KR/RM9600 Maintenance Manual

(Ver3.0)

Shanghai Topview Industrial Co., Ltd.

Contents

1.Introduction

- **The maintenance manual for the . KR/RM9600 series of refractometer**
- **This article briefly describes the KR/RM9600 major point of failure and maintenance methods**
- **Please refer to the instruction manual of KR/RM9600 for the main parts of the machine**
- **Please understand the contents of this article and then the operation and maintenance of the machine**
- **If there is no failure to mention this article, please contact Shanghai Topview Industrial Co., Ltd. after-sales service**

2.Safety Precautions

- **Maintenance and maintenance of the machine should be carried out by professionals or service instructors**
- **Refer to the description of the service manual for repair and maintenance**
- **Do not repair and maintain the machine in complex environments (such as high temperature and high humidity)**
- **When the maintenance and maintenance, please completely disconnect the machine power**
- **Do not wipe or touch the internal parts of the machine with any moist objects**
- **Do not leave any screws or parts inside the machine during maintenance**
- **When removing the machine, be prepared to store the accessories and screws to prevent loss**
- **Please use the appropriate tools to remove and install the machine parts, parts and shell**
- **When inserting and removing internal cables and cables, be careful and pay attention to the interface location**
- **Make sure that all parts, parts and harnesses are installed in place before powering on the test**

3.Instrument Performance Parameters

1. Sphere：-20.00~+20.00D
2. Cylinder：0.00~±10.00D
3. Axis：1°~180°
4. Pupil Distance：30~85mm
5. Min.pupil diameter measurable：∅2.0mm
6. Radius of curvature:5~10mm
7. Corneal Refraction：30.00~67.00D
8. Corneal Astigmatism：0.00~-15.00D
9. Angle of corneal：2.0~12.00mm
10. Corneal diameter：0.0mm,12.0mm,13.75mm,15.0mm
11. Target：Automatic fogging target
12. Monitor：7 inch Color LCD
13. Printer:Fast thermal printer
14. Power supply：AC100~240V,50/60Hz,50W
15. Power saving function：OFF,5,15mins(selectable)
16. Dimensions：262（W）*486（D）*466（H）mm

4.Introduction to Machine Configuration

4.1 Interior structure

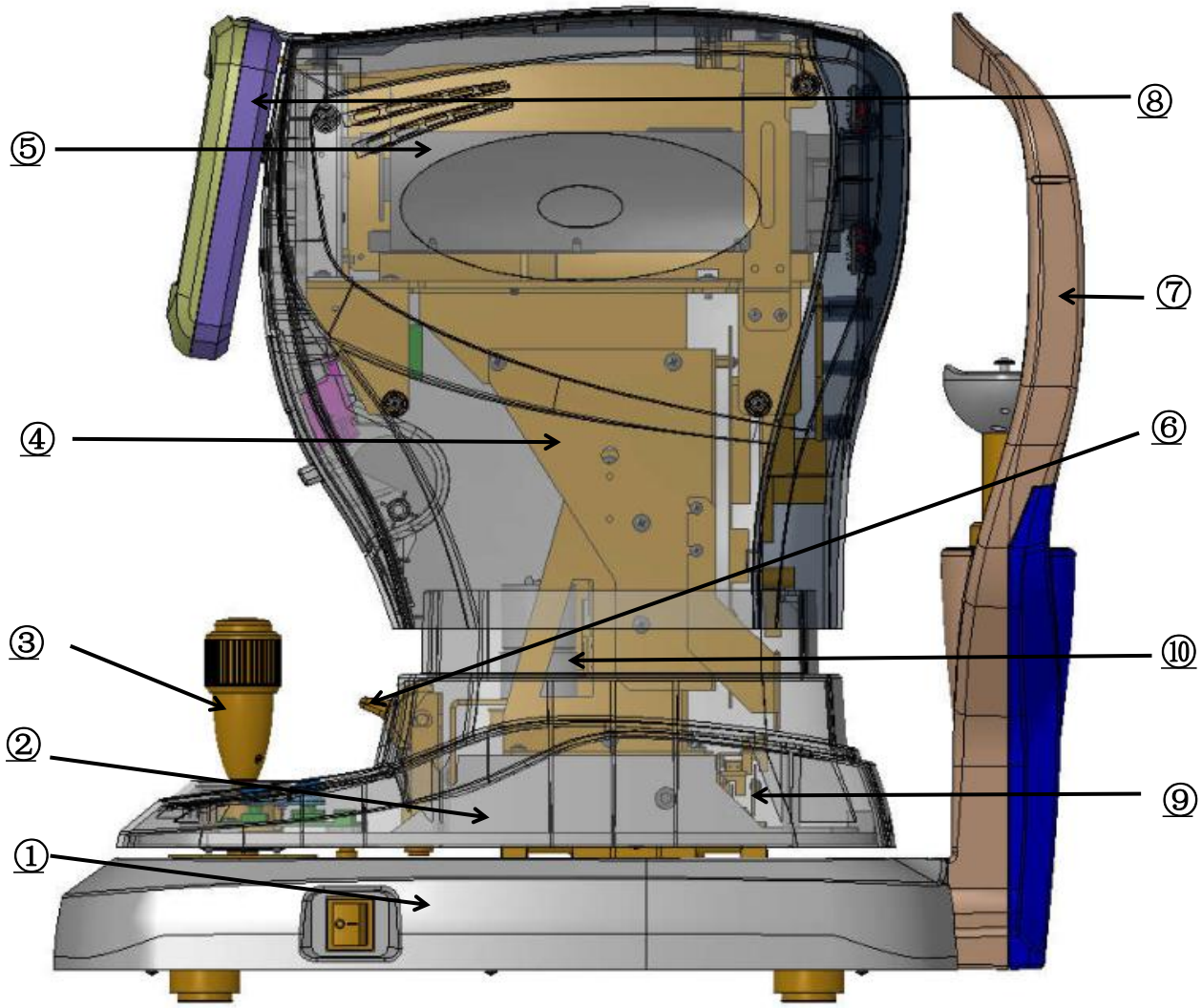


Fig4.1 The diagram of internal structure

1.Base assembly(AR9-1)　　2.Slide assembly(AR9-2)

3.Joystick assembly(AR9-3)　　4.Lifting assembly(AR9-4)

5.Optical system assembly(AR9-5)　　6.Locking assembly(AR9-6)

7.Forehead rest assembly(AR9-7)　　8.Screen assembly(AR9-8)

9.Optical Grating assembly（AR9-9）　　10.Lift motor assembly(AR9-4-2)

4.2 Shell structure

Fig4.2 The diagram of shell structure

1.Top cover(AR9-0-5)

2. Rear cover(AR9-0-4)

3.Right shell(AR9-0-2)

4. Chin-rest lift assembly(AR9-7)

5.Bottom cover(AR9-0-7)

6.Forehead rest cover(AR9-7-13)

7.Left shell(AR9-0-1)

8. Rear screen cover(AR9-8-5)

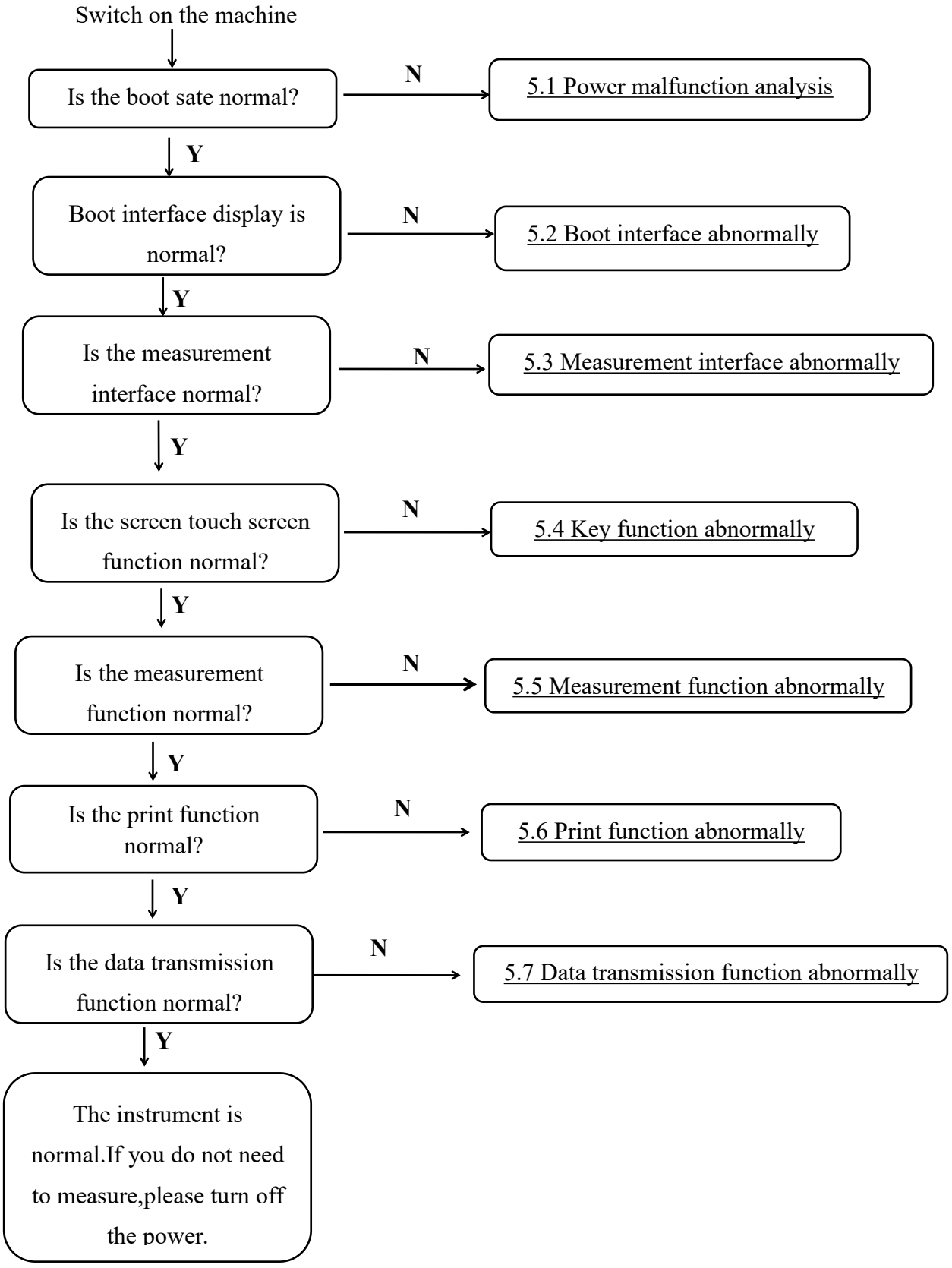
9.LCD screen (ELC07083)

10.Screen cover(AR9-8-4)

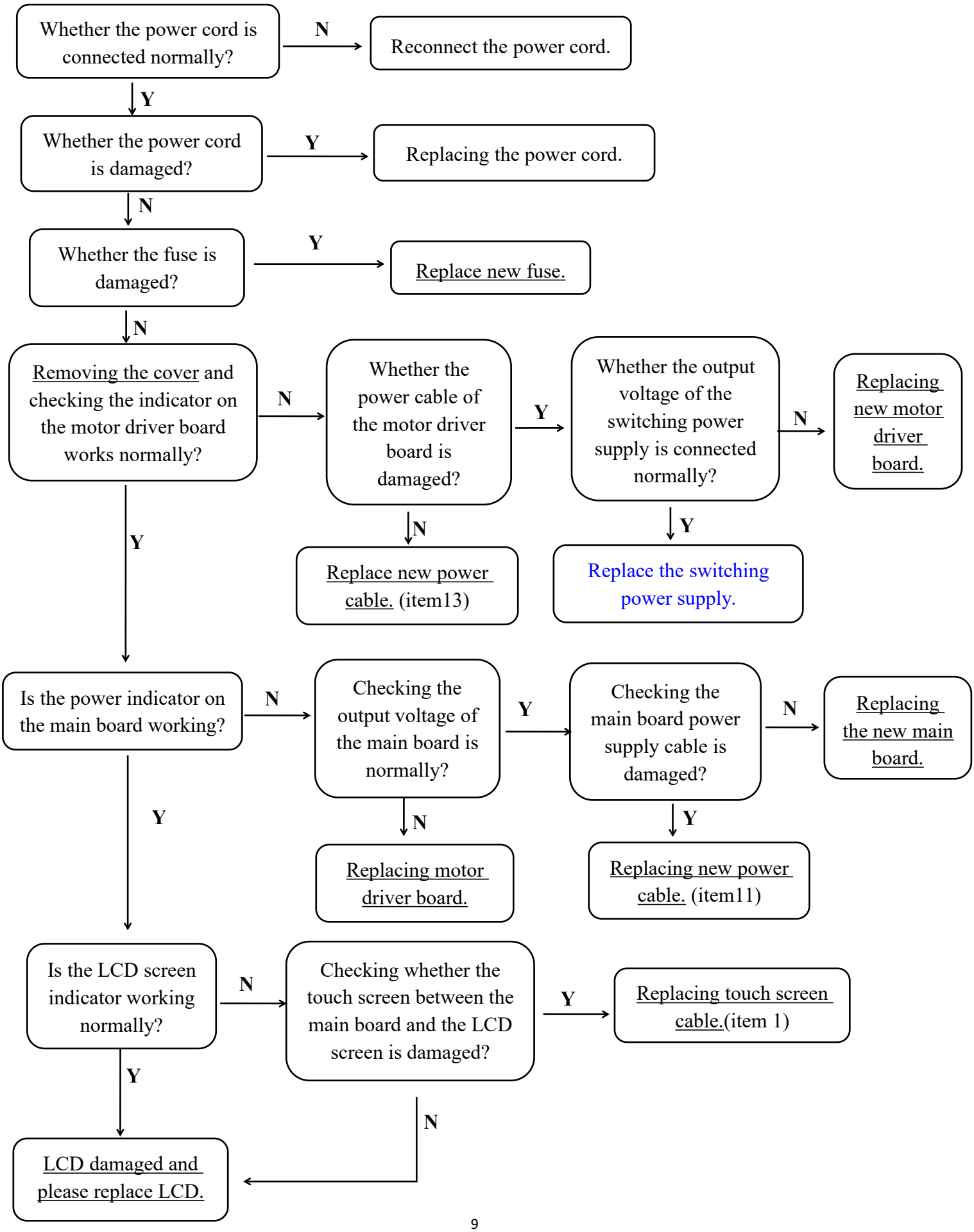
11.Front cover(AR9-0-3)

12.Bottom shell（AR9-0-6）

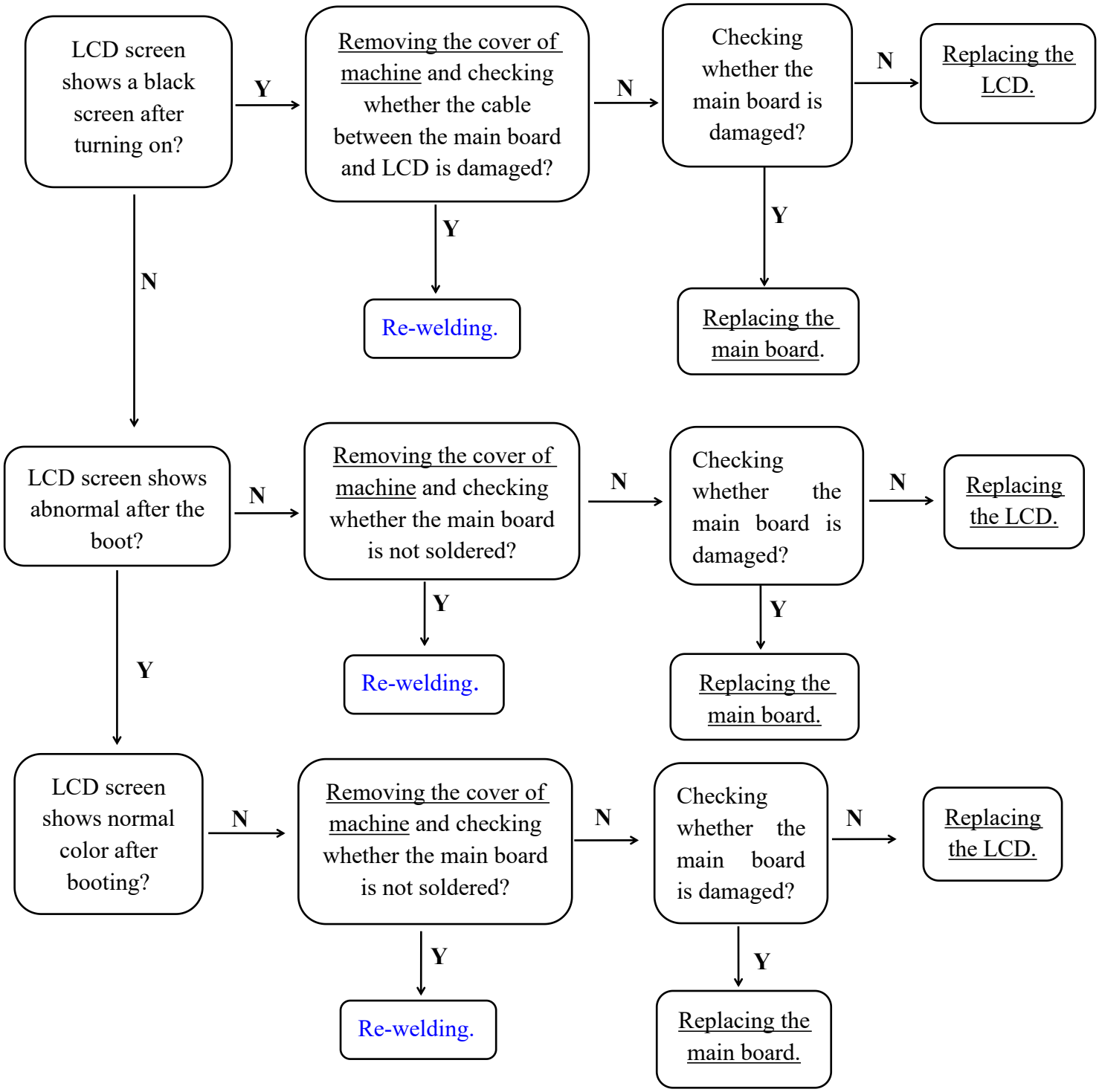
5. Device malfunction and maintenance methods



