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## 1445 / 1455 LOAD AND ATB INDICATOR INSTRUCTION MANUAL

MAN-1091 Rev F



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System  
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## Model 1445 Single Winch System



## Model 1455 Twin Winch System



### Features

- Load and anti-two-block indication
- Backlit digital display in 0.1 increments
- Outputs for motion cut devices
- Installation kit provided
- Simple push-button calibration
- Multiple anti-two-block sensor switch input facility
- Multi-function digital display
- Compact, robust display design
- Plug-in cables
- Fully tested against temperature, humidity and vibration
- Anti-corrosion design
- Operator-settable limit alarm
- Optional radio receiver & transmitter for wireless load and/or anti-two-block monitoring



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## **1. Important Safety Notice**

The Model 1455 and 1455 Load Indication Systems are crane devices which warn the operator of impending overload condition and/or of overhoist condition which could cause damage to property, crane and personnel.

The systems are 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 systems are equipped with a Cancel/Mute-Alarm 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 overload and/or overhoist 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 Model 1445 (Single Winch) and Model 1455 (Twin Winch) Load and Anti-Two-Block (ATB) Indication Systems are members of the ROBWAY 1400 series Semi Automatic Indicators and are specifically designed for low-cost applications.

*Please note that the 1445 and 1455 are NOT automatic safe load indicators. These systems **MUST** be used in conjunction with the crane manufacturer's load charts.*

**They do not contain any loadcharts and therefore cannot warn of exceeding loadchart capacities.**

**For the contents of this manual, these two displays will be treated and discussed as one System as all features are the same, except for the additional load display on the 1455. The two displays will be referenced as "1445/1455" in singular form throughout the manual.**

The 1445/1455 System is a microprocessor-controlled load and ATB indicator.

It has been designed to provide a cost effective display of hook load for strut boom and telescopic cranes.

The 1445/1455 System also requires very little installation time or operator training.

Although not a safe load indicator, the 1445/1455 can be configured to give warning and motion cut control on Two-Blocking and on reaching operator settable LOAD limit. This limit is remembered even after the 1445/1455 has been switched off.

***Since this limit can be set to any load value, it is the operator's responsibility to correctly set it for the required application.***

The 1445/1455 System can also be used with the following options:

- Remote Load and ATB Monitoring Using Radio Receiver and Transmitter  
A Robway radio load receiver can be connected to the 7-way bulkhead mil-spec socket at the back of the 1445/1455 display for use with a Robway radio load transmitter module connected to the load sensor to provide wireless load and ATB indication. **If this option is supplied, please refer to Section 7.2 Appendices, "Radio Load/ATB Manual Addendum" for details.**
- External Large LED Display  
A Robway large LED display can be connected to the 7-way bulkhead mil-spec socket at the back of the 1445/1455 display for use as an external slave display of loads.



## 3. Operating Instructions

The following sections explain how to operate the 1445/1455 System and make best use of its capabilities.

### 3.1. *Turning ON the Unit*

Power to the unit is from the crane battery 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 display window functions are selected by the **SELECT** push button. 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 LOAD.*

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:

#### **LOAD**

When the LOAD display is selected, the display window shows the current load value.

#### **FALLS**

When the FALLS display is selected, the display window shows the falls (*parts of line*) currently selected.

When the current falls are displayed, the operator is allowed to change the falls settings, using the UP/DOWN arrow buttons on the front panel.

The maximum falls to which the FALLS display can be set to is controlled by the value set up at calibration time using FUNCTION CODES. It is set to 1 (*one*) at the time of manufacturing.

*If this maximum value needs to be changed the operator should seek the services of the original installer or a ROBWAY distributor*

## LIMIT

When the LIMIT display is selected, the 1445/1455 displays the LESSER value of the limit set by the operator and the maximum linepull multiplied by the falls. A quick example should clarify this:

If the operator sets the LIMIT to 100 tonnes and the current FALLS is set to 2 and the maximum linepull is set to 20 tonnes at calibration time, then the LIMIT will be set to 2 times 20 tonnes which is 40 tonnes, because this is less than 100 tonnes. This will ensure that the crane is not over-loaded and that warnings and motion cut will occur in a more gradual way.

If, however, the linepull is set to 60 tonnes then 2 times 60 tonnes is 120 tonnes which is more than the 100 tonne limit set by the operator so LIMIT is going to be set to 100 tonnes. **Always the lesser value is used.**

*The maximum linepull must be set up at calibration time. If it needs changing at a later time the operator must seek the assistance of the original installer or a qualified ROBWAY distributor. It is set to 5 tonnes at time of manufacture.*

If the actual load is more than the allowed maximum, as indicated by the LIMIT display, the 1445/1455 will activate both audible/visual alarms and motion cut if installed.

The percentages of LIMIT at which intermittent alarm, continuous alarm or motion cut activate are also set at calibration time. These limits are set to 85%, 100% and 110%, respectively, at manufacturing.

*If these percentages need changing at a later time the operator must seek the assistance of the original installer or a qualified ROBWAY distributor.*

## CANCEL

Should any over-load condition occur and alarms/motion cut activate, the operator can disable these by pressing the CANCEL button. As a reminder of alarm/motion cut override, the 1445/1455 will have its O/RIDE and ALARM indicators ON.

***The CANCEL button should only be used if it is absolutely necessary and must be de-activated as soon as possible. If the CANCEL button is not de-activated after use, you may not be able to see approaching overloads.***

## TEST

This button starts up a self-test procedure. When activated the 1445/1455 will check its input channels, show test patterns in the display window so that the operator can check the operation of the display. The 1445/1455 will also activate the audible/visual alarms and the motion cut relay if connected. We recommend that this button be pressed periodically. If there is any error/s the 1445/1455 will display an **ERROR CODE** (refer to Section 6. "Troubleshooting" for details).

## ATB Indicator (Red LED)

If the optional Anti-Two-Block switch is installed, this indicator will be activated when a Two-Blocking condition is detected and will be lit until this condition is removed. **Please note that motion cut will not be activated if the O/RIDE lamp is ON** (refer to CANCEL button on previous page).

*If this lamp or LED is ON when the optional switch is NOT installed then the Anti-Two-Block inputs are left open incorrectly. Ensure that the "ATB" bullet type connectors of the power cable are shorted together.*

### **3.4. Operator Configurable Options**

The 1445/1455 System requires minimal configuration which includes the setting of falls and limits of maximum load. Once these are set up the 1445/1455 remembers them even after power is switch off.

#### **3.4.1. Changing Falls (Parts of Line)**

Refer to Display Functions in Section 3.3 above.

#### **3.4.2. Changing Load Limits**

The operator can change the maximum load allowed to lift at any time. This limit will be stored by the 1445/1455 until it is changed again and will be remember even after the power is switched off . The procedure is as follows:

1. Press the SELECT button until the FALLS indicator comes ON and verify that the value shown is correct for the winch you work with, use the UP/DOWN arrow buttons if you need to change the FALLS,
2. Press the SELECT button until the LIMIT indicator comes ON, the current value will be shown,
3. Use the UP/DOWN arrow buttons to change the LIMIT to the new value.

***Since these limits can be set to any load value it is the operator's responsibility to correctly set them for the application at hand.***



## 4. Installation

This part of the manual is intended for technical people who have been trained by ROBWAY or its distributors. It contains all necessary information to install and commission the ROBWAY 1445/1455 load indicator.

The following sections should be read initially, at least once to understand the general concept of the installation and calibration procedures. Special attention should be paid to Section 5.1 which describes the CORRECT ORDER OF PROCEDURES.

Using the FUNCTION CODE listing at the rear of this manual, the installer should then use those functions to carry out the required operations. For a detailed description of the individual function codes the installer should refer to Section 5.2 FUNCTION CODES DESCRIBED.

### 4.1. General Notes

In general, each installation will differ from others, which makes a general description of installation almost impossible. For each installation, however, information will be available in the form of diagrams and instructions. This information will be supplied in the manual with the system, and it is this information the installer must refer to. The main purpose of the installation information is to enable the correct wiring of the display, assuming the load sensors have been correctly installed. If there are any queries with regard to the installation of the system, the installer should call the authorised ROBWAY distributor from which the system was purchased.

The majority of the information required for installation is contained in the wiring diagrams supplied with the manual. This diagram should contain all of the components used in the system, and their interconnection. Detailed information such as cable/connector type may not be provided unless these are to be sourced by the installer. Information relating to the mounting of the display etc. will also not generally be given as this is often decided on-site once the equipment has been received. Unless specific detail is given, a common sense approach must be taken with all decisions.

### 4.2. 1445/1455 System Components

- **The 1445/1455 Display Module,**

*The computerised display and control systems.*

- **Load Sensor/s,**

*Used to send a signal which is proportional to the load lifted. These can be dynamometers (tensiometers), load pins or plate cells.*

- **Cabling,**

*Allows the connection of system components in a convenient manner*

- **Optional Anti-Two-Block,**

*This allows the computer to automatically detect and warn of Two-Blocking condition. For installation and use of this system refer to its own, separate manual.*

***Please note that if the optional Ani-2-Block assembly is not used, you must connect the TWO BULLET connectors, marked as “ATB”, together (i.e. short the wires together), otherwise the 1445/1455 will always sound the alarms and indicate Two-Blocking condition, i.e. the ATB LED indicator on the front panel will be ON.***

### **4.3. Installation Guidelines**

#### **4.3.1. Display Unit**

Fit the Display Unit in a convenient position in the crane cabin such that the operator can view the displays and reach the push buttons comfortably.

Standard back plate bracket and kit comprising of bolts and nuts are provided. Special bracket may need to be fabricated on site for suitable mounting in the cabin.

Care must also be taken to ensure that the mounting bracket for the display is earthed onto the chassis of the crane to ensure the display is protected against radio frequency interference.

**Drawing References:**

***DWG 0876 – “Dimensional Details, 14XX Display”***

***DWG 3069 – “General Arrangement Drawing, 1445 Standard System***

***DWG 3071 – “General Arrangement Drawing, 1455 Standard System***

***DWG 3073 – “General Arrangement Drawing, 1455 Typical Radio Load/ATB System”***

#### **4.3.2. Radio Receiver Unit (Optional Item)**

The optional Radio Receiver Unit can only be used with the Radio Transmitter Unit for wireless monitoring of load and/or ATB. The receiver unit can be fitted in a convenient position in the crane cabin with the 1445/1455 display unit. Ensure that the radio receiver cable is securely plugged to the 7-way socket at the back of the 1445/1455 display unit.

**Drawing Reference:**

***DWG 3073 – “General Arrangement Drawing, Typical Radio Load/ATB System”***

#### **4.3.3. Load Sensor/s**

The 1445/1455 System uses tension-based load sensing method which directly senses the line-pull generated to lift the load. Sensors can be dynamometers/tensiometers (line-riders) or tension plate type cells fitted into the dead-end of the hoist reeving. Load-pin type load-cells may also be used at the dead-end termination fitting.

### **STRUT BOOM OR LATTICE BOOM CRANES**

***Strut or Lattice boom cranes*** may use a Dynamometer (also referred to as Tensiometer), Tension Cell (or sometimes called Plate Cell), or a Load Pin (fitted to a Single-Sheave Dynamometer).

### **Dynamometer/Tensiometer Type**

This is a three-pulley arrangement load sensor with a beam type loadcell (model RW5000) mounted within. The tensiometer monitors the hoist rope line-pull as the hoist rope passes through the three sheaves. The tensiometer sheaves must be suited to the diameter of the hoist rope. The dynamometer type units are usually rigidly mounted on a suitable location on the boom tip section or fitted with articulating arm assembly at the boom butt section. The articulating arm assembly allows the unit to follow the natural position of the hoist rope relative to the boom itself.

Mounting the dynamometer using an articulating arm on lattice boom cranes requires two cross braces to be fitted to the boom top chords. One to be utilised as a 'take-off' point for the articulating arm and the other to secure timber to create a 'landing zone' for the tensiometer so as to not damage the boom chords or lacing during fast hoist rope working.

For cranes without fly-jibs, the dynamometers/tensiometers are usually rigidly mounted on the boom tip section. Fabricated brackets may be required to attach the tensiometer to the boom top and align it to the hoist rope.

For cranes with fly jibs, the fly-jib mast aux winch idler sheave necessitates using an articulating arm mounting to allow the tensiometer to follow the aux rope natural line over the mast idler sheave. Alternatively, the tensiometer may be mounted on the fly-jib tip section, or, off the boom butt section using an articulating arm if the aux and main winches are side by side.

The beam type loadcell inside the dynamometer outputs an electrical signal proportional to the hoist rope line-pull forces which the 1445/1455 unit then converts into hook-load weight. Correctly following the calibration procedures is essential for accurately determining the hook load weight

### **Drawing References:**

***DWG 1393 – “Overall Dimensions, HRT-3MM Micro-Mini Dynamometer”***

***DWG 0875 – “General Arrangement, HRT-3MM Dynamometer”***

***DWG 0422 (Sheets 1-2 of 2) – “General Arrangement, HRT-3 Dyno”***

***DWG 0104, 0786, 0787 – “Parts List for HRT-3 Dynamometer”***

***DWG 1795 – “Dimensional Detail, HRT-4 Dynamometer”***

***DWG 0796 – “General Arrangement, HRT-4 Dynamometer”***

***DWG 0799, 0340 – “Parts List for 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”***

### **Tension Cell Type**

A dead-end tension plate type load-cell with overload plate assembly may be fitted into the attachment of the hoist rope at the termination socket at the boom tip to sense the load-line line-pull. Any specially-prepared overload plate assembly or safety plates should provide for the existing rope wedge socket and pin to be re-used.

The safety-plate assembly may require modification to fit the rope fittings unless fitting knowledge was provided prior to system dispatch. The safety-plate assembly is fabricated from Bisalloy 80 plate and the pins are 4140-grade materials.

If safety-plate modifications are performed ensure they meet sound engineering practice and the end product provides the minimum required structural safety factors.

**Drawing References:**

**DWG 0990 – “Tension Plate Cell Dimensions”**

**DWG 2533 (Sheet 1 of 5) – “Assembly Details, 6t Overload Plate”**

**DWG 3092 (Sheets 1-2 of 2) – “Dimensional Detail, 10/15t Overload Plate”**

**DWG 1723 – “Dimensional Detail, 30t Overload Plate”**

**Load Pin Type**

The load pin is fitted to and is utilised for the axle shaft of a Single-Sheave Dynamometer. This type of dynamometer can either be supplied by Robway, or fabricated/supplied by the customer. For customer-supplied dynamometer, Robway will only supply the load pin to suit.

The Single-Sheave Dynamometer with integral Load Pin is usually rigid-mounted on a suitable location at the boom tip section.

**Drawing References:**

**DWG 1938 – “Dimensional Detail, RW1500 Load Pin”**

**DWG 0991 – “General Details, Single Sheave Dynamometer”**

**TELESCOPIC CRANES**

**Telescopic cranes** generally use a tensiometer/dynamometer mounted on top of the boom base section. For twin winch cranes, either a “double dynamometer” assembly or two separate dynamometers can be used to suit crane geometry and application.

The beam type loadcell (model RW5000) is mounted within the tensiometer and monitors the hoist rope line-pull as the hoist rope passes through the tensiometer unit. The tensiometer sheaves must be suited to the diameter of the hoist rope. These type tensiometer units are usually rigid mounted on a suitable location on top of the base boom section, or fitted with an articulating arm assembly which allows the tensiometer unit to follow the natural position of the hoist rope relative to the boom itself.

The beam type loadcell outputs an electrical signal proportional to the hoist rope line-pull forces which the 1445/1455 unit then converts into hook-load weight. Correctly following the calibration procedures is essential for accurately determining the hook load weight.

**Drawing References:**

**DWG 1393 – “Overall Dimensions, HRT-3MM Micro-Mini Dynamometer”**

**DWG 0875 – “General Arrangement, HRT-3MM Dynamometer”**

**DWG 0422 (Sheets 1-2 of 2) – “General Arrangement, HRT-3 Dyno”**

**DWG 0104, 0786, 0787 – “Parts List for HRT-3 Dynamometer”**

**DWG 0552 – “General Arrangement, HRT-3/2 Double Dyno (For use on Model 1455 Twin Winch only)”**

**DWG 0353 – “Parts List for HRT-3/2 Double Dynamometer”**

**DWG 0370 – “General Arrangement, Standard Articulated Arm for Dyno”**

**DWG 2468 – “Typical Installation of Dyno on Telescopic Crane”**

**4.3.4. Radio Transmitter Unit (Optional Item)**

The optional Radio Transmitter Unit (if supplied) can only be used with the Radio Receiver Unit for wireless monitoring of load and/or ATB. The transmitter unit can be mounted on a convenient location of the boom as close as possible to the load sensor and/or ATB switch. Standard mounting brackets are provided for use in mounting the transmitter unit. Ensure that the load sensor cable and/or ATB cable is/are securely

plugged to the radio transmitter and that the plastic (insulation) insert in the batteries inside the transmitter is removed after installation.

**Drawing References:**

***DWG 3073 – “General Arrangement Drawing, Typical Radio Load/ATB System”***

***DWG 2317 – “Radio Transmitter Installation on Telescopic Boom Crane”***

***DWG 2569 (Sheets 1-4 of 4) – “Transmitter Mounting Bracket Assembly Detail”***

***DWG 2682 – “Radio Transmitter Wiring Detail (Setup)”***

#### **4.3.5. Anti-Two-Block Sensor/s (Optional Items)**

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

Additional switches (for fly-jibs) can be added. Connection is via the bullet-type connectors from the cable. When more than one ATB switch is required (e.g. main & fly), connect the ATB cables of the switches in series via the bullet-type connectors.

Hang the bob weight assembly from the switch eye after cutting the chain to length if desired to suit winch line speed. Repeat the procedure if required for rooster or fly jib.

**Drawing Reference:**

***DWG 2934 – “Dimensional Detail, BB5 Anti-Two-Block Switch”***

#### **4.3.6. Cables**

The cables for the load cells are shielded instrumentation cables and are normally quite robust. They should be treated with care, however, as even a small amount of damage can be very costly due to down-time or intermittent behaviour. Always support the cable in such a way that there is no "excessive" strain applied, such as tension or flexing. The cable should be strapped to a fixed member that it runs along, unless it is held within a cable tray or trunking. The cable should be clipped at 600mm intervals. Avoid sharp bends such as around a sharp corner. Where there is to be flexing, the installer must ensure that the bending is reduced to an absolute minimum to avoid fatigue breakage of the conductors.

#### **4.3.7. Connectors**

It is recommended that the installer applies a suitable silicone grease (e.g., Dow Corning 4 “Electrical Insulating Compound”) on the plugs and sockets prior to connecting the cables. The silicone grease should be smeared across the connector contact points to increase the water proofing of the connector.

#### **4.3.8. Motion Cut Control Wiring**

The 1445/1455 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.

**Drawing Reference:**

***DWG 1011 – "Typical Motion Cut Control Wiring (1445 & 1455 Systems)"***



**Warning**

1. Permanent display damage may occur if incorrect motion-cut connections are made.
2. POWER MUST BE DISCONNECTED before attempting connections.
3. NEVER insert larger capacity fuses than those originally supplied.
4. Obtain specialist assistance if you are unfamiliar with crane electrics.

## 5. Calibration

After installing the 1445/1455 System modules, the unit must be calibrated to ensure accurate load measurement. The following sections explain how it is done.

*Before calibrating the 1445/1455, make sure that all system modules are correctly installed as described in section Installation Instructions and attached drawings.*

***Please note that only ROBWAY trained personnel should attempt any of the calibration procedures. Any misuse of the calibration functions can cause the 1445/1455 to operate incorrectly.***

Procedures in the following sections can only be used while in CALIBRATION MODE.

To enter CALIBRATION MODE you have to SWITCH OFF the 1445/1455 unit, then press and hold the CANCEL button WHILE SWITCHING ON the unit. You should release the CANCEL button after hearing the first beep from the unit.

If CALIBRATION MODE is successfully entered the 1445/1455 will show "F-00" on the display. If the message does not show, repeat procedure.

Once in calibration mode all procedures are activated via a FUNCTION CODE. Each FUNCTION CODE enables ONE procedure. A list of available FUNCTION CODES can be found at the rear of this manual.

***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 CODE 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 are expected to 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 1445/1455 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.

## 5.1. Correct Order of Procedures

When calibrating the 1445/1455 the installer should follow the following order of procedures.

### 1. Verify load sensor operation,

1445: Using F-01

1455: Using F-01, F-05

### 2. Configure settings/parameters,

1445: Using F-06 to F-08, F-10 to F-14

1455: Using F-10 to F-14, F-16 to F-22

### 3. Calibrate load on hook,

1445: Using F-03 to F-04

1455: Using F-03 to F-04, F-07 to F-08

### 4. Verify correct operations,

*This should include a thorough test of the accuracy of the load readout on normal operating mode and checking configuration data to make sure it suits the crane at hand.*

### 5. Apply load sample averaging if needed.

*This function may be used to improve stability of load readout (only if display readout seems erratic). Factory default setting is "0" and can be changed using the function codes below. The ideal sampling value differs from crane to crane and can be obtained by trial and error. On some cranes, for example, "8" or "10" is an ideal setting.*

1445: Using F-05

1455: Using F-09

## 5.2. Function Codes Described

This section describes the individual calibration functions in more detail.

### 5.2.1. Exit Calibration Mode (F-00)

This function is normally used after all desired calibration functions have been completed. Once selected the 1445/1455 exits calibration mode and re-enters normal operating mode.

Exiting calibration mode can also be achieved by pressing the CANCEL key while the F-xx prompt is shown in the display window.

### 5.2.2. View Uncalibrated Load Signal

**Model 1445: View Uncalibrated Load Signal (F-01)**

**Model 1455: View Uncalibrated Main Load Signal (F-01)  
View Uncalibrated Aux. Load Signal (F-05)**

Signal from any sensors are converted to a number in the range 0 - 1023 by the 1445/1455.

