
503

LOADWISE MODEL 503
RATED CAPACITY INDICATOR SYSTEM
OPERATORS MANUAL



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Introduction

INTRODUCTION

The Loadwise 500 Series Rated Capacity Indicator System provides the operator with a continuous display of essential information, to enable the crane to be used within its design parameters.

This information is on a large, easy to read liquid crystal display. Various sensing devices are positioned on the crane to monitor boom angle, boom length and load, all of which are displayed with rated capacity, boom tip height, percentage of load moment and various warning messages. When approaching rated capacity or non-permitted areas of operation, the operator will be warned by lights and audible alarm, and may be followed by the cutting of crane motion.

WARNING

This operator's manual describes the operation of the Loadwise 500 Series Rated Capacity Indicator, which has been developed over many years of design and field experience. While the indicator will display information and alert the operator to impending conditions, it must always be remembered that the system utilizes a series of electrical, mechanical and hydraulic components and cannot be 100% fail safe. Therefore, operators are warned not to consider the system as a substitute for good judgment, experience and accepted safe crane operating practice. The operator is solely responsible for safe operation of the crane.

Certain program selections are necessary before performing each lift. If incorrectly selected, the system may not alert the operator to an impending condition; therefore, this manual should be read and thoroughly understood before operating the crane.

This system may be equipped with an override key. This key by-passes the motion -stop function of the indicator. This switch should only be used by authorized personnel during emergency situations.

During normal operations of the Loadwise 500 Series Rated Capacity Indicator, the rated load of a crane should not be exceeded. Therefore the warning of overload should not be used as a normal operating facility. Additionally, certain statutory requirements do not permit the crane's rated capacity to be exceeded except for the purpose of testing.

The indicator in its standard form is not protected for explosive atmospheres. For applications up to ZONE 1 please consult the factory for modifications.

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SYSTEM DESCRIPTION

WHAT IT IS

The LOADWISE 500 series is a automatic microprocessor controlled rated capacity indicator that provides the operator with the essential information and vital approach and overload warnings.

The system works on the principle of comparing STORED data with LIVE data detected from the sensors.

The STORED data (which is in the memory chip) consists of capacity charts, crane boom dimensions, together with the line pull limits, slew limits etc.

The LIVE data is sensed by the boom length and angle sensors for radius calculations and by strain gauge loadcells located in in the derricking ropes for loading of the crane.

WHAT IT MEASURES

- (1) The boom hoist (support) load.
- (2) The boom angle with respect to the horizon

WHAT IT DOES

The system continually computes the radius (or any angle, on angle rated duties,) and refers to the appropriate duty chart to establish the rated capacity for the working position.

The resultant moment caused by the boom hoist load is used in conjunction with the radius to determine the hook load.

It compares the established hook load with the rated capacity, displaying the percentage on a bar graph and tripping the alarms required and any lockout system connected.

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WHAT IT CONSISTS OF

LOADPINS

Loadpins are installed in the hoist rope's path, so that the hoist rope is held deflected over three sheaves. The hoist rope causes a force to be applied to the loadpin. These electronic loadcells transmit the rope tension signal to the computer, where it is used to produce the weight indication on the display console.

ROPE DIRECTION SENSORS

Rope movement sensors are installed and electrically connected to the computer. This is used to enable corrections to be made to the load signal to combat the change in apparent load from hoisting and lowering.

INCLINOMETER (ANGLE SENSOR)

An angle sensor is located within an enclosure that is attached to the crane's butt section. This inclinometer is a potentiometer-driven pendulum that senses boom angle with respect to the horizon.

DISPLAY CONSOLE AND JUNCTION BOX

All the electronics are in the Display Console and the Junction Box, which is installed behind the Display Console.