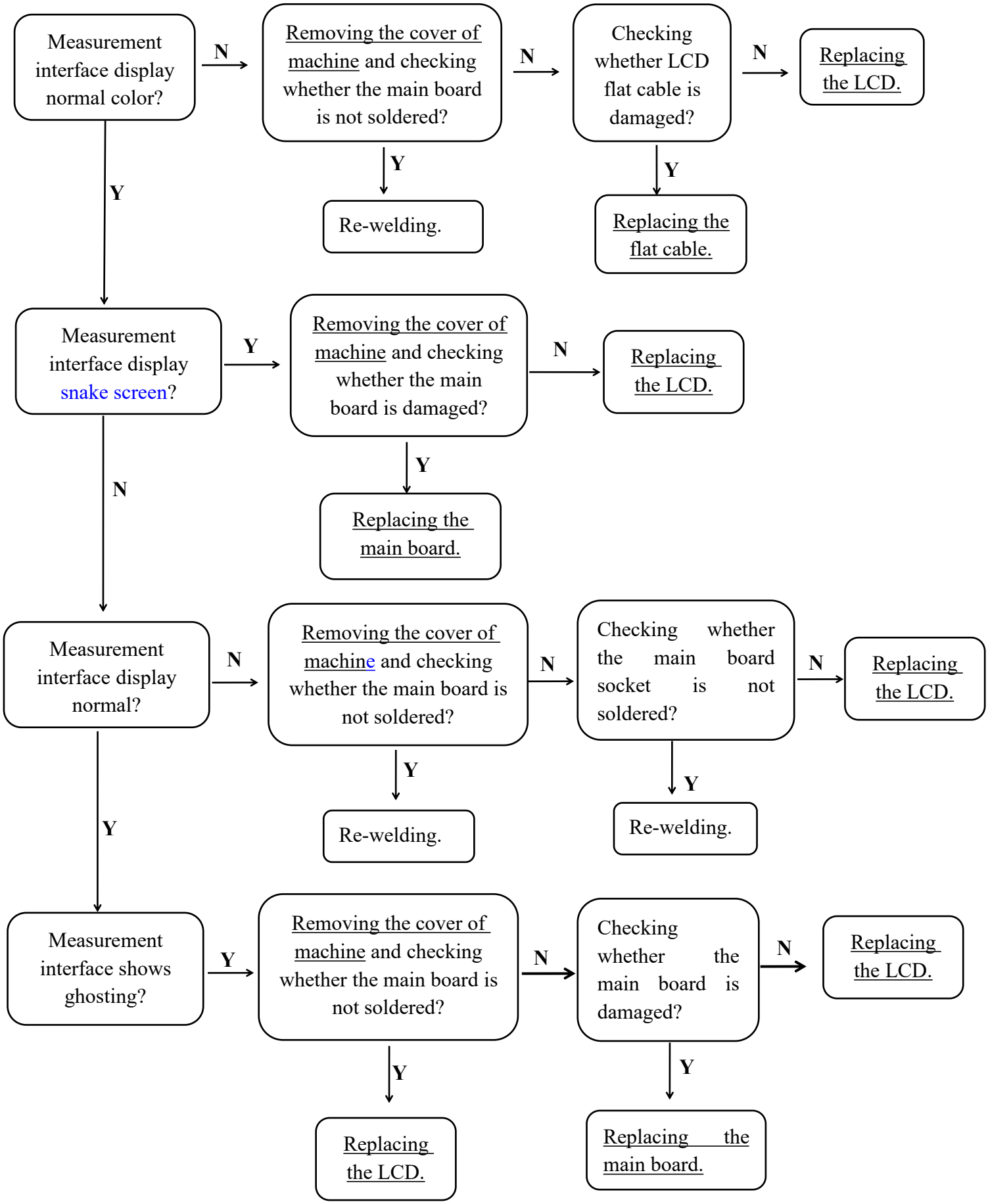
5.1 Power malfunction analysis



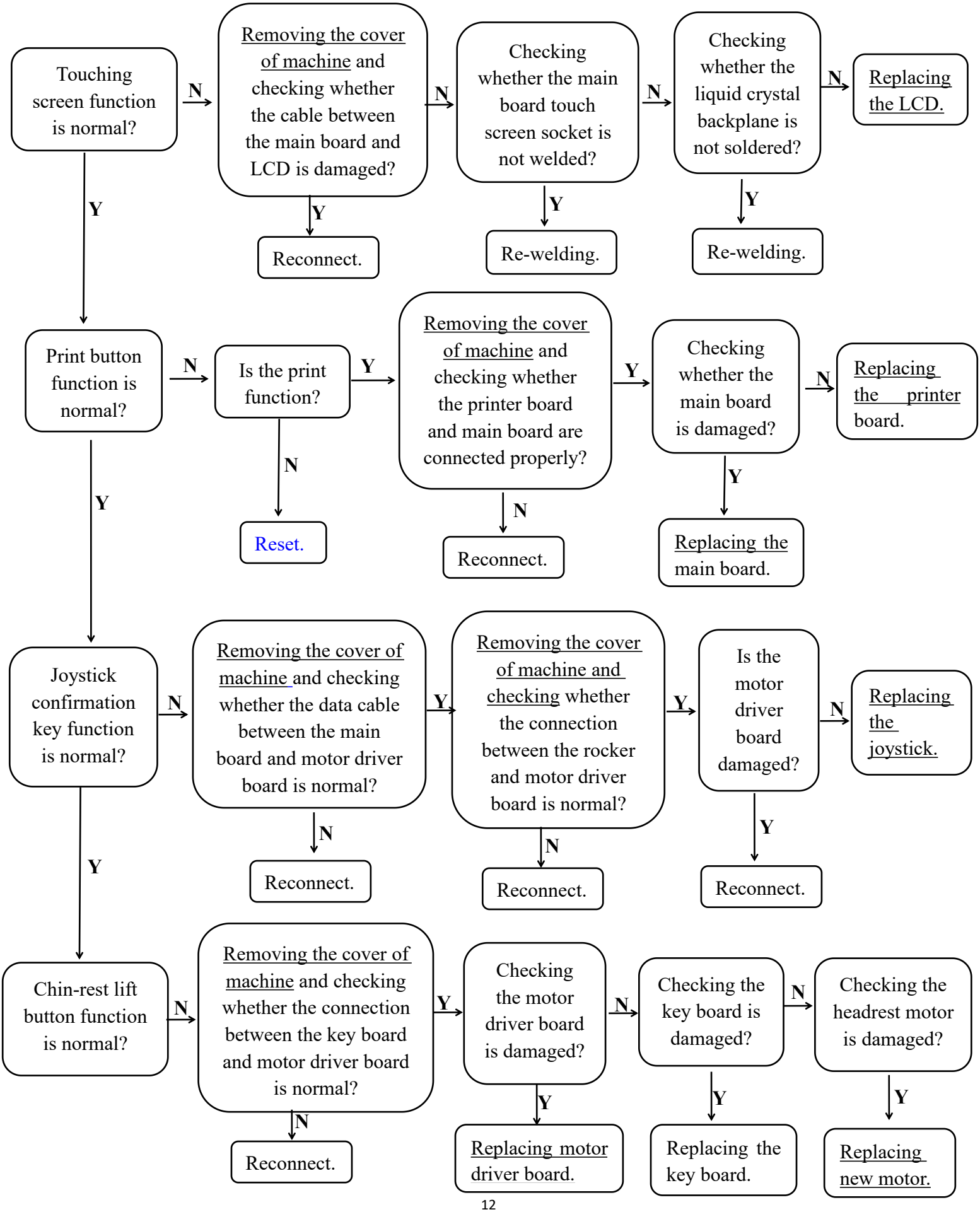
5.2 Boot interface abnormally



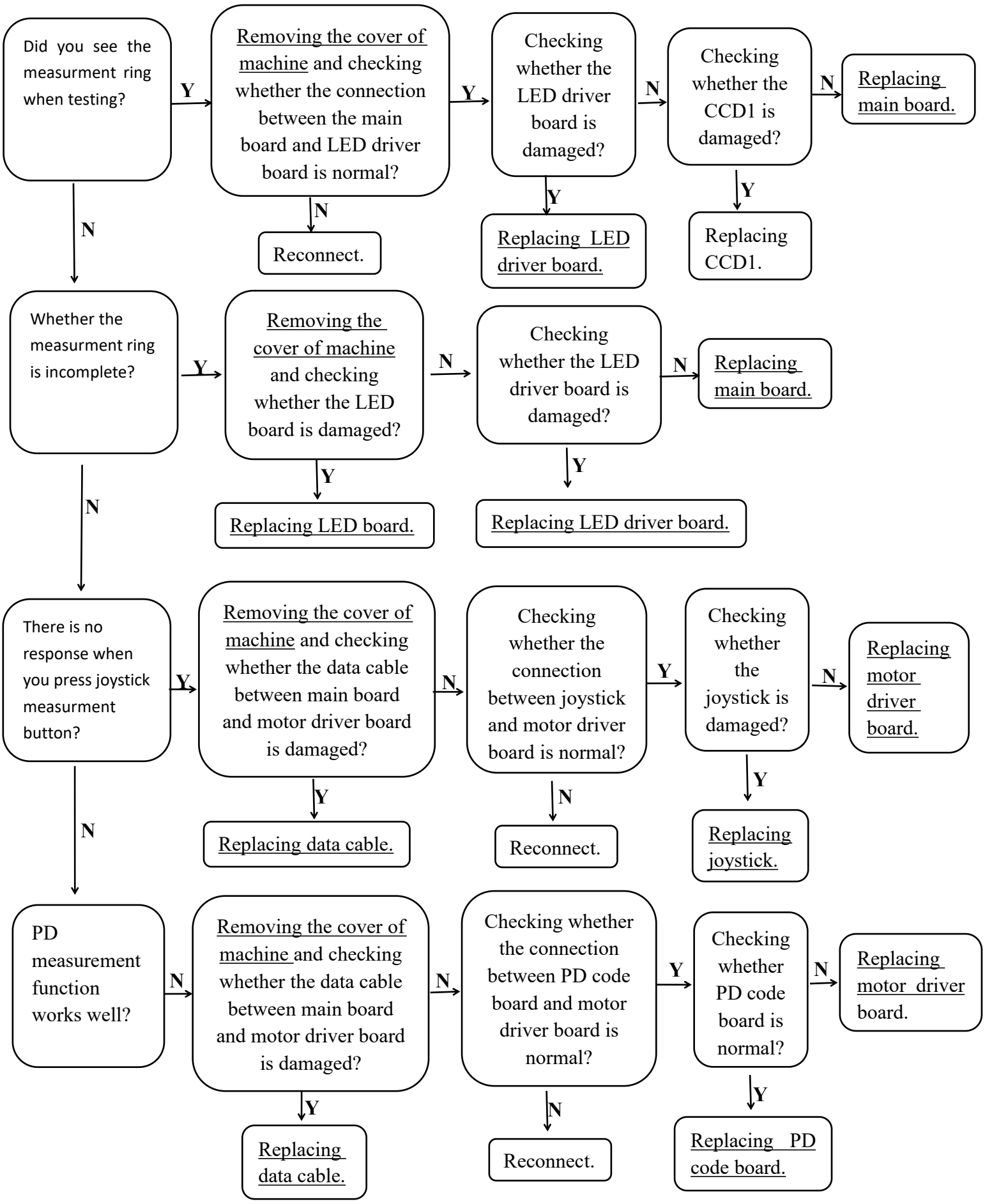
5.3 Measurement interface abnormally



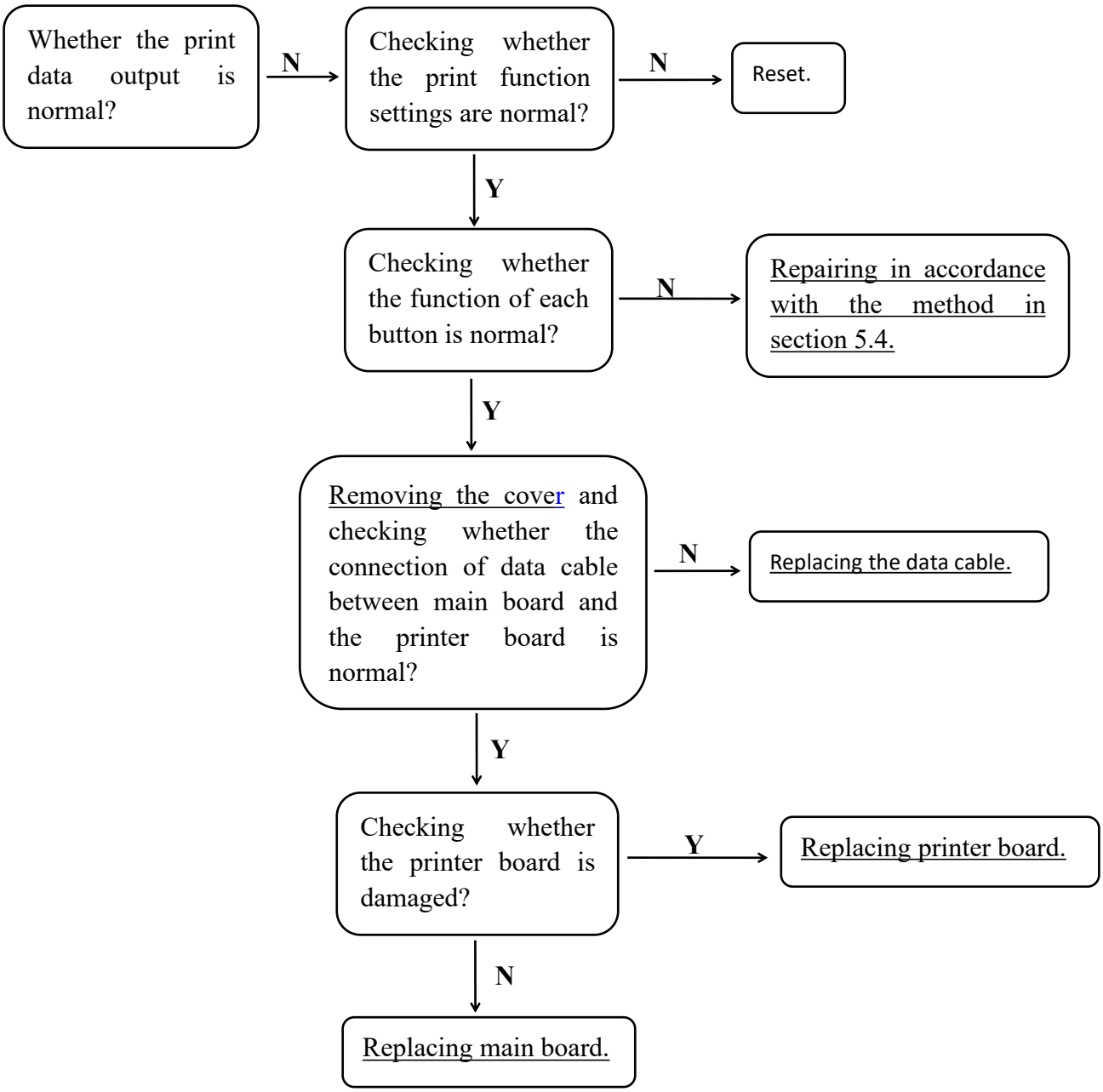
5.4 Key function abnormally



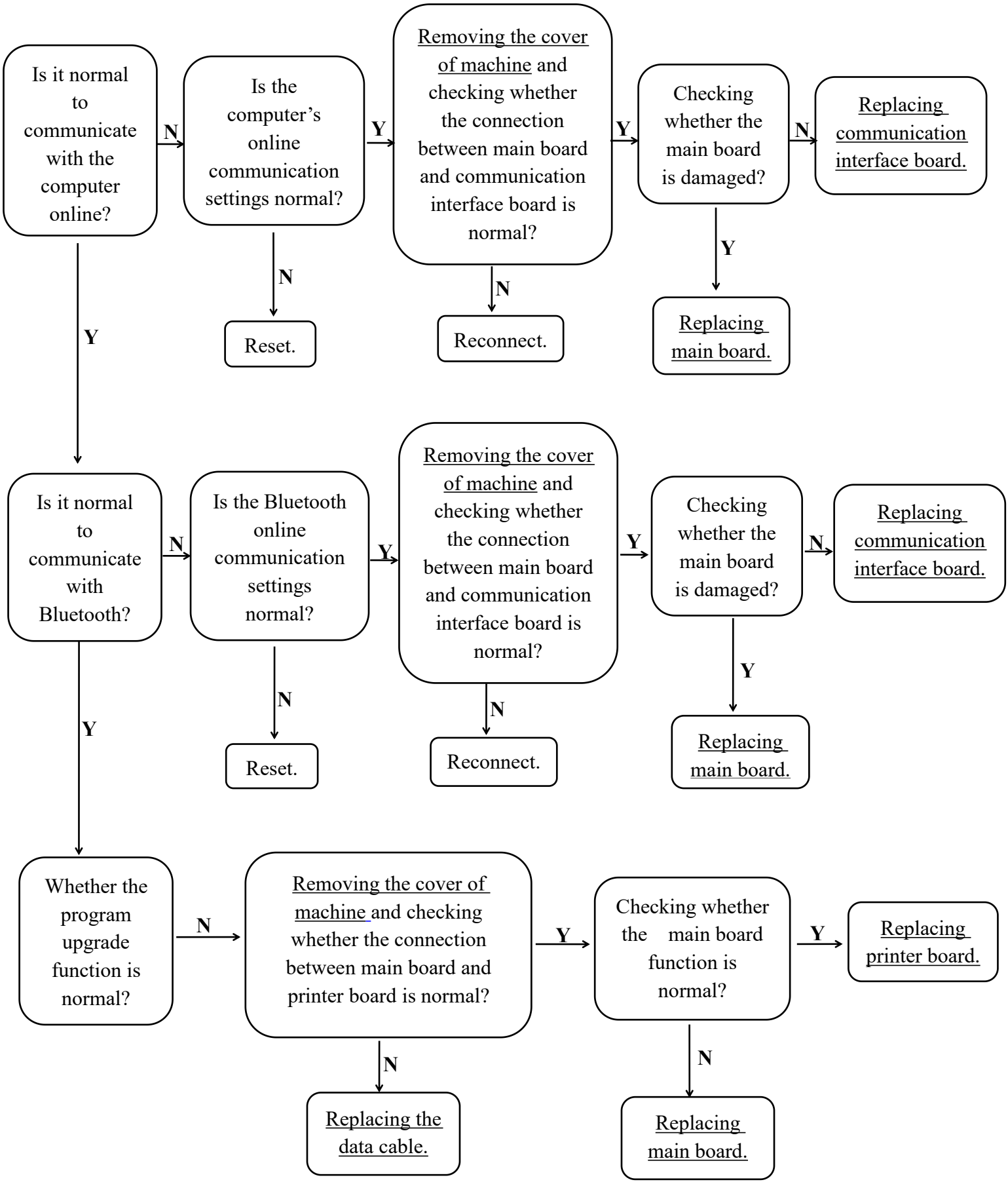
5.5 Measurement function abnormally



5.6 Print function abnormally



5.7 Data transmission function abnormally



6.Machine Shell Removal and Installation

6.1 Remove the left shell(AR9-0-1)

1.Pick up 4 caps with tweezers，and use a cross screwdriver screw out four M3 *8 three combination screws，as shown Fig 6.1-1.

2.Hold the device cover with your right hand，Hold the bottom of the left case with your left finger and pull forward and release the buckle，and remove the left shell，as shown Fig6.1-2 .

Fig 6.1-1

Fig 6.1-2

6.2 Remove the right shell(AR9-0-2)

1.Pick up 4 caps with tweezers，and use a cross screwdriver screw out four M3 *8 three combination screws，as shown Fig 6.2-1.

2.Hold the device cover with your left hand，Hold the bottom of the left case with your right finger and pull forward and release the buckle，and remove the right shell，as shown Fig6.2-2 .

Fig 6.2-1

Fig 6.2-2

6.3 Remove the top cover(AR9-0-5)

1.Pick up 4 caps with tweezers，and use a cross screwdriver screw out four M3 * 8 three combination screws，as shown Fig 6.3-1.

2.When loading the top cover,the positioning column on the top cover should be snapped into the positioning hole of the back cover，as shown Fig 6.3-2，Locating bars on both sides of the top cover side stuck outside the housing support frame，as shown Fig 6.3-3.

Fig 6.3-1

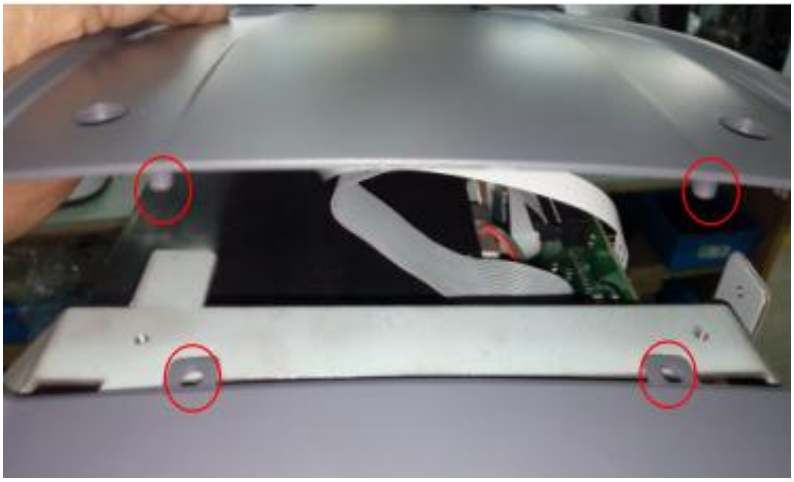


Fig 6.3-2

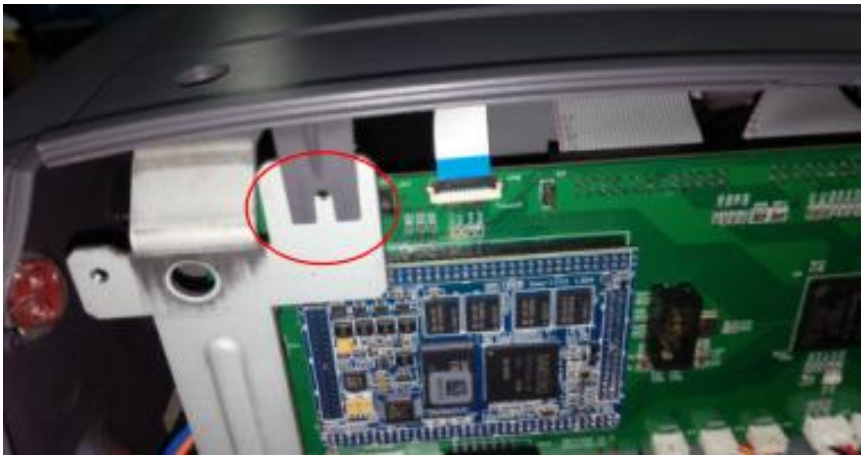


Fig 6.3-3

6.4 Remove the behind the cover(AR9-0-4)

1.Pick up 4 caps with tweezers，and use a cross screwdriver screw out four M3 * 8 three combination screws，as shown Fig 6.4-1.