An open circuited sensor (*or extension lead*) is represented by a number in the range 1000 - 1023 and a short circuited sensor (*or extension lead*) is represented by a number in the range 0 - 32. Any other number is accepted as a valid signal.

These numbers can be used to verify proper sensor operation. The procedure is as follows:

1. Select the code for this function as normal, and lift up a light test load,
2. The number on the display should be in the range 33 - 300 as described above,
3. Lift up a heavier load and make sure that the number you recorded in step 2 above has increased by at least 50 or 100 counts (*the more the better*) and it is still less than 1000 (*as described above*),
4. If the number does not change you need to check that you are using the correct function code, that the leads or loadcells are not faulty (*you may have to use a loadcell simulator and a loadcell tester*) and the sensor is plugged into the correct input connector and, if the display is a Model 1455, that you have not mixed up main and auxiliary lead. Refer to Section 7.2., 7.3., or 7.4. for the applicable "General Arrangement" drawing for cable connection details.

### 5.2.3. View Calibrated Load

**Model 1445: View Calibrated Load (F-02)**

**Model 1455: View Calibrated Main Load (F-02)  
View Calibrated Aux. Load (F-06)**

This function is only useful when you want to look at the actual load without leaving calibration mode. Remember that calibration mode can only be entered by switching the 1445/1455 off and then on again. This may not always be desirable or practical. In such cases use this function to look at the actual winch linepull.

While this function is active you can disable the main load channel by pressing the ENTER key. This will instruct the computer to ignore input from the main load sensor. It will remain in this mode until the ENTER key is pressed again while in this function.

*When the load channel is disabled the OFF message will be shown as a reminder.*

Press the CANCEL key to exit this function.

#### **5.2.4. Calibrate Light Load**

**Model 1445: Calibrate Light Load (F-03)**

**Model 1455: Calibrate Light Main Load (F-03)  
Calibrate Light Aux. Load (F-07)**

*This is one of the most important functions. It will affect the accuracy of the load readings. To accurately calibrate the light load the weight of the empty hook block must be known, it being a part of the "load" on the crane. In many cases, calibrating the light load with just the weight of the empty hook block is sufficient. However, for cranes with a lighter weight hook block, the weight of the block may not be sufficient to make the load sensor work hard enough. For such cranes, we recommend lifting a known test weight of at least 10% of the maximum load for a given crane configuration. If a test weight is used, the total light load will be the combined weight of the empty block, test load, and other lifting gears/accessories if used.*

The correct procedure for calibrating the light load is as follows:

1. Lift up the light load safely (*refer to above paragraph for details on light load*),
2. Select the code for this function (*refer to above function codes*),
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 light load,
4. Press the ENTER key to lock in the new value for the light load. The 1445/1455 should then return to the F-xx prompt.

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

#### **5.2.5. Calibrate Heavy Load**

**Model 1445: Calibrate Heavy Load (F-04)**

**Model 1455: Calibrate Heavy Main Load (F-04)  
Calibrate Heavy Aux. Load (F-08)**

*This is one of the most important functions. It will affect the accuracy of the load readings. To accurately calibrate the heavy load a known test weight must be used. We recommend 75% of the maximum load for a given crane configuration. The total heavy load will be the combined weight of the empty block, test load, and other lifting gears/accessories if used.*

The correct procedure for calibrating the heavy load is as follows:

1. Lift up the heavy test load safely (*refer to above paragraph for details on heavy load*),
2. Select the code for this function (*refer to above function codes*),
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 heavy load,

4. Press the ENTER key to lock in the new value for the heavy load. The 1445/1455 should then return to the F-xx prompt.

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

#### **5.2.6. Number of Load Samples to Average (1445: F-05 / 1455: F-09)**

This function allows you to stabilise the displayed load readout in the event the numbers are changing erratically. It is mainly used for display filtering purposes. Default value from factory is "0".

#### **5.2.7. Select Radio Family Address (1445: F-06 / 1455: F-10)**

This function is for the *optional case where a Radio Receiver unit is attached* to the display allowing the retrieval of data from remote Radio ATB/Load transmitter units.

The "Radio Family Address" (or RFA) will default to '0' if calibration data is lost or cleared for any reason. The installer should obtain the Radio Family Address from the Radio Receiver unit hardware. The RFA will be clearly marked as a number between 0 and 4095. Once obtained from the hardware, the number can be entered into this function code to enable the 1445/1455 to use Radio Load or ATB transmitter units.

#### **5.2.8. Use Radio Load**

***Model 1445: Use Radio Load "On/Off" (F-07)***

***Model 1455: Use Radio Load on Main "On/Off" (F-11)  
Use Radio Load on Aux. "On/Off" (F-12)***

This function is for the *optional case where a Radio Receiver unit is attached* to the display allowing the retrieval of data from remote Radio ATB/Load transmitter units.

When this function is set to ON, the Main load input on the 1445/1455 is disabled, and the Main load is obtained instead from a Radio Transmitter (marked "Main" or equivalent) that communicates with the Radio Receiver unit.

When set to OFF, the Main load input reverts to the normal input on the 1445/1455.

#### **5.2.9. Use Radio ATB**

***Model 1445: Use Radio ATB "On/Off" (F-08)***

***Model 1455: Use Radio ATB on Main "On/Off" (F-13)  
Use Radio ATB on Aux. "On/Off" (F-14)***

This function is for the *optional case where a Radio Receiver unit is attached* to the display allowing the retrieval of data from remote Radio ATB/Load transmitter units.

When this function is set to ON, the ATB switch input for the Main winch is obtained from a Radio Transmitter (marked "Main" or equivalent) that communicates with the Radio Receiver unit.

When set to OFF, the Main ATB switch is expected to be wired into the normal 1445/1455 ATB input.

*Note:* The normal 1445/1455 ATB input is never disabled, that is, it continues to cause an ATB alarm even if both Main and Aux. Radio-ATB inputs are enabled. In cases where it is not required, the ATB input (bullet connectors) on the 1445/1455 display should be shorted together.

#### **5.2.10. Clear All Calibration Data (1445: 09 / 1455: F-15)**

***This function must be used with extreme caution!!!***

*It erases all calibration data currently stored in the unit and a complete re-calibration must be performed before the unit can be used again.*

*It should only be used in special cases where the calibration data needs to be reset to a known state.*

#### **5.2.11. Percentage Limit for Intermittent Red Light and Audible Alarm (1445: F-10 / 1455: F-16)**

This function is used in applications where a limit is placed on the maximum load which can be lifted (*or can be a limit on the linepull, etc*). This function sets up a percentage at which an intermittent audible alarm and a flashing RED warning light are activated.

The factory default setting is 85% which can be changed to suit specific application if required.

To change this percentage to a different value, follow the procedure below:

1. Select the correct code for this function,
2. Use the UP/DOWN arrow keys to ramp to the desired percentage value,
3. Press the ENTER key to lock in the new percentage value.

You may press the CANCEL key to abort this procedure any time *before pressing the ENTER key*.

#### **5.2.12. Percentage Limit for Continuous Red Light and Audible Alarm (1445: F-11 / 1455: F-17)**

This function is used in applications where a limit is placed on the maximum load which can be lifted. This function sets up a percentage at which continuous RED warning light and continuous audible alarm are activated. The factory default setting is 100% which can be changed to suit specific application if required.

Refer to previous Section 5.2.11. for procedure in changing this % value

### **5.2.13. Percentage Limit for Motion Cut (1445: F-12 / 1455: F-18)**

This function is used in applications where a limit is placed on the maximum load which can be lifted. This function sets up a percentage at which the motion cut relay and continuous audible alarm are activated. The factory default setting is 110% which can be changed to suit specific application if required.

*Refer to previous Section 5.2.11. for procedure in changing this % value.*

### **5.2.14. Maximum Line Pull**

***Model 1445: Maximum Linepull (F-13)***

***Model 1455: Maximum Linepull for Main Winch (F-19)  
Maximum Linepull for Aux. Winch (F-21)***

This function is used in applications where a limit is placed on the maximum linepull allowed. This limit is normally obtained from load charts or customers. If it is not available from these sources ROBWAY sets this limit to one suitable for the load sensor used and the installer must check on site to insure that the limit supplied by ROBWAY is correct for the application or must change it if it is not suitable for the given application.

*Refer to previous Section 5.2.11. for procedure in changing this value.*

### **5.2.15. Maximum Falls Selectable**

***Model 1445: Maximum Falls Selectable (F-14)***

***Model 1455: Maximum Falls Selectable For Main Winch (F-20)  
Maximum Falls Selectable For Aux. Winch (F-22)***

This function allows you to change the maximum falls (*parts of line*) which the operator can select. This is based on the maximum number of falls the crane can be configured to as per the load charts.

Please note that this setting is different from the “falls” selection function on the operator display panel. The “falls” function on the display panel allows the operator (during normal operation) to set the actual number of falls the crane is configured to. The maximum number of falls that can be set is dependent on and limited by the maximum falls selectable “value” set in the function code/s above.

*Refer to previous Section 5.2.11. for procedure in changing this value.*



## 6. Troubleshooting

### 6.1. *Check the Obvious.*

- Make sure all of the connectors are tight.
- Is the motion cut output connected to an external relay?
- Check terminals/wiring/etc. are connected to existing power.
- Before any connection is made to an existing installation check for power on those connections.

### 6.2. *Do not modify the Calibration.*

- It is rare for calibration data to be corrupted.
- When a re-calibration has been attempted in order to rectify a problem before that problem has been correctly identified, it leads to added confusion as the perspective is moved from the real fault to "calibration problems".
- If the system had previously been operating correctly and suddenly developed a fault, the culprit is likely to be something external to the display rather than the calibration.
- If all of the external inputs appear to be operating correctly but the readouts do not show the correct values, then view all of the calibration data and record it.
- If in doubt, send a copy of this data to Robway Safety Systems, so that it can be analysed.
- If this is not possible, re-calibration may be attempted.
- Re-calibration must only be performed when all physical inputs have been verified for correct operation.
- If a re-calibration has been performed, record the new data. The new calibration data must always be recorded and a copy sent to Robway so that records reflect the current status of the display. This will ensure correct information is passed onto the next person needing to attend the site.

### 6.3. *Know what information you need to gather.*

- Check that the display is correctly configured for the crane environment.
- Are all of the sensors connected? The display will check them continuously and issue an error if that sensor cannot be detected.

### 6.4. *Identify the symptom.*

- Identify the end problem.
- Work backwards identifying what is causing the 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.
- Check the "raw counts" for each input. Refer to the system configuration sheets (Section 7.7. Appendices – System Configuration Sheets & Function Codes) for details on how to access the raw counts.
- The raw count shows what the actual inputs are doing (i.e., like a signal strength indication). These raw counts are then manipulated in software according to the calibration data stored in the display to produce the readouts on the front panel. If the calibration has been done incorrectly, or the configuration is incorrect, or something else is wrong, then the front panel readouts e.g. LOAD value may provide you with misleading information.
- Cycle the sensor through a range, for example lift a load and check that the raw counts vary from a low value (around 200) to a high value, around 800.

- For correct operation, these raw counts must be in the range 33 to 999 for each sensor used. Anything outside of this range will produce an error.

### **6.5. Perform test with a Robway simulator, if available.**

- A Robway simulator is a very quick way to verify if the fault is external to the display.
- It allows the input voltage to be easily varied without the need to physically move the crane or lift weights.
- If extension cables are used, try connecting the simulator both directly to the display and via the cable. If the results are not identical, suspect the cable as being faulty.

### **6.6. Consult the Manual and System Configuration Sheets.**

- As most systems are highly customised, it may be necessary to consult the manual to identify peculiarities or variables, specific to that system.

### **6.7. Error Codes and Displayed Messages.**

The following Error Codes cover both old and new versions of software. The old version error codes have four digits, while the new version codes have the letter "E" followed by three digits.

#### **6.7.1. Error code 0010 (or E201)**

This is indicating that the signal from the main load sensor is too low. This should be confirmed by viewing the Amp 1 raw counts and noting that the "r" value is lower than 33.

##### **Possible causes:**

- Load cell signal wires shorted together.
- The signal + is shorted to the shield.
- The excitation - is shorted to the shield.
- 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 raw counts will generally be non-zero, but below 33.

#### **6.7.2. Error code 0020 (or E201)**

This is indicating that the signal from the main load sensor is too high. This should be confirmed by viewing the Amp 1 raw counts and noting that the "r" value is higher than 999.

##### **Possible causes:**

- 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.

#### **6.7.3. Error code 0040 (or E202) – Model 1455 Only**

This is indicating that the signal from the auxiliary load sensor is too low. This should be confirmed by viewing the Amp 2 raw counts and noting that the "r" value is less than 33.

**Possible causes:**

- Load cell signal wires shorted together.
- The signal + is shorted to the shield.
- The excitation - is shorted to the shield.
- 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 raw counts will generally be non-zero, but below 33.

**6.7.4. Error code 0080 (or E202) – Model 1455 Only**

This is indicating that the signal from the auxiliary load sensor is too high. This should be confirmed by viewing the Amp 2 raw counts and noting that the "r" value is higher than 999.

**Possible causes:**

- 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.

**6.7.6. Error code 0400 (or 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 0400 (or 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.

**6.7.7. Error code 0800 (or 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.

**6.7.8. Multiple error codes on display (loss of calibration data)**

Loss of calibration data can be determined when the system gets into fault during start-up, displaying multiple error codes. When the override (bypass) key is turned ON, the LOAD function on the screen will display high values (i.e., it will show the default factory setting values or uncalibrated data values).

This indicates a fault on the Dallas Chip (memory chip). Replace the Dallas Chip and recalibrate the system (or restore the calibration data if previously recorded). The Dallas Chip is available at Robway.

## **6.8. Problems that Do Not Produce Error Codes/Messages.**

### **6.8.1. The load does not vary when weight is lifted (Model 1455 Only).**

- Determine the winch being used.
- If it is the main winch, then check the "AMP 1 or TRANS 1" raw counts while lifting a weight and check variation.
- If it is not moving, then check the "AMP 2 or TRANS 2" raw counts.
- 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;
  - There may be an open circuit in one or both of the load cell excitation wires,
  - One or more fuses may be blown in the amplifier. Check the excitation voltages,
  - 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.

### **6.8.2. When a certain load is lifted an Error code 0010/0040 (or E201/E202) appears.**

- View the raw counts in "AMP 1 or TRANS 1" and "AMP 2 or TRANS 2" (Note: only the 1455 model has AMP 2 or TRANS 2) 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. Alternatively if a load pin or a beam cell is used, it may have been installed upside-down.

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

- Check the raw counts for that channel.
- If the counts 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 there was an error in a load channel while calibrating). That is a heavy load was not lifted.
- In this situation, the calibration data is representing both the low load value and the high load value simultaneously.
- Recalibration is required. This can also occur if only part of the calibration procedure has been completed.

### **6.8.4. On start-up the displays are erratic, but settle during the day.**

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

**6.8.5. The display does not start.**

- Check the power supply. The recommended range for the systems is 10VDC to 40VDC.

**6.8.6. 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.



## **7. Appendices**

- 7.1. *Radio Load/ATB Manual Addendum***
- 7.2. *General Arrangement Drawing (1445 Std. Single Winch)***
- 7.3. *General Arrangement Drawing (1455 Std. Twin Winch)***
- 7.4. *General Arrangement Drawing (1455 Radio System)***
- 7.5. *Drawings (Sensors and Parts)***
- 7.6. *Motion Cut Connection***
- 7.7. *System Configuration Sheets & Function Codes  
(1445 & 1455 Systems)***



**Appendix 7.1**

**Radio Load/ATB Manual Addendum**

**(Section Deleted)**

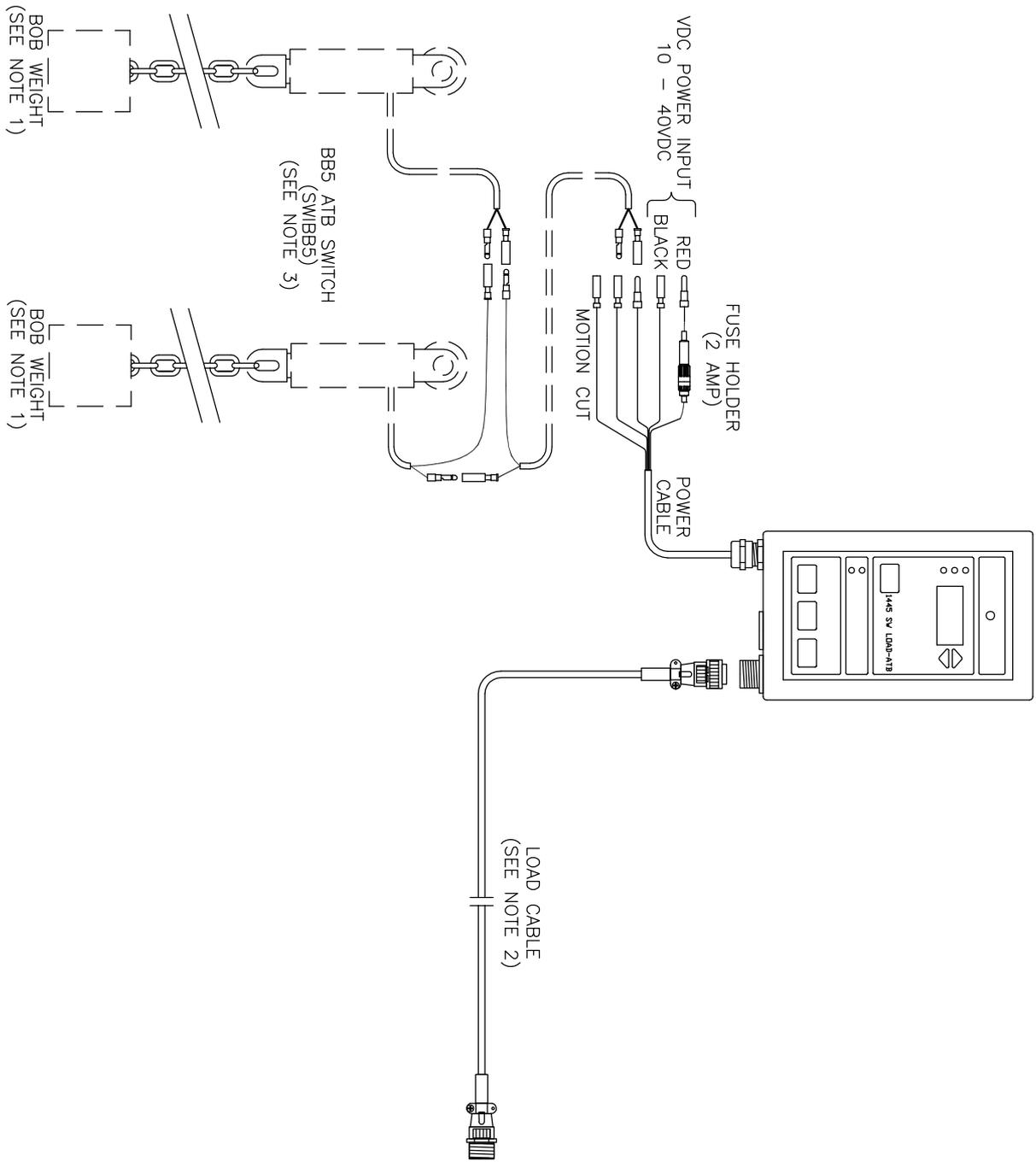


## **Appendix 7.2.**

### **General Arrangement Drawing (1445 Standard Single Winch System)**

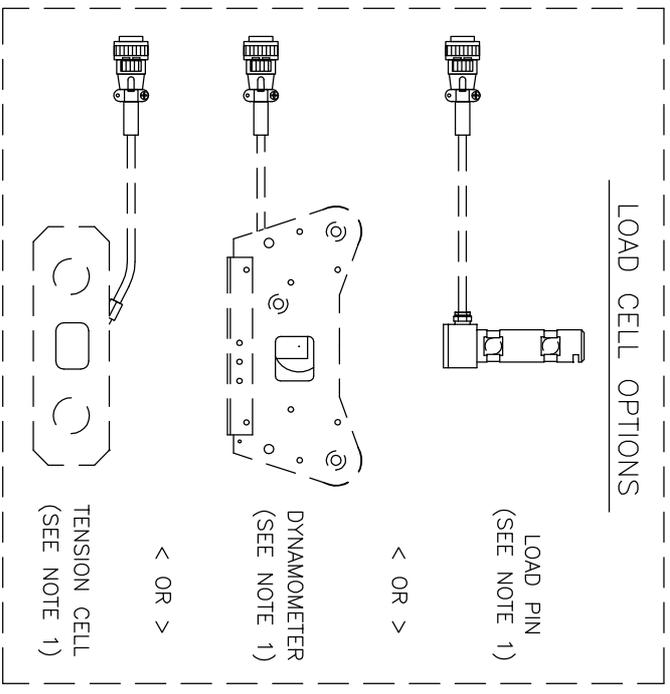


1445 DISPLAY  
(DIS1445CAS)



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

- 1) LOAD PINS, DYNAMOMETERS OR TENSION CELLS CAN BE USED DEPENDING ON THE APPLICATION REQUIRED.
- 2) LOAD CABLES CAN VARY IN LENGTH DEPENDING ON THE APPLICATION.
- 3) MORE THAN ONE ATB SWITCH CAN BE USED TO SUIT THE NUMBER OF HOIST WINCHES. IN THIS CASE, THE ATB SWITCHES MUST BE WIRED IN SERIES.



