



W3375R RADIO LOAD INDICATOR

Installation and Calibration Manual

Ref: VH sept 2003

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The purpose of this manual is to provide the customer with the operating procedures essential for the promotion of proper machine operation for its intended purpose. It is important to over-stress proper usage. All information in this manual should be read and understood before any attempt is made to operate the machine. Since the manufacturer has no direct control over machine application and operation, conformance with good safety practice in this area is the responsibility of the user and his operating personnel.

All procedures herein are based on the use of the system under proper operating conditions, with no deviations from the original design. Alteration and/or modification of the equipment is strictly forbidden without written approval from Rayco Technology Group. The W3375R Wylie Systems load indicator is to be regarded only as an aid to the operator.

This system must never be used, under any circumstances, as a substitute for the good judgment of a crane operator when carrying out approved crane-operating procedures. Responsibility for the safe operation of the crane lies with the crane operator. The indicator equipment will not necessarily prevent crane damage due to overloading and related causes if not set properly.

Before operating a crane equipped with a Wylie system indicator, the operator must carefully read the information in both this manual and the crane manufacturer operator's manual. He must also have read and understood the CIMA safety manual, the latest ASME B30.5 standard and the current OSHA, federal, state and local regulations applicable to his job. Correct functioning of the system depends upon routine daily inspection.

Any suspected faults or apparent damage should be immediately reported to the responsible authority before using the crane.

SINCE SAFETY OF PERSONNEL AND PROPER USE OF THE MACHINE IS OF PRIMARY CONCERN, DIFFERENT SYMBOLS ARE USED THROUGHOUT THIS MANUAL TO EMPHASIZE CERTAIN AREAS. THE FOLLOWING DEFINITIONS INDICATE THE LEVEL OF HAZARD WHEN THESE SYMBOLS APPEAR THROUGHOUT THIS MANUAL.

WHENEVER ONE OF THESE SYMBOLS APPEARS IN THIS MANUAL, PERSONNEL SAFETY IS A CONCERN. PLEASE TAKE TIME TO READ AND UNDERSTAND THESE DEFINITIONS!



DANGER: INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY.



CAUTION: INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, MAY RESULT IN MINOR OR MODERATE INJURY. IT MAY ALSO BE USED TO ALERT AGAINST UNSAFE PRACTICES.



IMPORTANT: INDICATES A SITUATION THAT MAY CAUSE MACHINE DAMAGE IF NOT CORRECTLY FOLLOWED.



NOTE: PROVIDES INFORMATION THAT MAY BE OF SPECIAL INTEREST.

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GENERAL DESCRIPTION

1.1 - Introduction

This manual contains installation, calibration and troubleshooting information for the W3375R load indicator system. Information in this manual will enable qualified personnel to install, calibrate and troubleshoot the W3375R system efficiently.

1.2 - Personnel qualification and scope of this manual

This manual is intended for use by field engineering and repair personnel, who are fully qualified and trained to perform the procedures described in this manual.

This manual is divided into the following sections:



SECTION 1 - GENERAL DESCRIPTION

SECTION 2 - INSTALLATION

SECTION 3 - CONFIGURATION AND CALIBRATION

1.3 - Brief description of the W3375R system

The W3375R is a computerized crane safety system. It measures load, boom angle (optional) and if configured correctly it indicates safe or hazardous conditions. It comprises wireless sensors fitted to the crane and a display located in the crane cabin.

The load sensors provide electrical signals that are proportional to the actual loads in the load hoist rope system of the crane. An inclinometer provides a signal that is proportional to the boom angle (optional). A wireless Anti-Two-Block switch to prevent two block condition is also available in option.

The Wylie W3375R has been designed to provide the crane operator with the information necessary for him/her to operate the crane safely and within the maximum load set by the operator himself.

The indicator functions by automatically monitoring the load applied to the crane and continuously comparing this load with the limit set by the operator. The display unit of the indicator system provides continuous information relating to the crane loading and warns the operator when he/she is approaching or exceeding a preset limit.

The values of hook load, maximum load and the boom angle are displayed in digital form on a liquid crystal display (LCD).

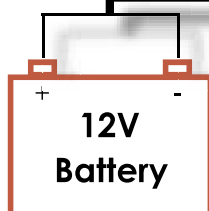
Figure 1: W3375R Block Diagram

**RADIO LOAD
LINK/PIN**



**Radio Angle
Sensor
(optional)**

**Radio A2B
Switch
(optional)**



**12V
Battery**

**Motion Cut
Relay
(optional)**

1.4 - W3375R specifications

1.4.1 - Display

- LCD (16 characters x 2 rows) with big characters (7.8 x 5 mm)
- Viewing area of 99 mm wide x 24 mm high
- LED backlight (yellow-green)
- 2 Color alarm status LED

1.4.2 – Sensor excitation

- Lithium battery powered (3V)

1.4.3 – Relay output

- 1 relay NO/NC contacts rated @ 5A

1.4.4 – Environmental

- Operating: -20 to +55 °C (slow display below -10 °C)
- Storage : -30 to +80 °C

1.4.5 – Input power

- 11 – 30 VDC (10W typical, 20W max)

