



W3350R
TELESCOPIC BOOM CRANE RADIO
RATED CAPACITY INDICATOR

Operator's Manual

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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 W3350R Wylie Systems Radio 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 W3350R Radio 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.

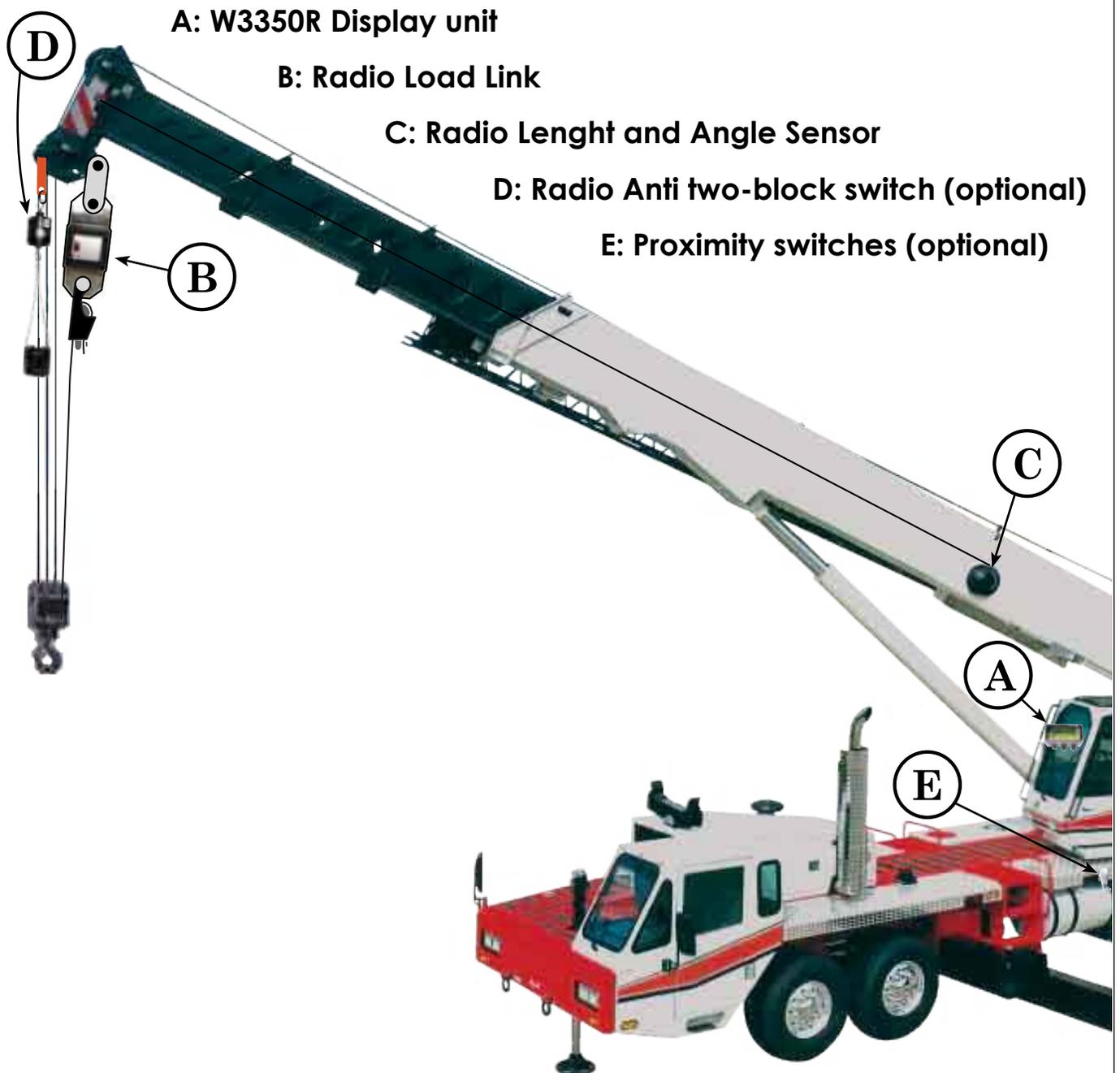
The indicator functions by automatically monitoring the load applied to the crane and continuously comparing this load with the maximum permitted load for each crane position. The display unit of the indicator system provides continuous information relating to the crane loading and warns the operator 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 W3350R 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 DIAGNOSTIC MODE