REV	DATE	DESCRIPTION OF CHANGE	APPR'D	DRAWN		APPROVED		PART OF ASSY		PART No:		PROJECT:	
1.1	24/02/05	ADD AUX ATB SWITCH	A.C.	S. CHAMBERS		A. CANLAS		-		TITLE:		DIS-1445 GENERAL ARRANGEMENT	
				09/06/04		09/06/04				FOR TYPICAL SINGLE WINCH SYSTEM		SCALE	
										DRAWING No:		DWG 3069	
										FILE No:		306901AB.DWG	
										SHEET		N/A	
										1 OF 1		REV	
										1.1		REV	
										1.1		REV	

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

DO NOT SCALE DRAWING  
UNLESS OTHERWISE STATED



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

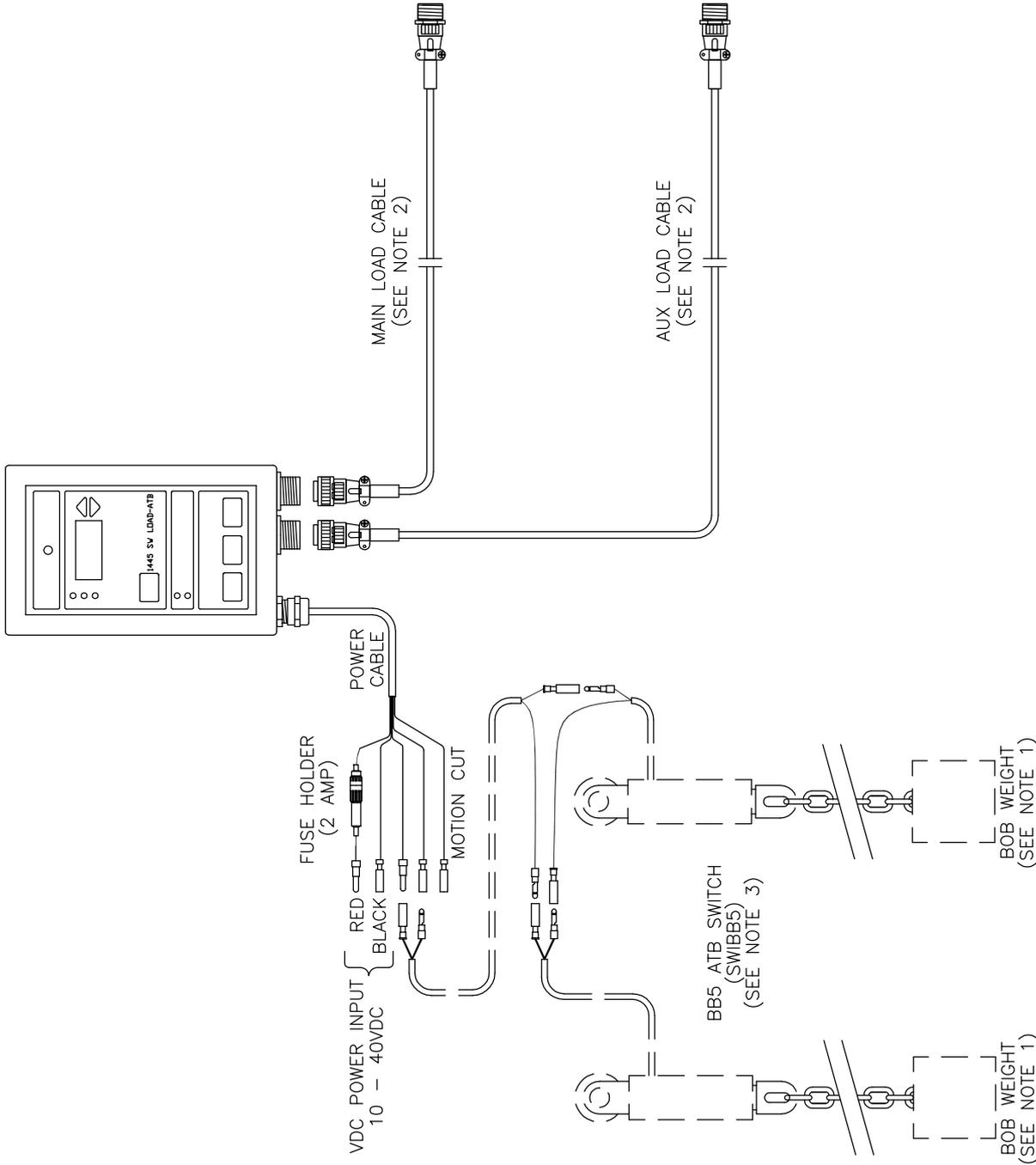


## **Appendix 7.3.**

### **General Arrangement Drawing (1455 Standard Twin Winch System)**



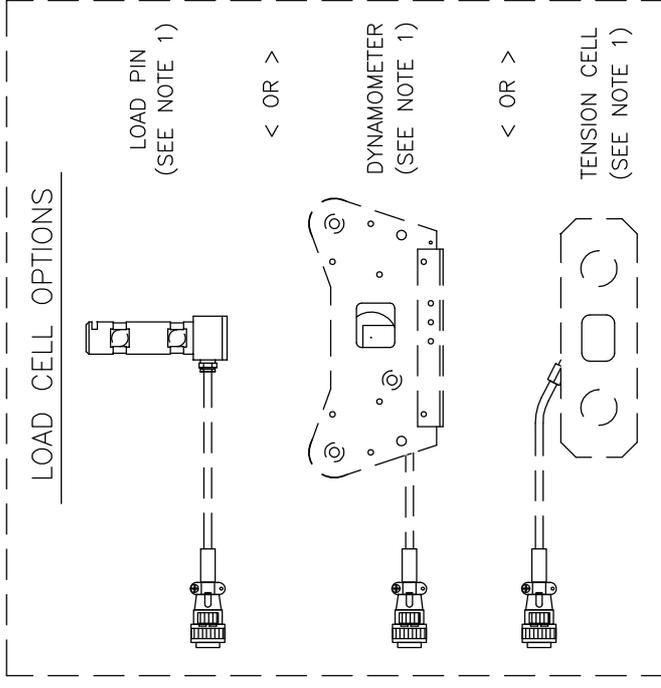
1455 DISPLAY  
(DIS1455CTWA)



SYSTEM NOTES:

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

- 1) LOAD PINS, DYNAMOMETERS OR TENSION CELLS CAN BE USED DEPENDING ON THE APPLICATION REQUIRED.
- 2) LOAD CABLES CAN VARY IN LENGTH DEPENDING ON THE APPLICATION.
- 3) MORE THAN ONE ATB SWITCH CAN BE USED TO SUIT THE NUMBER OF HOIST WINCHES. IN THIS CASE, THE ATB SWITCHES MUST BE WIRED IN SERIES.



REV	DATE	DESCRIPTION OF CHANGE	APPR'D	DRAWN	APPROVED	PART OF ASSY	PART No:	PROJECT:
1.1	24/02/05	ADD AUX ATB SWITCH	A.C.	S. CHAMBERS 10/06/04	A. CANLAS 10/06/04	—	DIS-1455 GENERAL ARRANGEMENT FOR TYPICAL TWIN WINCH SYSTEM	SCALE N/A
				<p>LSI-ROBWAY 32 WEST THEBARTON RD THEBARTON 5031 SOUTH AUSTRALIA PHONE +61 8 8352 6055 FAX +61 8 8352 1684</p> <p>A Division of Load Systems International</p>				SHEET 1 OF 1
								DRAWING No:
					DWG 3071	307101AB.DWG	1.1	

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

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



**Appendix 7.4**

**General Arrangement Drawing  
(1455 Radio System)**

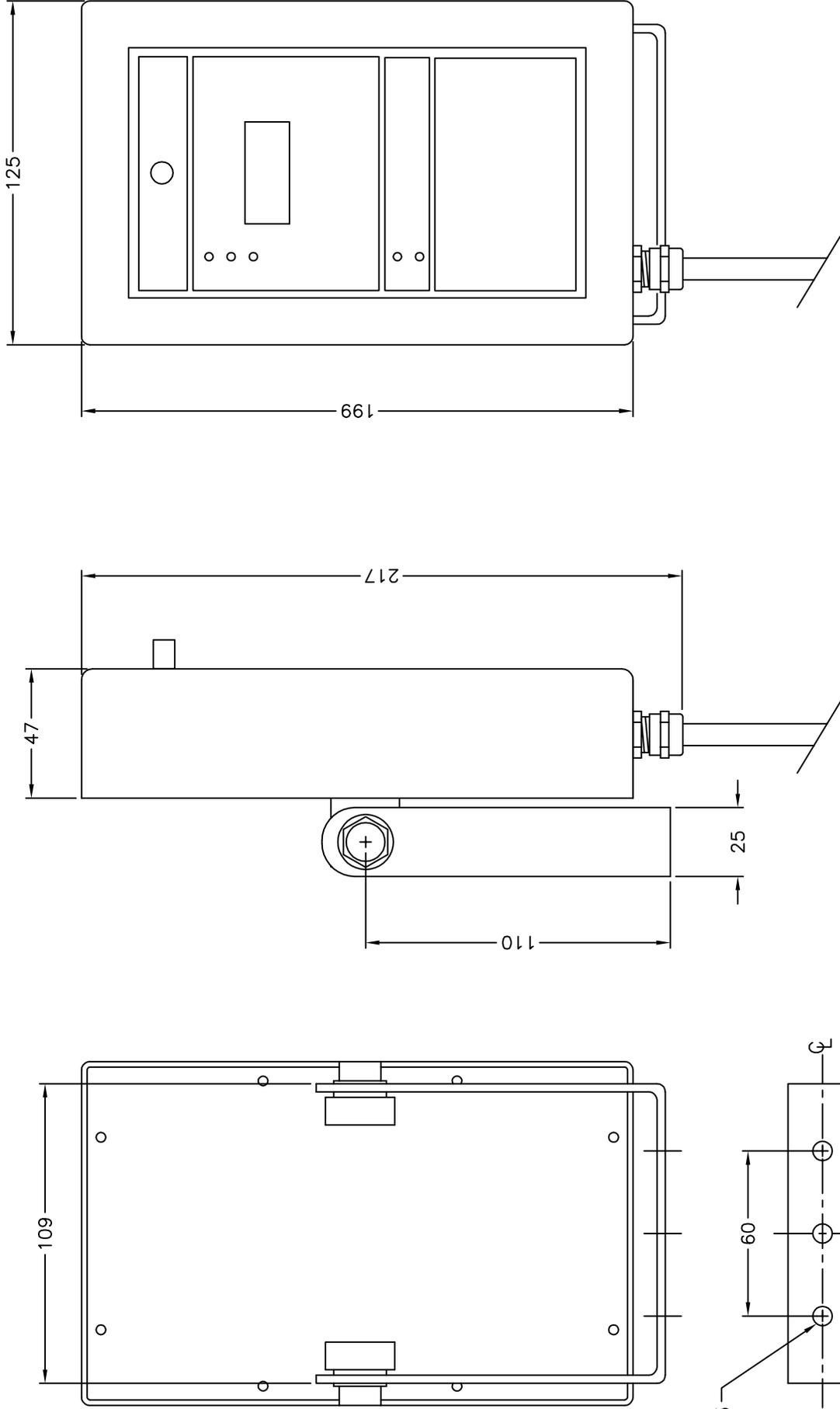
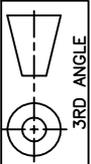
**(Section Deleted)**



**Appendix 7.5.**

**Drawings**  
**(Sensors and Parts)**





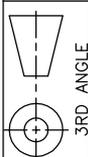
BOTTOM VIEW OF BRACKET

NOTE: ALL DIMENSIONS IN MILLIMETERS AND FOR REFERENCE ONLY

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1.1	19/10/00	REFER TO DR#677	D.P.	X: +/- 1 X.X: +/- 0.2 X.XX: AS STATED	M. TURNER 09/11/95	M. OBST 09/11/95	—	—	14XX DISPLAY	N/A
				DO NOT SCALE DRAWING ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED						SHEET 1 OF 1
										REV 1.1
										TITLE: DIMENSIONAL DETAILS
										DRAWING No: DWG 0876
										FILE No: 087601AB.DWG

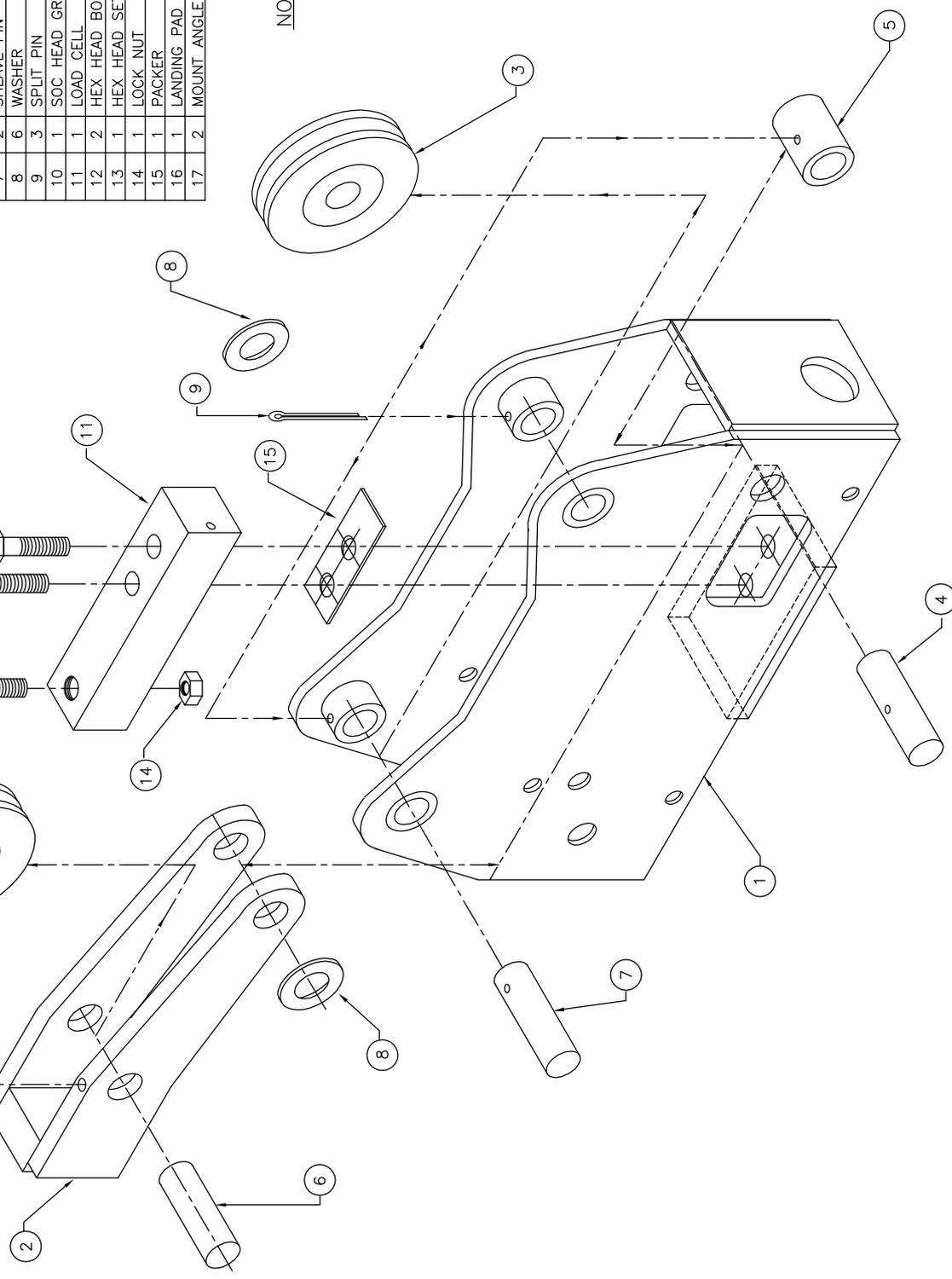
**LSI ROBWAY**  
 A Division of Load Systems International  
 LSI-ROBWAY  
 32 WEST THEBARTON RD  
 THEBARTON 5031  
 SOUTH AUSTRALIA  
 PHONE +61 8 8352 6055  
 FAX +61 8 8352 1684



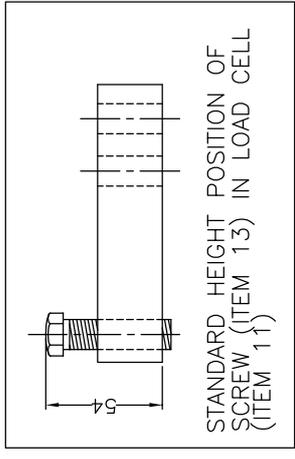


3RD ANGLE

NOTE: APPLY LOCTITE 243 TO THREAD OF GRUB SCREW.



NOTE: ITEMS 16 & 17 ARE NOT SHOWN ON DRAWING

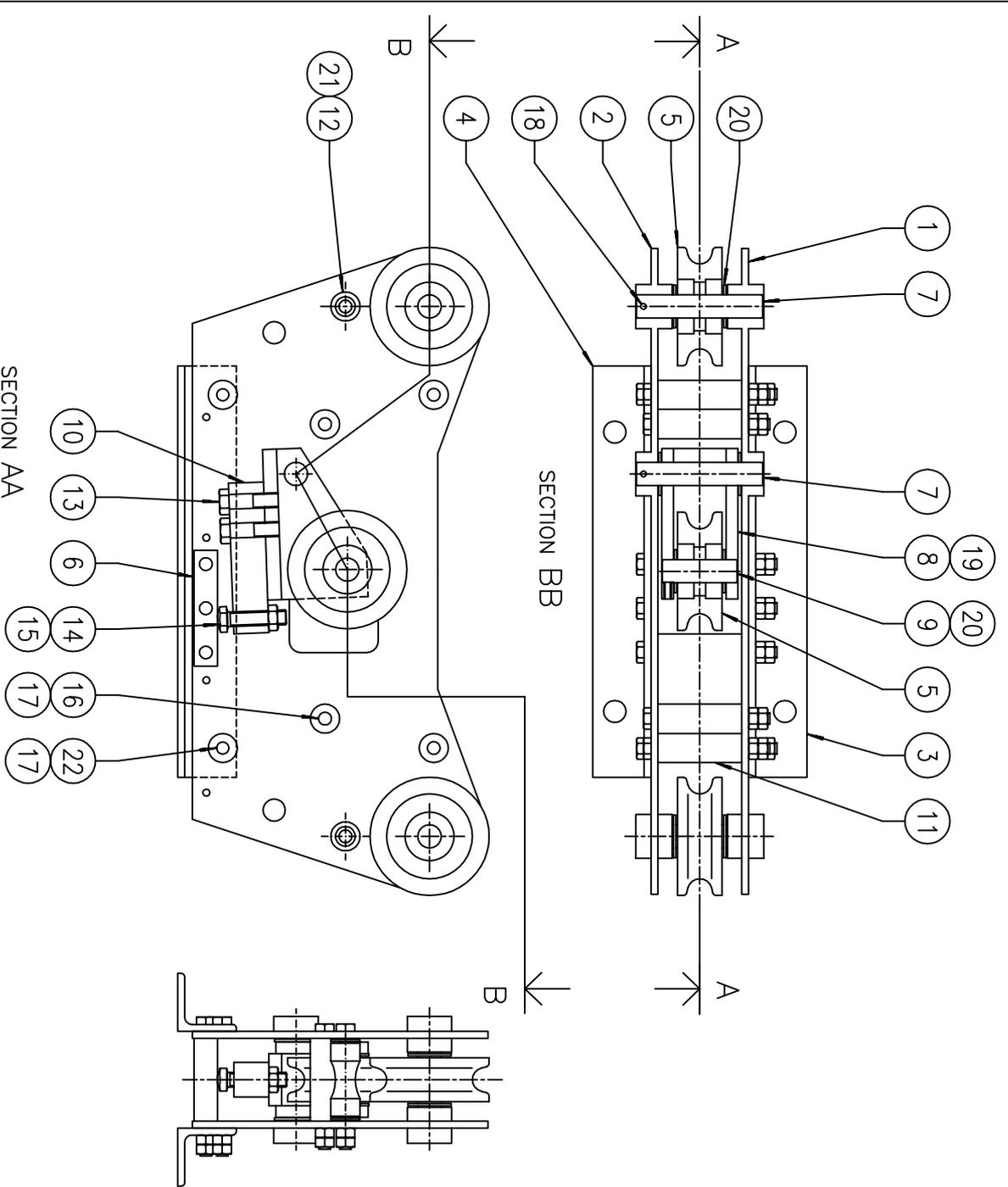


STANDARD HEIGHT POSITION OF SCREW (ITEM 13) IN LOAD CELL (ITEM 11)

STANDARD - DYNHRT3MM  
MARINE S/S - DYNHRT3MMSS

ITEM	QTY	MATERIAL/DESCRIPTION	DWG No.	STOCK CODE (STANDARD)	STOCK CODE (MARINE S/S)
1	1	MOUNTING FRAME	DWG0885	FRADYN01	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	---	PINCOIT03	---
10	1	SOC HEAD GRUB SCREW M6X20	---	SCRM620SG	---
11	1	LOAD CELL	---	CELBTD5P	---
12	2	HEX HEAD BOLT	---	BOL1213HHZP	---
13	1	HEX HEAD SET SCREW	DWG0287	SCR122CZP	---
14	1	LOCK NUT	---	NUT12HLZP	---
15	1	PACKER	DWG0884	PAGHRT01	---
16	1	LANDING PAD	DWG0887	PADHRT01	---
17	2	MOUNT ANGLE BRACKET	DWG0886	BRAMHRT3MMU	BRAMHRT3MMSS