1.4.6 – Enclosure

- IP67 Display and processing unit



The W3375R display is rated IP-67

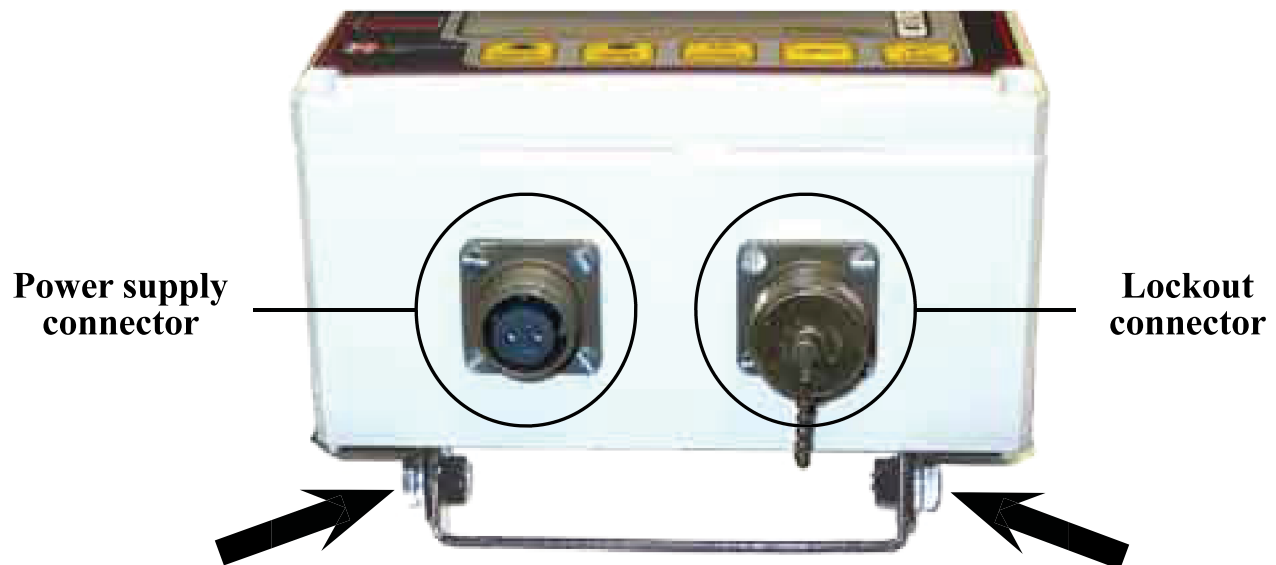


INSTALLATION

2.1 – Display mounting

The display is mounted on a bracket assembly that enables the unit to be tilted for optimum viewing angle.

The display should be located at the front of the cab, where it is readily visible from the operator's control position but does not interrupt the external view of the load working area. This is usually easier to accomplish when the display is mounted low in the operator's field of view. Also, if the display is mounted high in the cab, it can be hard to see against the sun. Take care not to obscure any crane instruments, control levers, or switches etc. Locate the best area and drill 2 x 1/4" mounting holes to match those in the bracket.

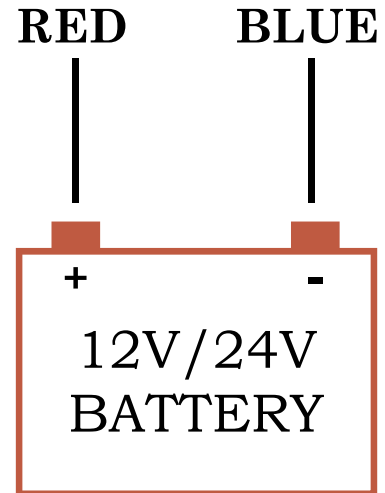


The viewing angle of the display can be adjusted using the two 7/16" hexagonal cap screws located each side of the bracket.

2.2 – Display connections

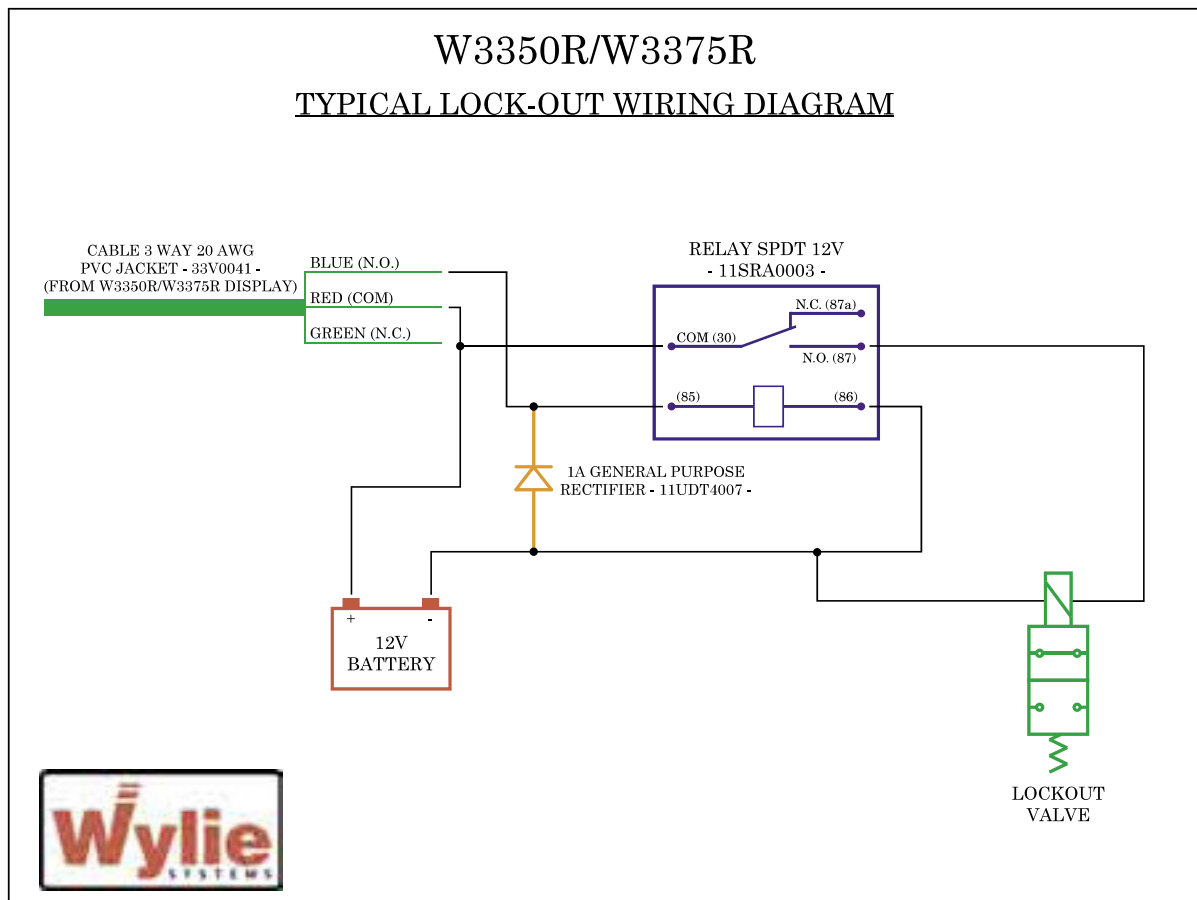
POWER CABLE:

The W3375R is sold with a 15 feet power cable that connect to the display left side connector. Connect either a +12VDC or +24VDC power source to the other end of the power cable. **The RED wire connect to the positive supply (+) and the BLUE wire to the negative supply (-).** Supply voltage must be a minimum of 11 volts and must not be greater than 30 volts otherwise over-voltage protection will be activated and will blow the protective input fuse.



LOCKOUT CABLE:

An optional 25 feet lockout cable can be connected to the right side connector of the display unit. The lockout connection is according to your specific lockout configuration. The relay is controlled in 'Fail Safe' mode, that is it will be closed during normal operation, relay status of COM-NO, and open during alarm or power-off, relay status of COM-NC.

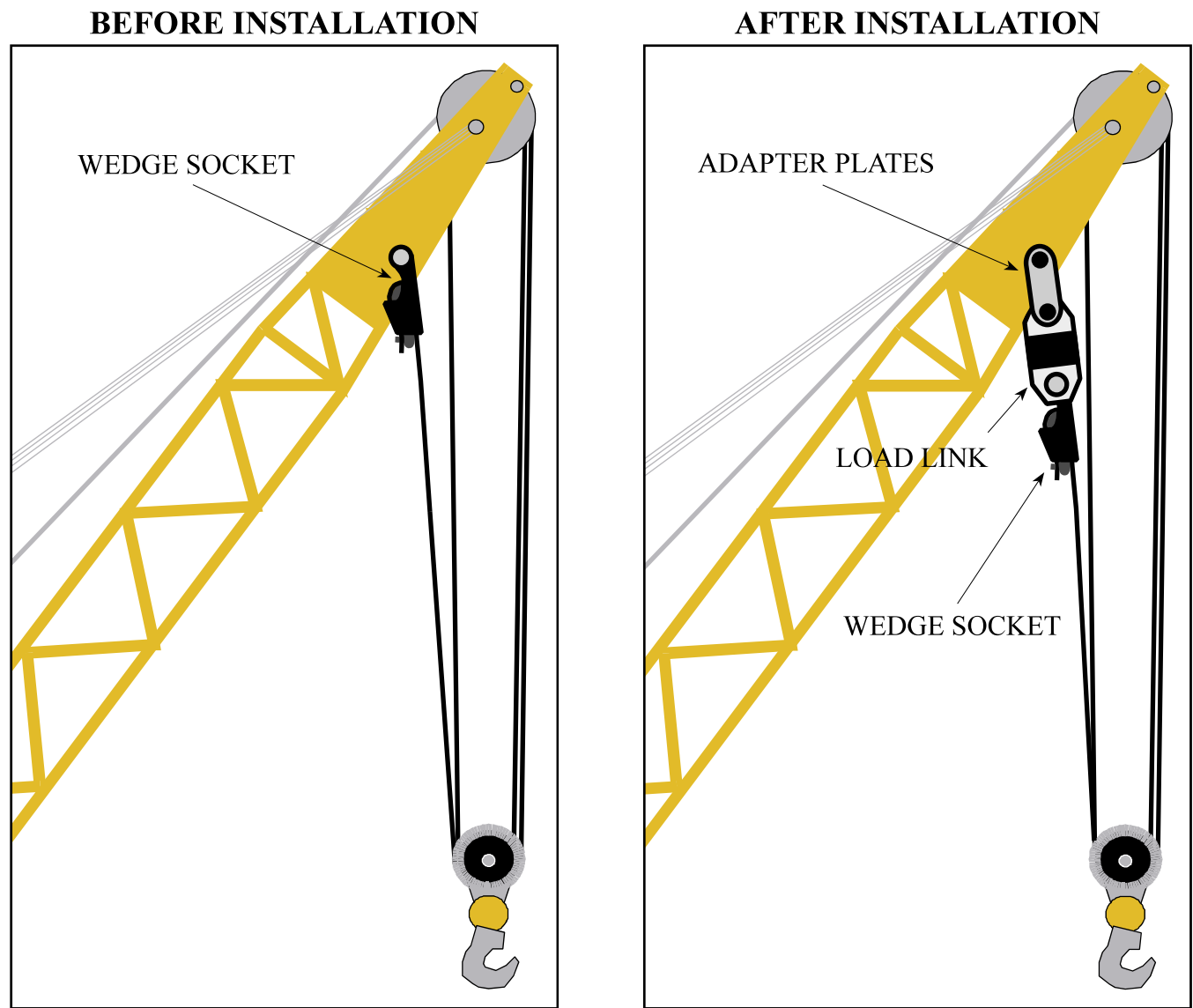


