SkyAzúl
EQUIPMENT SOLUTIONS

HC3900
(DS380)

Installation, Operation & Service Manual

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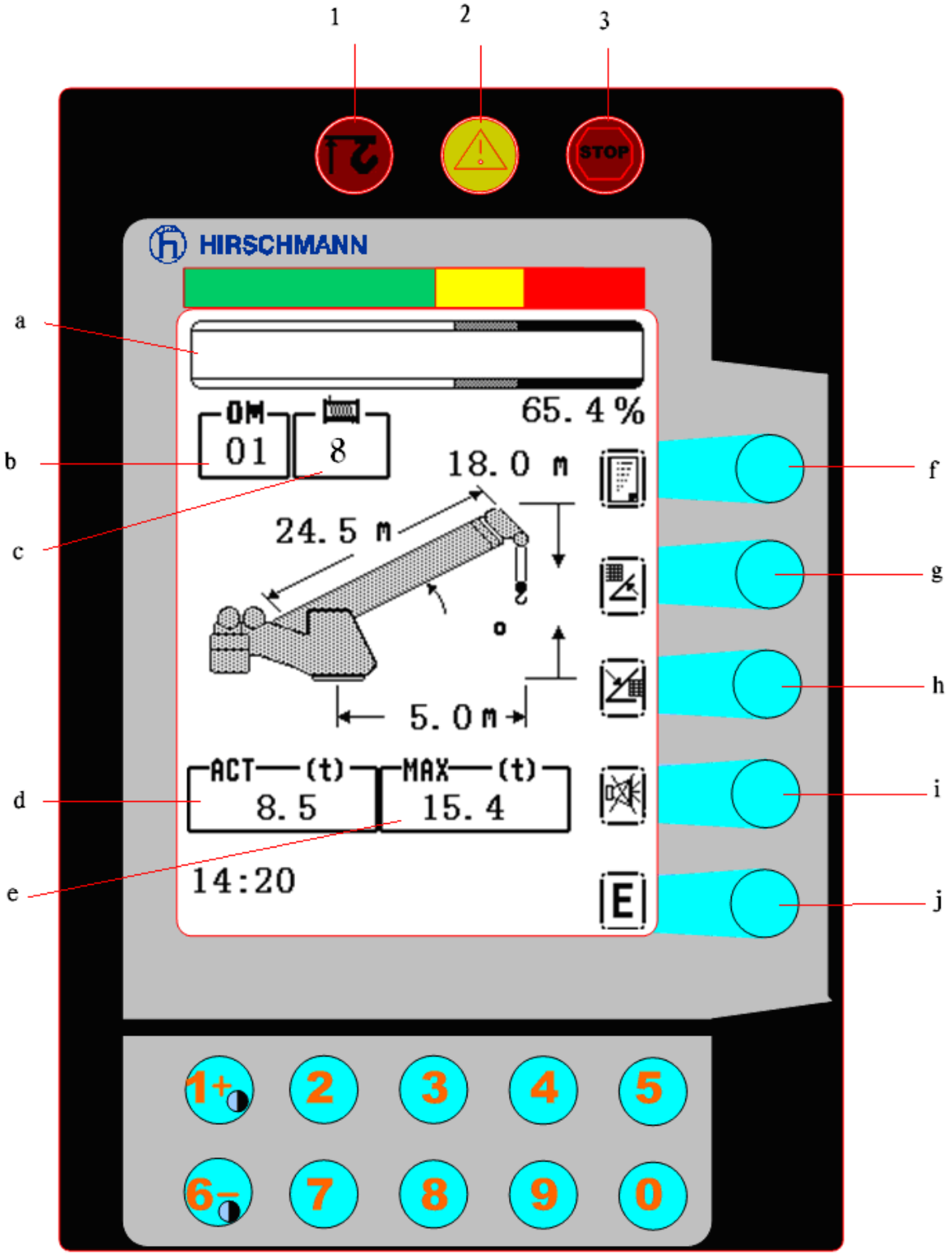


1. indication light of A2B switch
2. pre-warning light
3. overload warning light

a) bargraph (load moment percentage indication)

b) OM display

c) Reeving display

d) Actual load display

e) Rated capacity display

f) Function key

g) Upper limit angle setting

h) Lower limit angle setting

i) Alarm stop

j) Net weight

2.2 OPERATION DESCRIPTION

2.2.1 Setting the operating mode

The OM setting is used for to adjust the LMI parameter according to the actual crane's condition. When operate the crane please make sure the displayed operation mode is the same with the actual operation mode.

Before operate the crane please check the corresponding OM code according to your crane type and actual mode and then adjust the OM to be the same with the actual OM.

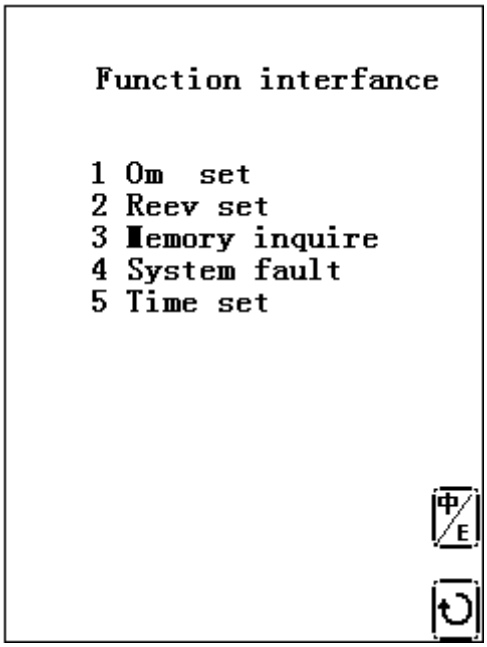
WARNING

The correct setting is of utmost importance for the proper function of the system and the crane. Therefore only operators who are thoroughly familiar with use and operation of the system shall set this function.

Way for correctly setting the operating mode:

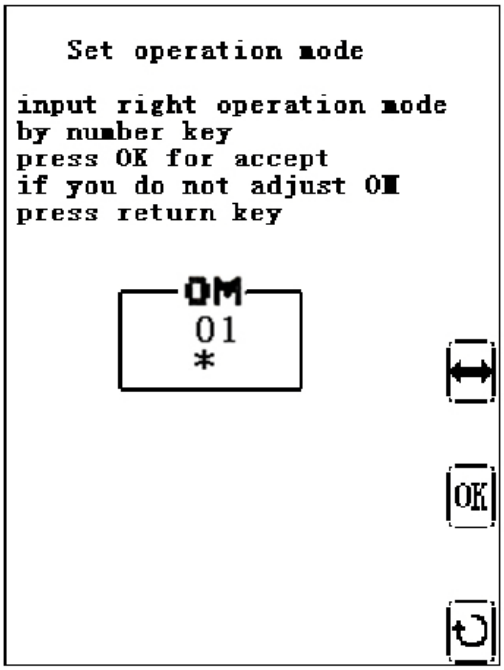
When it is need to adjust the operating mode please press the button under the **Function interface** (see pic.1), and press the button to change the language between English and Chinese

You should do as the following procedures:



(pic.1)

Pressing the key of number “1” enter into pic.2 “ **Set operation mode**”. (see pic.2)



(pic.2)

By pressing the number key the actual OM can be input. Let’s take a example: if you want to enter OM 02, you can press the key “0” to input the number key of “0”and press the function key to next digital. And press the number key of “2” for input 2, then press the function key to confirm this time’s operation. If needn’t OM setting operation, please press the function key for return to the

upgrade interface.

2.2.2 Setting the reevings

This function is for to setting the number of the rope for LMI system. Before operate the crane the operator is asked to adjust the displayed reeving to be same with the actual one.