- see section 4 for details

4) 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 and many other important kinds of 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 W3350R rated capacity indicator system:
 - the minimum and maximum boom angle limits,
 - the maximum boom tip height limit,
 - the maximum operating radius limit.
 - the maximum boom extension limit.
- 3) 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.
- 4) The **calibration mode** allows the calibration of the sensors and many other variables. The system start automaticaly in this mode when no load sensor has been calibrated.

1.4.2 Load sensor(s)

The location of the load sensor(s) is dependant on the crane type. Generally either a single pin or link type sensor is fitted into the dead end of the boom hoist rope. There are many variations available on these principles and other special options may be used in certain circumstances. Refer to application specific drawings where available or consult Wylie Systems for advice. *Spread Spectrum transmission technology, no wires.*



Radio Load Pin



Radio Load Link



1.4.3 Radio 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 gear driven. 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. *Spread Spectrum transmission technology, no wires.*

1.4.4 Radio 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. *Spread Spectrum transmission technology, no wires.*



1.4.5 Motion Cut Solenoid (optional)

A motion cut solenoid may be connected so that motion 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.



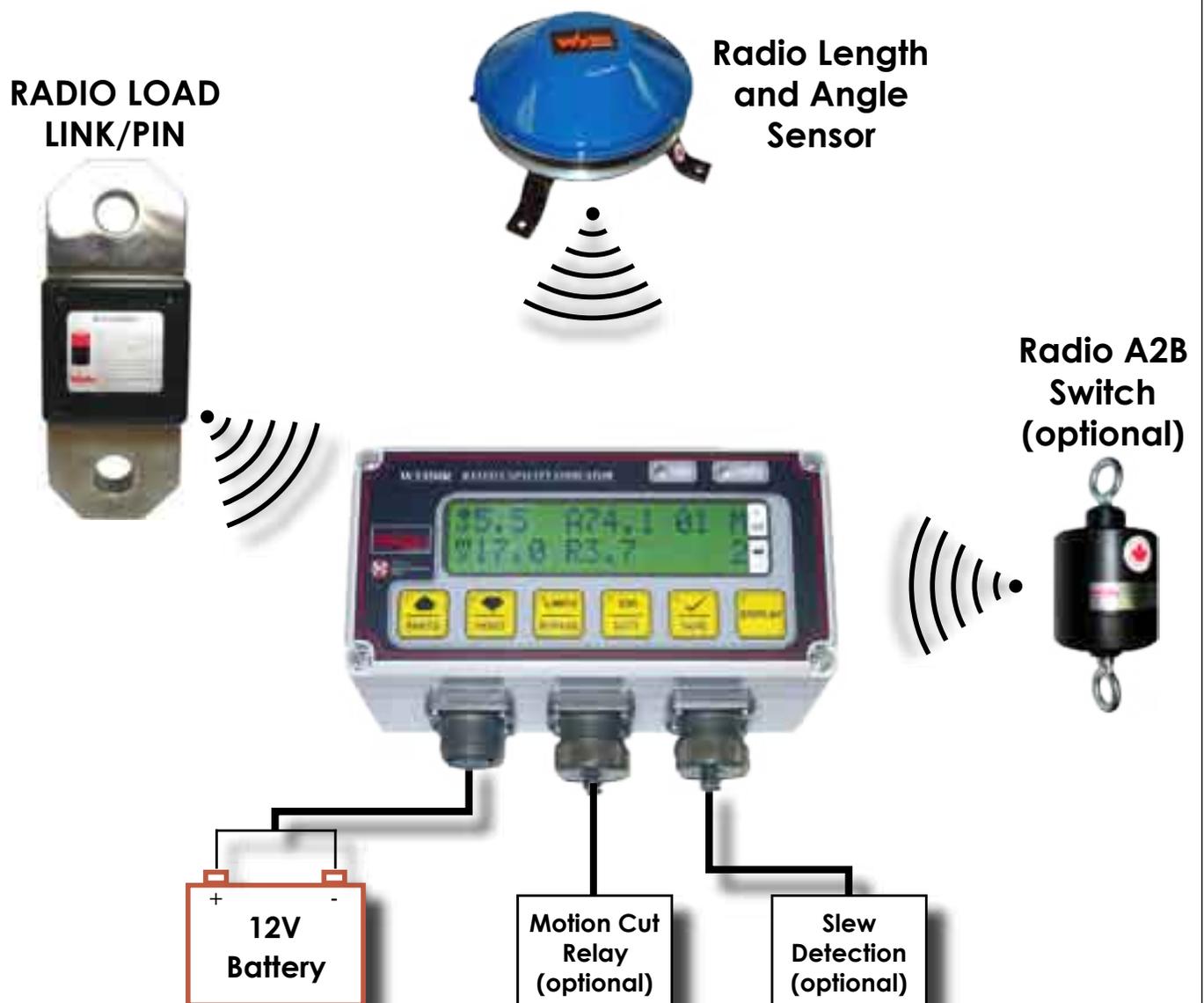
1.4.7 External Crane Switches



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.

