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Professional Service & Repair Inc. is a full-service mobile crane repair, inspection, and certification company. At Professional Service & Repair we understand the critical aspect of your crane being operational to your project schedule and budget. We will deliver world class service to have your crane operational in the minimum amount of time.

PSR is the global provider for sales, repair and installation of Load Moment Indicating (LMI) systems, Anti-Two Block Systems (A2B), and Rated Capacity Indicating systems. Please contact us with your crane repair and certification needs today.

PSR is the name businesses trust for crane repair, inspection, and certification.

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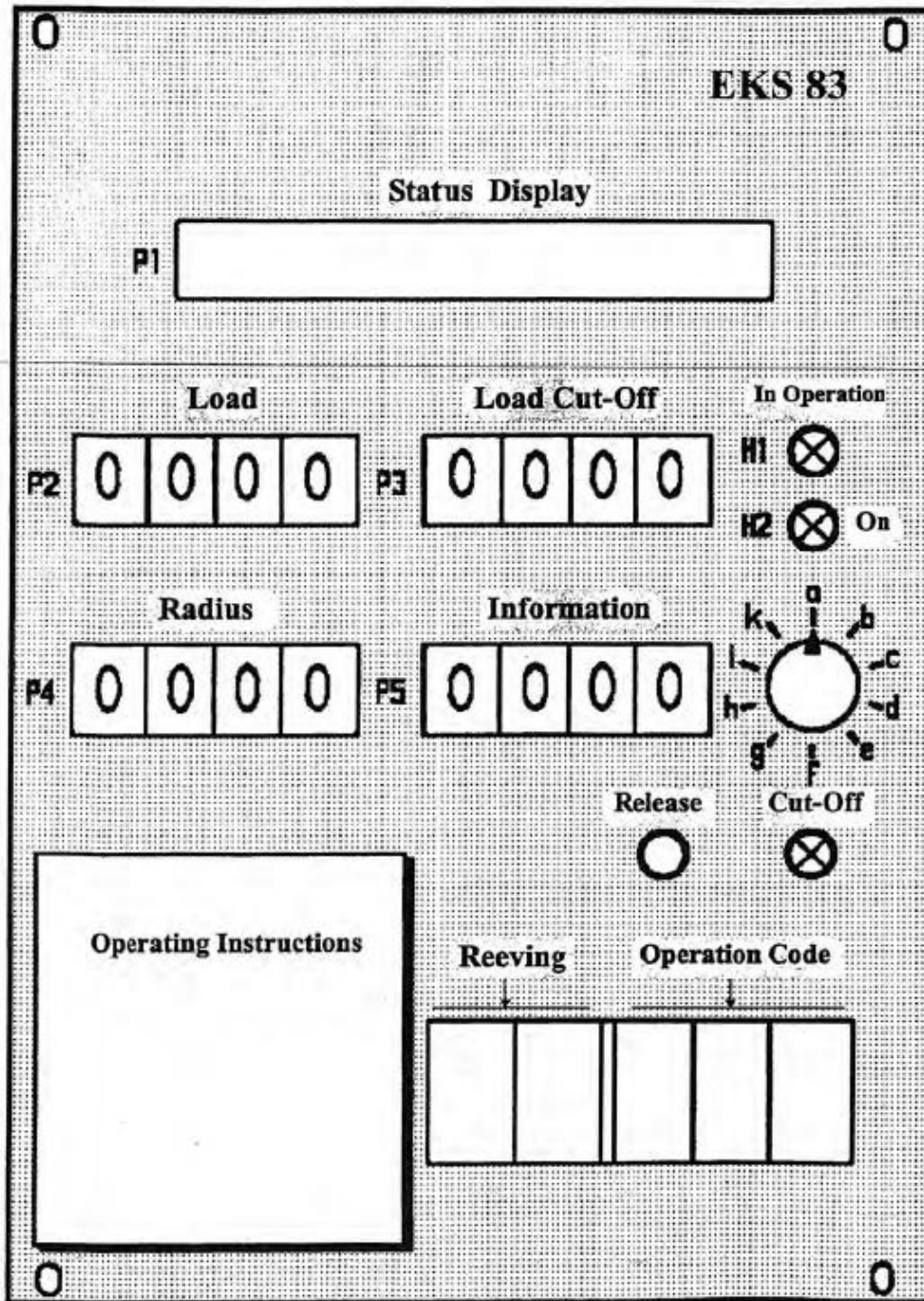
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EKS Load Moment Indicator

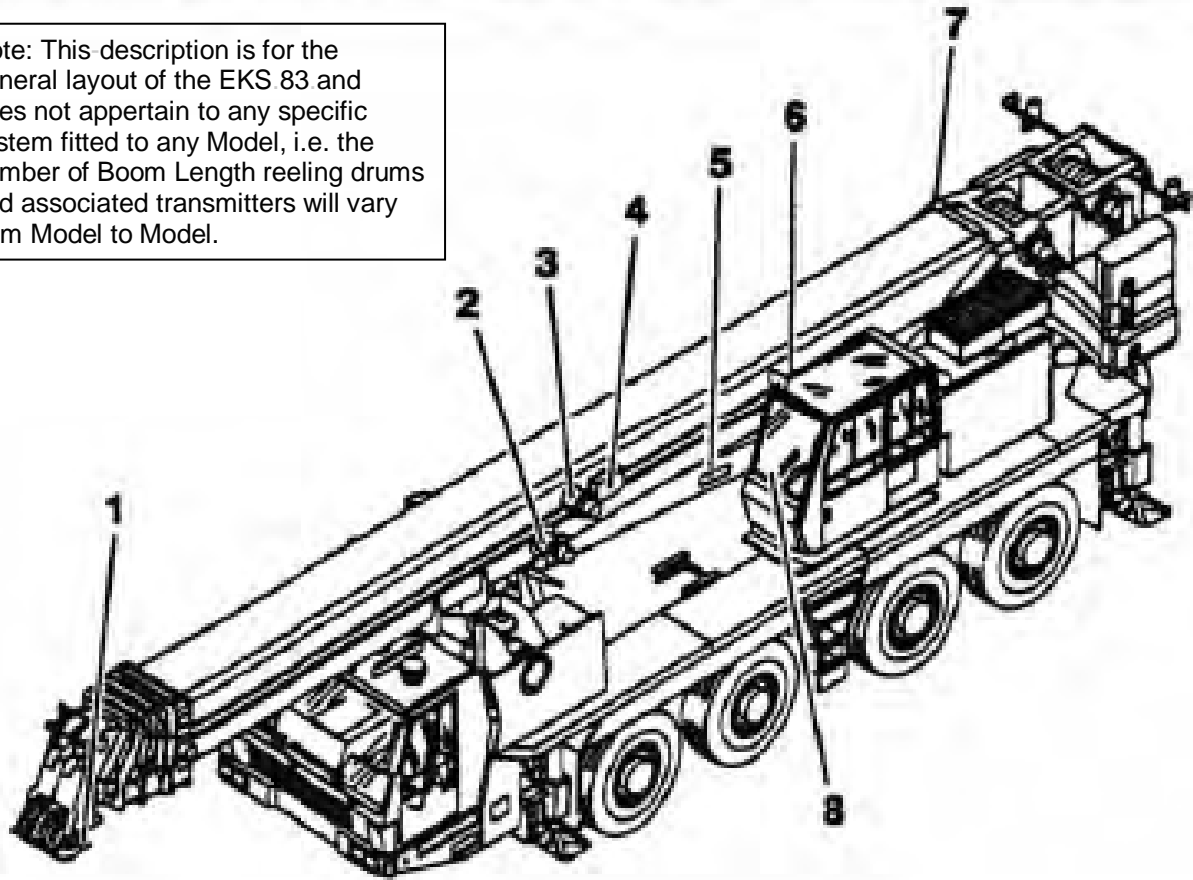
The combined Console and Central Unit



Load Moment Indicator

Description of Operation

Note: This description is for the general layout of the EKS 83 and does not appertain to any specific system fitted to any Model, i.e. the number of Boom Length reeling drums and associated transmitters will vary from Model to Model.