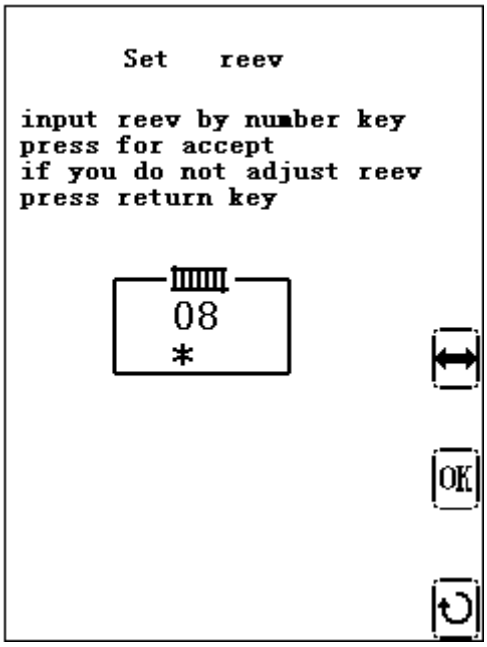
The relationship between the actual reeving and displayed one is as following:

Displayed value: 1 ----------16

Number of parts in line of the ropes: 1 ----------16

Way for correctly setting the reevings:

☞ Press the number “2” button under the **function interface** and enter into “**Set reev**” (see pic.3)



(pic.3)

The operation for enter the actual reeving is the same with OM setting.

2.2.3 Setting time

Only manufacture has this right.

2.3 ALARM STOP

The HC3936 system’s warning buzzer will sound alarm under the following conditions:

— reach max. of rated capacity

— the hook reach to height limit

— exceed the permitted movement radius of the crane

— load moment indicator malfunction

— Error operation

Press the key  in the main interface and the audible alarm will be silenced till above condition happen again.

2.4 DESCRIPTION OF INDICATION LIGHT

2.4.1 A2B indication light

The red warning light will light up

as soon as the **anti-two-block limit**

Switch contact open, indicating that a two-blocking condition is approaching. At the same time the audible alarm will sound.

The following crane movements will be stopped subsequently: hoist up, telescope out, boom down.

In order to avoid any injury to people or crane, please check the A2B system before operating the crane in the following procedure:

a. Manually lifting the weight attached to the anti two-block switches, then the audible alarm sound and the anti two-block alarm light will light.

b. Slowly raise the hook or lower the boom or extend(telescope) the boom to create a potential two-block condition, when the hook lifts the weight, the audible alarm sound, the anti two-block alarm light will light and the crane movement such as hoist up, luffing down, telescopic out will be stopped.

c. If the light and audible alarm do not function as described and the crane movements are not stopped, the system is not working properly. The malfunction shall be corrected before operating the crane.

2.4.2 Pre-warning light

The yellow load moment **pre-warning**

Light will light up when the load on the

crane reaches the defined pre-warning area 90%～100% of the rated capacity, thus indicating that an overload condition is approaching.

This means for the operator to continue his crane operation with extreme caution.

2.4.3 Overload alarm light

The red warning light will light up

when the load on the crane reaches

the defined overload capacity of 100%(or 102%,according to country standard) rated capacity,

2.5 SETTING OF UPPER AND LOWER LIMIT

The LMI system function for the limitation of the boom angle to warn the operator of extreme caution under dangerous condition: buildings, bridges, high-voltage wire.

WARNING

This limit function is only of warning use but without control function. For each time reset the LMI system you need to reset the limit value.

2.5.1 Setting of upper limit angle

Luff up the boom to max. safe position and then press the key to set present boom angle as upper limit. When this limit value is exceeded the STOP indication light will

light up and audible alarm sound to warn the operator to take extremely operate.

2.5.2 Setting of lower limit angle

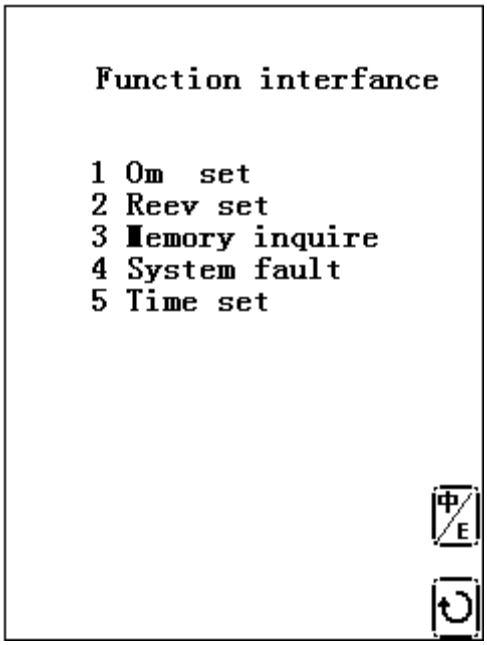
Luff down the boom to min. safe position and then press the key to set present boom angle as lower limit. When the angle is lower than this limit value the STOP indication light will light up and audible alarm sound to warn the operator to take extremely operate.

2.5.3 Delete of angle limit

Simultaneously press the number key“0”then the set limits are deleted.

Select language interface

When it is need to select language, please press the button under the **Function interface**(see pic.1), you should press the button



3 HC3936 SYSTEM FUNCTIONS

1. Warning

— overload

— 2 block condition

— malfunction

Any above condition happens the HC3936 system will light up and sound alarm for warning.

2. Prohibited

Cooperating with crane electrics system the system will send alarm warning and any of the following crane's movements will be prohibited:

— boom luffing down

— telescopic out

— hoist up

At this moment only the movements toward safety direction is allowed:

— boom luffing up

— boom retract

— hoist down

The LMI system has this cut-off function however the operation toward dangerous direction is not allowed when overload or 2 block condition happens. Because this cut-off device is a interacted system, in case of any error it may cause big danger.

NOTICE

When the cut-off device is activated this cut-off signal will always keep be out. Functions such as “dangerous direction operation is not allowed”, “only safe direction operation is allowed” is realized by cooperating with the crane’s electronics system which including “ safe direction inspect switch”, “ safe overflow solenoid valve” etc. The LMI system cannot judge the operation is safe or dangerous itself.

4 SERVICE AND MAINTENANCE

4.1 CONTENT OF MAINTENANCE

a. Check all cable connections of the system. Damaged cables are to be replaced immediately.

b. Check the isolation of the length sensor and A2B switch cable and the cable guides. Worm isolations and damaged cable guides have to be replaced.

c. Inspection of the anti-two block switch as to easy running

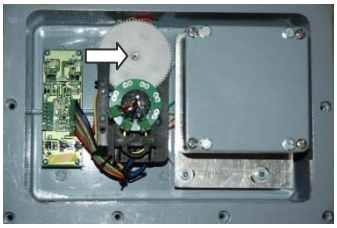
d. Check of the cable reel as to sufficient tight.

e. Check of the pressure transducers at the hoist cylinders and the connection hoses as to oil leakage.

4.2 LENGTH SENSOR ADJUSTMENT

When the displayed boom length is not correct (exceed the permitted error range) , please adjust it:

Retract the boom to the basic boom condition and check the pre-stressing force of the cable reel(cable must be tight)and then open the cover of the length/angle sensor and turn the axle of the length potentiometer slowly(see arrow mark) till the displayed value to be the same with the actual length.



Length sensor adjustment (see above arrow)

4.3 ADJUSTMENT FOR ANGLE SENSOR

The angle sensor is installed in the same house with the length sensor.

First, retract the boom to the basic length condition and make sure the displayed value accord with the actual length. Use the angle instrument to measure when the actual angle is between 10°and

70°whether the displayed vale is the same or use the tape to measure the working radius. If the displayed value or radius is not the same with the actual value, you should adjust the angle sensor. Please lose the three bolts (see the following pic.). Slowly turn the angle sensor till the displayed value accord with the actual value. And then tight the bolts again.

