

The background of the title section is a faded image of the W3100 Rated Capacity Indicator device. It is a rectangular control panel with a large digital display showing various readings like "0011 ft", "main boom", "M 10.1 26.5", and "4 15.5 866.5". To the right of the display are several buttons with symbols and labels like "TARE", "BYPASS", and "RIG". The text "RATED CAPACITY INDICATOR" is visible at the bottom left of the device, and "W 3100" is at the bottom right.

# W3100 TELESCOPIC BOOM CRANE RATED CAPACITY INDICATOR Operator's Manual

Ref: VH oct 2005

Crane Warning Systems Atlanta  
1-877-672-2951 Toll Free  
1-678-261-1438 Fax  
[www.craneindicators.com](http://www.craneindicators.com)  
[sales@craneindicators.com](mailto:sales@craneindicators.com)

















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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 W3100 Wylie Systems rated capacity 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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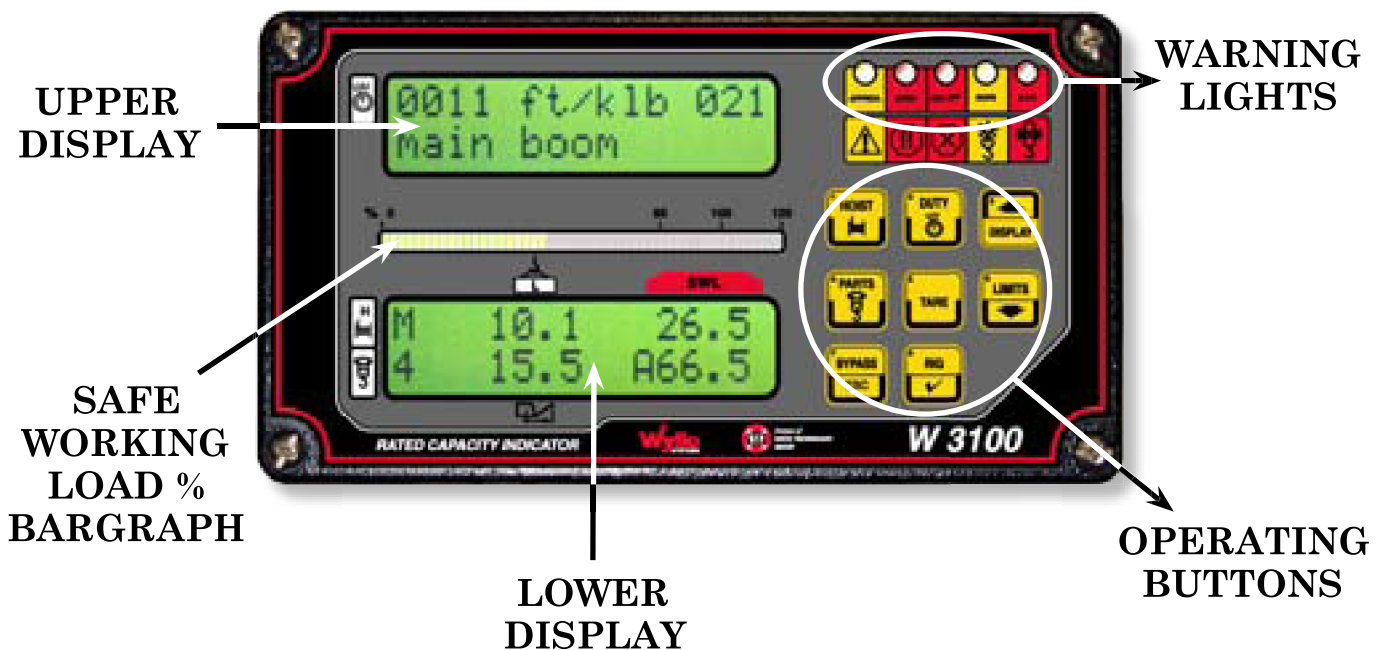
## GENERAL DESCRIPTION OF THE SYSTEM

### 1.1 Introduction

The Wylie W3100 Rated Capacity Indicator (RCI) system is a length, load, angle, radius, lifting capacity and anti two-block indicator. It has been designed to provide the crane operator with the information necessary for him/her to operate the crane safely and within the maximum permitted loadings specified by the crane manufacturer.

