

**UNIC HYDRAULIC CRANE**

**MAINTENANCE  
MANUAL**

**ML3A SERIES  
MOMENT LIMITER**

**FURUKAWA UNIC CORPORATION**

## **INTRODUCTION**

**This is a service manual which refers to checking of functions, trouble shooting, and adjustment of the moment limiters, ML-3A-EA series.**

**Technical Section, Service Department  
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## § 1. GENERAL DESCRIPTION OF MOMENT LIMITER

Moment limiter is a safety device which monitors load condition while the crane is being operated and issues a warning automatically when it judges that the crane is under overloaded condition exceeding the rated load capacity of the crane.

Major functions of the moment limiter are as follows:

(Refer to 'OPERATOR'S MANUAL' of moment limiter concerned for its operation in detail.)

### 1) Warning of overload prediction

If the crane comes close to overload condition (when exceeding 90% of the warning of overload limit), it allows the alarm buzzer to sound intermittently.

### 2) Warning of overload limit

If the crane has been overloaded, it allows the alarm buzzer to sound continuously and the crane functions of 'hoisting-up hook', 'extending boom', and 'lowering boom' to stop automatically.

### 3) Indication of lifting load

Weight of the cargo being lifted up by crane is shown on the 'lifting load' indicator ( $\times 100\text{lbs}$ ) mounted on the control box.

### 4) Inspection switch(▲)

While the inspection switch(▲) mounted on the control box is being depressed, it indicates as illustrated below:

- ① "Lifting load" indicator reads [ **BBB** ],
- ② Alarm buzzer gives an alarm sound, and
- ③ Automatic stop halts crane functions of 'hoisting-up hook', 'extending boom', and 'lowering boom'.

**Note 1)** In order to make the moment limiter to judge overloaded condition automatically, read the operator's manual of the crane carefully to observe the operating conditions of the crane.(e.g.:setting-up requirements of outriggers).

**Note 2)** Since the weight of lifting cargo can not be measured with the boom lowered to its extreme, it gives an alarm as illustrated below.

Operate the crane with the boom raised a little when the alarm has been issued.

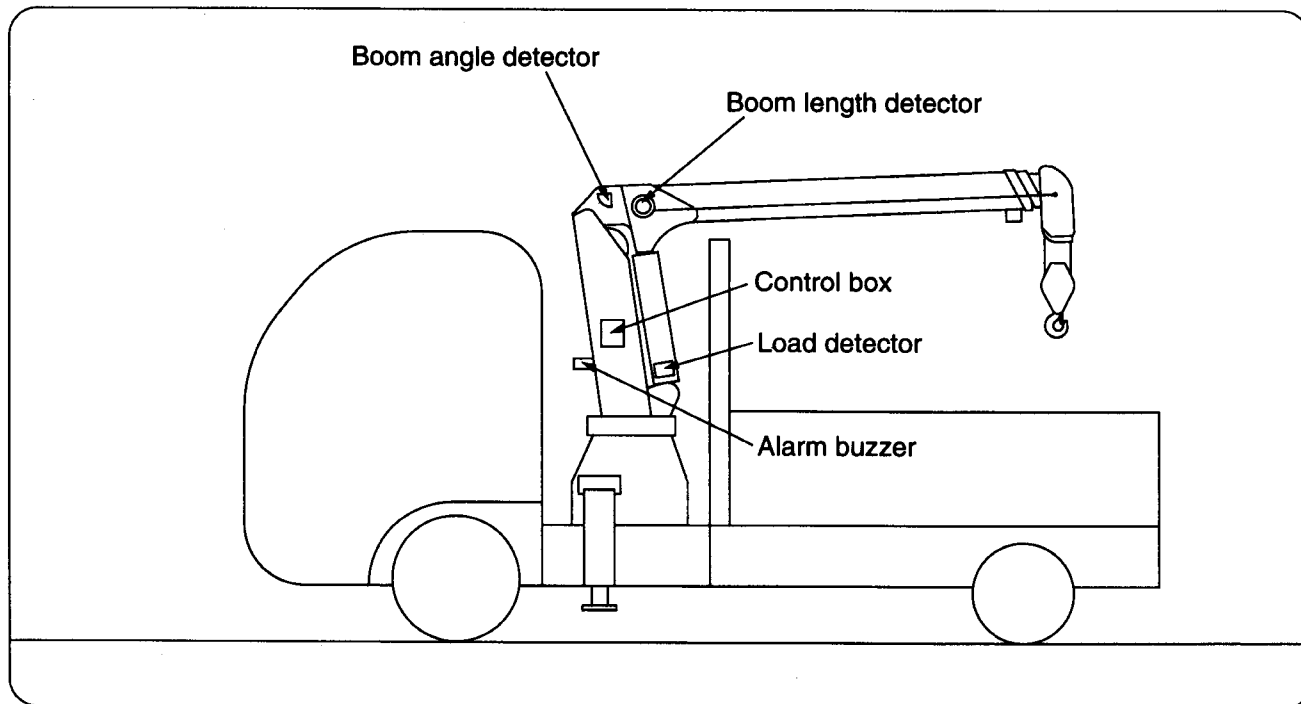
- ① "Lifting load" indicator on the control box reads [ **□□□** ].
- ② Extension of the boom by more than approx. 0.3ft from the position where it is retracted to its extreme allows the alarm buzzer to make an intermittent sound and the crane functions of 'extending boom' and 'hoisting-up hook' to stop automatically.