2.Be careful when loading the behind cover,and behind cover positioning column should be snapped into the bracket positioning holes on the board，as shown Fig 6.4-2.

Fig 6.4-1

Fig 6.4-2

6.5 Remove the front cover(AR9-0-3)

1.First, please turn up the LCD screen，be careful that the flip angle is less than 90 degrees，as shown Fig 6.5-1.

2.Pick up 4 caps with tweezers，and use a cross screwdriver screw out four M3 * 8 three combination screws，as shown Fig 6.5-2.

3.Be careful when loading the front cover,and front cover positioning column should be snapped into the bracket positioning holes on the board，as shown Fig 6.5-3.

Fig 6.5-1

Fig 6.5-2

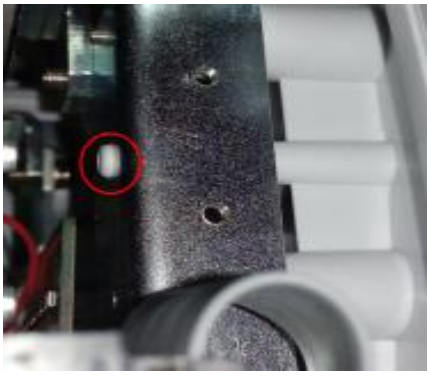


Fig 6.5-3

6.6 Remove the bottom cover(AR9-0-6)

1.Before opening the bottom cover,please power on and turn rocker handle to raise the instrument to its highest position.

2.Pick up 2 caps with tweezers on the bottom cover，as shown Fig6.6-1,and use a cross screwdriver screw out two M3 * 8 three combination screws， as shown Fig6.6-1,then lift up the bottom cover and disengage the dowel pin and remove it(The location is in the picture in red circle),as shown Fig 6.6-3.

3.Use a cross screwdriver screw out two M3 *8 three combination cross pan head screws on the bottom cover,as shown Fig 6.6-4.

4.First raise the bottom cover and remove it from the rocker and lock handle as shown Fig 6.6-5,Fig 4.6-6,and then turn left 90 degrees,poking both ends of the opening of the bottom case appropriately,and remove slowly from the lifting assembly.Note do not touch the circuit board wiring at both ends of the bottom cover opening as shown 6.6-7.

Fig 6.6-1

Fig 6.6-2

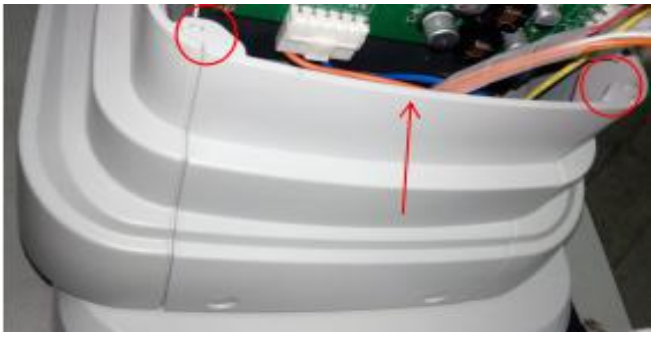


Fig 6.6-3

Fig 6.6-4

Fig 6.6-5

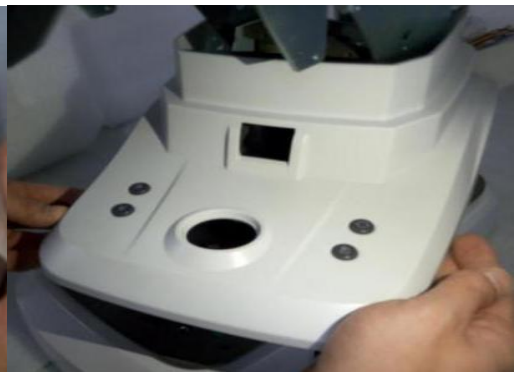


Fig 6.6-6

Fig 6.6-7

6.7 Remove the forehead rest cover(AR9-7-13)

1.Pick up the caps with tweezers on the forehead rest cover,as shown Fig6.7-1,then use a 2.5mm hex wrench screw out one M3*10 hexagonal screw,as shown Fig 6.7-2,and then screw out another two M3 *10 hexagonal screw,as shown Fig 6.7-3.

Fig 6.7-1

Fig 6.7-2

Fig 6.7-3

6.8 Remove the screen assembly

1.Pull out two LCD cables from Main board socket 1 and socket 4.

2.First, please turn up the LCD screen，be careful that the flip angle is less than 90 degrees，as shown Fig 6.8-1.

3.Use a cross screwdriver screw out four M3 * 8 three combination screws， remove the screen cover,as shown Fig 6.8-2.

4.Use a cross screwdriver screw out four M3 *8 three combination screws， remove the screen cover,as shown Fig 6.8-3.

5.Use a cross screwdriver screw out four M3*8 three combination screws，as shown Fig 6.8-4;and remove LCD screen,as shown Fig 6.8-5.

6.According to the above steps reverse process LCD screen can be replaced.

Fig 6.8-1

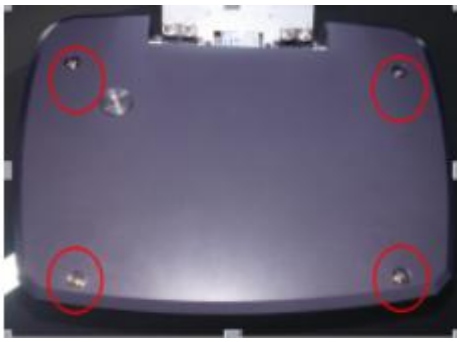


Fig 6.8-2

Fig 6.8-3

Fig 6.8-4

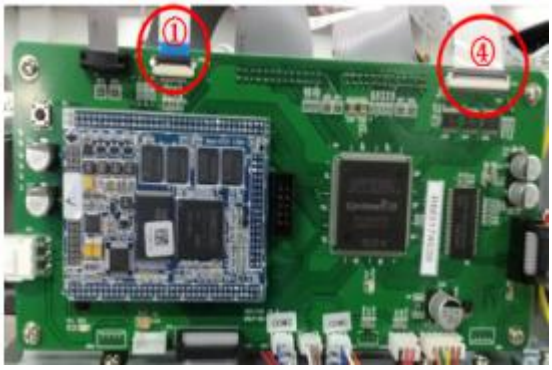


Fig 6.8-5

7. Replacement Method of Instrument Circuit Board

7.1 Motor drive board replacement

Motor drive board replacement as follows:

1.Remove the machine part of the shell.（Reference shell opening method 6.1--6.6）

2.Remove line deduction,cut the line tie,as shown Fig 7.1-1,then screw out four M3 * 8 three combination screws， take out stand backplane,as shown Fig7.1-2.

3.Taking out the various wiring plugs and then screw out four M3 * 8 three combination screws,securing the drive PCB,remove the motor drive board,as shown Fig 7.1-3.

4.After replace the new LED driver board,please according to the reverse process of demolition re-install.

5.A total of 14 driver circuit board cable,Each socket wiring as shown Fig 7.1-4. When replacing the installation, pay attention to the connecting position of the connecting wire.Please enter the number as shown in Table 1.

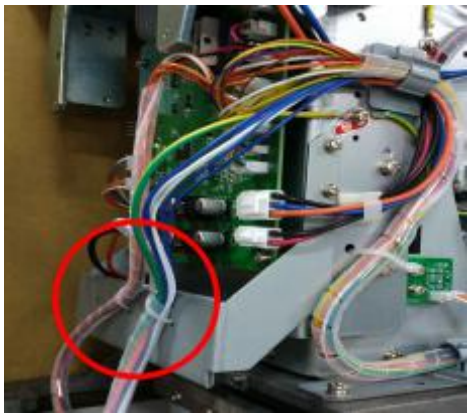


Fig 7.1-1

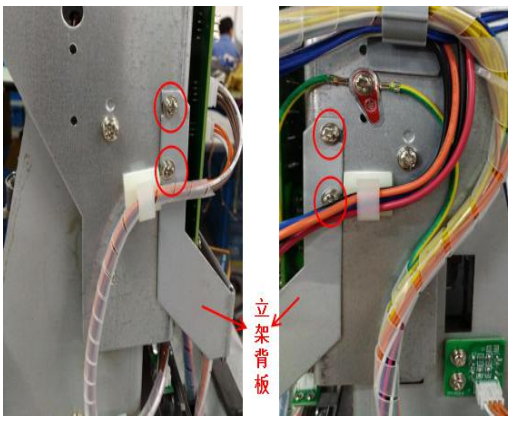


Fig 7.1-2

Fig 7.1-3

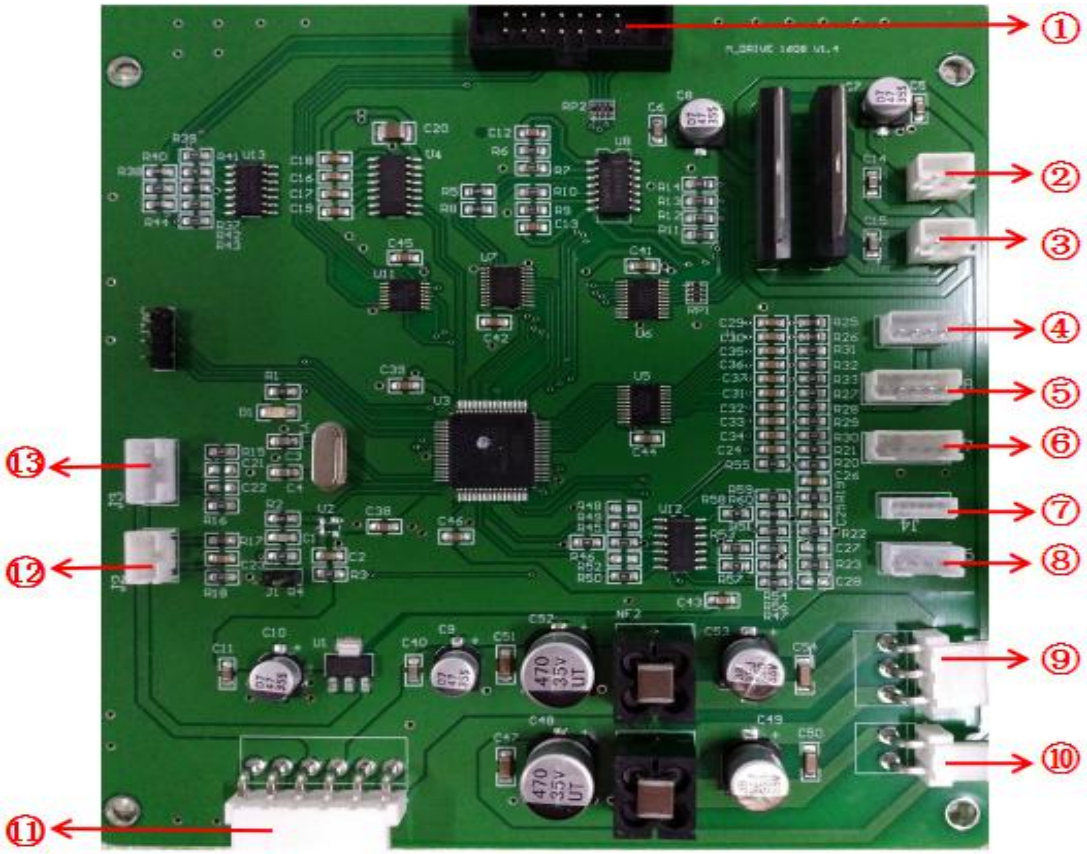


Fig 7.1-4

Table 1

NO.	Board socket name	name	Remarks
1	P1	The socket of motor driver board and main board data communication cable	(Sixteen cores flat line)
2	JP1(TBD-UD)	The socket main lift motor power cable	(Two cores line)
3	JP2(CHIN)	The socket of forehead rest lift motor power cable	(Two cores line)
4	J6(TBDLMT)	The socket of measuring station limit board cable	(Four cores line)
5	J8(CHNLMT)	The socket of forehead rest limit board cable	(Five cores line)
6	J7(KEY)	The socket of key board cable	(Five cores line)
7	J4(HANDLE)	The socket of handle button board cable	(Six cores line)
8	J5(TMENC)	The socket of main lift motor coding board cable	(Four cores line)
9	J12	The socket of motor driver board and the main board between the power connection cable	(Three cores line)
10	J11	The socket of motor driver board and the printer board between the power connection cable	(Two cores line)
11	J0	The socket of switching power supply and motor driver board connection cable	(Three cores line)
12	J2(PD_C)	The socket of PD limit board connection cable	(Three cores line)
13	J3(PD_ENC)	The socket of PD coding board connection cable	(Four cores line)

7.2 Main board replacement

Main board replacement as follows:

1.Remove the machine part of the shell.（Reference shell opening method 6.1--6.4）

2.Taking out the various wiring plugs and then screw out four M3 * 8 three combination screws,remove the Main board,as shown Fig 7.2-1.

3.After replace the new LED driver board,please according to the reverse process of demolition re-install.

4.A total of 13 main board cable,Each socket wiring as shown Fig 7.2-1.When replacing the installation, pay attention to the connecting position of the connecting wire.Please enter the number as shown in Table 2.

Note:（1）The data in the data chip is corresponding to the rack number(Marked in the yellow box shown as Fig 7.2-2),When replacing the Main board, you need to insert the old main board data chip into the new main board。

（2）After the new circuit board replaced ,each socket wiring must be connected and reliable，After the power test is normal,and then on both sides of the socket 1, 4 with hot melt positioning anti-loose

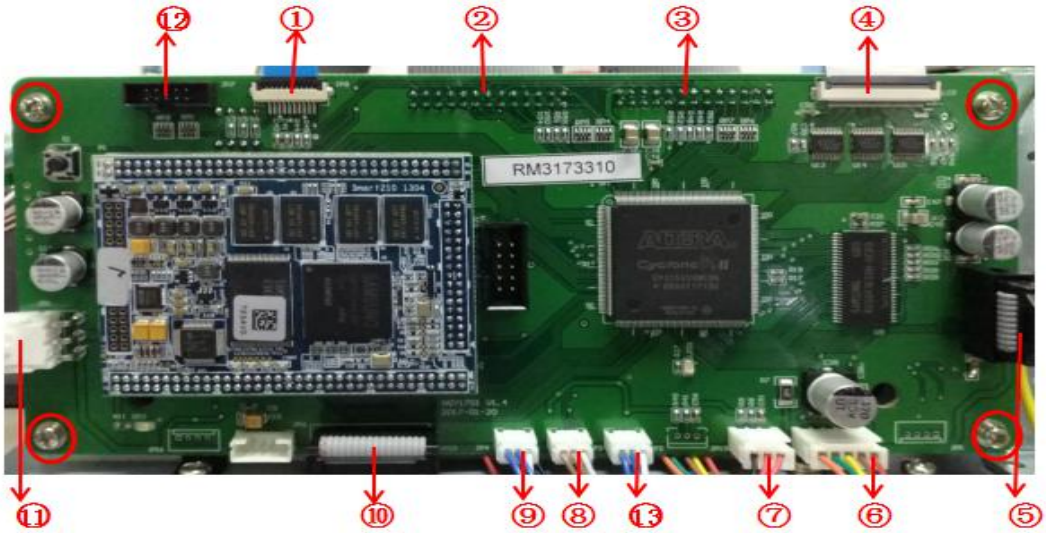


Fig 7.2-1

Fig 7.2-2

Table 2

NO.	Board socket name	name	Remarks
1	JP8	The socket of LCD touch cable	
2	JP11	The socket of CCD1 cable	
3	JP12	The socket of CCD2 cable	
4	LCD	The socket of LCD cable	
5	JP13(LED)	The socket of main board and LED driver board data transmission cable	
6	JP9	The socket of optical system stepper motor cable	（Four cores line）
7	P3	The socket of optical system limit board cable	（Three cores line）
8	JP3	The socket of printer serial port online cable	（Three cores line）
9	JP4	The socket of main board and communication interface board cable	（Three cores line）
10	JP10	The socket of motor driver board and main board data communication cable	
11	JP1(POWER)	The socket of main board power cable	（Three cores line）
12	JP7	The socket of SD card upgrade cable	
13	JP2	The socket of main board and communication interface board cable	（Three cores line）

7.3 LED driver board replacement

LED driver board replacement as follows:

1.Remove the machine part of the shell.（Reference shell opening method 6.1--6.3）

2.Taking out the various wiring plugs and then screw out two M3 * 6 three combination screws that fixed on the LED driver board,and remove LED driver board,as shown Fig 7.3-1.

3.After replace the new LED driver board,please according to the reverse process of demolition re-install.（**Note: circuit board socket can not be inserted wrong，please enter the number as shown in Table 3.**）Power test can be normal.

4.A total of 4 LED driver board cable,Each socket wiring as shown Fig 7.3-2. When replacing the installation, pay attention to the connecting position of the connecting wire.Please enter the number as shown in Table 3.

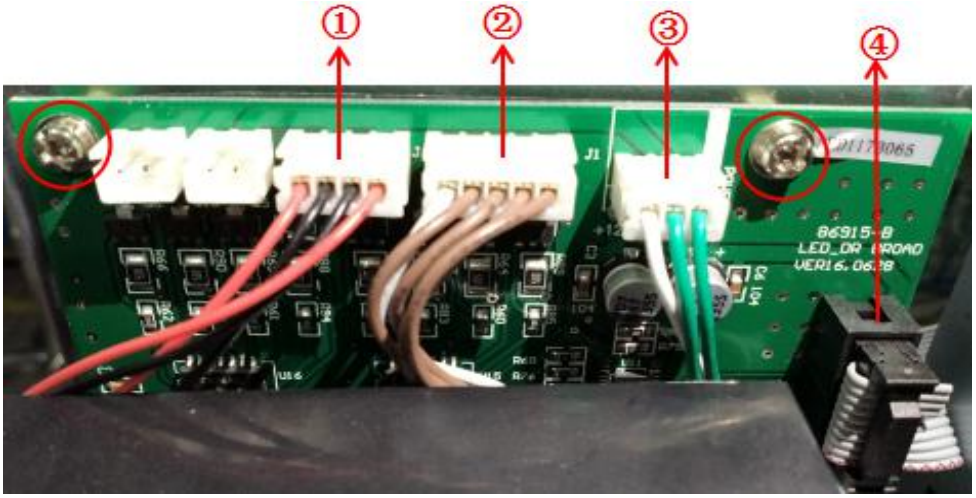


Fig 7.3-1

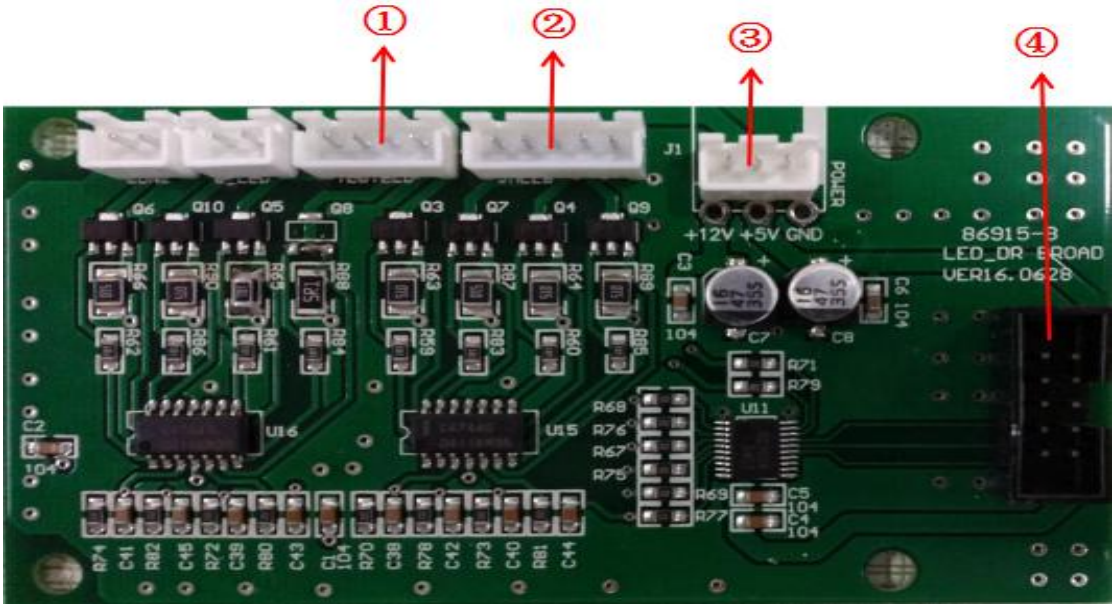


Fig 7.3-2

Table 3

NO.	Board socket name	name	Remarks
1	J4(TESTLED)	The socket of measuring light cable	（Four cores line）
2	J3(JMLED)	The socket of LED light board cable	（Five cores line）
3	J1(POWER)	The socket of power cable	（Three cores line）
4	J2(SIGNAL)	The socket of main board and LED driver board data transmission cable	

7.4 LED light board replacement

LED light board replacement as follows:

1.Remove the machine part of the shell.（Reference shell opening method 6.1--6.4）

2.Taking out the wiring plugs on the LED driver board,and then screw out two M3*6 cross countersunk head screw that fixed the LED driver board ,this can remove the LED light board with corneal lamp

holder,as shown Fig 7.4-1.