The indicator functions by automatically monitoring the load applied to the crane and continuously comparing this load with the maximum permitted load for each crane position. 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 the limit of the crane capacity.

### 1.2 Display Overview





## 1.3 Typical Components Location

The system has sensors installed in specific locations on the crane to monitor boom angle, boom extension, boom position (over front/over side), hook load and anti-two-block condition. The system uses this information to calculate the radius, determine the crane's current rated capacity, and to check for an overload condition. The system display is located inside the cab or near the operator's controls to allow easy access to this information.





## 1.4 Typical Components Description

In detail, the mandatory and optional items are described below. Note that sometimes, some of the items (eg external switches or motion cut) are built into the crane by the manufacturer and are therefore not supplied by Wylie Systems.

### 1.4.1 Display Unit

The W3100 display is mounted in a convenient position in front of the operator's working area. The display unit indicates the status of the crane to the operator. It is microprocessor based, meaning that there is a computer inside the box with operating software. This software has 4 operating modes allowing different functions:

**1) THE NORMAL MODE**

- see section 2 and 3 for details

**2) THE LIMITS SETTING MODE**

- see section 3 for details

**3) THE SYSTEMS SET UP**

- see section 3 for details

**4) THE DIAGNOSTIC MODE**

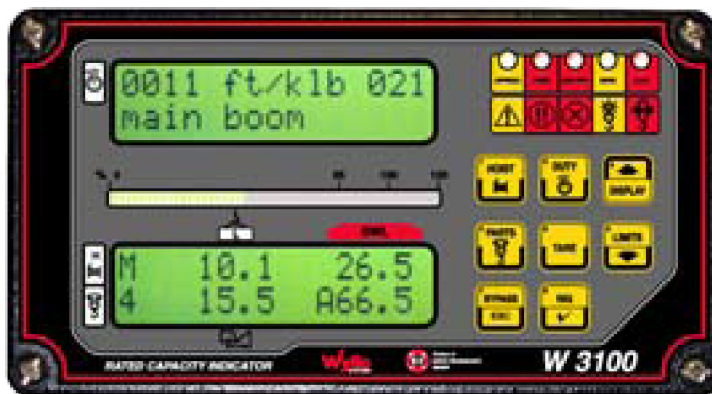
- see section 4 for details

**5) THE FAULT S REPORT MODE**

- see section 4 for details

**6) THE CALIBRATION MODE**

- supervisor mode (see installation/calibration manual)





- 1) The **normal mode** is the normal operating status of the unit when turned on. In this mode, the operator will read the hook load, the safe working load, the radius, the boom angle, the boom tip height, boom length and other essential information for his/her lift. In this mode, the operator will be able to set the actual hoist in use, the parts of line and the duty number.
- 2) In the **limits setting mode**, the operator can set some operational limits in addition to those automatically provided by the W3100 rated capacity indicator system:
  - the minimum and maximum boom angle limits,
  - the maximum boom length limit,
  - the maximum operating radius limit,
  - the maximum boom tip height limit.
- 3) The **systems setup mode** the operator can set change operational setting:
  - the measurement units,
  - the language,
  - the faults enable.
- 4) The **diagnostic mode** allows troubleshooting of the unit without the need of a voltmeter. It can be very helpful to check the sensors signal when calibrating the system or when a specific sensor is suspect.
- 5) The **faults report mode** allows the operator to pin point the source of failure. It can be very helpful to determine whether it is a hardware or a configuration problem.
- 6) The **calibration mode** allows the calibration of the sensors and other calibration variables.