**Note 3)** When the boom is raised to its maximum, "lifting load" indicator mounted on the control box reads more than the actual lifting weight and the overload alarm may be issued which is not a trouble.

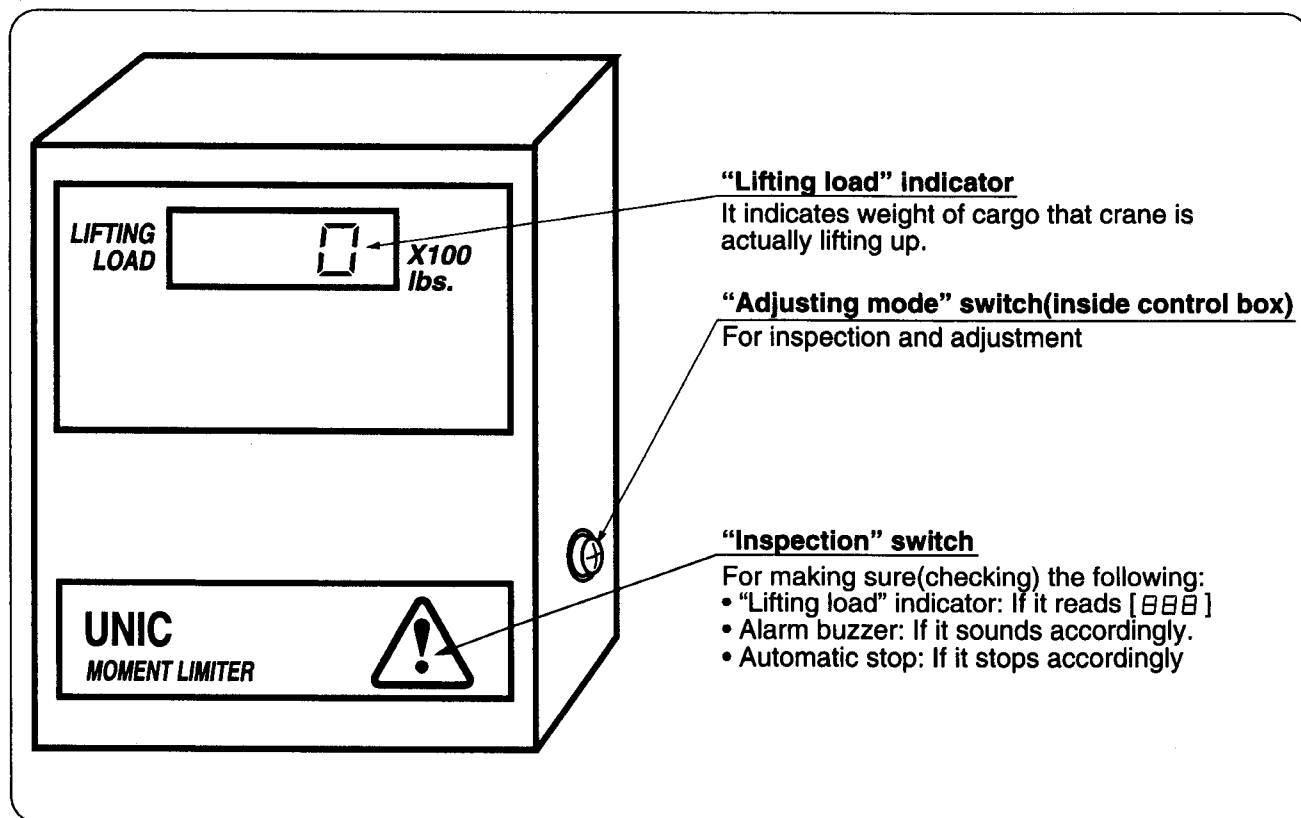
Be sure to operate the crane with the boom lowered to some extent when the alarm has been issued.