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



ITEM	QTY	MATERIAL/DESCRIPTION	DWG No.	STOCK CODE (STANDARD)	STOCK CODE (MARINE S/S)
1	1	SIDE PLATE-RIGHT	DWG0203	PLAHR10	PLAHR10SS
2	1	SIDE PLATE-LEFT	DWG0203	PLAHR13	PLAHR13SS
3	1	MOUNT ANGLE BRACKET RIGHT HAND	DWG0299	BRARHT04	BRARHT04SS
4	-	MOUNT ANGLE BRACKET LEFT HAND	DWG0299	BRARHT03	BRARHT03SS
5	3	SHEAVE ASSY #14 CABLE	DWG0345	SHEH32014	-
	3	OR #16 CABLE	DWG0345	SHEH32016	-
	3	OR #20 CABLE	DWG0345	SHEH32020	-
	3	OR #26 CABLE	DWG0345	SHEH32026	-
	3	OR #29 CABLE	DWG0345	SHEH32029	-
6	1	LOAD PLATE	DWG0302	PLAHR08	PLAHR08SS
7	3	SHAFT-SHEAVE	DWG0225	SHAHR12	-
8	1	ROCKER BOX	DWG0346	ROC3MAR	ROC3MARRSS
9	1	SHAFT-SHEAVE-ROCKER BOX	DWG0289	SHAHR11	-
10	1	LOAD CELL ASSY-5K-WITH PLUG	-	CELRD5P	-
11	1	SPACERS	-	CELRTD5	-
12	2	KEEPER-CABLE	DWG0301	SPAHR06	SPAHR06SS
13	2	BOLT-CELL MOUNTING 1/2"x1 3/4" SS	DWG0300	KEHRHT02	KEHRHT02SS
14	1	LOADING BOLT 1/2"x2" SS	DWG0287	SCR122CZP	-
15	1	LOCK NUT 1/2" UNF SS	-	NUT12HLSS	-
16	6	M10X100 HEX HEAD BOLT	-	BOLM1010DHG	BOLM1010DHSS
17	22	M10 HALF SIZE LOCK NUT	-	NUTM10HLG	NUTM10HSS
18	3	SPLIT PIN #4X50 SS	-	PINCOIT03	-
19	1	SOC GRUB SCREW M6X12 CUP PT	-	SCR0612SG	-
20	8	M20 FLAT WASHER	-	WASM20FZP	WASM20FSS
21	26	M10 FLAT WASHER	-	WASM10FZP	WASM10FSS
22	5	M10X120 HEX HEAD BOLT	-	BOLM10120HG	BOLM10120HSS

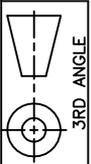
DYNHRT3 - STANDARD (NO SHEAVES)  
 DYNHRT3 - STANDARD (INCLUDING SHEAVES)  
 DYNHRT3SS - STAINLESS STEEL MARINE (NO SHEAVES)

REV	DATE	DESCRIPTION OF CHANGE	APPR'D	TOL:	DRAWN	APPROVED	PART OF ASSY	PART No:	PROJECT:	SCALE
1.0	14/09/95	ISSUED FOR MANUFACTURE		X	F. LOCKER	M. OBST	-	AS ABOVE	HRT-3 DYN0	N/A
1.1	04/01/96	ITEMS 3&4 CHANGED AS PER DR#124		XX				GENERAL ARRANGEMENT		SHEET
1.2	27/08/97	REFER TO DR#318		X:XX						1 OF 2
1.3	29/03/99	REFER TO DR#561								REV
1.4	27/01/05	REFER TO DR#345						DWG 0422	FILE No: 042201AE.DWG	1.4

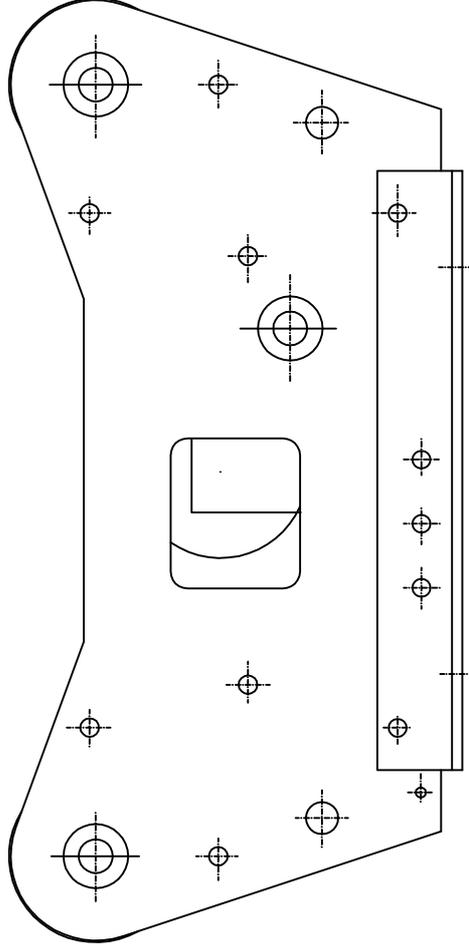
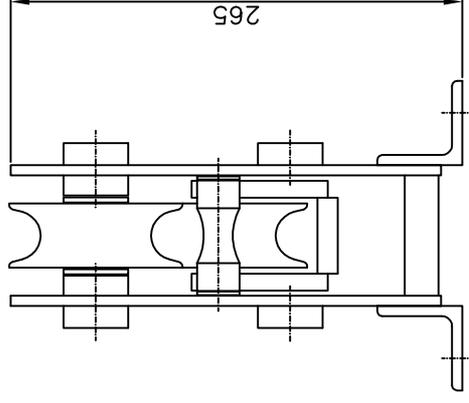
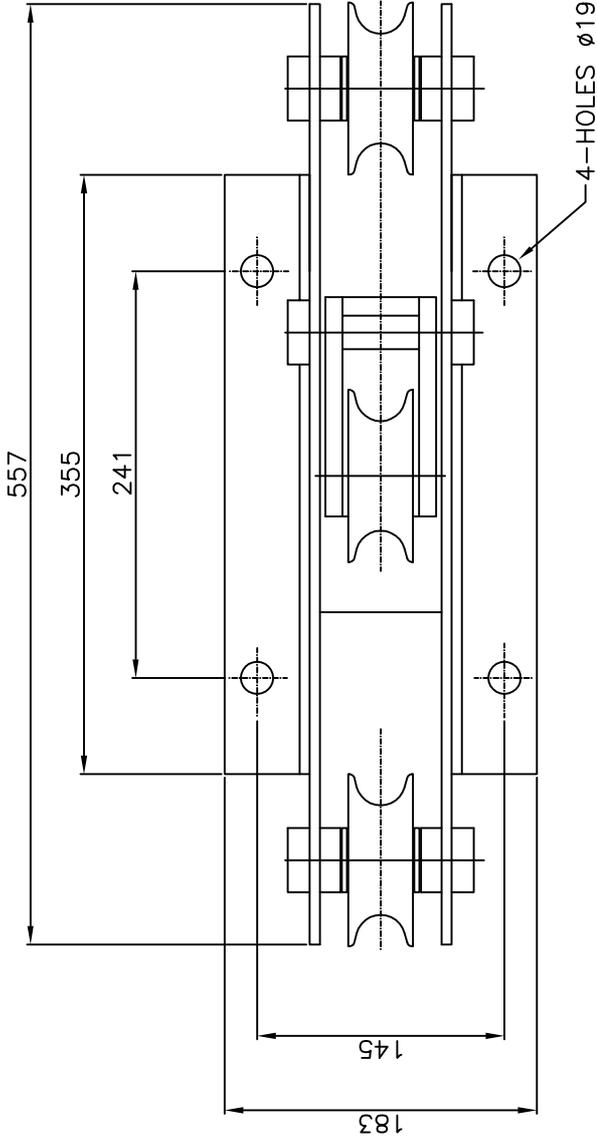
TO: X +/- 1  
 XX +/- 0.2  
 X:XX AS STATED  
 DO NOT SCALE DRAWING  
 UNLESS OTHERWISE STATED

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 SOUTH AUSTRALIA  
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LSI  
 ROBWAY  
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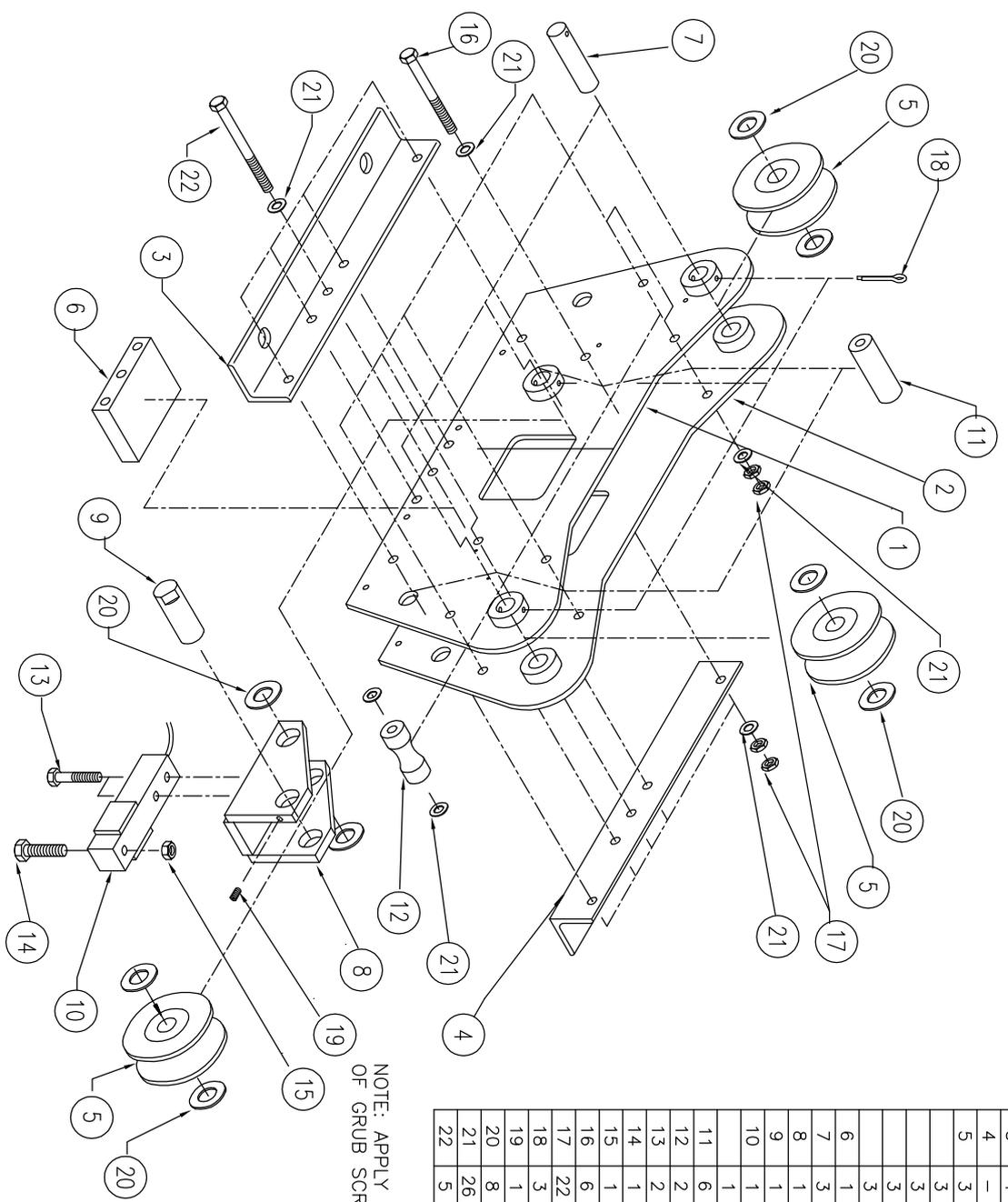
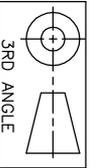


3RD ANGLE



REV	DATE	DESCRIPTION OF CHANGE	APPR'D	TOL:	X	+/- 1	+	-	0.2	AS STATED	DRAWN	APPROVED	PART OF ASSY	PART No:	PROJECT:	SCALE	SHEET	REV
1.0	14/09/95	ISSUED FOR MANUFACTURE			F. LOCKER	M. OBST					14/09/95	14/09/95	AS ABOVE	HRT-3 DYNO	N/A	2 OF 2	1.4	
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.															
													TITLE: GENERAL ARRANGEMENT		DRAWING No: DWG_0422		FILE No: 042201AE.DWG	
													LSI-ROBWAY 32 WEST THEBARTON RD THEBARTON 5031 SOUTH AUSTRALIA PHONE +61 8 8352 6055 FAX +61 8 8352 1684					





ITEM	QTY	MATERIAL/DESCRIPTION	DWG No.	STOCK CODE (STANDARD)	STOCK CODE (MARINE S/S)
1	1	SIDE PLATE-RIGHT	DWG0203	PLAHR10	PLAHR10SS
2	1	SIDE PLATE-LEFT	DWG0203	PLAHR13	PLAHR13SS
3	1	MOUNT ANGLE BRACKET RIGHT HAND	DWG0299	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	PLAHR108	PLAHR108SS
7	3	SHAFT-SHEAVE	DWG0225	SHAHR12	-
8	1	ROCKER BOX	DWG0346	ROC3MAR	ROC3MARSS
9	1	SHAFT-SHEAVE-ROCKER BOX	DWG0289	SHAHR11	-
10	1	LOAD CELL ASSY-5K-WITH PLUG	-	CELBTD5P	-
	1	LOAD CELL ASSY-5K-NO PLUG	-	CELBTD5	-
11	6	SPACERS	DWG0301	SPAHR106	SPAHR106SS
12	2	KEEPER-CABLE	DWG0300	KEEHR102	KEEHR102SS
13	2	BOLT-CELL MOUNTING 1/2"x1 3/4" SS	-	BOL1213HSS	-
14	1	LOADING BOLT 1/2"x2" SS	DWG0287	SCR122CZP	-
15	1	LOCK NUT 1/2" UNF SS	-	NU112HSS	-
16	6	M10X100 HEX HEAD BOLT	-	BOLM10100HG	BOLM10100HSS
17	2	M10 HALF SIZE LOCK NUT	-	NU1M10HLG	NU1M10HSS
18	3	SPLIT PIN Ø4X50 SS	-	PINCO1103	-
19	1	SOC GRUB SCREW M6X12 CUP PT	-	SCRM612SG	-
20	8	M20 FLAT WASHER	-	WASM20FZP	WASM20FSS
21	26	M10 FLAT WASHER	-	WASM10FZP	WASM10FSS
22	5	M10X120 HEX HEAD BOLT	-	BOLM10120HG	BOLM10120HSS

NOTE: APPLY LOCTITE 243 TO THREAD OF GRUB SCREW.

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

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

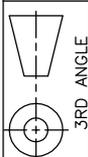
DO NOT SCALE DRAWING  
 UNLESS OTHERWISE STATED

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

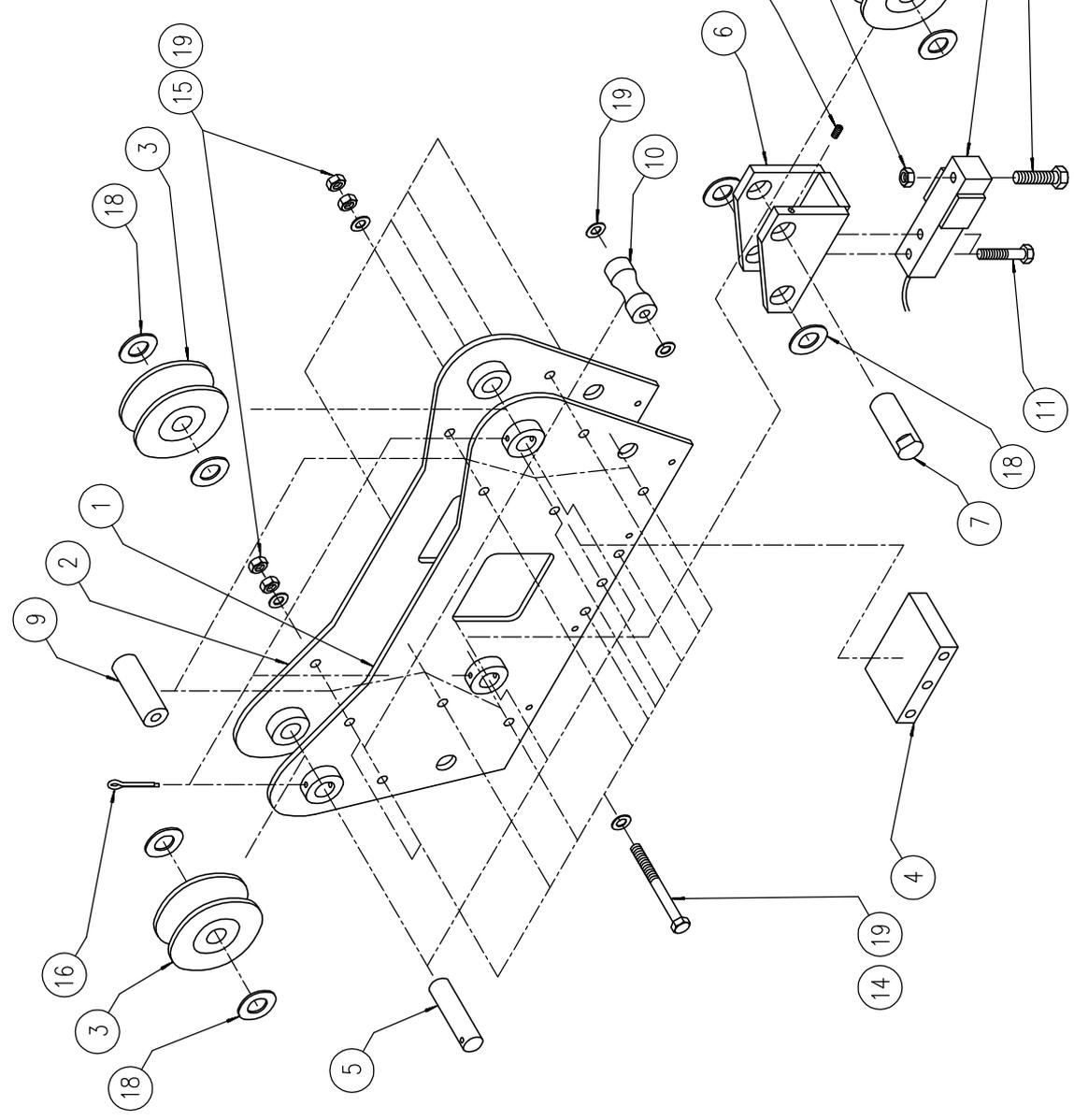
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 THEBARTON 5031  
 SOUTH AUSTRALIA  
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TITLE:	PART No.:	PROJECT:	SCALE
EXPLODED VIEW AND PARTS LIST FOR HRT-3 DYNO (VERTICAL MOUNT)	AS ABOVE	HRT-3 DYNO	N/A
DRAWING No.:	DWG 0104	FILE No.:	010401AG.DWG
REV	1.6	SHEET	1 OF 1

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



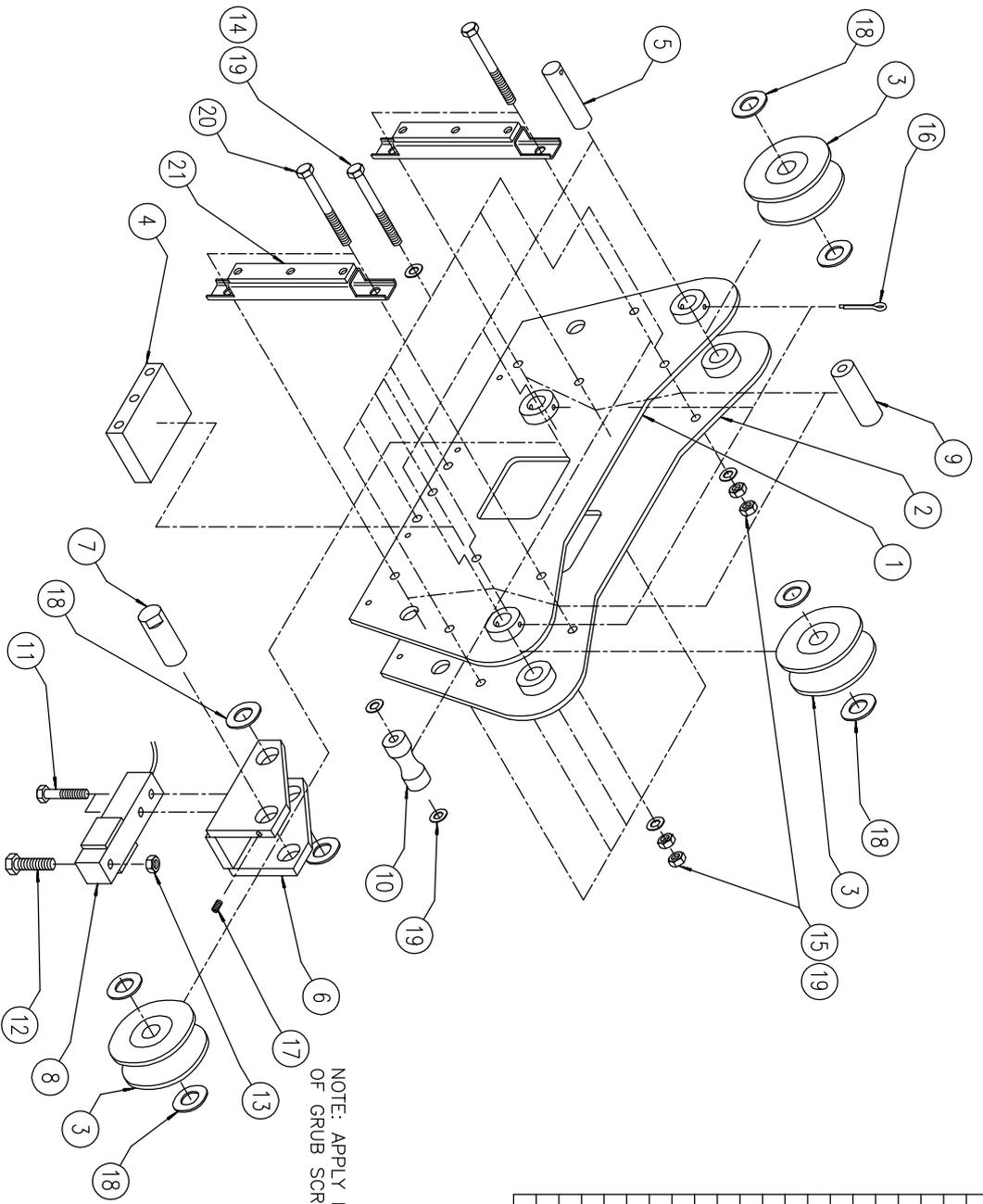
ITEM	QTY	MATERIAL/DESCRIPTION	DWG. No.	STOCK CODE (STANDARD)	STOCK CODE (MARINE S/S)
1	1	SIDE PLATE-RIGHT	DWG0203	PLAHR110	PLAHR110SS
2	1	SIDE PLATE-LEFT	DWG0203	PLAHR13	PLAHR13SS
3	3	SHEAVE ASSY Ø14 CABLE	DWG0345	SHEH32014	-
3	3	OR Ø16 CABLE	DWG0345	SHEH32016	-
3	3	OR Ø20 CABLE	DWG0345	SHEH32020	-
3	3	OR Ø26 CABLE	DWG0345	SHEH32026	-
3	3	OR Ø29 CABLE	DWG0345	SHEH32029	-
4	1	LOAD PLATE	DWG0302	PLAHR08	PLAHR08SS
5	3	SHAFT-SHEAVE	DWG0225	SHAHRT12	-
6	1	ROCKER BOX	DWG0346	ROC3MAR	ROC3MARSS
7	1	SHAFT-SHEAVE-ROCKER BOX	DWG0289	SHAHRT11	-
8	1	LOAD CELL ASSY-5K-WITH PLUG	-	CELBTD5P	-
1	1	LOAD CELL ASSY-5K-NO PLUG	-	CELBTD5	-
9	6	SPACERS	DWG0301	SPAHR06	SPAHR06SS
10	2	KEEPER-CABLE	DWG0300	KEEHR02	KEEHR02SS
11	2	BOLT-CELL MOUNTING 1/2"x1 3/4" SS	-	BOL1213HHSS	-
12	1	LOADING BOLT 1/2"x2" SS	DWG0287	SCR122CZP	-
13	1	LOCK NUT 1/2" UNF SS	-	NUT12HLSS	-
14	6	M10X100 HEX HEAD BOLT	-	BOLM10100HG	BOLM10100HSS
15	22	M10 HALF SIZE LOCK NUT	-	NUTM10HLG	NUTM10HSS
16	3	SPLIT PIN Ø4X50 SS	-	PINCOIT03	-
17	1	SOC GRUB SCREW M6X12 CUP PT	-	SCRM612SG	-
18	8	M20 FLAT WASHER	-	WASM20FZP	WASM20FSS
19	26	M10 FLAT WASHER	-	WASM10FZP	WASM10FSS



NOTE: APPLY LOCTITE 243 TO THREAD OF GRUB SCREW.