2.3 – Load link installation

Load link are generally installed on the hoist line's dead-end attachment to the boom. They measure the hoist line tension.

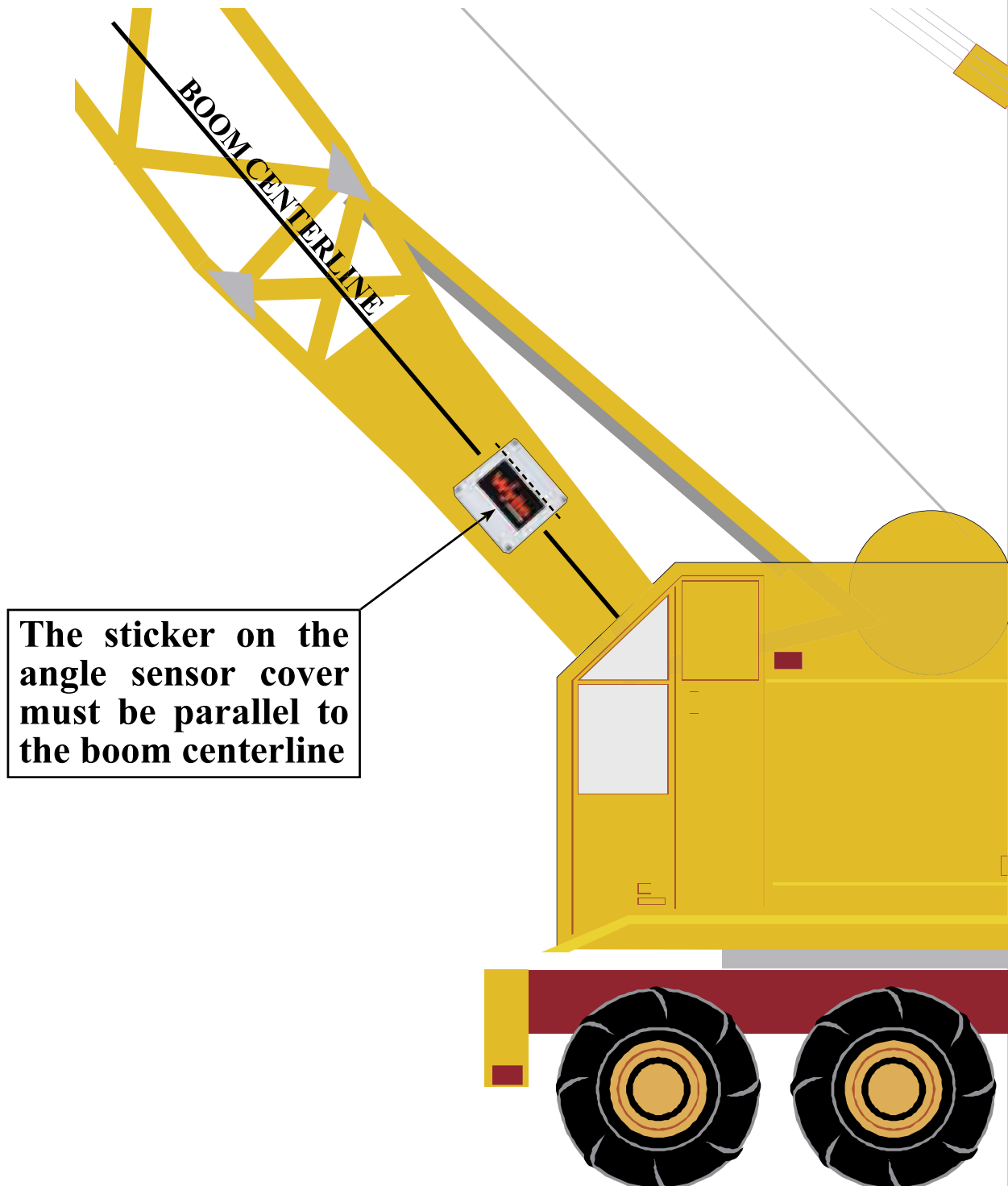
To install the load link:

- 1) Unpin the wedge socket or other hoist line attachment from the boom's dead-end point.
- 2) Pin two adapter plates to the boom dead-end.
- 3) Pin the load link to the adapter plates.
- 4) Pin the wedge socket or other attachment to the load link.



2.4 – Angle sensor installation

The angle sensor is typically mounted on the left hand side of the boom base section or in the inside of the right hand side plate of the boom base section. The sensor can be mounted by clamping, welding or bolting to the boom base section. The sensor is mounted so that the sticker on the cover is parallel to the centerline of the boom.