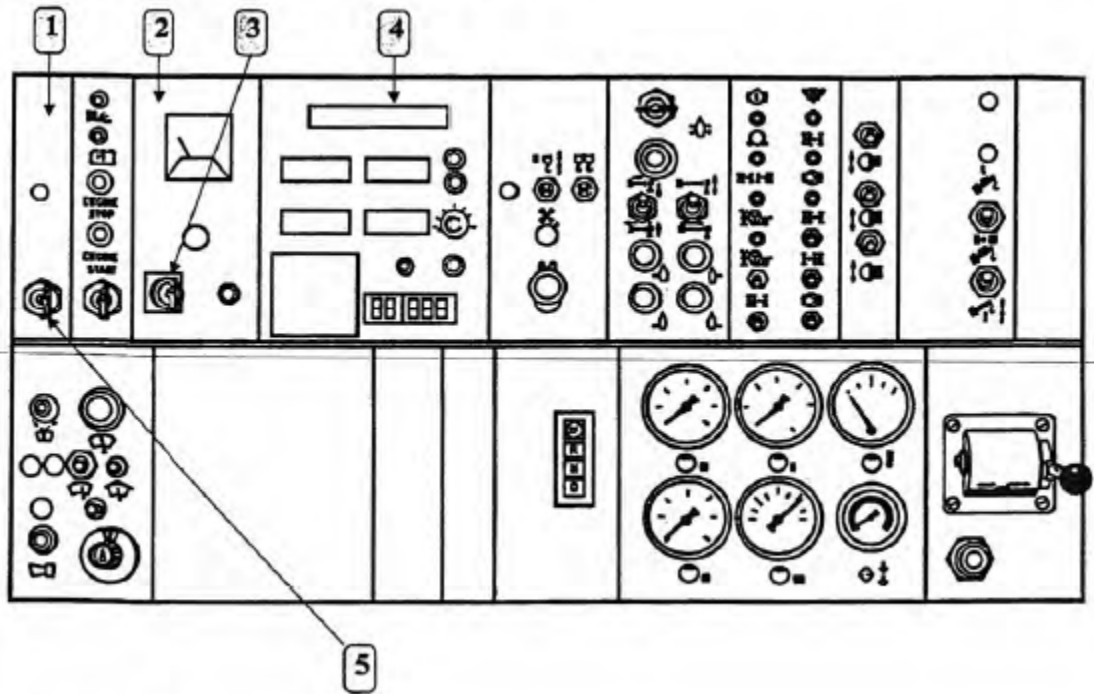


1. Lifting limit switch - main boom
2. Length measuring drum with potentiometer for telescope sections III/IV
3. Length measuring drum with potentiometer for telescope sections I/II
4. Boom unit with angle potentiometer and data transmitter for angle and length
5. Pressure sensor on derricking cylinder
6. Display unit on right-hand side of turntable
7. Data transmitter for pressure sensor on right-hand side of turntable
8. SLI central unit in the crane operator's cab

Operator's Cab - Dash Panel

A typical component layout

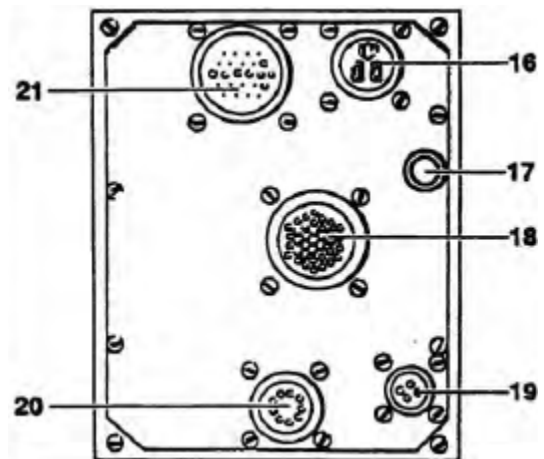
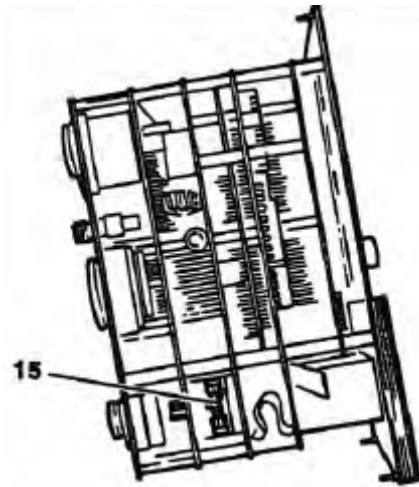
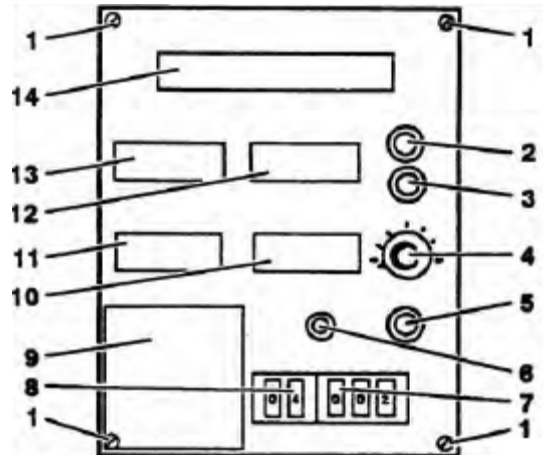
The dash panel shown is for a GMK407. The position of components in other models may vary and some items might not be fitted.



1. Plug-in module IOA, fuses FI (F1/8).
2. Plug-in module 9.5A, with LMI shutdown circuit (relay K1).
3. LMI override switch.
4. EKS 83, LMI combined console and central unit.
5. Crane switch for Superstructure S 11 (Superstructure 'ON').

EKS 83 Combined Console and Central Unit - Components

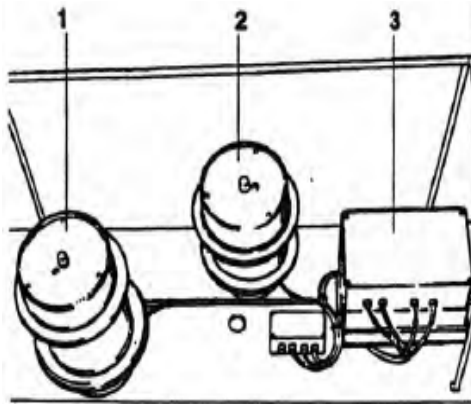
1. Mounting screws - Instrument panel
2. "ON" light
3. Supply voltage indicator light
4. Information switch "a" to "k"
 - a. Capacity utilization in %
 - b. Hook height in m
 - c. Main boom length in m
 - d. Main boom angle in degrees
 - e. No function
 - f. Piston surface pressure in derricking cylinder In bar
 - g. Piston ring surface pressure in derricking cylinder in bar
 - h. (h-k) No function
5. Warning light – shutdown
6. Release button
7. Switch for setting operating mode (SLI code)
8. Switch for setting reeving mode
9. 9 SLI brief information display
10. Display – information
11. Display – radius
12. Display - shutdown value
13. Display – load
14. Status display (operating modes, fault messages)
15. Fuse F2 (SU 2) for data bus (1.25 mA)
16. Plug X4 for 24 V power supply
17. Fuse F1 (SU 1) (3.15A)
18. Output X3 to crane electrics (shutdown signals)
19. Data bus connection supply XI for data transmitter
20. Additional outputs X5
21. Digital inputs X2



Remote External Components

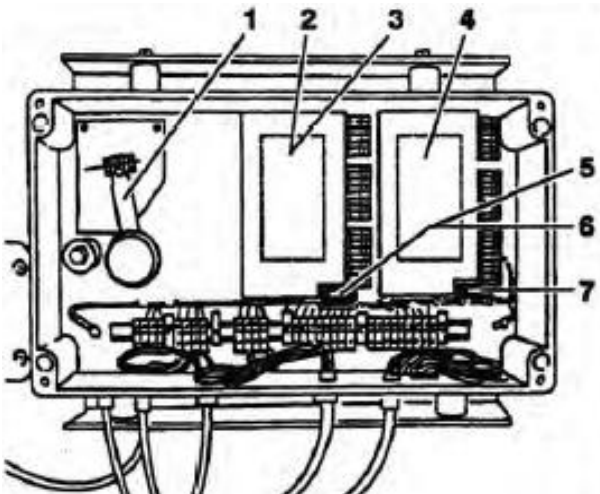
Below is the layout for the length & Angle transmitters on a GMK. 4070. Other models in the GMK range will have more length reeling drums on the side of the boom and corresponding number of transmitters.

LMI Boom-Length and--Angle-Sensors and Transmitters-



1. Cable drum with potentiometer for length - telescope sections III and IV
2. Cable drum with potentiometer for length - telescope sections I and II
3. Boom unit with angle measurement and data transmitter for angle and length

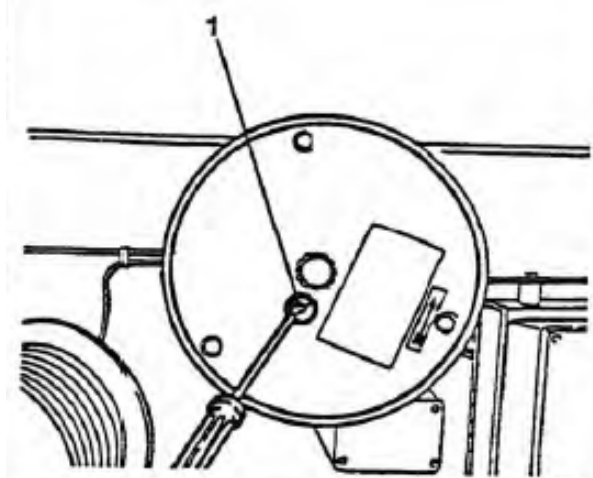
Boom-Angle-Sensor and Transmitters Box-



1. Angle potentiometer
2. Data transmitter (lower) - boom angle
3. Data transmitter (upper) – length telescope sections 1/11
4. Data transmitter - length telescope sections III/IV
5. Fuse (lower) (SU 3) 0.16 A M (medium time-lag)
6. Fuse (upper) (SU 4) 0.16 A M (medium time-lag) 1 per board
7. Fuse (SU 5) 0.16 A M (medium time-lag)

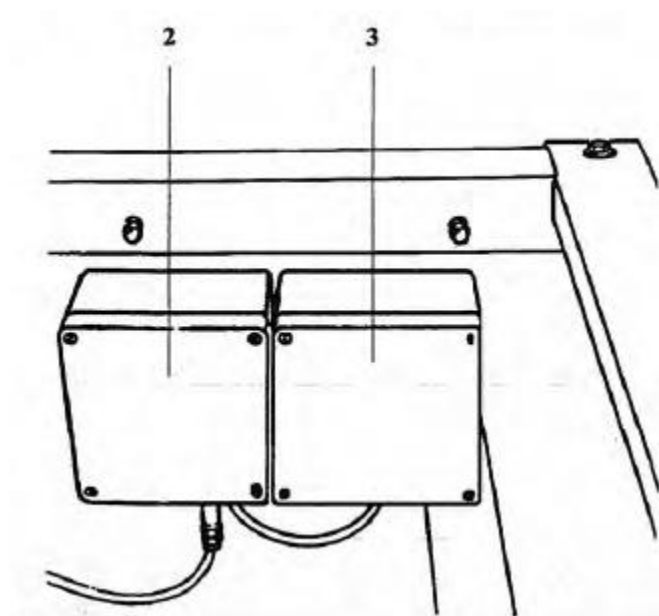
Reeling Drum Potentiometer

1. Using a screwdriver to set the Length Potentiometer to the anti-clockwise position, with the Boom fully retracted



LMI - Transmitter for Pressure Transducers

2. Data Transmitter Annular/Ring side pressure
3. Data Transmitter Full/Piston side pressure



Selection of lifting capacity chart

Selection of lifting capacity tables

The system selects the correct lifting capacity according to the operating mode set on the central unit and current boom configuration (length, telescope status, boom length).