1.5

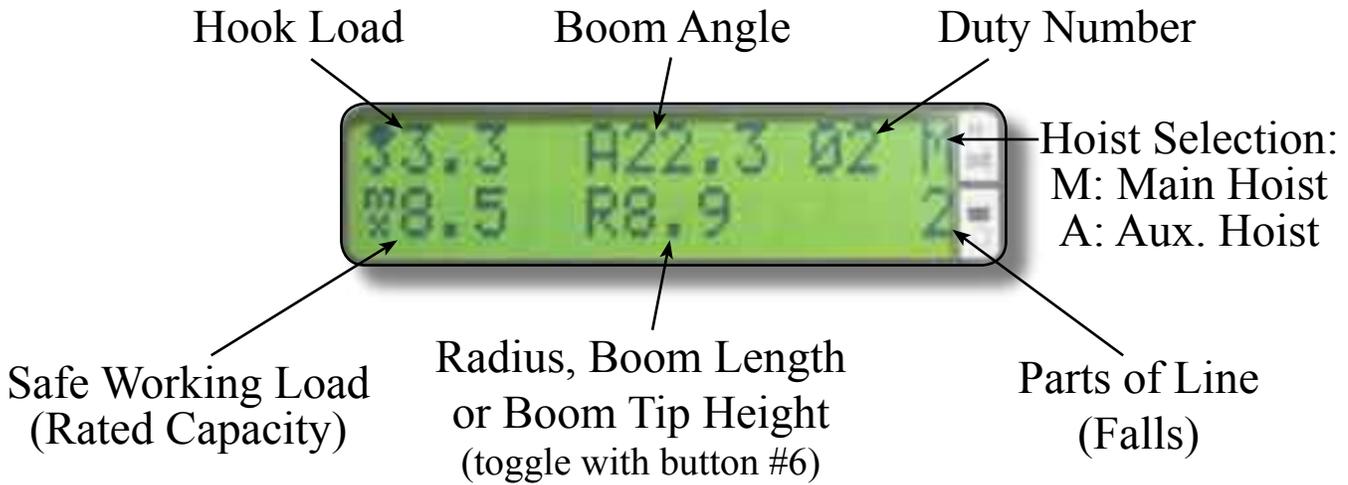
W3350R Block Diagram



-2-

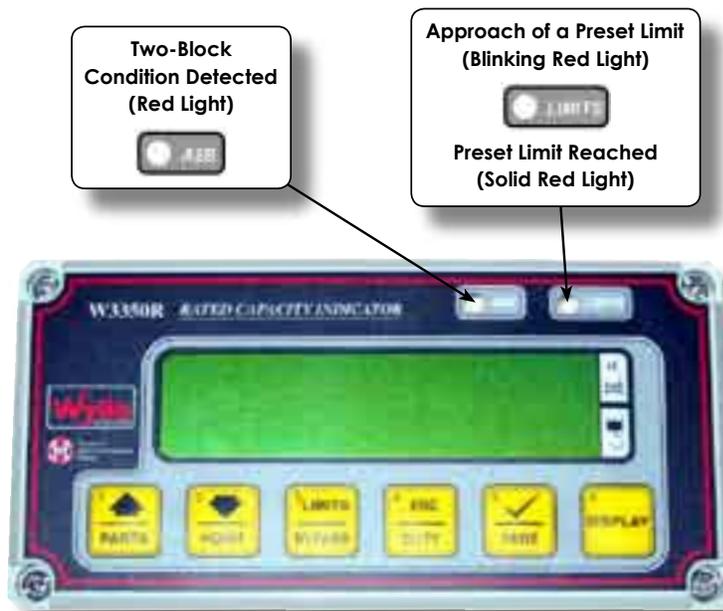
DETAILED DESCRIPTION OF THE DISPLAY UNIT

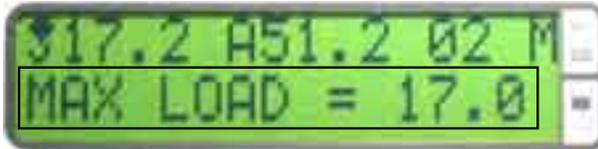
2.1 Normal Mode Display (default screen)



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 and Indicators Location





Maximum Rated Capacity in Approach or Reached



Preset Radius Limit in Approach or Reached



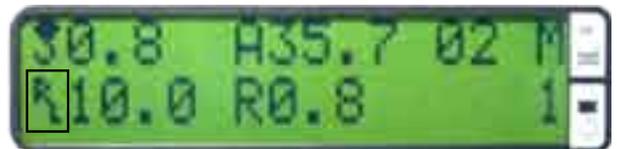
Preset High Angle Limit in Approach or Reached



Preset Extension Limit in Approach or Reached



Preset Low Angle Limit in Approach or Reached



Load Capacity Limited by the Hoist Rope



Preset Height Limit in Approach or Reached

2.3

Warning Lights Detailed Description



Approach of a
Preset Limit
(Blinking Red Light)

The limit warning light blinks when the load on the hook is between 85% and 99.9% of the rated capacity. This is accompanied by the operation of an audible warning device that is fitted inside the display unit.



**OPERATE WITH CAUTION!
THE CRANE IS WORKING NEAR ITS
MAXIMUM OPERATING CAPACITY.**



Preset Limit
Reached
(Solid Red Light)

The limit warning light will be permanently on (so as the audible alarm) when the load on hook is above 100% of the rated capacity. It will also be permanently on if you are reaching a predetermined limit (set in the limits setting mode).