3.Removed the LED light board is connected to corneal lamp holder,need to screw out the four M2.5*5 cross plate self-tapping screws,which is used to fixed LED light board and corneal lamp holder,then remove the LED light board,as shown Fig7.4-2.

4.After replace the new LED light board,please according to the reverse process of demolition re-install.(**Note: circuit board socket can not be inserted wrong，please enter the number as shown in Table 3.**)Power test can be normal.

5.LED light board have only one cable,the socket connected is shown as Fig7.4-3. When replacing the installation, pay attention to the connecting position of the connecting wire.

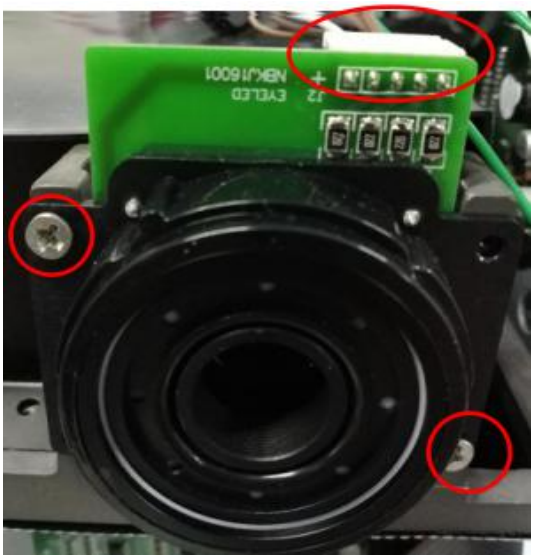


Fig 7.4-1

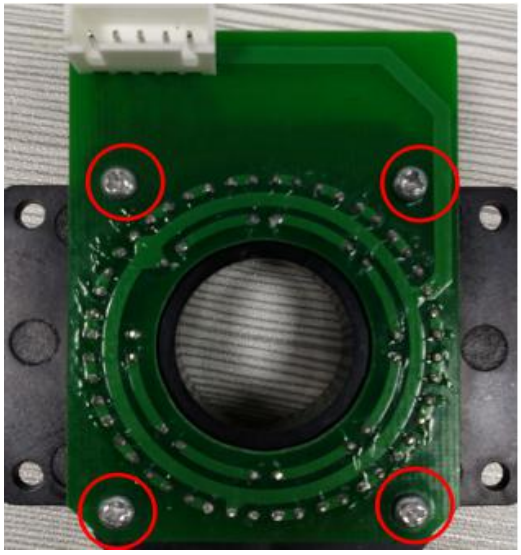


Fig 7.4-2

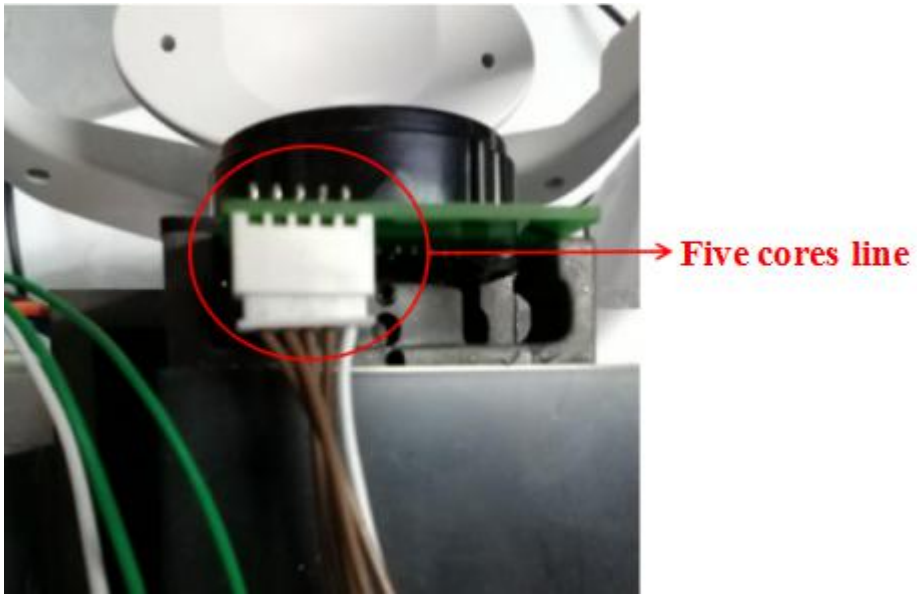


Fig 7.4-3

7.5 PD code board and limit board replacement and adjustment

7.5.1 PD code board and limit plate replacement and adjustment as follows:

1.Remove the machine part of the shell.（Reference shell opening method 6.1--6.7

2.Loosen M3 * 8 triple-assembly Phillips screws on both sides of the rack,two screws on each side,after loosened remove the stand backplane for securing wires Fig7.5-1.

3.Taking out the wiring plugs on the PD code board or the wiring plugs on the PD limit board,depending on the circuit board to be replaced,as shown Fig 7.5-2.

4.If you need to replace the PD code board,please screw out the two M2*5 cross with padded screws,which is used to fix the PD code board,as shown Fig 7.5-3.

5.If you need to replace the PD limit board,please screw out the two M2*5 cross with padded screws,which is used to fix the PD limit board,as shown Fig 7.5-4.

6.After replaced the PD code board or PD limit board,power on for testing,then please according to the reverse process of demolition re-install.

Note:1. When installing the PD code board, ensure that the height between the PD code board and the raster is within the range of 2 mm,at the same time, the grating should be located in the middle of the photoelectric switch groove on the PD code board, as shown in Figure 7.5-5.

2.After the power test to reduce the instrument to the lowest position， Install the rack backplane after power failure， Installation to ensure vertical rack back upright, left and right position slightly wider than the fuselage, to avoid collision with the PD code board, while avoiding collision with the shell, the installation of the style shown in Figure 7.5-6.

7.After replaced the PD code board or PD limit board,you need to enter the PD parameter calibration interface for parameter adjustment,for the specific debugging method, refer to section 7.5.1.

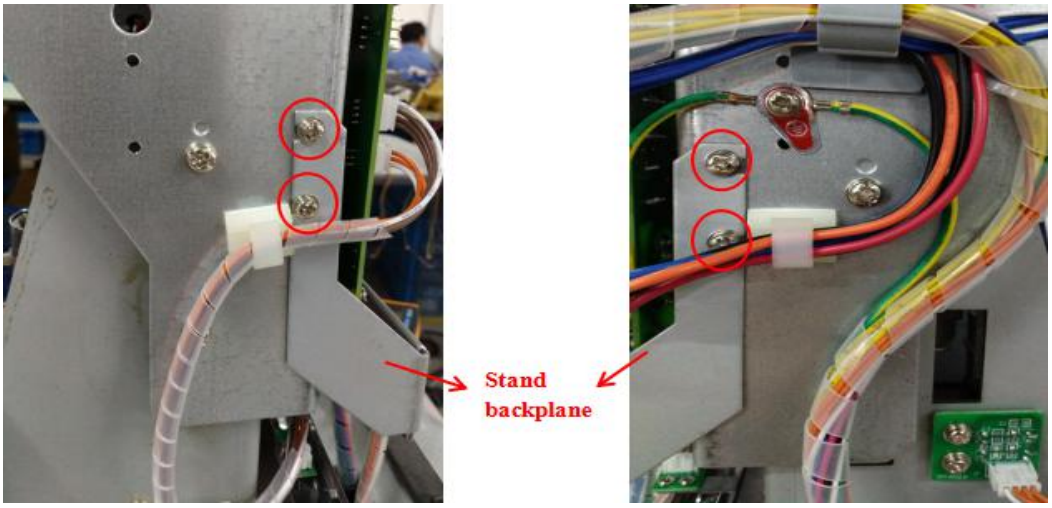


Fig 7.5-1

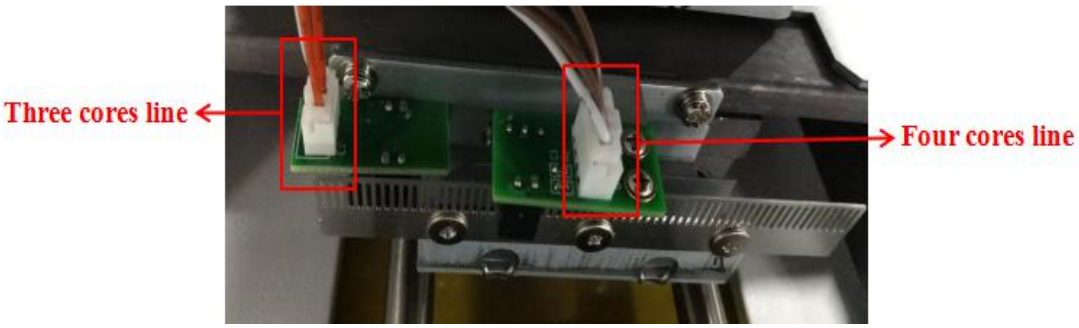


Fig 7.5-2

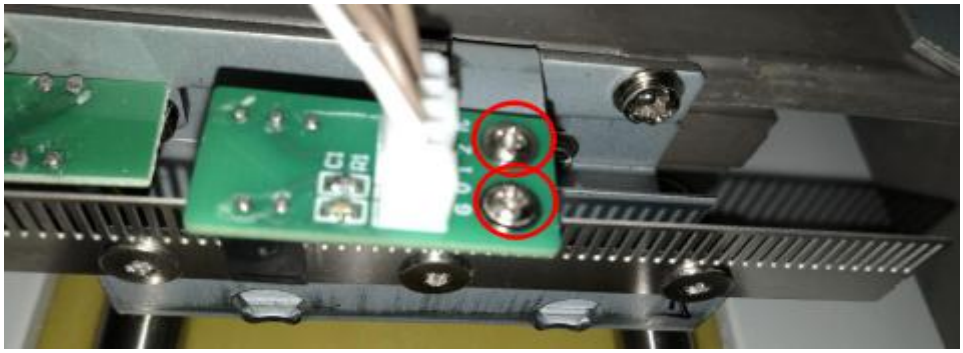


Fig 7.5-3

Fig 7.5-4

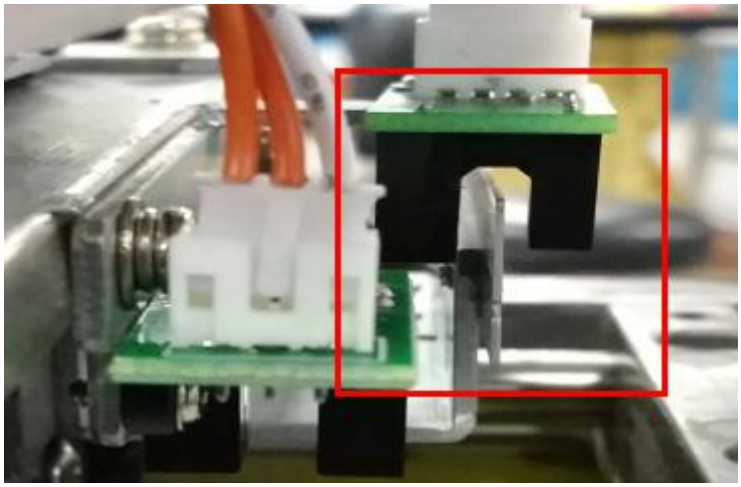


Fig 7.5-5

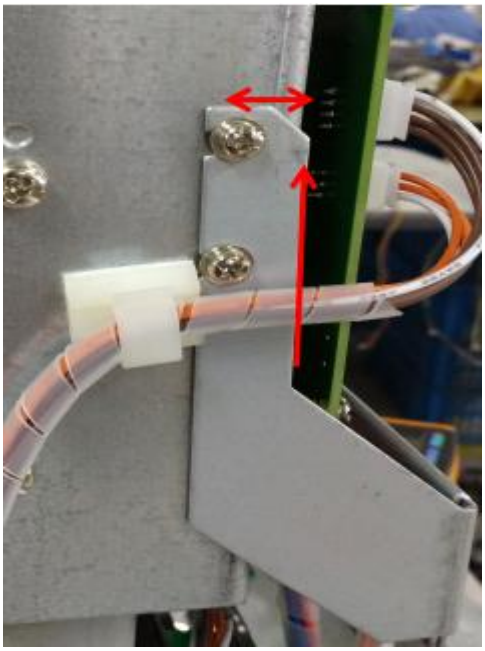


Fig 7.5-6

7.5.2 PD code board and shading shrapnel position adjustment

1.Enter the parameter setting interface according to Section 9.1 and 9.2 in Section IX， then enter the PD parameter detection interface and check the installation location is correct,as shown Fig 7.5-5 .

Fig 7.5-5

2.Move the device to the left and right extreme positions， observe the PD parameter values(The value in the red circle in the lower left corner of Figure 7.5-5 above),whether it reach the requirement(PD value of left and right position is generally between 120 ~ 125, and the left and right values difference should within 3, the left and right limit position PD parameter value as shown in Figure 7.5-6)，If the PD value is incorrect,please slight adjustment the PD code or shading shrapnel.

Left limit position PD parameter value

Right limit position PD parameter value Fig 7.5-6

If PD value less than 120， please adjustment the position of the PD code board.First,please loosen the

screw that is used to fixed the PD code board,as shown Fig 7.5-3.Move the PD code board position in the direction of the arrow(General is to let the grating film is located in the middle of the photoelectric switch recess, as shown Fig 7.5-7)， then move the device to the left and right extreme positions,and observe the PD parameters until meet the requirements.

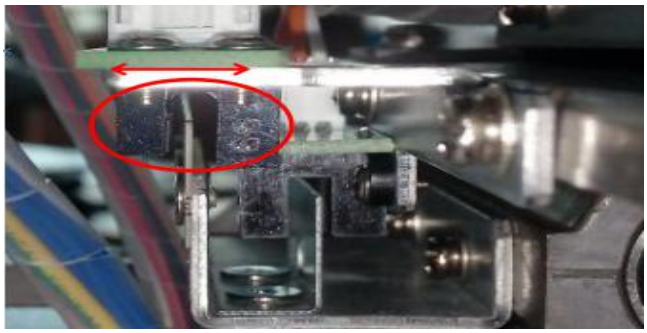


Fig 7.5-7

4.If the left and right PD parameters difference more than 3,please adjustment the shading shrapnel.First,please loosen the screw that is used to fixed the shading shrapnel,as shown Fig 7.5-8,moving the shading shrapnel position in the direction of the arrow,then moving the device to the left and right extreme positions,and observe the PD parameters until meet the requirements.

Fig 7.5-8

7.6 Communication interface board replacement

Communication interface board replacement as follows:

1.Screwing out the four adjust the casters and six M6*12 three combination Phillips screws for securing the bottom cover,remove the bottom cover,as shown Fig 7.6-1 .

2.Taking out the wiring plugs on the communication interface board,and screwing out two cross countersunk head screw,removing the communication interface board for replacement.

3.After replace the new communication interface board,please according to the reverse process of demolition re-install.After the installation is complete, test the power.

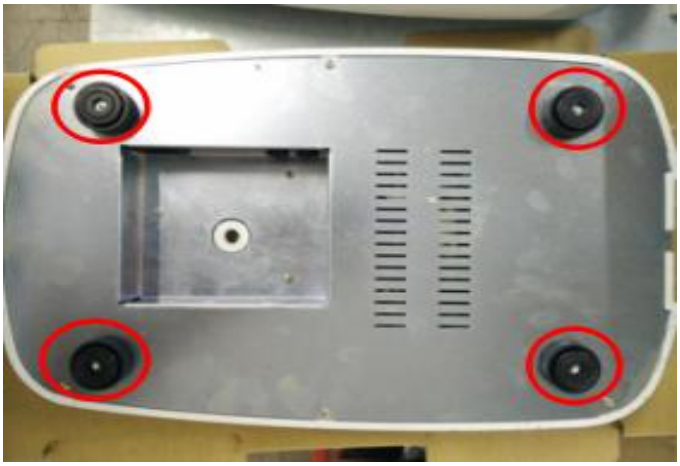


Fig 7.6-1

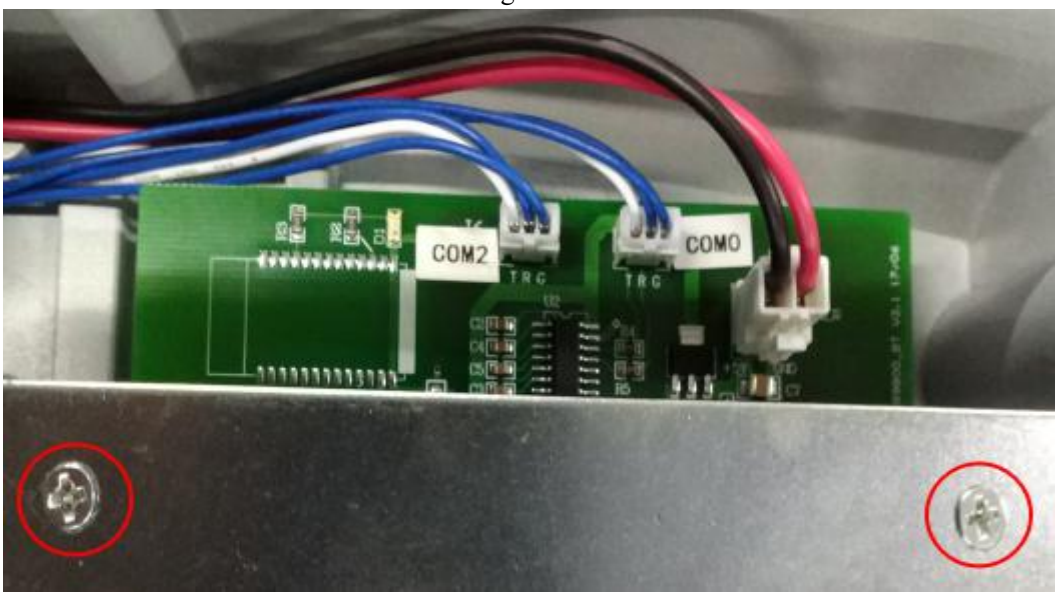


Fig 7.6-2

8. Mechanical Parts Replacement and Maintenance Methods

8.1 Optical path assembly replacement

1.Remove the machine part of the shell.（Reference shell opening method 6.1--6.7）

2.Screwing out the four M3*8 three combination screws,remove the shell support frame,as shown Fig 8.1-1.