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BILL OF MATERIAL

Qty	Area	Dwg #	Description
1	Display	94335	Display Console
1	Display	94337	Junction Box
1	Display		
1	Documents		Duty Selection Plate (specify crane)
1	Documents	94570	Operator's Manual
1	Documents	94599	Calibration Manual
1	Documents		Drawings Package (specify crane)
1	Sensor	94385	M1 Angle Sensor
2	Sensor		
2	Bracketry		Sensor Bracketry
2	Bracketry		Sensor Bracketry
6	Bracketry		Sensor Bracketry
	Wiring		
	Wiring		Boom Tip Junction Box
	Wiring		Dual Loadcell Cable, (length of boom)
	Wiring		
	Wiring		
	Wiring		
	Wiring		:
	Wiring		
	Wiring		
	Wiring		

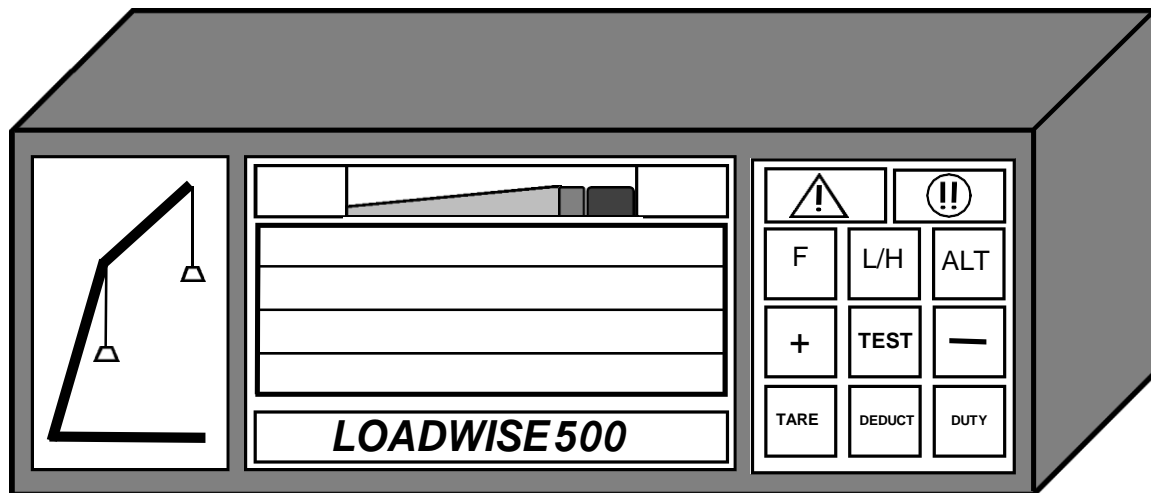
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SYSTEM OPERATION

DISPLAY CONSOLE

The Display Console is split into two sections. The center section is a four (4) line “alpha-numeric” screen that displays information to the operator, and the right section is a keypad used to change the display to alternative information modes, and is also used in the calibration process. Here is a sketch of the Display Console showing its two sections.