### 1.4.2 Load sensors

The system uses pressure transducers to determine the bore-side and rod-side cylinder pressures to calculate the current effective weight of the boom. The system subtracts the calculated empty boom weight from the current boom weight. The remaining pressure is a direct effect of load on the hook. Using the boom length, boom angle, and boom configuration to calculate the load generated by current pressure. This calculated load is displayed as the hook load.



### 1.4.3 Length and Angle sensor

The length and angle sensor are located inside the reeling drum, which is usually located near the center of the boom. The length sensor is a 10 turns potentiometer. As the boom extends, the reeling drum unwinds and the potentiometer is driven by gear. The output is proportional to the boom extension. An inclinometer (angle sensor) is also mounted inside the reeling drum to monitor the angle of the boom. The operator can set high and low boom angle limits. If an angle limit is reached, the operator is warned by audible and visual alarm on the display unit.





#### 1.4.4 Anti-Two-Block Switch (optional)

The anti-two-block switch is a normally closed (with weight hanging), spring-loaded switch. It is attached to the boom tip on one end and to a chain leading to a weight clamped around the hoist line at the other end. When the hook block lifts the weight, the switch contacts open and the signal is cut resulting in an audible and visual alarm on the display unit. If an optional motion cut solenoid is installed, then the hoisting and telescope out commands will be stopped. One switch may be mounted at the head of each boom or jib.



#### 1.4.5 Motion Cut Solenoid (optional)

A motion cut solenoid may be connected so those motions into danger (hoisting, telescope out or booming down) are prevented when the system detects a large overload or an anti-two-block condition. Outputs available from the system are in the form of dry contact relays rated 5 AMP at 12V DC.

#### 1.4.6 External Overload Warning Device (optional)

An audible electronic alarm can be installed outside the operator's cab. This gives a warning to workers around the crane that an overload condition exists.



#### 1.4.7 External Crane Switches

External crane status switches to monitor conditions such as slew sector or interlock detection can be installed on the crane. These can be connected to up to 3 switch inputs that may be monitored for «on» or «off» condition, or ignored, for any duty switch selection.

