSY,26m RECOIL DRUM, LENGTH, ANGLE & 4 CORE PAYOUT CABLE
A4
SHEET 6 OF 6
DRAWING No: 4581
FILE No: 458101AA.idw
REV 1.0

STEP 1



ENSURE THAT THE RECOIL DRUM IS MOUNTED VERTICALLY AND THAT THE DIRECTION THE CABLE IS PULLED OFF THE DRUM IS IN LINE WITH THE BOOM. IF IT COMES OFF AT AN ANGLE THERE IS RISK THAT IT WILL SLIP OFF THE SIDE OF THE DRUM.

STEP 2



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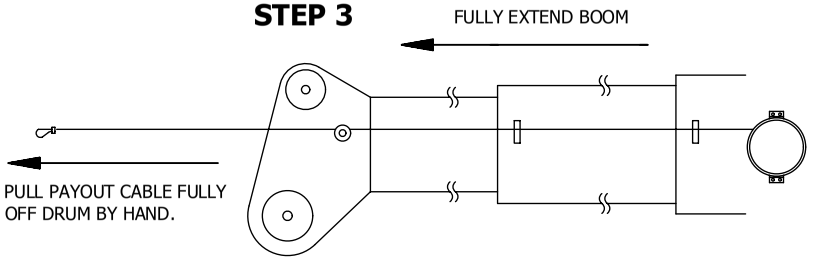

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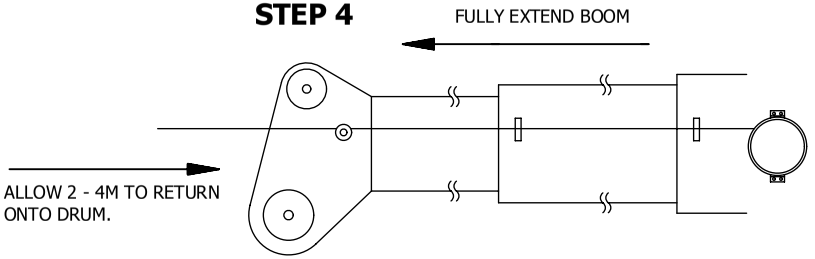

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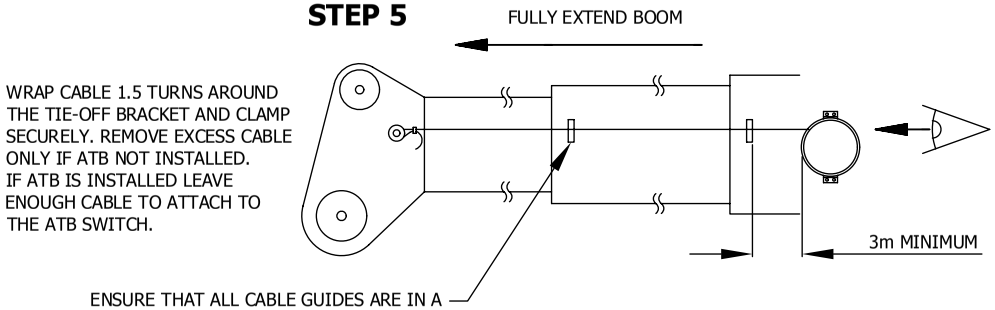

REV	DATE	DESCRIPTION OF CHANGE	APPR'D

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

DRAFTING STANDARD: AS1100

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31/10/2007	1/11/07

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PART NO.:	PROJECT:
-	RECOIL DRUM

TITLE: INSTALLATION DETAILS

SCALE N/A

SHEET 1 OF 4

DRAWING No:	FILE No:	REV
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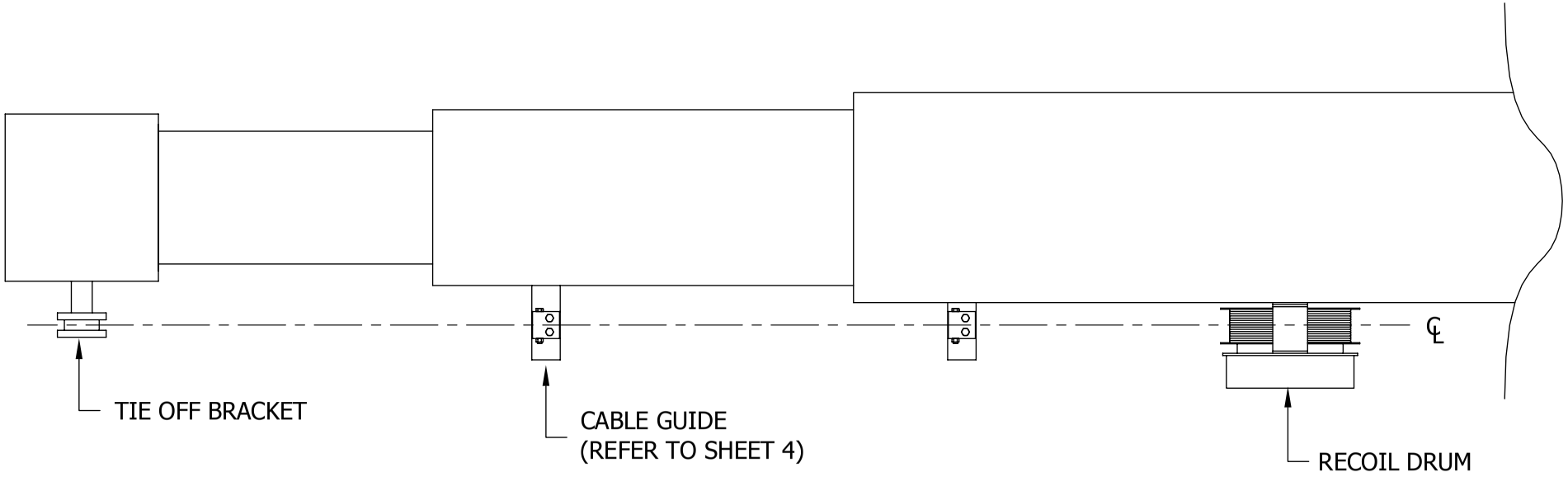

NOTE:
TO ENSURE CABLE FLEETS EVENLY OVER DRUM WIDTH. THE CENTRE OF THE CABLE GUIDES MUST BE FITTED ON THE CENTRE LINE OF THE CABLE DRUM AS SHOWN.

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

REV	DATE	DESCRIPTION OF CHANGE	APPR'D

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

DRAFTING STANDARD: AS1100

DO NOT SCALE DRAWING
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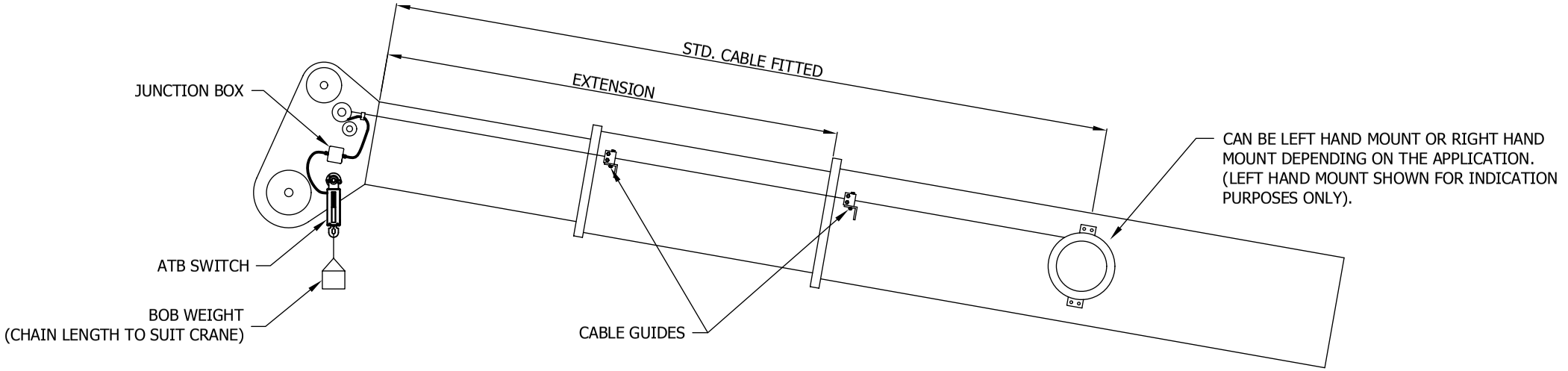
DRAWN	APPROVED	PART OF ASSY
S. CHAMBERS	J. KOVAL	—
31/10/2007	1/11/07	

PART NO.: -	PROJECT: RECOIL DRUM	
TITLE: INSTALLATION DETAILS		SCALE N/A
		SHEET 2 OF 4
DRAWING No: DWG 3718	FILE No: 371801AA.DWG	REV 1.0



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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DRAWN	APPROVED	PART OF ASSY
S. CHAMBERS	J. KOVAL	—
31/10/2007	1/11/07	

PART NO.: -

PROJECT: RECOIL DRUM

TITLE: INSTALLATION DETAILS

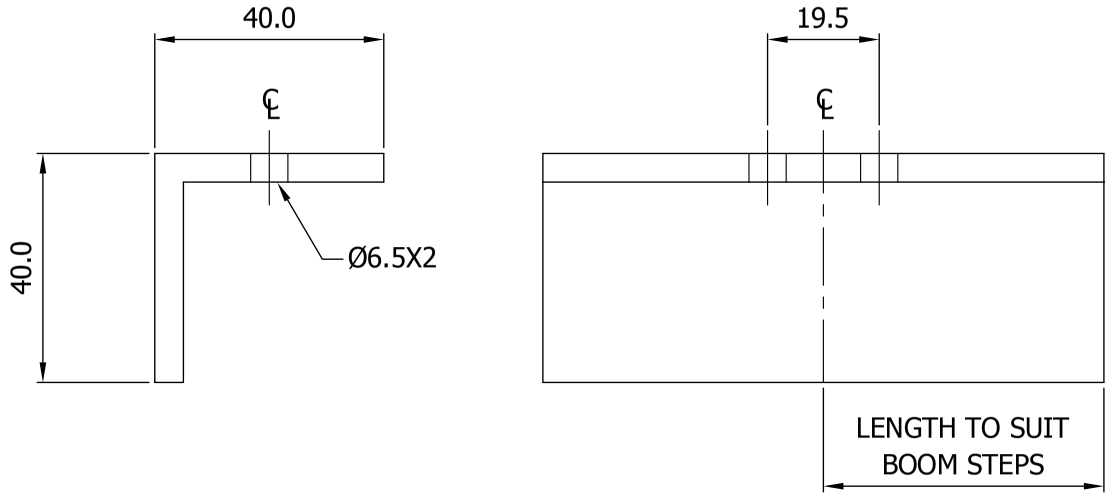
SCALE N/A

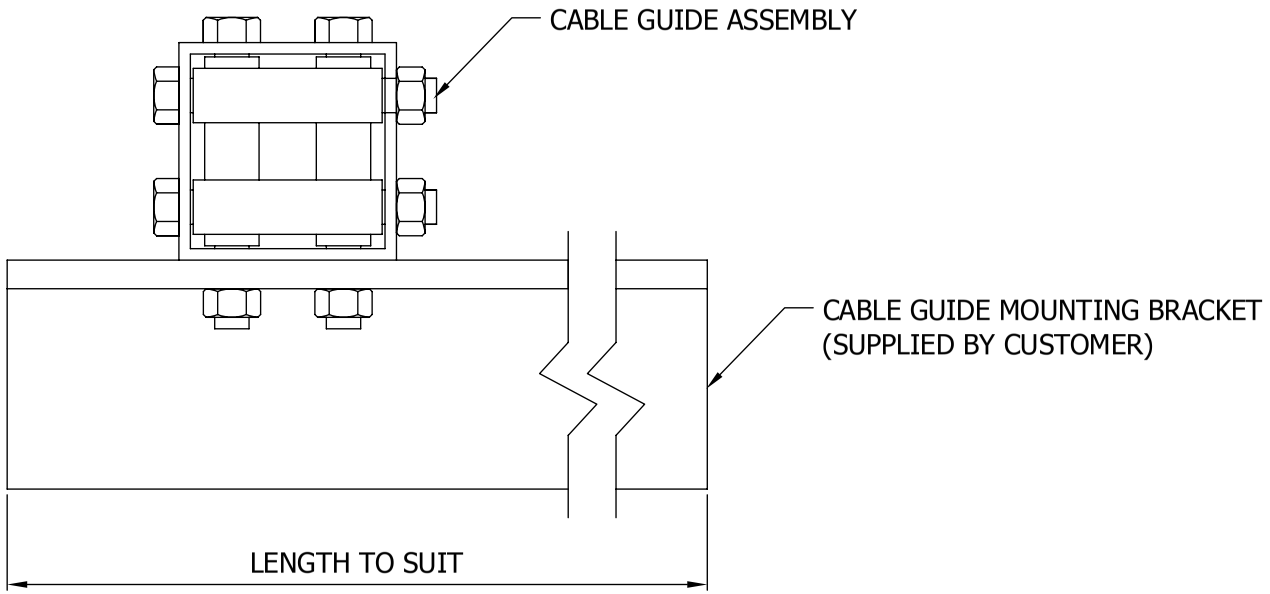
SHEET 3 OF 4

DRAWING No: DWG 3718

FILE No: 371801AA.DWG

REV 1.0





NOTES:

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

REV	DATE	DESCRIPTION OF CHANGE	APPR'D

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

DRAFTING STANDARD: AS1100

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31/10/2007	1/11/07

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FX: +61 8 8352 1684

web : www.robway.com.au

PART NO.:	PROJECT:
-	RECOIL DRUM

TITLE: INSTALLATION DETAILS

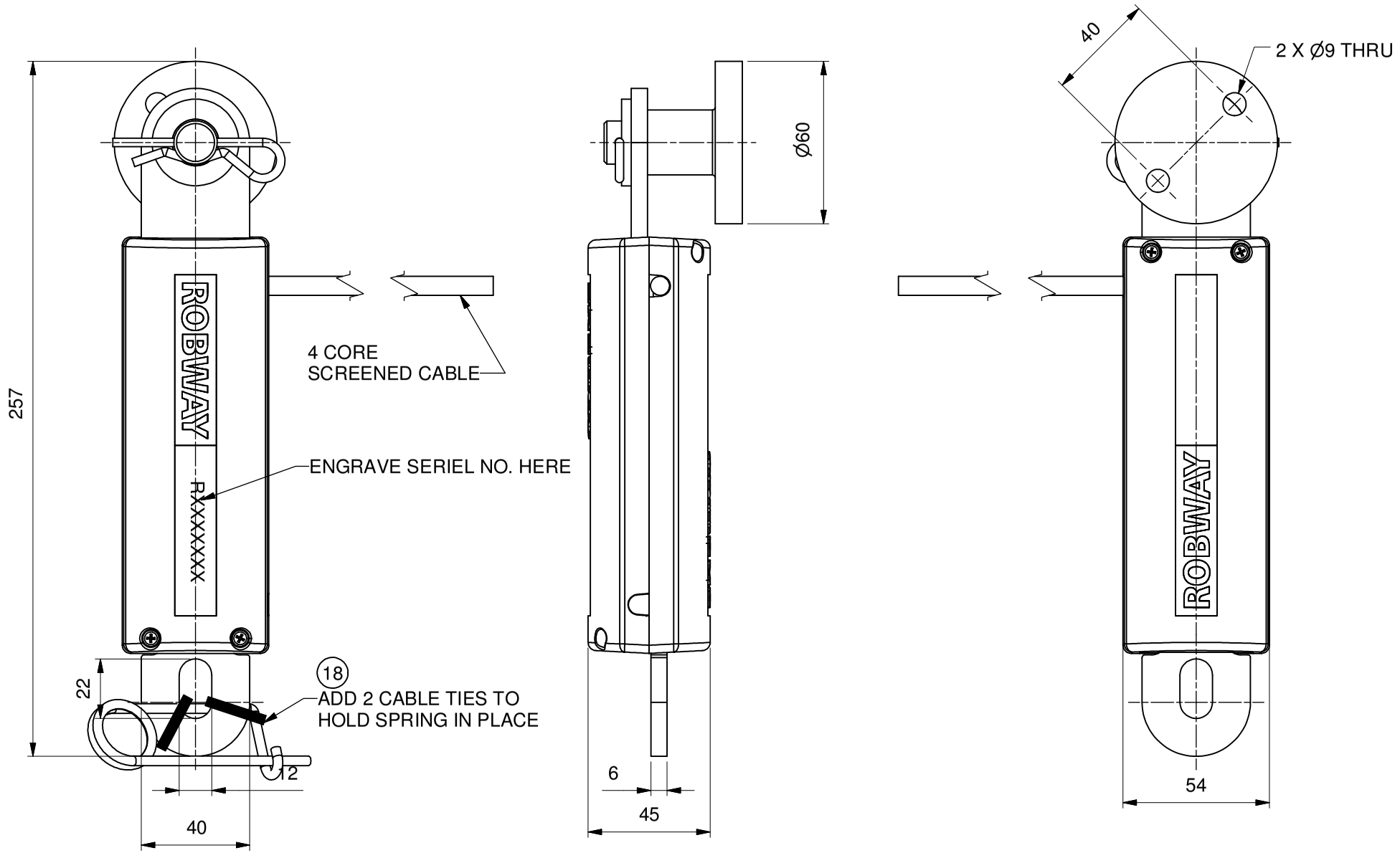
SCALE: N/A

SHEET: 4 OF 4

DRAWING No:	FILE No:	REV
DWG 3718	371801AA.DWG	1.0

3RD ANGLE

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



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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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19/04/2005	19/04/2005	

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PART No: SWIBB5

PROJECT: BB5 ATB SWITCH

TITLE: ASSY, BB5 DIMENSIONAL DETAIL

SCALE: N/A

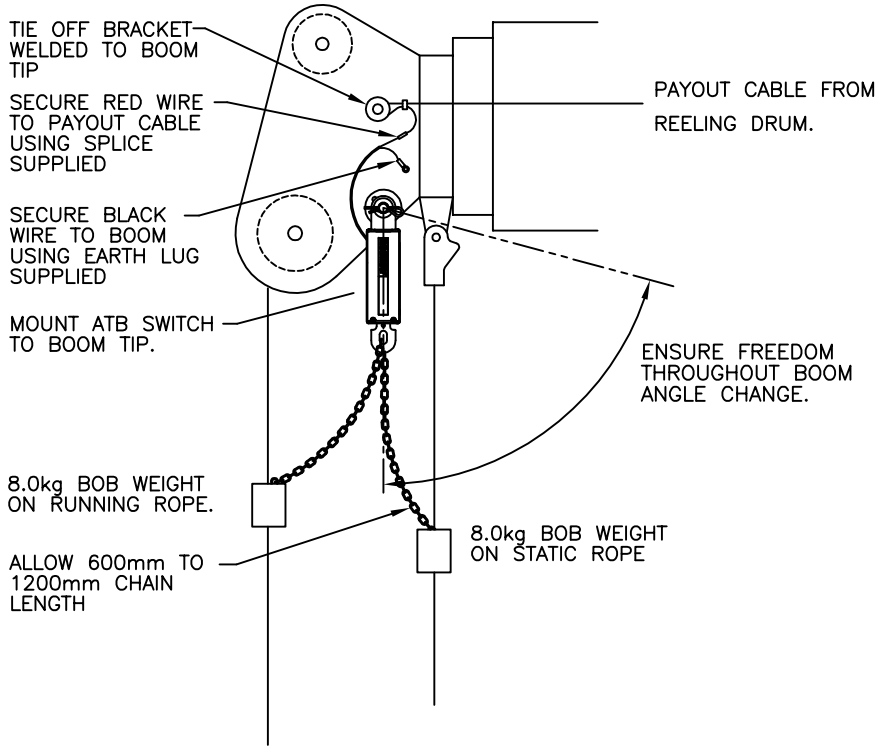
SHEET: 1 OF 2

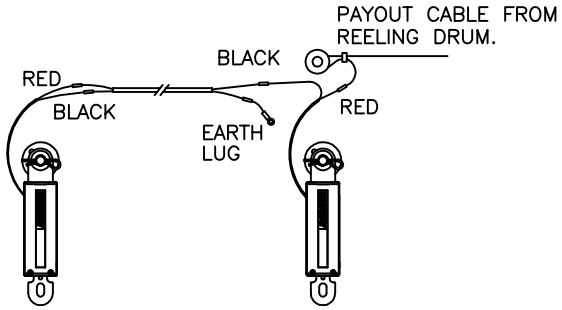
DRAWING No: 2934

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

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	

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FAX +61 8 8352 1684

PART No:	PROJECT:
—	—

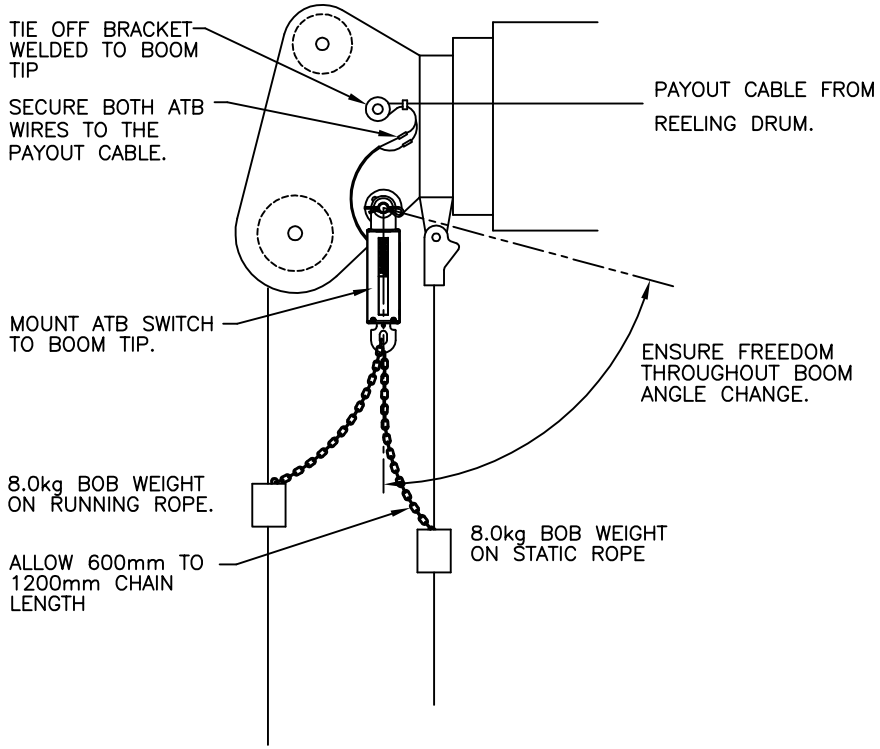
TITLE: ATB SWITCH INSTALLATION DETAILS

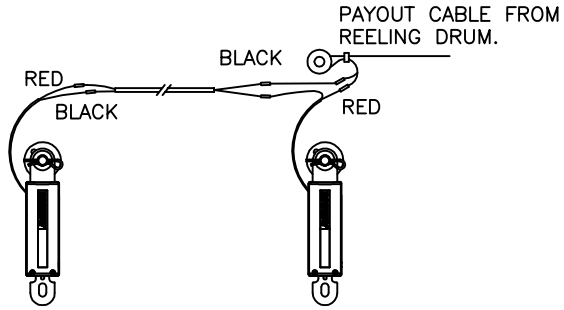
SCALE N/A

SHEET 1 OF 3

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

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	

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

PART No:	PROJECT:
—	—

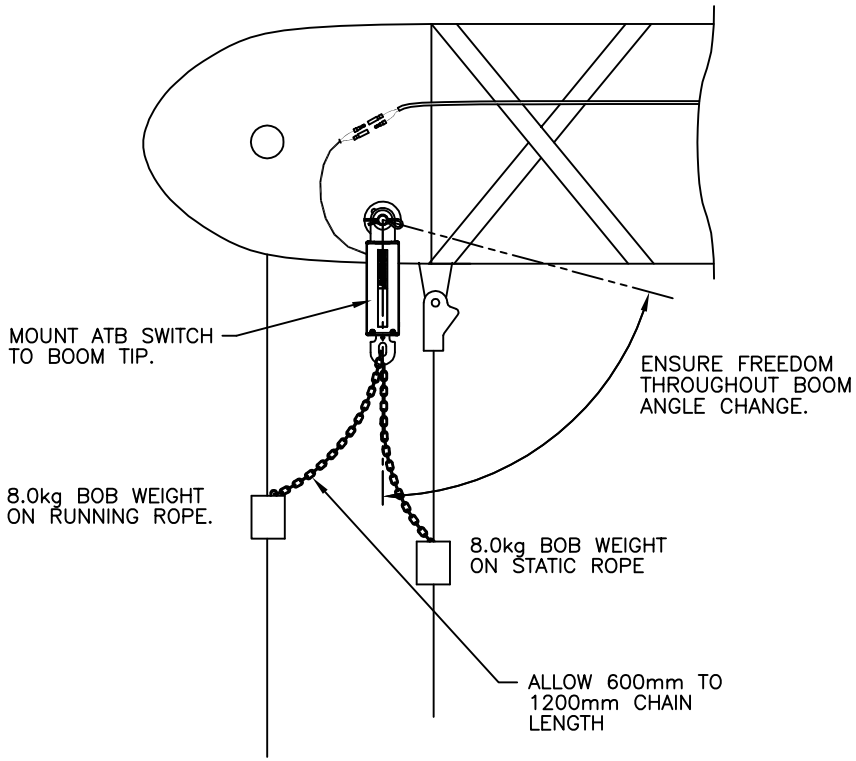
TITLE: ATB SWITCH INSTALLATION DETAILS

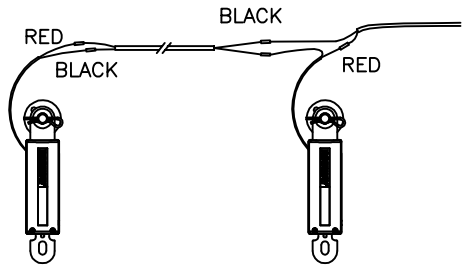
SCALE N/A

SHEET 2 OF 3

DRAWING No:	FILE No:	REV
DWG 0667	066701AB.DWG	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
ALL DIMENSIONS ARE IN MILLIMETERS
UNLESS OTHERWISE STATED