**DANGER! THE CRANE'S MAXIMUM
CAPACITY HAS BEEN REACHED OR
EXCEEDED.**

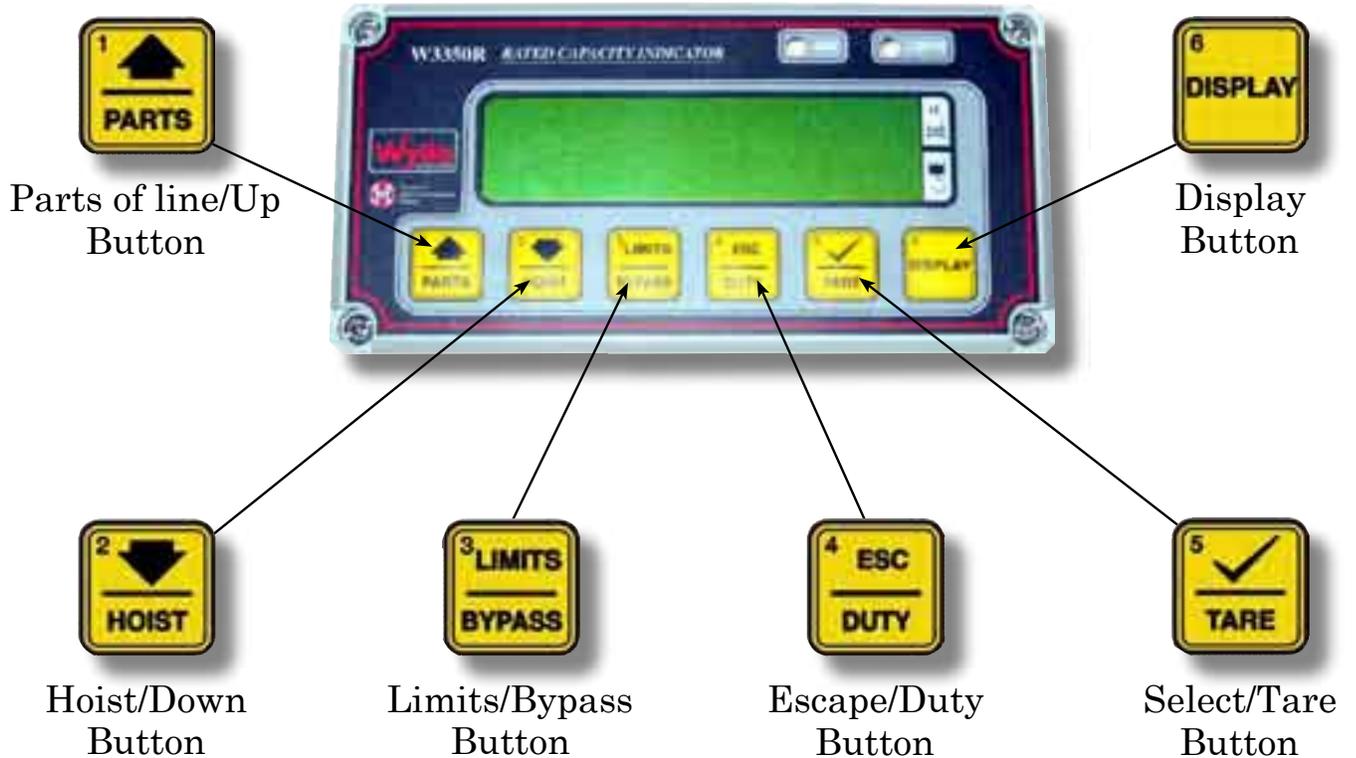


The Two-Block condition light appears when such a condition is detected by the system. This may block the hoist and telescope out function, depending on crane model and/or on options fitted on the machine.



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.

2.4 Display Buttons Location and Purpose



PARTS OF LINE/UP BUTTON: In normal display mode, press this button to increase the parts of line until it matches the machine configuration or reaches the maximum parts of line available. At that point, it will return to 1. In any other display modes, this button is used to scroll up in menus or to increase editable values.



HOIST/DOWN BUTTON: In normal display mode, press this button to change the hoist selection. In any other display modes, this button is used to scroll down in menus or to decrease editable values.



LIMITS/BYPASS BUTTON: In normal display mode, when in a lock-out condition, this button works as a momentary bypass function. Press and hold this button to release the lock-out relay. In normal display mode, when there is no lock-out condition, press this button to enter the limit setting mode. Once in the limit setting mode, press this button again to scroll between ANGLE LOW, ANGLE HIGH, HEIGHT MAX., RADIUS MAX. and LENGTH MAX. When the desired limit is displayed, use the up and down button to increase or decrease the value then push the select button to save it. Note: the display will return from the limit setting mode if no changes are made for 8 seconds.



ESCAPE/DUTY BUTTON: In normal display mode, press this button to increase the duty number to the next possible value. A message “CHANGING DUTY #” is displayed on the second line. Push the select button or wait 3 seconds to save the new duty selected. If the selected duty has not been calibrated yet, the message “DUTY NOT CALIB.” will be displayed on the second line. In any other condition or mode, this button will act as an ESCAPE function. Press this button to cancel any editing value or go back in normal display mode.



SELECT/TARE BUTTON: In normal display mode, press this button to tare the load. The displayed load will be reset to 0.0 and the hook picture on the screen will be replaced with a “T” to indicate that the tare function is active. To go back in normal display and show the actual load, push the TARE button again. This is a toggle button (toggles between tare and actual load). In any other mode, this button acts as a SELECT button. Use this button to enter in a menu or save an edited value.