If the warning of overload limit is issued with the boom raised to its maximum and it comes to a condition that the boom can not be lowered, try operating the crane to raise the boom further then lower the boom.

## § 2. STRUCTURE OF MOMENT LIMITER



## § 3. DESIGNATION OF EACH SECTION OFF CONTROL BOX



## § 4. HOW TO CHECK FUNCTIONS

### 1) Inspection using “inspection” switch on the control box

Depress the “inspection” switch to check that it indicates, while the switch is being depressed, as illustrated below:

- ① “Lifting load” indicator reads [ **BBB** ],
- ② Buzzer gives an continuous alarm sound, and
- ③ Operation of ‘hoisting-up hook’, ‘extending boom’, and ‘lowering boom’ stops functioning(automatic stop).

### 2) Inspection by checking the warning with the boom lowered to its extreme

Check the indication as shown on the table below with the boom lowered to its extreme.

	Boom length	Lifting load indicator	Alarm buzzer	Automatic stop
1	At less than ① + 0.3ft( ± 0.2ft)	[ <b>0000</b> ]	No sound	No stop
2	At more than ① + 0.3ft( ± 0.2ft)	[ <b>0000</b> ] blinking	Intermittent alarm sound	Operation of “extending boom” and “hoisting up hook” stops functioning

### 3) Inspection by checking the lifting load indicator with no load hoisted up

Check that the lifting load indicator reads [ **0** ] ~ [ **3** ] ( × 100lbs ) by extending the boom from its minimum to maximum with no load hoisted up, and with the boom angle set at approx. 40 degrees.

### 4) Inspection by checking indication of the overload alarm and the lifting load indicator

- ① Lift up a already known weight of cargo (with more than 2,000lbs.) within the rated working radius of the crane.
- ② Confirm that the “lifting load” indicator mounted on the control box reads:  
Weight of lifting cargo ± 3 ( × 100lbs.) or  
Weight of lifting cargo + (0~10%) ( × 100lbs.)
- ③ Allow the crane to lower the boom and check that the alarm buzzer makes intermittent sound as the boom come close to the rated working radius(warning of overload prediction).
- ④ Confirm that further lowering boom allows the alarm buzzer to make continuous sound and function of lowering boom to stop automatically (warning of overload limit).
- ⑤ Measure the working radius at which the lowering boom automatically stops functioning and find the rated load at the measured working radius from the rated load chart for the crane, then make sure that the difference from the lifted weight of cargo rests within ± 10%.

## § 5. HOW TO INSPECT AND ADJUST WHEN IN TROUBLE

### 1) Unusual readings of “lifting load” indicator on the control box

If “lifting load” indicator on the control box shows unusual readings as illustrated below, it allows the alarm buzzer to sound continuously and crane operation of ‘hoisting-up hook’, ‘extending boom’, and ‘lowering boom’ to be stopped functioning.

- Blinking [ 555 ]: Indicates a fault in boom length sensor
- Blinking [ 777 ]: Indicates a fault in boom angle sensor
- Blinking [ 888 ]: Indicates a fault in load detector (rod pressure)
- Blinking [ 999 ]: Indicates a fault in load detector (head pressure)

