SILICON INTERNATIONAL

Crane Moment Limiter

WITH LCD TOUCH SYSTEM

SLI-200

(Crane Computer)

PRELIMINARY

TECHNICAL MANUAL

SILICON INTERNATIONAL

171-COOPERATIVE MARKET SADDAR

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I. General Introduction

During operation, according to the specific circumstances at the working site, a crane has to frequently change its working conditions, such as the lifting angle and the boom length, to provide lifting. On the other hand, the rated maximum lifting capacity and the maximum and minimum working angle changes under different working parameters are also different. Therefore, we need a set of devices to indicate the working status of a crane, such as normal operation, full load, overload, upper limit of angle change exceeded and lower limit of angle change exceeded, and to implement relevant alarming, indication and control, so as to ensure proper operation of the lifting machinery.

The full automatic crane moment limiters are suitable for use with telescopic cranes (such as auto cranes). The system, which is a micro processing embedded operating system, has a friendly user interface, a small power consumption, strong functionalities and a high sensitivity and is compact in design, easy to operate and expand. It can display a crane's working parameters such as the actual lifted load, the rated lifting capacity, the angle and the length. It has complete pre-alarming, overload alarming and overload output control functions; it has a complete system failure self-detection function and can have options of Voice Urdu/English, which provides the operator with effective guidance in solving the problems; it also has unique function that can limit a crane's working angle, which makes operation under complicated conditions more reliable.

1) Functions

The product is integrity of electronic technologies, microcomputer technologies and crane mechanical technologies. It has the following major functions:

☞ It can automatically detect various kinds of signals related to lifting devices and enter the signals into instruments for micro processing. The signals include: weight signals, height signals, signals of included angle between boom and horizon, etc.;

☞ The instrument can display various kinds of pre-defined parameters related to the working conditions. The parameters include: boom length, rated lifting capacity, actual lifted load, working angle, and radius etc.;

☞ The system can carry out automatic sampling and real-time tracking of the performance parameters of the lifting device and can use a microcomputer to calculate, compare and determine the parameters and give out acousto-optic alarms when necessary.

☞ The host computer is universal and can be adapted to various kinds of lifting devices by changing the software, without having to change the host computer. This facilitates mass production. The computer has stored

multiple sets of rated load curves, which meets the requirements for infinitive alarming under various working conditions;

2) Major technical parameters

1. Working ambient temperature: ‑20℃~60℃

2. Working ambient humidity: 95% (25℃)

3. Working voltage: DC 24V ±20%

4. Working mode: Continuous

5. Vibration: Acceleration≤5g (g is gravity acceleration)

6. Overall system error: Less than ±5%

7. Overall power consumption: Less than 10W

8. Alarm volume: More than 60db

II. Composition and operating principles
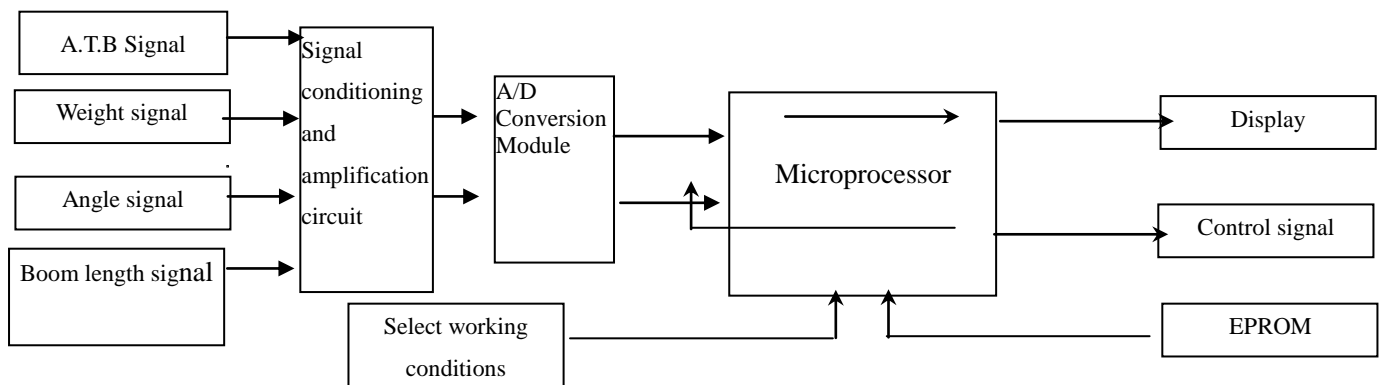
A) System composition

1. Main board

All-in-one main boards that were developed based on single-chips are used. All-in-one means that all hardware circuits (CPU, A/D converter, EPROM, EEPROM, serial ports and other peripherals) of a system is integrated onto a single board, thus providing extremely high reliability and resistance against interference and ensuring proper operation under

an industrial ambient temperature of ‑20℃~＋70℃ and a humidity

of 90%.