DISPLAY BUTTON: In normal display mode, use this button to change the display from radius to length to height. The display will return to show the radius automatically after 8 seconds. Use this button to enter the diagnostic mode : push the DISPLAY button 3 times and the screen will show “Diagnos.” then push the select button to enter the diagnostic mode. Push the ESC button to return to the normal display mode.



Note 1: Press button #5 (tare) and button #6 (display) simultaneously to reset the system. This could be useful if the system stalls or becomes unstable due to DC power supply regulation.



note 2: Press button #1 (parts) and button #6 (display) simultaneously to enter calibration mode.

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OPERATING PROCEDURE



Always Remember !

That the W3350R 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 W3350R 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 W3350R system. The indicator now performs a «self test» during which time (approximately 5 seconds) the audible alarm will sound, the limits and the A2B lights will illuminate and the display will show the system and software version, then the identification number of each transmitter (TX ID). Then as shown in section 2.1, the display will show the load on hook, the maximum rated capacity, the boom angle, the hoist and parts of line selection etc. If an anti two-block switch is programmed in the W3350R memory, the following screen will appear along with the default screen.

To get rid of this message, do the following: raise the hook block until it lifts the anti two-block weight allowing the switch to return to the open contacts position then lower the hook block to the normal operating position.



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 used. The operator can see the actual number of parts selected in the lower right portion of the display.



Numbers of Parts
of Line Actually
Selected

**TO CHANGE THE PARTS OF LINE SELECTION:**

1- Push the PARTS button (#1) to increase the parts of line number. When the parts of line reach the maximum parts of line set in calibration mode, the number of parts of line roll over to one. The number of parts of line is automatically saved.



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 right portion of the display. **M = main hoist; A= auxiliary hoist.**



Hoist Actually
Selected

**TO CHANGE THE HOIST SELECTION:**

1- Push the HOIST button (#2) to toggle between the auxiliary and main hoist. Note: if no rope limit has been set for the auxiliary hoist in the calibration mode then this button will have no effect. The hoist selection will stay on the main hoist.



3.2.3

Duty Selection



This button allows the operator to select the duty number representing the actual crane configuration (boom configuration, outriggers state, jib selection, head type etc). The operator can see the actual duty number selected in the first line of the display.

**TO CHANGE THE PARTS OF LINE SELECTION:**

1- In normal display mode, push the DUTY button to increase to the next duty number. **Refer to the duty reference sheet to choose the correct duty number representing the current crane configuration.** Push the select button or wait 3 seconds to save it. When you push the DUTY button, a message on the second line will tell you that you are presently changing the duty number.



The number of parts of line and the duty selection are associated with each hoist. Therefore, by changing to a different hoist, all associated settings for the hoist are changed automatically.



**AFTER THE HOIST, PARTS OF LINE
AND DUTY SELECTION, THE W3350R
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 W3350R rated capacity indicator. These are as follows:

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



TO ACCESS THE LIMIT SETTING MODE:

Push the LIMITS button once to set the low angle limit.



Push the LIMITS button twice to set the high angle limit.



Push the LIMITS button 3 times to set the maximum boom tip height limit.



Push the LIMITS button 4 times to set the maximum operating radius limit.



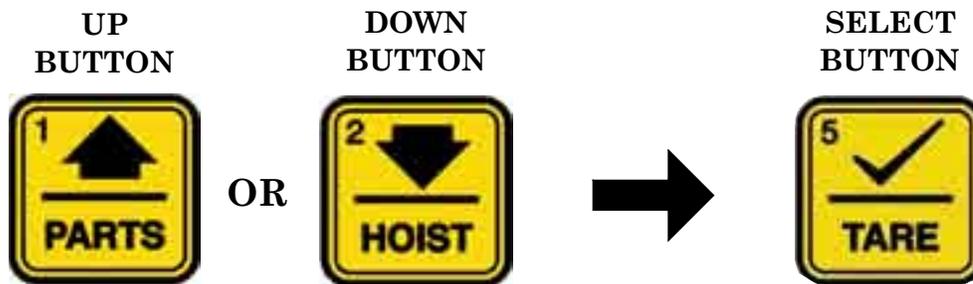
Push the LIMITS button 5 times to set the maximum boom extension limit.