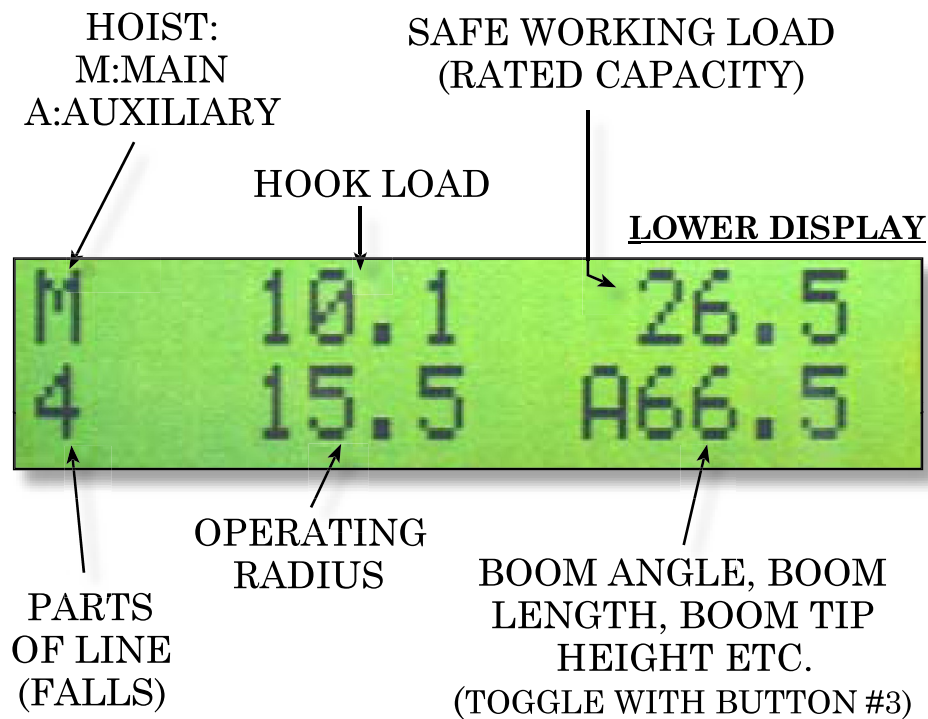
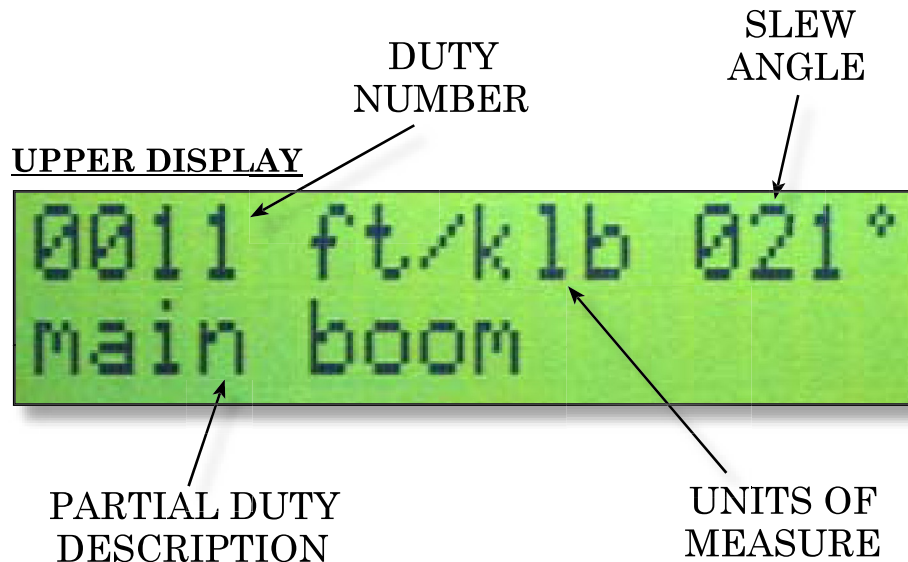




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## DETAILED DESCRIPTION OF THE DISPLAY UNIT

### 2.1 Normal Mode Display (default screen)



The display should be used only as a guide, NOT as an indication that the crane would or would not pass under a structure of accurately known height.



## 2.2

## Warning Lights



The approach warning light blinks when the load on the hook is between 85% and 99.9% of the rated capacity. This light (yellow in color) will also flash on and off if you are approaching within 3 units (feet, meters or degrees) of a predetermined limit.



The overload warning light (red in color) illuminates at or above 100% of the rated capacity. This light will also turn on if you are reaching a predetermined limit.



The motion cut warning light (red in color) illuminates at or above 100.1% of the rated capacity. This is usually associated with, for example, booming down, telescoping out or hoisting up. The exact operation is specific to the crane model.



The Rope Limit light indicates that the maximum load is limited by rated strength and the number of parts of line of the hoist rope. Increasing the number of falls (parts of line) reeved and set on the display is normally required to alleviate a rope limit.



The Two-Block condition light appears when such a condition is detected by the system. This may block the hoist and telescope out function, depending on crane model and/or on options fitted on the machine.



The default percentage levels for approach(85%), overload(100%) and motion cut(100.1%) may be changed in the calibration mode and must be set to meet local regulations.



## 2.3

## Display Buttons



Shows available hoist lines for selection.

---



Shows the menu for the selection of the crane duty number. Press this button to enable the selection of the actual crane duty number.

---



Press this button to toggle between the angle, length, height and %SWL (in the lower-right portion of the bottom display). Also used to scroll up in menus or increase editable values.

---



Shows parts of line (falls) menu for selection of the number of parts actually in use.





This button is used to subtract the weight of any slings or lifting frames when the weight of only the load lifted is required. Switch back to the normal load display by pressing it again.