3.Taking out the wiring plugs,then screwing out four M3*8 three combination screws,that is used to fixed the Main board,as shown Fig 8.7-2.

4.Loosening six M3*6 Pan head screws that is used to fixed the hood,lift the hood off,as shown Fig 8.1-3.

5.Moving the three lens seat to the left,then use a 2.5MM Allen wrench screw out three M3*10 hexagonal screw,remove the optical path assembly,as shown Fig 8.1-4.

6.Replacing the new optical path assembly and fixed,according to the reverse process of demolition re-install.(Note:**circuit board socket can not be inserted wrong，refer to Section 7.2 main board replacement wiring method**)Power test can be normal.

Fig 8.1-1

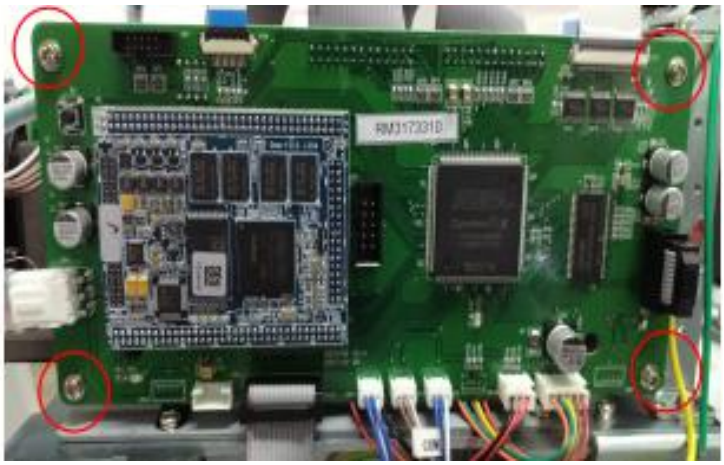


Fig 8.1-2

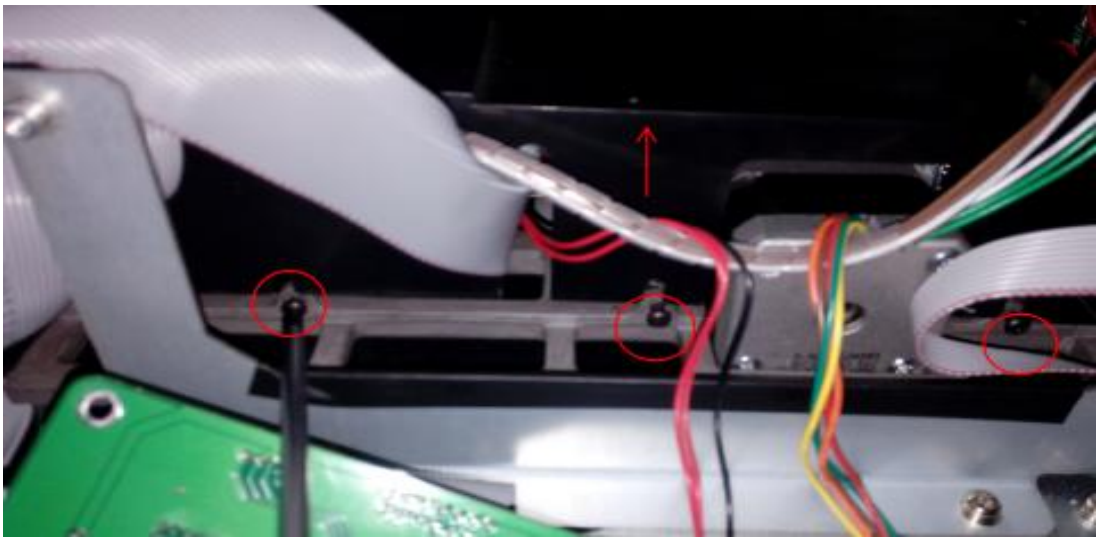


Fig 8.1-3

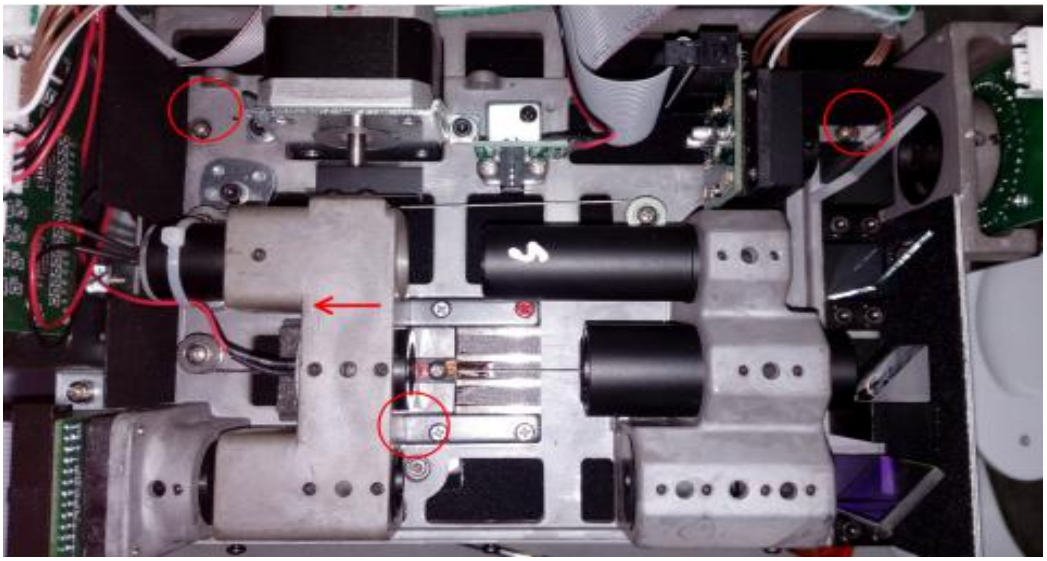


Fig 8.1-4

8.2 Lift assembly replacement

1.Remove the machine part of the shell.（Reference shell opening method 6.1--6.6）

2.Scattered bobbins,take out the main lifting motor power socket 2 and lift the motor encoder socket 8 from the motor drive circuit board,as shown Fig 8.2-1.

3.Screwing out two M4*8 three combinations of cross pancreas screws,taking off the timing belt and moving the motor,as shown Fig 8.2-2.

4.Replacing new motor and put on the timing belt,after adjust the timing belt is suitable,Tighten the captive screws and plug in the cable.When power test lift reaction was normal,wrapping bobbin.

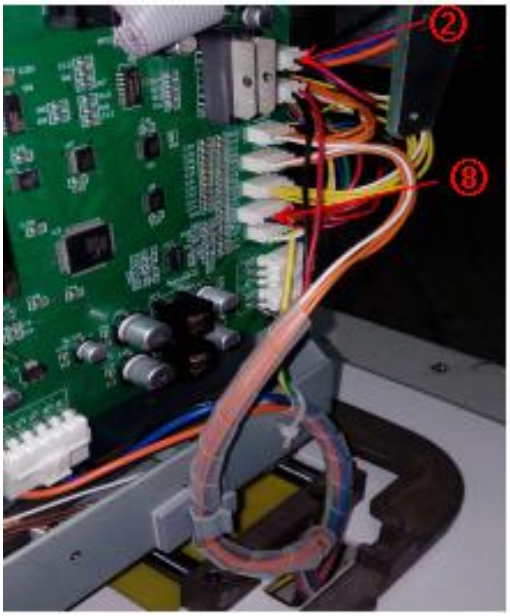


Fig 8.2-1

Fig 8.2-2

8.3 Joystick assembly replacement

1.Remove the machine part of the shell.（Reference shell opening method 6.1--6.6）

2.Scattered bobbins,take out the joystick socket 2 from the motor drive circuit board,as shown Fig 8.3-1.

3.Placing a cushion between the base and the translating plate(or turning the lock switch locked),screwing out four M4*8 three combinations of cross pancreas screws,moving the joystick,as shown Fig 8.3-2.

4.Replacing new joystick assembly and plug in the cable,when power test lift reaction was normal,wrapping bobbin.

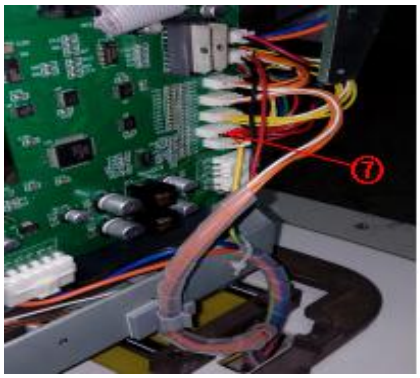


Fig 8.3-1

Fig 8.3-2

8.4 Locked assembly replacement

1.Remove the machine part of the shell.（Reference shell opening method 6.1--6.6）

2.Screwing out the two M3*8 three combination cross Pan head screws,moving the locked assembly,then replacing the new locked assembly and tightening the captive screws.Testing can be normal locking,replacement successful,as shown Fig 8.4-1.

Fig 8.4-1

8.5 Forehead rest assembly replacement

1.Remove the machine part of the shell.（Reference shell opening method 6.1--6.7）

2.Scattered bobbins,taking out the forehead rest lift motor socket 3 and photoelectric switch socket 5,as shown Fig 8.5-1.

3.Screwing out the four adjust the casters and six M6*12 three combination Phillips screws for securing the bottom cover,remove the bottom cover,as shown Fig 8.5-2.

4.Screwing out the M3*8 three combination screw used fixed grand cable,and screwing out four M4*10 hexagonal screw used to fixed the forehead rest,the control cable passes through the square hole in the base,as shown Fig 8.5-3.

5.After replacing the new forehead rest assembly,please according to the reverse process of demolition re-install,then plug in the cables and tidy up the harness.Power on test is normal.

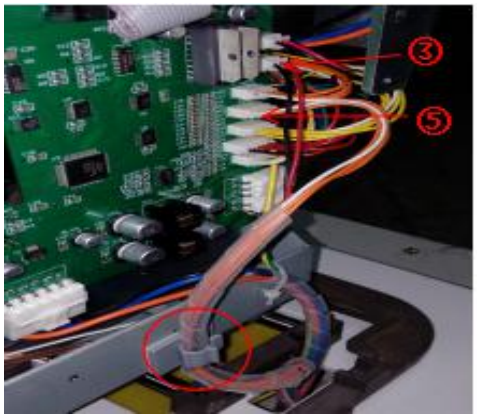


Fig 8.5-1

Fig 8.5-2

Fig 8.5-3

8.6 Fuse replacement

1.Disconnect the power,put the machine side on the cushion,use a short handle flathead screwdriver align the fuse of the glyph slot,force down and unscrew the fuse holder counterclockwise,as shown Fig 8.6-1,Fuse Holder is shown Fig8.6-2.

2.Replacing the new fuse,put the fuse holder in place and turn clockwise to the end.

Fig 8.6-1

Fig 8.6-2

9.Parameter Adjustment Settings

9.1 Interior of the parameter setting and calibration interface

Touch the time display,input the password six “9”,as shown Fig9.1-1,click “OK” then showing interior of the parameter setting interface:

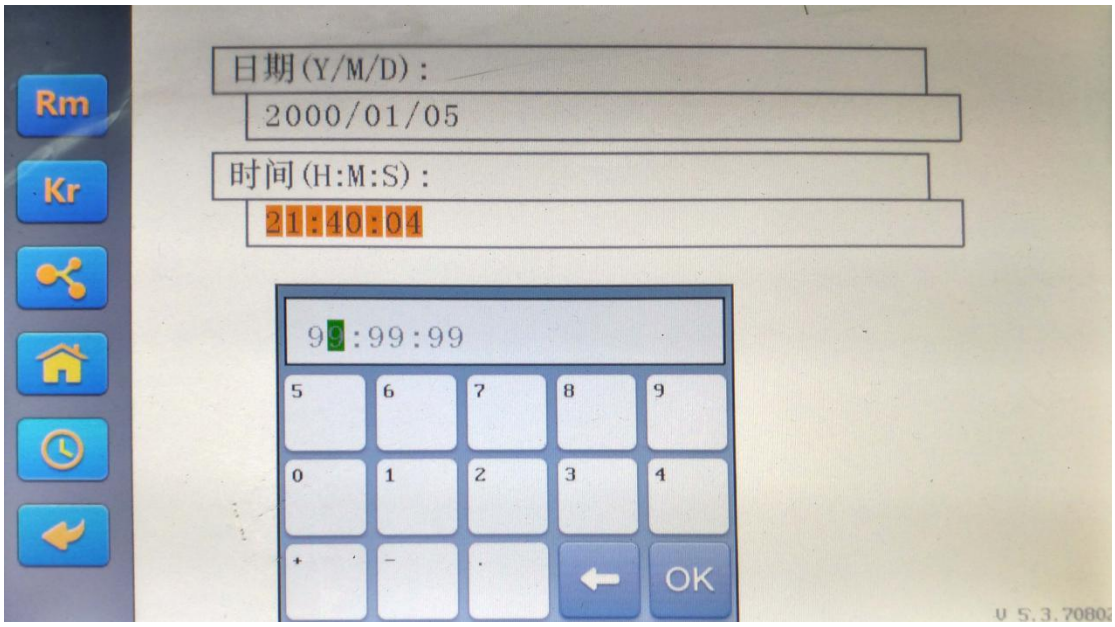


Fig 9.1-1

9.2 Interface of the parameter setting directory

As shown Fig 9.2-1:

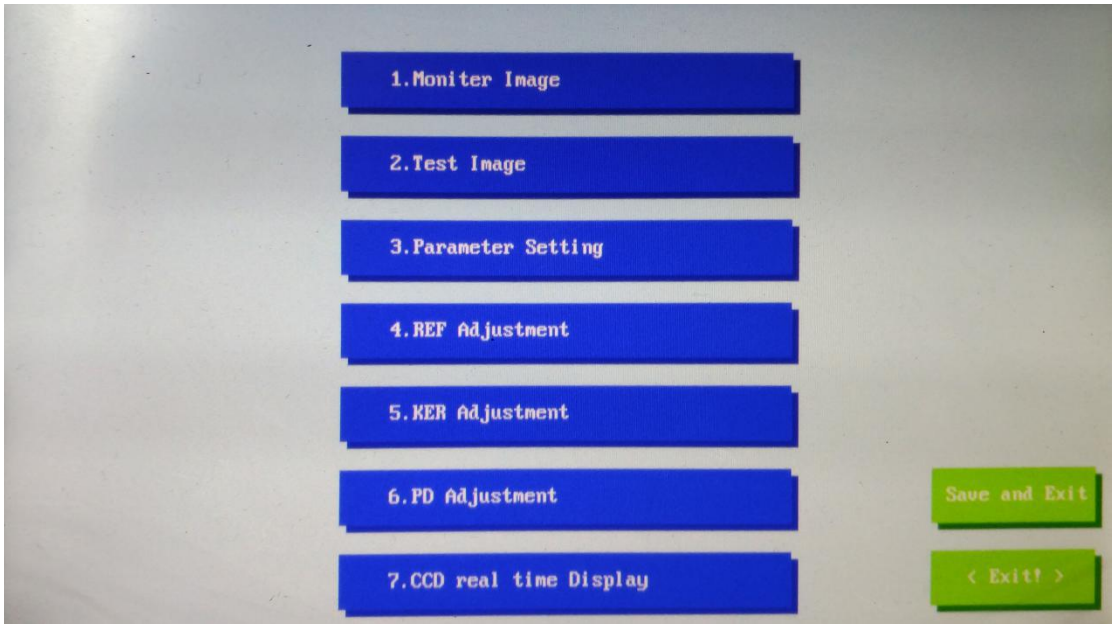


Fig 9.2-1

Each interface function description as follows:

1.Moniter Image	CCD1 image display and analysis
2.Test Image	CCD2 image display and analysis
3.Parameter Setting	Working parameter setting
4.REF Adjustment	The calibration of the diopter
5.KER Adjustment	The calibration of the corneal curvature
6.PD Adjustment	The calibration of the pupillary distance
7.CCD real time Display	CCD real-time image display

9.2.1 Moniter Image

Enter the interface，As shown Fig 9.2-2：

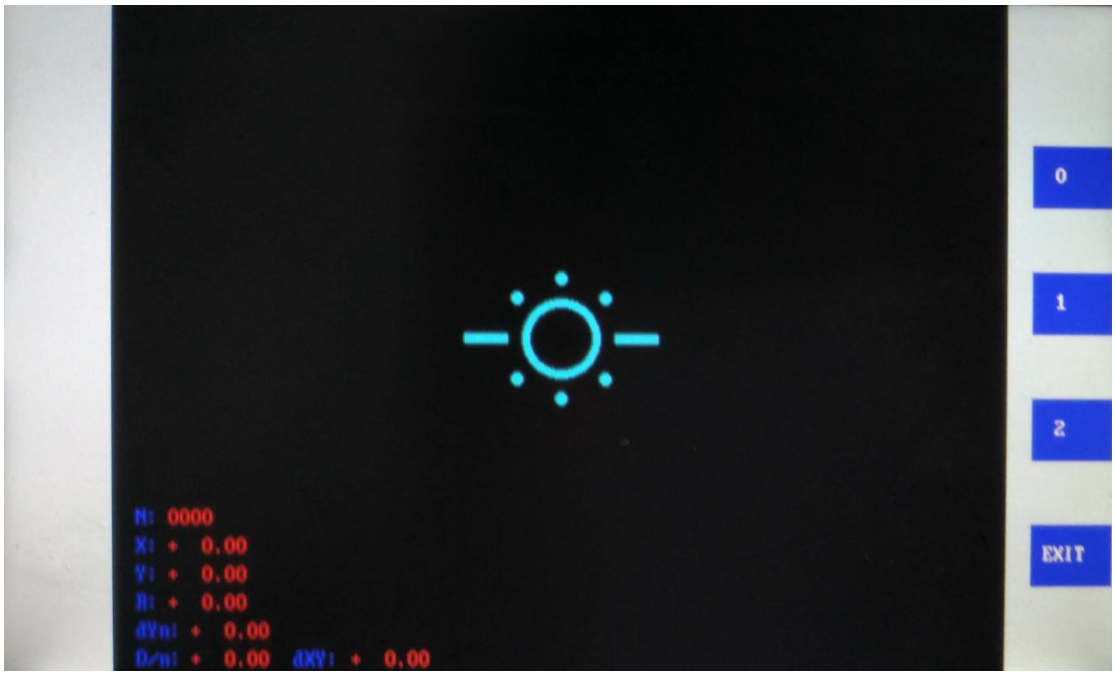


Fig 9.2-2

Right icon:

【0】:Full image shows the image measured by CCD1,X, Y, R are the center coordinates of the target ring and the radius of the circle, respectively;

【1】:Display the center area image,X, Y, R are the center coordinates of the target ring and the radius of the circle, respectively;F1 is the image focusing factor.

【2】:Displays the sampled graphics in real time,with terrain color display.

9.2.2 Test Image

Enter the interface，As shown Fig 9.2-3：

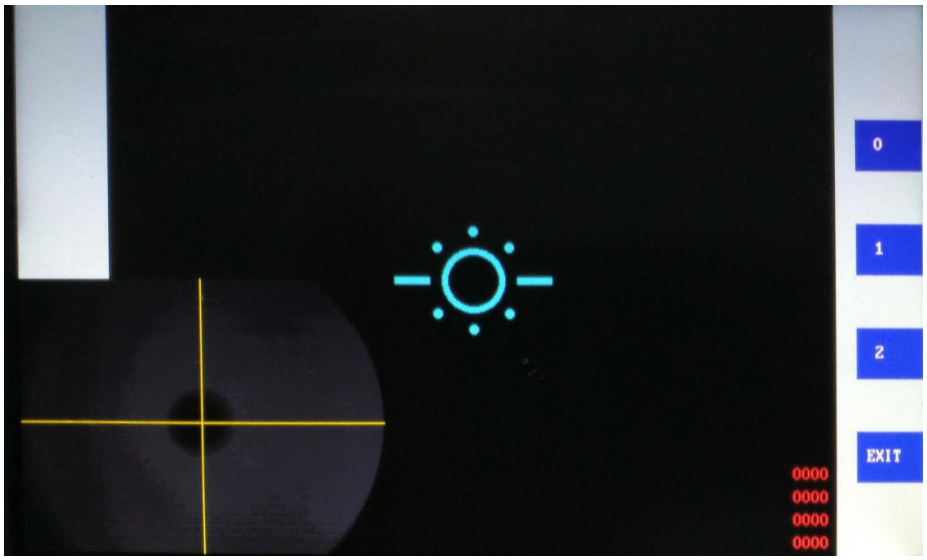


Fig 9.2-3

Right icon:

【0】：Real-time display CCD1 monitoring, CCD2 measurement images,Lower left window for the CCD2 measurement images;

【1】：Real-time display CCD2 measurement images,with terrain color display;

【2】：Real-time analysis of CCD2 sampled images,and numerical display, long axis, short axis, angle and center position.

