



SAFETY INSTRUMENTATION

**Operators/Maintenance
Instructions for
WW650L System
(Fixed boom length cranes)**

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WARNINGS

In connection with the manufacture and sale of rated capacity indicators (automatic rated capacity indicators) to fulfil our obligations under BS 7262: 1990 no responsibility for the specification, installation and type testing of the product can be accepted by Wylie Systems unless the installation and calibration is completed by or under the supervision of its own engineers or directly authorised personnel.

ALWAYS REMEMBER!

- A That the Automatic 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.
- B That the Indicator system is purely an aid to the operator. Responsibility for the safe operation of the crane lies with the crane operator, and the indicator equipment will not necessarily prevent crane damage due to overloading and related causes.
- C Proper functioning of the equipment is dependent upon proper daily inspection and observance of the operating instructions referred to in this manual.
- D During normal operation the Rated Capacity of a crane should not be exceeded. Therefore the indication 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.
- E The crane should be operated at all times so that crane motions occur smoothly and at a safe speed.
- F The Indicator is suitable for use with Load Cells and Boom Inclinator in Zone 1 Hazardous Flammable atmospheres.

This handbook applies to a WW650L indicator fitted to a fixed length Boom crane and is directed at the crane operator and routine maintenance personnel. See SI 555 for details of calibration and faultfinding.

Wylie Systems WW650L

Offshore Crane Indicator

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Appendix A

Fault Finding Table

1 **General Description of the Indicator System**

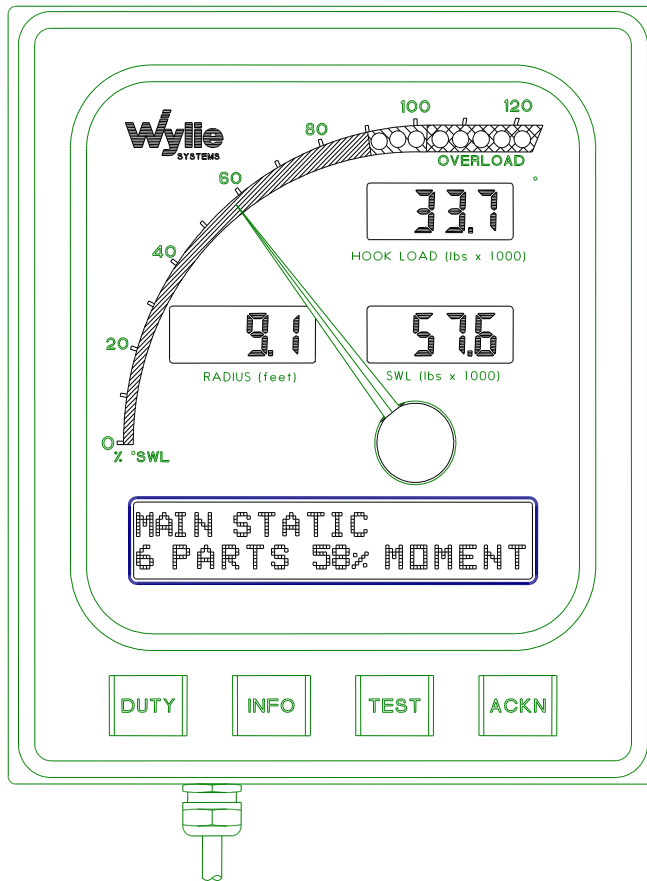
The Wylie Systems WW650L Automatic Rated Capacity Indicator (R C I) System has been designed to provide the operator of an offshore crane with the information necessary for him/her to operate the crane safely and within the maximum permitted loadings specified by the crane manufacturer.

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.

Section 4 describes the main assemblies within the system and how each part works.

View of the WW650L Display Unit

(Load and Radius units and operating condition display may vary with application)



2 Operating Procedure

2.1 Power On

Switch on the electrical supply (ie crane key switch/isolator) to the indicator.

The display unit first shows the following messages on the multifunction display immediately above the push buttons. Initially it shows the message AStarting≅, it then goes into a test sequence.

The test sequence consists of the following:-

- X Pointer smoothly moved through its full range.
- X Radius, Hook Load and Safe Working Load show all eights.
- X All segments of the multi-function display go black.
- X Alarms occur in sequence with pointer.
- X The crane type is then displayed.

When the test sequence is complete, the system reverts to normal operating mode. A full description of the information displayed in normal operating mode is given in section 2.7.