4.4 THE REASON FOR BUZZER KEEPING SOUND ALARM

After start the system it displays without any malfunction or error code but the buzzer keep sound alarm, in this case please check if any disconnection or water falls in the connection between length cable and A2B switch.

4.5 CABLE RETRACT NOT SMOOTHLY

Sometimes when retract the boom it happens that the length cable cannot return to the original position naturally or retract not smoothly. It is because of the coil-spring's pre-tight is too low or the length cable in the cable reel fall off.

Please pre-tighten the length cable several circles to solve the problem:

1. Retract the boom and put it on the rack

2. Draw back the tip of the cable from the tip of the boom and retract to the cable reel

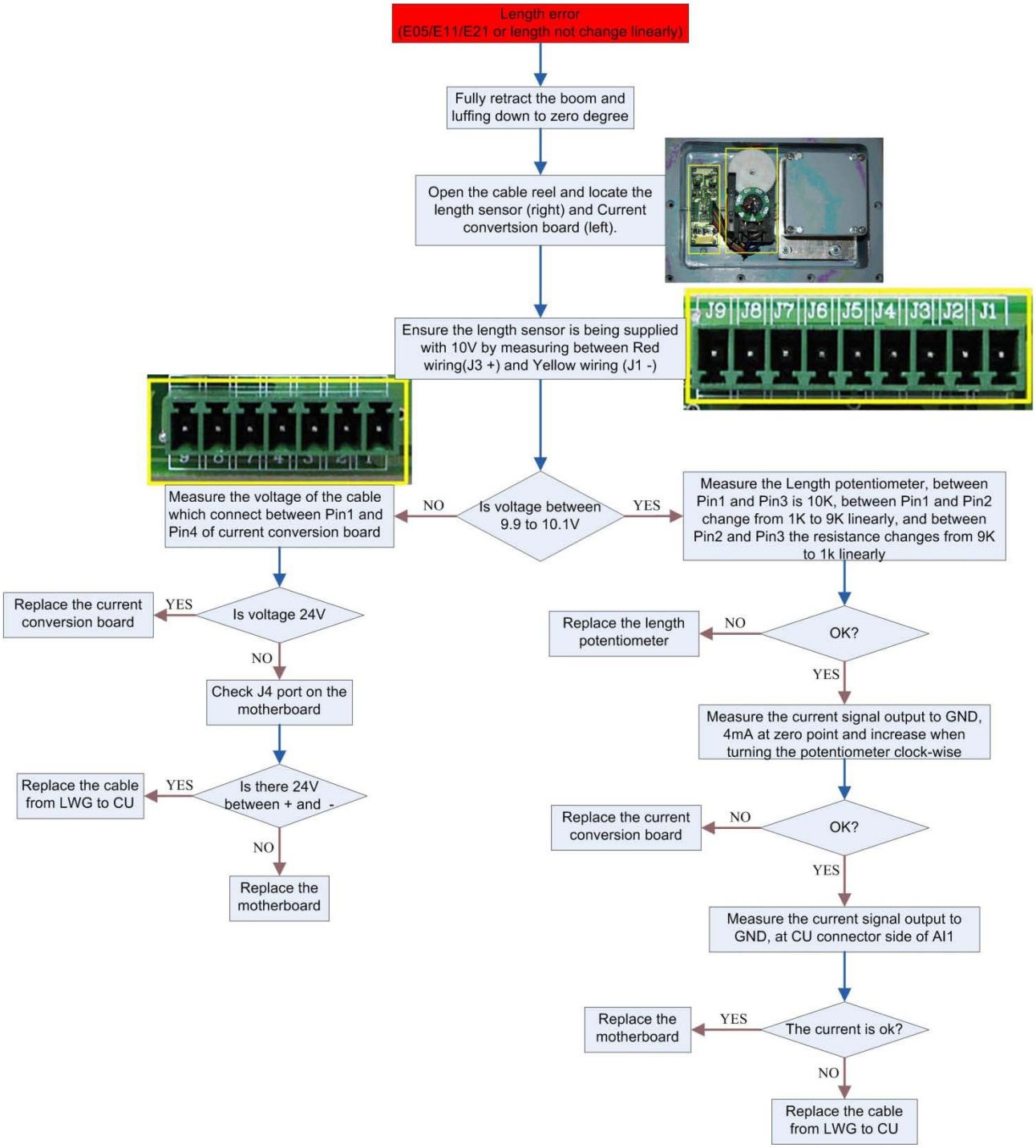
3. Pre-tight the cable reel 3 to 5 circles, to make the cable can be pulled out and retracted smoothly.

4. Pull out the cable and fix it on the tip of the boom again

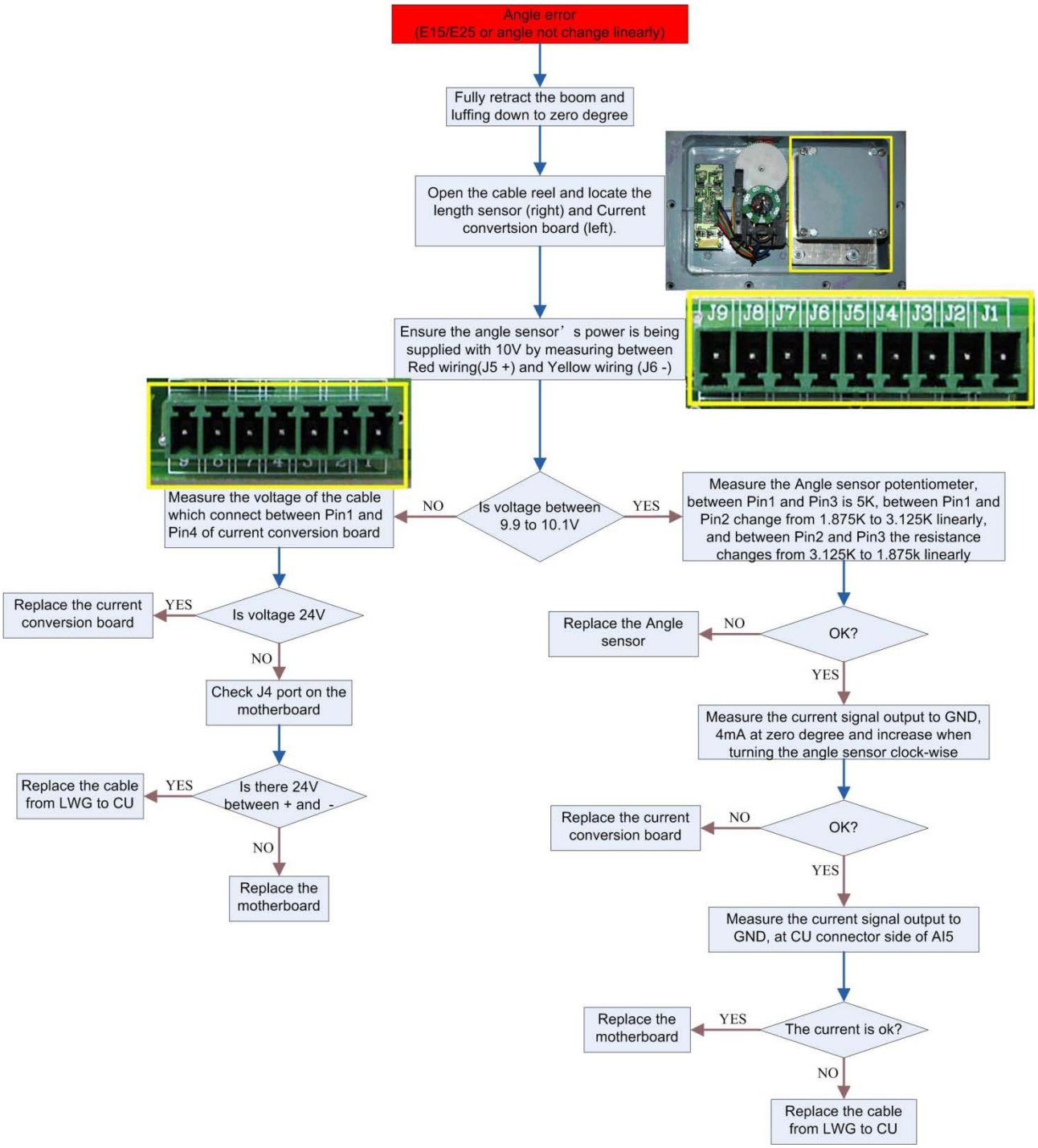
5. After pre-tight the cable reel the display of the boom length will be affected, so at this moment please adjust the length sensor till the displayed value the same with the actual length.