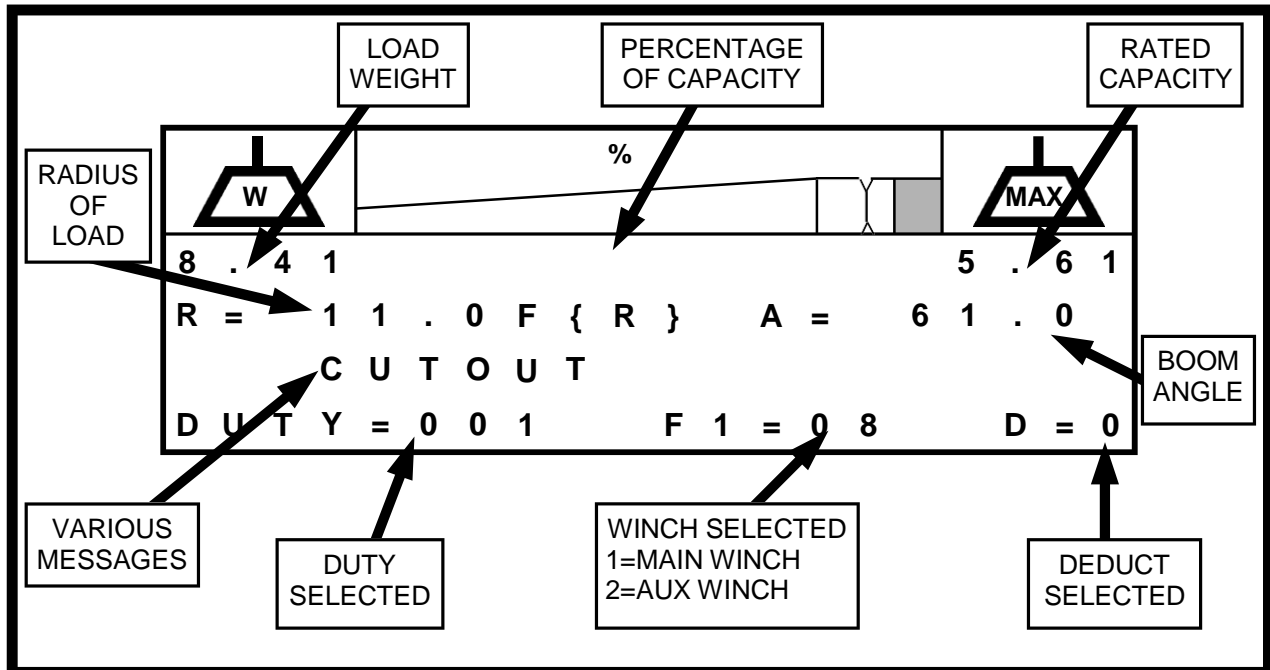
Display Section

Keypad
Section

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SYSTEM OPERATION



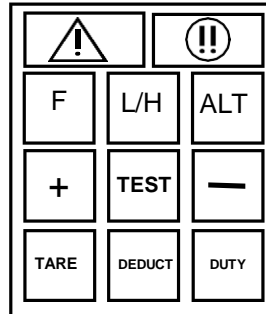
DISPLAY CONSOLE FUNCTIONS

The Display offers a variety of operational data to the crane operator, depending on the application. The illustration below shows that data normally displayed. Additionally, a keyboard, on the right-hand side of the Display Console, allows for the input of information to the system, including: the ALTERNATE INFORMATION screen; the L/H screen; the TEST screen; DUTY SELECTION; STOWED AND ERECTED DEDUCT SELECTION; FALLS (Parts-of-Line) SELECTION; and TARE SELECTION.

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KEYBOARD

DISPLAY MODES (ACCESSED BY USING THE KEYBOARD)

- L/H** When pushed, causes the display location showing radius (R) to display main boom length (L), and the display location for angle (A) shows boom head height (H). A second push will restore the display to normal, or after a time delay, display will be automatically restored to normal.
- TEST** When pushed, initiates a test routine, and will display the word TEST on the third line of the display screen. After the test routine is completed, the TEST message is removed. The test may be canceled by two pushes on the ALT button.
- TARE** When pushed, will deduct the existing load displayed from itself and any future loads. It is canceled by a second push. When operating in the TARE mode, the word TARE will be displayed on the third line of the display.
- ALT** When pushed, will show:

When pushed with a normal display showing, will show a description of the duty selected. To return to the normal display screen, push ALT a second time.

When pushed while in the TEST routine, will display fault diagnosis information, which can be used to confirm the system is operational, and also gives information on optional input sensors. To return to the normal display while in the TEST and fault diagnostic mode, press ALT a second time.

The above modes are display modes only and do not affect the operation of the system.

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CONTROL MODES (ACCESSED BY USING THE KEYBOARD)

The following modes are input instruction controls and are **VERY IMPORTANT** for the correct operation of the system.