2. LCD displays

Can display all data with which a customer may be concerned in a single screen, such as the angle, the actual lifted load, the rated lifting capacity, boom, length & radius.

I) Schematic Block Diagram

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A.T.B Signal ──────┐
                   ├──► Signal          A/D
Weight signal ─────┤    conditioning    Conversion
                   │    and             Module ──────►  ┌─────────────────┐
Angle signal ──────┤    amplification              ──►  │  ──────────►    │──► Display
                   │    circuit                         │  Microprocessor │
Boom length signal ┘                                    │                 │──► Control signal
                        Select working ────────────►    │  ──────────     │
                        conditions                      └─────────────────┘◄── EPROM
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II) Operating principles

During the operation of Crane, the Microprocessor receives the current status of the sensors. Therefore, after collecting and processing of corresponding signals, the CPU will search for the corresponding curves of the load chart's, and determine the rated lifting capacity under the conditions, compare the capacity with the actual lifted load and carry out control. Of course it can also determine whether the limit is exceeded by checking the angles and carry out control.

During operation, the moment limiter first detects various kinds of operational parameters (angle, length & weight) of crane by corresponding sensors and sends signals to main board after simulated amplification adjustment, then converts the signals into digits by A/D and sends them to the core host computer. Then, microprocessor makes process and calculation to data according to sets and some condition signals, after that, it on one hand sends the processing results to display, on the other hand compares the processing results with inherent load characteristic curves of crane (this part of curve is solidified in EPROM) to judge if the crane is in safe work area,

based on which the microprocessor sends out corresponding control order in order to achieve the purpose of protecting the crane to operate safely.
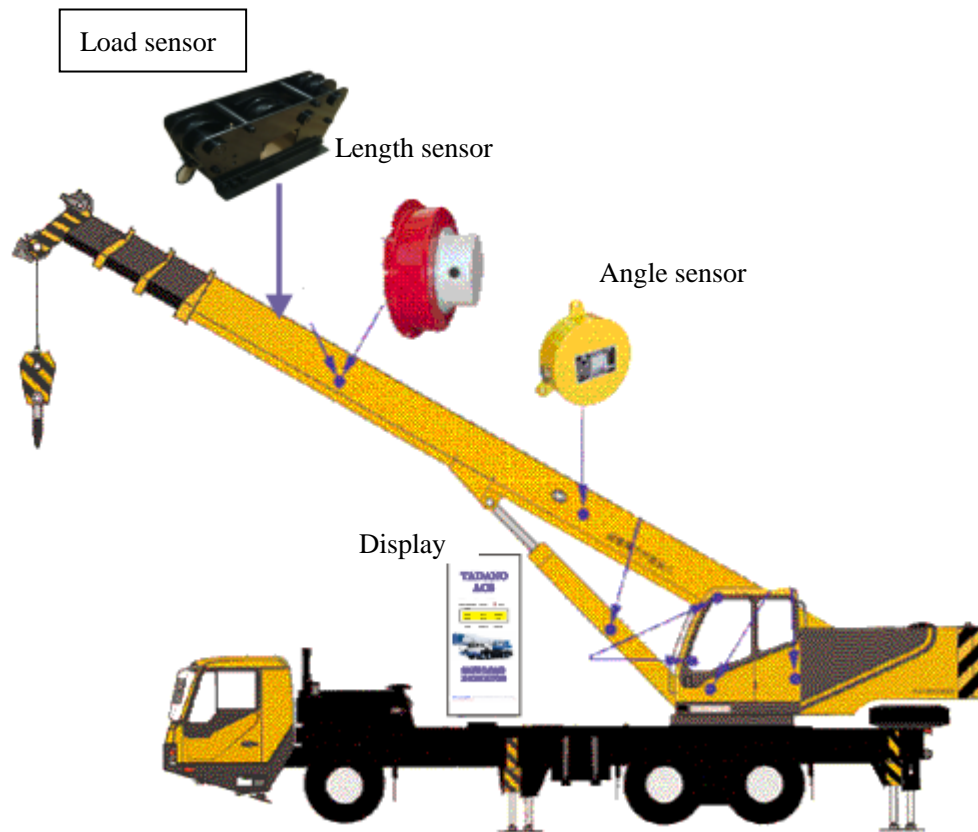
III. DISPLAY