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

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



NOTE: APPLY LOCTITE 243 TO THREAD OF GRUB SCREW.

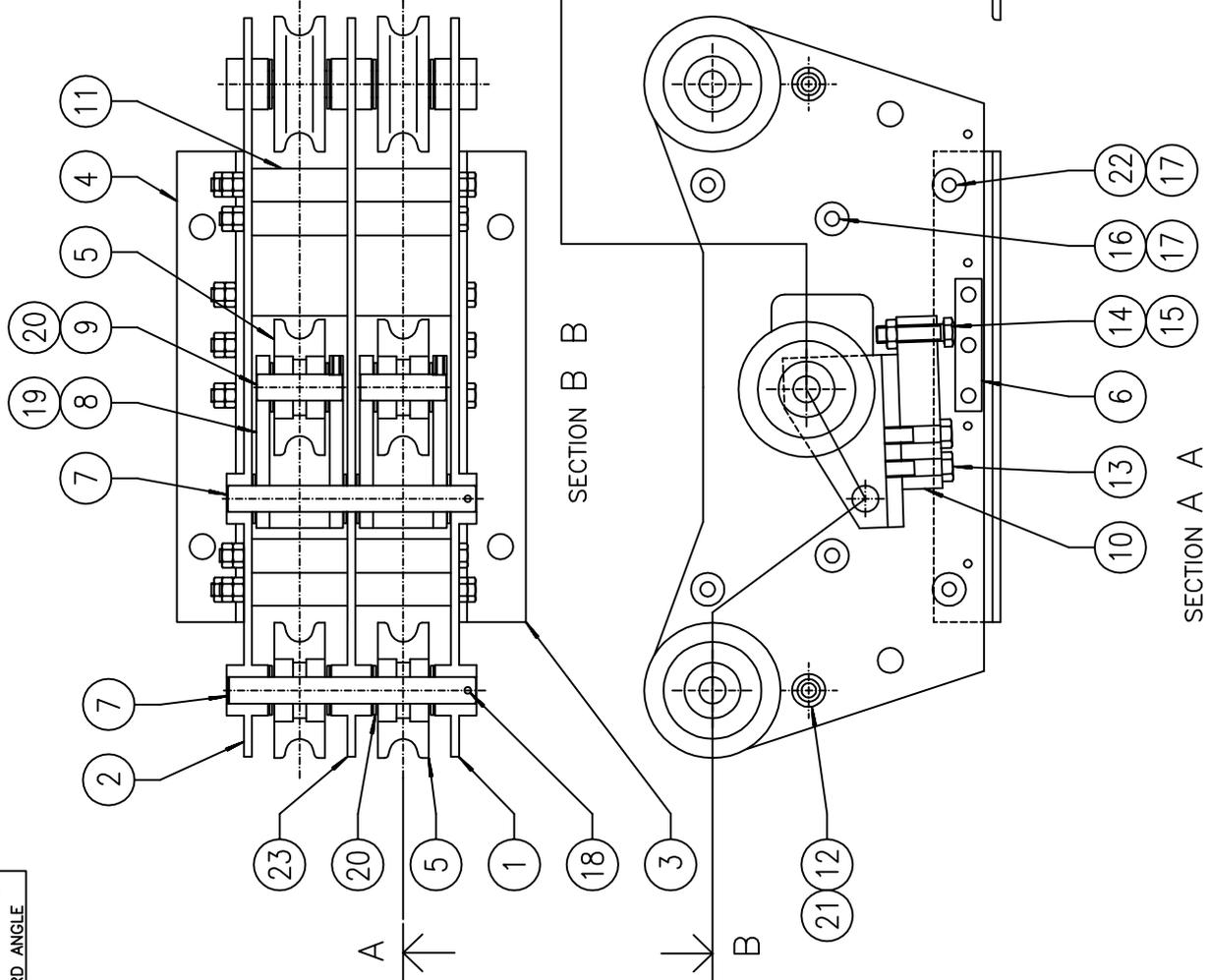
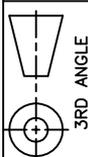
ITEM	QTY	MATERIAL/DESCRIPTION	DWG No.	STOCK CODE (STANDARD)	STOCK CODE (MARINE S/S)
1	1	SIDE PLATE-RIGHT	DWG0203	PLAHR10	PLAHR10SS
2	1	SIDE PLATE-LEFT	DWG0203	PLAHR13	PLAHR13SS
3	3	SHEAVE ASSY $\phi$ 14 CABLE	DWG0345	SHEH32014	-
3	3	OR $\phi$ 16 CABLE	DWG0345	SHEH32016	-
3	3	OR $\phi$ 20 CABLE	DWG0345	SHEH32020	-
3	3	OR $\phi$ 26 CABLE	DWG0345	SHEH32026	-
3	3	OR $\phi$ 29 CABLE	DWG0345	SHEH32029	-
4	1	LOAD PLATE	DWG0302	PLAHR108	PLAHR108SS
5	3	SHAFT-SHEAVE	DWG0225	SHAHR112	-
6	1	ROCKER BOX	DWG0346	ROCM3AR	ROCM3ARSS
7	1	SHAFT-SHEAVE-ROCKER BOX	DWG0289	SHAHR111	-
8	1	LOAD CELL ASSY-5K-WITH PLUG	-	CELBTD5P	-
8	1	LOAD CELL ASSY-5K-NO PLUG	-	CELBTD5	-
9	6	SPACERS	DWG0301	SPAHR106	SPAHR106SS
10	2	KEEPER-CABLE	DWG0300	KEHR102	KEHR102SS
11	2	BOLT-CELL MOUNTING 1/2"x1 3/4" SS	-	BOL1213HSS	-
12	1	LOADING BOLT 1/2"x2" SS	DWG0287	SCR122CZP	-
13	1	LOCK NUT 1/2" UNF SS	-	NUT12HSS	-
14	7	M10X100 HEX HEAD BOLT	-	BOLM10100HG	BOLM10100HSS
15	22	M10 HALF SIZE LOCK NUT	-	NUTM10HLG	NUTM10HSS
16	3	SPLIT PIN $\phi$ 4X50 SS	-	PINCOT103	-
17	1	SOC GRUB SCREW M6X12 CUP PT	-	SCRM612SG	-
18	8	M20 FLAT WASHER	-	WASM20FZP	WASM20FSS
19	22	M10 FLAT WASHER	-	WASM10FZP	WASM10FSS
20	4	M10X120 HEX HEAD BOLT	-	BOLM10120HG	BOLM10120HSS
21	2	LANDING PAD	DWG0303	PADHRT01	-

REV	DATE	DESCRIPTION OF CHANGE	APPR'D	TOL:	DRAWN	APPROVED	PART OF ASSY	PART No.:	PROJECT:	SCALE
1.1	11/01/96	CORRECT PART NO 14 AS PER DR#125	M.O.	X	F. LOCKER	M. OBST	-	AS ABOVE	HRT-3 DYNO	N/A
1.2	30/10/97	REFER TO DR#318	M.O.	XX	15/09/95	15/09/95	-	EXPLODED VIEW AND PARTS LIST FOR HRT-3		SHEET
1.3	26/03/99	REFER TO DR#551	M.G.	X:XX				DYNO (HORIZONTAL MOUNT WITH LANDING PADS)		1 OF 1
1.4	27/01/05	REFER TO DR#345	G.C.					DRAWING No.:	FILE No.:	REV
1.5	01/08/05	REFER TO DR#409	S.C.					DWG 0787	078701AF.DWG	1.5

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



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

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

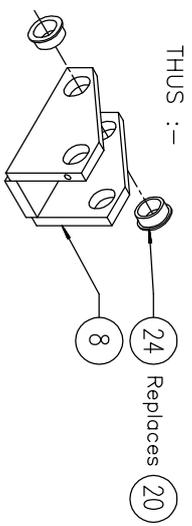
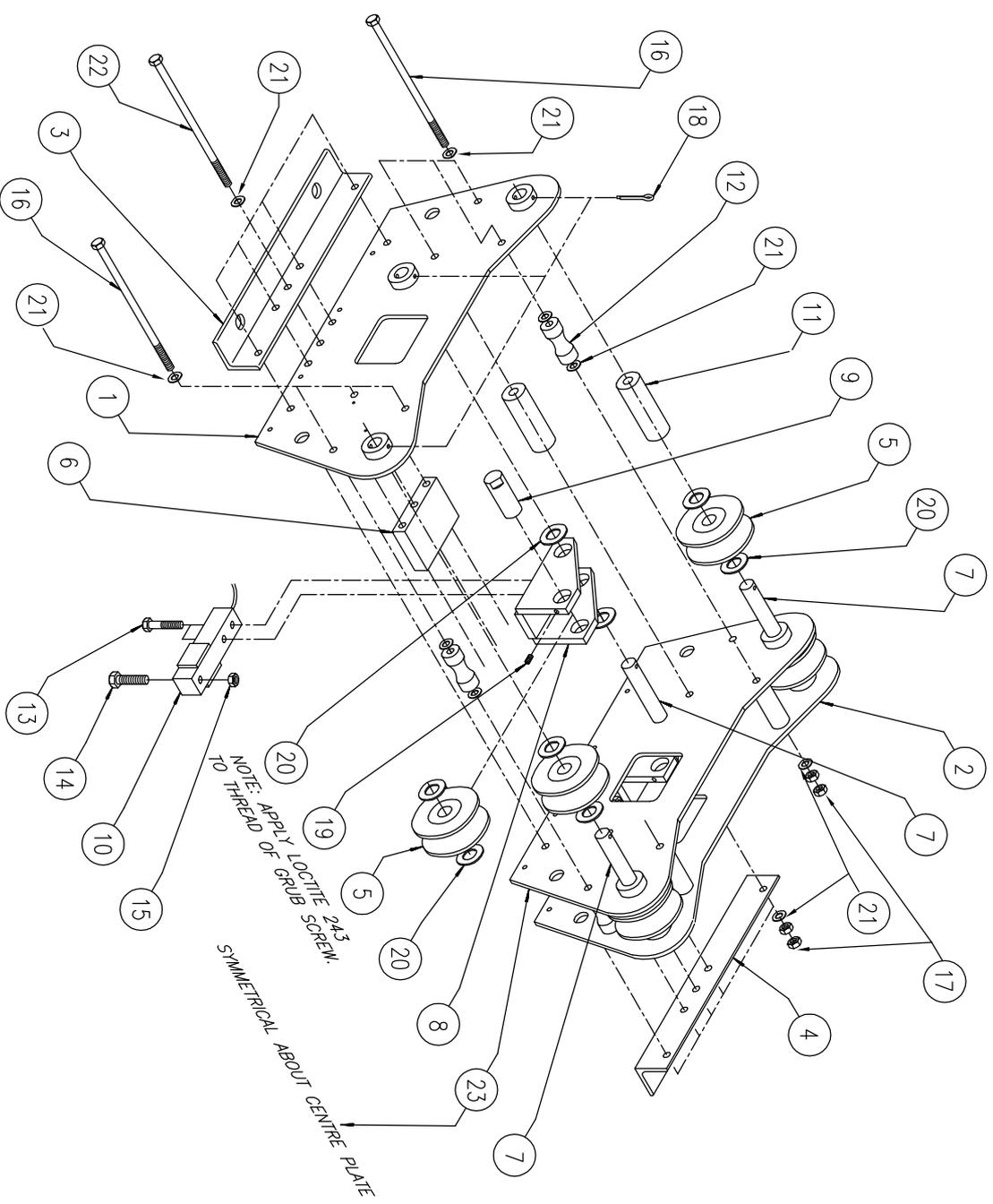
8	2	ROCKER BOX	DWG0823	ROCH3M0823
20	12	M20 FLAT WASHER SS	-	WASM20SS
24	4	BUSH-SHOULDERED	DWG0824A	BUSHHRT03

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

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

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





ITEM	QTY	MATERIAL/DESCRIPTION	DWG No.	STOCK CODE
1	1	SIDE PLATE-RIGHT	DWG0203	PLAHR10
2	1	SIDE PLATE-LEFT	DWG0203	PLAHR13
3	1	MOUNT ANGLE BRACKET RIGHT HAND	DWG0299	BRARHT04
4	1	MOUNT ANGLE BRACKET LEFT HAND	DWG0299	BRARHT03
5	6	SHEAVE ASSEMBLY Ø14 CABLE	DWG0345	SHEH32014
6	OR	Ø16 CABLE	DWG0345	SHEH32016
6	OR	Ø20 CABLE	DWG0345	SHEH32020
6	OR	Ø26 CABLE	DWG0345	SHEH32026
6	OR	Ø29 CABLE	DWG0345	SHEH32029
6	2	LOAD PLATE	DWG0302	PLAHR108
7	3	SHAFT-SHEAVE	DWG0290	SHAHR15
7	2	ROCKER BOX	DWG0346	ROCM3AR
9	2	SHAFT-SHEAVE-ROCKER BOX	DWG0289	SHAHR11
10	2	LOAD CELL ASSY-5K-WITH PLUG	-	CELBTD5P
2	2	LOAD CELL ASSY-5K-NO PLUG	-	CELBTD5
11	2	SPACERS	DWG0301	SPARHT06
12	4	KEEPER-CABLE	DWG0300	KEHRHT02
13	4	BOLT-CELL MOUNTING 1/2"x1 3/4" ZP	-	BOLT1213HHZP
14	2	LOADING BOLT 1/2"x2" ZP	-	SCR122CZP
15	2	LOCK NUT 1/2" UNF GALV	-	NUT12HL2P
16	6	M10X180 BOLT HEX HEAD GALV	-	BOLM10180HG
17	22	M10 HALF SIZE LOCK NUT GALV	-	NUTM10HLG
18	3	SPLIT PIN Ø4X50 SS	-	PINCOT103
19	2	SOC GRUB SCREW M6X12 CUP PT SS	-	SCRM612SG
20	16	M20 FLAT WASHER ZP	-	WASW20FZP
21	30	M10 FLAT WASHER ZP	-	WASW10FZP
22	5	M10X200 BOLT HEX HEAD GALV	-	BOLM10200HG
23	1	CENTRE PLATE	DWG0367	PLAHR118
8	2	ROCKER BOX	DWG0823	ROCK3M0823
20	12	M20 FLAT WASHER SS	-	WASW20SS
24	4	BUSH-SHOULDERED	DWG0824A	BUSHRT03

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

DYNNHRT32 NO SHEAVES  
 DYNHRT32S INCLUDING SHEAVES  
 DYNHRTM32 MARINEISED NO SHEAVES

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

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

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

DRAWN	F. LOCKER	APPROVED	M. OBST
DATE	04/08/94	DATE	04/08/94

PART OF ASSY: -

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

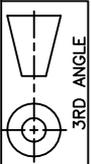
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FILE No: 035301AF.DWG

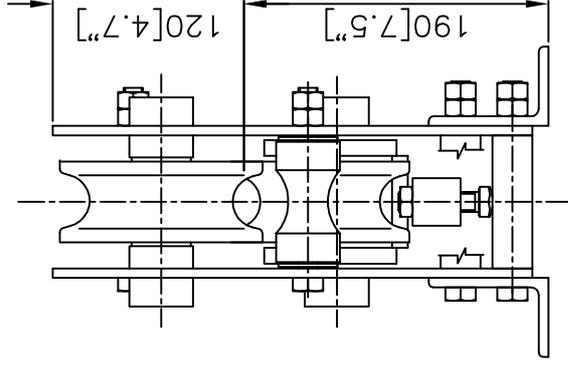
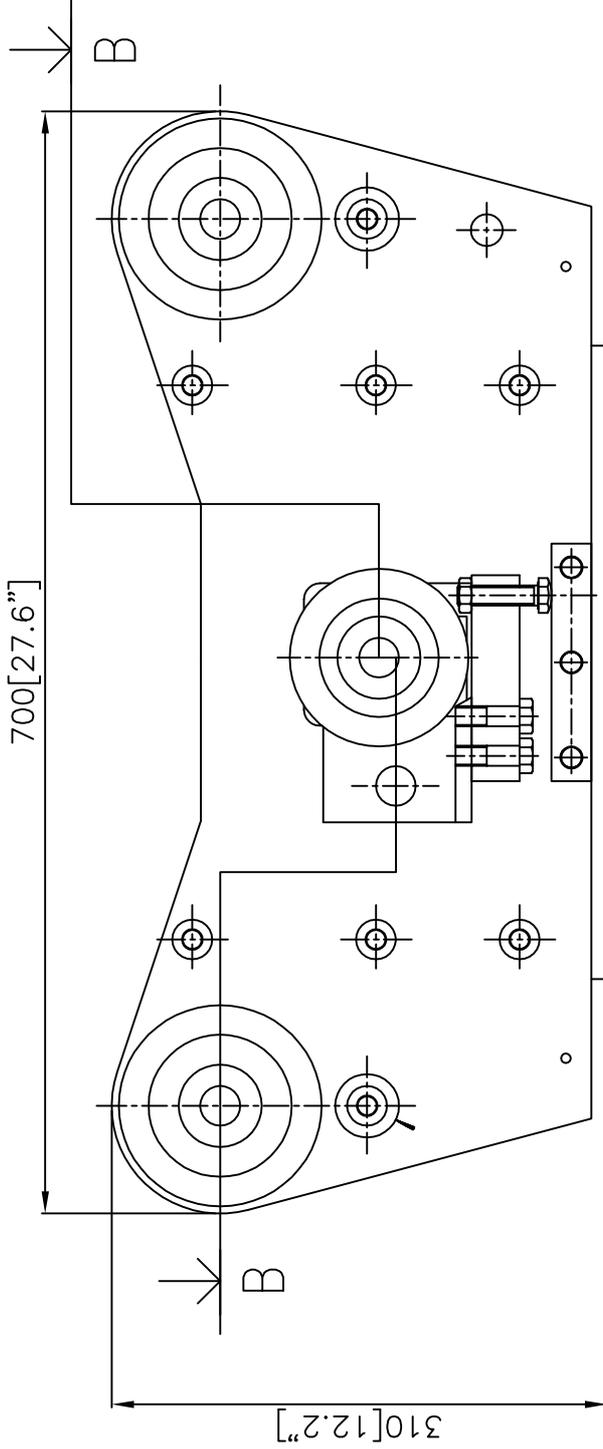
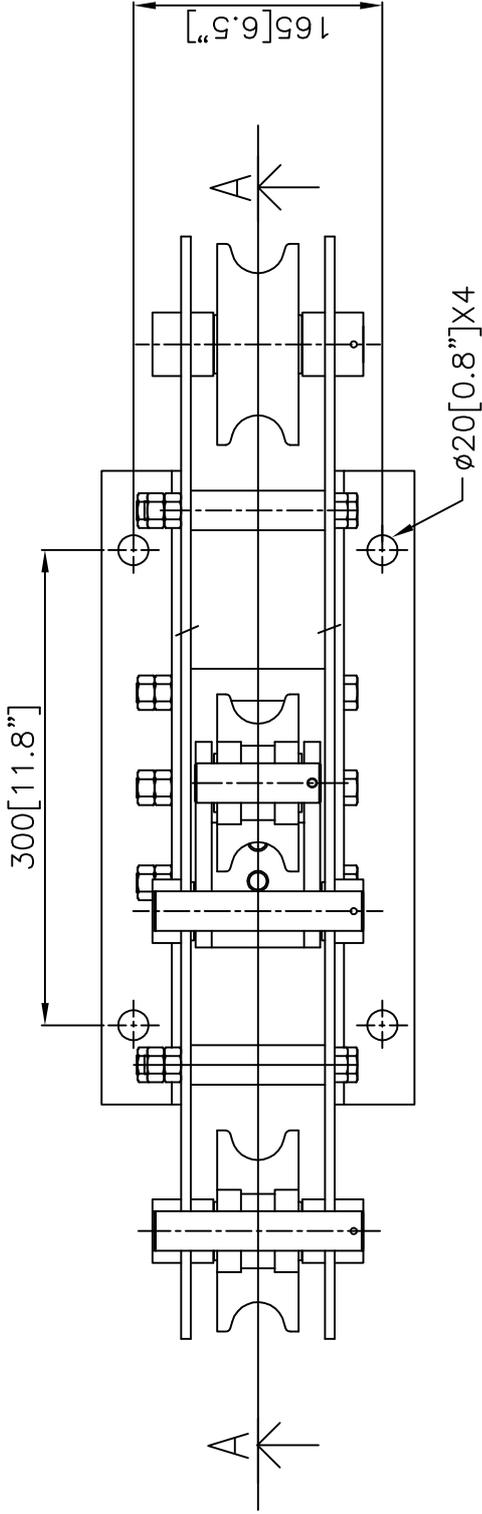
SCALE: N/A