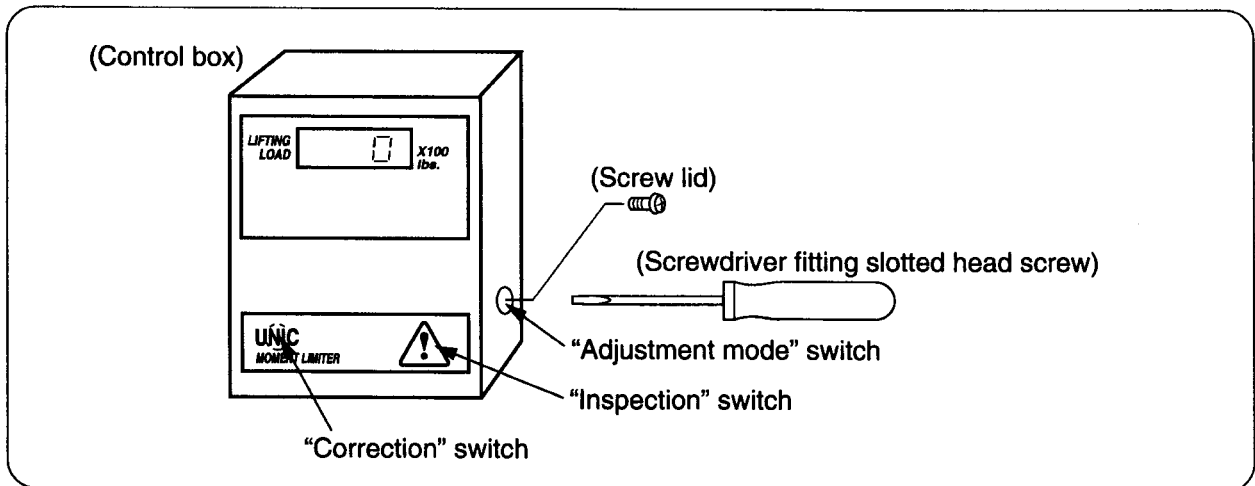
If any of indications mentioned above is found, check the cables and the detectors concerned because possible causes may be in continuity of cables and connections of the detectors (including cable disconnection at connectors), or in the detectors in question.

- Boom length sensor: Potentiometer(5K $\Omega$ )
- Boom angle sensor: Potentiometer(500 $\Omega$ )
- Load sensor(pressure sensor): Output level of sensor amplifier

### 2) Inspection by adjustment mode switch located inside of the control box and how to adjust it

Inspection and adjustment of moment limiter can be made by making use of adjustment mode switch provided inside of the control box.

If your moment limiter is found something wrong or when replacing components of the moment limiter, inspect it according to the following and carry out adjustment as necessary.



- 1) Make that your crane is ready to be operated and check that “lifting load” indicator on the control box lights.
- 2) Remove the screw lid located on the side of the control box covering “adjustment mode” switch with a phillips screwdriver.
- 3) Turn the “adjustment mode” switch located inside the control box with a screwdriver(with its tip width of less than 3mm) and carry out inspection and adjustment as necessary by referring to the table, “Inspection and adjustment by using adjustment mode switch”, illustrated on the next page

(Note: Do not try to adjust the moment limiter more than is necessary as it has been adjusted before shipment from the factory.)

### Inspection and adjustment by using adjustment mode switch

Switch No.	Readings of 'lifting load' indicator	What to inspect and adjust	Adjustment
0	Lifting load( × 100lbs.)	Normal mode	Be sure to return it to normal mode except when making inspection and adjustment.
1	(1→)Model code	Model check, setting • Inspection and setting of crane model code(number of boom section) (e.g.:505→005)	① Depress "correction" switch to allow the model code of the crane in question to indicate. ② Depress "inspection" switch (confirming beep sound) to complete the setting.
2	(2→)Boom length(ft)	Inspection and adjustment of boom length • Adjustment of minimum length(with boom retracted to minimum) • Adjustment of maximum length(with boom retracted to maximum)	Allow the boom to operate according to the boom function to be adjusted and depress "inspection" switch (confirming beep sound) to complete the setting. • Check the reading of lifting load indicator after making adjustment.
3	(3→)Boom angle(°)	Inspection and adjustment of boom angle • Adjustment to 5°(with boom angle set at 5°) • Adjustment to 70°(with boom angle set at 70°)	
4	(4→)Working radius(m)	Inspection of working radius	_____
5	(5→)Lifting load(lbs.)	Inspection and adjustment of lifting load • Adjustment of lifting load Range to be adjusted: - 20% ~ + 20% Readings : 80 ~ 20	① Set number of boom section of the target boom ② Depress "correction" switch to indicate the weight of load to be adjusted (it reads while the switch is being depressed). ③ Depress "inspection" switch (confirming beep sound) to complete the setting.



Switch No.	Readings of 'lifting load' indicator	What to inspect and adjust	Adjustment
6	(6→)Rated load(lbs.)	Inspection of rated load	_____
7	(7→)Load pressure(kg/cm <sup>2</sup> )	Derrick cylinder Inspection of load pressure	_____
8	(8→)Head pressure(kg/cm <sup>2</sup> )	Derrick cylinder Inspection of head pressure	_____
9	(9→)Rod pressure(kg/cm <sup>2</sup> )	Derrick cylinder Inspection of rod pressure	_____
10~15	Internal data	No inspection and adjustment are necessary	

Note1) Turning “adjustment mode” switch allows the “lifting load” indicator to show the adjustment mode (1, 2, 3 . . . .) accordingly for one second then it changes to indicate the corresponding value in digital .