---



This button is used to set operational limits in addition to those automatically provided by the W3100. Also used to scroll down in menus or decrease editable values.

---



Press this button to bypass the motion cut (lockout). Also used to close a menu or cancel the modification of a value.

---



Used to select (confirm, approve) an item in a menu. Press it in normal mode when below the rig angle to enter the rigging mode.

---



**Note 1:** Press button #3 and button #6 simultaneously to reset the system. This could be useful if the system stalls or becomes unstable due to DC power supply regulation.



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## OPERATING PROCEDURE



### **Always Remember !**

**That the W3100 Load Indicator must be correctly set up in use and that wrong adjustments may cause the indicator system to show a safe condition in the event of an overload.**

**That the indicator system is purely an aid to the operator. 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.**

**Proper functioning of the equipment is dependent upon proper daily inspection and observance of the operating instructions referred to in this manual.**

**During normal operation the SWL of a crane should not be exceeded. Therefore the warning of overload should not be used as a normal operating facility. It should be noted that certain statutory requirements do not permit the safe working load to be exceeded except for the purpose of testing.**

**The crane should be operated at all times so that crane motions occur smoothly and at a safe speed.**

**This W3100 system is not suitable for use in hazardous (explosive) atmospheres.**



## 3.1 Power On

Switch on the electrical supply (ie. crane key switch) to the W3100 system. The indicator now performs a «self test» during which time (approximately 10 seconds) the audible alarm will sound, the approach, overload, motion cut, rope limit, two-block and bargraph lights will illuminate and the display will show the message “starting, please wait...”

Subsequently, the indicator goes to the normal operating mode. The normal mode displays the hook load, the rated capacity, the radius, the boom angle, the hoist used, the parts of line, etc.

## 3.2 System Configuration



In order to have the proper rated capacity and radius, the system must be configured properly. **Failure to configure the system properly can cause the crane to break or tip and result in injury or death.** Failure to configure properly may also cause a zero capacity if no chart is found to match the configuration set by the operator.

The operator must verify the crane configurations for each available hoist every time he/she enters the crane and every time the crane is rigged. Each hoist has its own configuration set-up in memory. Simply by changing the hoist from main to auxiliary, the configuration and number of parts of line will change.

The system configuration is done with the following three buttons:

**PARTS  
BUTTON**



**USED FOR PARTS OF  
LINE SELECTION**

**HOIST  
BUTTON**



**USED FOR SELECTION  
OF THE HOIST IN USE**

**DUTY  
BUTTON**



**USED FOR DUTY  
SELECTION**

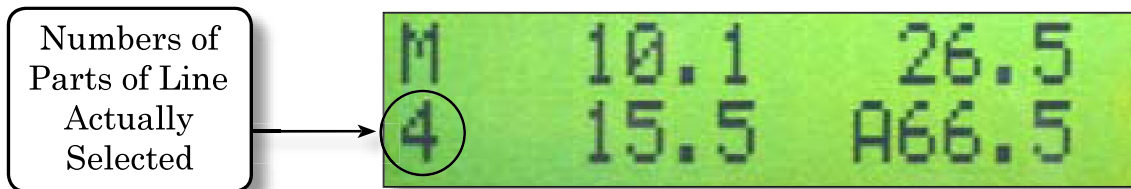


## 3.2.1

## Parts of line Selection



This button allows the operator to select the number of parts of line (falls) used. The operator can see the actual number of parts selected in the lower left portion of the lower display.

**To change the parts of line selection:**

- 1- Push the button #4 to display the parts of line selection menu on the upper display.



- 2- Scroll up or down with buttons #3 and #6 to display the desired number of parts of line in the lower left portion of the bottom display.



or



- 3- Push button #8 to confirm your choice.