The easiest method of mounting the angle sensor is by using weld lugs. For this reason, the angle sensor is provided with two weldable mounting lugs. Mount the weld lugs to the angle sensor bracket and position the sensor so that the sticker is parallel to the centerline of the boom. While holding the sensor in position, tack weld lugs to the boom base section sideplate. Remove sensor from the weld lugs, finish welding the lugs to the boom base side plate and then remount the angle sensor.



WELD LUG

It is sometimes preferable to drill holes in the boom base sideplate to mount the sensor instead of using weld lugs. Position the angle sensor as described above, then mark and drill the holes for 1/4" bolts. Bolt the sensor to the boom base sideplate.

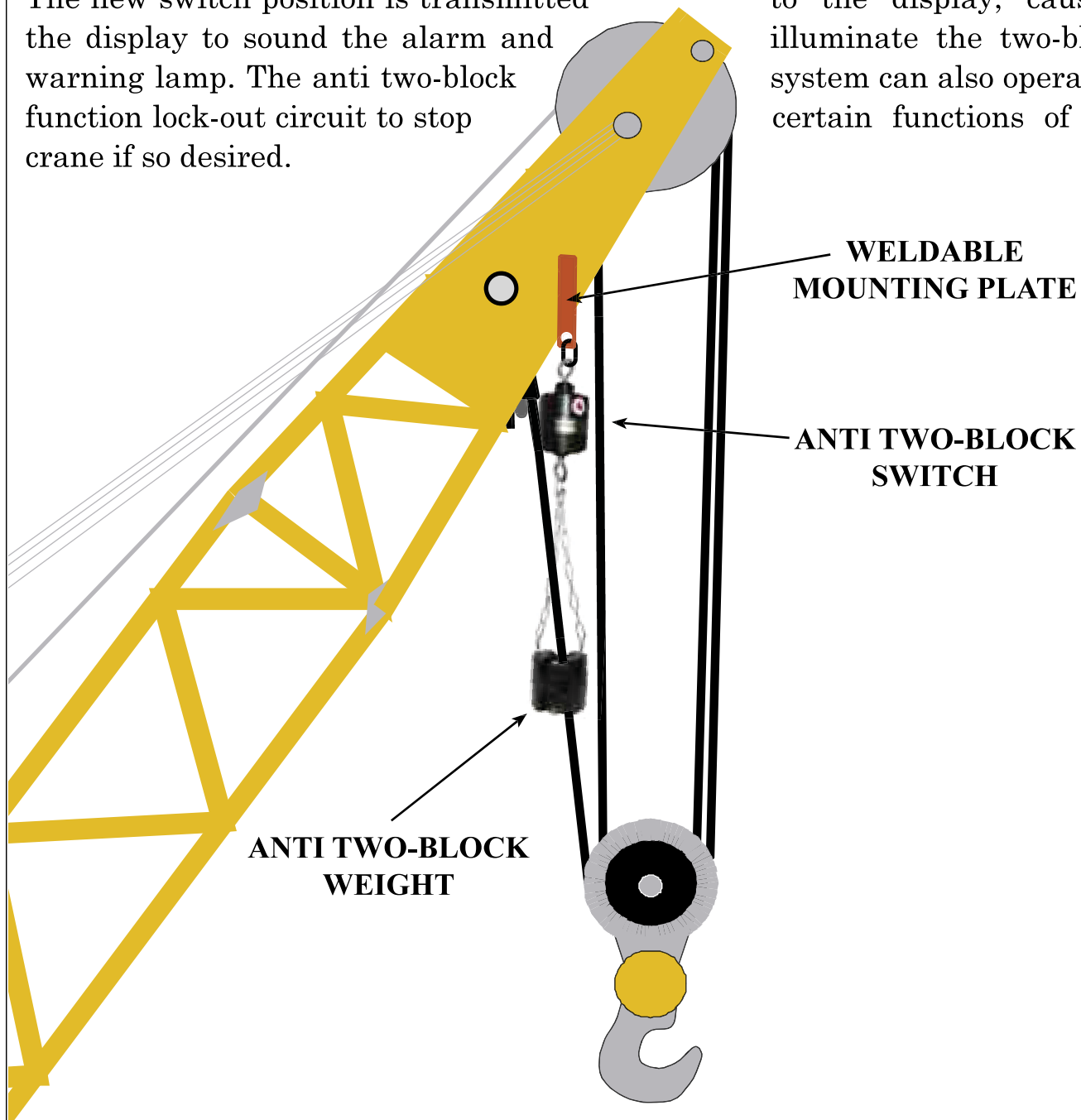
In some situations, a manufacturer will not want drilling or welding to the boom. In these cases, it is necessary to clamp the angle sensor to the lacings of the boom (for a lattice crane boom). This will require 4 pieces of flat steel strip and mounting bolts, typically 1/4" bolts. Clamp the pieces of steel strip to the boom lacings on the left hand side of the boom base, spacing them so that the outside pieces can be drilled to mount the angle sensor with the sticker parallel to the boom centerline. Locate the sensor as above, and mark and drill the outside pieces to mount the angle sensor. Bolt the sensor on the flat steel strips.



Never cut, drill or weld to the boom lacings or chords, as this permanently damages the boom and creates a dangerous condition. Always obtain permission from the crane manufacturer before doing any drilling or welding on or near any crane structural area.