9.2.3 Parameter Setting

Enter the interface，As shown Fig 9.2-4：

Fig 9.2-4

Right icon:

【Date+】: The data in the selected item is increased;

【Date-】: The data in the selected item is reduced;

【EXIT】: Return,before exiting the interface, please confirm whether the parameters are saved ? save YES,don't save NO;

The definition of the parameters:

Parameter name	Explanation
3.1 Fog_Step	Fogs stepper motor steps
3.2 C1 Brightness	CCD1 brightness
3.3 C1 Limit(%)	CCD1 calculate the level percentage
3.4 C2 Brightness	CCD2 brightness
3.5 C2 Limit(%)	CCD2 calculate the level percentage
3.6 C2 Limit(%)-IOL	CCD2 calculate the level percentage(IOL mode)
3.7 Ker_bias	Corneal parameter bias
3.8 Ref_bias	Diopter parameter bias
3.9 -----	In vain
3.10 Auto trigger VL(%)	Automatic trigger calculate the base level percentage
3.11 Auto trigger max	Automatically trigger the maximum value of the parameter
3.12 Auto trigger min	Automatically trigger the minimum value of the parameter

9.2.4 REF Adjustment

Enter the interface，As shown Fig 9.2-5：

Fig 9.2-5

Button function:

【EXIT】: Return,before exiting the interface, please confirm whether the parameters are saved ? save YES,don’t save NO;

【TRY】: Enter the test interface;

【DATA】: Parameter display;

【O】: Measurement image display;

【UP+】: Increase the value of ITEM;

【DN-】: Reduce the value of ITEM;

【RST】: Measurement status reset;

【IT+】: Calibration project next step;

Display above the interface:

ITEM:Current calibration items;

POS:After focusing stepper motor position in current；

K0:Calibration parameters;

9.2.5 KER Adjustment

Enter the interface，As shown Fig 9.2-6：

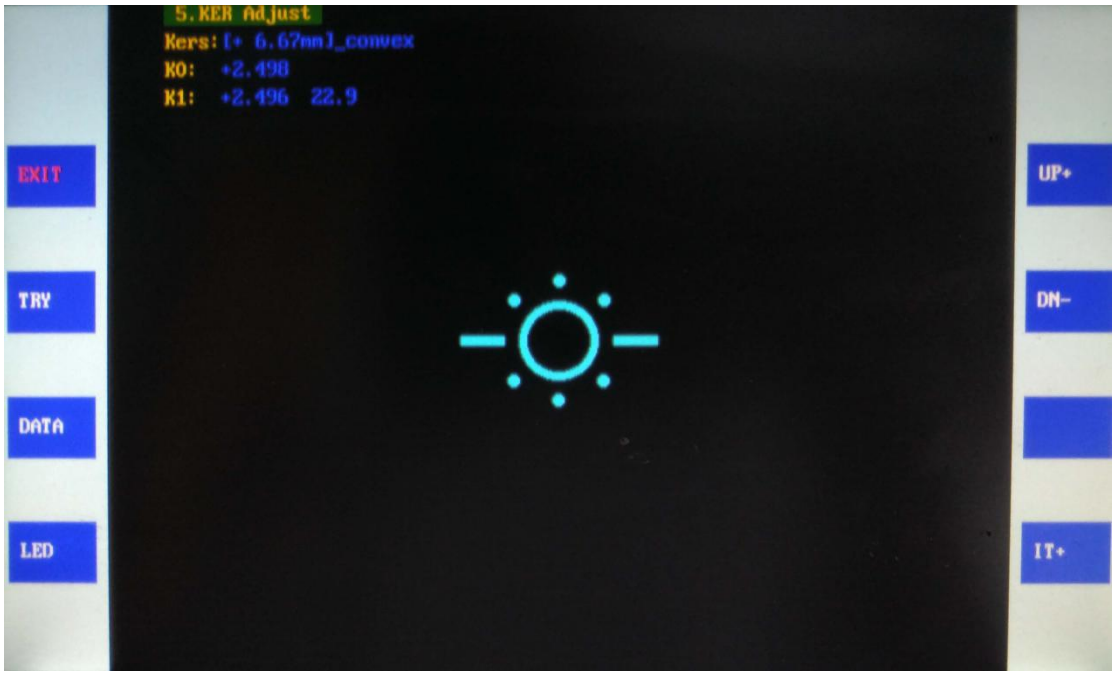


Fig 9.2-6

Button function:

【EXIT】: Return,before exiting the interface, please confirm whether the parameters are saved ? save YES,don't save NO;

【TRY】: Enter the test interface;

【DATA】: Parameter display;

【UP+】: Increase the value of Kers;

【DN-】: Reduce the value of Kers;

【IT+】: Calibration project next step;

Display above the interface:

Kers: Represent corneal calibration project;

K1,K2: Calibration parameters;

9.2.6 PD Adjustment

Enter the interface，As shown Fig 9.2-7：

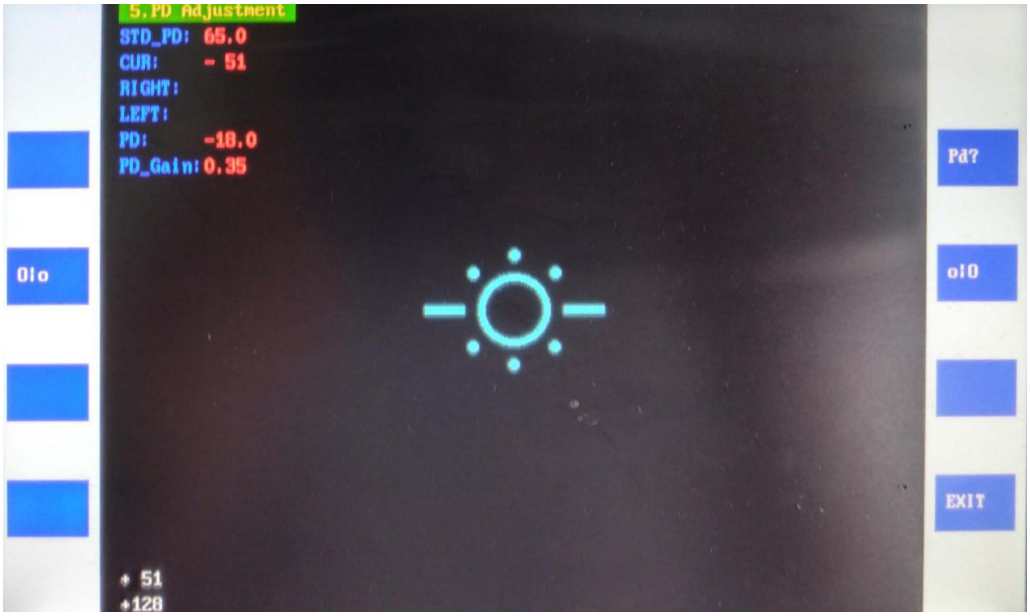


Fig 9.2-7

Button function:

【EXIT】: Return,before exiting the interface, please confirm whether the parameters are saved ? save YES,don’t save NO;

【Pd?】: Standard PD value switching;

【O|o】: Left PD calibration;

【o| O】: Right PD calibration;

Interface display:

STD_PD: The current calibrated PD value; either one can be calibrated.

CUR: PD original value in current;

RIGHT: Right PD value;

LEFT: Left PD value;

PD_Gain: Calibrated PD gain;

9.2.7 CCD real time Display

Enter the interface，As shown Fig 9.2-8：

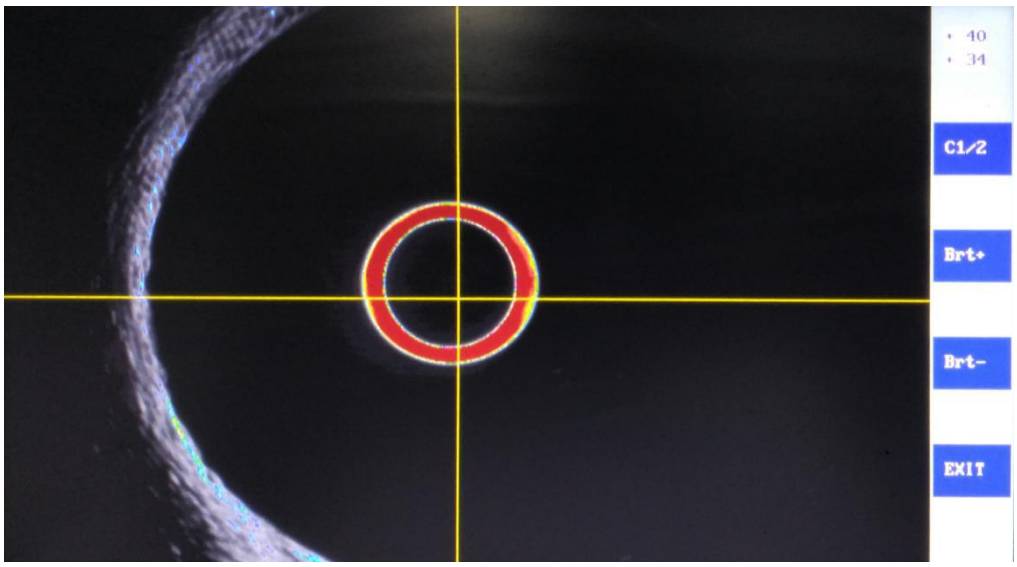


Fig 9.2-8

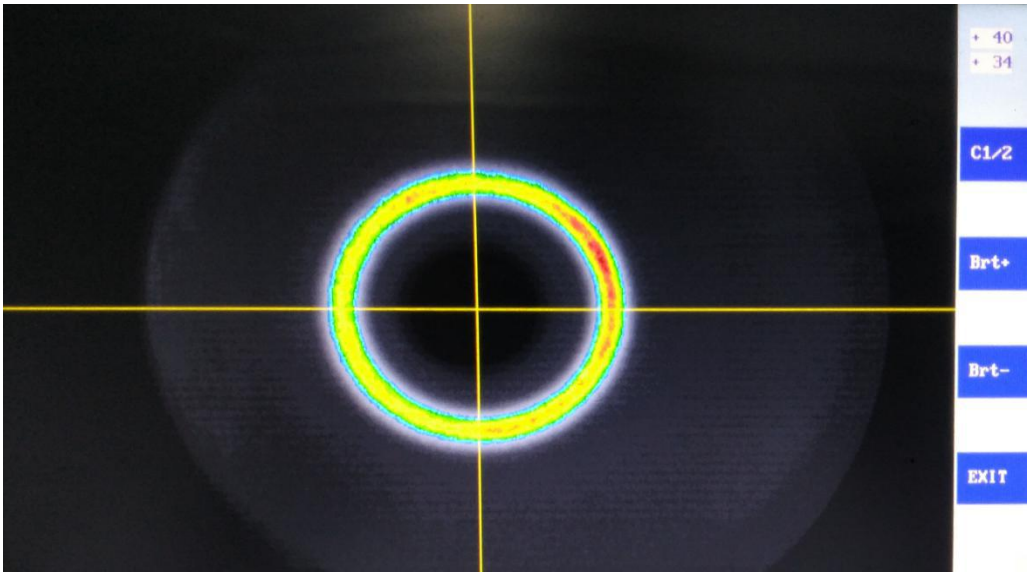


Fig 9.2-9

Button function:

【C1/2】: Switch the real-time display of CCD1 and CCD2;

【Brt+】: Increase the brightness;

【Brt-】: Reduce the brightness;

【EXIT】: Return;

9.3 Optical system adjustment and parameter calibration steps

9.3.1 Optical system CCD sampling inspection

Enter 7 CCD real time Display interface,switch CCD1、CCD2;check image sampling,CCD working well;

9.3.2 Optical system concentricity adjustment

Optical system concentricity adjustment is to adjust the position of each lens in the optical system, the position of the test light and the position of the CCD;a.Install standard simulation eye support,and through the concentric rod,the support is concentric with the overall light path;b.Install simulation eye 0D to support,enter 1 Moniter Image interface,adjust the position of CCD1,Position the ring in the center of the cursor,X, Y coordinate position is (0,0);c.Install simulation eye +15D to support,enter 2 Test Image interface,adjust the position of the lens and CCD2,position the measuring ring in the center of the cross,X, Y coordinate position is(320,250);ring illumination uniformity.

9.3.3 The calibration of the diopter

The standard simulation eye support mounted on the simulation eye,enter 4 REF Adjustment interface,according to the ITEM project calibrate different simulated eyes;

9.3.4 The calibration of the corneal curvature

Removing the standard simulation eye support,install corneal curvature support,enter 5 KER Adjustment interface,according to the Kers project calibrate different simulated eyes;

9.3.5 The calibration of PD

Installing PD calibration support,press [PD?] to select the corresponding PD calibration value,aligning the right simulation eye press the right measurement button【o| O】;aligning the lift simulation eye press the left measurement button【O|o】;complete the PD calibration.

10. The Wiring Specifications of Board

10.1 The wiring specifications of Main board

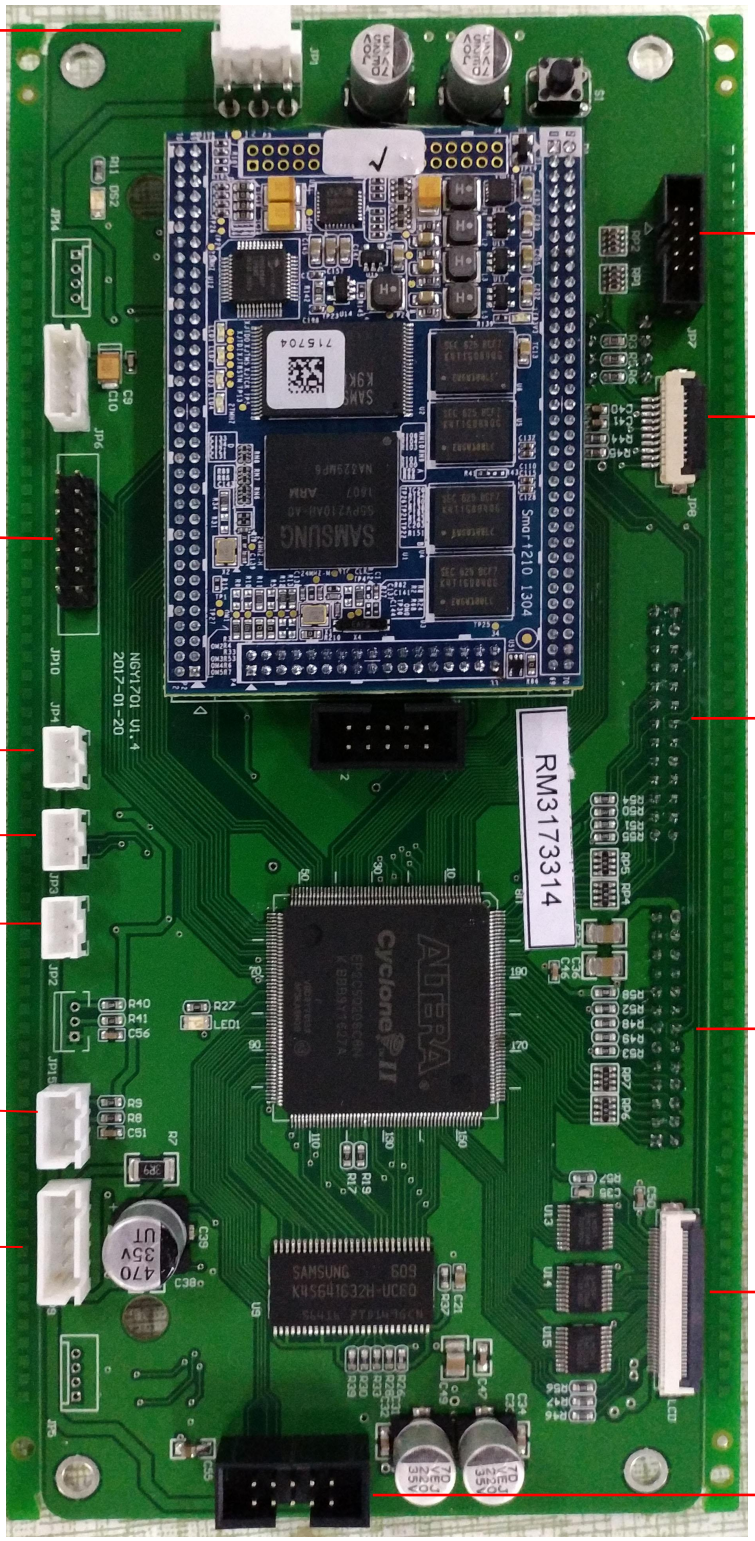


Fig 10.1-1

The names of each socket connector on the circuit board are shown in the following table

Table 4

NO.	Name	Describe	Pattern
1	10P LCD cable	The cable is used to connect Main board's socket ① and LCD backplane socket J1	
2	2*13P soft cable	The cable is used to connect Main board's socket ② and optical system's CCD1	
3	2*13P soft cable	The cable is used to connect Main board's socket ③ and optical system's CCD2	
4	40P LCD cable	The cable is used to connect Main board's socket ④ and LCD backplane J2	
5	2*5P soft cable (cut 4 lines)	The cable is used to connect Main board's socket ⑤ and LED driver board's socket ④	
6	Five cores line	The cable is used to connect Main board's socket ⑥ and optical system stepper motor	
7	Three cores line	The cable is used to connect Main board's socket ⑦ and optical system limit board	
8	Three cores line	The cable is used to connect Main board's socket ⑧ and printer board's socket	
9	Three cores line	The cable is used to connect Main board's socket ⑨ and communication interface board socket COM0	
10	2*8P soft cable	The cable is used to connect Main board's socket ⑩ and motor drive board's ①	
11	Three cores line	The cable is used to connect Main board's socket ⑪ and motor driver board's socket ⑨	
12	2*5P soft cable	The cable is used to connect Main board's socket ⑫ and printer's socket JP3	
13	Three cores line	The cable is used to connect Main board's socket ⑬ and communication interface board socket COM0	