5 TROUBLE SHOOTING

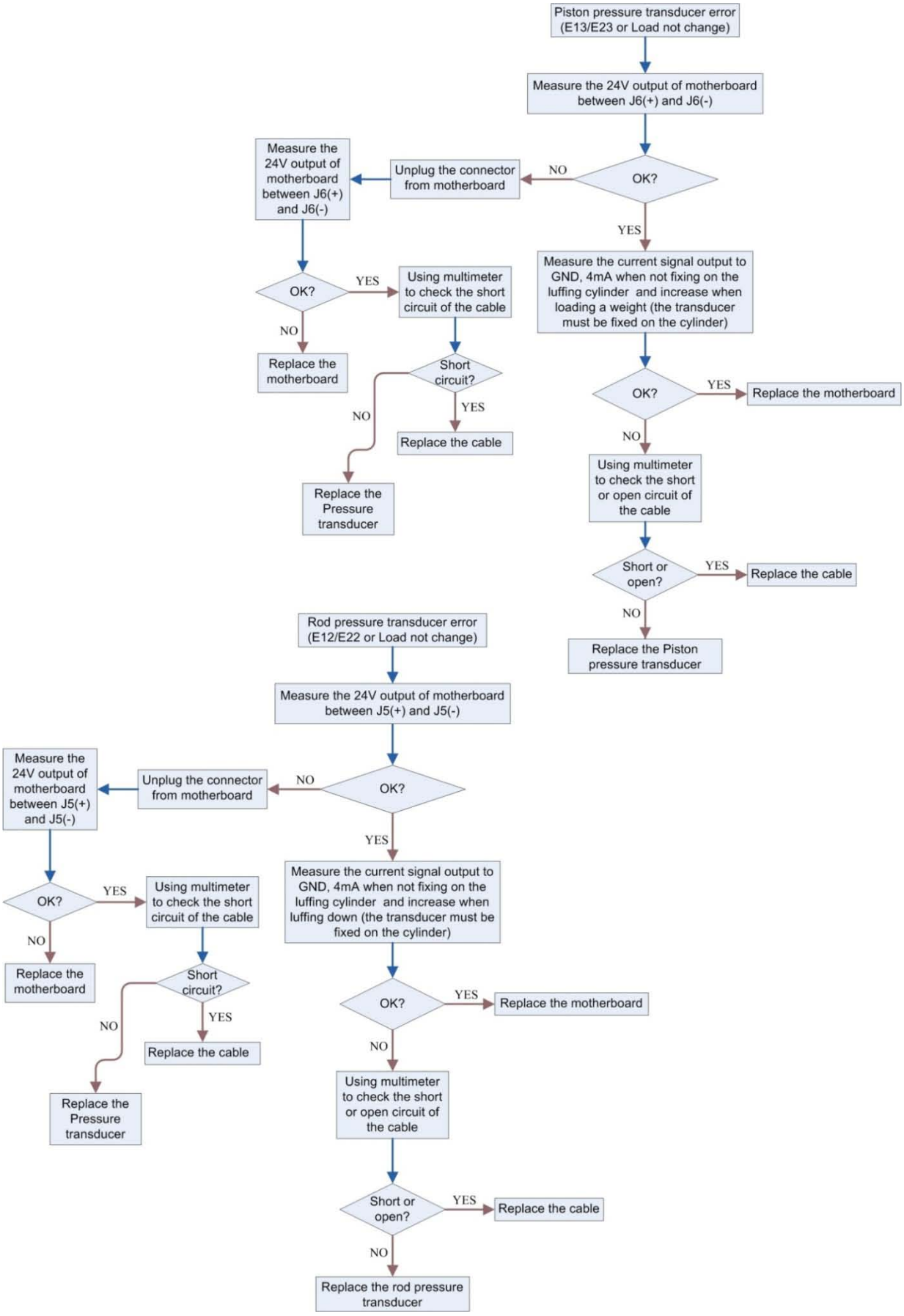
5.1 LENGTH SENSOR



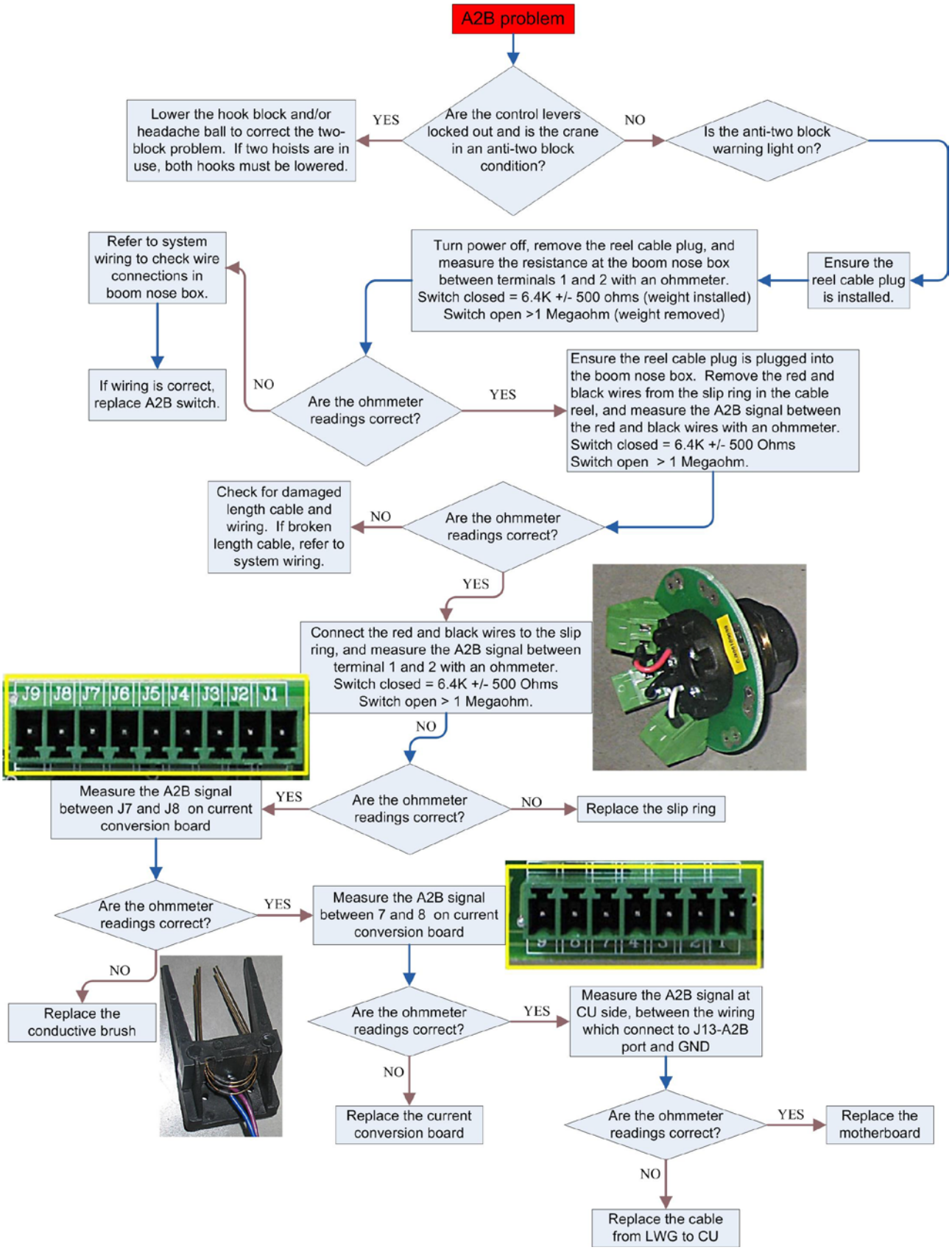
5.2 ANGLE SENSOR



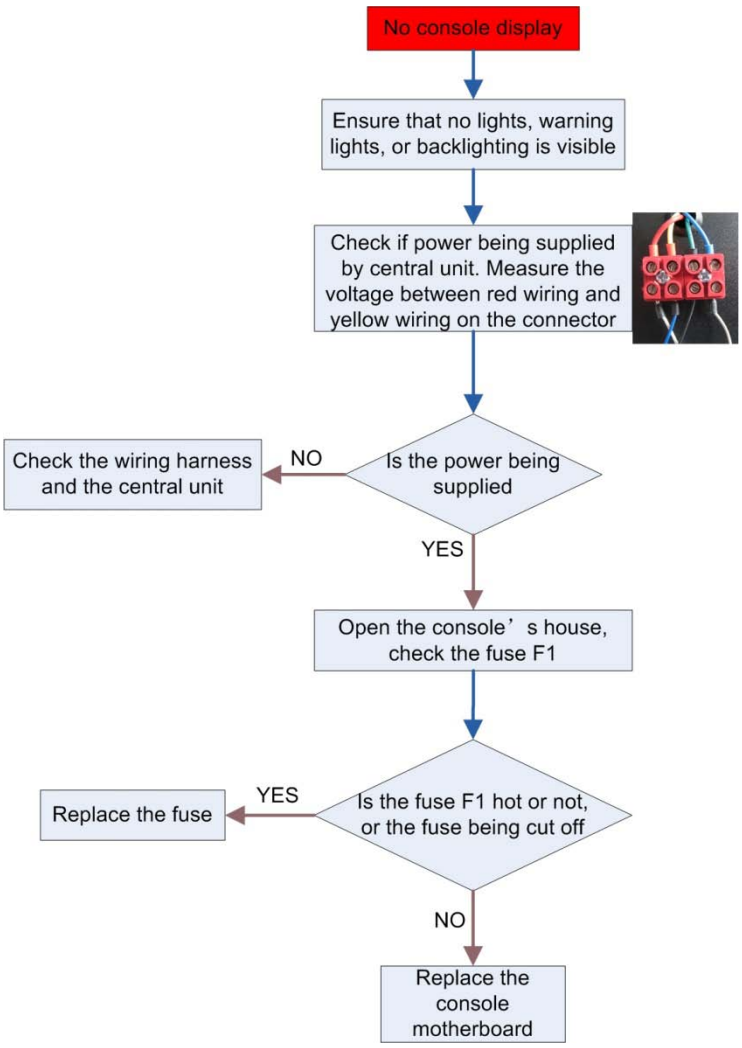
5.3 PRESSURE TRANSDUCER



5.4 A2B


A2B problem
Are the control levers locked out and is the crane in an anti-two block condition?
YES
Lower the hook block and/or headache ball to correct the two-block problem. If two hoists are in use, both hooks must be lowered.
NO
Is the anti-two block warning light on?
Ensure the reel cable plug is installed.
Turn power off, remove the reel cable plug, and measure the resistance at the boom nose box between terminals 1 and 2 with an ohmmeter. Switch closed = 6.4K +/- 500 ohms (weight installed) Switch open >1 Megaohm (weight removed)
Are the ohmmeter readings correct?
NO
Refer to system wiring to check wire connections in boom nose box.
If wiring is correct, replace A2B switch.
YES
Ensure the reel cable plug is plugged into the boom nose box. Remove the red and black wires from the slip ring in the cable reel, and measure the A2B signal between the red and black wires with an ohmmeter. Switch closed = 6.4K +/- 500 Ohms Switch open > 1 Megaohm.
Are the ohmmeter readings correct?
NO
Check for damaged length cable and wiring. If broken length cable, refer to system wiring.
YES
Connect the red and black wires to the slip ring, and measure the A2B signal between terminal 1 and 2 with an ohmmeter. Switch closed = 6.4K +/- 500 Ohms Switch open > 1 Megaohm.