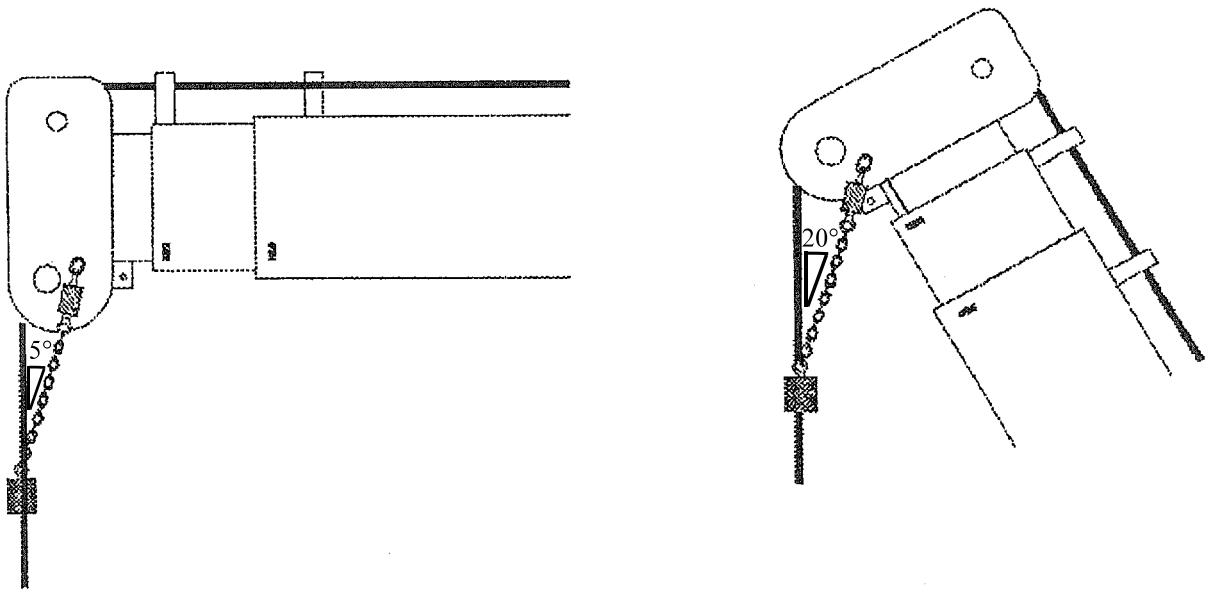
2.5 – Anti two-block switch installation

The anti two-block switch is a spring pressured, normally open switch used to provide a warning to the operator that the hook block is approaching the boom tip sheaves or the upper block. An anti two-block weight is hung from the anti two-block switch, holding the switch in a closed contacts position. Depending upon the design, this weight is loosely clamped around one or more of the hoist line falls below the boom tip. When the hook block is raised into the weight it lifts the weight, allowing the switch to return to the open contacts position. The new switch position is transmitted to the display, causing the display to sound the alarm and warning lamp. The anti two-block function lock-out circuit to stop crane if so desired.



The anti two-block switch is mounted at the boom or jib tip in a location which allows the switch to hang freely suspended through the boom's range of motion. This will allow it to follow the hoist line as the boom angle changes. The switch should be mounted so that there is little or no side pull on the switch when the weight is clamped around the hoist line. It is preferable to install the anti two-block weight on the slowest moving part of the hoist line's reeving. This is typically the last line (the dead-end).

The ideal angle of assembly (switch, chain and weight) with the hoist line is between 5 degrees and 25 degrees at all boom angle. To keep this tolerance, the mounting bracket should be installed as close as possible to the head sheave center pin and sticking out about 3 to 5 inches away from the outmost sheave. In no instances, must the switch lean or touch parts of the boom during operation: this would cause side forces on the switch leading to mechanical wear.



Once the mounting location is determined, weld the mounting plate in the proper position. Refer to previous notes about welding on the crane boom in the angle sensor installation section of this manual. The weight will be clamped around the proper hoist rope then attached to the bottom of the switch. Please note that the anti two-block weight should move freely on the hoist rope and not bind on the hoist rope. If the weight is too tight on the hoist rope, false two-block indications will occur.

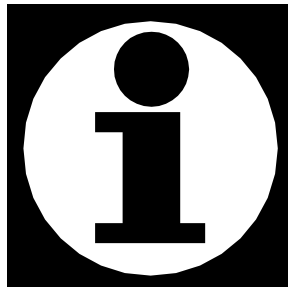


CONFIGURATION AND CALIBRATION

The calibration section will guide the technician and explain the procedures to follow, in order to calibrate the W3375R system rapidly and efficiently.

The calibration of the sensors is performed using software by entering data using the display's keypad.

Necessary Calibrating Tools	<ul style="list-style-type: none">• Angle indicator with accuracy of 0.5° or better.• Test load that produces a line pull of approximately 90% of line pull.
Necessary Calibration Information	<ul style="list-style-type: none">• The rated line pull of each hoist line.• The maximum number of parts of lines.• The weight of each block (within $\pm 1\%$), slings and attachment used for calibration.

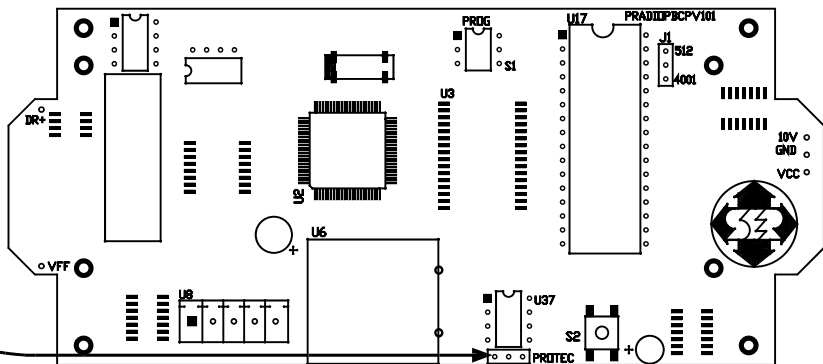


THE W3375R IS FACTORY CALIBRATED. THIS CALIBRATION PROCEDURE IS TO BE USED ONLY IF CALIBRATION IS LOSS OR CORRUPTED.