2.2 Test

The test sequence, as described above, may be selected at any time by momentarily pressing the ATEST≅ button.

2.3 Info

When the AINFO≅ button is pressed the lower left part of the multi-function display will read other parameters not normally displayed other than percentage moment. The first press will show boom angle >A= in degrees. A second press will show boom length in feet. A third press will show ADuty≅ number (refer to service label.) and a final press will show currently set falls. AMF≅ for main and AAF≅ for auxiliary. (these are set in Supervisor Mode)

2.4 Duty

The WW650L can automatically monitor the Main or Auxiliary hook depending upon which is selected at the crane controls, but this feature is optional. Press the DUTY button to step through those available. Duties can also be selected by number with reference to the service label. First press the INFO button three times to display Duty number. Then press DUTY to select the correct number.

Each time the ADUTY≅ button is pressed the system moves to the next duty rating appropriate for that hook. To select a previous duty press the button repeatedly until the duty required is re-selected.

2.5 Acknowledge

The AACKN≅ push button allows the audible alarm that sounds if the approach percentage of SWL is exceeded by the hook load to be silenced. If the hook load falls below the approach percentage and then exceeds it again, the audible warning of approach percentage will again operate.

It does not silence the audible warning which sounds if the overload percentage of SWL is exceeded.

2.6 Parts of Line (falls)

The number of falls to which each hook is reeved is generally fixed for this type of crane, and so the parts of line automatically changes to the correct, preset number as the hook being monitored is changed at the crane controls (see section 2.4 above). However, should the reeving of either hook be changed to a different number of falls rated by the manufacturer, the WW650L can be changed to that alternative number of falls by the crane supervisor (refer to handbook SI551).

2.7 Normal Operation

During normal operation, the display will present information to the crane operator as shown on the drawing in section 1.

The large pointer shows the load currently being lifted as a percentage of the current safe working load. This percentage is also displayed on the multi-function display directly above the push buttons, together with the hook selected, parts of line, and the operating condition.

The load currently being lifted is shown on the top digital display, with the present Safe Working Load directly beneath it. To the left of the SWL the Load Radius is shown.

There are three alarm thresholds built into the system. These alarm thresholds are related to load radius by tables defined by the crane manufacturer.

The first alarm threshold occurs at about *95% of SWL, and brings the yellow lamps on. The cab mounted audible also operates. The Acknowledge (ACKN) pushbutton can be used to cancel this.

The second alarm threshold occurs at about *105% of SWL, and brings the external audible warning on.

The third alarm also occurs at the *110%, and operates that output relay which may inhibit crane operations to danger. ie hoist raise or boom lowering.

For operation in a dark crane cab the push buttons, multi-function and digital displays, and the cardinal points of the large pointer scale can all be illuminated via an external switch input if one is available otherwise they will be permanently illuminated.

* percentages may vary depending on application.

3 **Maintenance**

3.1 Routine Weekly Checks

- 3.1.1 Check the Link/Pin Loadcells for security. Pay attention to split pins, washers and any other securing devices. Check the cables and glands for security or damage.

Check that the hoist ropes run smoothly through the sheaves (rollers) and that they freely rotate during load hoisting or lowering.

Visually inspect the rope run through the crane, checking that the rope passes properly over all the sheaves and that the load link is properly aligned.

Clean out any clogged grease or dirt which may have accumulated, especially adjacent to the load sensing sheaves.

- 3.1.2 If the display fascia should become dirty it may be cleaned by a non-abrasive cloth dampened with isopropyl alcohol or methylated spirits.

- 3.1.3 Inspect all wiring, particularly wiring external to the cab, and check that there are no loose connections. Check tightness and bonding on cable glands. - Action Service/Supervisor only.

- 3.1.4 Position the boom at two or three different radii with a load suspended and accurately measure the hook radius. Check that the actual radius display is correct in all cases.

- 3.1.5 Check the accuracy of the load indicator by lifting a load of known weight.

3.2 Steam Cleaning

Care should be exercised when steam cleaning the crane so that none of the enclosure seals are damaged, allowing moisture into the electronics.

3.3 Welding

The WW650L should be isolated from both sides of the mains input power supply leads before any welding is carried out on the crane.

3.4 Fault Diagnosis

The WW650L has a sophisticated system of continuously monitoring its own operation, and displays the appropriate message when a fault is detected. An explanation of these fault messages is given in Appendix A.

4 Detailed Description of the System Sub-Assemblies

The individual sub-assemblies which go to make up the complete WW650 system are listed below.