J9 J8 J7 J6 J5 J4 J3 J2 J1
NO
Are the ohmmeter readings correct?
YES
Measure the A2B signal between J7 and J8 on current conversion board
NO
Replace the slip ring
Are the ohmmeter readings correct?
YES
Measure the A2B signal between 7 and 8 on current conversion board
NO
Replace the conductive brush
Are the ohmmeter readings correct?
YES
Measure the A2B signal at CU side, between the wiring which connect to J13-A2B port and GND
NO
Replace the current conversion board
Are the ohmmeter readings correct?
YES
Replace the motherboard
NO
Replace the cable from LWG to CU

5.5 NO CONSOLE DISPLAY



6 DS380 TOOL

DS380 Tool is used for uploading, downloading and verifying of system software, Interpol data, crawler crane calibration data between PC and HC3900 central unit, it is also possible to download overload record from HC3900 central unit.

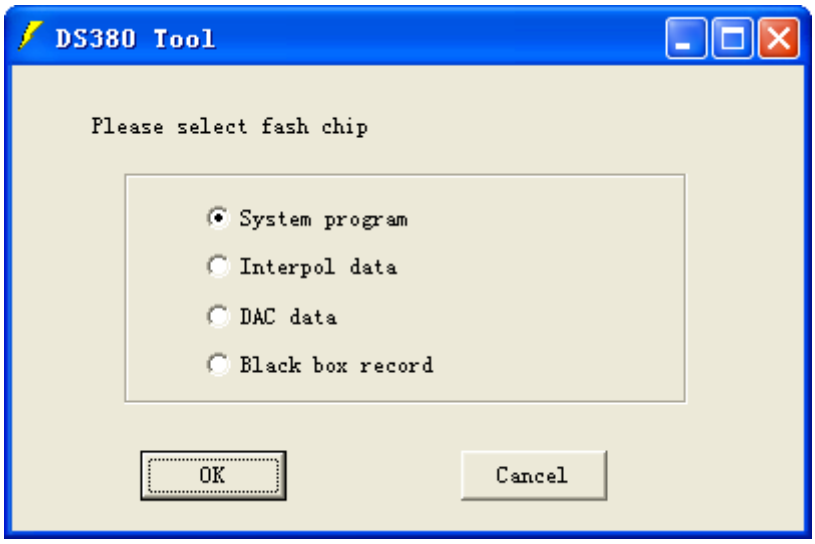
6.1 SOFTWARE INSTALLATION

Double click Setup. Bat in the Setup folder, perform registration of some .OCX file which the software need, you can run DS380 TOOL Vx.xx.EXE.

6.2 SOFTWARE INTRODUCTION

6.2.1 Welcome window

When starts the program, welcome form show as follow:



In the window above we should select which kind of data we will operate.

System program: This selection is only available on two layer PCB board of old hard ware version, in HC3900 it is not possible because system program is not flash but EEPROM.

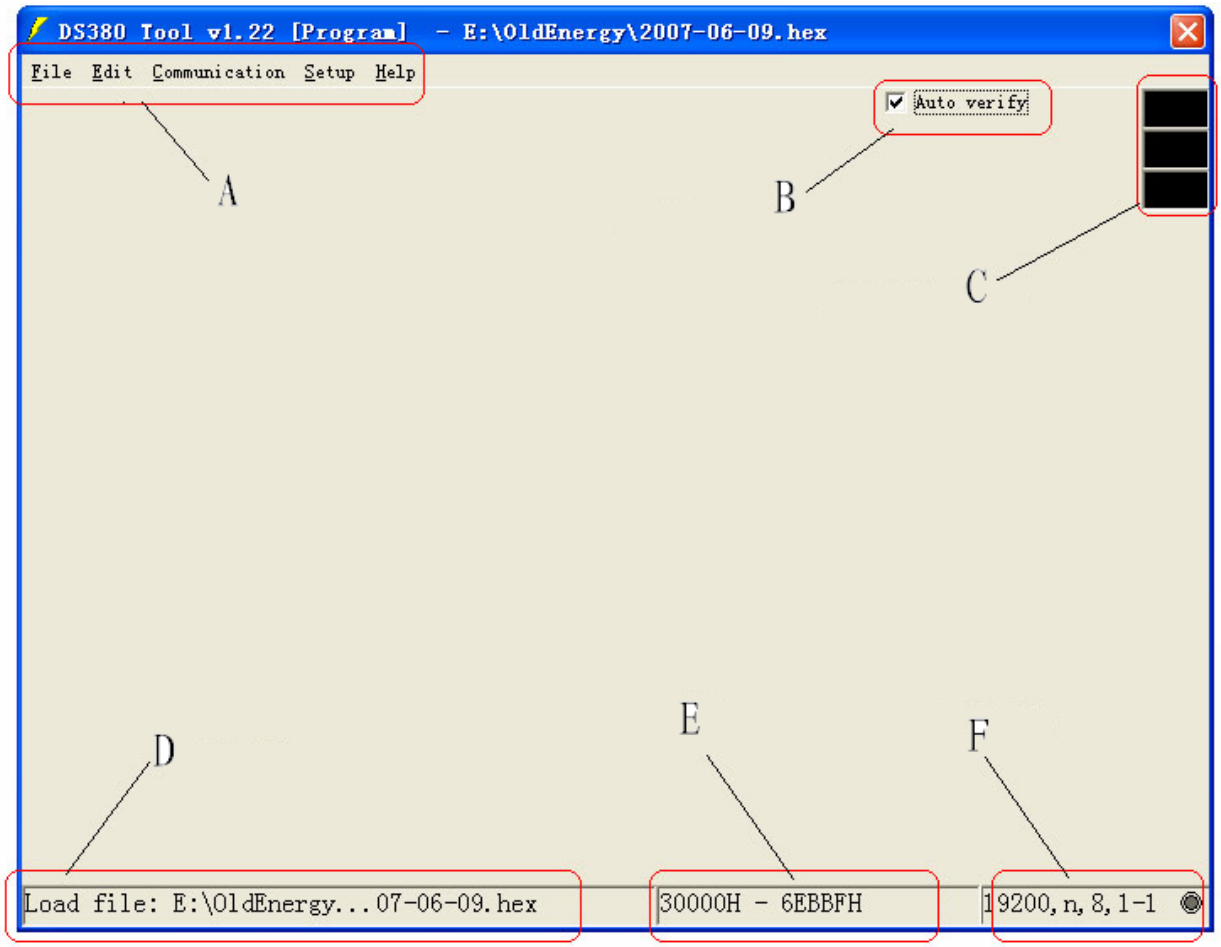
Interpol data : data file generated by Interpol software ， extension name is ： da4

DACdata： Calibration data of crawler crane before July 18, 2007 system software DS380_track_xcmg_v3_build071108.hex, default address: 0x40000-0x5dfff, it is now not available for HC3900.

Black box record: for overload record downloading.

After selecting the data type, press OK button you can go to the main window.

6.2.2 Main window



A: Menu：menu of data transmission, software setting, include File, Edit, Communication, Setup, Help。

B: Auto verify check box：when it is checked，the program will check if the data uploaded into the central unit is correct automatically after uploading，otherwise the program will stop without verifying；when you download data from central unit without auto verify checked , a save as dialog box will show ,and you can save the data as binary format.

C: Progress display：while uploading or downloading of data，you can see how many sectors are finished ,and the percentage of finished sector.

D: File status bar：Indicate the hex file name opened by the program.

E: Address status bar：Address range of HEX file.

F: Communication status bar：indicate serial port configuration，when communication is running, the light on the right side of bar turns green .

Menu introduction

6.2.3 File -> Load hex file [F2]

Load hex file which you want to transmit to central unit，or you can also press a shortcut key to do this ， if you select system program in welcome form ,you can load file with extension name of “*.hex”, if you select “Interpol data” in welcome form ,you can load file with extension name of “*.da4”or “*.dac”.

6.2.4 File ->Save as binary file

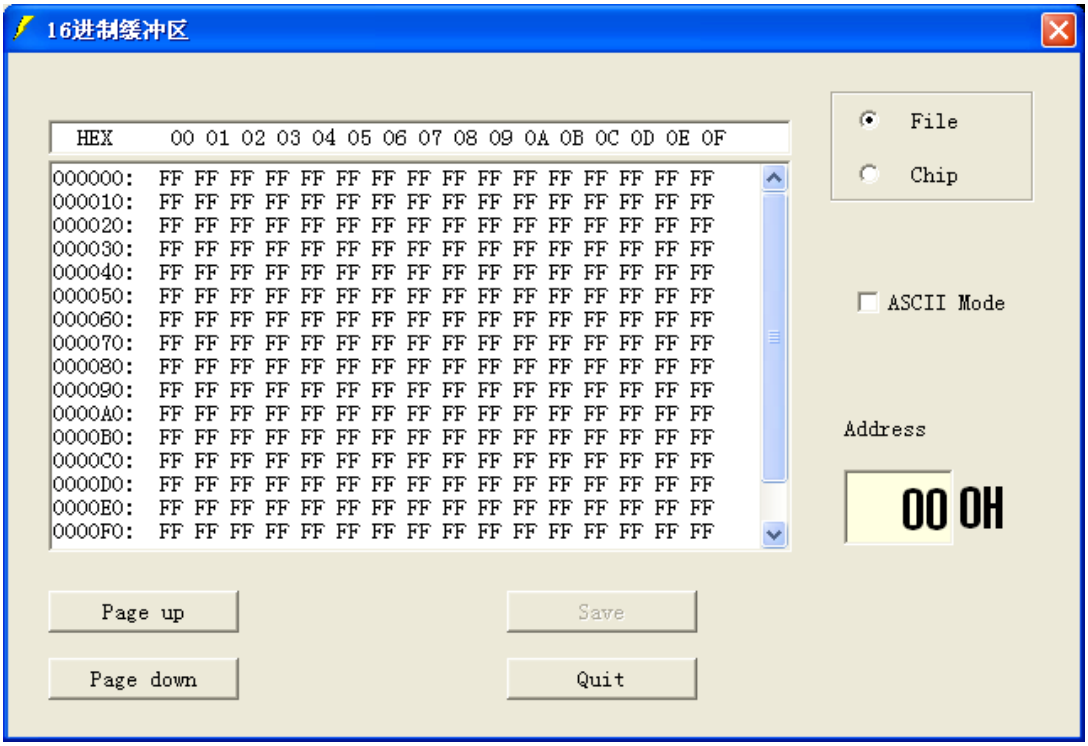
Convert hex file into binary format file.

6.2.5 File ->Exit

Exit program .

6.2.6 Edit -> Buffer

Display loaded hex file content or target buffer which you download from central unit as hex format or ASC format, in order to switch between file and target buffer content, you should select between option box of “File” and “Chip”.



You can press “Page up” or“Page down” button to skip the buffer address，there are 256 bytes in one page.

If ASCII Mode option is selected ， buffer is displayed as ASC format, for example, in hex mode you can read “30 31” in text box , in ASC mode you can read “01”.

The text box below “Address” you can input address which you want to read, it is a easy way to browse buffer content in different addresses.

6.2.7 Communication -> Connect [F5]

Connect to the central unit, please note the operating sequence:

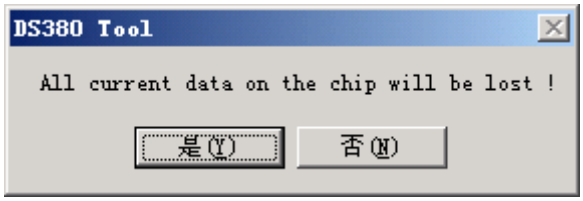
1. plug the communication cable between central unit and PC serial port ,
2. switch on the power supply of the central unit ,
3. Click the menu or press F5 on the computer.

In this step we transmit the operating code into the central unit so that we can do uploading or downloading. if everything works well ,you can see the dialog box with message “Success!”, it means that the operating code we have sent to central unit is running , or you can see the message “Timer out” if the connecting is failure , in this case ,you should check if the operating sequence is right ,and if the cable is wiring in right way ,some time you can see the message “No such com port or occupied com port!” after connecting. You should check if the setting of serial port number of PC is available or is being opened by other software.

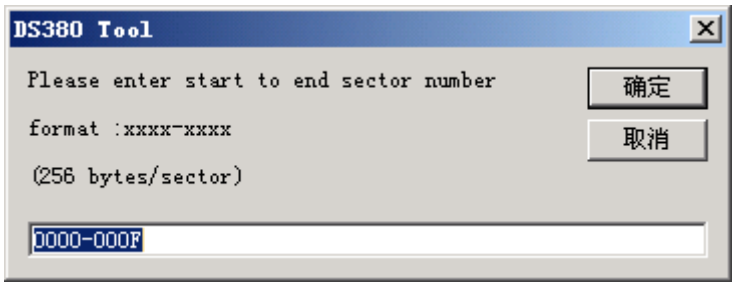
After succeed on connecting, you should keep the power on of the central unit during operating, if you turn off the power, you must reconnect as the instruction above.

6.2.8 2．6 Communication ->Upload [F6]

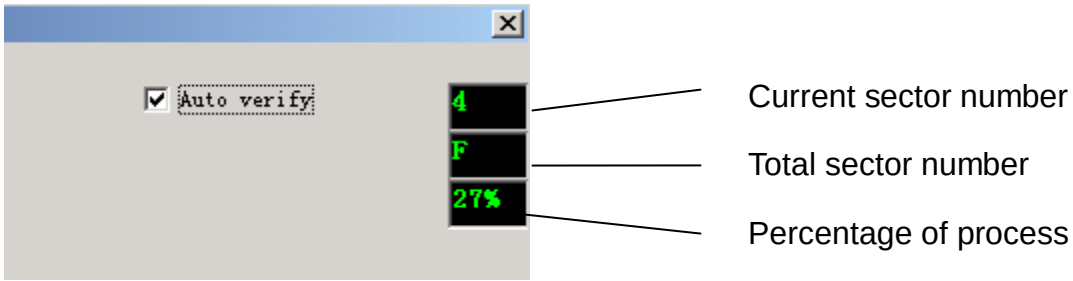
transmit the hex file to the central unit , if the connection above has not succeeded , this menu is disabled ,if the auto verify check box is checked ,after finish uploading the program will read the content of central unit and check if it is right， you should pay attention to this operating because it will overwrite the flash memory of central unit ,the program will show you the message “All current data on the chip will be lost!”



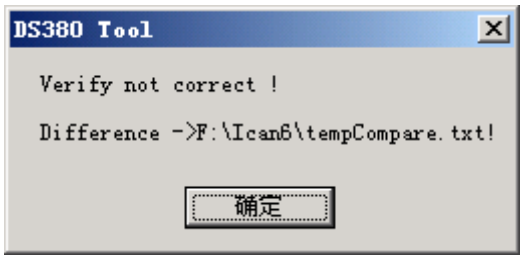
Select “Yes” to continue uploading and old data in flash is erased, or you can select “No” to cancel the operating.



Next step, in the input box you can select the sector range you want to write, there are 256 bytes in one sector, and the default string in the input box is based on the hex file we have just loaded. Normally you should not change the range. After input the range ,the uploading start, in the top right side you can see the progress of operating.



When the percentage reaches 100% ,the uploading is finished and the program will start the verifying if auto verify check box is checked. At first the data we have uploaded in the central unit will send back to PC ,then make the comparison with the hex file in the PC ,a message window will show the result of comparison , if it is not correct you will see the message as following :



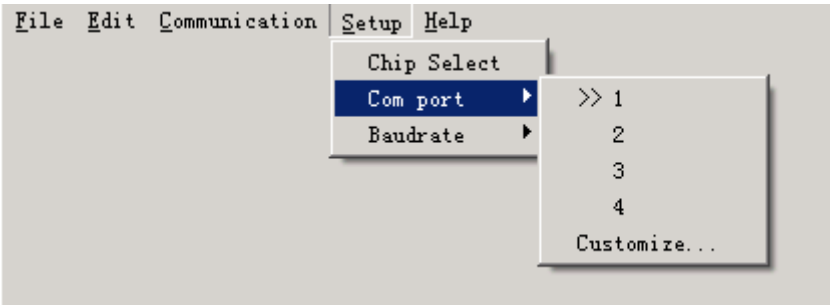
The comparison result is saved as ASC format file , you can open the file with notepad or any text editor, there three columns in the file ,address, data in flash memory, data in hex file, this file can help us find out the reason of the failed transmitting.

6.2.9 Setup -> Chip Select

By the menu we can go back to the welcome window, and change the flash memory we want to operate on .after make the changing ,reconnect to the central unit must be done.

6.2.10 Setup -> Com port

Setting the serial port number, com1 to com 16 are available.



6.2.11 Setup -> Baud rate

Setting the baudrate of serial port , 4800 bps,9600 bps,19200 bps,38400 bps,57600bps are available, please note :do not set the baudrate great than 38400bps.

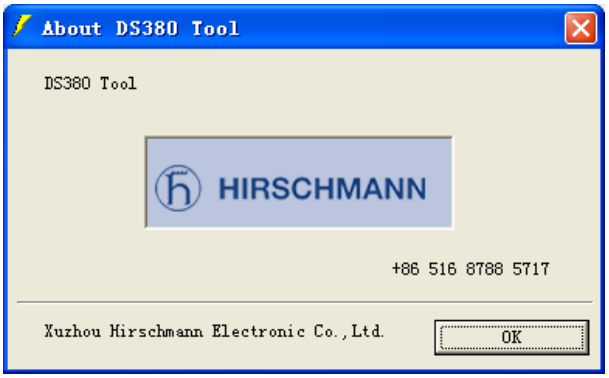
Note ： if you change com port or baudrate after connecting to the central unit , you should reconnect again.

6.2.12 Setup ->language

Setting of software language, there are two options: English and Chinese. New change will take effect on next startup of the program.

6.2.13 Help ->About DS380 Tool

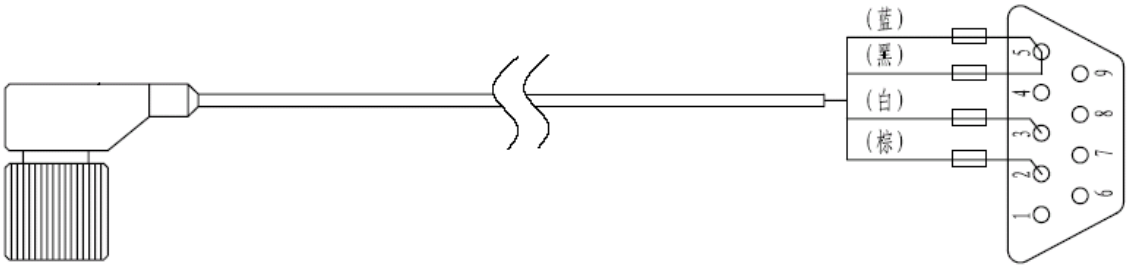
Some message about DS380 Tool, include company name, telephone number.