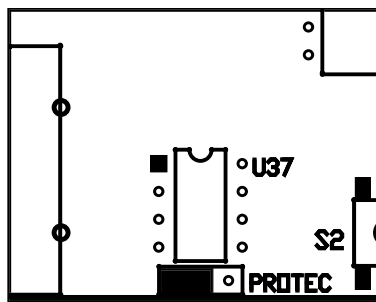
3.1 - Memory Protection

The W3375R system has both a hardware and software key to protect the data calibration. The hardware key protection is implemented by the calibration jumper located on the CPU board. When you place the calibration jumper to the PROTEC position, the hardware protection is enabled and you are not allowed to enter calibration data in the memory bank.

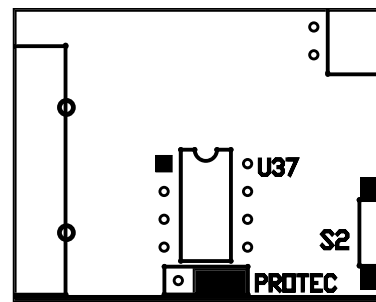
Close up view of the calibration jumper located on the CPU board. When the switch is placed on the PROTEC position, calibration modification is disabled.



The W3375R CPU board



Jumper set to the calibration enabled position (non-protect).



Jumper set to the calibration disabled position (protect).

MAKE SURE THAT THE CALIBRATION SWITCH IS SET TO THE NON-PROTEC POSITION BEFORE STARTING CALIBRATION OF THE SYSTEM. WHEN THE CALIBRATION IS OVER SET THE SWITCH TO THE PROTEC POSITION TO PREVENT YOUR CALIBRATION DATA FROM BEING CORRUPTED.

3.2 – System Initialization

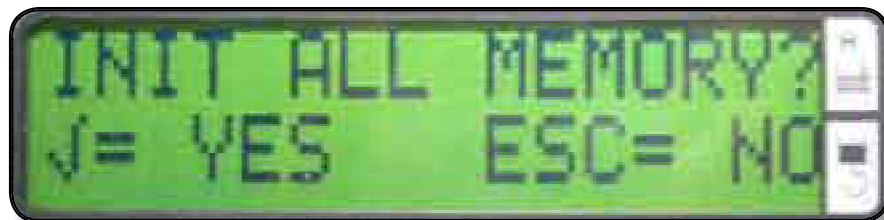
When each sensor has been verified for its full functionality the system can be initialized in order to start the calibration procedure. This will obliterate all calibration data from the memory bank, and therefore should be done only when a system is FULLY re-calibrated.

Perform a system initialization as follows:

1. Press and hold buttons #1 and #2 at the same time when the system is powered up.



AND



2. Press Select (#5) to confirm your choice.



3.3 - Calibration Mode

The calibration mode is a separate entity of the w3375r system. It is totally independent of the regular operating mode as if it was a different system. The purpose of the calibration mode is to calibrate the angle sensor, the load sensor(s) and numerous factors or set points.

The calibration mode is accessed by pressing both button #1 and button #5 in normal operation.



The calibration mode is organized in a linear sequence. A series of 16 items will appear. The SCROLL UP (#1) or SCROLL DOWN (#2) buttons



will allow you to navigate through these items. Although in calibration mode it is possible to navigate and access any stage of the calibration, it is recommended (and sometimes essential) that the system is calibrated in the order described in this manual.

CALIBRATION MENU:

- | | |
|-------------------|-------------------|
| 1- ZERO LOAD | 8- APPROACH % |
| 2- SPAN LOAD | 9- OVER % |
| 3- ZERO ANGLE | 10- CUT OFF % |
| 4- MAXPARTS | 11- TX ID AUTOMAT |
| 5- ROPE LIM. MAIN | 12- TX ID MANUAL |
| 6- ROPE LIMIT AUX | 13- RELAY FUNCT. |
| 7- DISPLAY UNITS | 14- TX BATTERY(V) |

3.4

Calibration Procedure

STEP 1

The first thing to do is to **identify the transmitters used with the system**. Each transmitter is labeled with a serial number that contain the TX ID number (ie the serial #). It is a 4 digit hexadecimal number (0-9 and A-F). Example: 8675, A457, 7BF4. The TX ID number can be entered by two different way: manually or automatically.

MANUALLY: in the calibration menu, scroll down with button #2 to choose the “12 -TX ID MANUAL” line and push the button #5 to enter the menu.






The display should now show:



Select «A)LOAD SENS.MAIN» with button #5. The display should now show:



Use the UP  or DOWN  button to choose the first character and press  when it's done. The cursor shifts automatically to the next character once your selection is made. Enter the whole TX ID number for your main load sensor.

AUTOMATICALLY: in the calibration menu, scroll down with button #2 to choose the “11 -TX ID AUTOMAT” line and push the button #5 to enter the menu. The display should now show :



Push the button #5 to select the load sensor. Now the display will show :



Now the system will wait to receive a transmission from any load sensor.