Calculation of the radius

The radius is calculated from the boom length and angle as well as from the boom load derived from the hydraulic pressure measured in the derricking cylinder, taking the deflection of the boom into consideration. When the operating mode has been set the length of the boom and fixed angle position of the boom extension are included in the calculation.

Calculation of the reference value

Using the radius and boom length as a reference, the corresponding reference value (= maximum load with selected crane configuration) is selected from the lifting capacity table. The reference value is reduced, depending on the reeving mode set on the central unit.

Calculation of the load

The pressure measurement in the derricking cylinder produces a signal which is proportional to the measured load moment. After subtraction of the inherent moment of the boom, the actual load is calculated, taking into account the reeving configuration set on the central unit.

Warning and shutdown in case of overload

Reference value and calculated load are continually monitored and compared. If the load reaches the warning threshold (90% of the reference value), a warning is activated (intermittent buzzer, "Warning" relay, status indicator). If the load reaches the shutdown threshold (100% of the reference value), shutdown is activated. A continuous buzzer sounds and the red LED warning light "Shutdown" comes on. The "Shutdown" relay interrupts the power supply to the SU valve. The valve switches over and blocks the control pressure for the crane functions. The shutdown is displayed on the status display.

Measurement of variables

Data sensing

- Boom angle to the horizontal with pendulum-driven potentiometer.
- Boom length with potentiometer, driven by length measuring rope or wire and gear unit
- Derricking cylinder pressure with two pressure sensors in the lower chamber (piston surface chamber) and the upper chamber (piston ring surface chamber) of the derricking cylinder.

Data translation and transmission

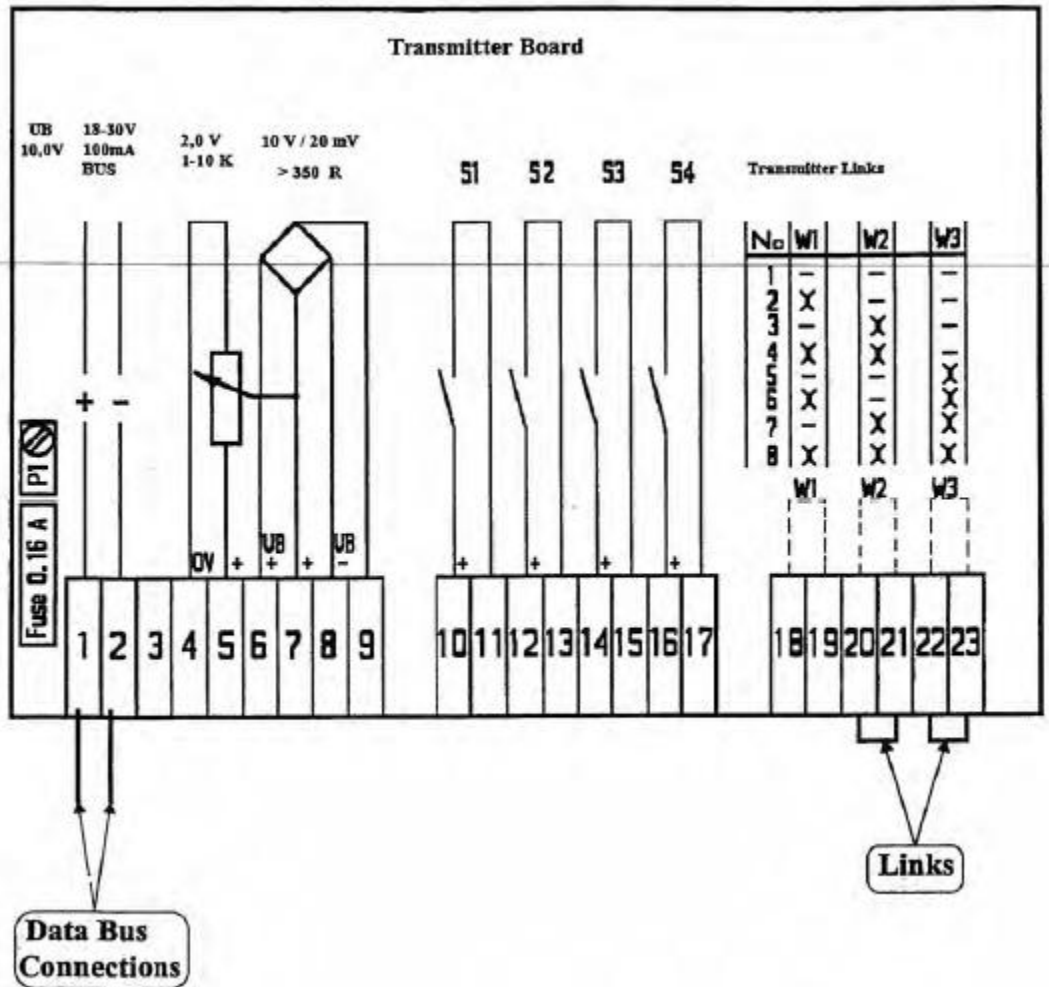
The measured values are digitized in the data transmitter, converted into telegrams and transmitted time-delayed as impressed current to the central unit through the common dual-line data bus.

Data Translation and Transmission

The measured values are digitized in the Data Transmitters, converted into signals and transmitted time-delayed as impressed current via the common dual-line data bus to the central unit.

Transmitter Boards

All transmitter Boards fitted on a machine are the same part number. The system each board is monitoring is identified to the CPU by the number and configuration of Links (Jumper wires).



Up to 3 Links can be placed in positions W1, W2 & W3. These correspond to positions between the following terminals:

W1 = 18 - 19

W2 = 20 - 21

W3 = 22 - 23

Between 0 - 3 links (inclusive) can be fitted to each board. This will give up to 8 Permutations of configuration. Each configuration, varies the 'Output Signal' level of the transmitter board onto the Data Bus, thereby giving it a unique signature, therefore we can have up to 8 transmitters with different output signals on 1 Data Bus.

A second Data Bus must be used for machines that use more than 8 transmitters, e.g. 5 section (4 telescoping section) boom machines. –

The CPU identifies each individual transmitter board from its unique signal off its corresponding Data Bus. The CPU samples the Data from each transmitter in turn and if it fails to detect one or more it will give a fault warning (audible), lock out the crane motions and display an Error code in the Status display window (P 1).

Checking Data Transmitters

Any data transmitter failure is registered by the central unit as a 'Missing Transmitter Identification Signal' and displayed as a malfunction.

The CPU will react as follows:- Console 'Cut Ofr and Status display will show a code for most transmitter failures it is prefixed with 'd='.

Note:- On a number of models a prefix of 'g=' will represent certain transmitters, i.e. machines with 4 telescoping sections. See Transmitter Identification Sheet.

See diagnosis sheets for the assistance in correcting malfunctions.

Transmitter Identification Sheet

A Transmitter Identification Sheet containing the various Models, Transmitter number, the motion they monitor and the Error Code associated with it, is copied at the back of this publication.