6.3 APPENDIX：

Wiring diagrams of the serial communication cable.

Brown -----2
White-------3
Black-------5
Blue---------5



TO HC3900 Central unit to 9 pin serial port of PC

7 ERROR CODE

Error code	Error	Cause	Elimination
E 01	Fallen below the radius range or angle range exceeded.	Fallen below the minimum radius or exceeding the maximum angle specified in the respective load chart due to luffing up the boom too far	Luff down the boom to a radius Or angle preset in the load chart
E 02	Max. radius exceeded or Fallen below the angle range	The maximum radius was exceeded or fallen below the Minimum angle specified in the respective load chart due to luffing down the boom too far	Luff up the boom to a radius or an angle reset in the load chart
E 03	Boom position is out of the permissible working area	Exceeded the permissible working area with load	Move boom back to the permissible working area
E 04	Operating mode not existing	Incorrect setting of OM or enter into impermissible working area	Correctly set Operating mode according to actual operation or move back to the permissible working area
E 05	Prohibited length range	a) boom has been extended too far or not enough ,e.g. if operation is only admitted up to a certain boom length or for load charts of jibs with the boom having to be extended to a certain length b) the length sensor adjustment changed i.e. length sensor cable slid off the length sensor drum c) Clutch between length sensor pot and drive is defective d) cable between the central unit and the length sensor defective or slack e) length potentiometer defective	a) telescope boom to correct length, given in the load capacity chart b) Retract the boom. Check the pre-stress of the cable reel(the rope has to be under traction open the length sensor and carefully turn the length pot counterclockwise by use of a screwdriver to make the displayed value the same with the actual length of the boom c) completely replace the clutch with the drive wheel and adjust length sensor pot as described at b d) check cable as well as connectors and exchange, if necessary e) replace length potentiometer

Error code	Error	Cause	Elimination
E 11	Fallen below limit for the measuring channel “length Telescopic boom”	a) cable between length sensor and central unit defective not connected or water in the connectors b) length sensor pot defective c) electronic board in the measuring channel defective	a) check cable and connectors as well and replace, if necessary b) replace length sensor pot c) replace main board
E 12	Fallen below Lower limit value For the measuring channel “ pressure Transducer rod side”	a) cable leading from the central unit to the pressure transducers defective or water in the connectors. b) pressure transducer defective c) electronic board in the measuring channel defective	a) Check cable and connectors as well and replace, if necessary. b) replace pressure transducer c) replace main board
E 13	Fallen below lower limit value For the measuring channel “pressure Transducer piston side”	a) cable between central unit to the pressure transducer defective or water in the connectors b) pressure transducer defective c) electronic board in the measuring channel defective	a) check cable &connectors as well and replace, if necessary b) replace pressure transducer c) replace main board
E 15	Fallen below lower limit value for the measuring channel “angle Main boom”	a) cable between central unit to the length/angle sensor defective, loose or water in the connectors b) angle sensor defective c) electronic board in the measuring channel defective	a) check cable &connectors as well and replace if necessary b) replace angle sensor c) replace main board
E 19	Reference voltage defective	a) reference voltage is less than 3.6V b) A/D converter defective	a) check supply voltage b) replace main board
E 21	Exceeded the upper limit value for measuring channel “length telescopic boom”	a) cable between length/angle sensor to central unit defective or water in the connectors b) length pot defective c) electronic board in the measuring channel defective	a) check cable & connectors and replace if necessary b) replace length potentiometer c) replace main board

Error code	Error	Cause	Elimination
E 22	Exceeded the upper limit value for measuring channel “pressure transducer rod side”	a) cable between pressure transducer to central unit defective or water in the connector b) pressure transducer defective c) electronic board in the measuring channel defective	a) check cable and connector, and replace if necessary b) replace pressure transducer c) replace main board
E 23	Exceeded the upper limit value for measuring channel “pressure transducer piston side”	a) cable between pressure transducer to central unit defective or water in the connector b) pressure transducer defective c) electronic board in the measuring channel defective	a) check cable and connector, and replace if necessary b) replace pressure transducer c) replace main board
E 25	Exceeded upper limit value for measuring channel “angle main boom”	a) cable between central unit to length/angle sensor defective or water in the water b) angle sensor defective c) electronic board in the measuring channel defective	a) check cable &connectors replace if need b) replace angle sensor c) replace main board
E 29	Reference voltage defective	a) reference voltage is higher than 4.4V b) A/D converter defective	a) check voltage supply b) replace main board
E 31	Cannot store the overload memory’s counter	a) chip trouble b) chip drop off c) in-correct setting of the chip’s jumper d) overload record over than 1000 times	a) set the overload chips’ jumper (JIP1,JP2) to 512K b) replace chips and test the overload record c) replace main board
E 38	Wrong system program in the SL1	The system program in the SLI does not match the programming in the data EPROM	Replace system program EPROM

Error code	Error	Cause	Elimination
E39	Voltage of the analog input over than it's measurement range	The voltage supply in the analog channel or A2B switch is over 5V	a) check the ground connection of the sensors b) check the test-point's c) check 8V voltage d) check if the analog signal is connected with high voltage e) check if the A2B switch connect with high voltage f) If it cause the circuit board distortion by tightening the screw replace main board
E 41	Error in the internal write/ Read memory (RAM) of the computer module C167		a) replace computer module C167 b) replace main board
E 42	Error in the external write/read memory(RAM)defective		a) replace write/read memory (CMOS) b) replace SLI main board
E 46	Cannot write data into overload chips	a) chips drop off b) incorrect setting of the chip's jumper c) chips defective d) malfunction of the working voltage	a) high voltage in the analog channel b) check the setting of the jumper c) replace chips and do the overload test d) replace main board
E 47	Load chart CRC calibration is not correct	The data in the load chart was lost or been changed	a) check the load chart chip b) check the load chart chip's +5V supply c) replace the load chart data d) replace load chart chips
E48	Defective of load chart chips	a) chips drop off b) chips defective	a) replace the load chart data chips b) check if high voltage pass the analog channel c) check the digital channel's 5V supply d) replace main board

Error code	Error	Cause	Elimination
E 49	Faulty data during on-line operation	Upon loading, no valid data are to be found on the RMA in the memory extension in on-Line-programming	a) replace memo. extension b) replace on-line interface c) replace SLI main board
E 51	Error in the FLASH	Error in the FLASH data	Replace data FLASH
E 80	Short circuit between length cable and A2B switch	a) cable to A2B switch defective b) A2B switch defective c) electronics in the main board defective	a) check cable b) check the A2B switch c) replace main board
E 91	No data transmission from console to central unit	a) no 24V power supply to the console b) circuit of the electronics from console to central unit broken or touch the ground c) electronic board of the send/receiver defective	a) check 24V power supply in b) check the connection between console electronics and central unit, if find defective, replace it c) replace console electronics or related SLI main board
E 92	Error in the data transmission from console to central unit	a)circuit from console electronics to central unit not connected properly b)electronic board of the send/receiver defective	a)check the connection between console electronics & central unit b) replace console electronics or corresponding SLI main board
E 93	Error in the data transmission from central unit to the console	a)improper connection between central unit to console b)electronic board of the send/receiver defective	a) check circuit to the console b) replace console electronics or corresponding SLI main board
E 94	No data transmission from central unit to the console	a) circuit from central unit to the console is broken or touch the ground b) 5V power supply in the central unit is defective c) 5V power supply is too low d) data send/receive defective	a) check connection of the console b) check the connection of the power supply c) replace electronics d) replace electronics of the console or central unit e) check the FLASH

		e) data FLASH defective f) computer module defective g)coupler defective	f) replace main board of the central unit g)replace computer module h)replace the coupler of main board

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