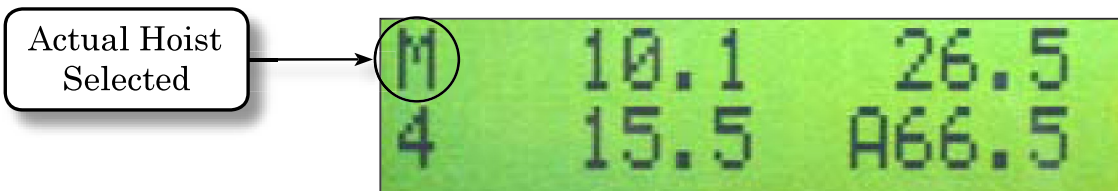
## 3.2.2

## Hoist Selection

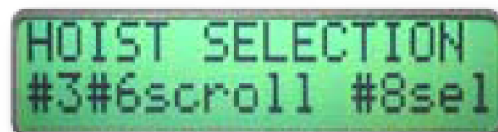


This button allows the operator to select the hoist used. The operator can see the actual hoist selected in the upper left portion of the bottom display.

M = Main hoist,  
A = Auxiliary hoist,  
W = Whip hoist.

**To change the hoist selection:**

1- Push the button #1 to display the hoist selection menu on the upper display.



2- Scroll up or down with buttons #3 and #6 to display the desired hoist in the lower left portion of the bottom display.



or



3- Push button #8 to confirm your choice.



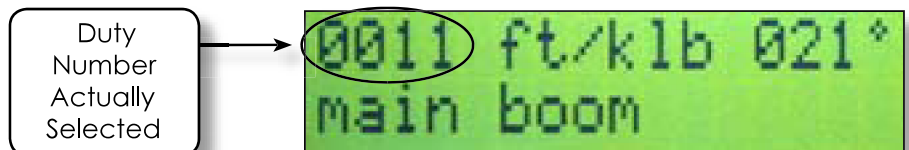



## 3.2.3

## Duty Selection



Look up the crane duty number to be used on the W3100 duty list. The W3100 duty list is a plastic laminated sheet of paper and it must be stored in the operator's cab for duty selection purpose. For ease of use the duty selection can either be done directly with duty number or with configuration parameter selection. When configuration parameter selection is used the system will determine the duty number according to the selected parameter. The currently selected duty number is displayed in the upper left part of the higher display. The second line of this display shows a partial description of the selected duty. To toggle the information displayed on this line, press the button (#7).

**To change the duty number selection:**

1-Push the button #2  to display the duty selection menu on both display.

2-Scroll up or down with buttons #3 and #6 to display the desired duty number in the top display upper left corner.



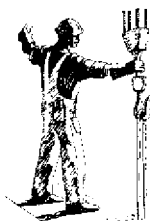
or



Partial Duty  
Description



3-Push button #8 to confirm your choice.



**AFTER THE HOIST, PARTS OF LINE  
AND DUTY SELECTION, THE W3100  
RATED CAPACITY INDICATOR IS FULLY  
CONFIGURED, AND READY TO USE.**



### 3.3

## Limit setting mode

In the limits setting mode, the operator can set five (5) operational limits in addition to those automatically provided by the W3100 rated capacity indicator. These are as follows:

- 1) the minimum boom angle limit,
- 2) the maximum boom angle limit,
- 3) the maximum boom length limit,
- 4) the maximum operating radius limit,
- 5) the maximum boom tip height limit.

### To access the limit setting mode:

Push the #6 button **once** to set the **low angle limit**.



Push the #6 button **twice** to set the **high angle limit**.



Push the #6 button **3 times** to set the **maximum boom length limit**.



Push the #6 button **4 times** to set the **maximum operating radius limit**.



Push the #6 button **5 times** to set the **maximum boom tip height limit**.





**To change a limit:**

1- Push button #8 to edit the selected limit.



2- Scroll up or down with buttons #3 and #6 to change the selected parameter.



3- Push button #8 to confirm your choice.



Push button #7 and scroll up or down with buttons #3 and #6 to accelerate the change of the selected parameter.



If no button is pressed during 6 seconds, the display come back in normal display mode and any change of limit will be cancelled.