SHEET: 1 OF 1

REV: 1.5



SECTION B B

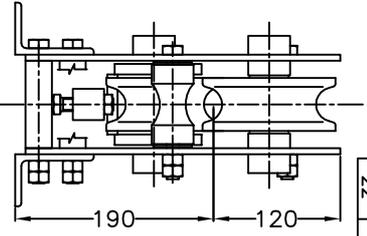
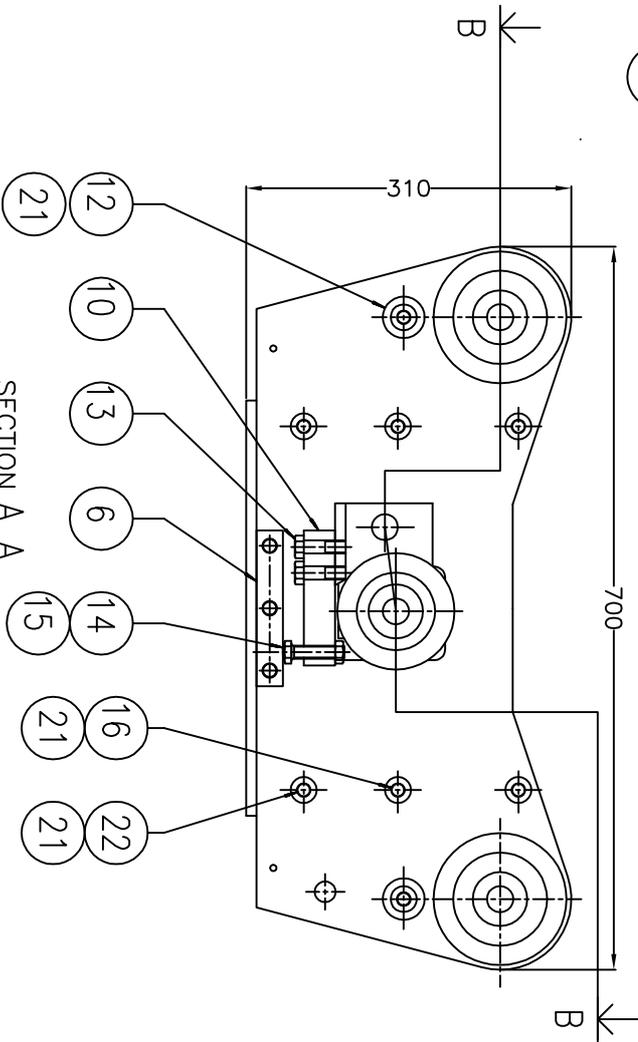
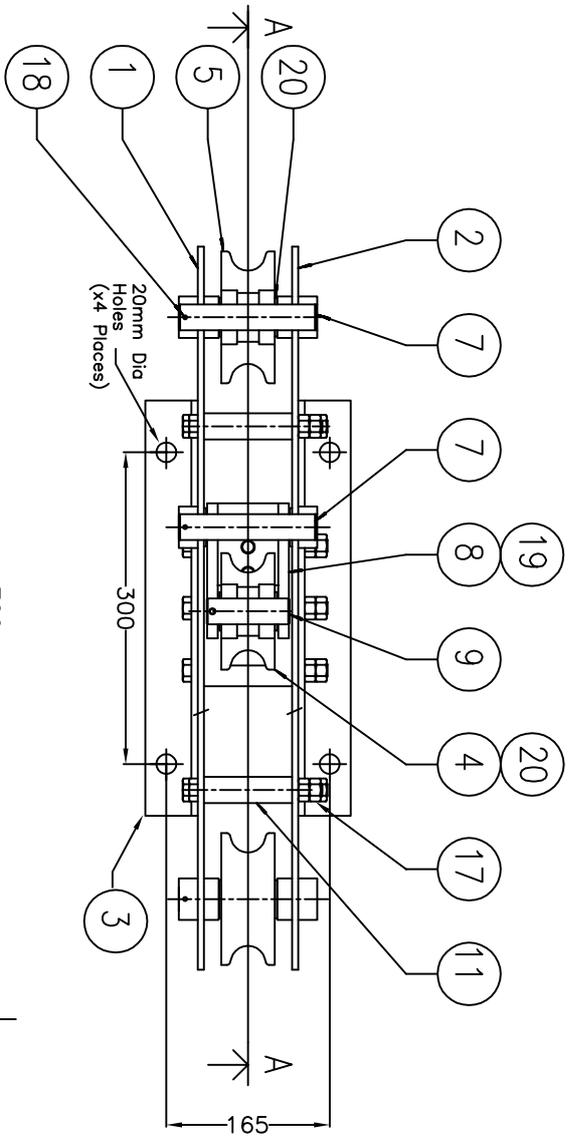


SECTION A A

REV	DATE	DESCRIPTION OF CHANGE	APPR'D	TOL:	X	+/- 1	X.X	+/- 0.2	X.XX	AS STATED	DRAWN	APPROVED	PART OF ASSY	PART No:	PROJECT:	SCALE	SHEET	REV
											C. HOBBY				HRT-4 DYNO	N/A	1 OF 1	1.0
				<p>DO NOT SCALE DRAWING ALL DIMENSIONS ARE IN MILLIMETERS [INCHES] UNLESS OTHERWISE STATED</p>										<p>HRT-4 DYNAMOMETER DIMENSIONAL DETAIL</p>				
				<p>LSI-ROBWAY 32 WEST THEBARTON RD THEBARTON 5031 SOUTH AUSTRALIA PHONE +61 8 8352 6055 FAX +61 8 8352 1684</p>										<p>DRAWING No: DWG 1795 FILE No: 179501AA.DWG</p>				



SECTION B B



ITEM	QTY	MATERIAL/DESCRIPTION	DWG No.	STANDARD	MARINE
1	1	SIDE PLATE RIGHT	DWG0272	PLAHR4RH	PLAHR4RHSS
2	1	SIDE PLATE LEFT	DWG0272	PLAHR4LH	PLAHR4LHSS
3	2	MOUNT ANGLE BRACKET	DWG0273	BRHR14V	BRHR14VSS
4	1	SHEAVE ASSY Ø26 CABLE	DWG0348	SHE4C2526	-
1	1	OR Ø29 CABLE	DWG0348	SHE4C2529	-
1	1	OR Ø33 CABLE	DWG0348	SHE4C2533	-
2	2	SHEAVE ASSY Ø26 CABLE	DWG0348	SHE4E2526	-
2	2	OR Ø29 CABLE	DWG0348	SHE4E2529	-
2	2	OR Ø33 CABLE	DWG0348	SHE4E2533	-
6	1	LOAD PLATE	DWG0350	PLAHR14LD	PLAHR14LDSS
7	3	SHAFT-SHEAVE	DWG0280	SHASH4	-
8	1	ROCKER BOX	DWG0349	ROCHR14	ROCHR14SS
9	1	SHAFT-SHEAVE-ROCKER BOX	DWG0347	SHARBSH4	-
10	1	LOAD CELL ASSEMBLY-5K-WITH PLUG	-	CELBTD5P	-
1	1	OR WITHOUT PLUG	-	CELBTD5	-
11	6	SPACERS	DWG0352	SPAHR14	SPAHR14SS
12	2	KEEPER CABLE	DWG0351	KEHR14	KEHR14SS
13	2	BOLT-CELL MOUNTING 1/2"x1 3/4"	-	BOL1213HHSS	-
14	1	SCREW-ADJUSTMENT 1/2"x2"	-	SCR122C2SS	-
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	-	PINCO1103	-
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	TOL:	+	-	SCALE
1.1	11/01/96	CORRECT PART 14 AS PER DR#125	J.D.R.	X	+/-	0.2	N/A
1.2	04/09/96	REFER TO DR#197	M.O.	XX	AS	STATED	N/A
1.3	30/10/97	REFER TO DR#318	D.P.	X:XX			SHEET 1 OF 1
1.4	26/03/99	REFER TO DR#551	G.C.				REV 1.5
1.5	27/01/05	REFER TO DR#345					

DRAWN	APPROVED	PART OF ASSY	PART No:	PROJECT:
F. LOCKER	M. OBST	-	AS ABOVE	HRT-4 DYNO

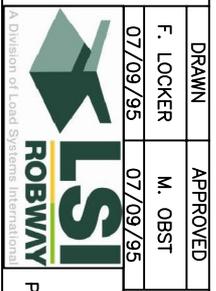
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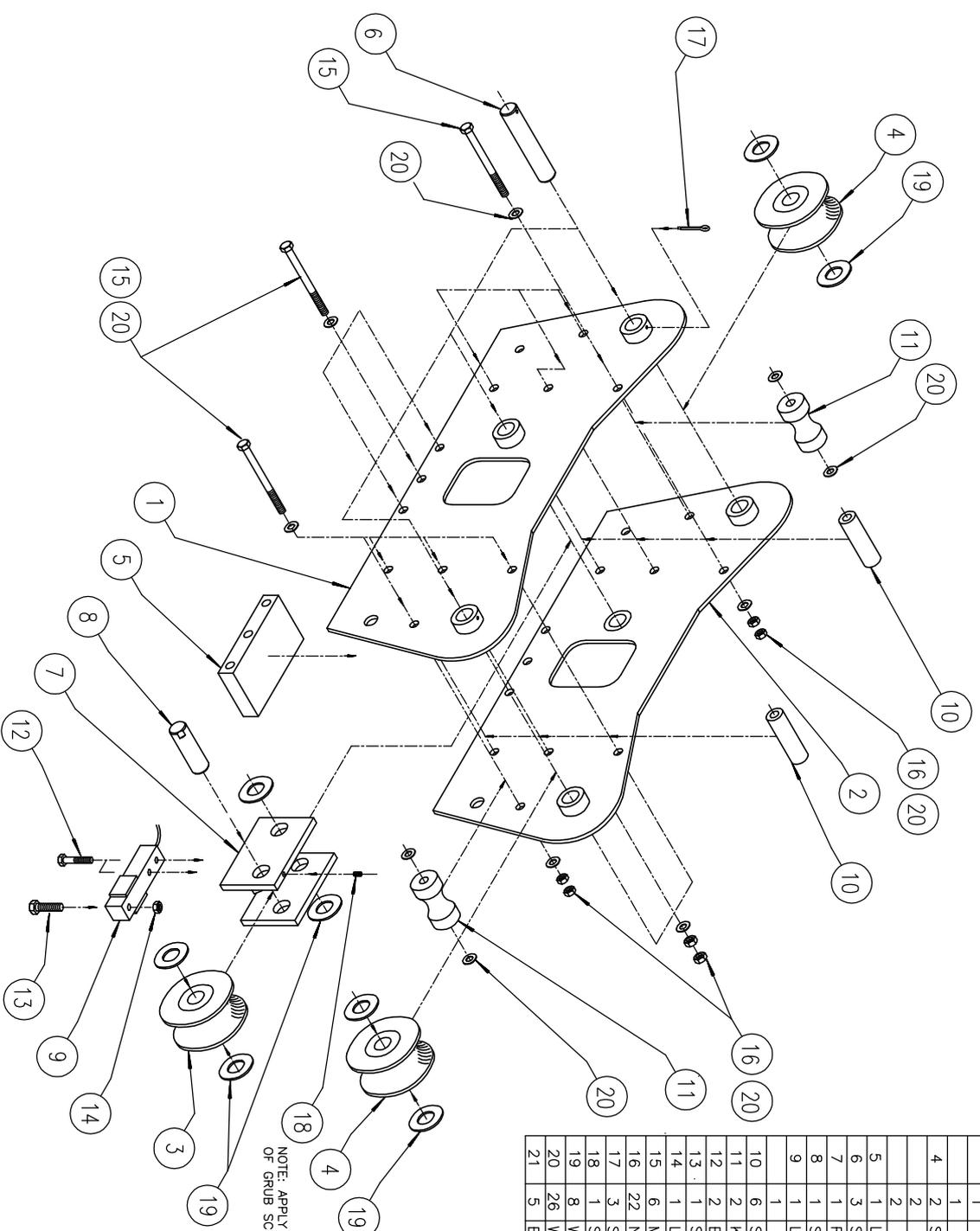
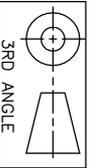
TITLE:	SCALE
GENERAL ARRANGEMENT	N/A

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



ALL DIMENSIONS ARE IN MILLIMETERS  
 UNLESS OTHERWISE STATED



NOTE: APPLY LOCTITE 243 TO THREAD OF GRUB SCREW.

ITEM	QTY	MATERIAL/DESCRIPTION	DWG No.	3190K-090F (3190K-090F)	3190K-090F (3190K-090F)
1	1	SIDE PLATE RIGHT	DWG0272	PLAHR14RH	PLAHR14RHSS
2	1	SIDE PLATE LEFT	DWG0272	PLAHR14LH	PLAHR14LHSS
3	1	SHEAVE ASSY #26 CABLE	DWG0348	SHE4C2526	-
1	1	OR #29 CABLE	DWG0348	SHE4C2529	-
1	1	OR #33 CABLE	DWG0348	SHE4C2533	-
4	2	SHEAVE ASSY #26 CABLE	DWG0348	SHE4E2526	-
2	2	OR #29 CABLE	DWG0348	SHE4E2529	-
2	2	OR #33 CABLE	DWG0348	SHE4E2533	-
5	1	LOAD PLATE	DWG0350	PLAHR14LD	PLAHR14LDSS
6	3	SHAFT-SHEAVE	DWG0280	SHASH4	-
7	1	ROCKER BOX	DWG0349	ROCHR14	ROCHR14SS
8	1	SHAFT-SHEAVE-ROCKER BOX	DWG0347	SHARBSH4	-
9	1	LOAD CELL ASSEMBLY-5K-WITH PLUG	-	CELBTD5P	-
1	1	OR WITHOUT PLUG	-	CELBTD5	-
10	6	SPACERS	DWG0352	SPAHR14	SPAHR14SS
11	2	KEEPER CABLE	DWG0351	KEHR14	KEHR14SS
12	2	BOLT-CELL MOUNTING-1/2"x1 3/4"	-	BOL1213HHSS	-
13	1	SCREW-ADJUSTMENT 1/2"x2"	-	SCR122CSS	-
14	1	LOCK NUT 1/2" UNF	-	NUT12HLSS	-
15	6	M12X120 HEX HEAD GALV	-	BOLM12120HG	BOLM12120SS
16	22	NUT M12 HALF SIZE LOCK GALV	-	NUTM12HLG	NUTM12HSS
17	3	SPLIT PIN #4X50 S/S	-	PINCOIT03	-
18	1	SOC GRUB SCREW M6X20 CUP PT S/S	-	SCRM620SG	-
19	8	WASHER M24 ZP	-	WASM24FZP	WASM24FSS
20	26	WASHER M12 ZP	-	WASM12FZP	WASM12FSS
21	5	BOLT M12X130 HEX HEAD GALV	-	BOLM12130HG	BOLM12130HSS

REV	DATE	DESCRIPTION OF CHANGE	APP'R'D	TOL:	+	-	1
1.2	04/09/96	REFER TO DR#197	J.D.R.	X	+	-	1
1.3	30/10/97	REFER TO DR#318	M.O.	XX	+	-	0.2
1.4	02/10/98	REFER TO DR#494	M.O.	X.XX	AS	STATED	
1.5	26/03/99	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.				

DRAWN	APPROVED	PART OF ASSY	PART No.:	PROJECT:
F. LOCKER	M. OBST	-	-	HRT-4 DYNO

TITLE:	SCALE
EXPLODED VIEW AND PARTS LIST FOR HRT-4 DYNO (EXCLUDING MOUNTING ANGLE BRACKET)	N/A

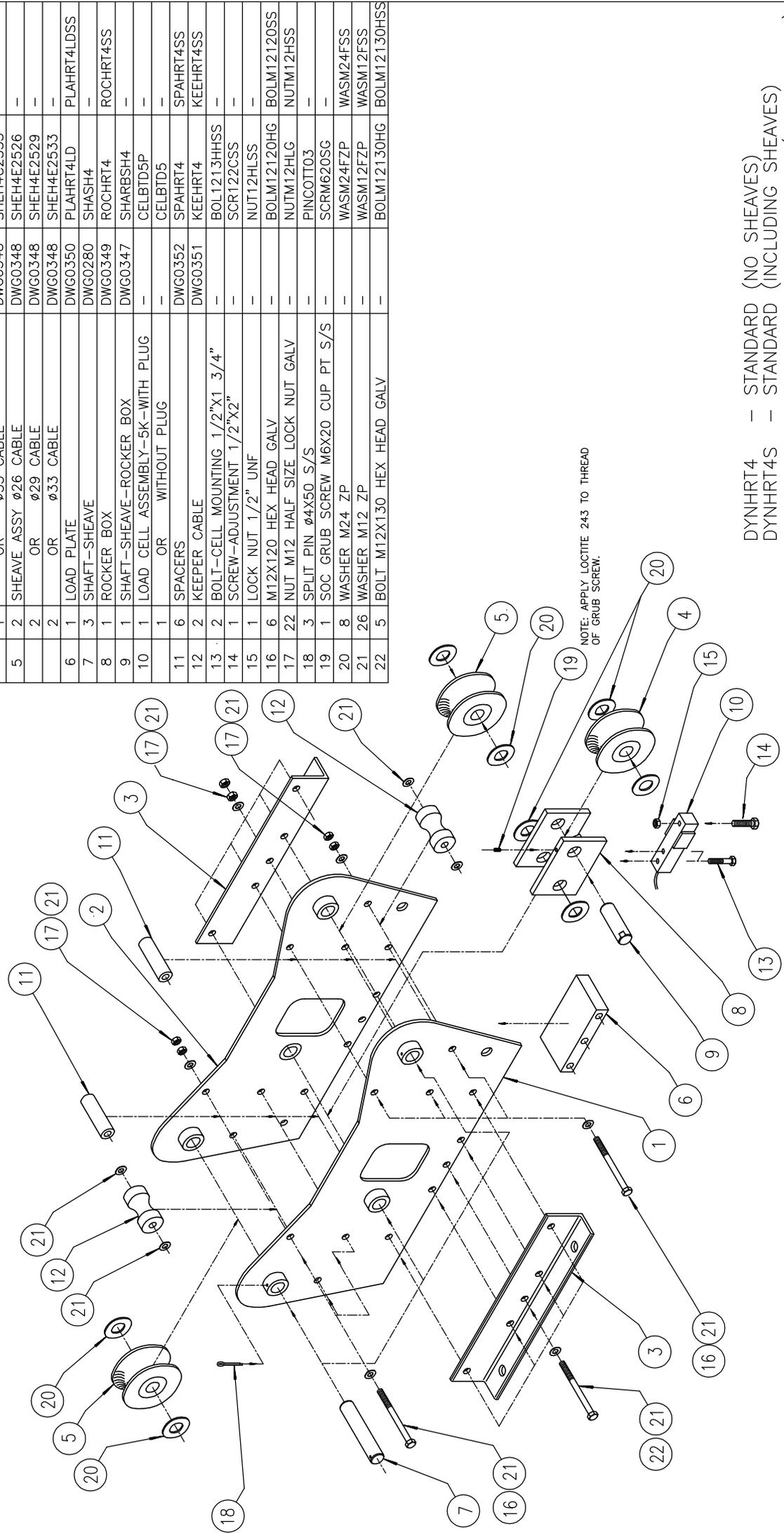
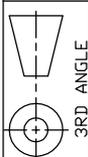
  