Fault Diagnosis and Error Code Rectification

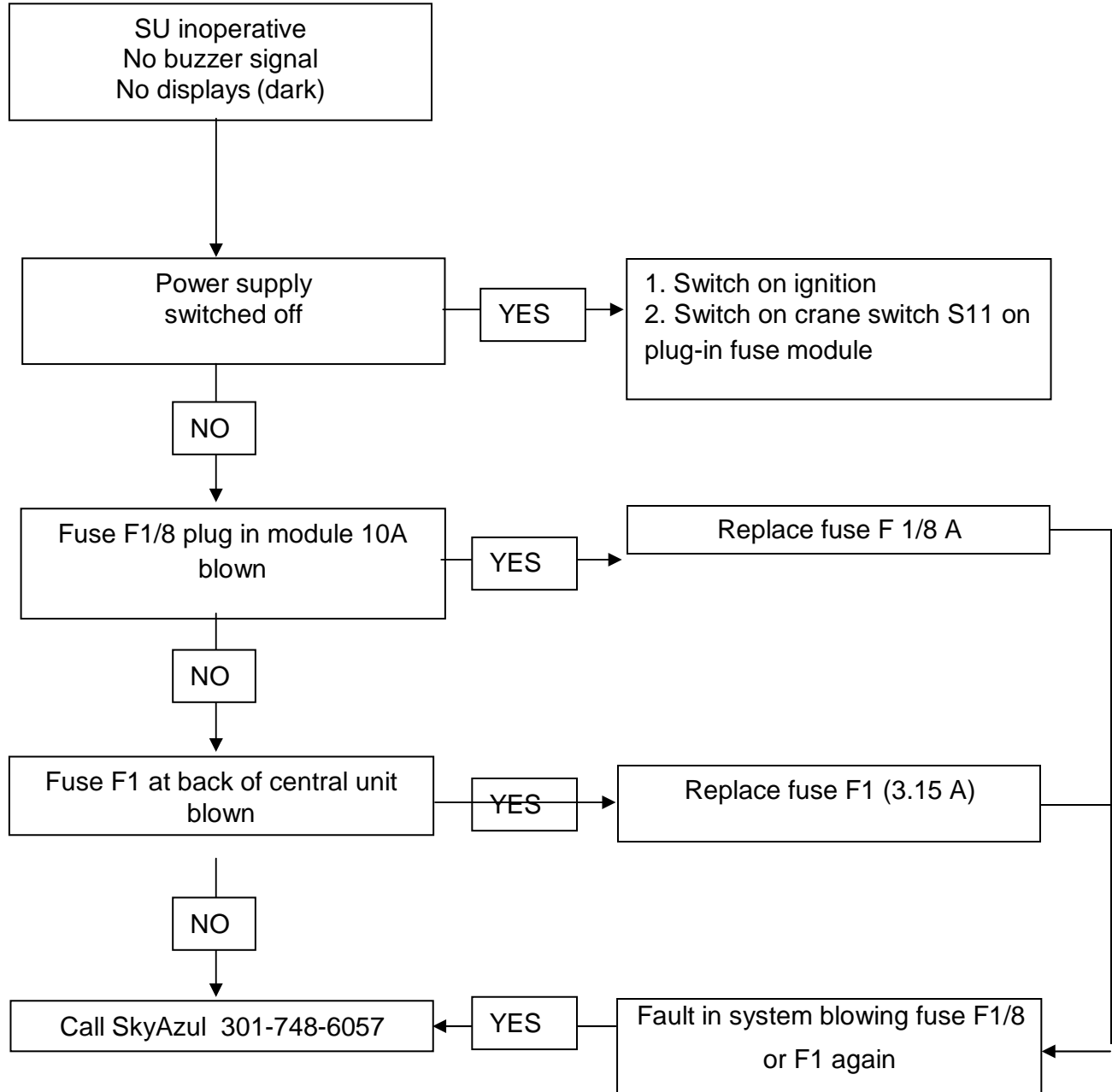
The following pages are to assist you in clearing Error Codes and carrying out general Fault Diagnosis on the EKS 83. If these steps do not help you clear the problem and it becomes necessary to contact Grove for assistance, a precise and detailed description of the malfunction will assist understand your problem and could help you with future problems without having call for assistance. Such a description should address the following points as a matter of course:

1. Exact malfunction description
2. Under what conditions does the malfunction occur
3. What is indicated on the five display windows :-
 - Status Display (P 1) =
 - Load(P2) =
 - Load Cut-off (P3) =
 - Radius (P4) =

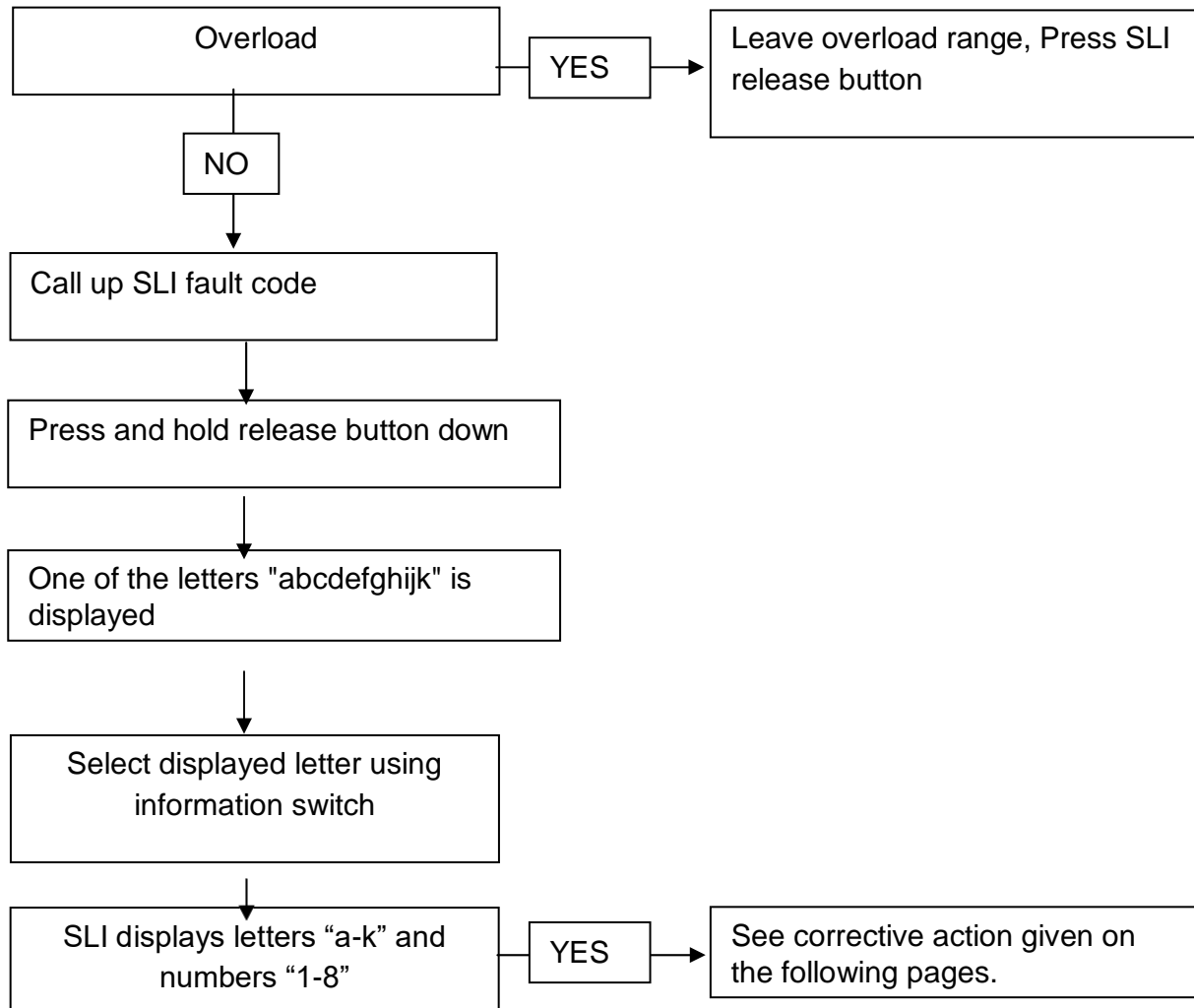
4. Select sequentially all positions of the Information-switch (S2) and note all information displayed in the Information display (P5)
5. What operating Code is dialed into the 3x switches
6. What Number is dialed into the 2x Reeving Switches