Prior to making a lift operation, the operator must consult the DUTY SELECTION CHART to establish the correct duty number for the required configuration of the crane. (For example, DUTY 001 = 100 Ft Main Boom Plus 32 Ft Jib @ 15° Offset.) Next, the operator must select how many parts-of-line (“falls”) required to make the lift, and if any “Stowed or Erected Deducts” are applicable. These duties, falls and deducts are entered into the system using the following commands on the keyboard:

DUTY / F (“falls” or “parts-of-line”) / DEDUCT

These commands will only operate when the load is on the ground. Any attempt to change these commands while lifting will cause the word **INHIBITED** to be displayed. This is to prevent the operational instructions to the indicator from being changed during a lifting operation.

DUTY When pushed, will flash the most significant digit. To change, push “+” or “-”.

A second push of the DUTY button will cause the second digit to flash and a third push will cause the third digit to flash. A fourth push of the DUTY button will store the duty selection made, (after a three (3) second pause).

F (Falls) The display will indicate by a “1” or a “2” which winch is in operation for the duty selected. Press “F” to flash the most significant digit; the digit flashing may be increased or decreased using the “+” or the “-” buttons. To select the next less significant digit, press “F” again. A third push of the “F” button will store the parts-of-line selected (for that winch only) , after a three (3) second pause.

D (DEDUCT) When pushed, will flash to indicate that a selection can be made (using the “+” or the “-” buttons) in a range of 0 to 9. A selection of available deducts is located on the Duty plate; typically these are deductions from the capacity of the crane due to stowed or erected jibs, hook blocks, balls, etc. that are not in use for a particular duty. A second push of the “DEDUCT” button will store the selection made, after a three (3) second pause.

After a CONTROL MODE selection has been made, the ALT buttons should be pressed, to give the operator an opportunity to check that the selections made are entered into the system CHECK ALL DATA CAREFULLY.

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MESSAGES

The third line of the normal display is used to display a variety of messages. The line of twenty (20) characters is divided into two sections; one section of thirteen (13) characters and one section of seven (7) characters. Each of these two sections is totally independent and are not to be read together. Within each section there are a number of possible messages, some of much greater importance than others. Therefore, each section has a priority rating, with the message at the top of the list taking priority. During normal operating conditions, the third line will be blank.

The section of thirteen (13) characters is displayed on the left-hand portion of the third line, and include the following messages:

OUT OF LEVEL	if equipped with the necessary switch(es) and/or sensor(s)
RIGGING	if equipped with the necessary switch(es) and/or sensor(s)
OVERRIDE	if equipped with the necessary switch(es) and/or sensor(s)
OVERHOIST	if equipped with the necessary switch(es) and/or sensor(s)
DUTY NUMBER	indicates that a duty is being selected where no duty is possible. When this is displayed, consult the DUTY SELECTION PLATE to make the correct duty selection.
FAULT	indicates the system has generated a fault code. Press "TEST" and then press "ALT" to display the fault. This will display fault diagnosis information, which can be used to confirm the system is operational, and also gives information on optional input sensors. To return to the normal display while in the TEST and fault diagnostic mode, press ALT a second time.
HIGH ANGLE	indicates that the max high angle has been exceeded.
LOW ANGLE	indicates that the max low angle has been exceeded.
OUT OF RADIUS	indicates that there is no rated capacity for the radius of the crane, for the duty selected.
OUT OF ANGLE	indicates that there is no rated capacity for the boom angle of the crane, for the duty selected.
UNCALIBRATED	indicates that a duty selection has been made for a duty configuration that has not been calibrated.
CUT-OUT	indicates that the crane's (optional) "motion-cut" or "lever-lockout" has been activated.
INHIBITED	indicates an attempt to change a CONTROL MODE input while a load is suspended.

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SYSTEM OPERATION

MESSAGES (continued)

The section of seven (7) characters is displayed on the right-hand portion of the third line, and include the following messages:

ROPE	indicates that the crane's rated capacity is limited by the number of parts-of-line selected. Additional capacity is available by re-reeving the crane for additional parts-of-line and selecting the additional parts-of-line in the CONTROL MODE.
FALLS	indicates that a selection for the number of parts-of-line has been made that exceeds the maximum number permitted by the crane's rated capacity chart(s) for the winch selected.
TEST	indicates that the system is in its "self-test" mode. The system will, in the event of a successful test, return to the normal, working display upon completion of the self-test.
TARE	indicates that the TARE function has been selected and is in operation.