DRAWING No.:	FILE No.:	REV
DWG 0799	079901AH.DWG	1.7

LSI-ROBWAY  
32 WEST THEBARTON RD  
THEBARTON, 5031  
SOUTH AUSTRALIA  
PHONE +61 8 8352 6055  
FAX +61 8 8352 1684

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED



ITEM	QTY	MATERIAL/DESCRIPTION	DWG No.	STOCK CODE (STANDARD)	STOCK CODE (MARINE S/S)
1	1	SIDE PLATE RIGHT	DWG0272	PLAHR4RH	PLAHR4RHSS
2	1	SIDE PLATE LEFT	DWG0272	PLAHR4LH	PLAHR4LHSS
3	2	MOUNT ANGLE BRACKET	DWG0273	BRAHRT4V	BRAHRT4VSS
4	1	SHEAVE ASSY Ø26 CABLE	DWG0348	SHEH4C2526	-
	1	OR Ø29 CABLE	DWG0348	SHEH4C2529	-
	1	OR Ø33 CABLE	DWG0348	SHEH4C2533	-
5	2	SHEAVE ASSY Ø26 CABLE	DWG0348	SHEH4E2526	-
	2	OR Ø29 CABLE	DWG0348	SHEH4E2529	-
	2	OR Ø33 CABLE	DWG0348	SHEH4E2533	-
6	1	LOAD PLATE	DWG0350	PLAHR4LD	PLAHR4LDSS
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	SPAHR4	SPAHR4SS
12	2	KEEPER CABLE	DWG0351	KEEHR4	KEEHR4SS
13	2	BOLT-CELL MOUNTING 1/2"x1 3/4"	-	BOL1213HSS	-
14	1	SCREW-ADJUSTMENT 1/2"x2"	-	SCR122GSS	-
15	1	LOCK NUT 1/2" UNF	-	NUT12HLSS	-
16	6	M12X120 HEX HEAD GALV	-	BOLM12120HG	BOLM12120SS
17	22	NUT M12 HALF SIZE LOCK NUT GALV	-	NUTM12HLG	NUTM12HSS
18	3	SPLIT PIN Ø4X50 S/S	-	PINCOTT03	-
19	1	SOC GRUB SCREW M6X20 CUP PT S/S	-	SCRM620SG	-
20	8	WASHER M24 ZP	-	WASM24FZP	WASM24FSS
21	26	WASHER M12 ZP	-	WASM12FZP	WASM12FSS
22	5	BOLT M12X130 HEX HEAD GALV	-	BOLM12130HG	BOLM12130HSS

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

REV	DATE	DESCRIPTION OF CHANGE	APPR'D	DRAWN	APPROVED	PART OF ASSY	PART No:	PROJECT:	SCALE	SHEET		
1.1	29/03/99	REFER TO DR#551	D.P.	F. LOCKER	M. OBST	-	SEE ABOVE	HRT-4 DYNO	N/A	1 OF 1		
1.2	27/01/05	REFER TO DR#345	G.C.	07/09/95	03/11/97							
1.3	01/08/05	REFER TO DR#409	S.C.	LSI-ROBWAY 32 WEST THEBARTON RD THEBARTON 5031 SOUTH AUSTRALIA PHONE +61 8 8352 6055 FAX +61 8 8352 1684								
1.4	01/08/07	REFER TO PCR#24	S.C.									
							DWG 0340	FILE No: 034001AE.DWG		REV 1.4		

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

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

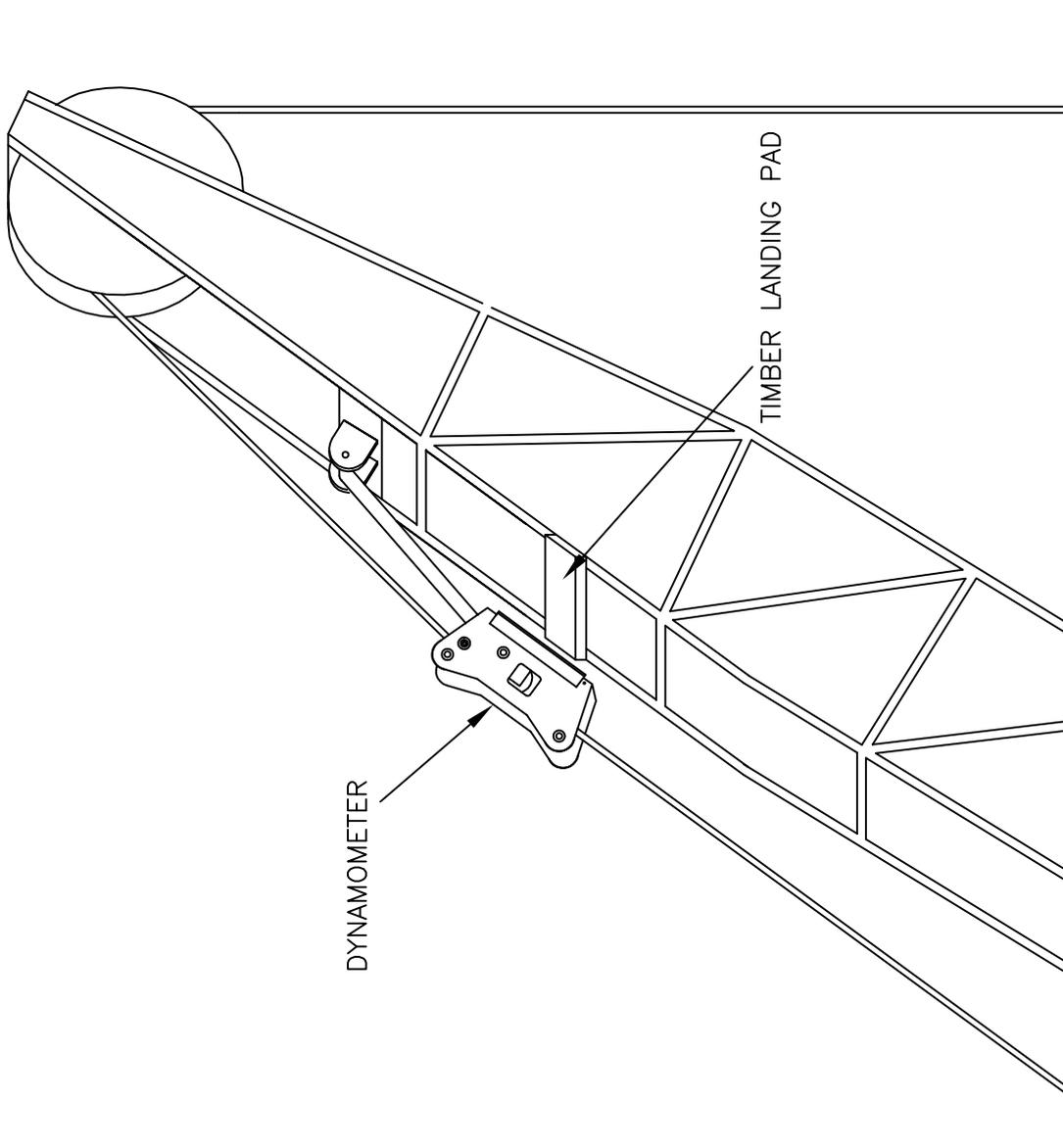








# ARTICULATED ARM MOUNTED DYNAMOMETERS AT BOOM TIP

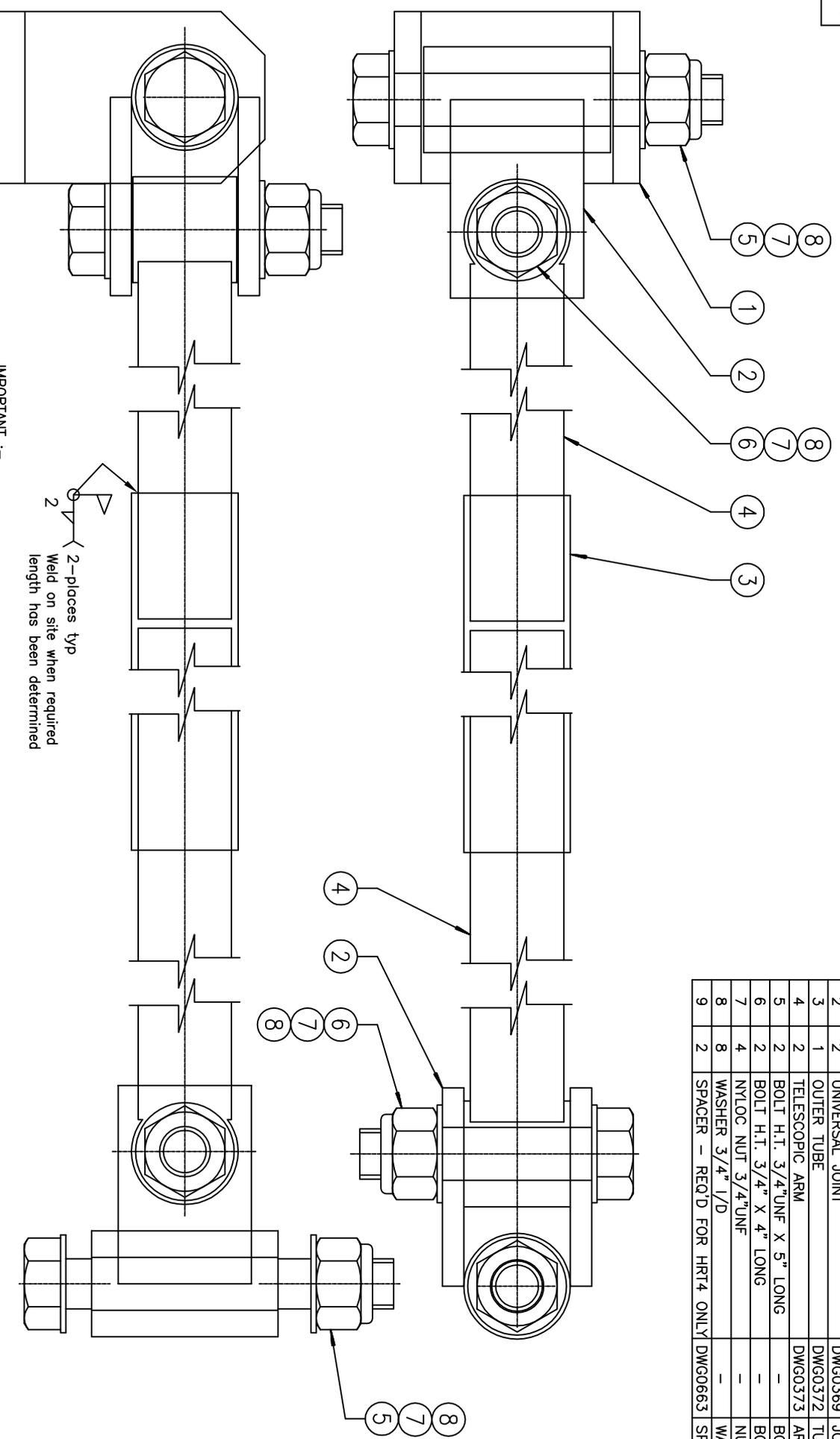


REV	DATE	DESCRIPTION OF CHANGE	APPR'D	DRAWN	APPROVED	PART OF ASSY	PART No:	PROJECT:			
				S. CHAMBERS 13/07/01	A. CANLAS 13/07/01	—	—	—			
<p>TOL: X +/- 1 X.X +/- 0.2 X:XX AS STATED</p> <p>DO NOT SCALE DRAWING ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED</p>				 <p>LSI-ROBBWAY 32 WEST THEBARTON RD THEBARTON 5031 SOUTH AUSTRALIA PHONE +61 8 8352 6055 FAX +61 8 8352 1684</p>					<p>TITLE: TYPICAL DYNAMOMETER INSTALLATION TO SUIT STRUT BOOM CRANES</p>		SCALE N/A
				DRAWING No: DWG 2468					FILE No: 246801AA.DWG	SHEET 2 OF 4	
									REV 1.0		





ITEM	QTY	MATERIAL/DESCRIPTION	DWG No.	STOCK CODE
1	1	MOUNTING BRACKET	DWG0368	BRAMA0368
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	SPA00663



**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	APP'R'D	TOL:	DRAWN	APPROVED	PART OF ASSY	PART No.:	PROJECT:	SCALE
1.0	16/10/01	CONVERTED TO AUTOCAD FORMAT	S.C.	X XX XXX	F. LOCKER	M. OBST	-	ARMART0370	ARTICULATED ARM	N/A
1.1	25/08/03	REFER TO DR#186	S.C.	+/- 1 +/- 0.2 AS STATED	10/11/94	10/11/94	-	GENERAL ARRANGEMENT		1 OF 1
				DO NOT SCALE DRAWING UNLESS OTHERWISE STATED						REV
										1.1

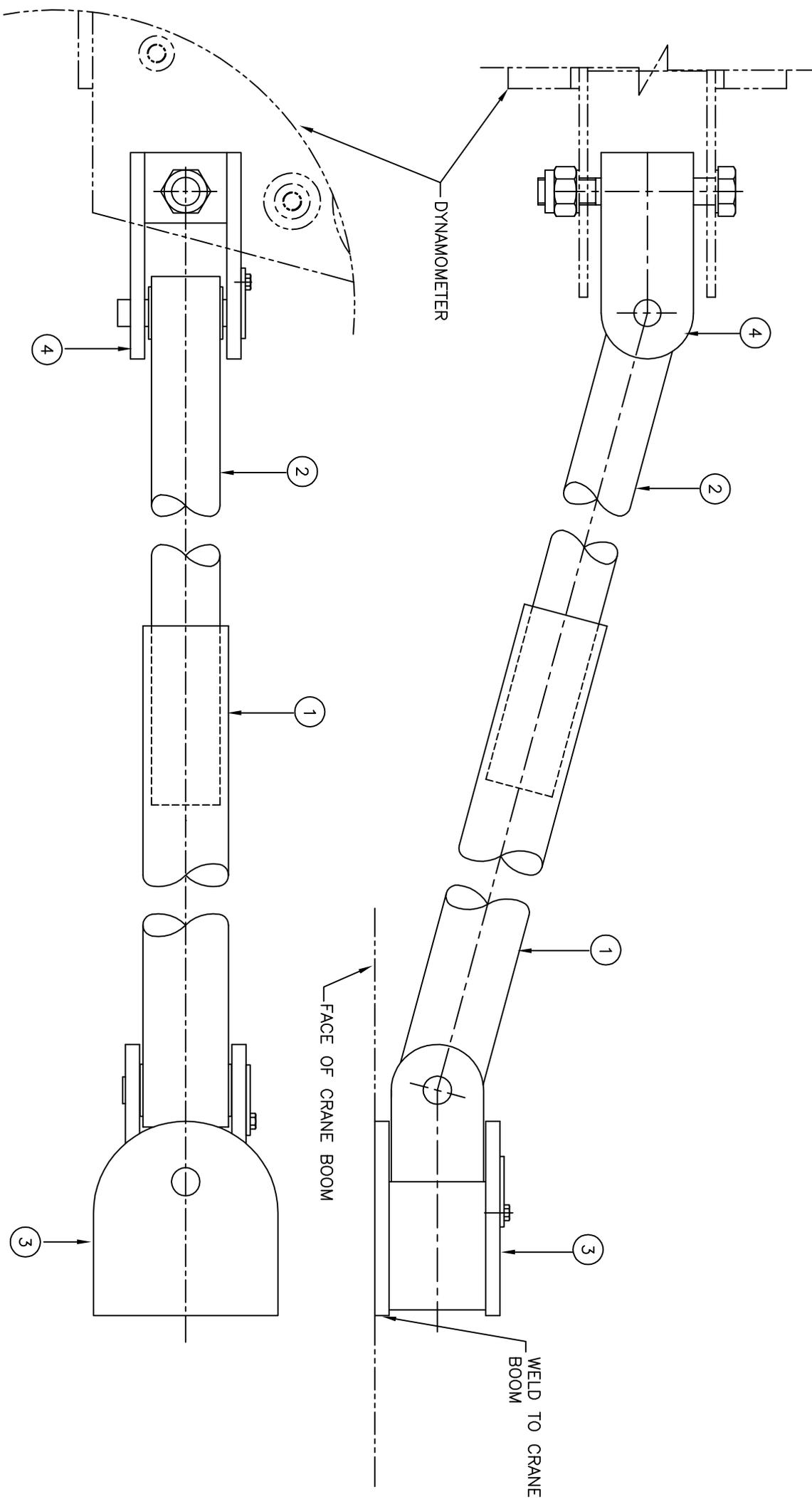
LSI-ROBWAY  
32 WEST THEBARTON RD  
THEBARTON 5031  
SOUTH AUSTRALIA  
PHONE +61 8 8352 6055  
FAX +61 8 8352 1684

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



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.

<b>DRAWN</b>	<b>APPROVED</b>	<b>PART OF ASSY</b>	<b>PART No.:</b>	<b>PROJECT:</b>
F. LOCKER	M. OBST	-	ARMARTIC02	ARTIC ARM - H/D
19/09/95	19/09/95		<b>TITLE:</b>	<b>SCALE</b>
			GENERAL ARRANGEMENT	N/A
			<b>DRAWING No.:</b>	<b>SHEET</b>
			DWG 0805	1 OF 1
			<b>FILE No.:</b>	<b>REV</b>
			080501AB.DWG	1.1

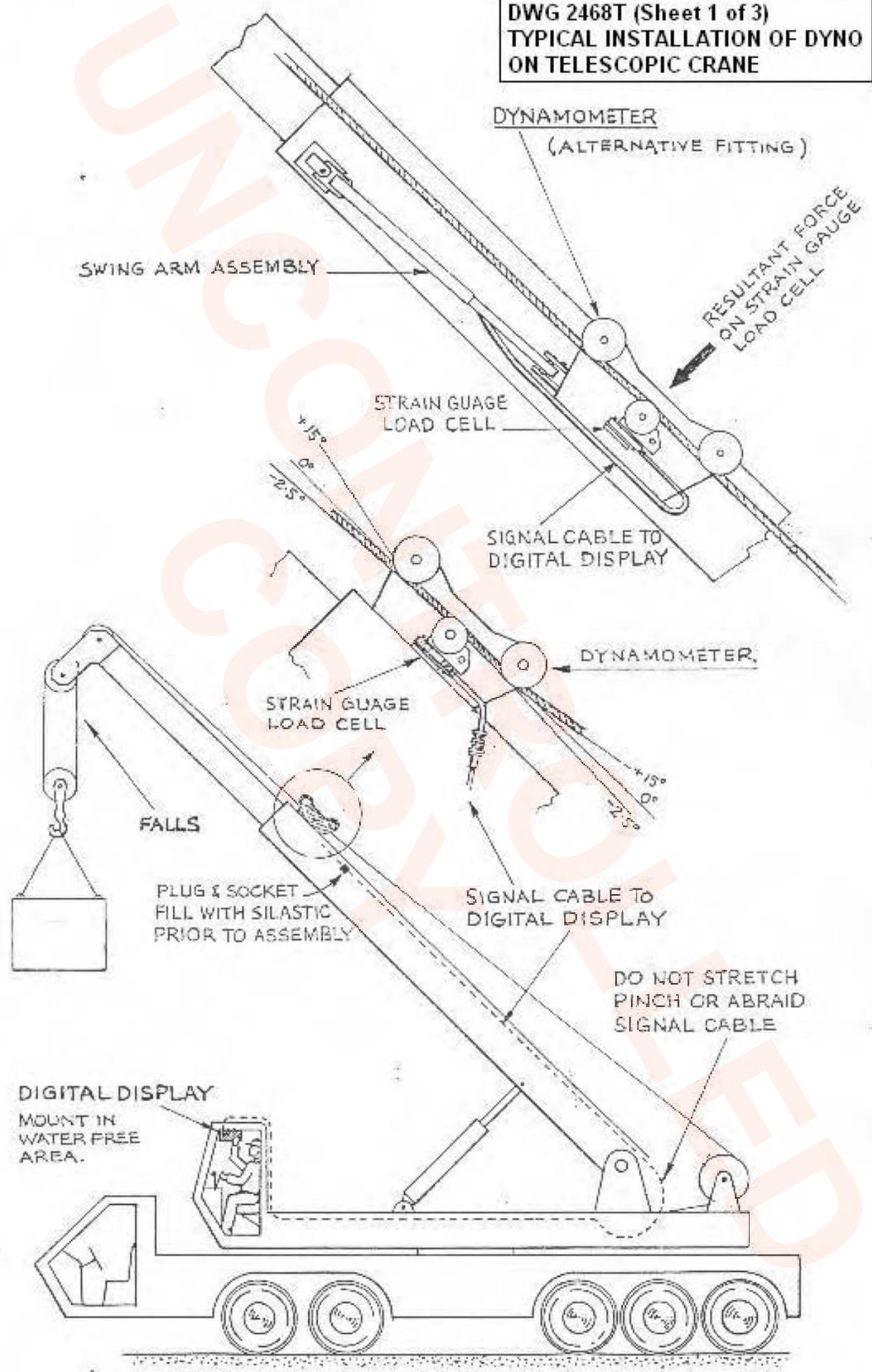
<b>TOL:</b>	X	+/- 1
	XX	+/- 0.2
	X:XX	AS STATED

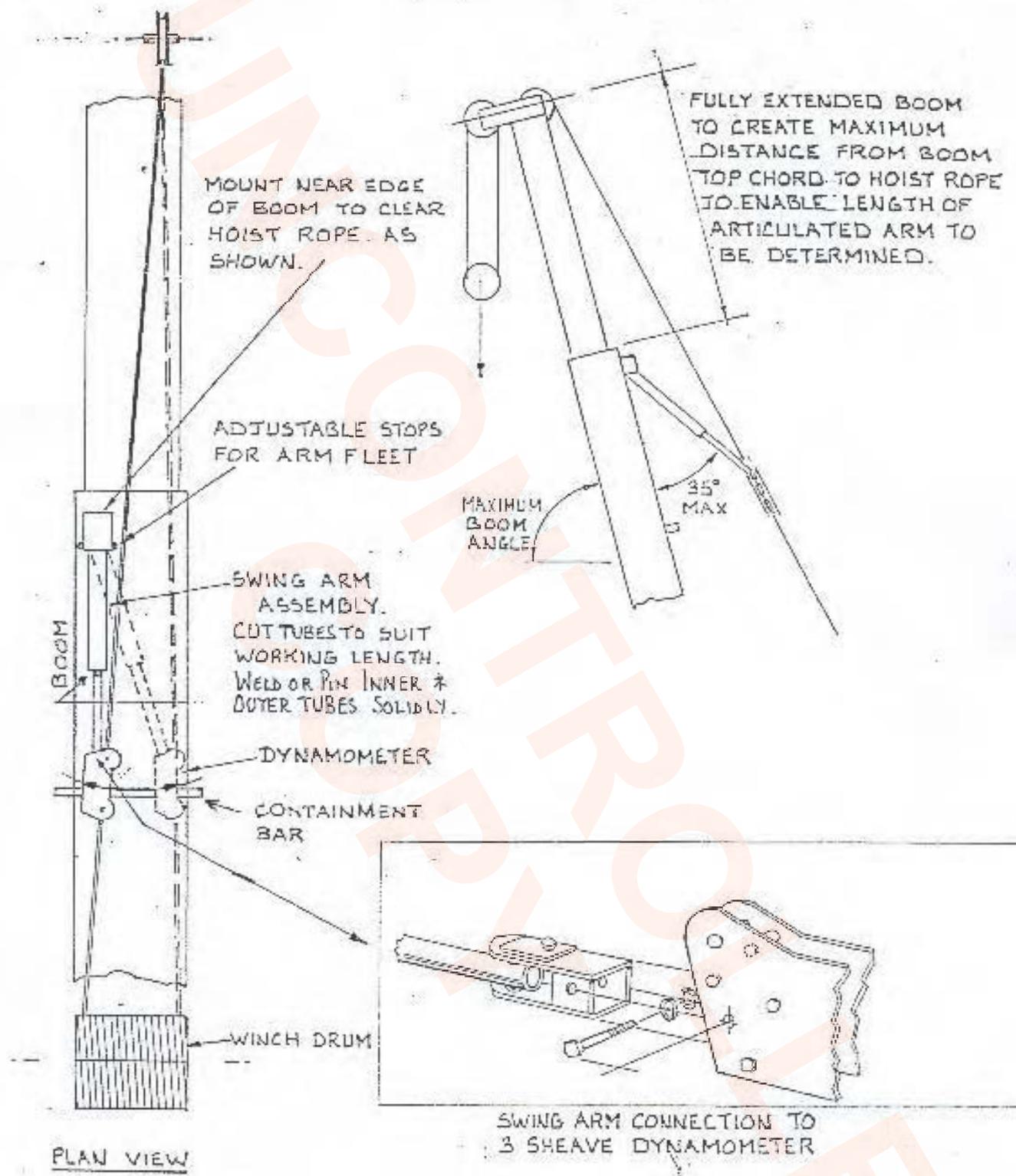
DO NOT SCALE DRAWING  
UNLESS OTHERWISE STATED

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ROBWAY  
A Division of Lead Systems International

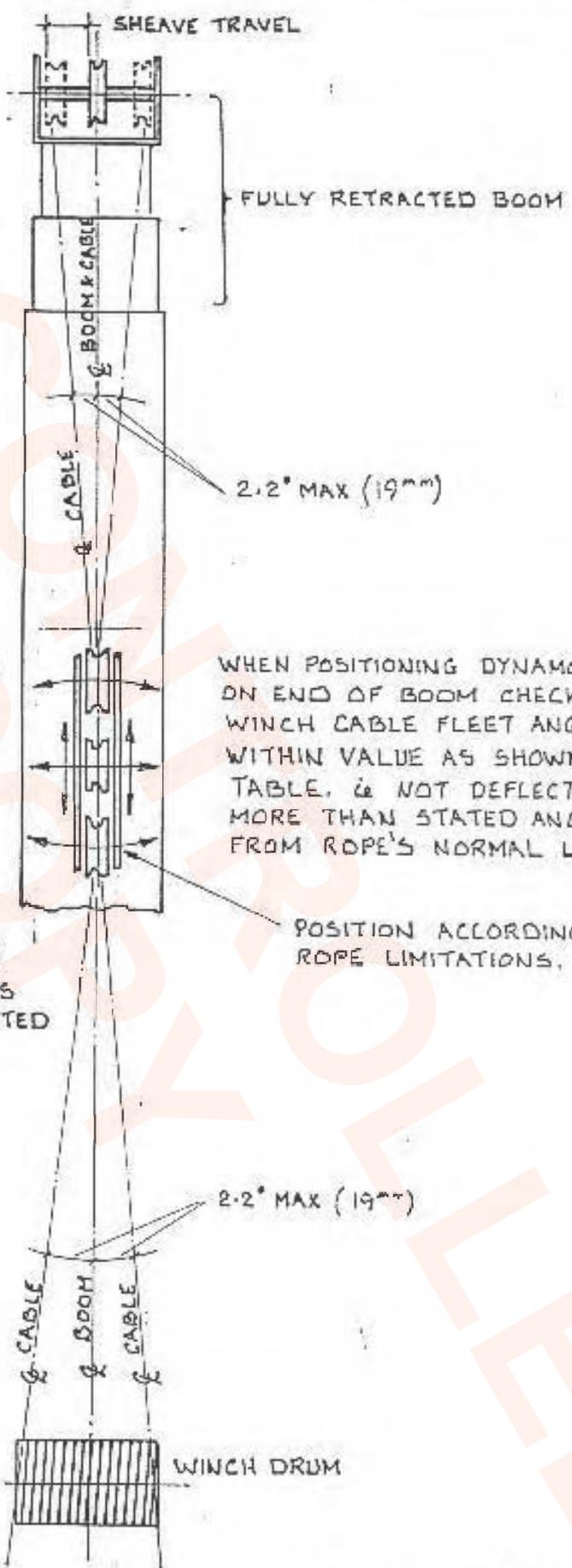
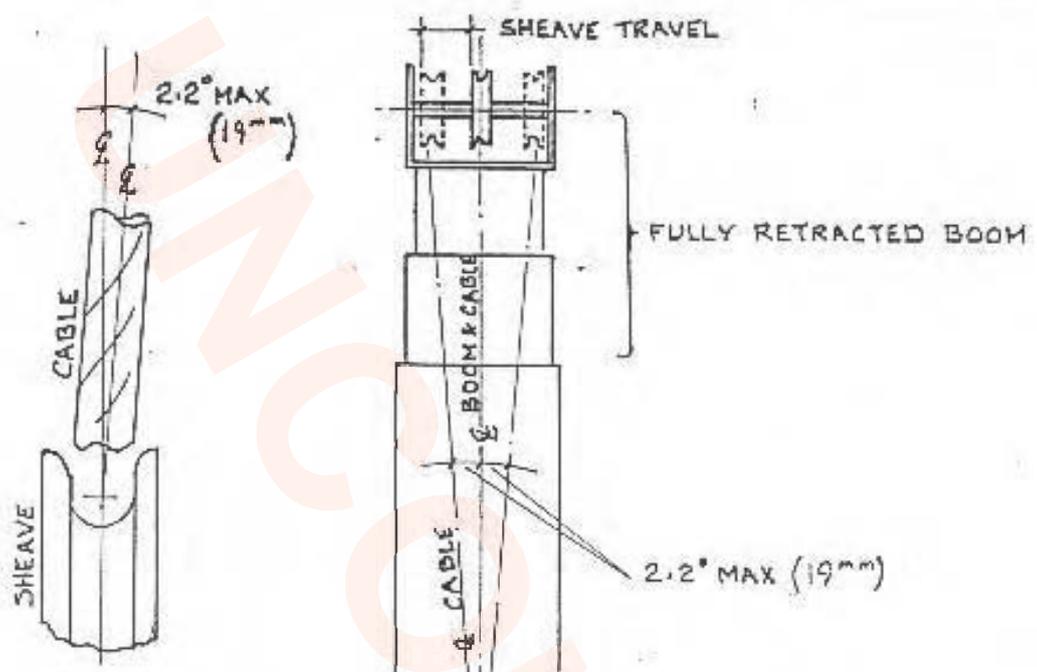
LSI-ROBWAY  
32 WEST THEBARTON RD  
THEBARTON 5031  
SOUTH AUSTRALIA  
PHONE +61 8 8352 6055  
FAX +61 8 8352 1684

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





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



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

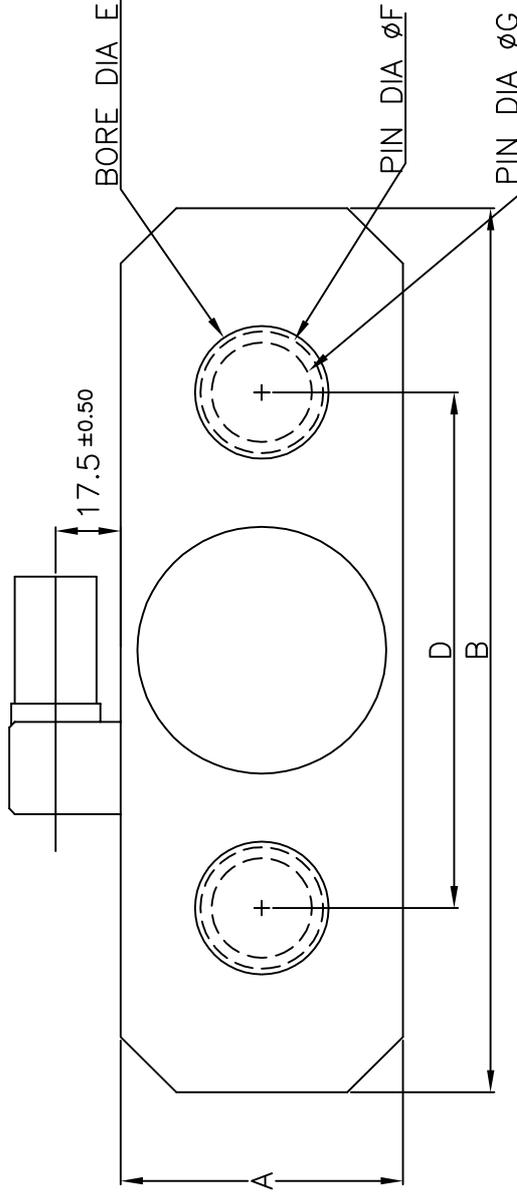
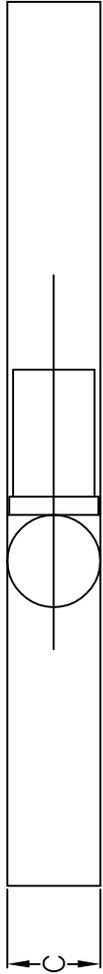
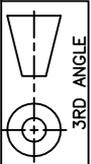
WHEN POSITIONING DYNAMOMETER ON END OF BOOM CHECK THAT WINCH CABLE FLEET ANGLE IS WITHIN VALUE AS SHOWN IN TABLE, & NOT DEFLECTED MORE THAN STATED ANGLE FROM ROPE'S NORMAL LINE.

POSITION ACCORDING TO ROPE LIMITATIONS,

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

PLAN VIEW

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



**GENERAL SPECIFICATIONS**

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

**PIN DIA ØG USING REDUCING BUSH (BUSHR1015)**

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

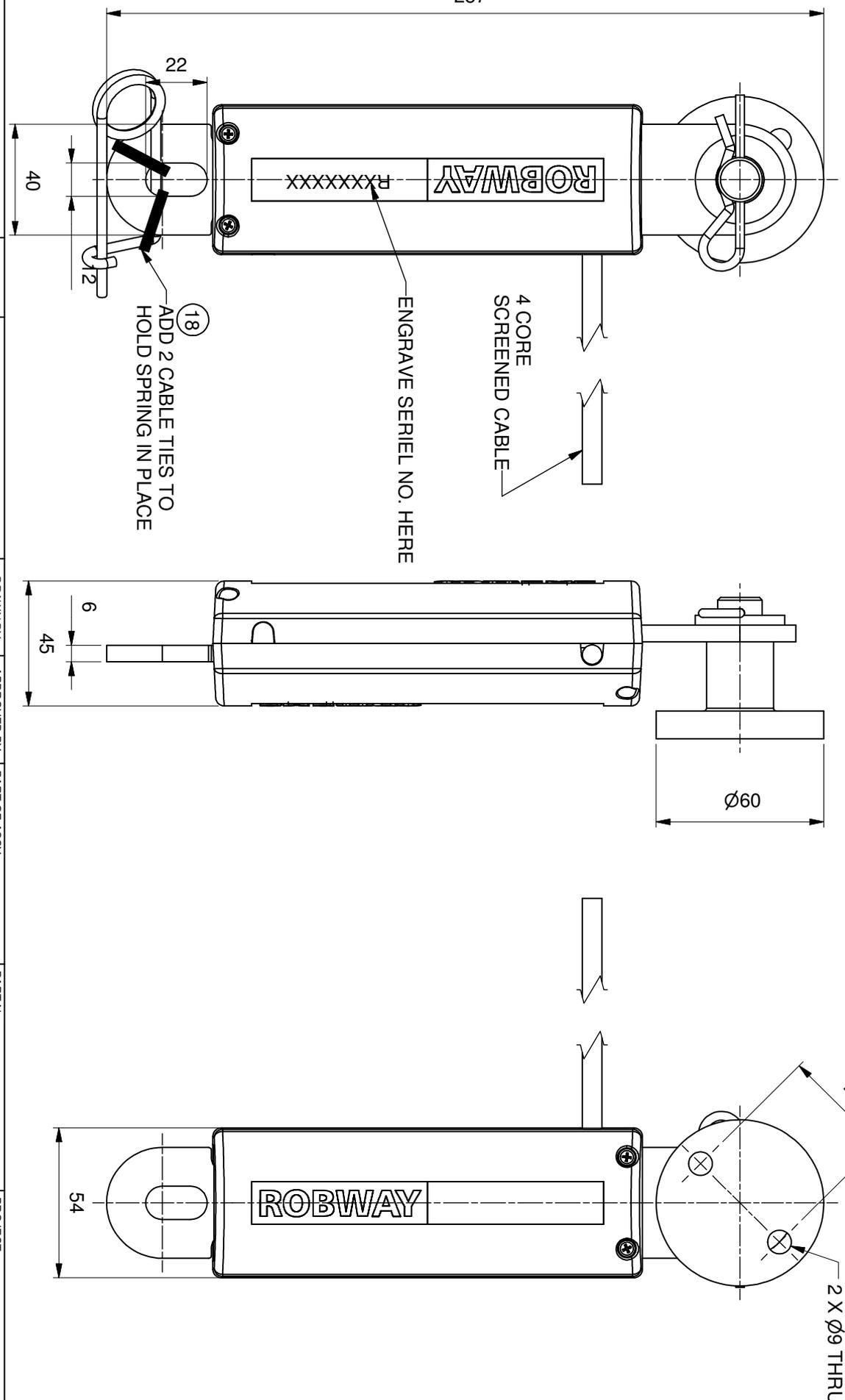
<b>REV</b>	<b>DATE</b>	<b>DESCRIPTION OF CHANGE</b>	<b>M.O.</b>	<b>APPROVED</b>	<b>PART OF ASSY</b>	<b>PART No:</b>	<b>PROJECT:</b>
1.1	06/05/98	REFER TO DR#480					
1.2	05/11/98	REFER TO DR#564		M. TURNER			
1.3	05/01/06	ADD 20T TENSION CELL & SPACER DETAIL		M. TURNER			
1.4	30/5/13	REFER PCR 489		08/03/96			
1.5	18/7/13	17.5±0.5 was 16.0		15/01/97			
						<b>LSI-ROBWAY</b> 32 WEST THEBARTON RD THEBARTON 5031 SOUTH AUSTRALIA PHONE +61 8 8352 6055 FAX +61 8 8352 1684	
				<b>TITLE:</b> TENSION PLATE CELL DIMENSIONS TO SUIT 10, 15, 20, 30, CELLS		<b>DRAWING No:</b> DWG 0990	
				<b>SCALE:</b> N/A		<b>FILE No:</b> 099001AF.DWG	
				<b>SHEET:</b> 1 OF 1		<b>REV:</b> 1.5	







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



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

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

DO NOT SCALE DRAWING  
UNLESS OTHERWISE STATED

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

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

**Appendix 7.6.**  
**Motion Cut Connection**





## **Appendix 7.7.**

### **System Configuration Sheets & Function Codes (1445 and 1455 Systems)**



## 1445 SYSTEM CONFIGURATION SHEET

Chip Number **1445 V3.0**Function Code List **01401.FCN**

### LOAD SENSOR

 Load cell     Pressure Transducer     Other

### CRANE CONFIGURATION

	<i>Supplied</i>	<i>Changed To</i>		
SWL % for Intermittent Red light and Audible	85.0		%	[ F-10 ]
SWL % for Continuous Red light and Audible	100.0		%	[ F-11 ]
SWL percentage for motion cut	110.0		%	[ F-12 ]
Maximum Linepull	5.0		t	[ F-13 ]
Maximum Falls	1			[ F-14 ]

By **YZ***Prepared*For **ROBWAY SAFETY SYSTEMS**Date **2004-06-08**

## ROBWAY 1445 DISPLAY CALIBRATION PROCEDURE WITH USER CONFIGURABLE OPTIONS

### WARNING

**CALIBRATION SHOULD ONLY BE DONE BY ROBWAY TRAINED PERSONNEL.  
MISUSE OF CALIBRATION FUNCTIONS MAY CAUSE THE DISPLAY TO FUNCTION INCORRECTLY**

1. Press and hold **CANCEL** while switching on the **1445** display, release **CANCEL** after the first short beep. After finishing the self-test procedure the display should show 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.

*In calibration mode you may use CANCEL key to cancel any function*

## FUNCTION CODES

F-00	EXIT CALIBRATION MODE
F-01	VIEW UNCALIBRATED LOAD SIGNAL
F-02	VIEW CALIBRATED LOAD
F-03	CALIBRATE LIGHT LOAD
F-04	CALIBRATE HEAVY LOAD
F-05	NUMBER OF SAMPLES TO AVERAGE
F-06	SELECT RADIO FAMILY ADDRESS
F-07	USE RADIO LOAD (ON/OFF)
F-08	USE RADIO ATB (ON/OFF)
F-09	<b>CLEAR ALL CALIBRATION DATA ( USE EXTREME CAUTION )</b>
F-10	PERCENTAGE LIMIT FOR INTERMITTENT RED LIGHT AND AUDIBLE ALARM
F-11	PERCENTAGE LIMIT FOR CONTINUOUS RED LIGHT AND AUDIBLE ALARM
F-12	PERCENTAGE LIMIT FOR MOTION CUT
F-13	MAXIMUM LINEPULL
F-14	MAXIMUM FALLS

# 1455 SYSTEM CONFIGURATION SHEET

Chip Number **1455 V3.01**

Function Code List **91649.FCN**

## LOAD SENSOR

Load cell   
  Pressure Transducer   
  Other

## CRANE CONFIGURATION

	<i>Supplied</i>	<i>Changed To</i>		
SWL % for Intermittent Red light and Audible	85.0		%	[ F-16 ]
SWL % for Continuous Red light and Audible	100.0		%	[ F-17 ]
SWL % for Delayed Motion Cut	110.0		%	[ F-18 ]
Time for Delayed Motion Cut	1.0		Sec	[ F-19 ]
SWL % for Immediate Motion Cut	120.0		%	[ F-20 ]
Maximum Linepull for Main winch	5.0		t	[ F-21 ]
Maximum Falls for Main winch	1			[ F-22 ]
Maximum Linepull for Aux. winch	5.0		t	[ F-23 ]
Maximum Falls for Aux winch	1			[ F-24 ]

By **YZ**

*Prepared*

*For* **ROBWAY SAFETY SYSTEMS**

*Date* **2006-10-16**

# ROBWAY 1455 DISPLAY CALIBRATION PROCEDURE WITH USER CONFIGURABLE OPTIONS

## WARNING

**CALIBRATION SHOULD ONLY BE DONE BY ROBWAY TRAINED PERSONNEL. MISUSE OF CALIBRATION FUNCTIONS MAY CAUSE THE DISPLAY TO FUNCTION INCORRECTLY**

1. Press and hold **CANCEL** while switching on the **1455** display, release **CANCEL** when display shows "1455"
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.

*In calibration mode you may use CANCEL key to cancel any function*

## FUNCTION CODES

F-00	EXIT CALIBRATION MODE
F-01	VIEW UNCALIBRATED MAIN LOAD SIGNAL
F-02	VIEW CALIBRATED MAIN LOAD/FALL
F-03	CALIBRATE LIGHT MAIN LOAD
F-04	CALIBRATE HEAVY MAIN LOAD
F-05	VIEW UNCALIBRATED AUX. LOAD SIGNAL
F-06	VIEW CALIBRATED AUX. LOAD/FALL
F-07	CALIBRATE LIGHT AUX LOAD
F-08	CALIBRATE HEAVY AUX. LOAD
F-09	NUMBER OF LOAD SAMPLES TO AVERAGE
F-10	SELECT RADIO FAMILY ADDRESS
F-11	USE RADIO LOAD ON MAIN (ON/OFF)
F-12	USE RADIO LOAD ON AUX. (ON/OFF)
F-13	USE RADIO ATB ON MAIN (ON/OFF)
F-14	USE RADIO ATB ON AUX. (ON/OFF)
F-15	<b>CLEAR ALL CALIBRATION DATA ( USE EXTREME CAUTION )</b>
F-16	PERCENTAGE LIMIT FOR INTERMITTENT RED LIGHT AND AUDIBLE ALARM
F-17	PERCENTAGE LIMIT FOR CONTINUOUS RED LIGHT AND AUDIBLE ALARM
F-18	PERCENTAGE LIMIT FOR DELAYED MOTION CUT
F-19	TIME FOR DELAYED MOTION CUT
F-20	PERCENTAGE LIMIT FOR IMMEDIATE MOTION CUT
F-21	MAXIMUM LINEPULL FOR MAIN WINCH
F-22	MAXIMUM FALLS SELECTABLE FOR MAIN WINCH
F-23	MAXIMUM LINEPULL FOR AUX. WINCH
F-24	MAXIMUM FALLS SELECTABLE FOR AUX. WINCH