DRAWN	APPROVED
S. CHAMBERS	A. CANLAS
10/07/01	10/07/01

PART OF ASSY: —

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FAX +61 8 8352 1684

PART No: —

PROJECT: —

TITLE: ATB SWITCH INSTALLATION DETAILS

SCALE N/A

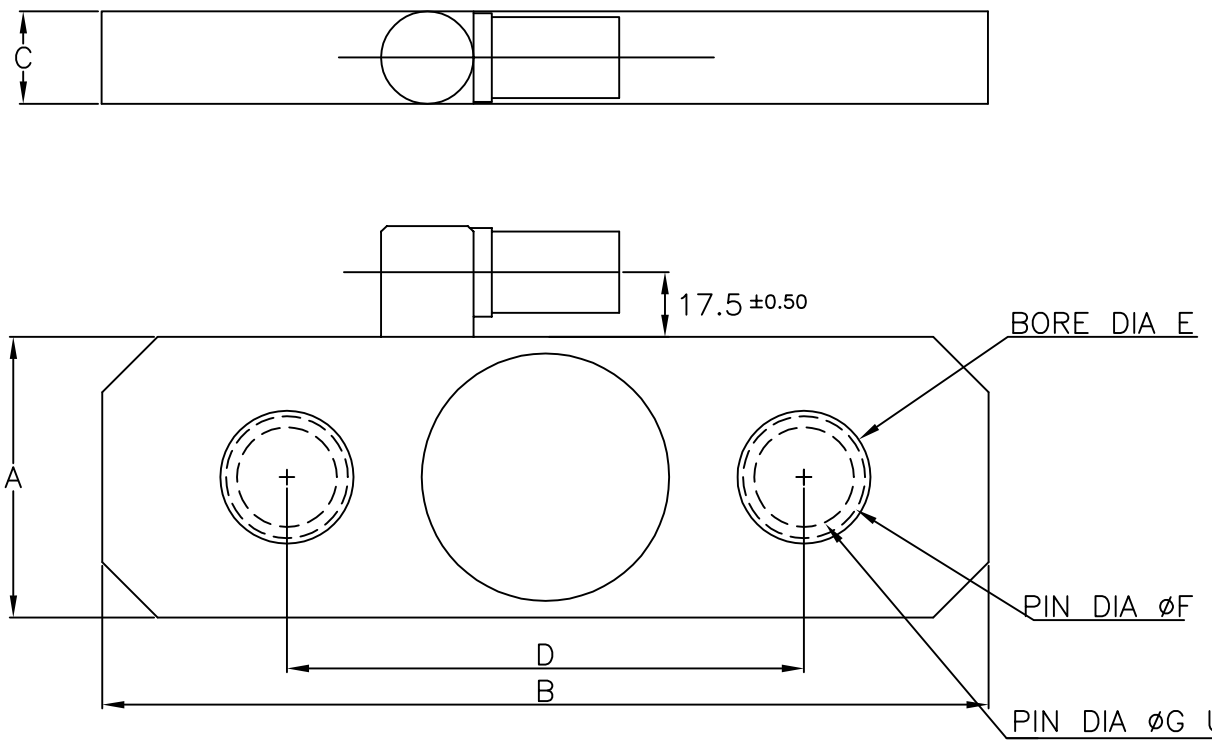
SHEET 3 OF 3

DRAWING No: DWG 0667

FILE No: 066701AB.DWG

REV 1.1

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
ALL DIMENSIONS ARE IN MILLIMETERS
UNLESS OTHERWISE STATED

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

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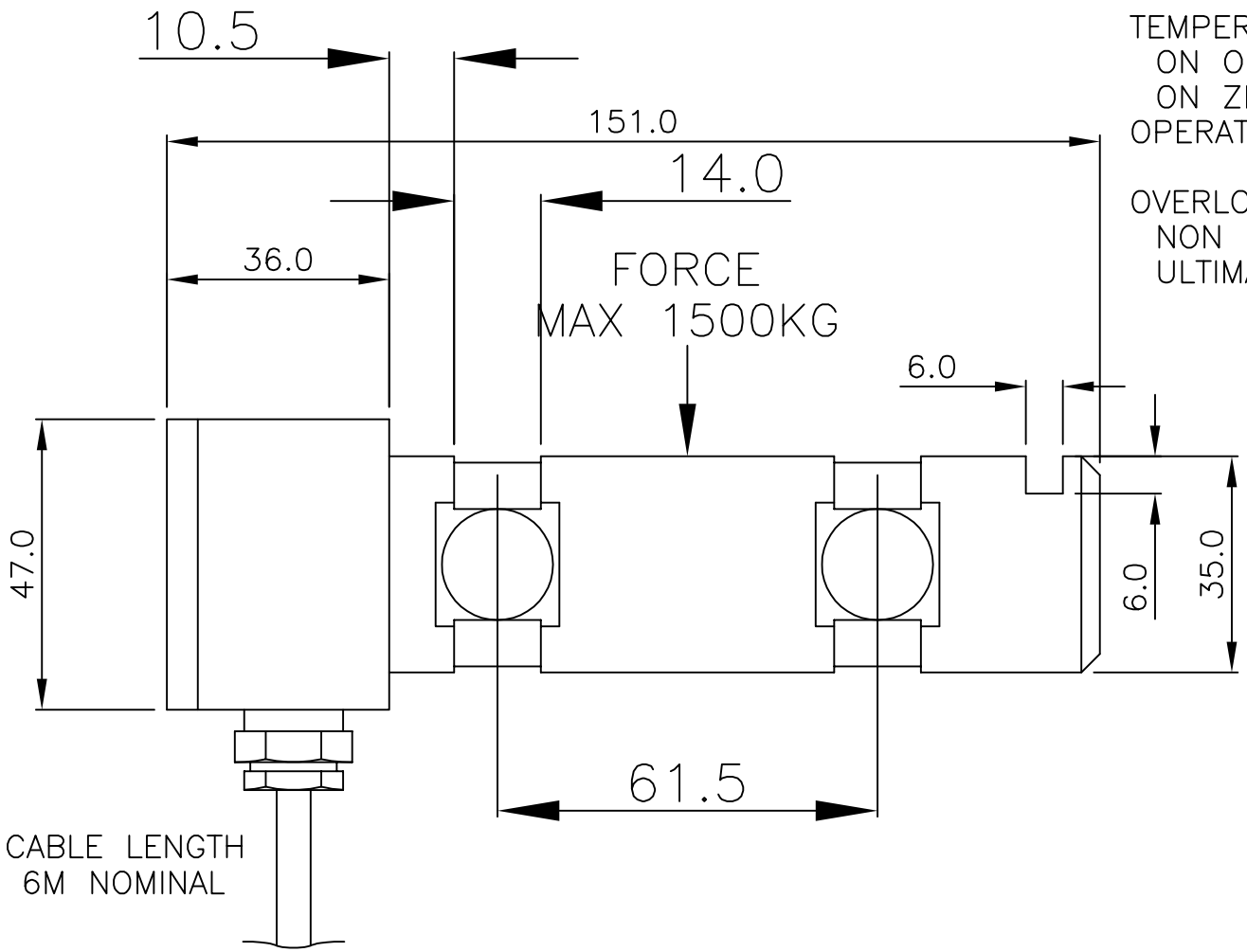
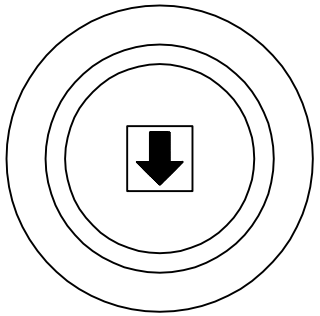
PART No: —
PROJECT: —
TITLE: TENSION PLATE CELL DIMENSIONS TO SUIT 10, 15, 20, 30, CELLS
SCALE N/A
SHEET 1 OF 1
DRAWING No: DWG 0990
FILE No: 099001AF.DWG
REV 1.5

3RD ANGLE

GENERAL SPECIFICATIONS

CAPACITY:	1500KG
EXCITATION:	12VAC/DC
RATED OUTPUT:	TYPICAL, 1mV/V
NON LINEARITY:	<1%
REPEATABILITY ERROR:	<0.1%
TEMPERATURE EFFECTS	
ON OUTPUT	<0.005%/DEG C
ON ZERO SHIFT	<0.005%/DEG C
OPERATION RANGE	MATERIAL DEPENDANT −10 TO +70 DEG C
OVERLOAD EFFECTS	
NON ELECTRICAL DAMAGE	<200%
ULTIMATE	>400%





DIRECTION OF
CENTRE FORCE

REV	DATE	DESCRIPTION OF CHANGE	APPR'D
1.1	11/05/05	REFER TO DR#369	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	PART OF ASSY
C. HOBBY	D. PLANTHABER	—
10/05/99	10/05/99	

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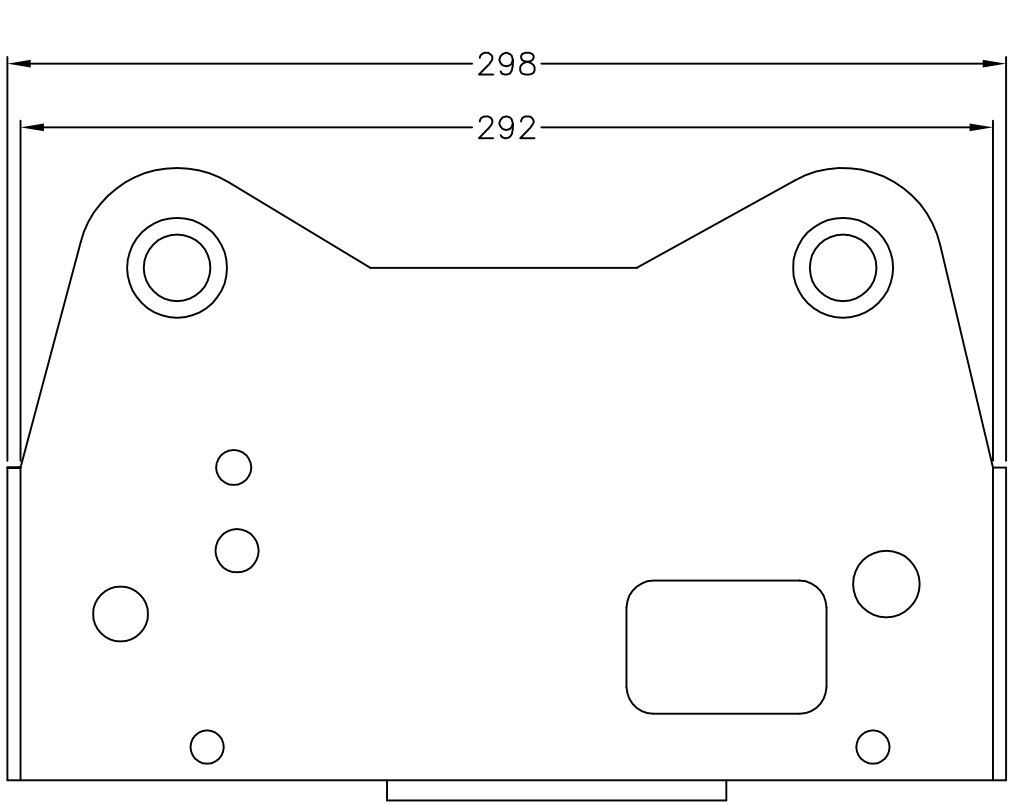
PART No:	PROJECT:
—	CELRW1500

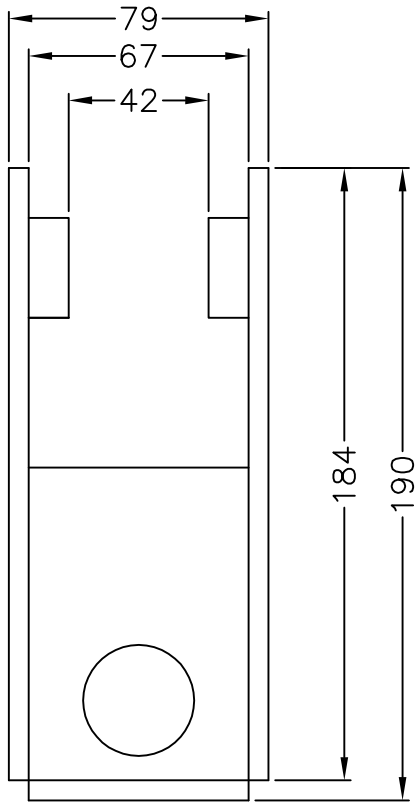
TITLE: RW1500 LOAD PIN DIMENSIONAL DETAIL

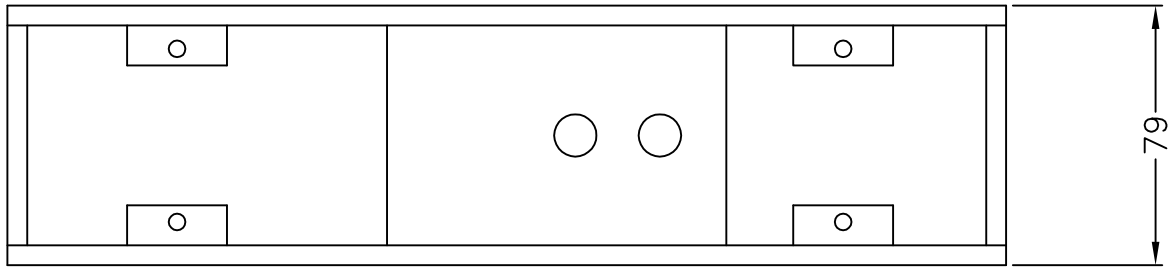
SCALE N/A

SHEET 1 OF 1

DRAWING No:	FILE No:	REV
DWG 1938	193801AB.DWG	1.1







REV	DATE	DESCRIPTION OF CHANGE	APPR'D
1.1	28/05/98	REFER TO DR#451	

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
C. HOBBY	D.G.
10/09/97	10/09/97

PART OF ASSY
—

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PART No: —

PROJECT: HRT3MM

TITLE: OVERALL DIMENSIONS

SCALE N/A

SHEET 1 OF 1

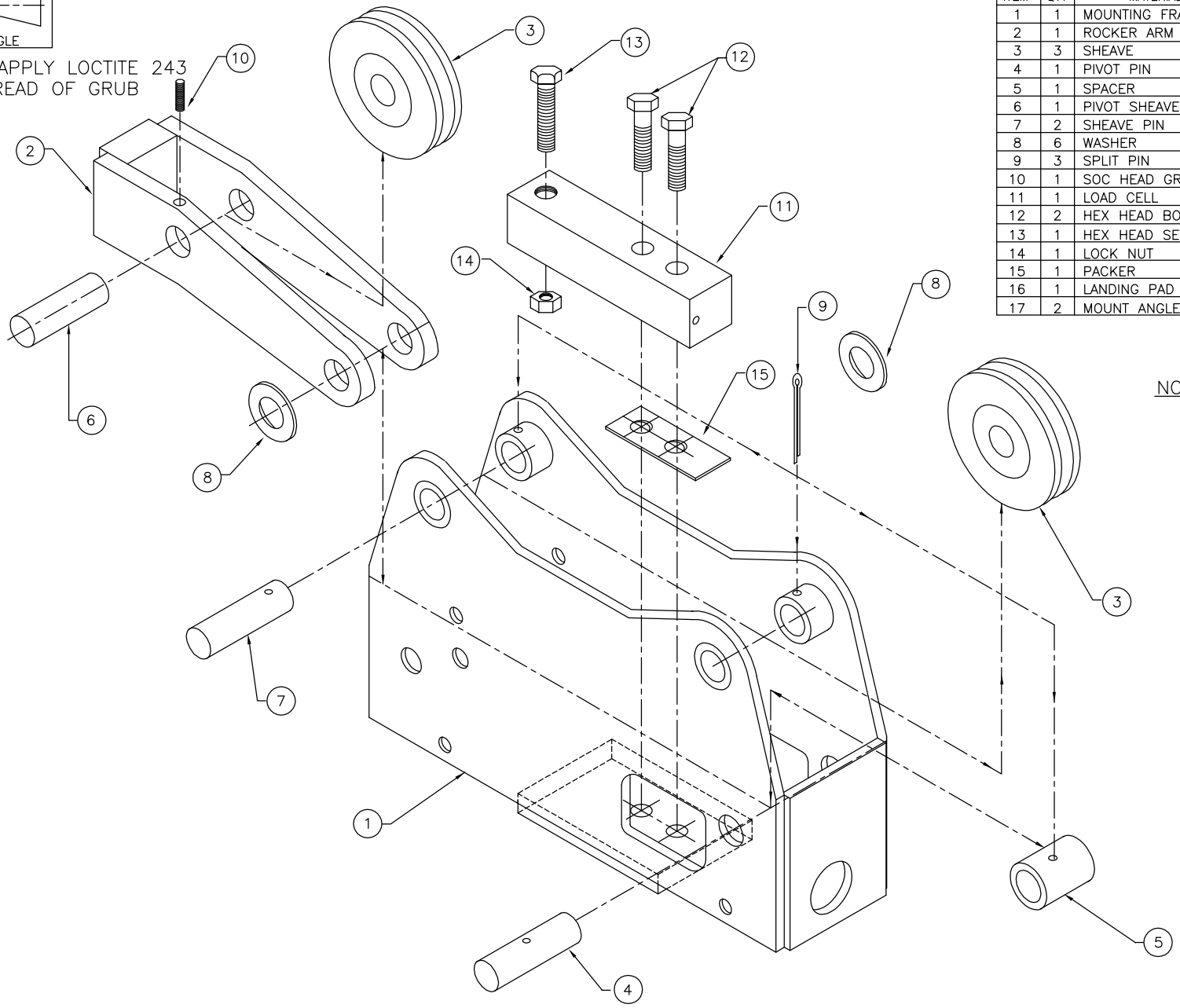
DRAWING No: DWG 1393

FILE No: 139301AB.DWG

REV 1.1

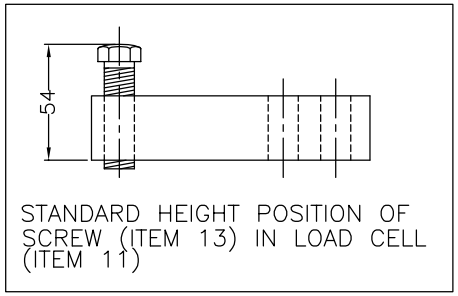
3RD ANGLE

NOTE: APPLY LOCTITE 243 TO THREAD OF GRUB SCREW.



ITEM	QTY	MATERIAL/DESCRIPTION	DWG No.	STOCK CODE (STANDARD)	STOCK CODE (MARINE S/S)
1	1	MOUNTING FRAME	DWG0885	FRADYNO1	FRAHRT3MMSS
2	1	ROCKER ARM	DWG0880	ROC3MM	ROC3MMSS
3	3	SHEAVE	DWG0892	SHEH3MM####	–
4	1	PIVOT PIN	DWG0882	SHAHRT01	–
5	1	SPACER	DWG0883	SPAHRT08	SPAHRT3MMSS
6	1	PIVOT SHEAVE PIN	DWG0881	SHAHRT03	–
7	2	SHEAVE PIN	DWG0882	SHAHRT02	–
8	6	WASHER	–	WAS20F	–
9	3	SPLIT PIN	–	PINCOTT03	–
10	1	SOC HEAD GRUB SCREW M6X20	–	SCRM620SG	–
11	1	LOAD CELL	–	CELBTD5P	–
12	2	HEX HEAD BOLT	–	BOL1213HHZP	–
13	1	HEX HEAD SET SCREW	DWG0287	SCR122CZP	–
14	1	LOCK NUT	–	NUT12HLZP	–
15	1	PACKER	DWG0884	PACHRT01	–
16	1	LANDING PAD	DWG0887	PADHRT01	–
17	2	MOUNT ANGLE BRACKET	DWG0886	BRAMHRT3MMU	BRAMHRT3MMSS

NOTE: ITEMS 16 & 17 ARE NOT SHOWN ON DRAWING



STANDARD HEIGHT POSITION OF SCREW (ITEM 13) IN LOAD CELL (ITEM 11)

STANDARD – DYNHRT3MM
MARINE S/S – DYNHRT3MMSS

REV	DATE	DESCRIPTION OF CHANGE	APPR'D
1.2	11/01/96	REFER TO DR#125	M. OBST
1.3	11/02/97	REFER TO DR#229	M. OBST
1.4	28/05/98	REFER TO DR#451	M. OBST
1.5	29/03/99	REFER TO DR#551	D.P.
1.6	27/01/05	REFER TO DR#345	G.C.
1.7	01/08/05	REFER TO DR#409	S.C.

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
ER	M. OBST	–
07/10/89	20/11/95	

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PART No:	PROJECT:
SEE ABOVE	HRT–3MM DYNO

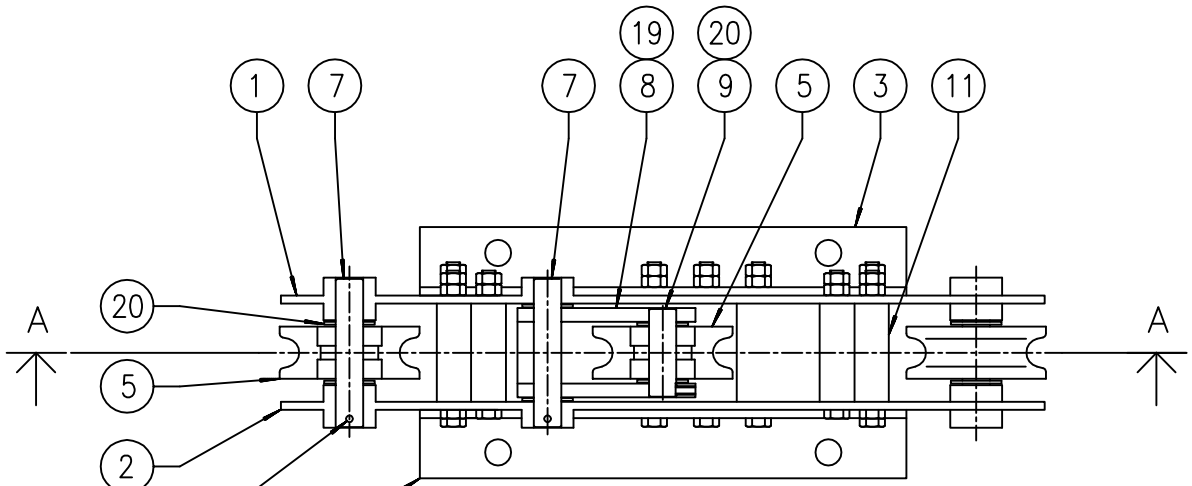
TITLE: GENERAL ARRANGEMENT

SCALE N/A

SHEET 1 OF 1

DRAWING No:	FILE No:	REV
DWG 0875	087501AH.DWG	1.7

3RD ANGLE



SECTION BB

SECTION AA

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

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

REV	DATE	DESCRIPTION OF CHANGE	APPR'D
1.0	14/09/95	ISSUED FOR MANUFACTURE	
1.1	04/01/96	ITEMS 3&4 CHANGED AS PER DR#124	M.O.
1.2	27/08/97	REFER TO DR#318	M.O.
1.3	29/03/99	REFER TO DR#551	M.G.
1.4	27/01/05	REFER TO DR#345	G.C.

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	–
14/09/95	14/09/95	

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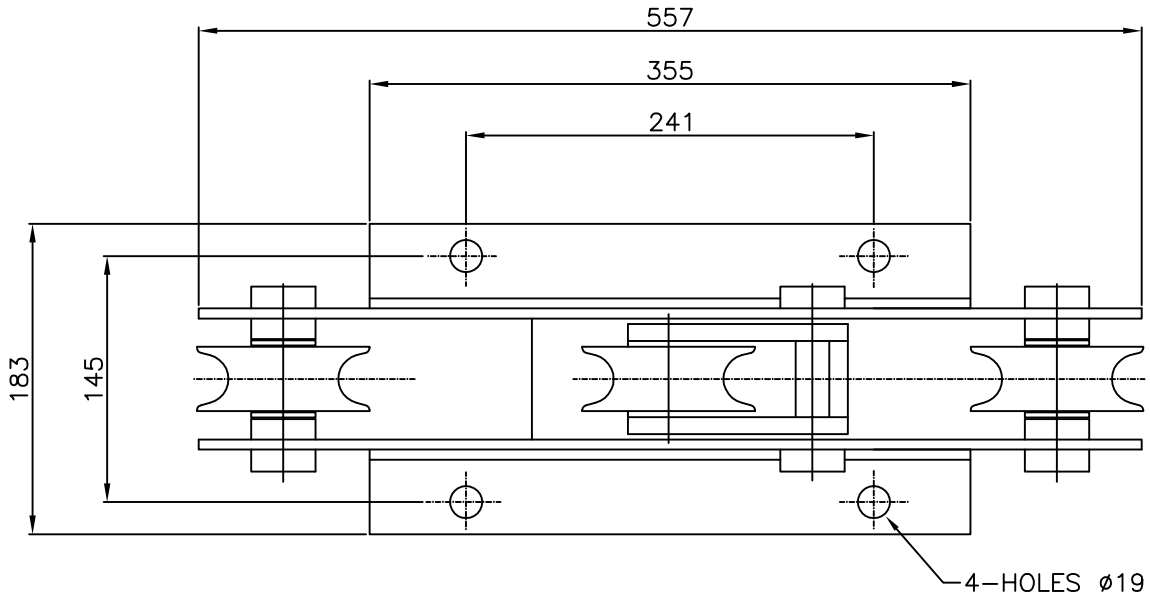
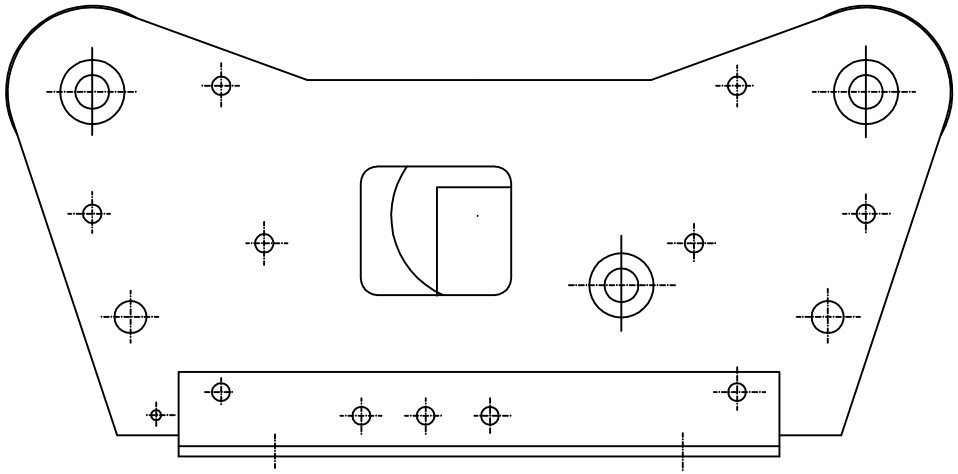
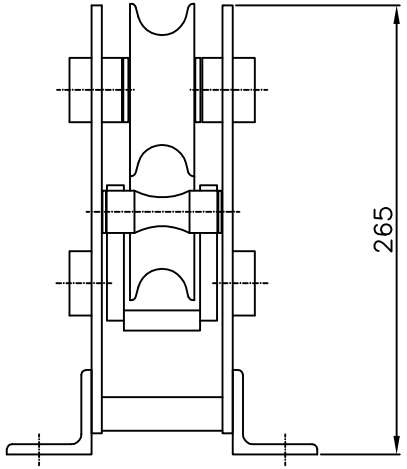
PART No: AS ABOVE
PROJECT: HRT–3 DYNO
TITLE: GENERAL ARRANGEMENT
SCALE N/A
SHEET 1 OF 2
DRAWING No: DWG 0422
FILE No: 042201AE.DWG
REV 1.4

3RD ANGLE







REV	DATE	DESCRIPTION OF CHANGE	APPR'D
1.0	14/09/95	ISSUED FOR MANUFACTURE	
1.1	04/01/96	ITEMS 3&4 CHANGED AS PER DR#124	M.O.
1.2	27/08/97	REFER TO DR#318	M.O.
1.3	29/03/99	REFER TO DR#551	M.G.
1.4	27/01/05	REFER TO DR#345	G.C.

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
14/09/95	14/09/95

PART OF ASSY
–

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A Division of Load Systems International

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SOUTH AUSTRALIA
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FAX +61 8 8352 1684

PART No: AS ABOVE

PROJECT: HRT–3 DYNO

TITLE: GENERAL ARRANGEMENT

SCALE N/A

SHEET 2 OF 2

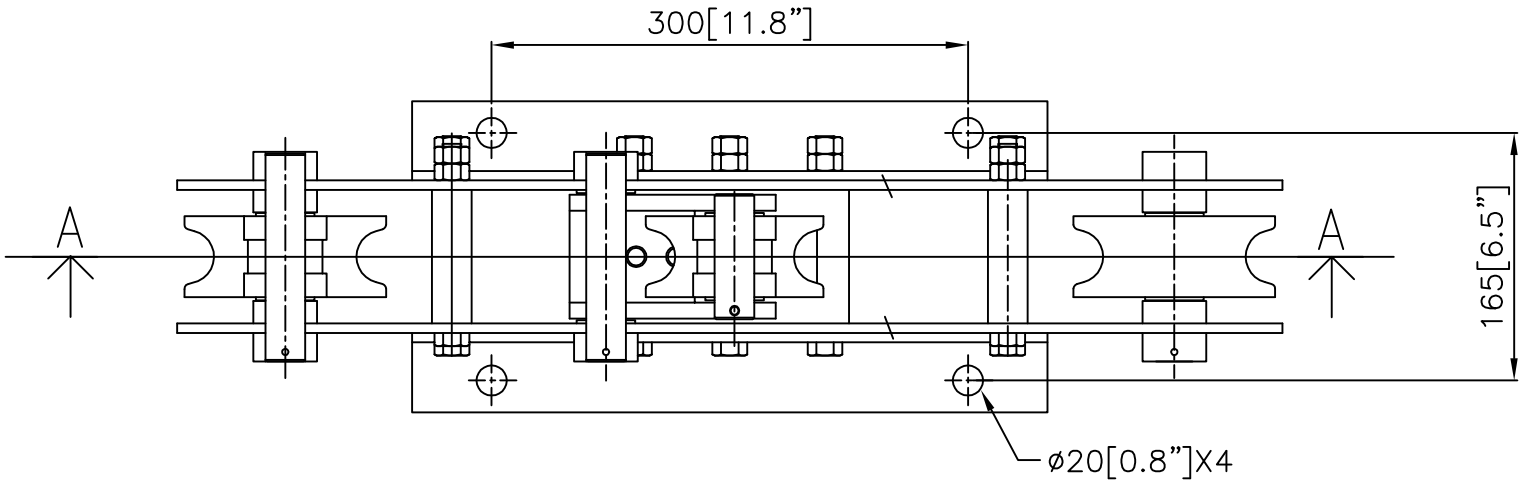
DRAWING No: DWG 0422

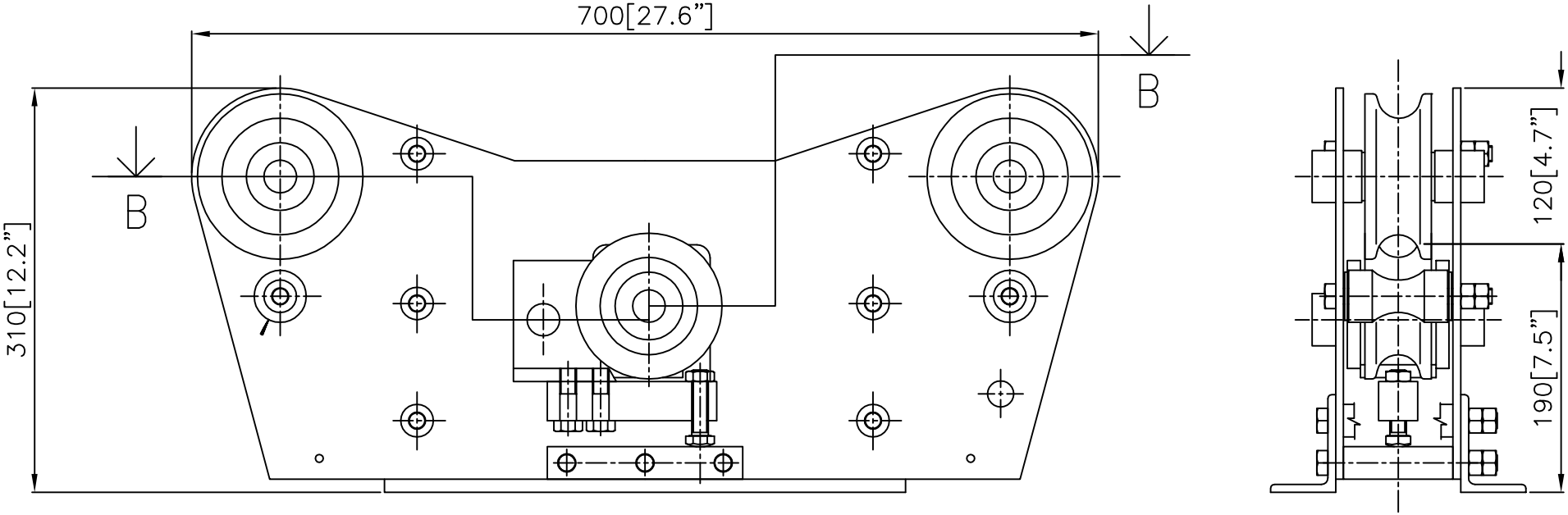
FILE No: 042201AE.DWG

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

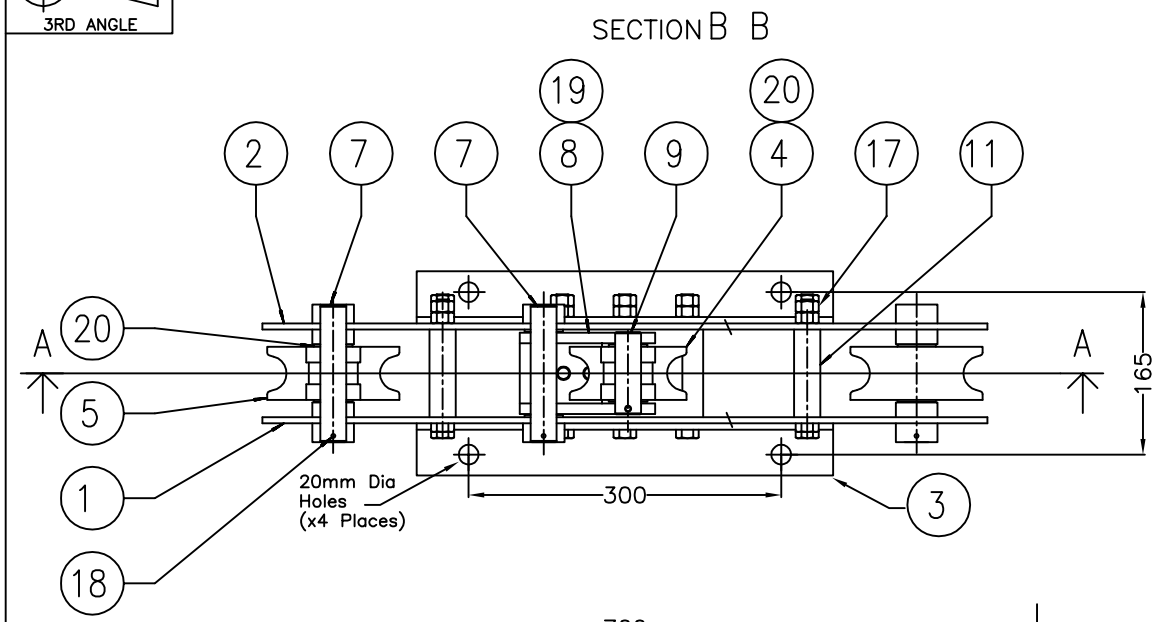
SHEET 1 OF 1

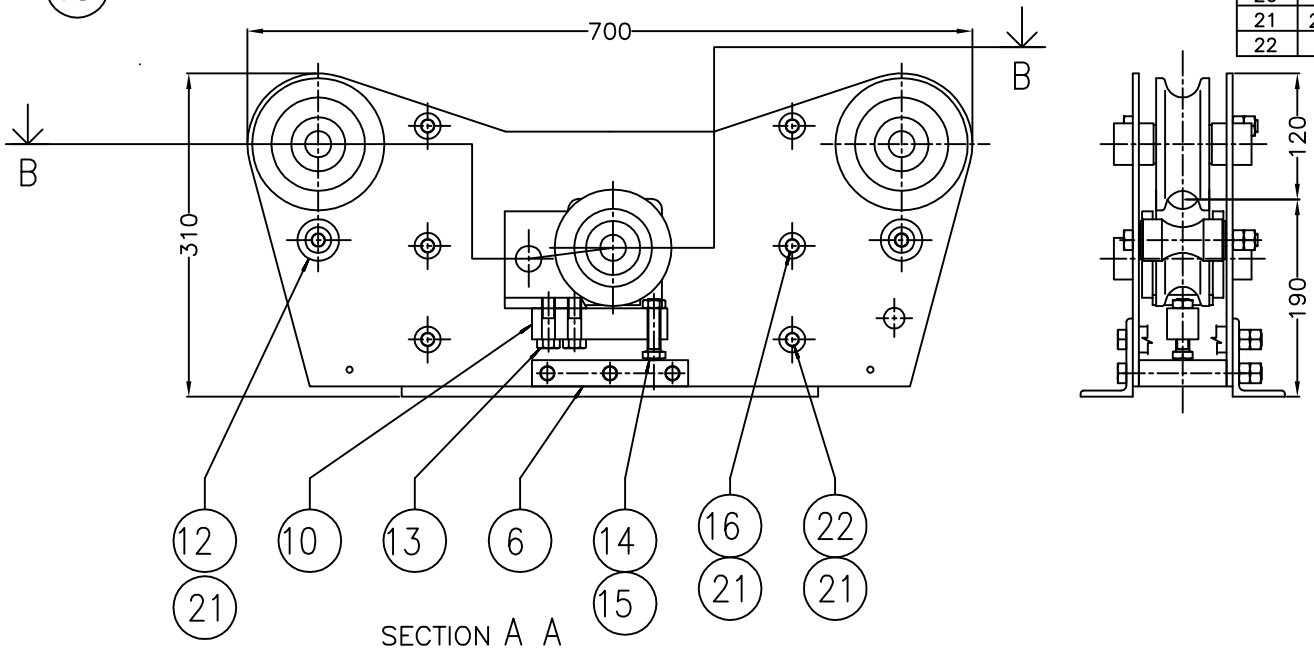
DRAWING No: DWG 1795

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	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	SHE4C2526	–
	1	OR ø29 CABLE	DWG0348	SHE4C2529	–
	1	OR ø33 CABLE	DWG0348	SHE4C2533	–
5	2	SHEAVE ASSY ø26 CABLE	DWG0348	SHE4E2526	–
	2	OR ø29 CABLE	DWG0348	SHE4E2529	–
	2	OR ø33 CABLE	DWG0348	SHE4E2533	–
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 M6X12 CUP PT S/S	–	SCRM612SG	–
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	11/01/96	CORRECT PART 14 AS PER DR#125	
1.2	04/09/96	REFER TO DR#197	J.D.R.
1.3	30/10/97	REFER TO DR#318	M.O.
1.4	26/03/99	REFER TO DR#551	D.P.
1.5	27/01/05	REFER TO DR#345	G.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	07/09/95

PART OF ASSY
–

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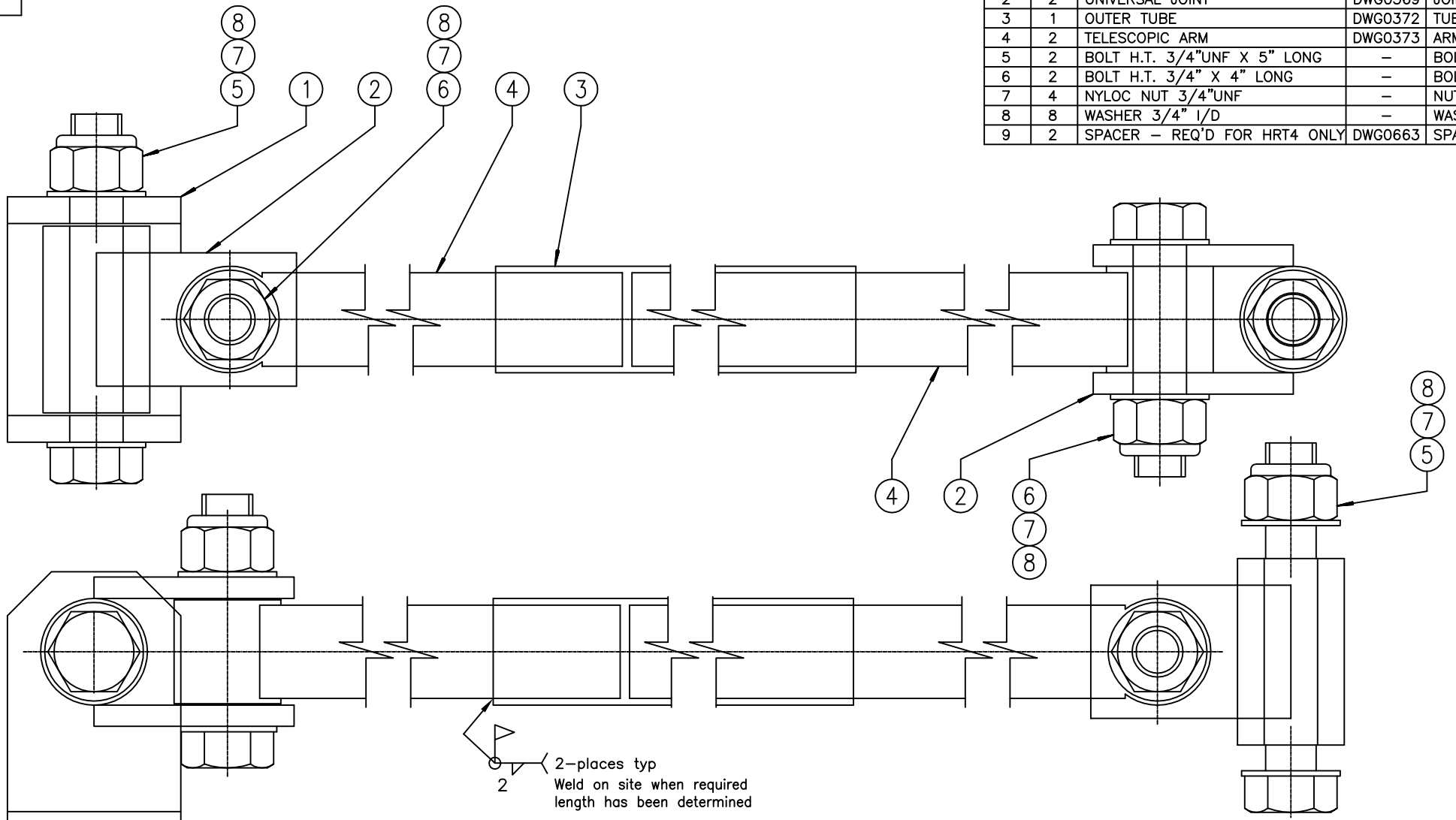
PART No: AS ABOVE
PROJECT: HRT–4 DYNO
TITLE: GENERAL ARRANGEMENT
SCALE N/A
SHEET 1 OF 1
DRAWING No: DWG 0796
FILE No: 079601AF.DWG
REV 1.5

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
ALL DIMENSIONS ARE IN MILLIMETERS
UNLESS OTHERWISE STATED

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

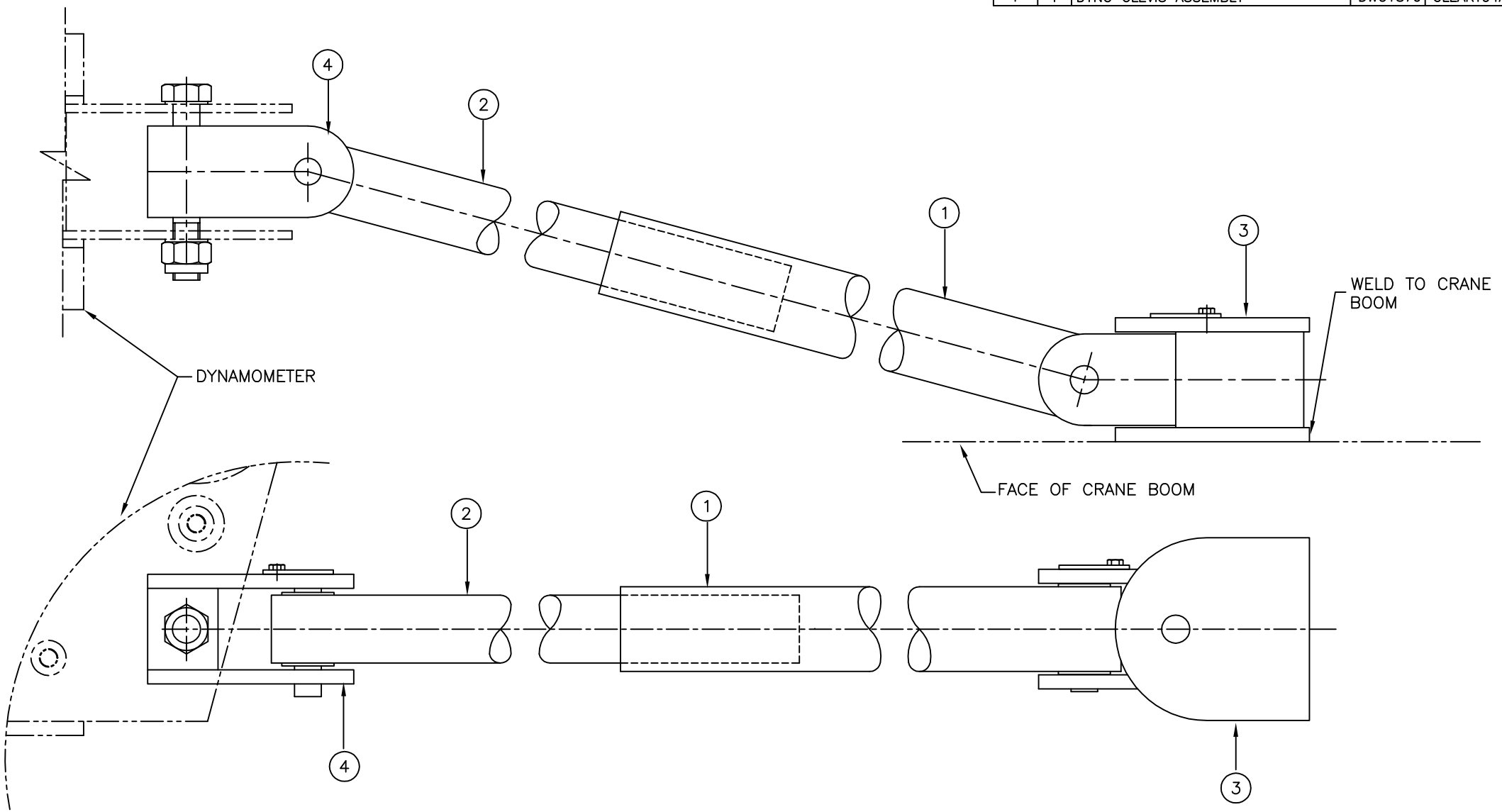
SCALE N/A

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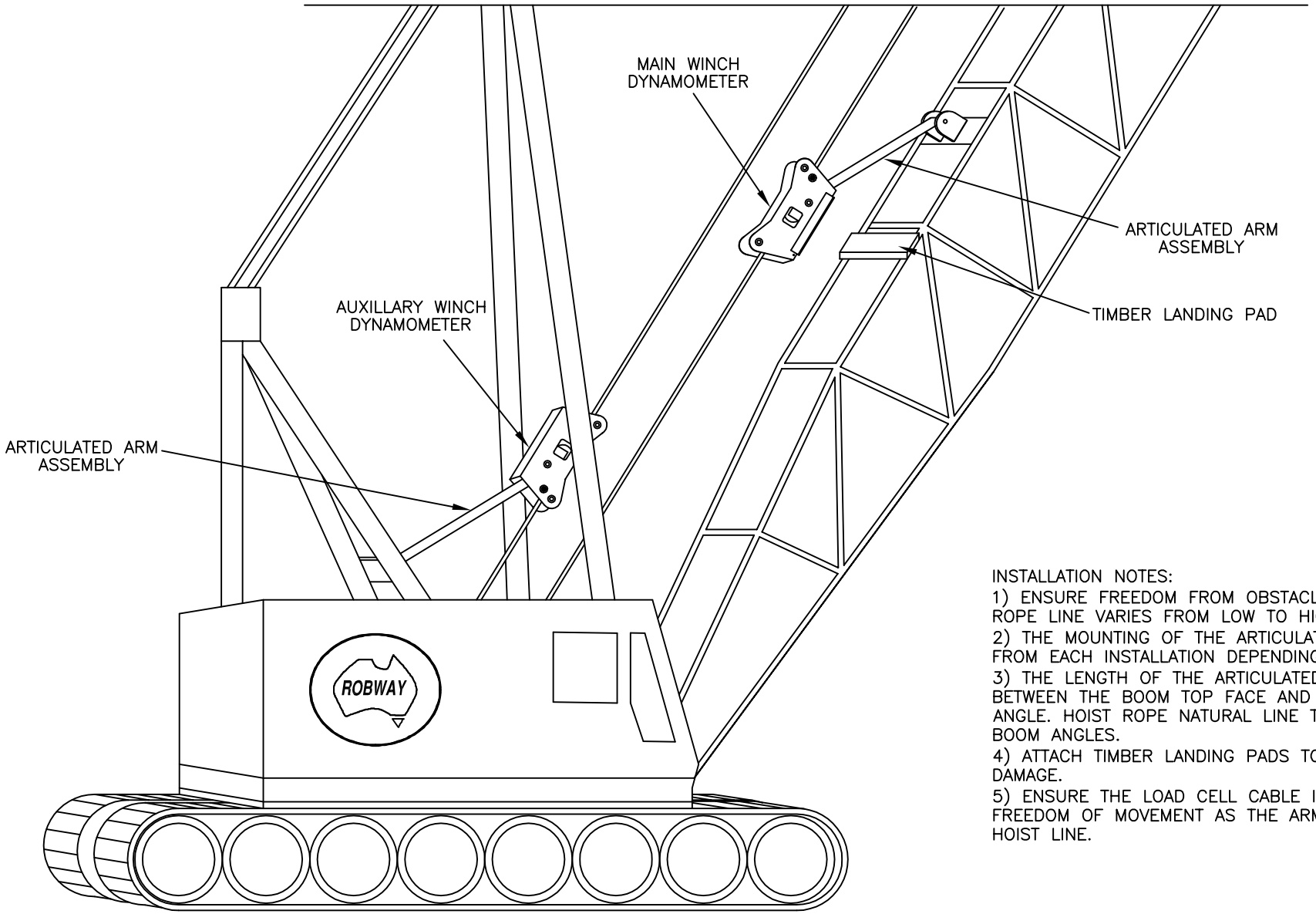
PART No: ARMARTIC02
PROJECT: ARTIC ARM – H/D
TITLE: GENERAL ARRANGEMENT
SCALE N/A
SHEET 1 OF 1
DRAWING No: DWG 0805
FILE No: 080501AB.DWG
REV 1.1

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
ALL DIMENSIONS ARE IN MILLIMETERS
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:
–	–

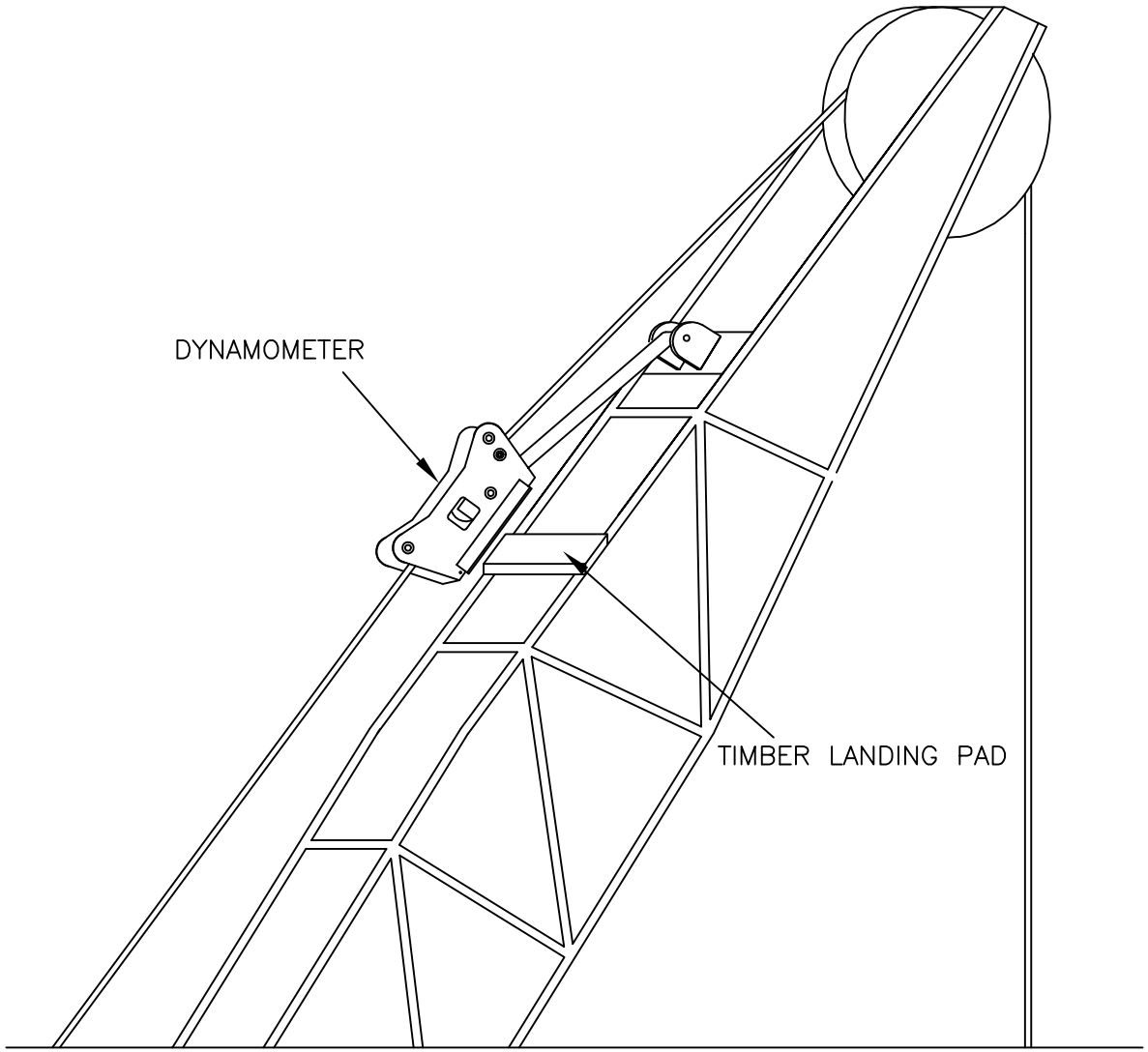
TITLE: TYPICAL DYNAMOMETER INSTALLATION TO SUIT STRUT BOOM CRANES

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
—

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PART No: —

PROJECT: —

TITLE:
TYPICAL DYNAMOMETER INSTALLATION
TO SUIT STRUT BOOM CRANES

SCALE N/A

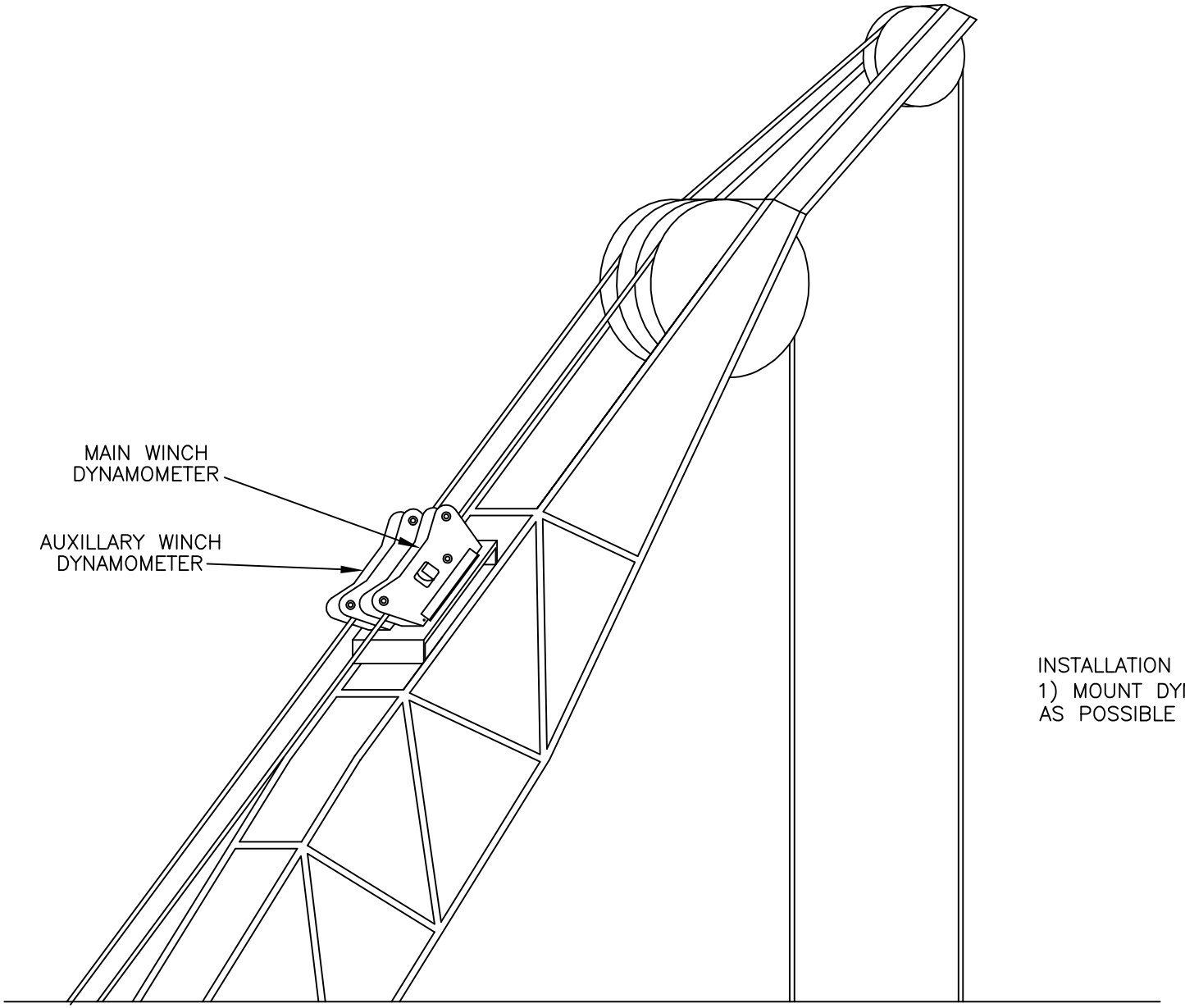
SHEET 2 OF 4

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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PART No: –

PROJECT: –

TITLE: TYPICAL DYNAMOMETER INSTALLATION TO SUIT STRUT BOOM CRANES

SCALE: N/A

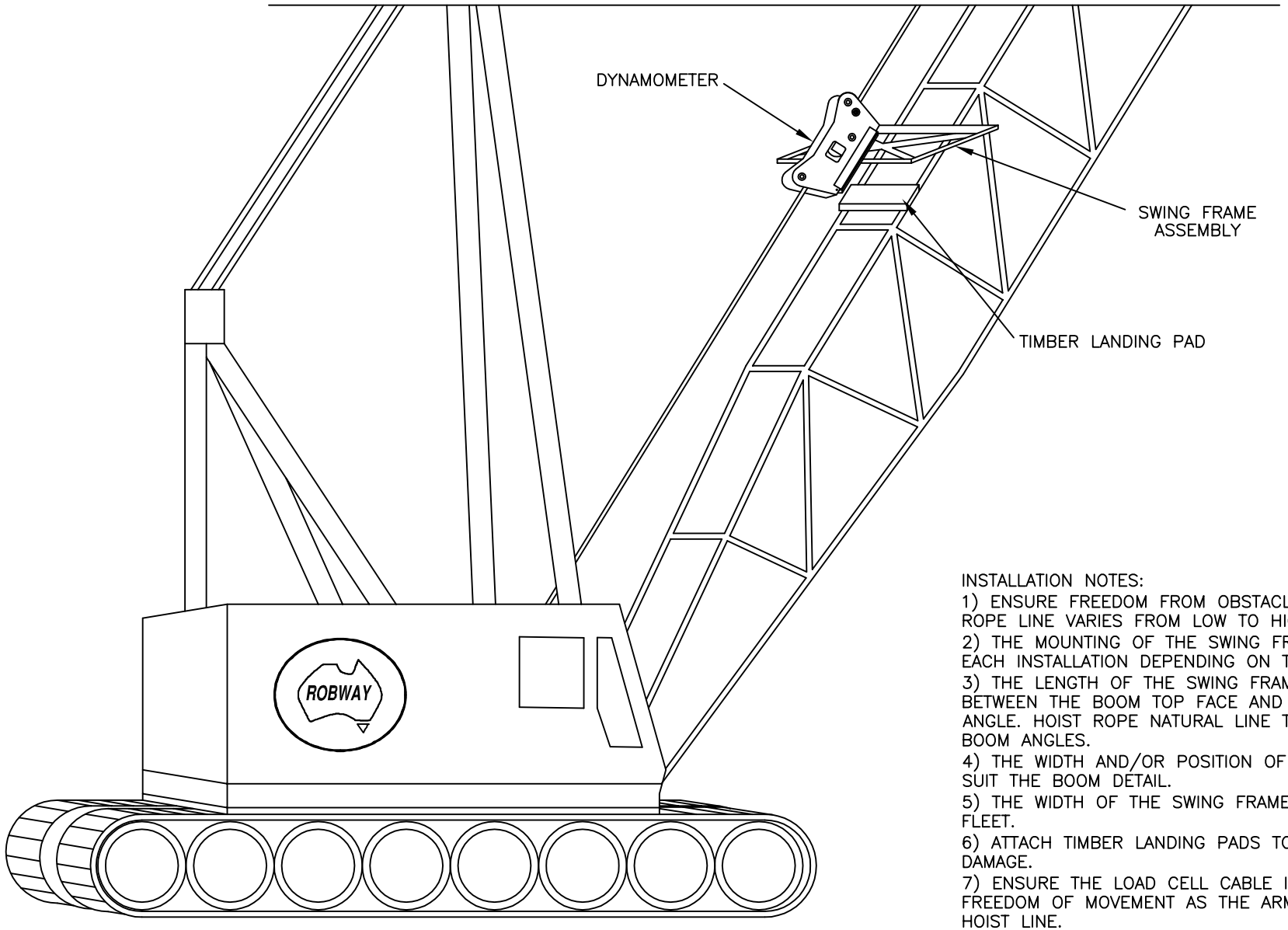
SHEET: 3 OF 4

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
ALL DIMENSIONS ARE IN MILLIMETERS
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 4 OF 4