TO CHANGE A LIMIT:

When the desired limit is displayed on the screen, use the up or down button to increase or decrease the value.

Push the select button to save the desired limit and go back in normal display mode.



Note 1: keeping button up or down depressed will accelerate the speed of increase or decrease.



Note 2: 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 LIMITS/BYPASS button.



HOW TO USE THE BYPASS FUNCTION: When in a lock-out condition, press and hold the “BYPASS” button to momentarily release the lock out condition and return into safe condition.

-4-

TROUBLESHOOTING

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

- 1) an operator adjustable limit exceeded,
- 2) an overload,
- 3) 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 W3350R 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 #5 (tare) and button #6 (display) simultaneously to reset the system. If the fault, problem or malfunction persists, remove supply to the W3350R for a few seconds then power it back again.



If the system shows «**waiting for load**» and the counter rolls to 0:00, this probably means that the load sensor's batteries are dead. Try to lift a weight. If the display still shows «waiting for load», change the load sensor's batteries. If the problem persists, contact Wylie systems.

If the system shows «**waiting for angle**» and the counter rolls to 0:00, this probably means that the angle sensor's batteries are dead. Try to boom up. If the display still shows «waiting for angle», change the angle sensor's batteries. If the problem persists, contact Wylie systems.

If the system shows «**waiting for A2B**» and the counter rolls to 0:00, this probably means that the anti two-block battery is dead. Try to initiate a two-block condition. If the display still shows «waiting for A2B», change the anti two-block battery. If the problem persists, contact Wylie systems.

4.1 Diagnostic Mode

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

To enter this mode proceed as follows:

In the normal operating mode, press the display button until the word "diagnos." appears on the bottom line of the display...



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



SCREEN #1

Operating system name and version



Capacity chart name



Load sensor TX ID number

SCREEN #2

Angle sensor TX ID number



Anti two-block switch TX ID number



Load sensor signal (550 - 2100)

SCREEN #3

Anti two-block sensor signal (0 or 1)



Angle sensor signal (1200 - 3000)

Length sensor signal (used to monitor a tower crane trolley position)



Load sensor batteries strength (change below 2.6V)

SCREEN #4

Anti two-block sensor battery status (OK or LOW)



Angle sensor batteries strength (change below 2.6V)

4.2 Changing The Sensor's Batteries

If you see “ANGLE BAT. LOW”, “LOAD BATTERY LOW” or “A2B BATTERY LOW” flashing on the bottom line of the display, it's time to replace the applicable battery. If the message “BATTERY FAIL CHANGE BATTERY” appears on the display, the system is not functional and you must change the appropriate battery. To see which battery needs to be changed, see section 4.1 “diagnostic mode”.



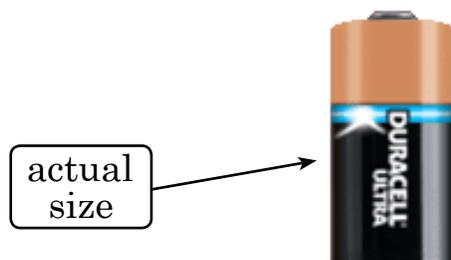
If the LOAD or ANGLE batteries are under 2.6V, they need to be changed. If the A2B indicates LOW, the battery in the two block switch is dead.

Every sensor (transmitter) operates from four (4) or five (5) lithium batteries. The load and angle sensors are powered with five batteries and the load link sensor uses four of them.

In case of a load link and an angle sensor, follow the instructions on the sticker applied on the sensor to replace the batteries.

i Be careful to check the orientation of the battery, damage can result if the battery is mounted in the wrong way.

Use only 3 volts Lithium battery type 2/3A (same as those used in digital camera, size 123).



Use CR-123A, EL123A
or DL123A Battery.