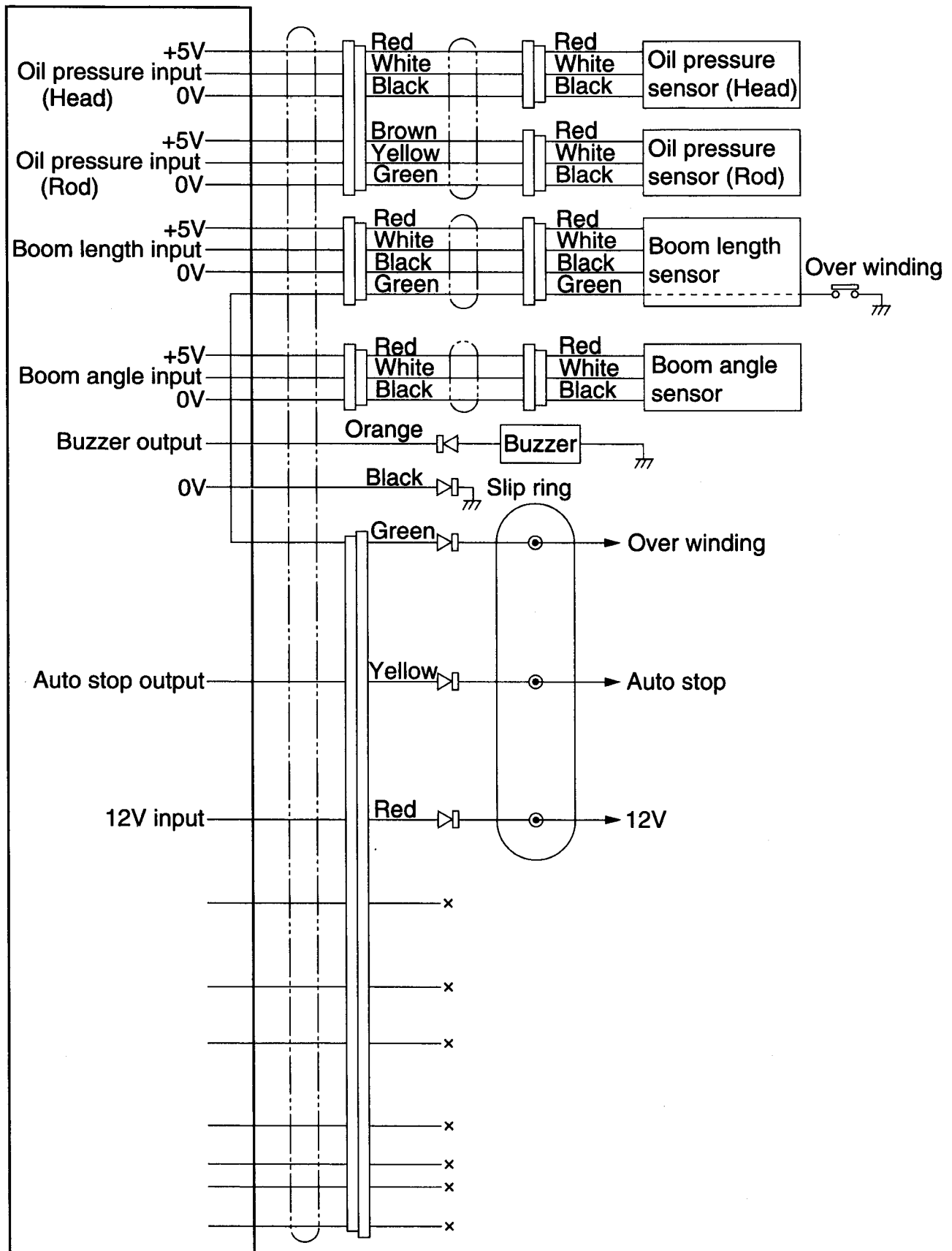
Note2) Blinking of “lifting load” indicator means that it is ready to be adjusted.

- When making adjustment, it can not be carried out if the boom condition is out of the specified range.
- Blanks in ‘adjustment’ column in the table above are to be applied to inspection only (i.e. any adjustment is prohibited).

Note3) Be sure to return the “adjustment mode” switch to the normal mode after adjustment has been completed.

(“Lifting load” indicator reads actual weight of lifted cargo.)

## § 6. ELECTRIC CIRCUIT DIAGRAM



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