Interpretation of display interface
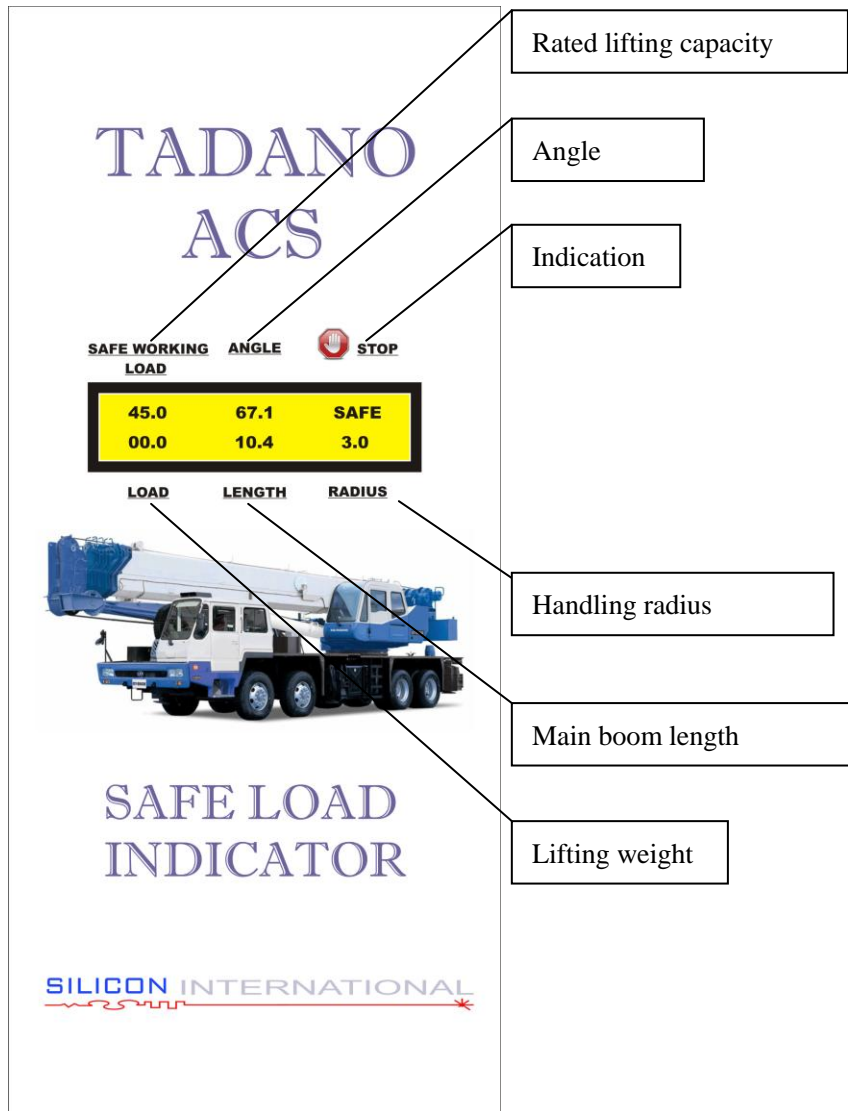
Installation instructions

A complete set of system includes display, length sensor, over Limit switch, Load sensor and angle sensor.

Load sensor

Length sensor

Angle sensor

Display

Erection diagram

Length sensor is installed in the middle of basic boom of crane by welding and the start of sensor is drawn out to fix at the front end of crane boom.

Angle sensor is installed near to the root of basic boom with its outlet downwards and it is fixed to basic boom by welding mounting board.

Load sensor is installed at the main boom as shown above.