You can wait for a maximum of 5 minutes until you receive a transmission from your main load sensor or you can force a transmission by lifting a load with your main hoist. As soon as the load sensor transmits, its tx id will appear on the second line of the display.



Push button #5 to accept it.



WARNING : since the tx id automatic can identify any load sensor transmitter, it can identify another load sensor from Wylie systems if there is another in the near area. Be sure that the tx id suggested by the system is really the one you want. If the ID is not the one on the label of the transmitter, push the button #2 and the system will wait for a different tx id.



Repeat the procedure for the angle sensor and the anti two-block switch TX ID number, if those options are fitted on the crane. Instead of choosing load sens. main, push button #2 to select a different sensor.

STEP 2

The second step is to select the **display units**.

Scroll the calibration menu with the up and down button to the line:

7- DISPLAY UNITS

and push the button #5 to enter this menu. The display will show:



You can use the up or down button to scroll between 5 different choices : pounds (lbs), tonne (te), 1000 pounds (Klb), Kilograms (Kg) and Tons (T). Push button #5 when the desired unit is on the screen.

STEP 3

The third step is to enter the **maximum number of parts of line**.

Scroll the calibration menu with the up and down button to the line :

4- MAX PARTS

and push button #5 to enter it. The display will show :



Use the up, down and select (#5) button to enter the maximum parts of line to be used.



The max parts of line is not the current number of parts rigged on the machine. It is only to restrict the operator in the choice of the parts of line. For exemple, if the max parts is set to 01, this mean that the operator won't be able to change his parts of line to 2 or more.

STEP 4

The next step is to **calibrate the load sensor**.

Before starting the load sensor calibration, make sure that the correct crane configuration is set in the normal mode: the number of parts of line rigged and the actual hoist selection are important factors for load sensor calibration because the zero and span load will take those parameters into account.

Scroll with the up and down button in the calibration menu to the line:

1- ZERO LOAD

and push button #5 to enter it. The display will show:



The number on the first line is the value (in bits) of the load. Without any load applied (load cell on a shelf), this number should be around 500. With the up, down and select (#5) button, enter the load value in the second line of the display. This value should be the weight of the slings, hook block, shackles, and hoist line below boom tip.

Scroll down one time to the line:

2- SPAN LOAD

and push button #5 to enter it. The display should now show:



Slowly lift a large test load (between 50% and 90% of the maximum rated capacity for the current parts of line and crane configuration) and then stop smoothly. The value on the first line of the display should be above 1500.

The value on the second line of the display must match the true value of the suspended load (load, slings, hook block, shackles, hoist line below boom tip) in thousand pounds or kilos depending the units of measure selected. To adjust this value use the up (#1) and down (#2) buttons to select the value of the first digit and press the select button (#5) to accept it. Repeat this procedure with remaining digit(s). The load sensor is now calibrated.



Note: the biggest load (without overloading the crane) you can use for calibration, the better precision you will get with the system.

STEP 5

The next step is to **calibrate the angle sensor** (only if the option is installed). Scroll with the up (#1) and down (#2) button the calibration menu to the line:

3- ZERO ANGLE

and push button #5 to enter it. The display will show :



Boom down to zero degrees or near and enter the angle of the boom with the up (#1), down (#2) and accept (#5) button.

Scroll down one line to:

STEP 6

Enter the **rope limit (line pull)**.

Scroll the calibration menu to the line :

«5-ROPE LIM. MAIN»

Use the up (#1), down (#2) and accept (#5) button to enter the rope limit of the main hoist (line pull).



To be able to use the auxiliary hoist and calibrate it, you must enter a value in the rope limit aux menu. You can use the same load sensor for the main and the auxiliary if you enter the same tx id for both sensors.



To calibrate the auxiliary hoist, you must select it in the normal operation mode then enter in the calibration mode of the W3375R.

STEP 7

The next step is to enter the **CUT OFF %**, **OVER %** and **APPROACH %**.

Those values are the percentage of the load when the system will activate the lock out function (CUT OFF %), light up permanently the limits led and the buzzer (OVER %) and make the limits led blink and buzzer sound on and off (APPROACH %).

First scroll the calibration menu with the up and down button to the line :

“10- CUT OFF %”

Push button #5 to enter it. The default value is set to 120 %. Thus mean that as soon as you will lift a load heavier or equal to 120 % of the maximum load set, the system will be in a lockout condition.

Use the up (#1), down (#2) and accept (#5) button to enter the desired value.



The CUT OFF value can not be lower than the OVER value and the OVER value can not be lower than the APPROACH value.

Proceed the same way to enter the OVER and the APPROACH values.

STEP 8

The last step is to set the **relay function**. Scroll the calibration menu with the up and down button to the line :

13-RELAY FUNCT.

and push the select button (#5) to enter it. The display will show :

«RELAY FUNCTION :»
«A2B + CUT-OFF»

Use the up or down button to scroll between the 5 different options.

A2B + CUT-OFF : this means that the system relay will react when an A2B condition or a CUT OFF condition occurs.

CUT-OFF ONLY : this means that the system relay will react only when a CUT OFF condition occurs.

A2B ONLY : this means that the system relay will react only when an A2B condition occurs.

EXT. BUZZER : this means that the system relay can be used to drive an external relay.

CAB. BUZZER : this means that the system relay will act the same way as the buzzer in the display.

When the desired function is on the second line of the display, push the select button (#5) to save it.

Notes

[illegible]