10.2 The wiring specifications of motor drive board

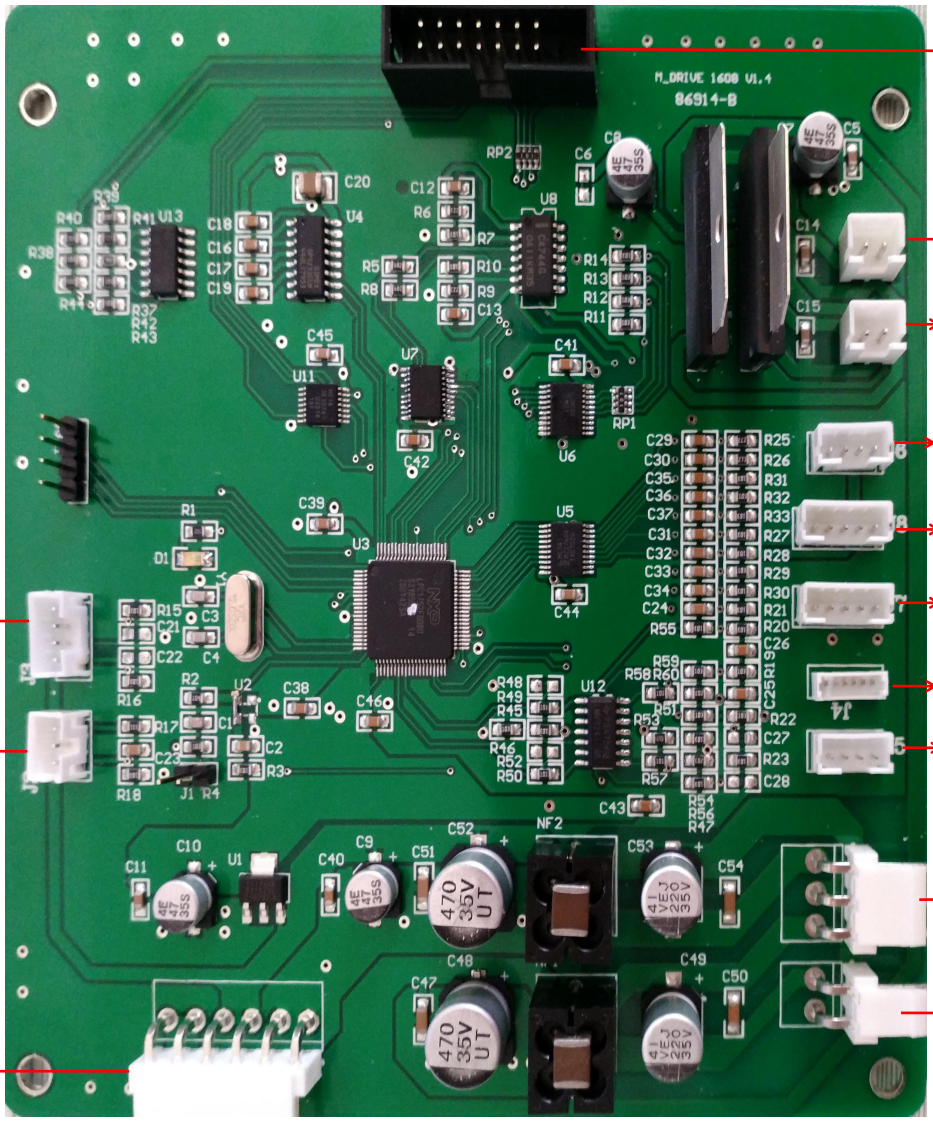
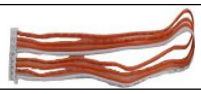
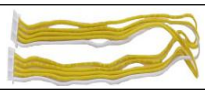
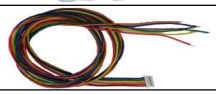
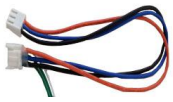
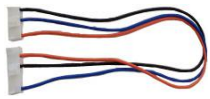


Fig 10.2-1

The names of each socket connector on the circuit board are shown in the following table

Table 5

NO.	Name	Describe	Pattern
1	2*8P Soft cable	The cable is used to connect motor drive board socket ① and Main board socket⑩	
2	Two cores line	The power cable is used to connect motor drive board socket ② and main lift motor	
3	Two cores line	The cable is used to connect motor drive board socket ③ and forehead rest lift motor	
4	Four cores line	The cable is used to connect motor drive board socket ④ and measuring station limit board	
5	Five cores line	The cable is used to connect motor drive board socket ⑤ and forehead rest limit board	
6	Five cores line	The cable is used to connect motor drive board socket ⑥ and key board socket	
7	Six cores line	The cable is used to connect motor drive board socket ⑦ and joystick	
8	Four cores line	The cable is used to connect motor drive board socket ⑧ and main lift motor	
9	Three cores line	The power cable is used to connect motor drive board socket ⑨ and Main board socket⑨	
10	Two cores line	The power cable is used to connect motor drive board socket ⑩and printer board socket JP1	
11	Four cores line	The cable is used to connect motor drive board socket ⑫ and PD code board	
12	Three cores line	The cable is used to connect motor drive board socket ⑬ and PD limit board	
13	Eight cores line	The cable is used to connect motor drive board socket ⑪ and bottom power module	

10.3 The wiring specifications of LED drive board

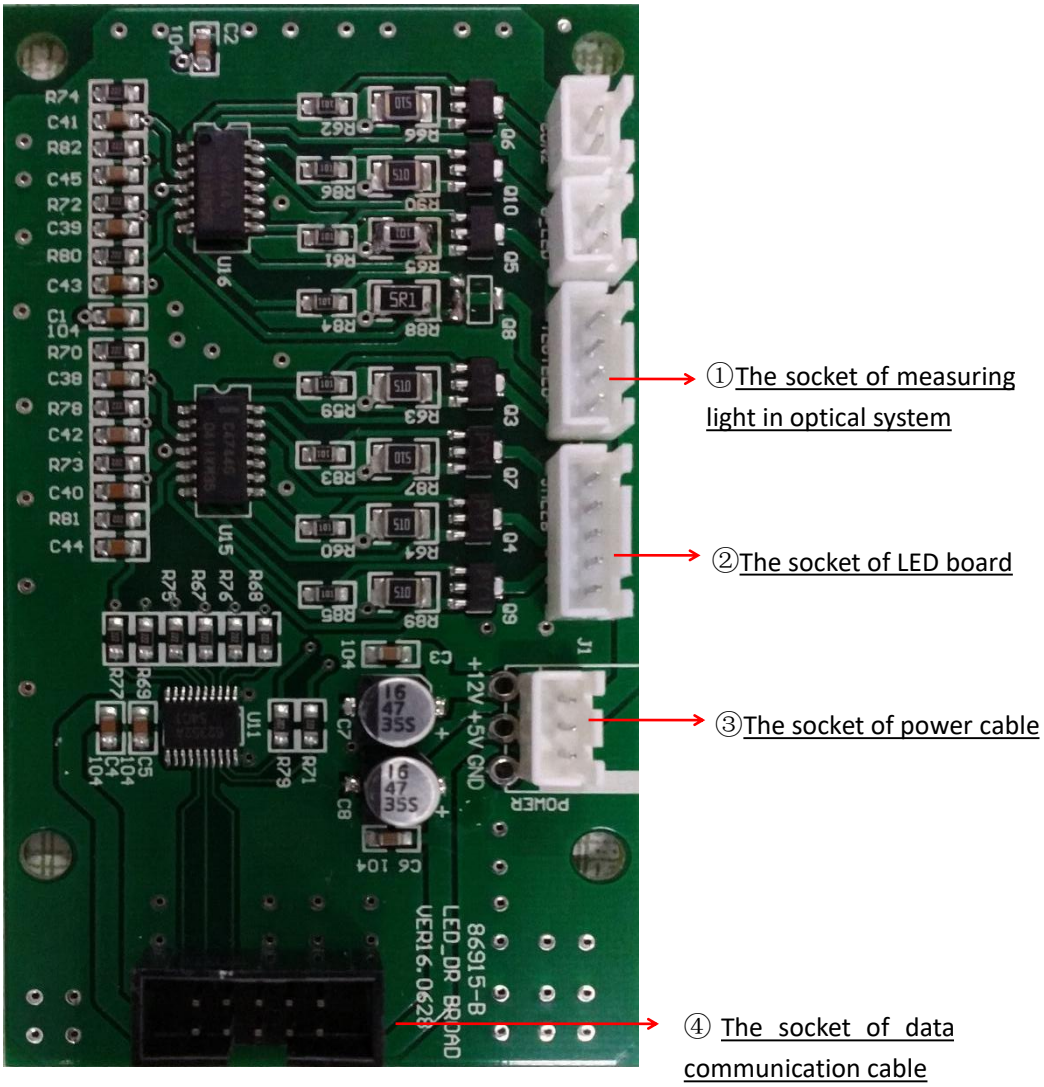
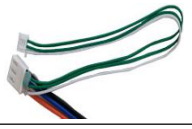


Fig 10.3-1

The names of each socket connector on the circuit board are shown in the following table

Table 6

NO.	Name	Describe	Pattern
1	2*5P soft cable (cut 4 lines)	The cable is used to connect LED drive board socket ④ and Main board socket ⑤	
2	Three cores line	The cable is used to connect LED drive board socket ③ and Main board socket ①	
3	Five cores line	The cable is used to connect LED drive board socket ② and LED board	
4	Four cores line	The cable is used to connect LED drive board socket ① and optical system measuring light	

10.4 The wiring specification of printer board

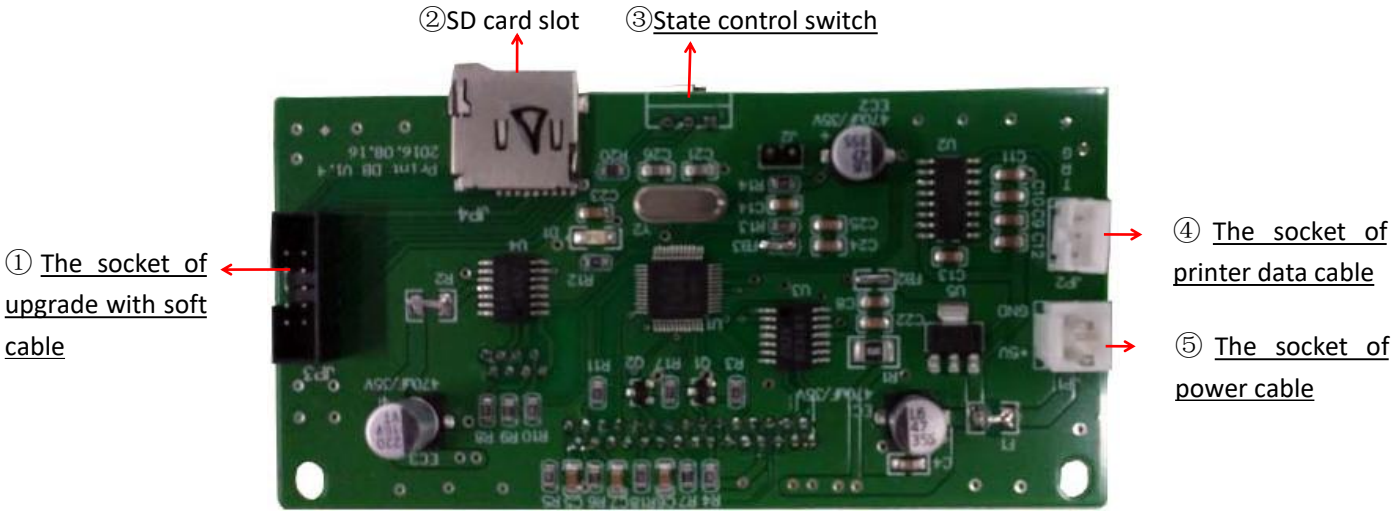


Fig 10.4-1

The names of each socket connector on the circuit board are shown in the following table

Table 7

NO.	Name	Describe	Pattern
1	2*5P soft cable	The cable is used to connect Main board's socket ⑫ and printer board's socket ①	
4	Three cores line	The cable is used to connect Main board's socket ⑧ and printer board's socket ④	
5	Two cores line	The power cable is used to connect motor drive board socket ⑩and printer board socket ⑤	

The printer board is installed at the front cover of the instrument. The printer board has a status control switch. When the switch is set to the right, the instrument is in normal operation. When the switch is set to the left, the instrument is in the status of program upgrade.

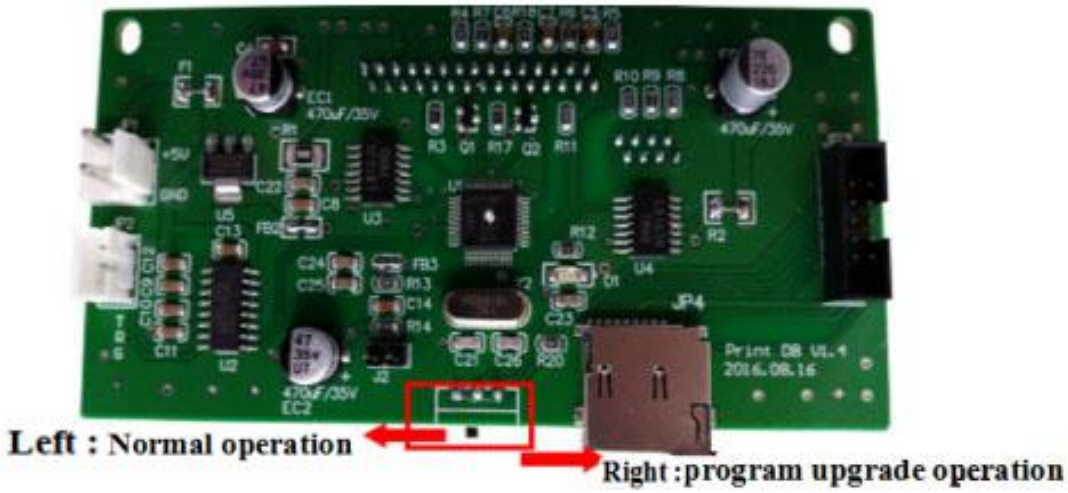
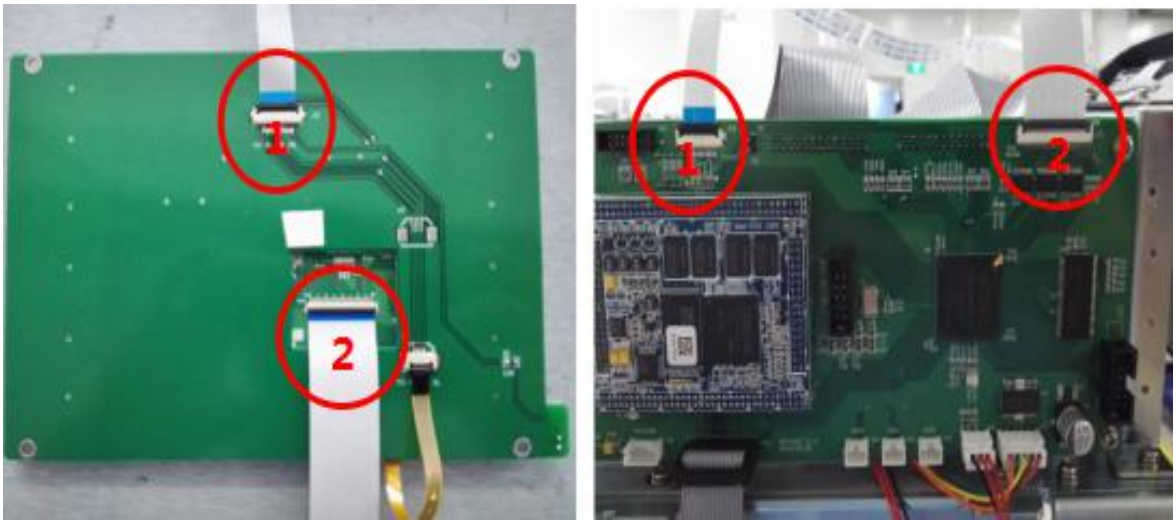
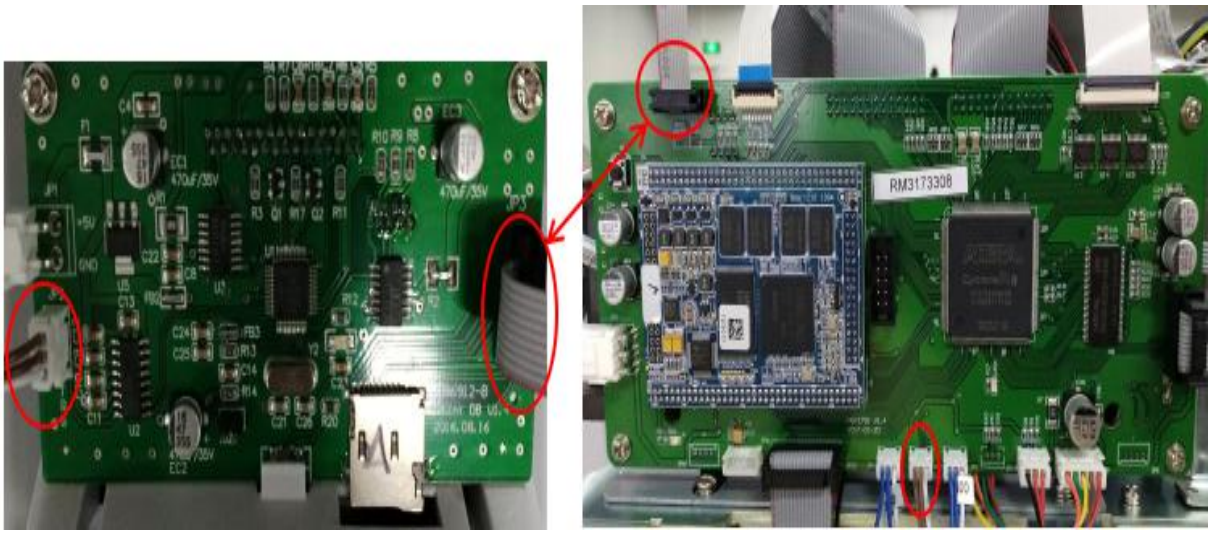


Fig 10.4-2

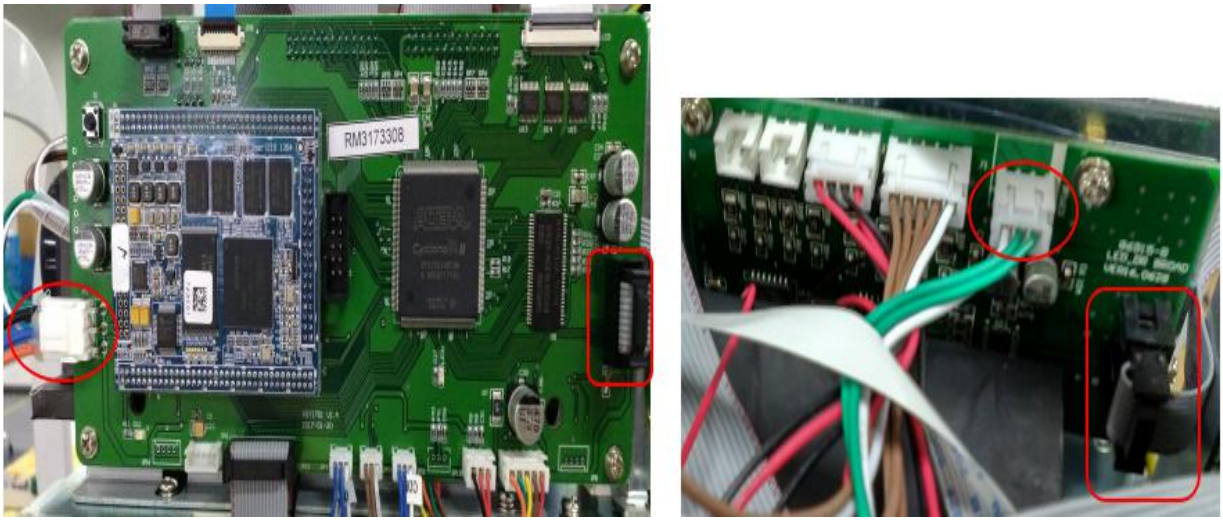
10.5 Each circuit board wiring physical map display



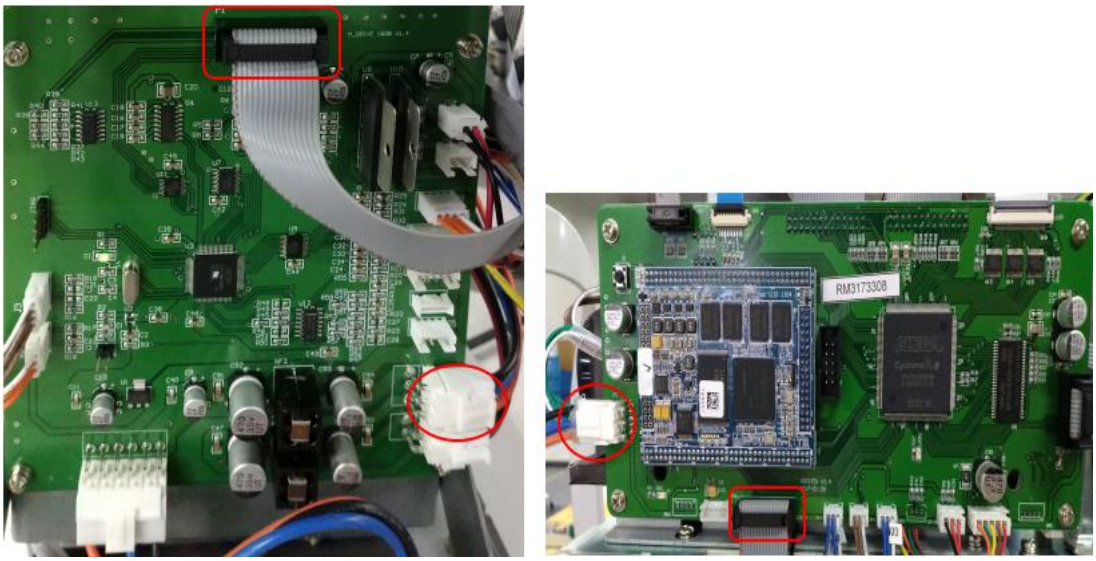
The diagram of the connection between main board and LCD