Fault Diagnosis Flow Charts

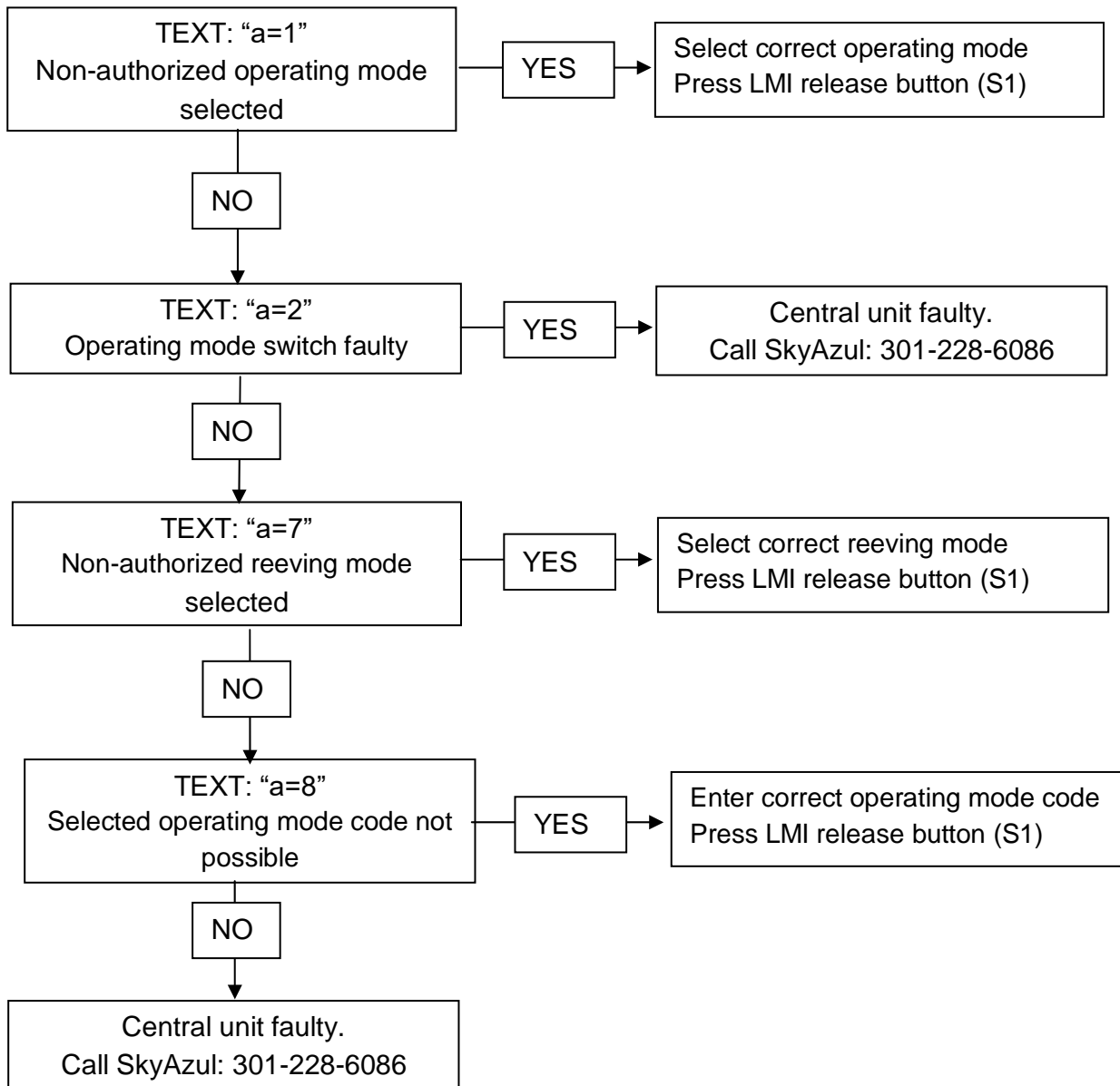
No Buzzer or Displays



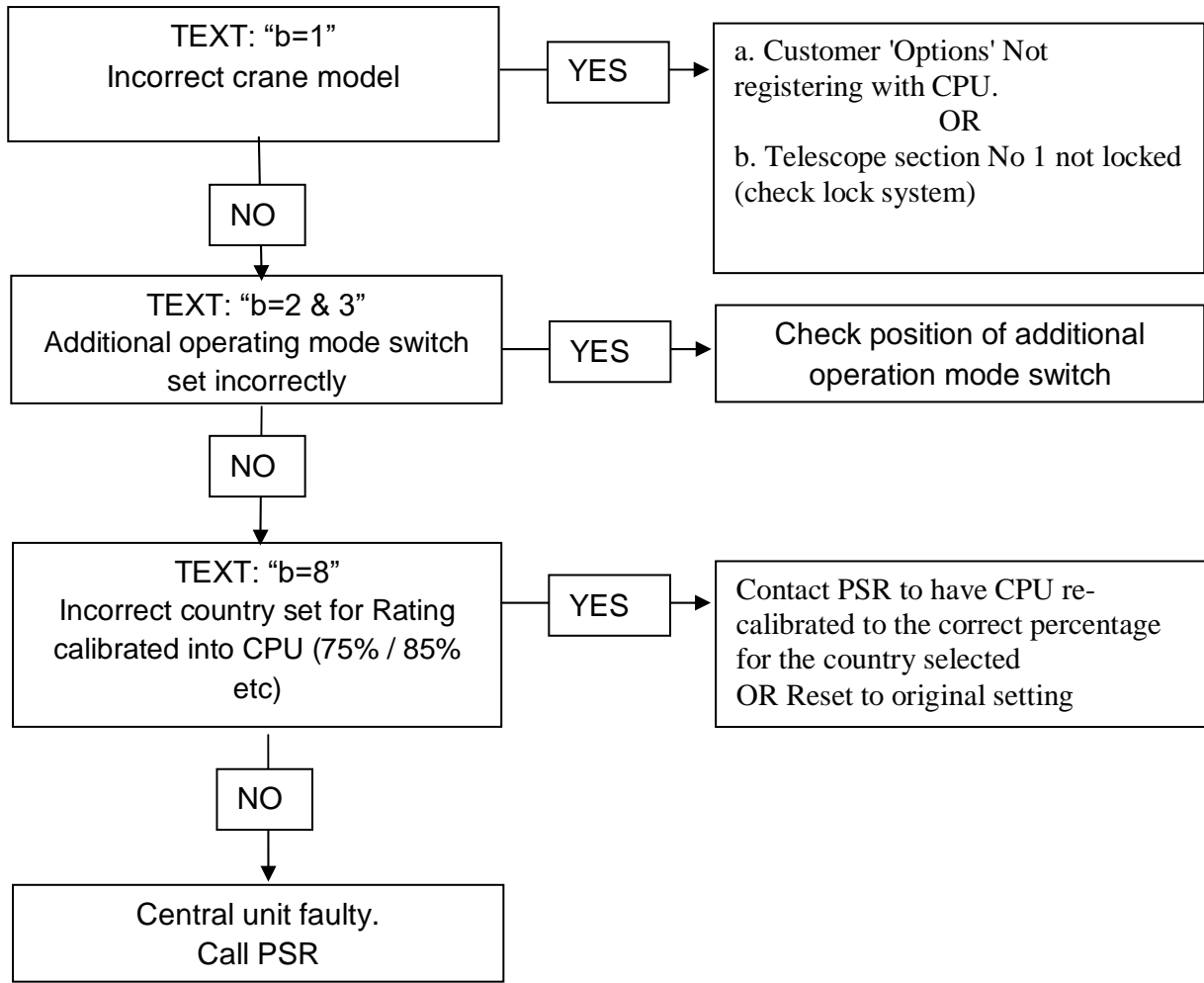
LMI Shutdown! Red Lamp on – Release button does not respond



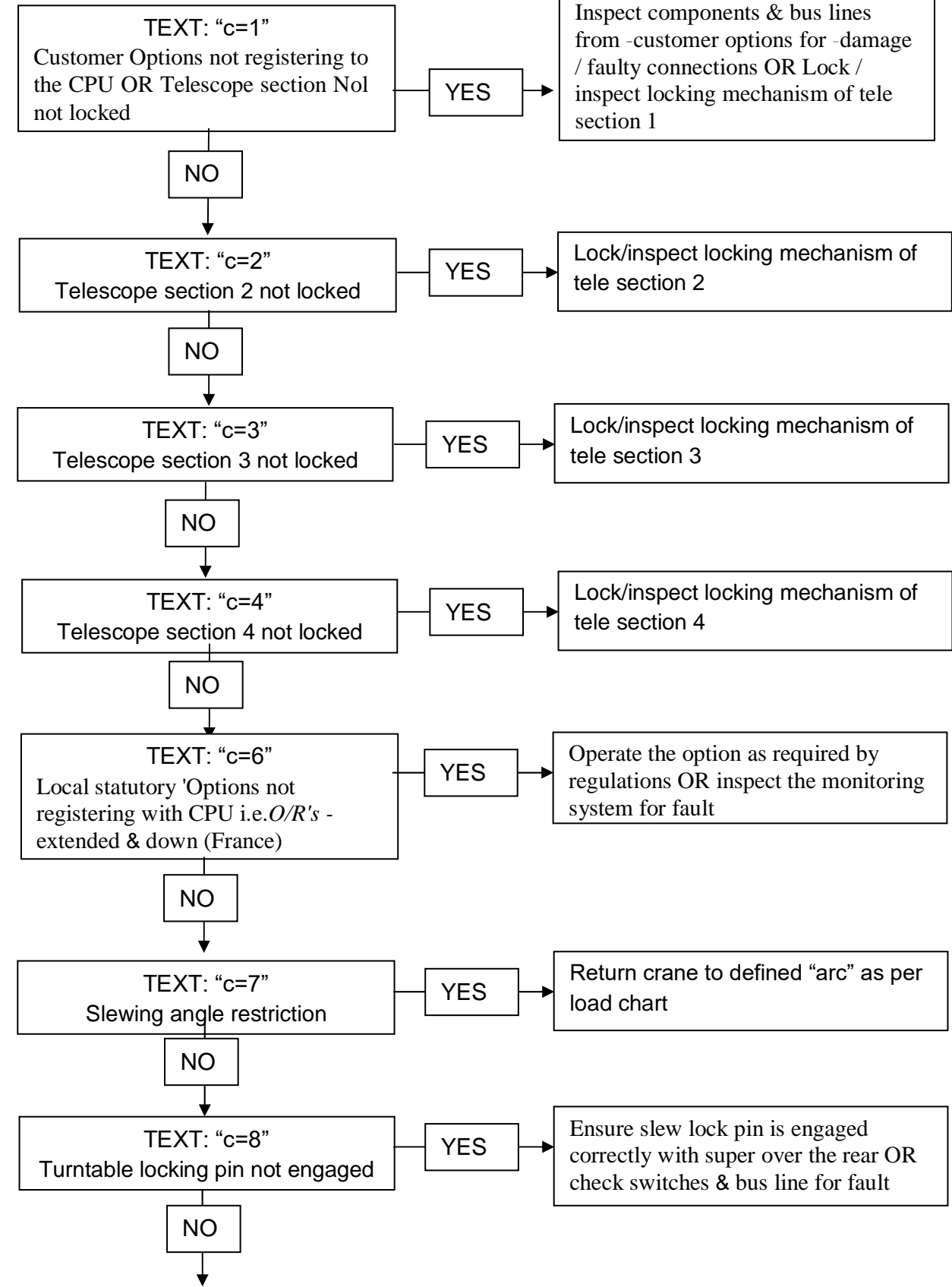
Information display shows letter a:



Information display shows letter b:



Information display shows letter c:

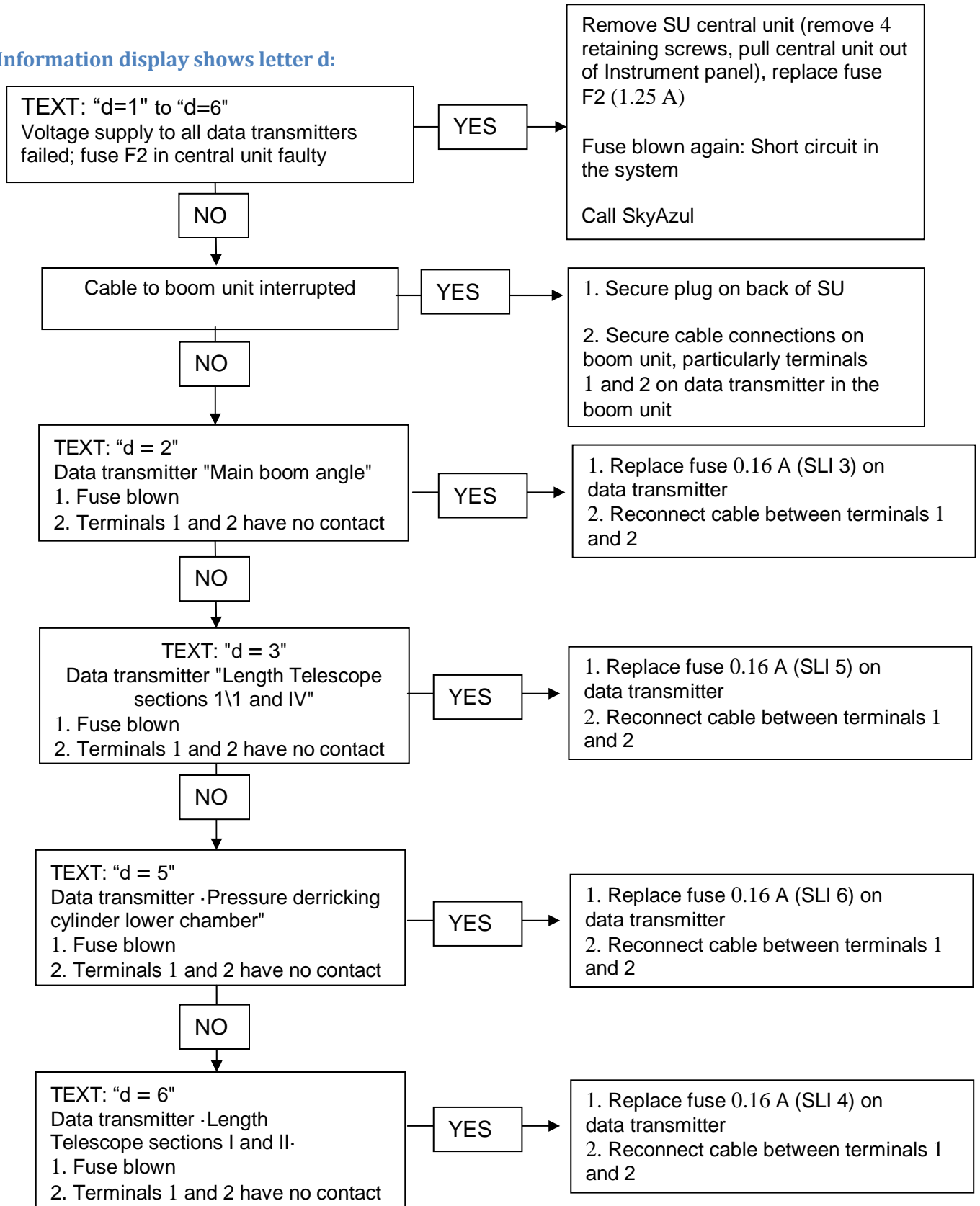


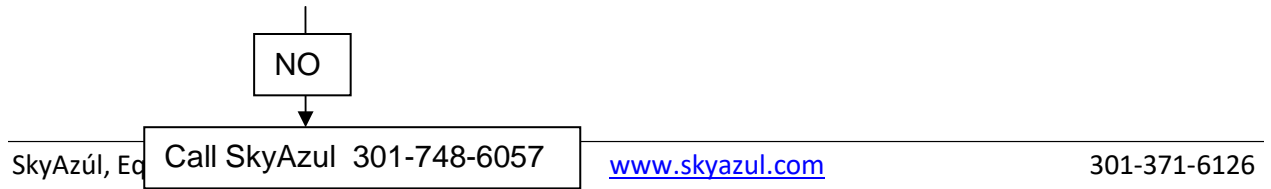
S Central unit faulty.
Call SkyAzul: 301-228-6086

www.skyazul.com

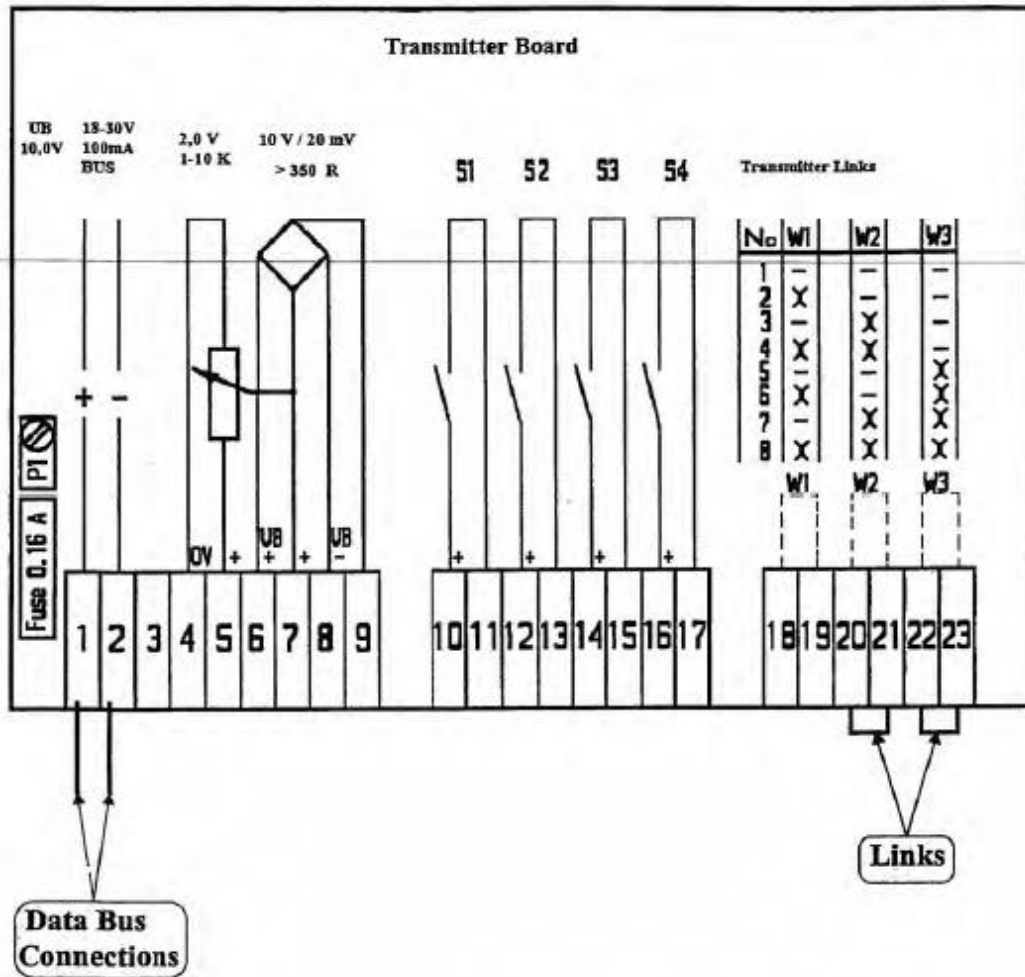
301-371-6126

Information display shows letter d:

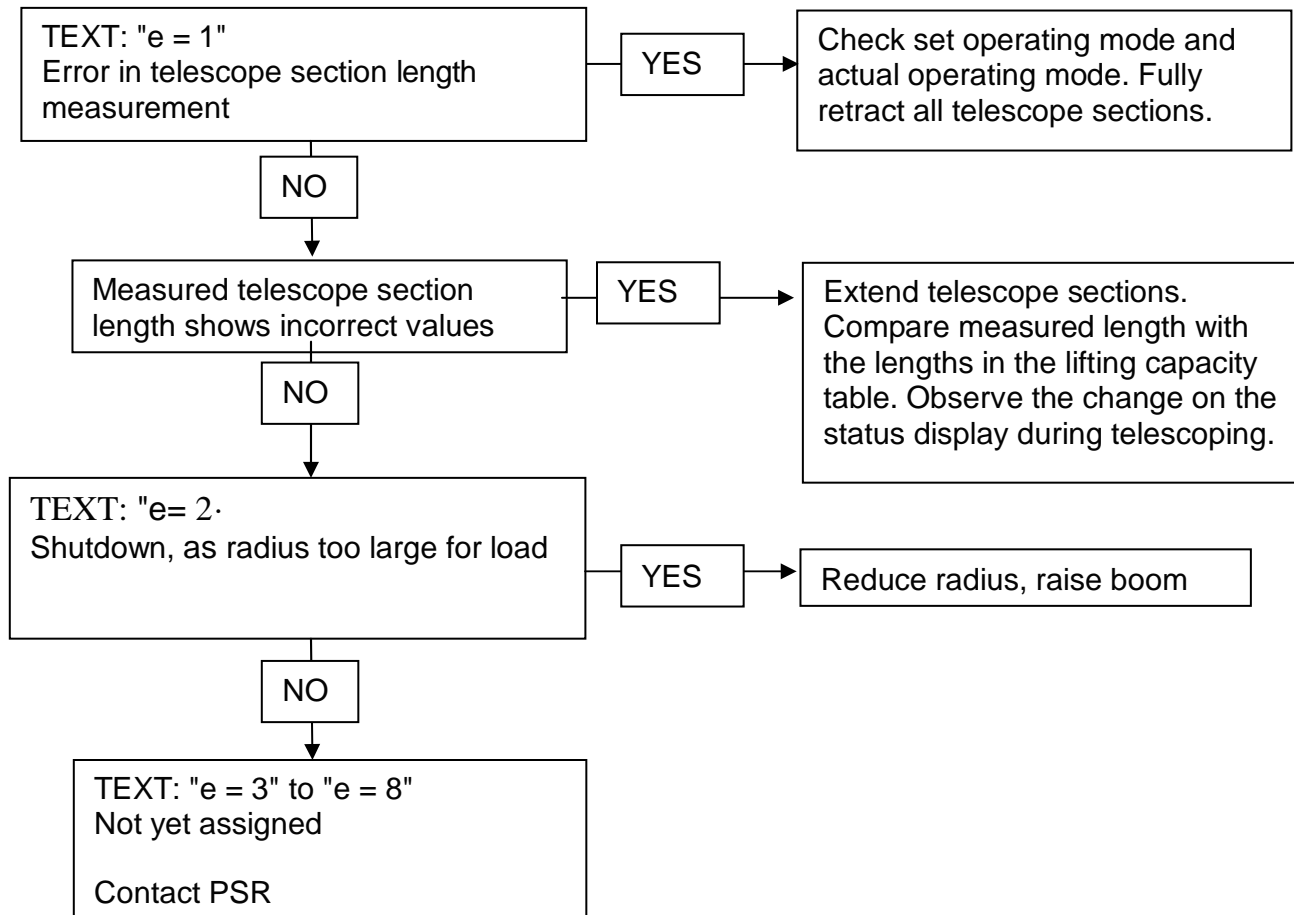




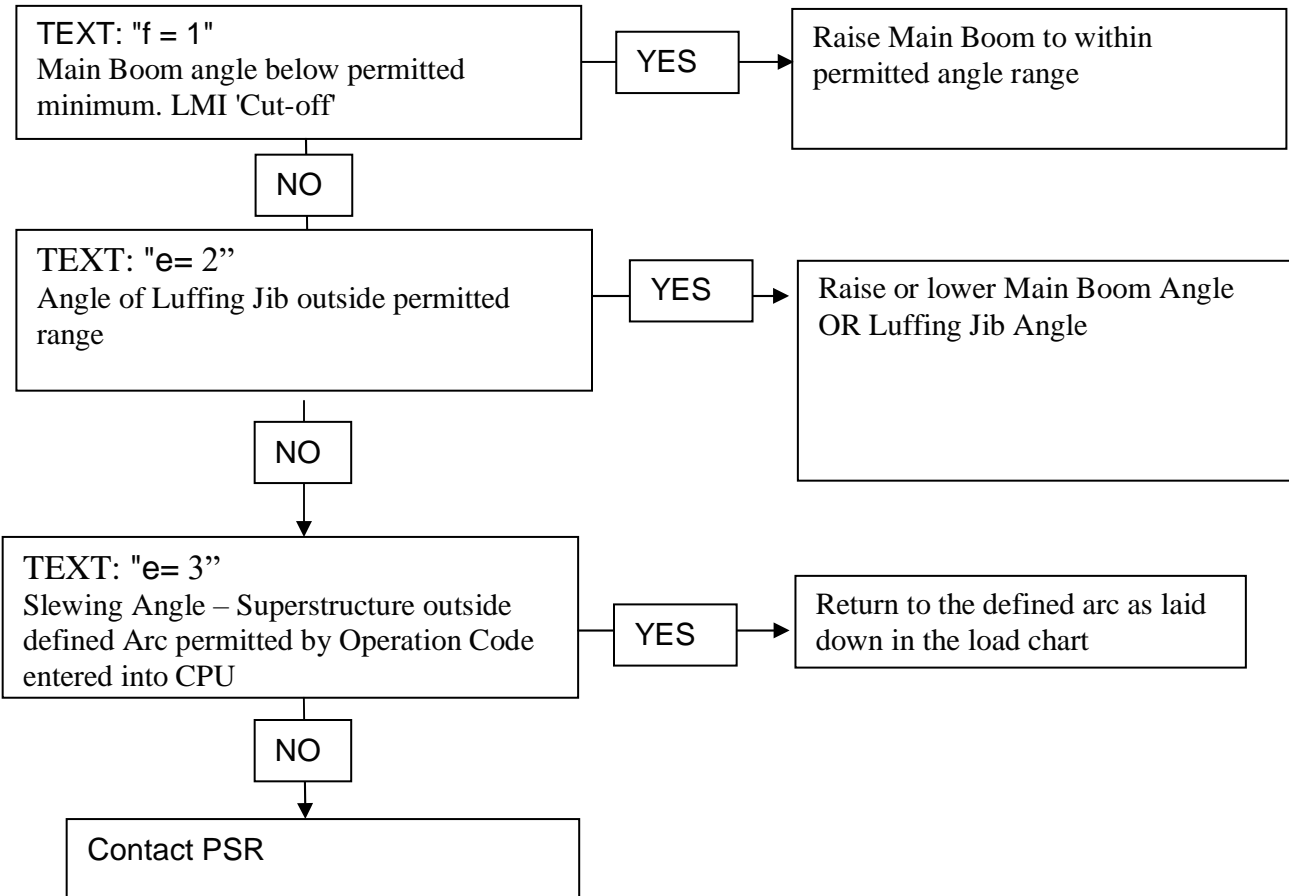
Note: When replacing Transmitter Boards ensure the Link wires are transferred to the same position on the new board. Switch connections 10-17 are only used on older GMT models.



Information display shows letter e:



Information display shows letter f:

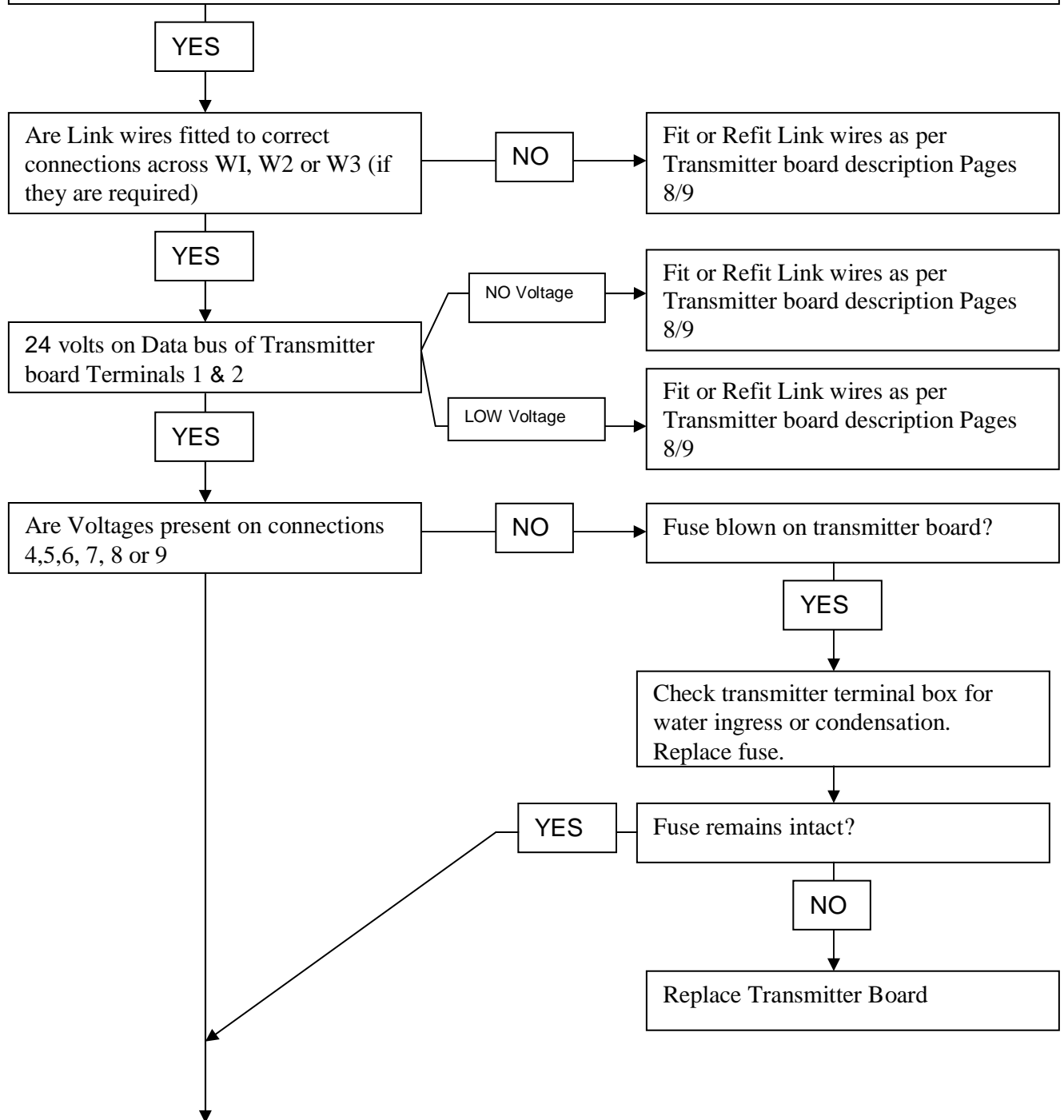


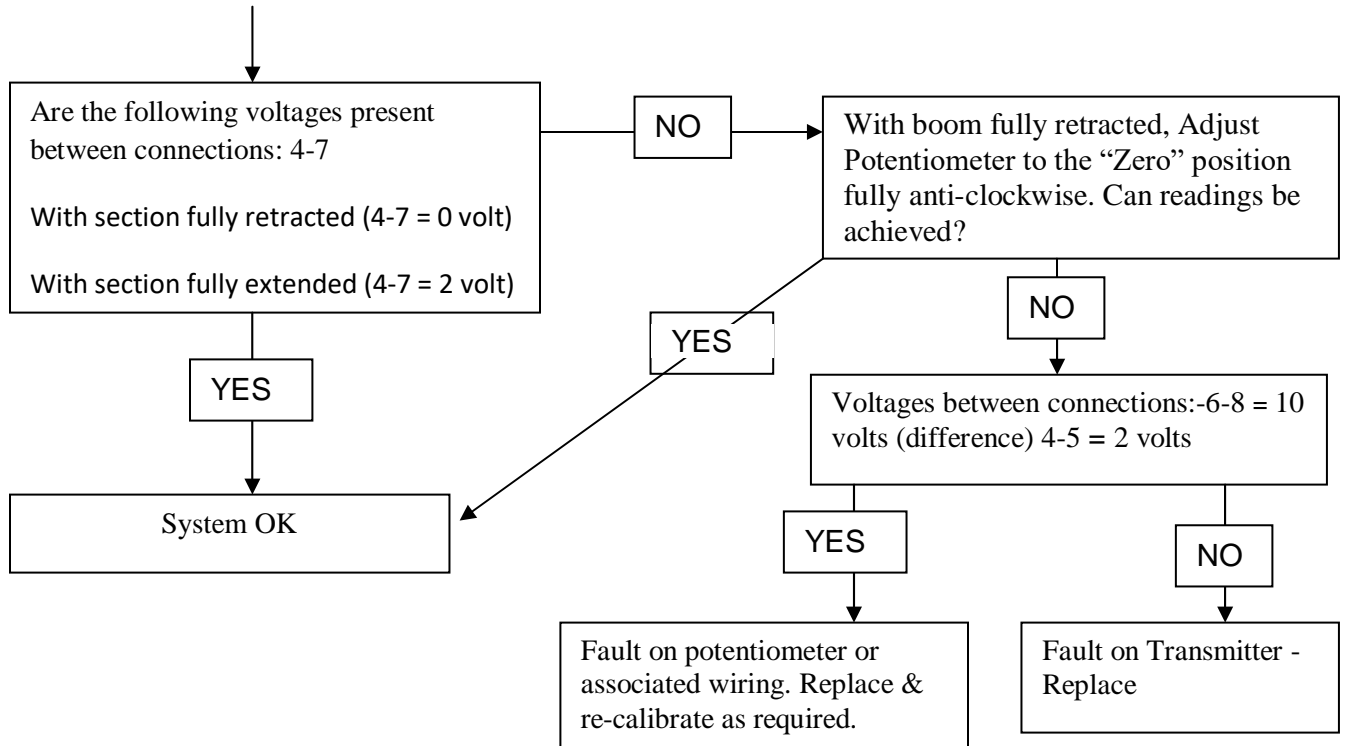
Information display shows letter g:

TEXT: "g = 3"- Data Transmission-fault-Length. Transmitter identification sheet Pg II

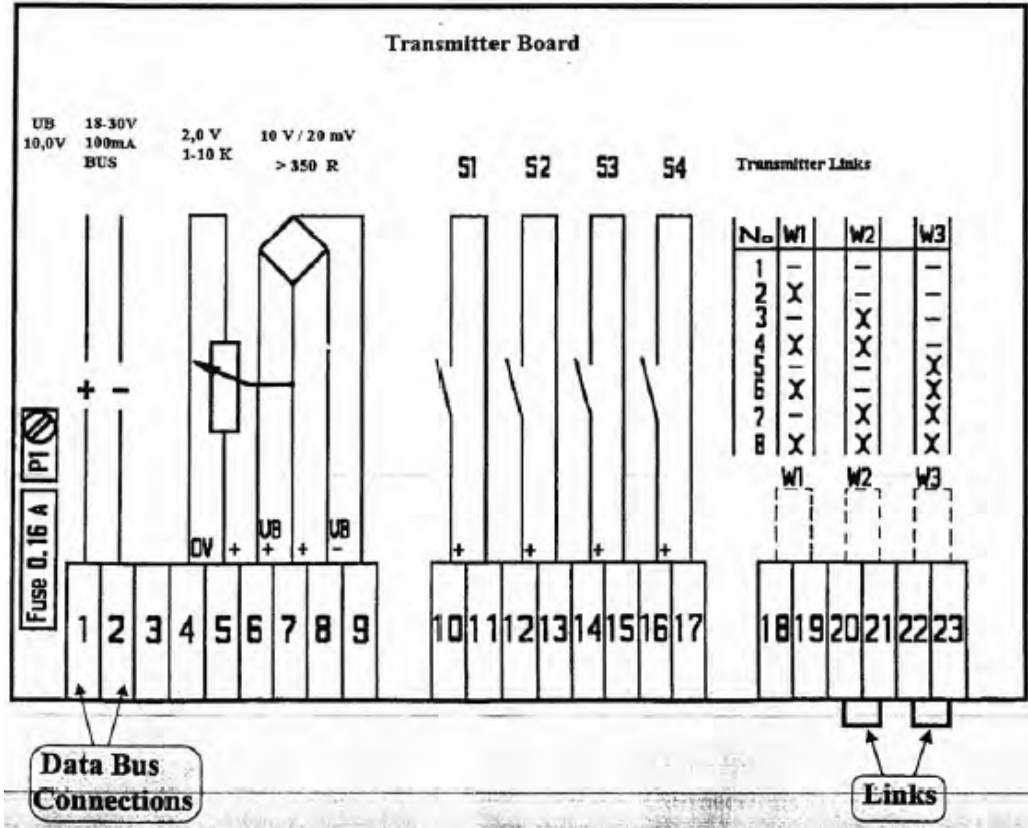
TEXT: "g = 6"- Data Transmission-fault-Length. Transmitter identification sheet Pg II

With boom fully retracted, ensure the cables are wound evenly on each reeling drum starting with T1.

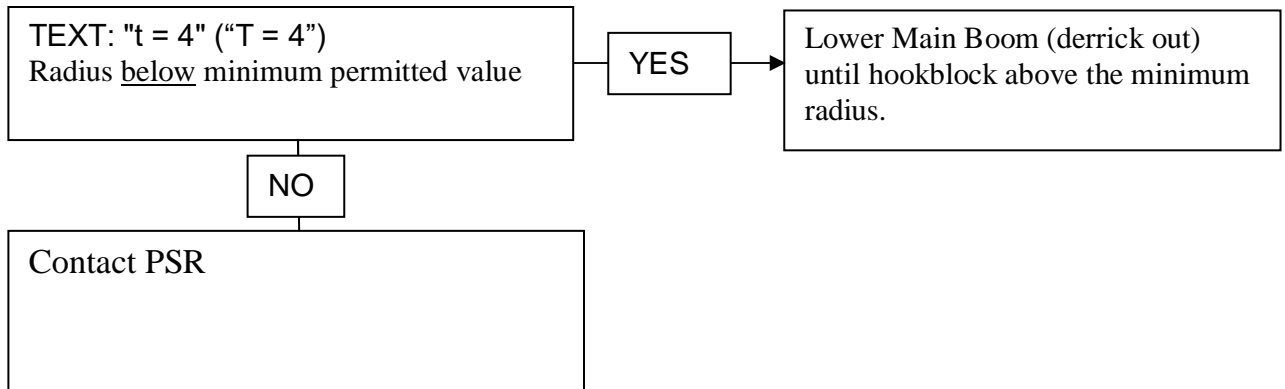




Note: When replacing Transmitter Boards ensure the Jumper wires are transferred to the same position on the new board. Switch connections 10-17 are only used on older GMT models.



Information display shows letter t:



If any other Error Code 'Text', other than those described in this manual, contact SkyAzul service with the "displayed code, the Operation & Reeving configuration dialed into the Console and a full description of the actual configuration the crane is in.