Additionally, eight optional input switches are available, as necessary to a particular crane. These can include swing switches, counterweight position switches, etc.

DISPLAY NOTES

- 1) Load and rated capacity are displayed to:
 - TWO decimal places, in the range from 0.00 to 9.99
 - ONE decimal place, in the range from 10.0 to 99.9
 - NO decimal place, in the range from 100 to 9999
- 2) The bar graph only shows from 0% to 120%. Any further excess will not be shown.
- 3) The rated capacity will display 0.00 if a correct rated capacity cannot be found, or if the system detects a fault.
- 4) The angle display will normally show the main boom angle (A°) but will show the luffing jib angle (0°) when the system is fitted with such, and when that duty is selected.
- 5) The boom length display (L) refers only to the main boom and does not include any extensions or jibs.
- 6) The height display refers only to the main boom.
- 7) F1 or F2 are normally displayed to indicate with which winch the duty is associated.

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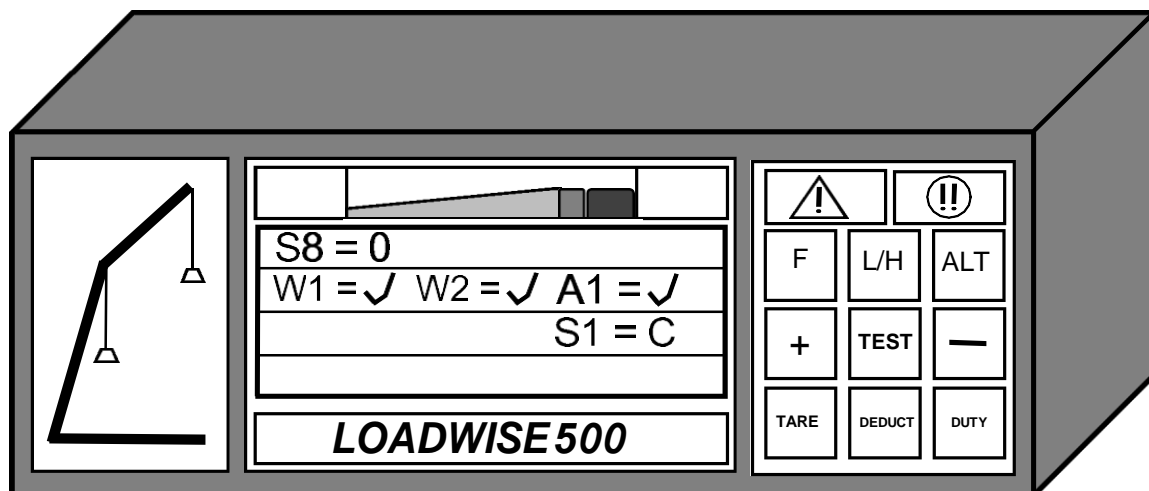
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FAULT CODES

When the word FAULT appears on the third line of the display, all the warning lamps will be “ON” and the capacity is reduced to ZERO.

To access the fault listing, push the “TEST” button and then push the “ALT” button.

The display will then look like the illustration below.



Lines 1 and 3 will display those switch inputs that are in use and whether they are open or closed. To check which switches are programmed to be in service, consult the DUTY SELECTION PLATE located in the crane cab. This plate will show, at the bottom, the program number and the switch(es) used.

Lines 2 and 4 will display the sensor conditions. When the sensor is connected and is within the range required by the system, a “check mark” will appear. An “X” means the system is not receiving correct signals; in this case, the wiring to the applicable sensor, or the sensor itself, must be checked out.

Standard sensor inputs include:

W1 (1st load sensor)	A1 (main boom angle sensor)	L1 (main boom length sensor)
W2 (2nd load sensor)	A2 (luffing jib angle sensor)	L2 (2nd boom length sensor)