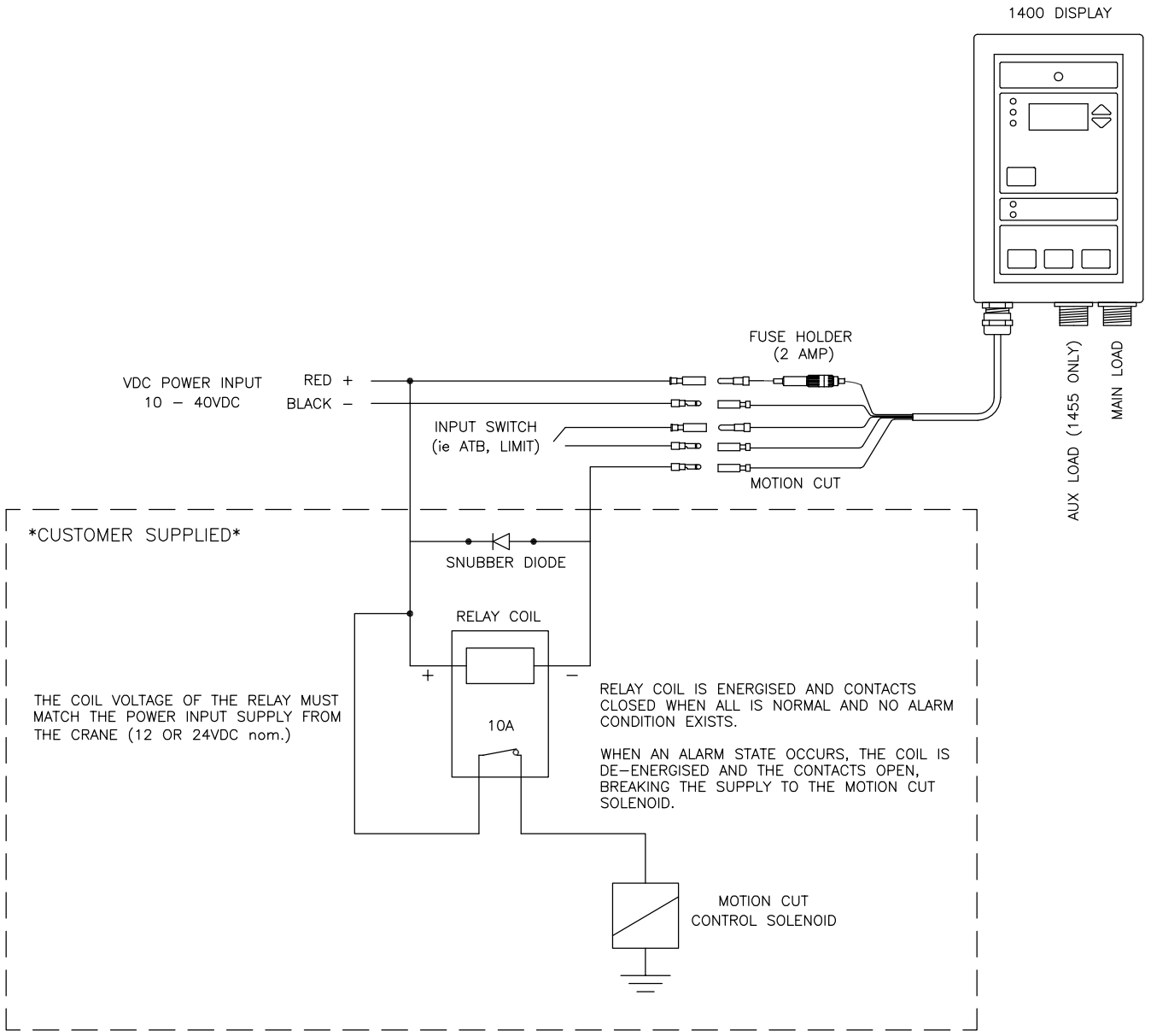
DRAWING No: DWG 2468

FILE No: 246801AA.DWG

REV 1.0

Appendix 9.3.

Motion Cut Connection



REV	DATE	DESCRIPTION OF CHANGE	APPR'D
1.1	29/04/05	UPDATE DRAWING	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
M. GURNEY	M. OBST
04/04/96	04/04/96

PART OF ASSY
—

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PART No:

PROJECT: 1400 SERIES DISPLAYS

TITLE: 1400 SERIES MOTION CUT CONTROL WIRING (FOR APPLICABLE UNITS)

SCALE N/A

SHEET 1 OF 1

DRAWING No: DWG 1011

FILE No: 101101AB.DWG

REV 1.1

Appendix 9.4.

System Configuration Sheets & Function Codes

ROBWAY 1465 SYSTEM CONFIGURATION SHEET

Chip Number	**1465 V2.00**	Calibration Function Code List	**90360.FCN**

FACTORY CONFIGURATION

	Supplied	***Changed To***		
SWL % for Intermittent Audible/Visual alarm	**85.0**		**%**	**[F-42]**
SWL % for Continuous Audible/Visual alarm	**100.0**		**%**	**[F-43]**
SWL % for motion cut and Continuous Audible/Visual alarm	**105.0**		**%**	**[F-44]**
Slew offset	**0.0**		**m**	**[F-45]**
Maximum Main Winch Linepull	**5.0**		**t**	**[F-46]**
Maximum Falls For Main Winch	**1**			**[F-47]**
Boom Offset	**0.0**		**m**	**[F-48]**
Main Sheave Radius	**0.2**		**m**	**[F-49]**
Maximum Aux. Winch Linepull	**5.0**		**t**	**[F-50]**
Maximum Falls For Aux. Winch	**1**			**[F-51]**
Jib Offset	**0.0**		**m**	**[F-52]**
Aux. Sheave Radius	**0.2**		**m**	**[F-53]**
Height of foot-pin from ground	**1.0**		**m**	**[F-54]**
Motion-cut on A.T.B.	**ON**			**[F-55]**
Motion-cut on limits	**OFF**			**[F-56]**
Number of Winches	**2**			**[F-57]**
Length of boom to end of sequential sections *Use only if payout wire does not attach to boom tip*	**0.0**			**[F-58]**

Number of direction switches used **N/A**

Input	*Description*

Prepared

By ***YZ*** *For* ***Robway Crane Safety Systems***

Date ***2006-05-01***

ROBWAY 1465 CALIBRATION PROCEDURE WITH USER CONFIGURABLE OPTIONS

1. Press and hold **CANCEL** while switching on the 1465 display. Waiting until the 1465 finishes its self-test and the display shows F-00,

2. Use **UP/DOWN** keys to select function then press **ENTER** to accept,

3. Use **UP/DOWN** keys to set new value then press **ENTER** to accept,

4. Repeat steps 2 and 3 for any other functions if required,

5. Select **F-00** or press **CANCEL** to exit calibration mode.

NOTE

Once in calibration mode you may use CANCEL key to cancel any function.

FUNCTION CODES

F-00	EXIT CALIBRATION MODE	
F-01	VIEW CALIBRATED MAIN LOAD	
F-02	CALIBRATE LIGHT MAIN LOAD	
F-03	CALIBRATE HEAVY MAIN LOAD	
F-04	VIEW CALIBRATED AUX LOAD	*(TWIN WINCH ONLY)*
F-05	CALIBRATE LIGHT AUX LOAD	*(TWIN WINCH ONLY)*
F-06	CALIBRATE HEAVY AUX LOAD	*(TWIN WINCH ONLY)*
F-07	VIEW UNCALIBRATED ANGLE INPUT	
F-08	VIEW CALIBRATED ANGLE INPUT	
F-09	CALIBRATE LOW ANGLE	
F-10	CALIBRATE HIGH ANGLE	
F-11	VIEW UNCALIBRATED BOOM LENGTH INPUT	*(TELESCOPIC CRANES ONLY)*
F-12	VIEW CALIBRATED BOOM LENGTH INPUT	*(TELESCOPIC CRANES ONLY)*
F-13	CALIBRATED SHORT BOOM LENGTH	*(TELESCOPIC CRANES ONLY)*
F-14	CALIBRATED LONG BOOM LENGTH	*(TELESCOPIC CRANES ONLY)*

WARNING

THE FOLLOWING FUNCTIONS SHOULD ONLY BE USED BY ROBWAY TRAINED PERSONNEL. MISUSE OF THESE FUNCTIONS MAY CAUSE THE DISPLAY TO FUNCTION INCORRECTLY

F-15	VIEW UNCALIBRATED TRANSDUCER 1 INPUT	
F-16	VIEW CALIBRATED TRANSDUCER 1 INPUT	
F-17	CALIBRATE LOW END OF TRANSDUCER 1	
F-18	CALIBRATE HIGH END OF TRANSDUCER 1	
F-19	VIEW UNCALIBRATED TRANSDUCER 2 INPUT	*(TWIN WINCH ONLY)*
F-20	VIEW CALIBRATED TRANSDUCER 2 INPUT	*(TWIN WINCH ONLY)*
F-21	CALIBRATE LOW END OF TRANSDUCER 2	*(TWIN WINCH ONLY)*
F-22	CALIBRATE HIGH END OF TRANSDUCER 2	*(TWIN WINCH ONLY)*
F-23 - F-28	NOT USED	
F-29	PERFORM LADEN BOOM RADIUS CORRECTION	*(TELESCOPIC CRANES ONLY)*
F-30 - F-39	NOT USED	
F-40	ALTER CALIBRATION DATA	
F-41	CLEAR ALL CALIBRATION DATA	**USE EXTREME CAUTION**
F-42	SWL % FOR YELLOW LIGHT AND INTERMITTENT AUDIBLE ALARM	
F-43	SWL % FOR RED LIGHT AND CONTINUOUS AUDIBLE ALARM	
F-44	SWL % FOR MOTION-CUT AND CONTINUOUS AUDIBLE ALARM	
F-45	SLEW-OFFSET (PLEASE REFER TO THE MANUAL FOR A DESCRIPTION)	
F-46	MAXIMUM MAIN WINCH LOAD PER FALL	
F-47	MAXIMUM FALLS SELECTABLE FOR MAIN WINCH	
F-48	BOOM HEAD OFFSET (PLEASE REFER TO THE MANUAL FOR A DESCRIPTION)	
F-49	MAIN WINCH SHEAVE RADIUS	
F-50	MAXIMUM AUX. WINCH LOAD PER FALL	*(TWIN WINCH ONLY)*
F-51	MAXIMUM FALLS SELECTABLE FOR AUX. WINCH	*(TWIN WINCH ONLY)*
F-52	JIB HEAD OFFSET	*(TWIN WINCH ONLY)*
F-53	AUX. WINCH SHEAVE RADIUS	*(TWIN WINCH ONLY)*
F-54	HEIGHT OF FOOT-PIN FROM GROUND	
F-55	MOTION CUT ON A.T.B. ON/OFF	
F-56	MOTION CUT ON LIMITS ON/OFF (DOES NOT AFFECT LOAD LIMITS)	
F-57	NUMBER OF WINCHES	
F-58	LENGTH OF BOOM UP TO END OF SEQUENTIAL SECTIONS (ONLY NON-ZERO WHEN LENGTH PAYOUT WIRE DOES NOT ATTACH TO BOOM TIP)	