4.1 Load Sensors

Two methods of load sensing are used:-

1. Hoist rope sensing
This is done using a Link or Pin type loadcell to measure the tension in the dead end of the hoist rope or a compression/beam loadcell in conjunction with a deflection pulley, also to measure tension by deflecting the hoist rope.
2. Derrick system sensing
This method derives the load indirectly by measuring, again with a Link or Pin type loadcell either in the boom pendants or boom hoist system or pressure transducers in the boom hoist hydraulic cylinders.

All of the above loadcells are Asimple apparatus≅, and so can be used in zone 1 hazardous areas when protected by the zener barriers fitted in the Control Unit.

4.2 Boom Angle Sensors

An inclinometer (angle sensor) is used to monitor the angle of the boom. The internal plastic inclinometer housing is partially filled with a silicone oil to mechanically damp the pendulum movement and environmentally protect the potentiometer and SHOULD NOT BE OPENED BY UNQUALIFIED PERSONNEL.

This angle sensor is also Asimple apparatus≅, and so can be used in zone 1 hazardous areas when protected by zener barriers fitted in the control unit.

4.3 Termination Unit

This unit contains all the system electronics with the exception of that in the display. It also contains zener barriers to interface with the load and angle sensors, terminals to connect to the other sensors, audible alarm, and display, and a power supply to convert from 110/240 VAC to the system 24 VDC.

This unit has been mounted in a safe area, so no techniques appropriate to electronics in hazardous areas are required except for those associated with the zener barriers.

4.4 Display Unit

The display unit indicates the status of the crane to the crane operator. The normal format of displayed information is shown on the drawing in section 1, and the function of the different parts of the display and push buttons is given in sections 2.2 to 2.7.

This unit has been mounted in a safe area, so no techniques appropriate to electronics in hazardous areas are required.

4.5 Load Sensor Junction Box

This is mounted on the boom, and connects the cables from the Main and Auxiliary Hoist load sensors to be connected to the common cable which runs down the boom back to the Termination Unit.

This junction box is >simple apparatus= and so can be used in zone 1 hazardous areas when protected by the zener barriers fitted in the Termination Unit.

4.6 Angle Sensor Junction Box (optional)

This is mounted near the base of the boom, and connects the cable from the Angle Sensor to the cable from the Termination Unit.

This junction box is A simple apparatus≅ and so can be used in zone 1 hazardous area when protected by the zener barriers fitted in the Termination Unit.

4.7 Friction Compensation Switches (optional - 2 inputs maximum)

The system is able to compensate for the effect of friction in the load or boom hoist systems monitoring the appropriate crane function(s). The movement of the hoist rope or boom hoist system is detected by two switches. One switch detects raising and the other lowering.

These switches must be mounted in a defined safe area and so are not protected by zener barriers.

4.8 Main/Auxiliary Switch (optional)

This switch is provided by the crane manufacturers, and is monitored by the WW650L system to determine which of the crane hooks is to be monitored. The switch contacts are voltage-free, and will be closed when the Main Hoist is to be selected and open when the Auxiliary Hoist is to be selected.

4.9 Audible Alarms

These are electronic sounder devices. One is mounted in the cab for approach alarm and the other mounted outside for overload.

Appendix A

Symptom	Possible Cause	Action
WW650L not functioning.	No Power from machine Internal Fuse Blown Internal Connection damaged	Check supply voltage to system. Check Fuse inside Interface Unit and replace with correct rating fuse if blown (2 amp anti-surge). Check connections inside Interface Unit.
Audible Warnings do not sound on switch on.	Faulty Relays in Interface Unit, faulty audible warnings	Replace.
<u>Message:</u> AIC5 missing or Faulty!≅	IC5, the machine Data memory has been removed from the main PCB or is damaged	Replace or Refit.
Overload warning on <u>only</u> .Blank display.	Complete programme failure.	Check that IC1 and IC3 are correctly fitted to their sockets. Check +5V supply at TP1 to TP5. Replace PCB.
Approach and overload Warning <u>Message:</u> ASENSOR FAULT LO≅ or ASENSOR FAULT HI≅	Bottom line shows which external sensor input is faulty. If more than one sensor is faulty, descriptions will alternate	Check wiring to appropriate sensor for damage. When repaired turn WW650L on again.
<u>Message:</u> AFault Clear. #4 continue #3 to review≅	Fault has cleared or has been rectified	Press button #4 to restart system. Press button #3 to review which sensor caused fault.