### 3.4 Motion Cut (lockout) Bypass

The operator can override the lockout system in the event of an emergency by pressing the button #7.



#### How to use the bypass function:

When in a lockout condition, press and hold the “BYPASS” button #7 to momentarily release the lock out condition and return into safe condition.

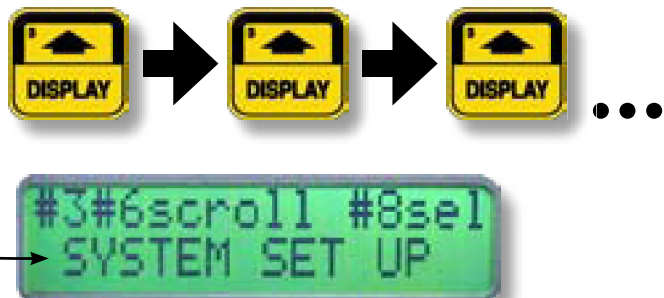
### 3.5 Systems Set Up

In the systems setup mode, the operator can change operational setting.

- 1) the measurement units,
- 2) the language,
- 3) the faults enable.

To enter this mode proceed as follows:

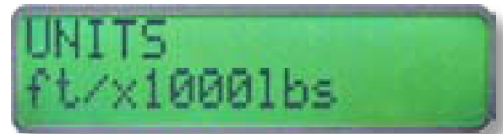
In the normal operating mode, press the button #3 until the word “SYSTEM SET UP” appears on the bottom line of the upper display...



...then press the select button to enter the setup mode.





**TO CHANGE THE UNITS:**A green rectangular LCD screen displaying the text "UNITS" on the top line and "ft/x1000lbs" on the bottom line.

- 1- Push button #8 to edit.



- 2- Scroll up or down with buttons #3 and #6 to change the selected parameter.



or



- 3- Push button #8 to confirm your choice, save the change and go back in normal display mode.

**TO CHANGE THE LANGUAGE:**A green rectangular LCD screen displaying the text "LANGUAGE" on the top line and "english" on the bottom line.

- 1- Push button #8 to edit.



- 2- Scroll up or down with buttons #3 and #6 to change the selected parameter.



or



- 3- Push button #8 to confirm your choice, save the change and go back in normal display mode.

**TO CHANGE THE FAULTS ENABLE:**A green rectangular LCD screen displaying the text "FAULTS ENABLE" on the top line.

- 1- Push button #8 to edit.



- 2- Scroll up or down with buttons #3 and #6 to change the selected parameter.



or



- 3- Push button #8 to confirm your choice, save the change and go back in normal display mode.





### 3.6 Rigging Mode (maintenance/erection mode)

It is necessary with many cranes, when stowing or erecting the machine, to go outside the working «envelope» for which the crane manufacturer provides ratings.

For example, the boom stowed position may be outside the maximum load radius or minimum boom angle specified on any load chart.

For this reason, Wylie Systems provides a maintenance/erection mode, where the boom may be lowered to or raised from horizontal without the external alarm continuously sounding or the motion cut (if fitted) operating.

This is brought into operation by pressing button #8 when the boom angle is below 10 degrees.



In this mode, the display will show the following message:

**!!! WARNING !!! RIGGING MODE  
NO CUTOUT OR OVERLOAD ALARMS**

Moving the boom above 10 degrees restores normal operation. This floor value of 10 degrees can be changed upon customer request.



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## TROUBLESHOOTING

If the alarm sounds (the display internal buzzer is active and the limits warning light illuminates), it is probably caused by:

- **an operator adjustable limit exceeded,**
  - **an overload,**
  - **the system start up.**
- 1) If an operator adjustable limit is exceeded, it will be displayed on the normal operating mode screen. See the limits setting section of this manual for details.
  - 2) Once you're sure that the alarm is not operator adjustable limit related, the next step is to verify if the alarm is caused by an overload. Check the hook load and the rated capacity and if the crane is overloading, lower the load or reduce the operating radius.
  - 3) During system start up, the buzzer is activated for test purpose.

If the W3100 is not functioning, check the supply voltage. It should be between 11 and 30 VDC. If supply voltage is correct, then check the fuse inside and replace with correctly rated fuse if blown.

If the system stalls or fail to function properly, Press button #3 and button #6 simultaneously to reset the system. If the fault, problem or malfunction persists, remove supply to the W3100 for a few seconds then power it back again.



+



**Pressing these two buttons  
simultaneously will reset the system.**



## 4.1 Diagnostic Mode

The diagnostic mode can be very helpful to verify the sensor's signals.

To enter this mode proceed as follows:

In the normal operating mode, press the display button #3 until the word "DIAGNOSTIC" appears on the bottom line of the upper display...



...then press the select button to enter the diagnostic mode.



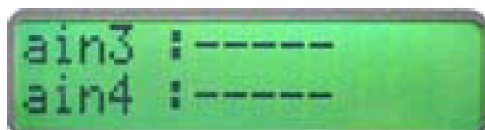
Analog input 1  
ANGLE  
(1.7 @ 3.2 Volt)



Analog input 2  
LENGTH  
(0.25 @ 4.75 Volt)



Analog input 3  
(ain3 : disable)



Analog input4  
(ain4 : disable)



Analog input5  
(ain5 : disable)



Sensor supply dr+  
(dr : 5.00 +/- 0.1 Volt)



Digital inputs



Relay



Bore pressure  
transducer signal



Rod pressure  
transducer signal



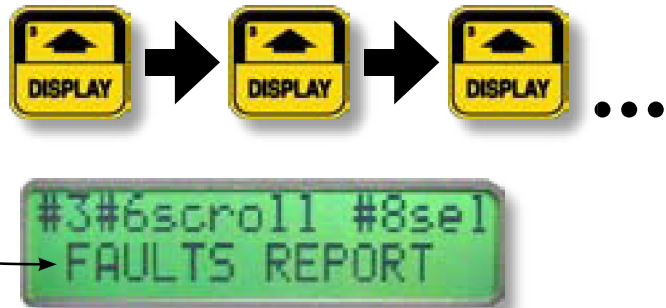


## 4.2 Faults Report Mode

The faults report mode can be very helpful to determine the cause of failure.

To enter this mode proceed as follows:

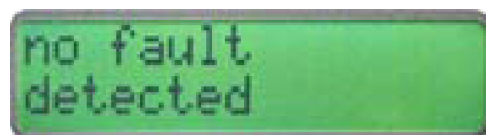
In the normal operating mode, press the button #3 until the word “FAULTS REPORT” appears on the bottom line of the upper display...



...then press the select button to enter the fault report mode.



This is the default screen:



See next page for a list of possible errors.



**List of possible fault:**

<b>Fault on</b>	<b>Description</b>
AIN1	FAILURE IN SENSOR (ANGLE SENSOR)
AIN2	FAILURE IN SENSOR (LENGTH SENSOR)
TX0	FAILURE IN SENSOR (BORE PRESSURE TRANSDUCER)
TX1	FAILURE IN SENSOR (ROD PRESSURE TRANSDUCER)
DR+	FAILURE DUE TO I/O BOARD/ FAILURE IN DR PLUS
NO DUTY	FAILURE DUE TO CHART/ FAILURE NO DUTY CHART
MEMORY A	FAILURE DUE TO MEMORY/CHECKSUM EEPROM A
RAM	FAILURE DUE TO RAM MEMORY
NOT CALIBRATED	FAILURE DUE TO CONFIGURATION NOT CALIBRATED
NO PARAMETER	FAILURE DUE PARAMETER/ DIMENSIONS MISSING
MEMORY C	FAILURE DUE TO MEMORY/CHECKSUM EEPROM C
CALIB STATUS	FAILURE DUE TO PARTIAL CALIBRATION



## Notes

[illegible]