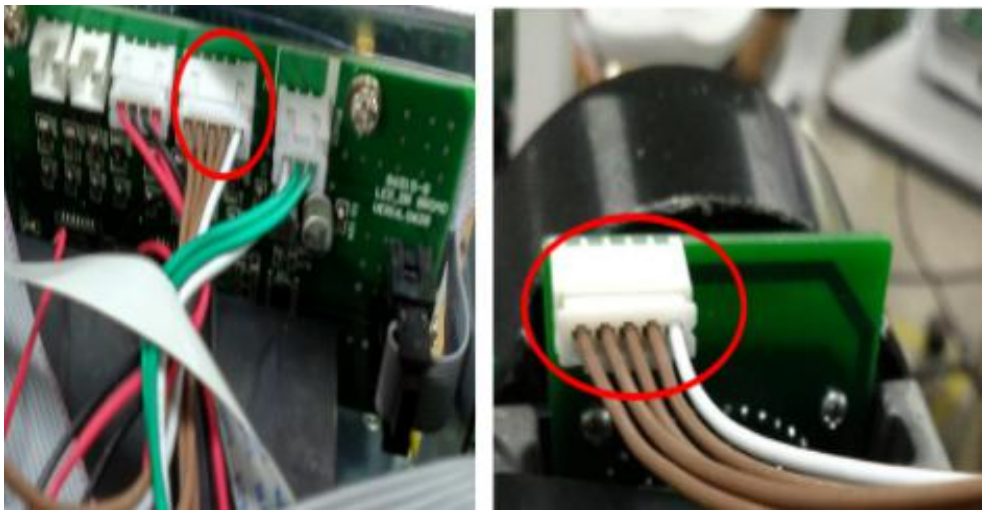
The diagram of the connection between main board and printer board



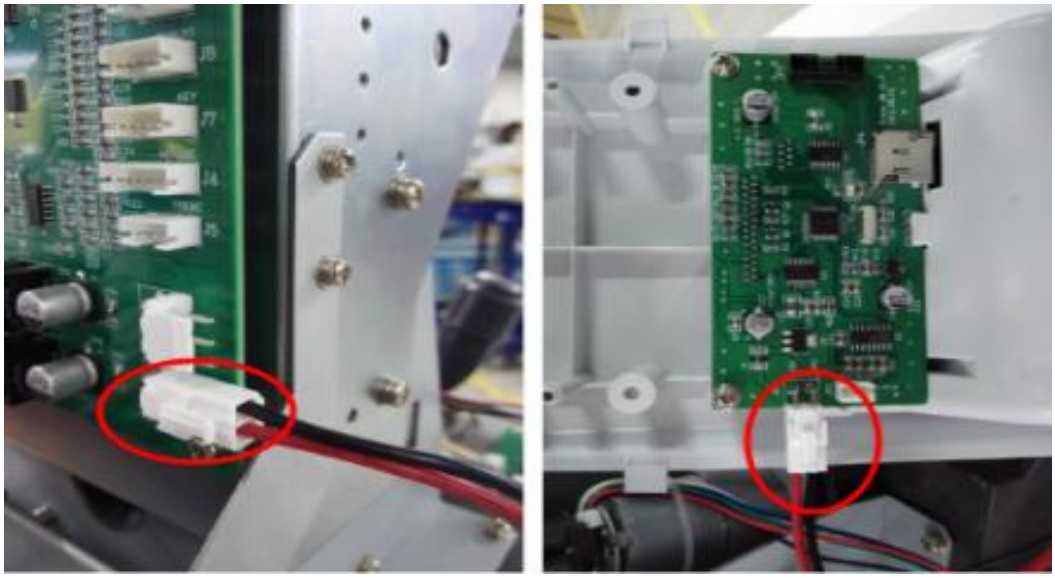
The diagram of the connection between main board and LED driver board



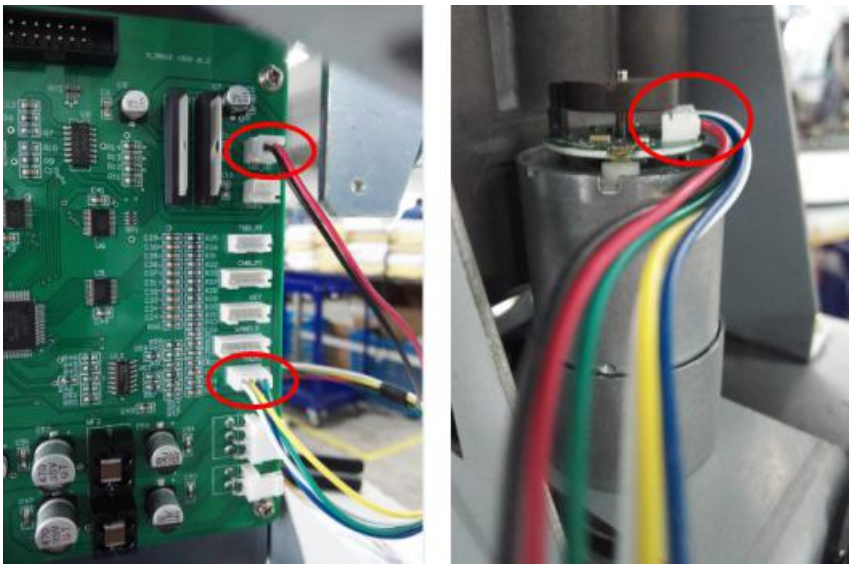
The diagram of the connection between main board and motor driver board



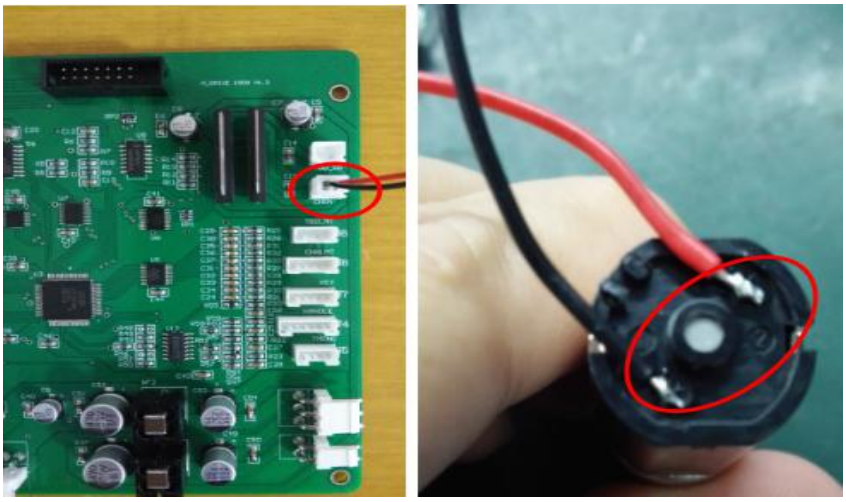
The diagram of the connection between LED driver board and LED light board



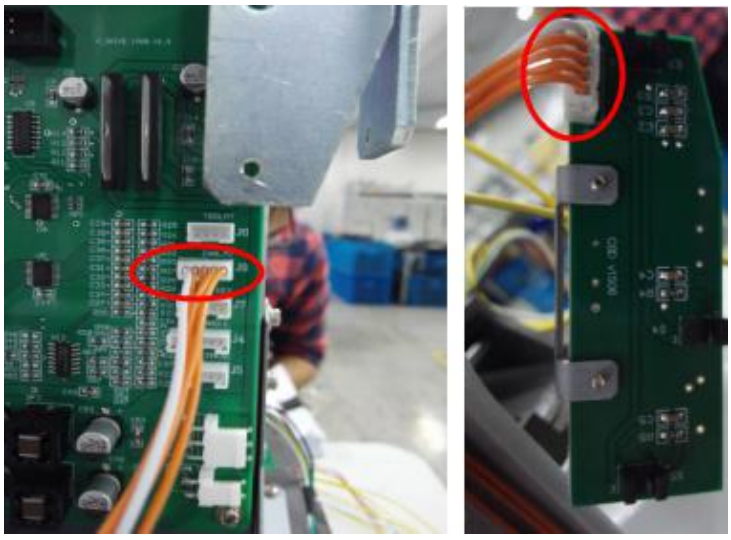
The diagram of the connection between motor driver board and printer board



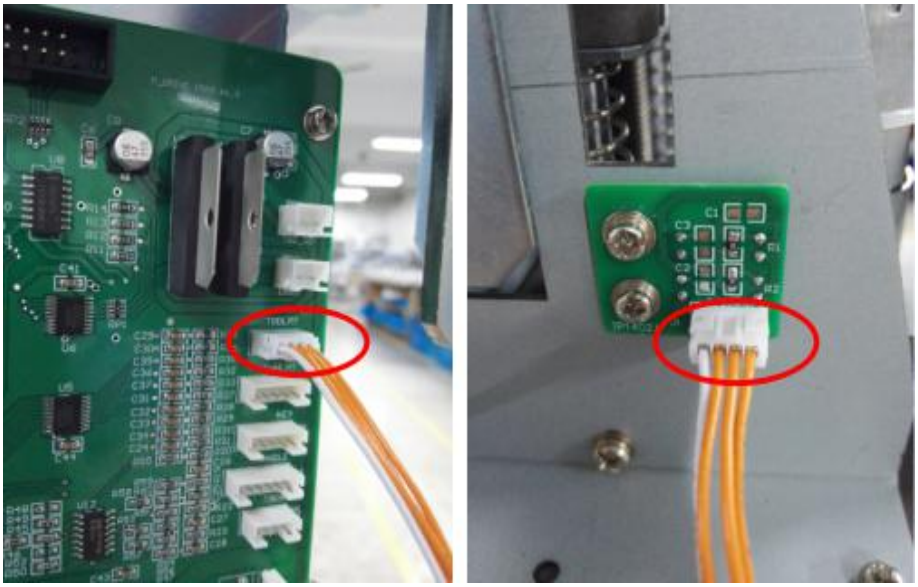
The diagram of the connection between motor driver board and main lift motor



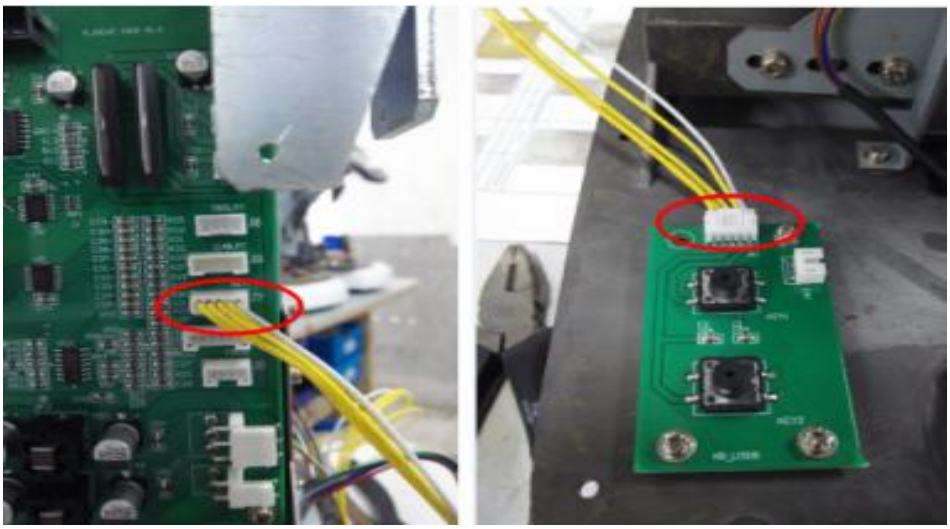
The diagram of the connection between motor driver board and forehead rest lift motor



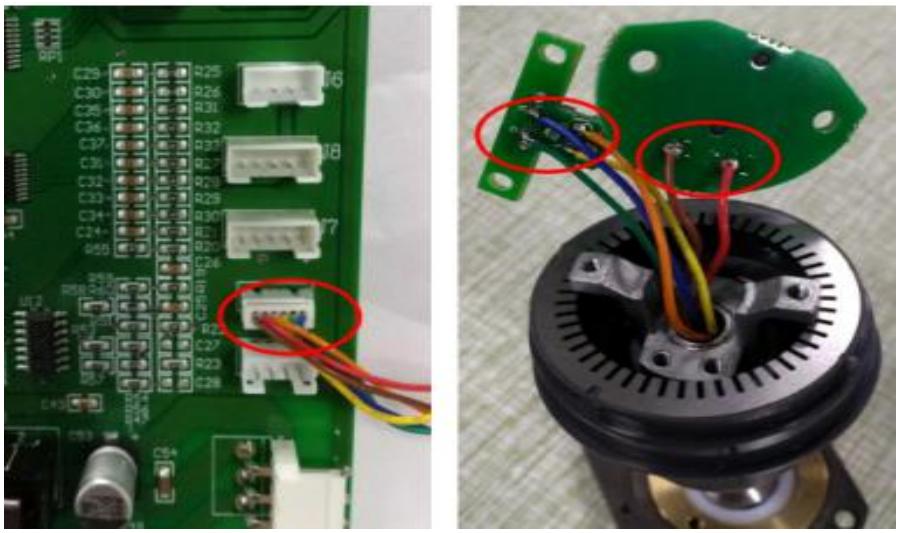
The diagram of the connection between motor driver board and forehead rest limit board



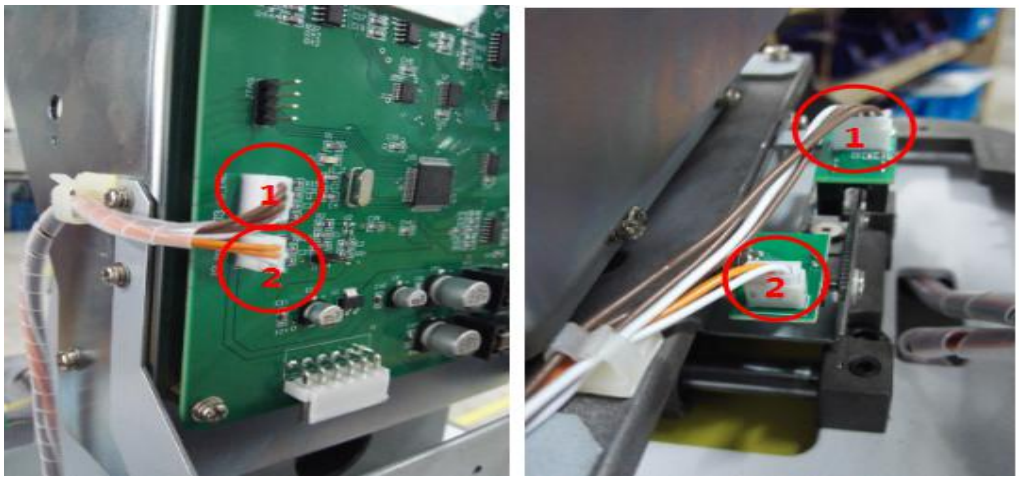
The diagram of the connection between motor driver board and main lift motor limit board



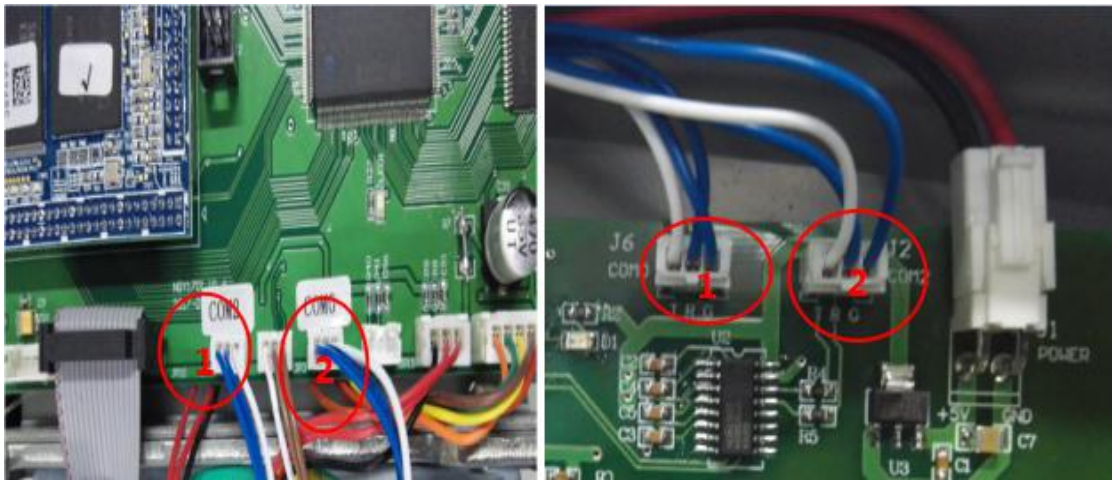
The diagram of the connection between motor driver board and key board



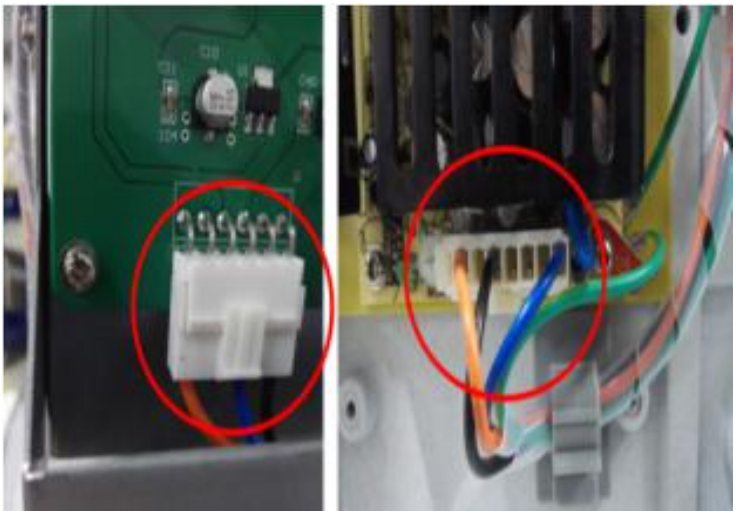
The diagram of the connection between motor driver board and joystick



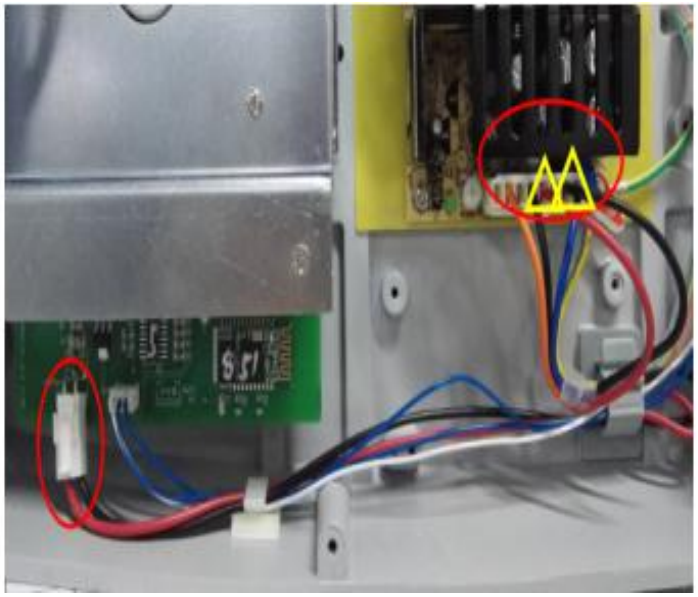
The diagram of the connection between motor drive board and PD code board / limit board



The diagram of the connection between Main board and communication interface



The diagram of the motor driver board power cord connection



The diagram of the communication interface board power cord connection

Draw up：_____ Check：_____ Approved：_____

Date: