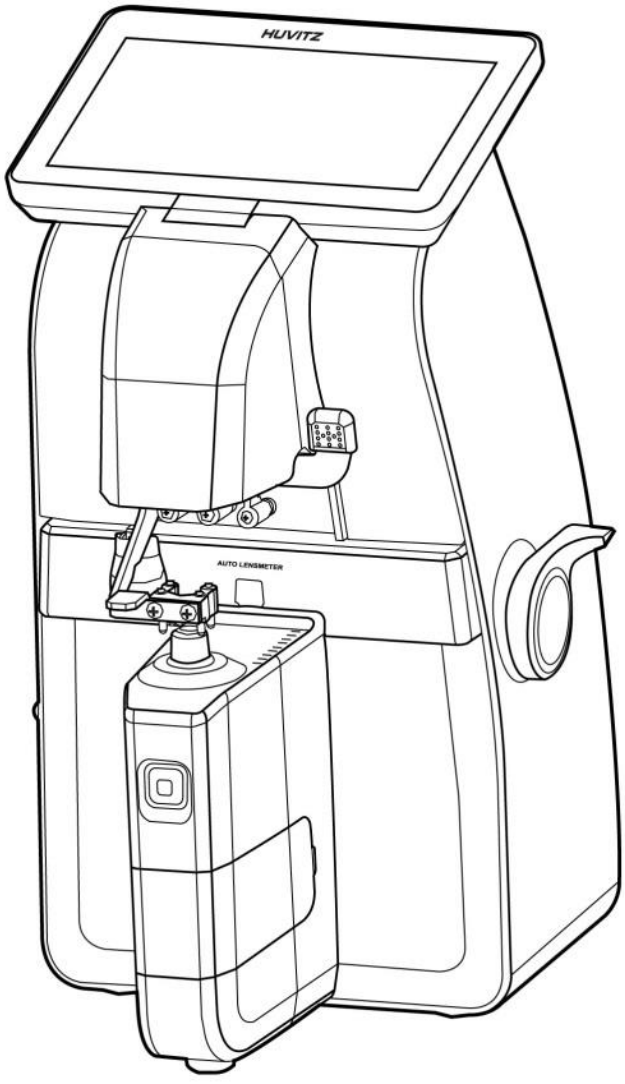
Service Manual

Auto Lensmeter HLM-9000



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1. Introduction

1.1. Components List

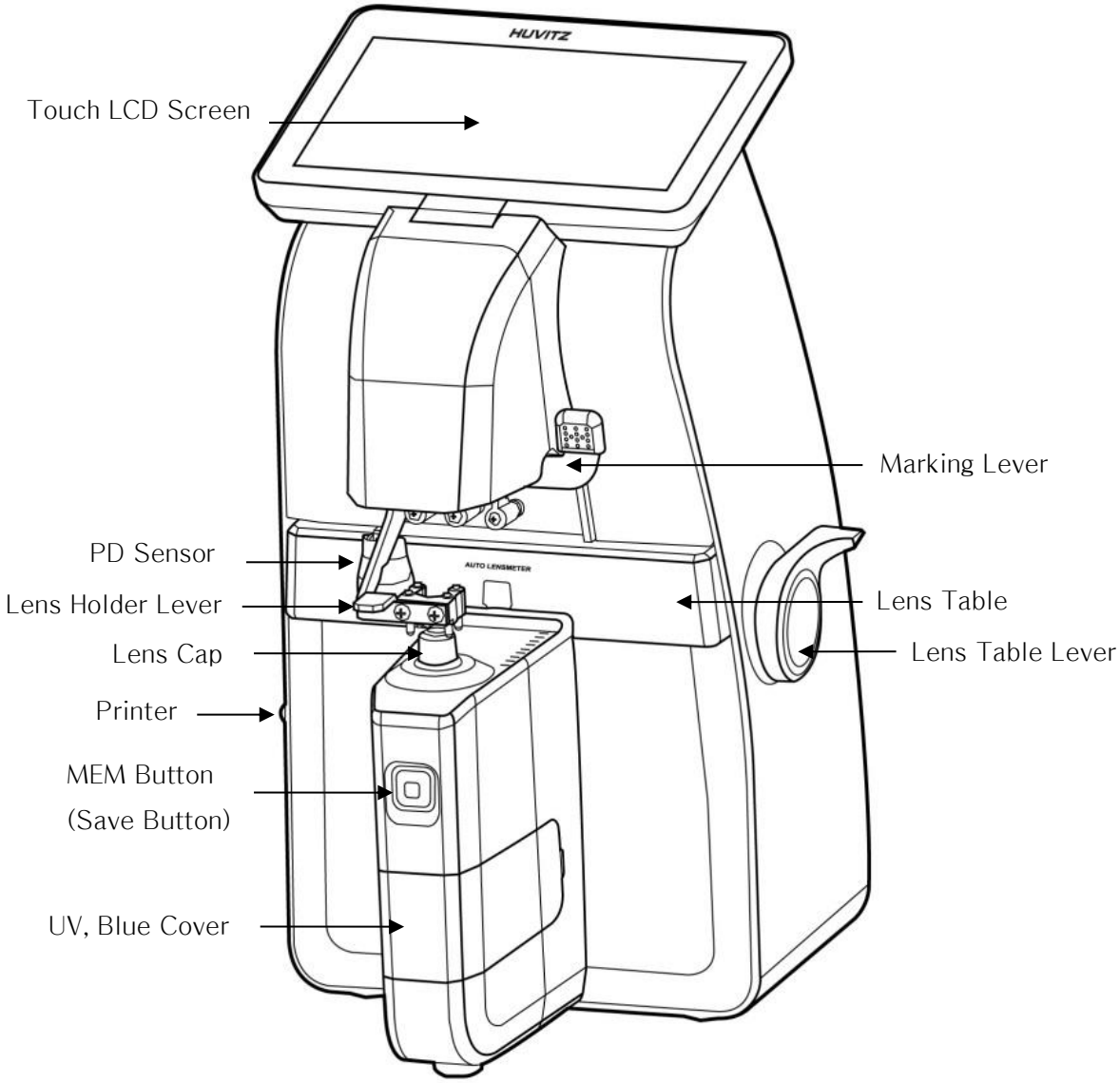


Figure 1. Components Names (I)

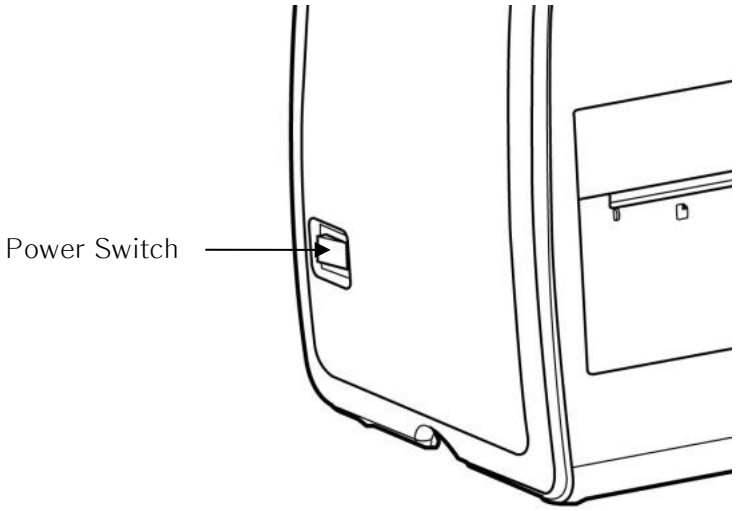


Figure 2. Components Names (II)

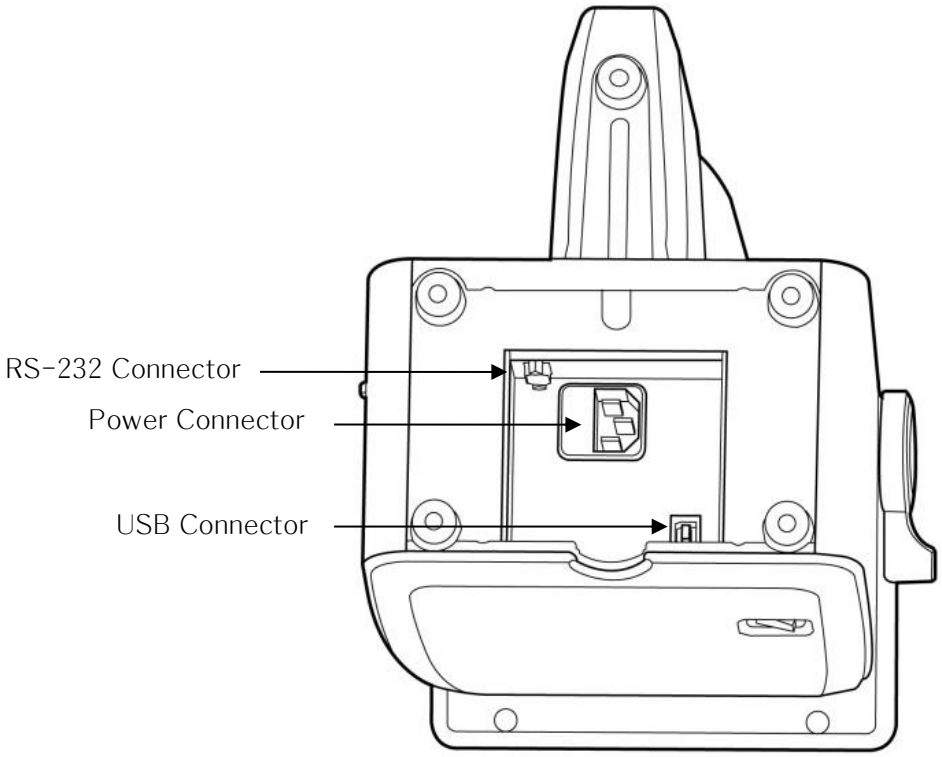


Figure 3. Components Names (III)

1.2. Repair Procedure

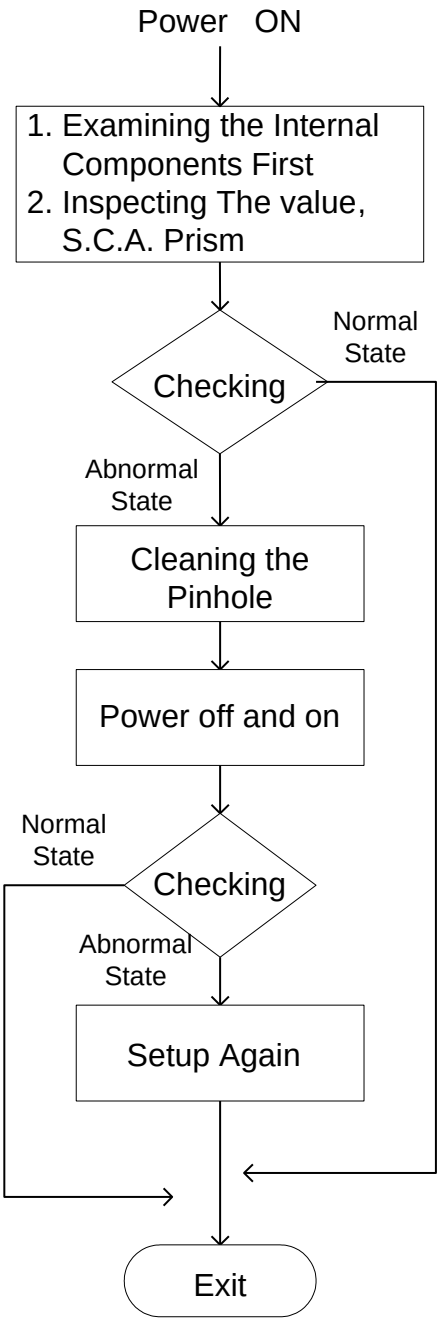


Figure 4. Repair procedure flow chart

1.3. Cautions

- Always protect this instrument with Dust Cover after using.
- Do not vibrate or drop this instrument; it can cause damage.
- Use soft cloth or cotton swaps with alcohol when clean the pinhole.

1.4. Software OS version

Software OS version will be shown on the screen if you turn on the power switch.

1.5. Optical System

Optical system resolves the features of the lens such as diopter and prism. It is composed of light emitting part and signal receiving part: light emitting part composed of optic LED and collimation lens, signal receiving part composed of hartman plate and 2-dimentional CMOS sensor. The followings are the components of each part:

- Light Emitting Part

- Optic LED : 545nm
- Ball Lens : condenses the light radiated from Optic LED.
- Rubber Ring : fix ball lens.
- Scatter : disperse the optic LED light
- Pinhole : 0.3mm diameter
- Collimation lens : makes parallel light.

- Signal Receiving Part

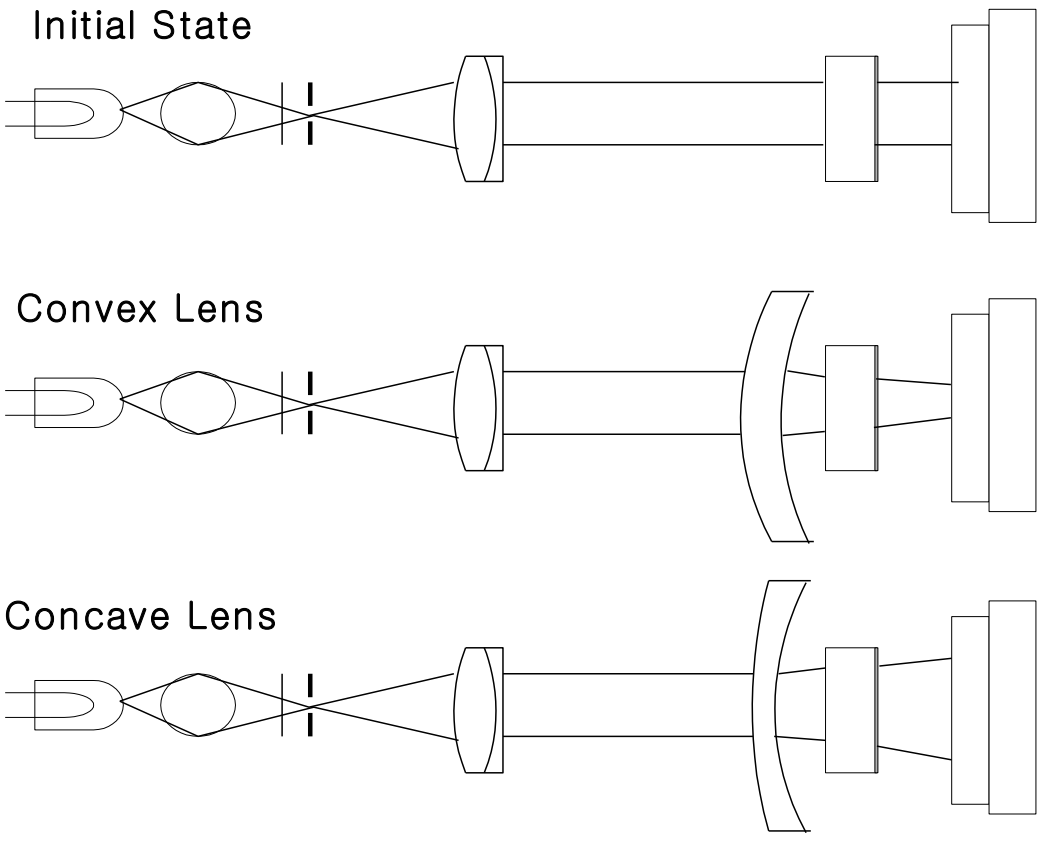
- Hartmann plate : divide the signal into 81 points. Prevent the other light except the signal
- 2-dimentional CMOS sensor : converts signals into digital value.

The lens meter also built optical system for UV and Blue light transmittance. The system is composed of light emitting LED (UV and Blue light) and receiving part (UV and Blue detector). The wavelength of the UV light is 395nm and the Blue is 450 nm.

1.6. Measurement Principle

Basic Principle

When there is no lens (0D state), parallel light that has transmitted the collimator lens passes the pinhole and makes image on CCD. In case of convex lens (lens with plus diopter), parallel light that has transmitted the collimator lens converges through the measuring lens, passes the pinhole and then makes image on CCD. On the other hand, in case of concave lens (lens with minus diopter), parallel light that has transmitted the collimator lens diverges through the measuring lens and then passes the pinholes and at last makes image on CCD.

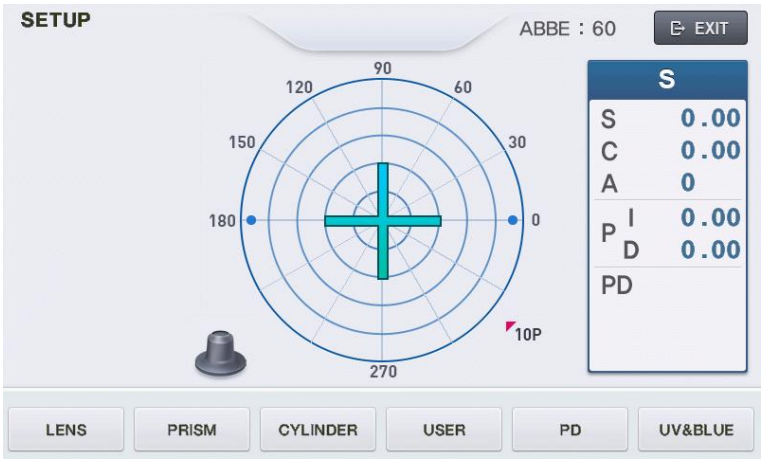


2. Checking and Setup Method

2.1. Setup Order

After booting is completed, you can see button icons in bottom area. To enter the ‘SETUP’ mode, see as follows:

A. Press once delete button (trash icon).
B. Press three times S or R side (data area).
C. Press the user setup (option) button.



HLM-9000 will start in setup mode. While this mode, ‘SETUP’ mark will show in the left-upper area.

Calibration can be processed only in SETUP mode; LENS, PRISM, CYLINDER, PD, UV&BLUE. To all setting, you should convert the display step (STEP) into 0.01. In case of prism, convert the prism display into P-B format. Display step (STEP) and prism display format can be changed in ‘User Setup’ screen. Press the ‘USER’ (USER) button in the basic display screen.

2.2. How to Set Origin

The steps of setting origin are as follows:

A. Press the 'LENS' (LENS) button.

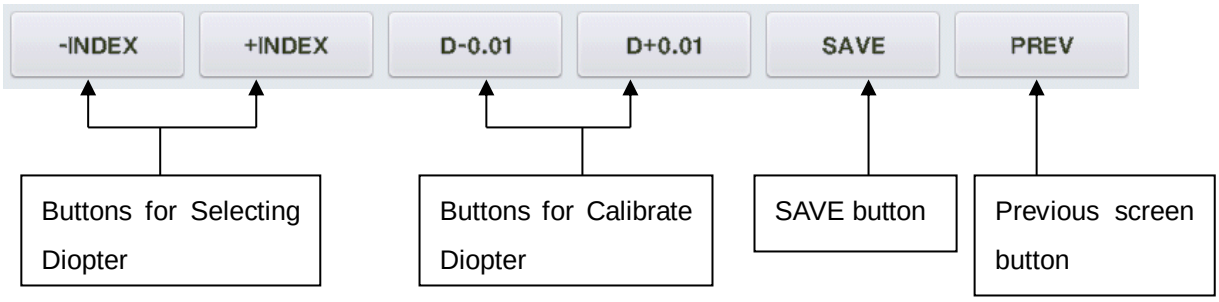
B. Press the 'MEASURE' button.

C. Determine the lens to measure by using two '-INDEX', '+INDEX' buttons.

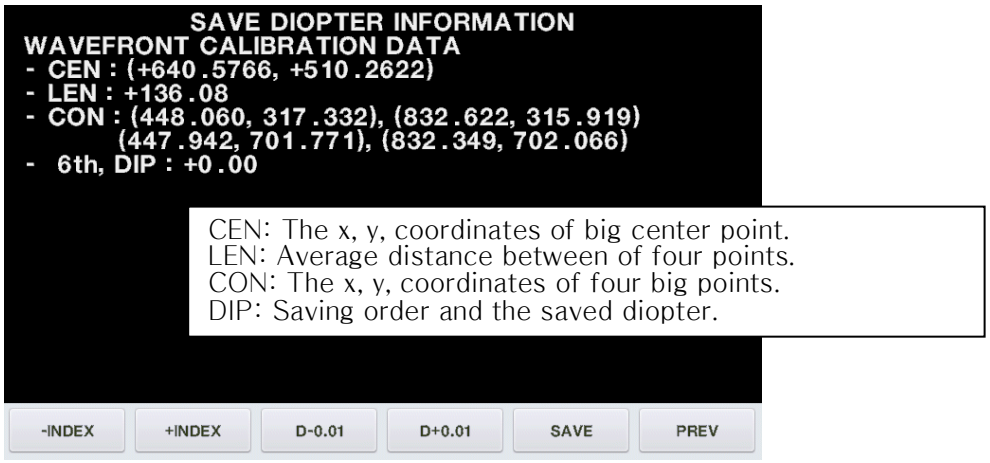
D. 'D-0.01' button and 'D+0.01' button by the given value in the standard model-eye specification.

E. To save and exit, press the 'SAVE' button.

F. Press the 'EXIT' button again. And check if the diopter that has been set up in the basic display screen is shown.



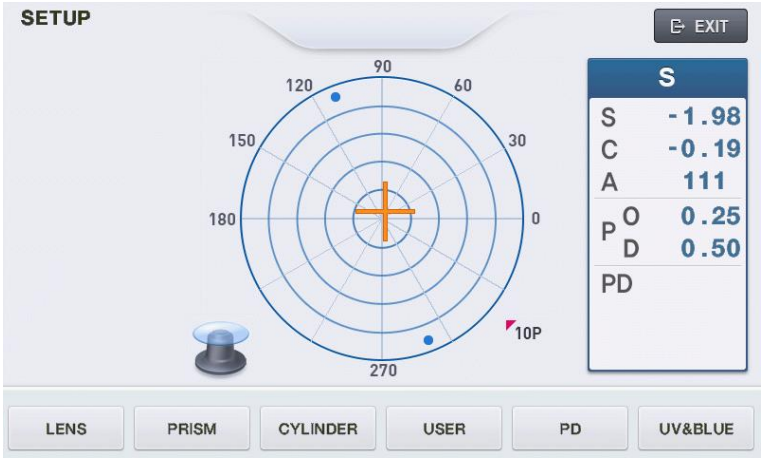
'SAVE SCREEN INFORMATION' is as follows:



If you want to return to the previous one without saving in the SAVE screen, press the rightmost 'PREV' button.

2.3. How to Set 12 standard lenses

If the measured value is not accurate, you should set the diopter variables again by using the standard lens-set: for all the 12 lenses in the standard lens set. Always keep the standard lens clean out of dust or stain.



A. Set the diopter display step into 0.01.
B. Place the standard lens and move it so that 'Green Color Cross Line' will appear.
C. Press the 'LENS' (LENS) button.
D. Press the 'MEASURE' button.
E. Determine the lens to measure by using two '-INDEX', '+INDEX' buttons.
F. 'D-0.01' button and 'D+0.01' button by the given value in the standard model-eye specification.
G. To save and exit, press the 'SAVE' button.
H. Press the 'EXIT' button again. And check if the diopter that has been set up in the basic display screen is shown. .
I. Repeat the procedures from step B to H for 12 standard lenses.

The information displayed in the 'Setting Diopter' screen is the same as that of 'Setting 0D' screen.

2.4. How to Set Prism

If the measured value is not accurate, you should set the 2Δ, 5Δ, 10Δ, 15Δ, 20Δ lens again by using the standard lens-set.

A. First, convert prism display format into P-B.

B. Then, press the 'PRISM' (PRISM) button.

C. After selecting the 2Δ lens from the standard lens set, place it on the lens cap.

D. 'D-0.01' button and 'D+0.01' button by the given value in the standard model-eye specification.

E. Rotate it to become the center position of 0~30(A0) degree.

F. Press the 'MEASURE' button and check if 'A0/A1/A2/A3/A4/A5/A6/A7/A8/A9/A10/ A11:' value is changed.

G. Repeat from step E ~ F to the center position of 331 ~ 360(A11) degree.

H. Finally the 'SAVE' button to save.

I. Repeat the procedures from C to H for 5Δ, 10Δ, 15Δ lens and 20Δ lens.

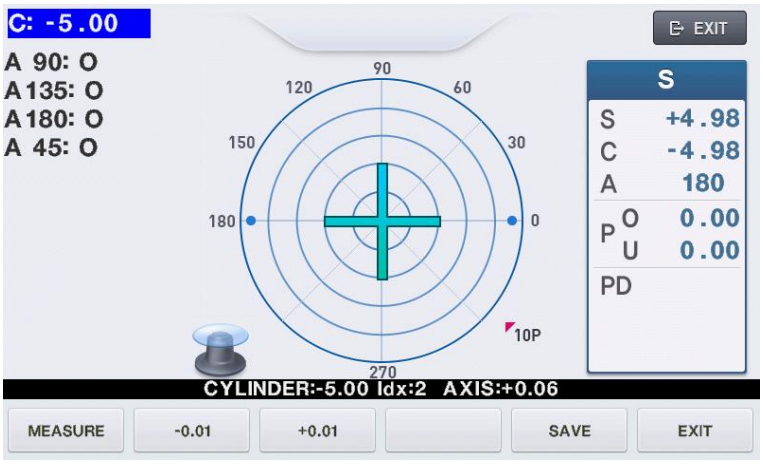
'Prism' screen will show the following information:

-	PRISM	: 2 Prism, 5 Prism, 10 Prism, 15 Prism, 20 Prism
-	Idx	: Display prism index currently.
-	ANGLE	: Display axis index currently.

ANGLE	PRISM BASE
0	0° ~ 30° center
1	31° ~ 60° center
2	61° ~ 90° center
3	91° ~ 120° center
4	121° ~ 150° center
5	151° ~ 180° center
6	181° ~ 210° center
7	211° ~ 240° center
8	241° ~ 270° center
9	271° ~ 300° center
10	301° ~ 330° center
11	331° ~ 360° center

2.5. The calibration of the cylindrical axis

With the +5D rectangular cylindrical lens, we can calibrate the cylindrical axis of our machine. The procedures are as followings:



A. First, convert prism display format into P-B.

B. Then, press the 'CYLINDER' (CYLINDER) button.

C. Place the +5D rectangular cylindrical lens on the lens cap.

D. '-0.01' button and '+0.01' button by the given value in the standard model-eye specification.
E. Locate it to the center while cling it to the lens.
(Axis : 90°/135°/180°/45°, Prism_x, y: 0)
F. Press the 'MEASURE' button and check if 'A90/A135/A180/A45:' value is changed.
G. Rotate the cylinder lens with a, repeat from Step D ~ to Step E to the Axis value equal to 135°/180°/45°.
H. Finally the 'SAVE' button to save.

- CYLINDER	: 5Diopter cylinder lens.
- Idx	: Display axis index currently.
- AXIS	: Display axis base currently.

2.6. PD Setup

With the PD Sensor, we can calibrate the PD value of our machine.

The procedures are as followings:

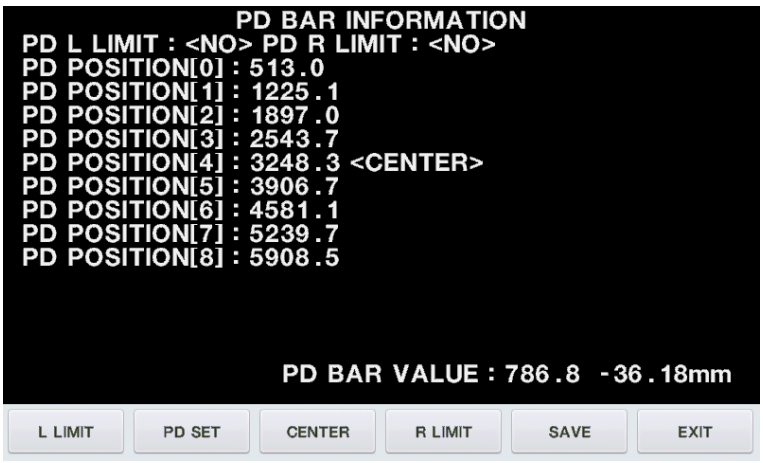
A. Press the 'PD' (PD) button.

B. Push in the PD sensor is the leftmost. And press the 'L Lim' button.

C. Push in the PD sensor is the rightmost. And press the 'R Lim' button and check if 'PD POSITION[0] ~ PD POSITION[8]' values are changed.

D. Finally the 'SAVE' button to save.

The information displayed in 'setting the position of PD' screen is as follows:



2.7. UV & BLUE Setup

With the UV&BLUE, we can calibrate the UV&BLUE value of our machine.

The procedures are as followings:

A. Press the 'UV&BLUE'(UV&BLUE) button.

B. Open UV&BLUE cover.

C. Focus to UV 0.0 by using 'INDEX' button.

D. '-0.01'button and '+0.01' button by the given value in the UV lens specification.

E. When UV transmissivity is 0.0 : Prevent part that UV-LED comes out.
When UV transmissivity is 25.0/50.0/75.0 : Put a lens on the top of the UV-LED comes out..
When UV transmissivity is 100.0 : Nothing raises.

F. Press the 'MEASURE' button.

G. UV transmissivity by 0.0->25.0->50.0->75.0->100.0 orders Step C ~ to Step F repeat.

H. Focus to BLUE 0.0 by using 'INDEX' button.

I. '-0.01'button and '+0.01' button by the given value in the BLUE lens specification.

J. When BLUE transmissivity is 0.0 : Prevent part that BLUE-LED comes out.
When BLUE transmissivity is 25.0/50.0/75.0 : Put a lens on the top of the BLUE-LED comes out.
When BLUE transmissivity is 100.0 : Nothing raises.

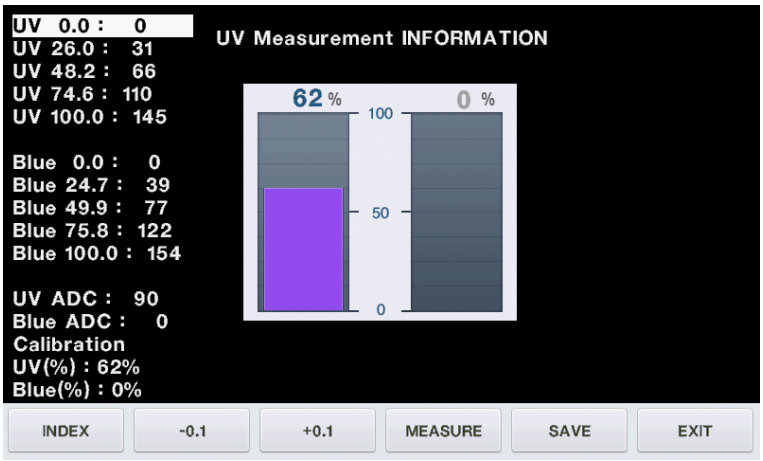
K. Press the 'MEASURE' button.

L. BLUE transmissivity by 0.0->100.0->25.0->50.0->75.0 orders Step C ~ to Step F repeat.

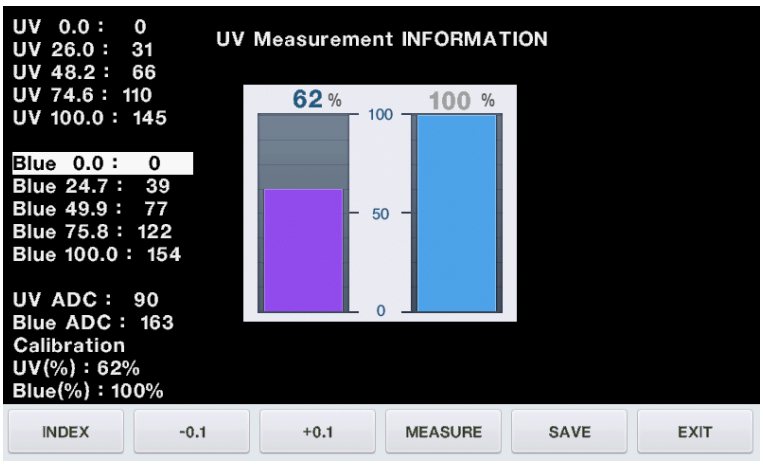
M. Finally the 'SAVE' button to save.

N. Press the 'EXIT' button and get out.

The information displayed in 'setting the position of UV' screen is as follows:

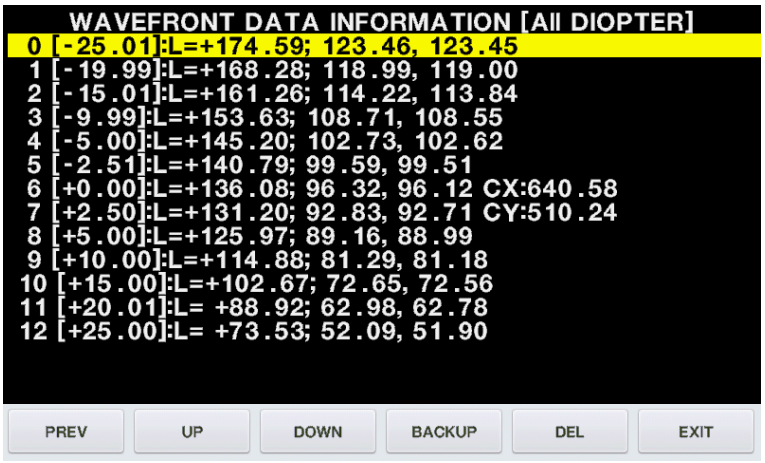


The information displayed in 'setting the position of BLUE' screen is as follows:


UV 0.0 : 0
UV 26.0 : 31
UV 48.2 : 66
UV 74.6 : 110
UV 100.0 : 145
Blue 0.0 : 0
Blue 24.7 : 39
Blue 49.9 : 77
Blue 75.8 : 122
Blue 100.0 : 154
UV ADC : 90
Blue ADC : 163
Calibration
UV(%) : 62%
Blue(%) : 100%
UV Measurement INFORMATION
62 %
100 %
100
50
0
INDEX
-0.1
+0.1
MEASURE
SAVE
EXIT

2.8. Diopter Setting Variables List

The followings are diopter setting variables list:



WAVEFRONT DATA INFORMATION [ALL DIOPTER]

0 [−25.01]: L=+174.59; 123.46, 123.45: average distance and distance rates between the four points and −25D

1 [−19.99]: L=+168.28; 118.99, 119.00: average distance and distance rates between the four points and −20D

...

6 [+0.00]: L=+136.08; 96.32, 96.12 CX:640.58: average distance and distance rates between the four points and 0D

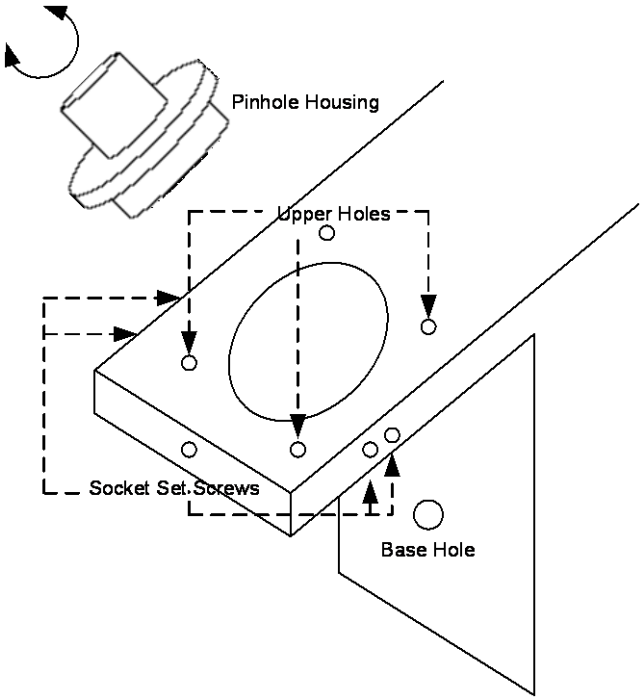
7 [+2.50]: L=+131.20; 92.83, 92.71 CY:510.24: average distance and distance rates between the four points and +2.5D

...

12 [+25.00]: L=+73.53; 52.09, 51.90: average distance and distance rates between the four points and +25.00D

If diopter controlling is performed normally, the length of each row (L) decreases row by row.

2.9. How to change the CCD camera



The procedures for changing a camera are as followings.

A. Remove all subassemblies that are the side cover, the lens table and the lower cover and the CCD cover etc.
B. Loose the Base Screw I and then take out the old CCD assembly.
C. Detach the protective seal from the new CCD.
D. Place the new CCD in its position. Lift it up as much as you can. But Be careful not to collide with the bone metal.
E. Fasten the Base Screw I into Base Hole.
F. Loose CMOS Camera Screw I and CMOS Camera Screw II a little.
G. Turn on the machine as the setup mode and then press the 'LENS' (LENS) button for a while to go into the Calibration page.
H. Press the first 'ALIGN' button to check the CMOS Camera position continuously.

I. We should place the CMOS Camera keeping two conditions: The first condition is the position of center point. The center position is shown at the 5th row like this.

- CEN: (+640.00, +512.00)

It must be within (+640.00 ± 15, 512 ± 15)

The second one is the orientation of CMOS Camera. It should be parallel with that of the base side plane. Keep the side plane of CMOS Camera parallel with the plane of that of the Base metal as much as you can. While two conditions both are all right, fasten two CMOS Camera Screws.

J. If the sum of two A12 values in 6th row is greater than | 0.1 |, loose all set screws for the Pinhole Housing. And then rotate a little so that the sum of two A12 values is less than | 0.1 |. On the contrary, if the sum of two A12 values is within | 0.1 |, there is no need to do Step J and K.

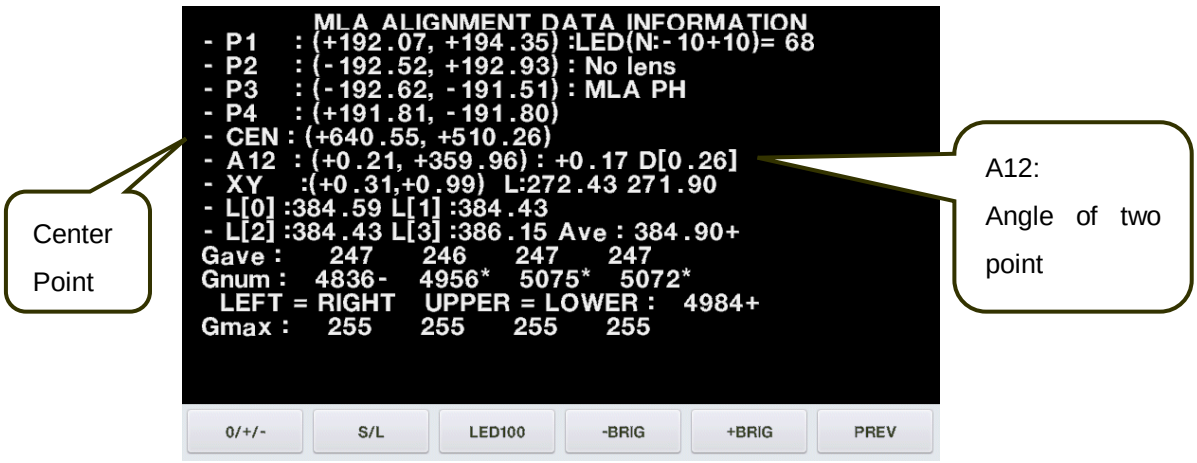
K. And then fasten all set screws for the Pinhole Housing.

L. Cover the CMOS Camera cover and fasten it.

M. Assemble all subassembly again.

N. You must execute all procedures for the calibration that are described in from section 2.2 to section 2.8.

When you loose the 5 socket set screws, be cautious not to crash the space of screws. To do so, force it pushing and rotate so slowly.



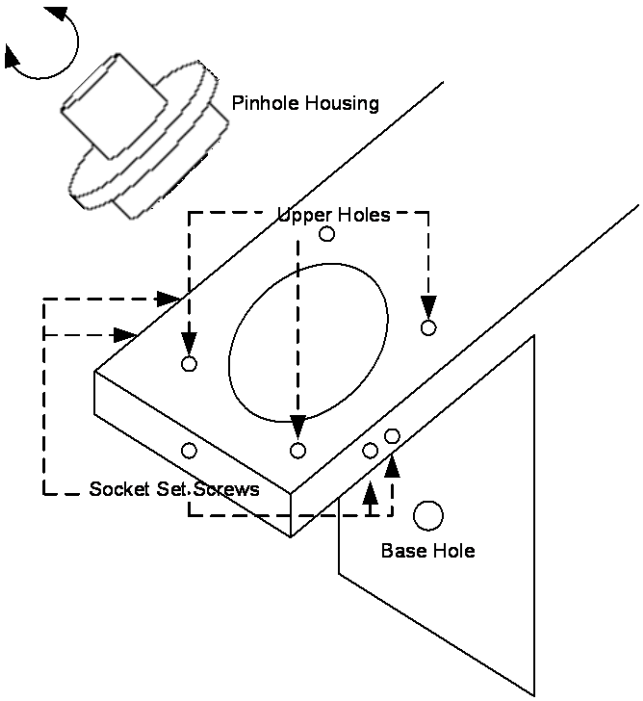
2.10. How to change the LED Assembly

The spare part for the LED assembly is the Upper Frame. So, we provide all upper frame assembly for the LED assembly.

The procedures for changing the upper frame Assembly are as followings:

A. Remove the Side Cover, Front Upper Cover and Upper Frame.
B. Place the new Upper Frame and fasten it.
C. Assemble the Front Upper Cover and the Side Cover again.
D. You must execute all procedures for the calibration that are described in from the section 2.2 to section 2.8.

2.11. How to change the Pinhole Housing



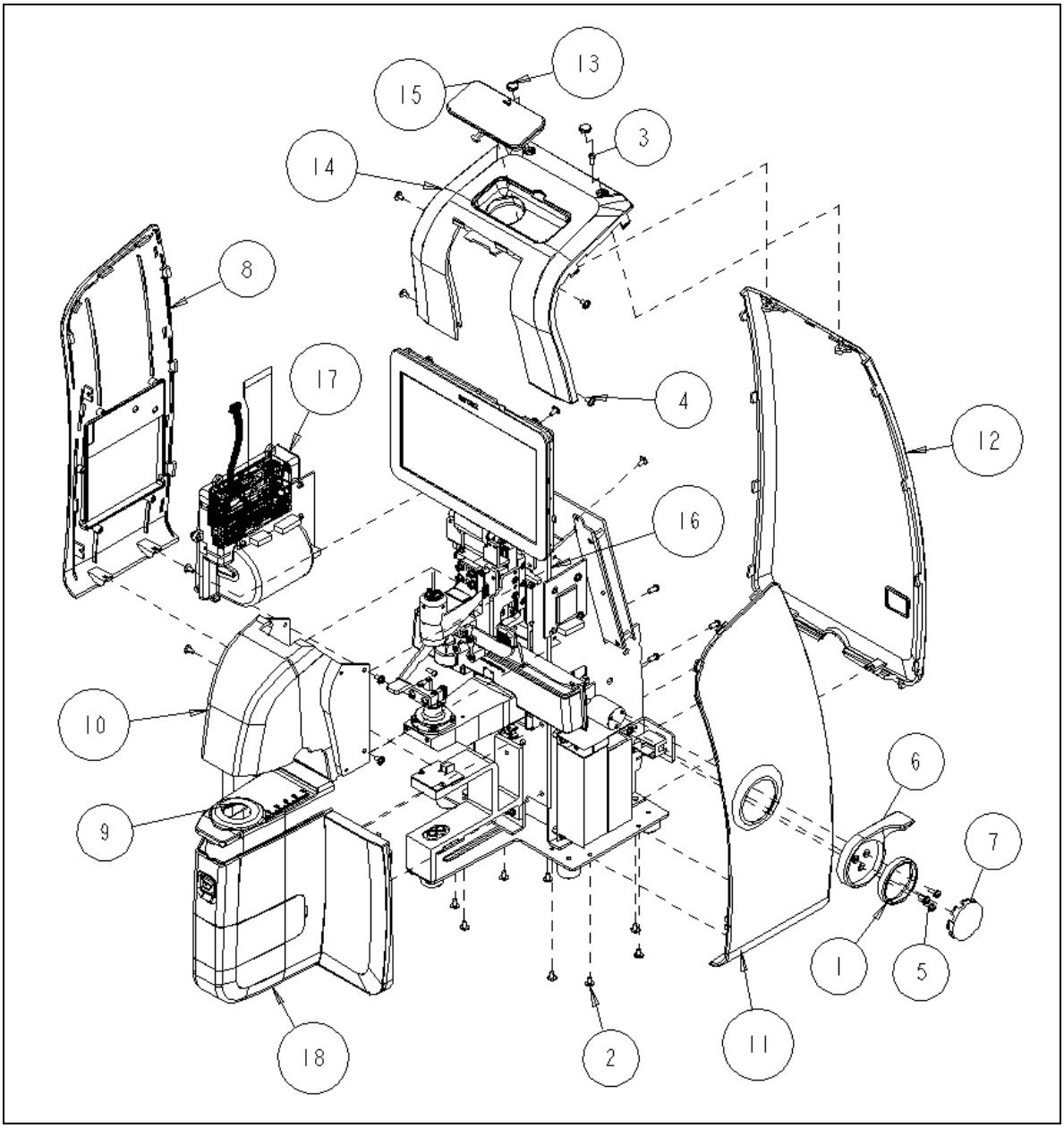
The procedures for changing the Pinhole Housing are as followings:

1. Take out the Lens Supporter.
2. Remove the Pinhole Housing Cover which is the below cover under the Lens Supporter. This is stuck with soft glue. Therefore we need to lift up smoothly.
3. Loose and take out the screws in Upper Holes.
4. Loose the Socket Set Screws.
5. Lift up the Pinhole Housing and replace it the new one.
6. Turn on the machine to the Setup Mode and then press 'LENS' (LENS) button for a while to go into the Calibration Display.
7. Press the first 'ALIGN' button to see the position information.
8. Rotate the Pinhole Housing a little to make the parallel level which is the sum of two A12 less than |0.1|.
9. Fasten the 5 Socket Set Screws keeping the parallel level guaranteed.
10. Fasten all the screws in Upper Holes.
11. Place the Upper Cover of Pinhole Housing and stick it.
12. You must execute all procedures for the calibration that are described in from the section 2.2 to section 2.8.

3. Repair Standard

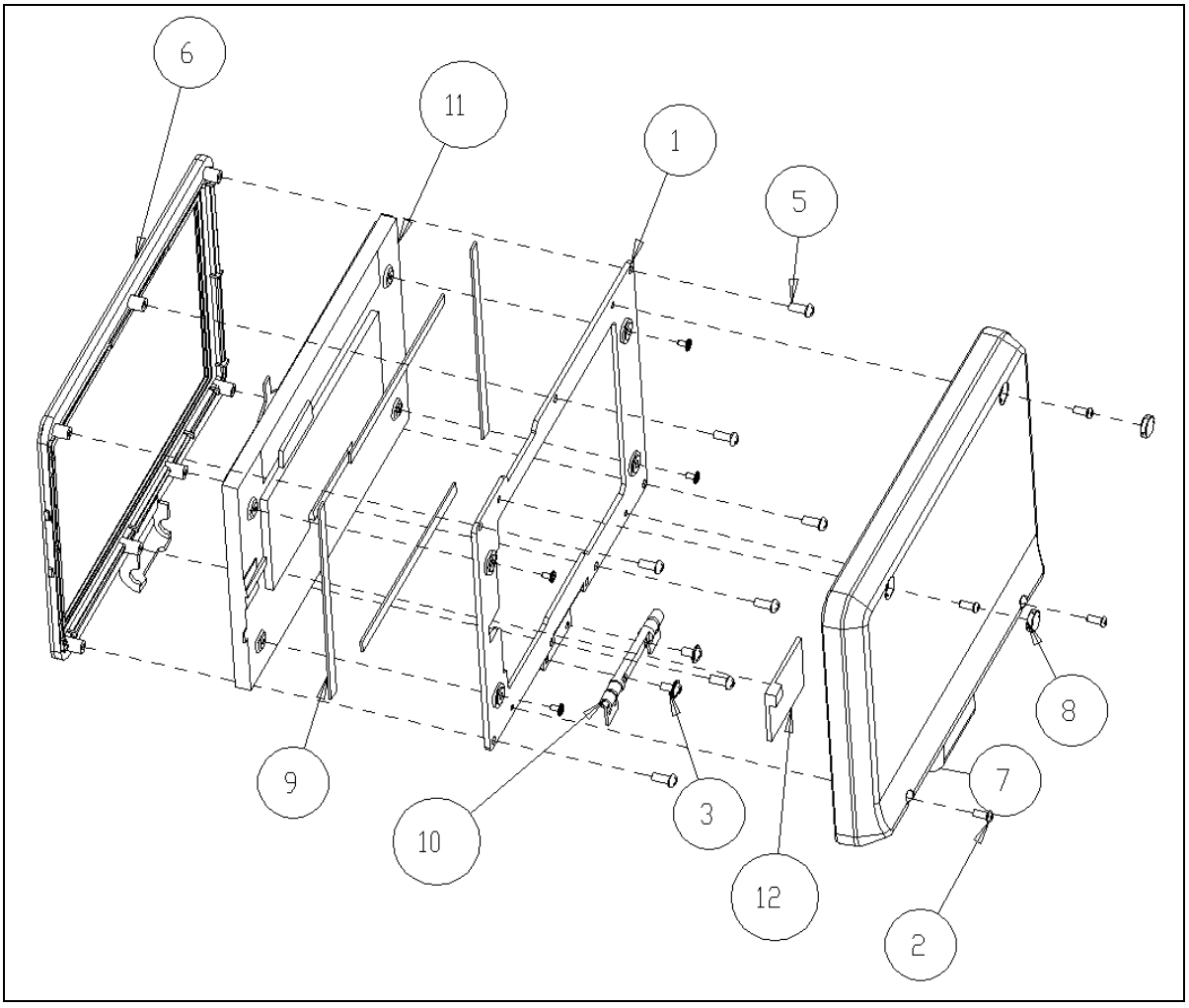
3.1. Removing cover assembly

Picture



No	Component	Removal method
1	B4_COVER-HANDLE-RING	- First, extract [12] remove 2 screw on bottom and top side - Next, remove 2 screws on bottom side and 2screw inside from [8] and separate [8] - Separate the [7], [5], [6] step by step, - Next, remove 2 screws on bottom side and 2screw inside from [11] and separate [11] - Next, remove 4 screws on left and right side from [14] and separate [14] - Next, remove 4 screws on left and right side from [10] and separate it - Next, remove 4 screws inside [18] and separate it - Be careful that you never scratch on the surface of 'Cover' while assembling or disassembling. - Assembly is the reverse procedure of disassembly
2	MACHINE-SCREW_PH_M3-8L_SPW_FW	
3	MACHINE-SCREW-PHW-M3-L6	
4	TAPPING-SCREW2-PH-M3L8-NI	
5	TAPPING-SCREW2-PH-WA-M3L6-NI	
6	B4_COVER-PD-BAR-HANDLE	
7	B4_COVER-HANDLE-CAP	
8	B4_COVER-LEFT	
9	B4_COVER-FILTER-HOUSING	
10	B4_COVER-FRONT-2	
11	B4_COVER-RIGHT	
12	B4_COVER-BACK	
13	D1_CHART-BOLT-CAP	
14	B4_COVER-FRONT-1	
15	B4_COVER-FRONT-RUBBER	
16	B4_FRAME-TOTAL-ASSY	
17	B4_PRINTER-ASSY	
18	B4_COVER-BOTTOM-ASSY	

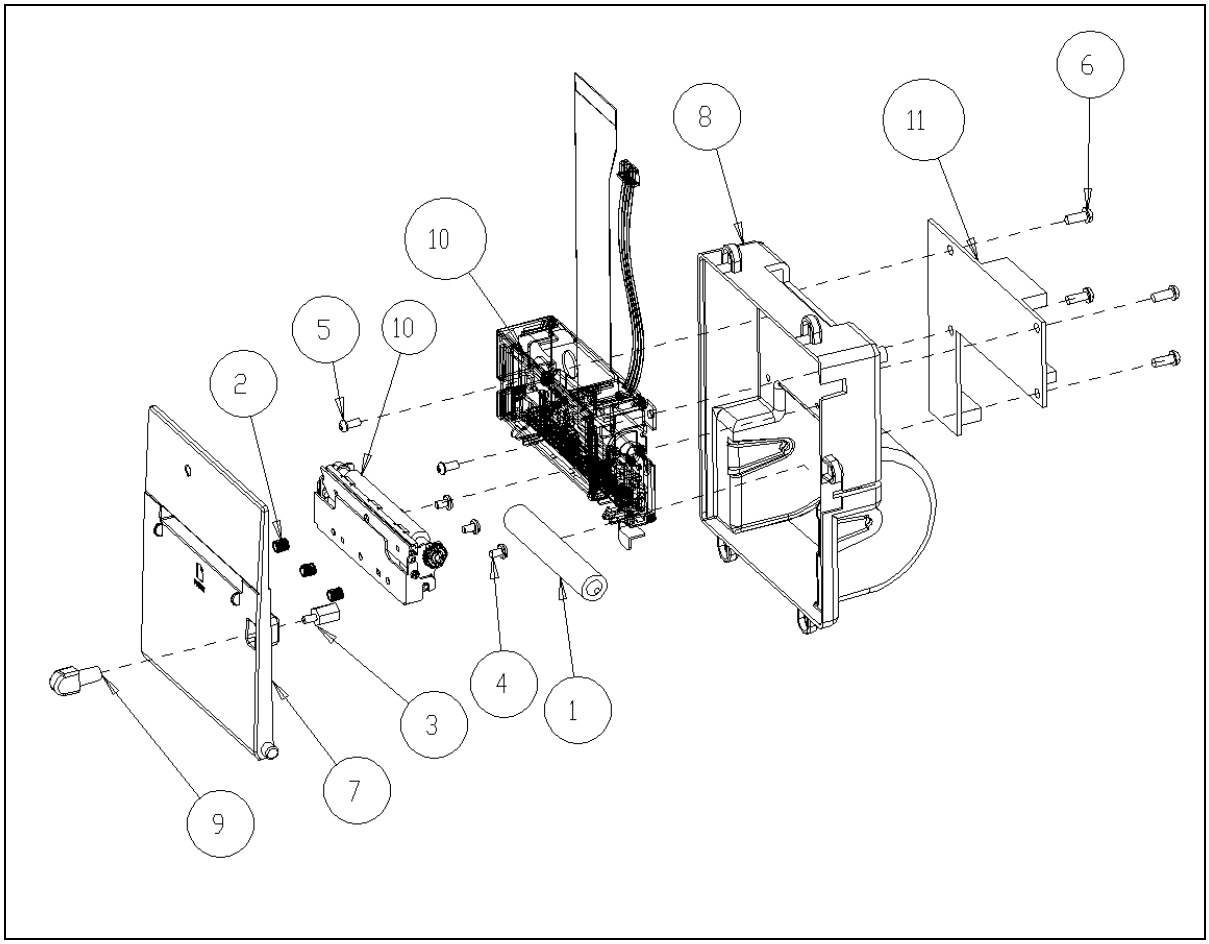
3.2. LCD ass'y

Picture	
	

No	Component	Removal method
1	B4_LCD-BASE-PLATE	- First, remove 4 screws from [7] and separate it. - Next, remove 6 screws from [6] and separate it. - Next, remove 4 screws from [1] Then separate [11] - Assembly is the reverse procedure of disassembly.
2	MACHINE-SCREW-PH-M2_6L6-NI	
3	MACHINE-SCREW-PHW-M3-L6	
4	MACHINE-SCREW-BHW-M2L4-NI	
5	TAPPING-SCREW2-PH-M3L8-NI	
6	B4_COVER-LCD-FRAME	
7	B4_COVER-LCD-BACK	
8	D1_CHART-BOLT-CAP	
9	LCD-CR-RUBBER	
10	B4_DOUBLE-HINGE-ASSY	
11	LCD-GRAPHIC-TOUCH-SCREEN	
12	PCB-ASSY-TOUCHIF-103	

3.3. Printer ass'y

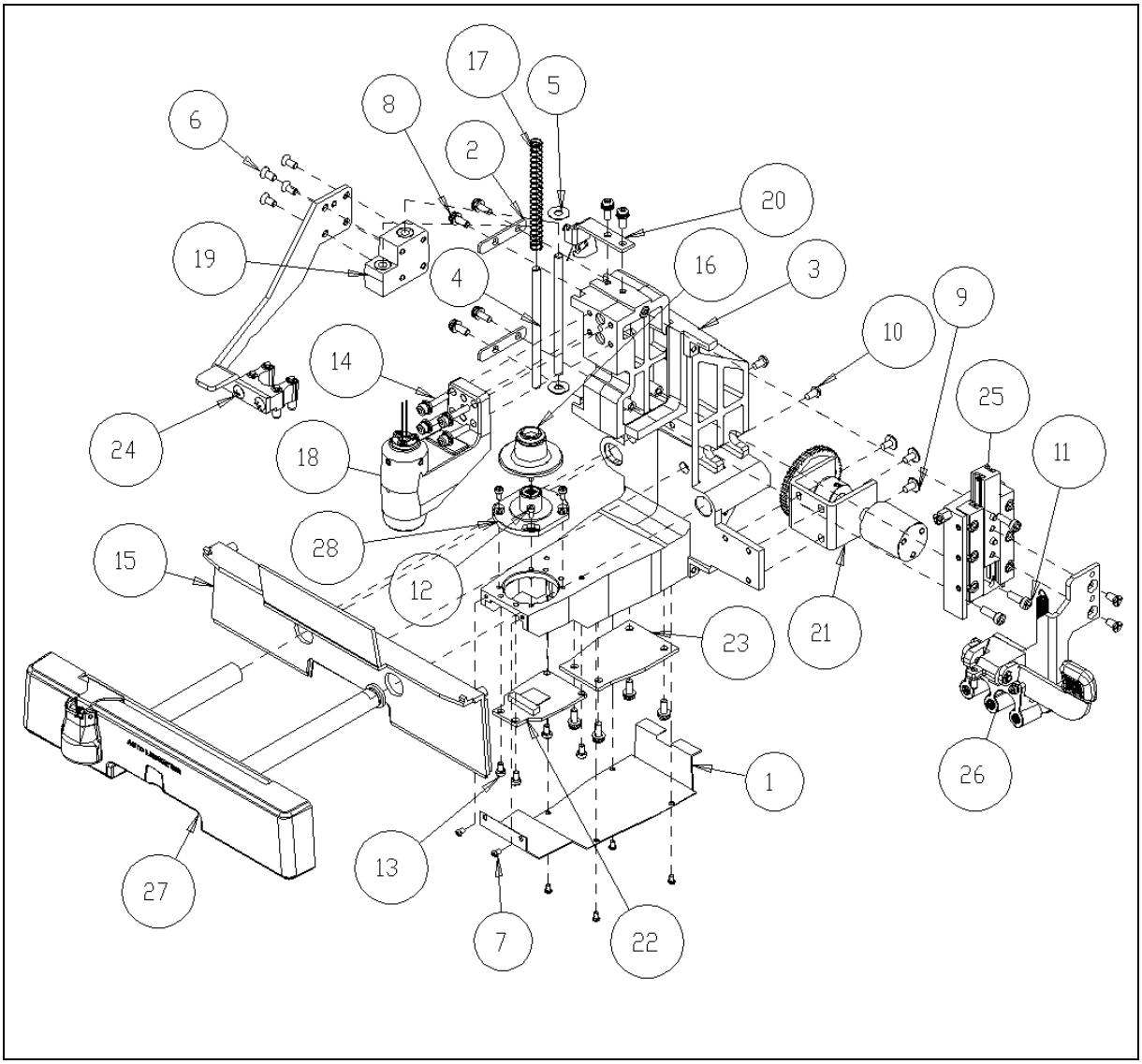
Picture



No	Component	Removal method
1	PAPER-HOLDER	- First, remove 5 screws from Print Assy'. Then, separate it from the 'Cover Left'
2	INSERT-M2_6D4L4_5	
3	PCB-SUPPORT-M3L8-PLASTIC	
4	MACHINE-SCREW-BH-M2_6L4-NI	- Next, remove 3 screws from [10] and separate it.
5	TAPPING-SCREW-PH-M2_6L6-NI2	
6	TAPPING-SCREW2-PH-M3L8-NI	- Be careful that there is no scratch and assembly is the reverse procedure of disassembly.
7	B4_COVER-PRINTER	
8	B4_PRINTER-CASE	
9	B4_PRINTER-BUTTON	
10	THERMAL-PRINTER-SMP6210	
11	PCB-ASSY-PRT-102	

3.4. B4_BACK-BONE-Assembly

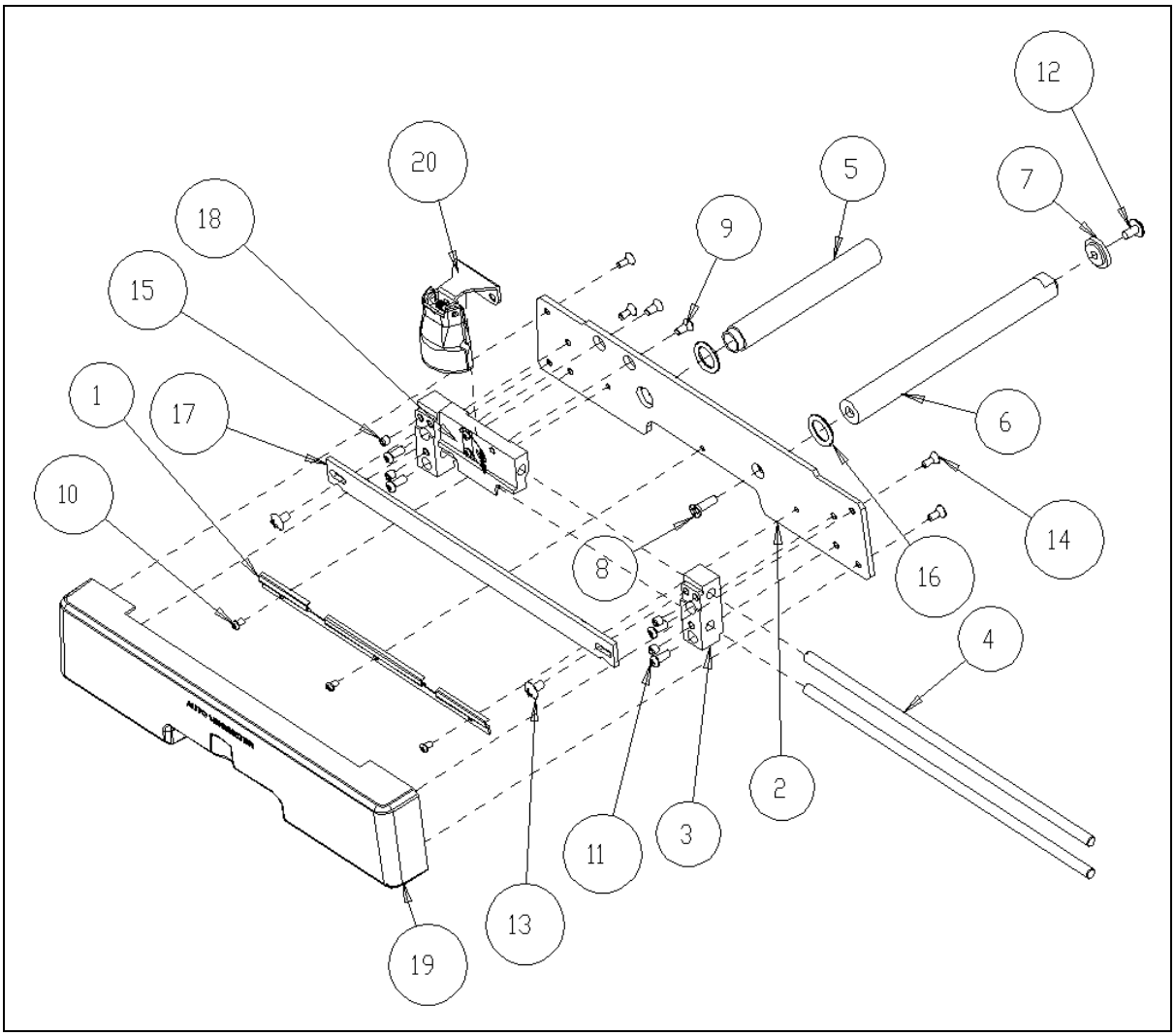
Picture



No	Component	Removal method
1	B4_CCD-CAMERA-COVER	- Disconnect 'PD Bar Board' cable from 'Main Board'.
2	SHAFT-FIX-BRK	
3	B4_BACK-BONE	- Remove cap [16]
4	GUIDE-SHAFT-4	
5	FOOT-MOVING-BLOCK-DAMPER	- Remove 4 screws on back side of B4_COVER-PD-BAR-ASSY
6	MACHINE-SCREW_FH_M3-5L-NI	(reference 3.4.1 PD-Bar subassembly)
7	MACHINE-SCREW_PH_M2-3L	
8	MACHINE-SCREW_PH_M3-8L_SPW_FW	- Then, remove 1 screw on back side of [27] from the [3]. Then, separate it. (Be careful contact with [28])
9	MACHINE-SCREW-PHW-M3-L6	
10	TAPPING-SCREW2-PH-M3L5-NI	- Please see the drawing for disassemble, as needed
11	WRENCH-BOLT_M3X10L	
12	WRENCH-M2L4-NI	- Be careful to prevent from interfering with the 'Filter housing' which is included in the optical components when assembling or disassembling the PD assembly.
13	WRENCH-M2_5L4-NI	
14	WRENCH-BOLT_M3X15L_SPW_FW	
15	B4_COVER-PD-BAR-BACK	- Assembly is the reverse procedure of disassembly.
16	FILTER-HOUSING-CAP-13	
17	B4_FOOT-EXTENSION-SPRING	
18	B4_LED-BONE-ASSY	
19	FOOT-MOVING-BLOCK-ASSY	
20	FIXING-BRK-ASSY	
21	PD-PINION-ASSY	
22	PCB-ASSY-CMOS-101	
23	PCB-ASSY-LVDS-101	
24	B4_FOOT-FRAME-ASSY	
25	B4_PEN-SLIDE-ASSY	
26	B4_PEN-FRAME-ASSY	
27	B4_PD-BAR-ASSY	
28	B4_FILTER-HOUSING-ASSY	

3.4.1. PD-Bar subassembly

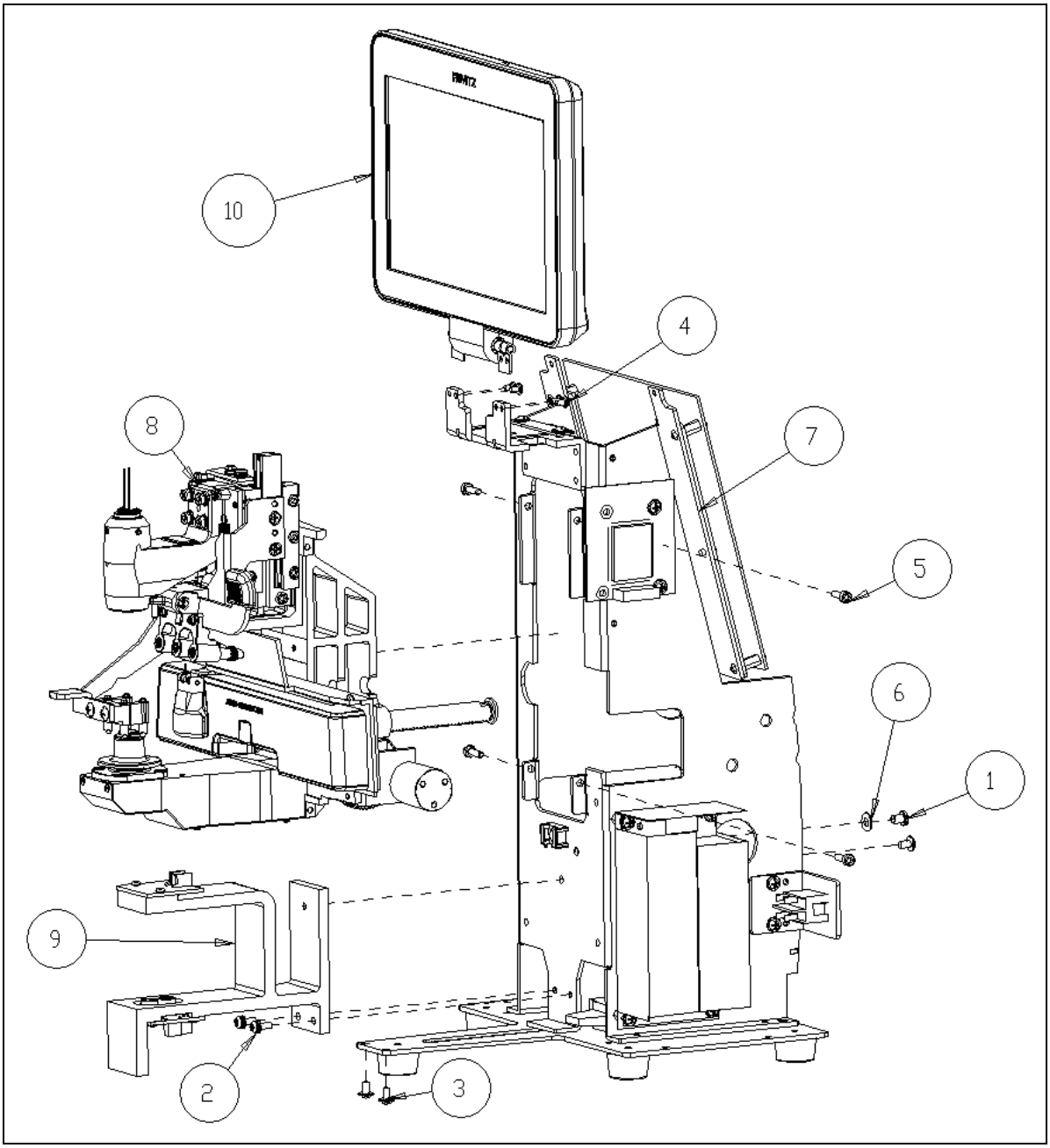
Picture



No	Component	Removal method
1	PD-BAR-CABLE-BRK	- To separate the Nose Assembly[20], remove two screws that fix [8]. - Then, remove four screws from [19] and take off [19]. - Remove three screws to separate [17]. - Remove four screws to separate [4]. Then, separate them. This time, be careful not to be deformed [18]'s shape. - Assembly is the reverse procedure of disassembly.
2	B4_PD-BAR-PLATE	
3	B4_PD-ENCODER-SHAFT-BLOCK	
4	B4_ENCODER-SHAFT	
5	B4_PD-SHAFT	
6	B4_PD-RACK-GEAR-SHAFT	
7	B4_PD-RACK-STOPPER	
8	MACHINE-SCREW_FH_M3-10L-NI	
9	MACHINE-SCREW-FH-M2_6L6-NI	
10	MACHINE-SCREW_PH_M2-3L	
11	MACHINE-SCREW-PH-M2_6L6-NI	
12	MACHINE-SCREW-PHW-M3-L6	
13	MACHINE-SCREW_TH_M3-5L	
14	TAPPING-SCREW2-FH-M2_3L6	
15	SETSCREW-M3L3	
16	O_RING_7_8__1_9	
17	B4_HLM-PD-BAR-BD_HLMP-100	
18	B4_PD-BAR-ENCODER-HOUSING-ASSY	
19	B4_COVER-PD-BAR-ASSY	
20	B4_PD-NOSE-ASSY	

3.5. B4_FRAME-TOTAL- assembly

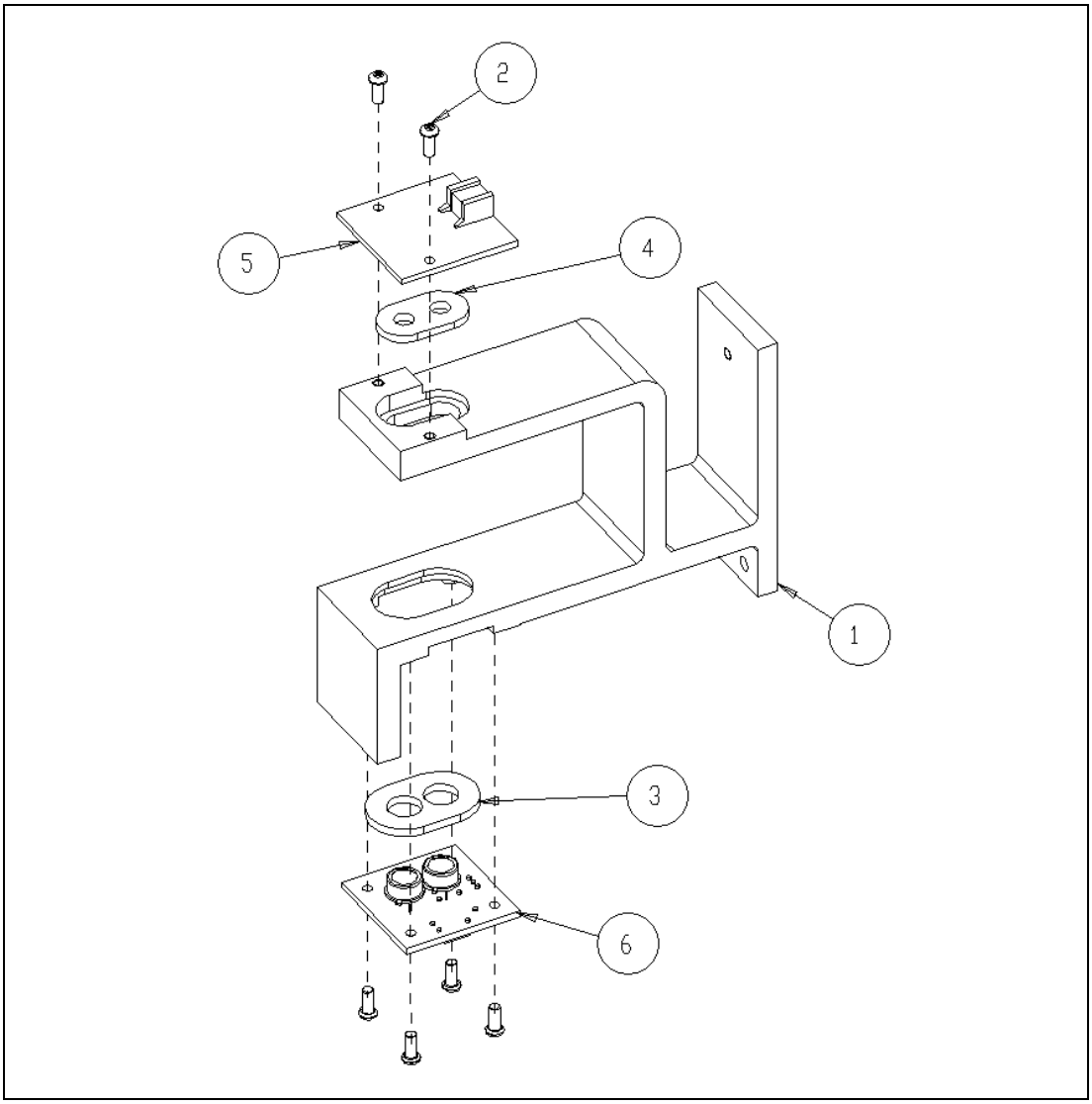
Picture



No	Component	Removal method
1	MACHINE-SCREW-PH-M4L5-NI	- Remove 5 screws bottom, front and back side that fix [9] from the 'Main Frame Assy" Then separate it. - Please see the drawing for disassemble, as needed - Assembly is the reverse procedure of disassembly.
2	MACHINE-SCREW_PH_M3-8L_SPW_FW	
3	MACHINE-SCREW-PHW-M3-L6	
4	MACHINE-SCREW-BH-M2_6L4-NI	
5	WRENCH-BOLT_M3X10L	
6	STAR-WASHER-M4	
7	B4_FRAME-ASSY	
8	B4_BACK-BONE-ASSY	
9	B4_UV-BONE-ASSY	
10	B4_LCD-ASSY	

3.6. B4_UV-BONE-assembly

Picture

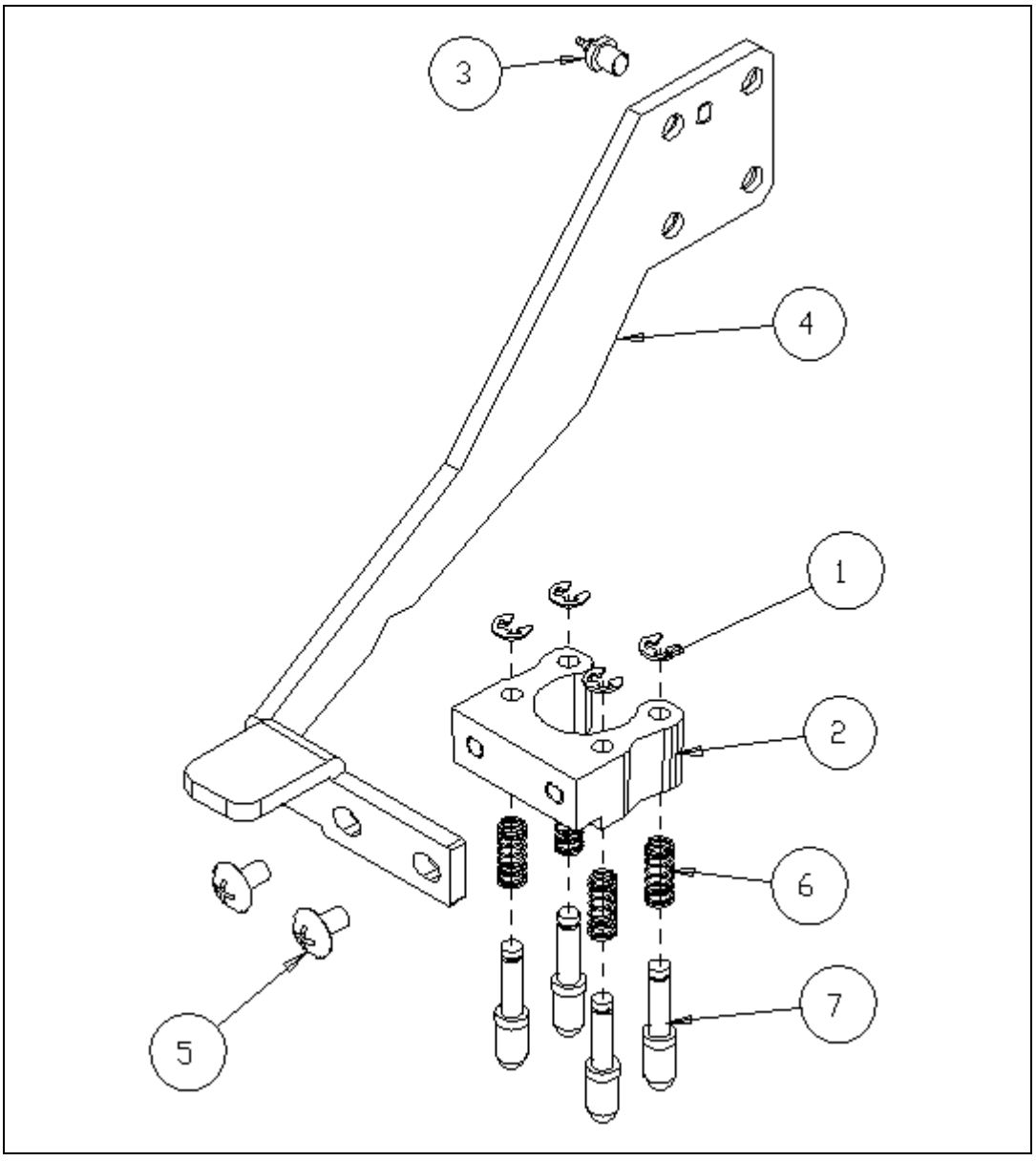


No	Component	Removal method
1	B4_UV-BONE	- To separate [6], remove 4 screws.
2	MACHINE-SCREW-PH-M2_6L6-NI	
3	B4_UV_TEFRON_L	- To separate [5], remove 2 screws.
4	B4_UV-TEFRON-U	
5	PCB-ASSY-UVBLUE-LED-101	- Assembly is the reverse procedure of disassembly.
6	PCB-ASSY-UVBLUE-SENSOR-101	

.

3.6.1. B4_FOOT-FRAME-Subassembly

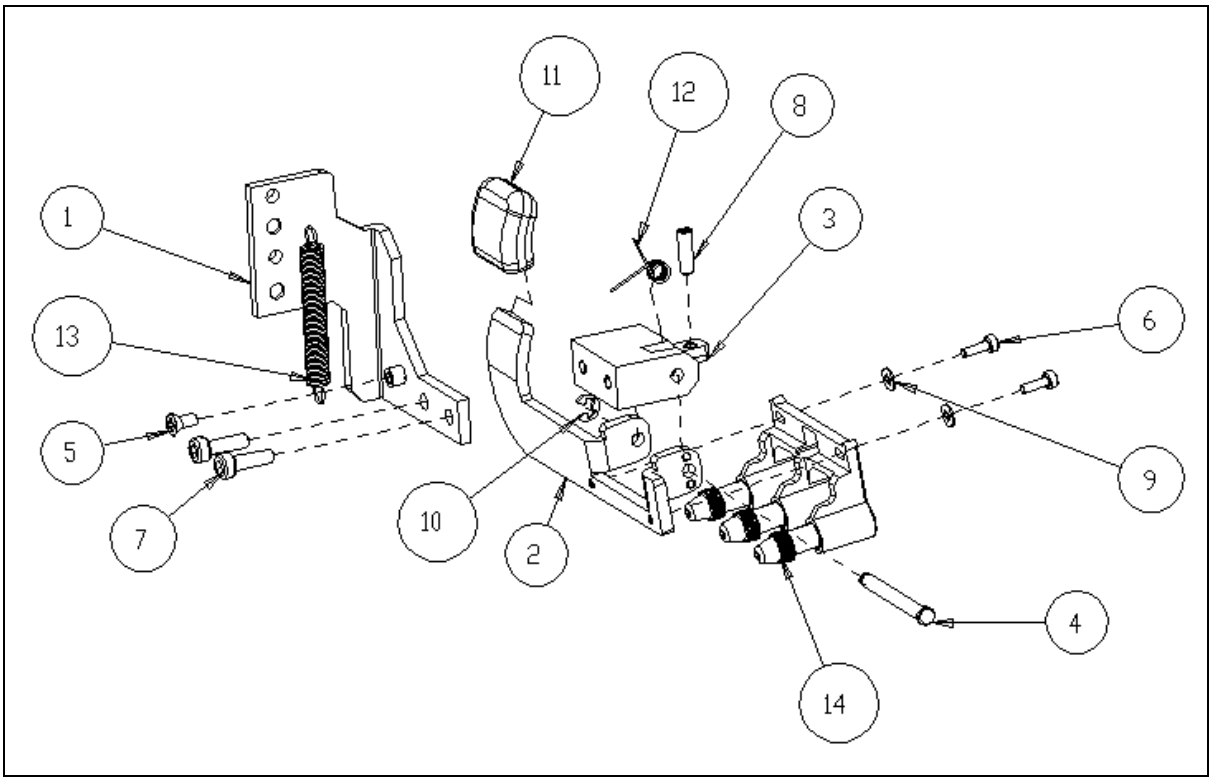
Picture



No	Component	Removal method
1	E-RING-2-SUS	- Please see the drawing for disassemble, as needed - Assembly is the reverse procedure of disassembly.
2	FOOT-HOLDER	
3	F_T2_CONTROL_POS_PIN	
4	B4_FOOT-FRAME-BRACKET-13	
5	MACHINE-SCREW_TH_M3-5L	
6	POSITION-FOOT-SPRING	
7	C7_POSITION-FOOT-RUBBER-ASSY	

.

3.6.2. B4_PEN-FRAME-ASSY

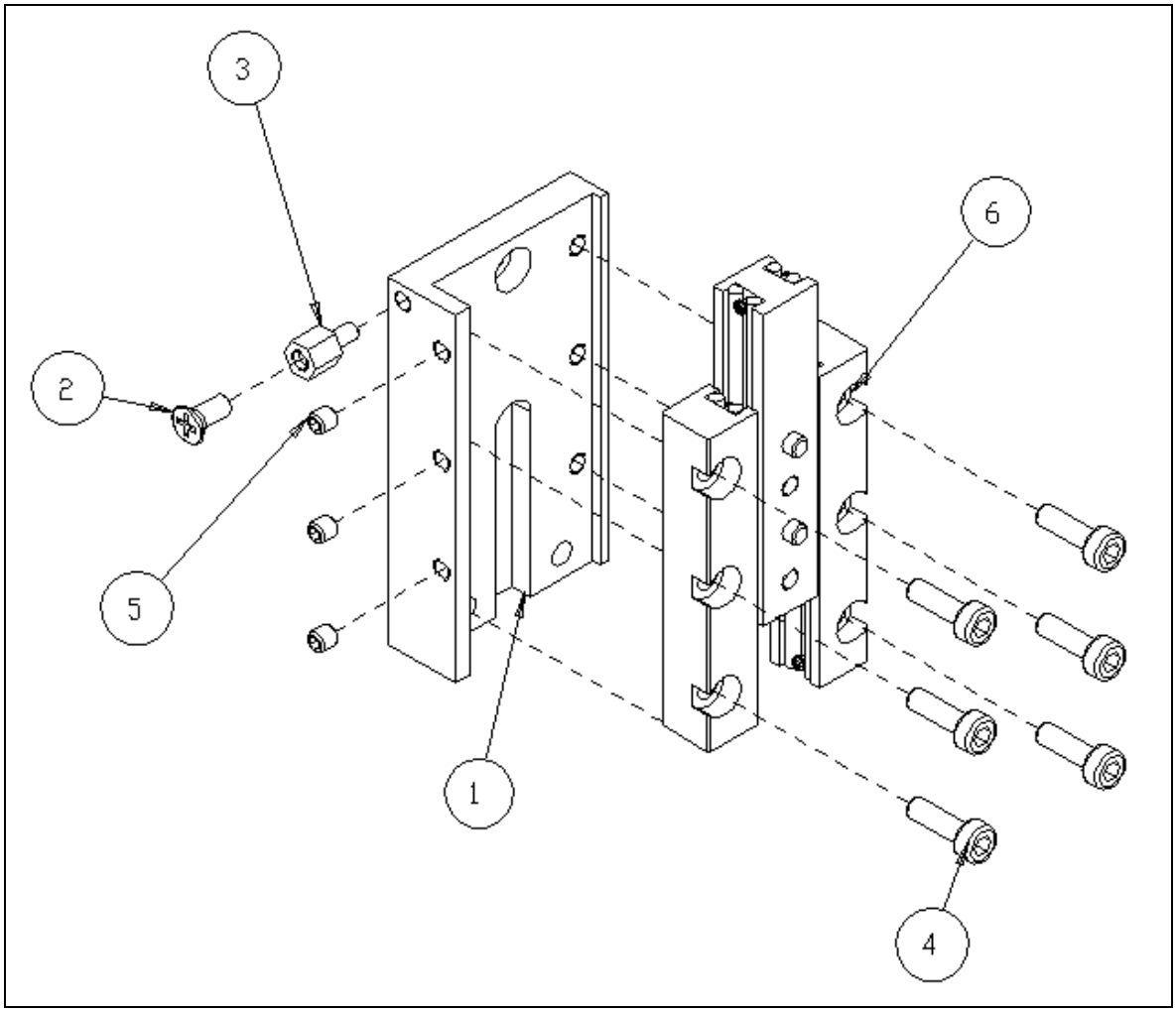
Picture	
	

No	Component	Removal method
1	B4_PEN-FRAME-BRK	- Please see the drawing for disassemble, as needed - Assembly is the reverse procedure of disassembly.
2	B4_PEN-PRESS-BRK	
3	B4_PEN-CONT-SUPPT	
4	PEN-GUIDE-SHAFT	
5	MACHINE-SCREW-FH-M2_6L6-NI	
6	WRENCH-M2L6-S	
7	WRENCH-BOLT_M3X10L	
8	SETSCREW-M3_10L	
9	WASHER-M2	
10	E_RING-2_5	
11	B4_PEN-PRESS-BRK-KNOB	
12	PEN-GUIDE-SPRING	
13	PEN-EXTENSION-SPRING	
14	B4_PEN-HOLDER-ASSY	

.

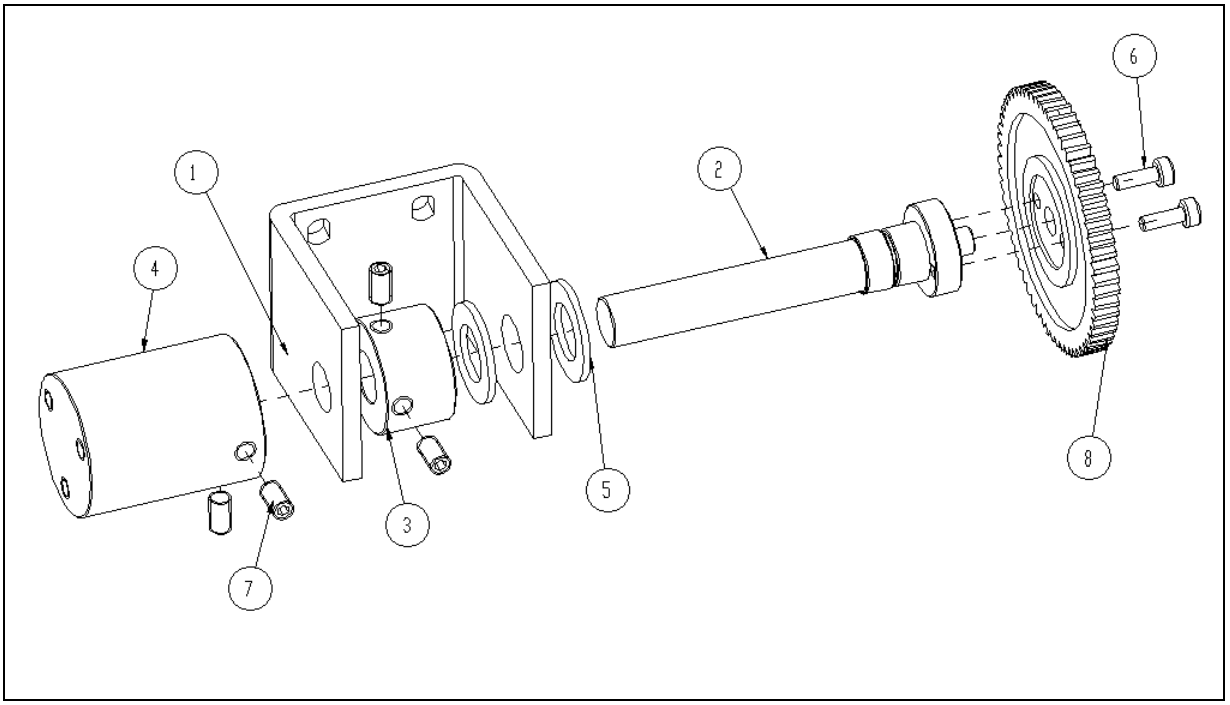
3.7. B4_PEN-SLIDE- assembly

Picture



No	Component	Removal method
1	B4_PEN-SLIDE-BASE	
2	MACHINE-SCREW_FH_M3-5L-NI	- Please see the drawing for disassemble, as needed
3	PCB-SUPPORT-M3L5-N	
4	WRENCH-BOLT_M3X10L	- Be careful the balls
5	SETSCREW-M3L3	
6	B4_SLIDE-ASSY	- Assembly is the reverse procedure of disassembly.

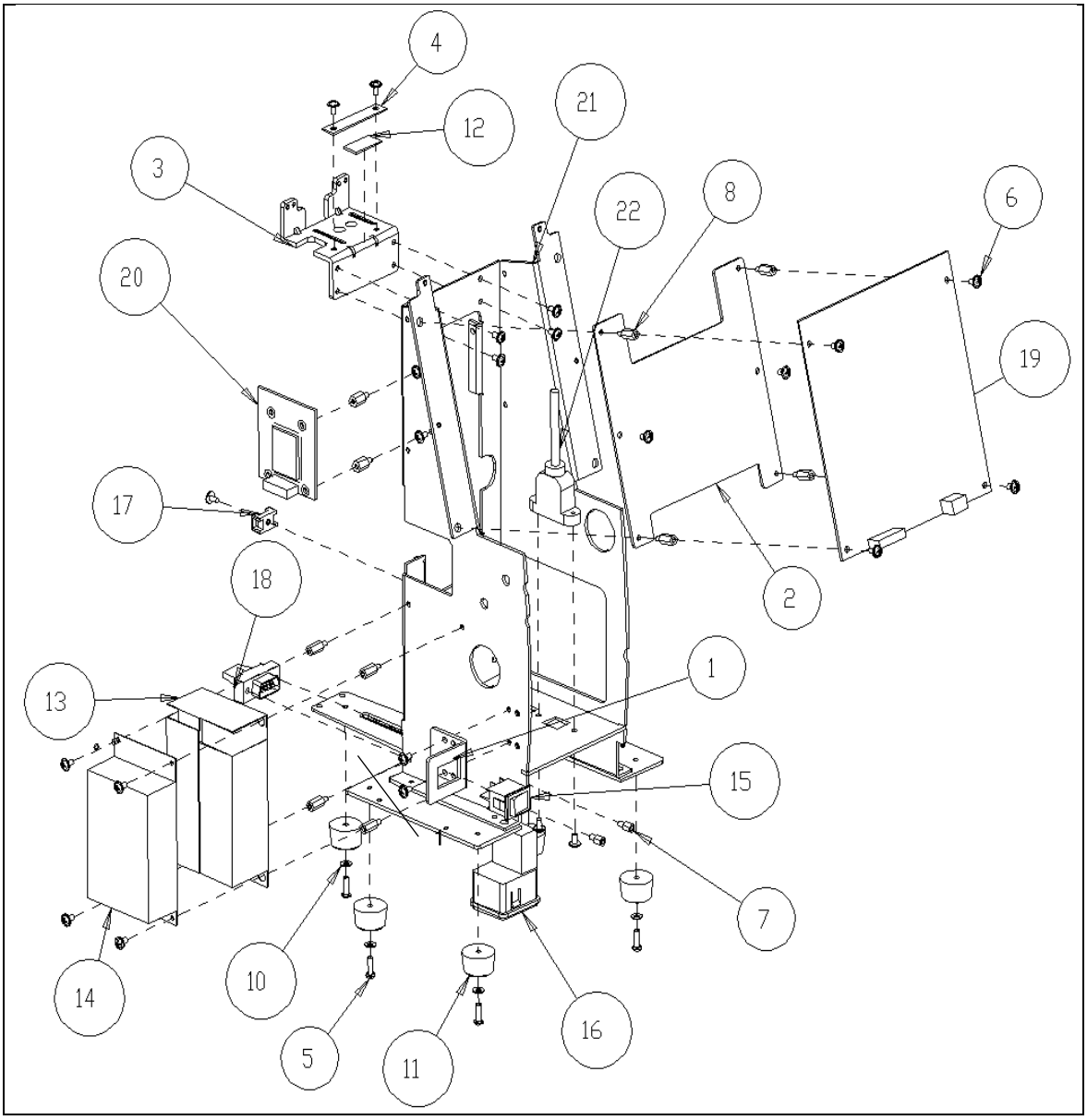
3.8. PD-PINION-assembly

Picture	
	

No	Component	Removal method
1	PD-PINION-BRK	- Please see the drawing for disassemble, as needed - Assembly is the reverse procedure of disassembly.
2	PD-PINION-SHAFT	
3	PD-PINION-NUT	
4	PD-PINION-SHAFT-HOLDER	
5	GEAR-WASHER	
6	WRENCH-M2L6-S	
7	SETSCREW-M3_5L	
8	GEAR-L	

3.9. B4_FRAME-assembly

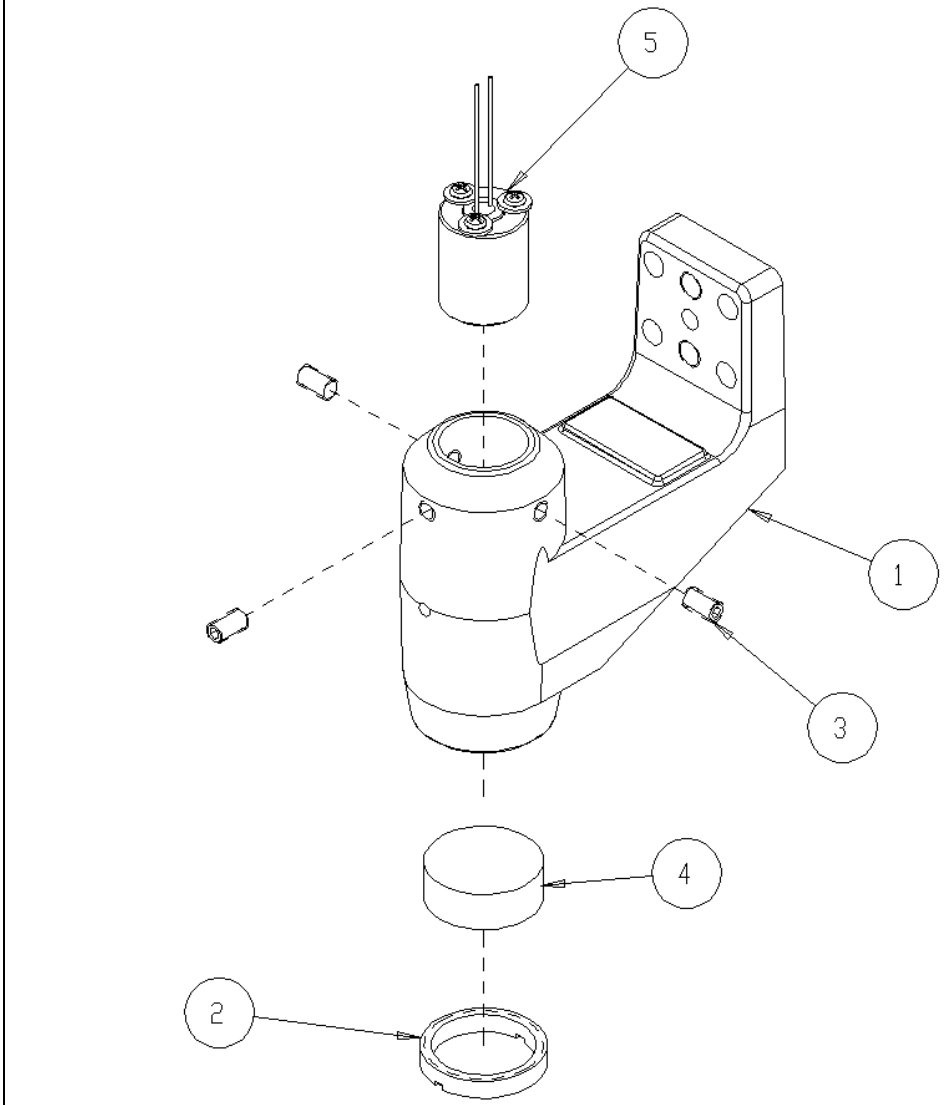
Picture



No	Component	Removal method
1	B4_POWER-SW-BRK	- Please see the drawing for disassemble, as needed - Assembly is the reverse procedure of disassembly.
2	B4_MAIN-BD-BRACKET	
3	B4_FRAME-LCD-HINGE	
4	LCD-CABLE-FIX-BRK	
5	MACHINE-SCREW-PH-M3L10-NI	
6	MACHINE-SCREW-PHW-M3-L6	
7	PCB-SUPPORT-5	
8	PCB-SUPPORT-M3L10-N	
9	PCB-SUPPORT-M3L8-PLASTIC	
10	WSFL-M3T0_5-NI	
11	FOOT	
12	FRAME-CR-RUBBER-1	
13	B4_SMPS-COVER_	
14	Z-A-25-5_SMPS	
15	Z-POWER-SWITCH	
16	FUSE-INLET-SCHURTER	
17	HARNESS_HOLDER	
18	Z-RJ45-TR	
19	MAIN-PCB	
20	WIFI-BD-ASSY	
21	B4_BASE-FRAME-ASSY	
22	USB-TYPE_B	

3.9.1. Removing Lens housing bone and LED subassembly

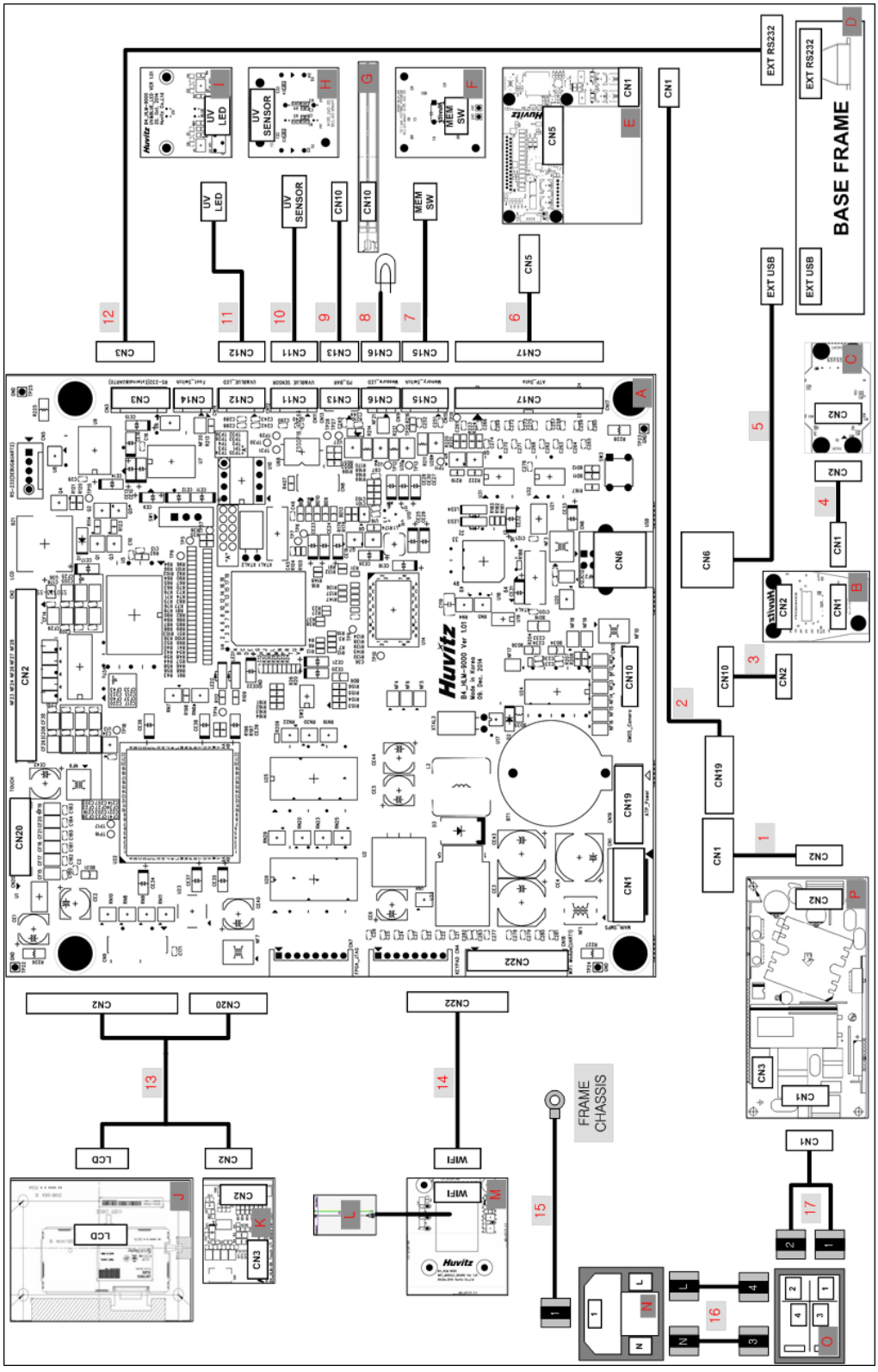
Picture



No	Component	Removal method
1	B4_LED-BONE-13	-Turn part [2] for disassemble lens [4]
2	B4_LED-LENS-NUT-13	
3	SETSCREW-M3_5L	- Please see the drawing for disassemble, as needed
4	SETSCREW-M3_5L	
5	B4_LED-HOUSING-ASSY-GREEN	- Assembly is the reverse procedure of disassembly.

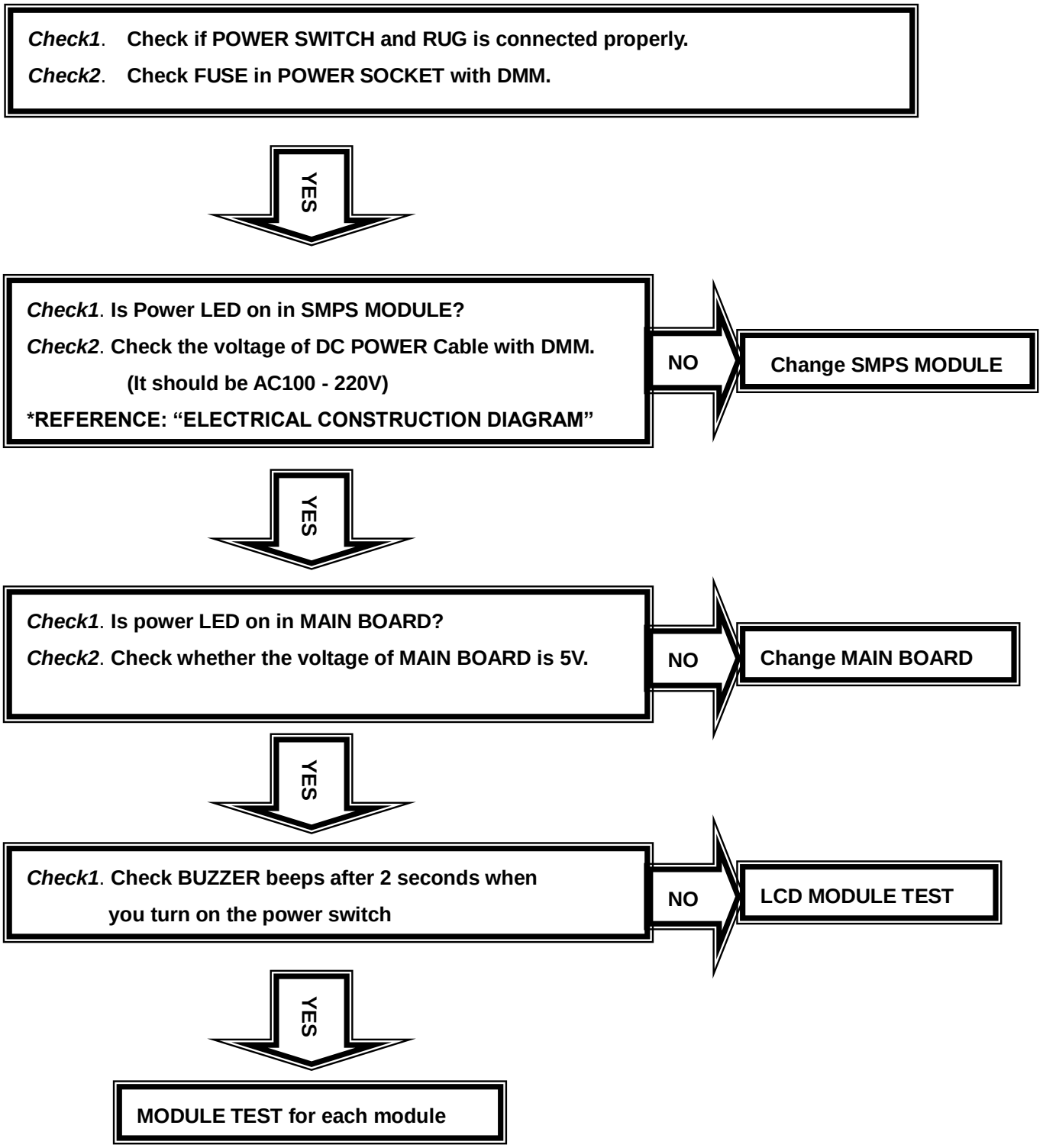
4. Electrical block diagram

4.1. Electrical block diagram



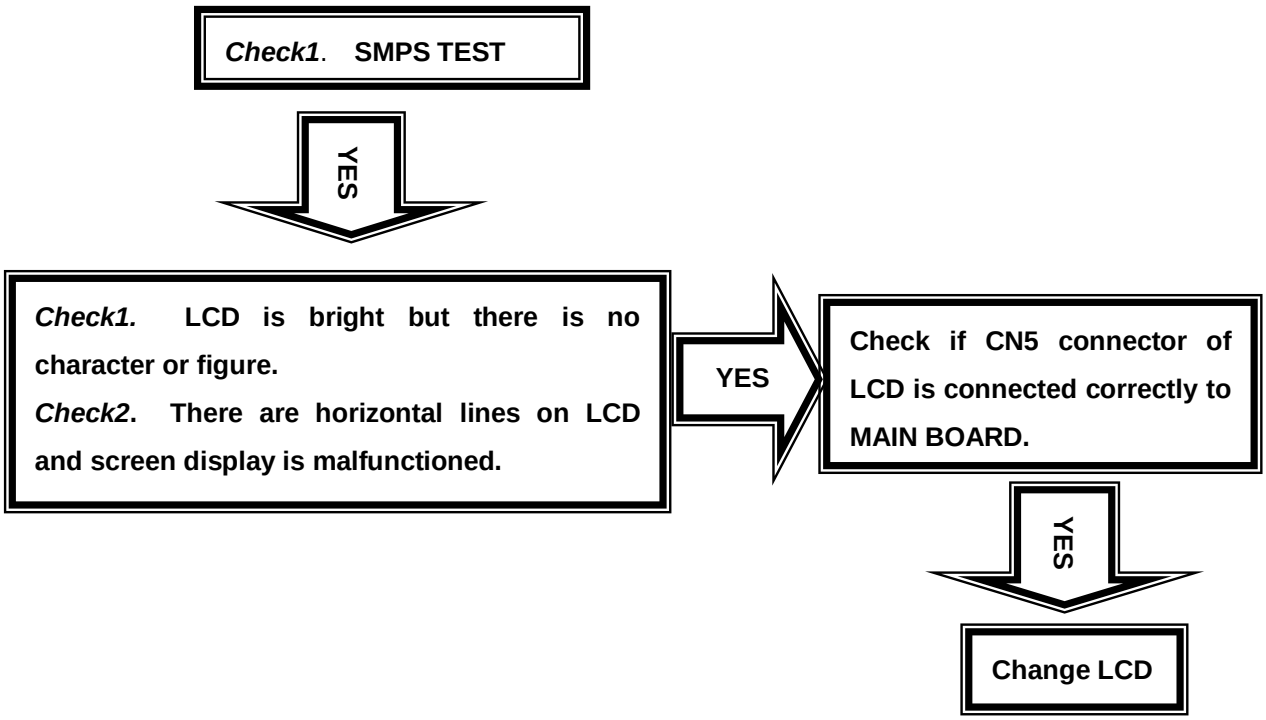
N	Part Code	Part Name	SUB Part Cod	SUB Part Name	Remarks	Q
A	B4EPCB0001-AA	PCB ASSY(HLM9K MAIN-101)			MAIN BOARD	1
B	B4EPCB0007-AA	PCB ASSY(LVDS-101)			LVDS BOARD	1
C	B4EPCB0006-AA	PCB ASSY(CMOS-101)			CMOS CAMERA BOARD	1
D	B4MASSY004-AA	B4_BASE-FRAME-ASSY			BASE FRAME	1
E	B4EPCB0008-AA	PCB ASSY(PRT-102)			AUTO THERMAL PRINTER BOARD	1
F	B4EPCB0005-AA	PCB ASSY(MEM SW-101)			MEMORY SWITCH BOARD	1
G	B4EPCB0010-AA	PCB ASSY(PD BAR)			PD BAR BOARD	1
H	B4EPCB0004-AA	PCB ASSY(UVBLUE SENSOR-101)			UV & BLUE SENSOR BOARD	1
I	B4EPCB0003-AA	PCB ASSY(UVBLUE LED-101)			UV & BLUE LED BOARD	1
J	720500A0006-A	LCD(GRAPHIC), TOUCH SCREEN			LCD TOUCH SCREEN	1
K	B4EPCB0002-AA	PCB ASSY(TOUCHIF-103)			LCD TOUCH INTERFACE BOARD	1
L	B4EPCB0011-AA	PCB ASSY(ANTENNA PCA-4606-2)	B4MASSY026-AA	WIFI-BD-ASSY	WIFI ANTENNA	1
M	B4EPCB0009-AA	PCB ASSY(WIFI-101)	B4MASSY026-AA	WIFI-BD-ASSY	WIFI BOARD	1
N	7604ACI5220-A	FUSE-INLET-SCHURTER			INLET	1
O	2100ALL0002-A	POWER SWITCH			POWER SWITCH	1
P	7501POW0009-A	SMPS(DELTA 65W)			POWER SUPPLY(SMPS)	1
1	B4EHAR0001-AA	HARNESS(MB(CN1) TO SMPS)	B4EHARS001-AA	HARNESS ASSY(MB(CN1) TO SMPS)	MB TO SMPS	1
2	B4EHAR0002-AA	HARNESS(MB(CN19) TO PRT PW)			MB TO PRT PW	1
3	B4EHAR0003-AA	HARNESS(MB(CN10) TO LVDS)			MB TO LVDS	1
4	B2EHAR3020-AA	HARNESS(FFC CABLE)			LVDS TO CMOS	1
5	B4EHAR0004-AA	HARNESS(MB(CN6) TO EXT USB)			MB TO EXT USB	1
6	B4EHAR0005-AA	HARNESS(MB(CN17) TO PRT DATA)			MB TO PRT DATA	1
7	B4EHAR0006-AA	HARNESS(MB(CN15) TO MEM SW)			MB TO MEM SW	1
8	B4EHAR0007-AA	HARNESS(MB(CN16) TO MEASURE LED)	B4EHARS002-AA	HARNESS ASSY(MB(CN16) TO MEASURE LED)	MB TO MEASURE LED	1
9	B4EHAR0008-AA	HARNESS(MB(CN13) TO PD BAR)	B4EHARS003-AA	HARNESS ASSY(MB(CN13) TO PD BAR)	MB TO PD BAR	1
10	B4EHAR0009-AA	HARNESS(MB(CN11) TO UVBLUE SENSOR)			MB TO UVBLUE SENSOR	1
11	B4EHAR0010-AA	HARNESS(MB(CN12) TO UVBLUE LED)			MB TO UVBLUE LED	1
12	B4EHAR0011-AA	HARNESS(MB(CN3) TO EXT RS232)			MB TO EXT RS232	1
13	B4EHAR0012-AA	HARNESS(MB(CN2 CN20) TO LCD)	B4EHARS004-AA	HARNESS ASSY(MB(CN2 CN20) TO LCD)	MB TO LCD	1
14	B4EHAR0013-AA	HARNESS(MB(CN18) TO WIFI)	B4EHARS005-AA	HARNESS ASSY(MB(CN18) TO WIFI)	MB TO WIFI	1
15	B4EHAR0014-AA	HARNESS(AC INLET TO CHASSIS GND)	B4EHARS006-AA	HARNESS ASSY(AC INLET TO CHASSIS GND)	AC INLET TO CHASSIS GND	1
16	B4EHAR0015-AA	HARNESS(AC INLET TO POWER SW)			AC INLET TO PW SW	1
17	B4EHAR0016-AA	HARNESS(POWER SW TO SMPS)			POWER SW TO SMPS	1

4.2. Inspecting SMPS



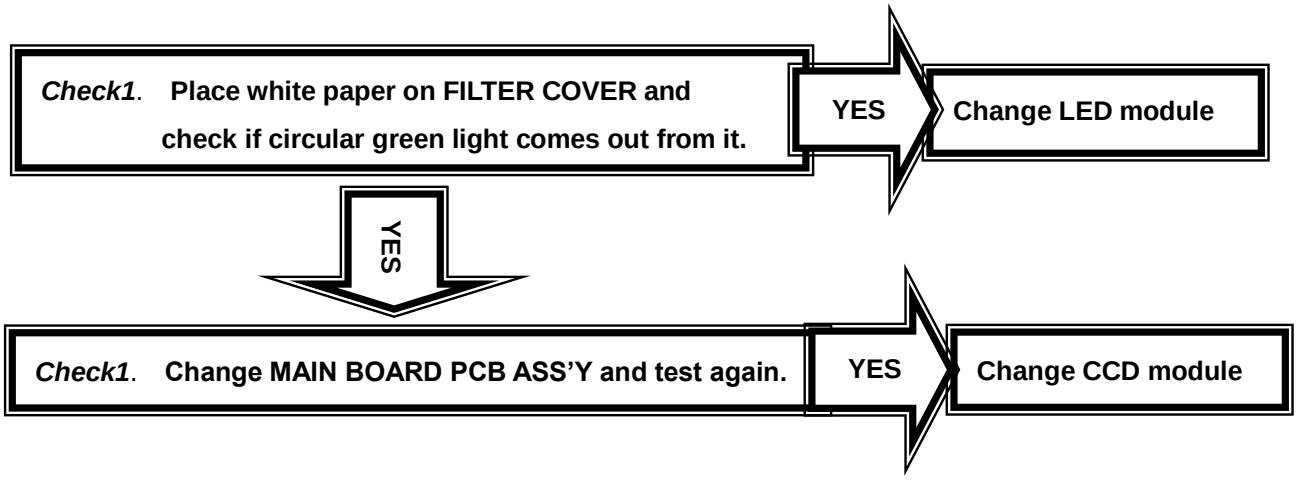
4.3. LCD TEST

- Measurement screen is not displayed…



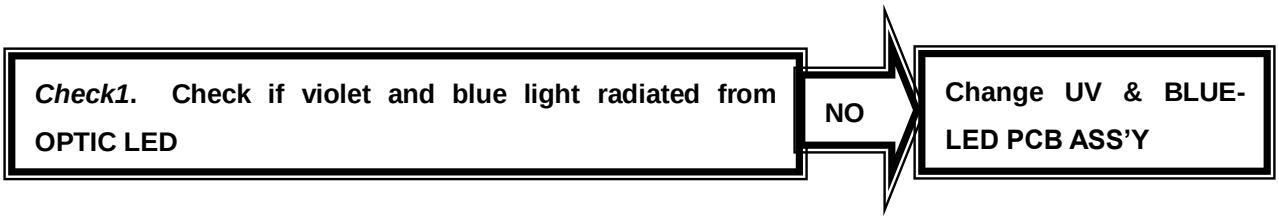
4.4. LED TEST

- Cross mark (+) isn't displayed in measurement waiting state…

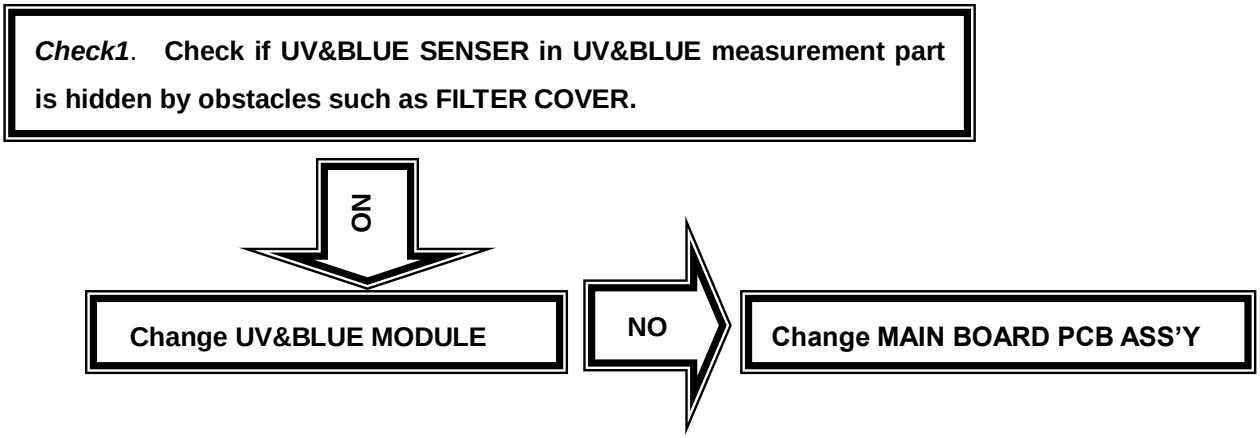


4.5. UV & BLUE MODULE TEST

- Check UV&BLUE-LED states



- UV&BLUE values in UV&BLUE mode should change(100% -> 0%).

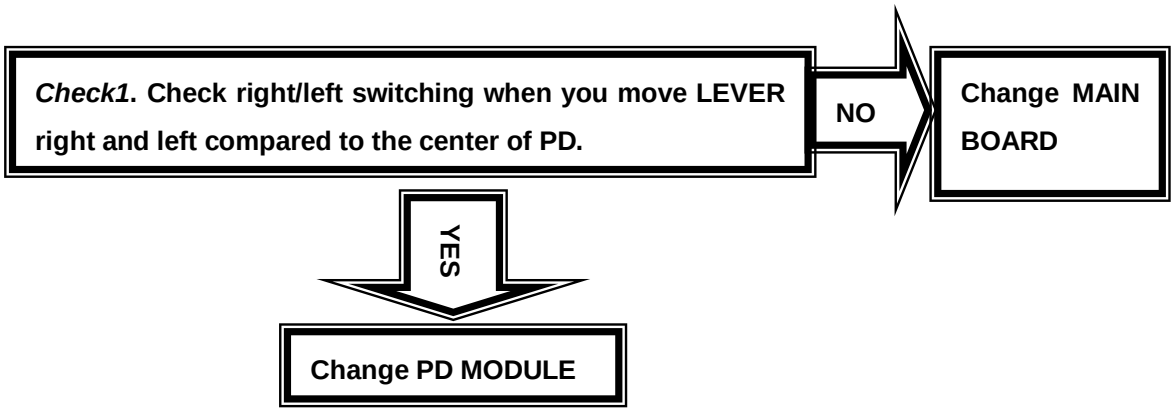


- You can get UV&BLUE values at most 100%.
  (When you get in the UV&BLUE mode, then popup message shows to adapt auto 100% function)

Check1. **Turn on the power switch and enter UV&BLUE MODE.**
Check2**. Turn variable resistance in UV&BLUE-REC PCB with cross screw driver.**
Check3**. Press CAL BUTTON among MODE BUTTON and you can get 100%.**

4.6. PD TEST

- PD value is not displayed…



4.7. THERMAL PRINTER TEST

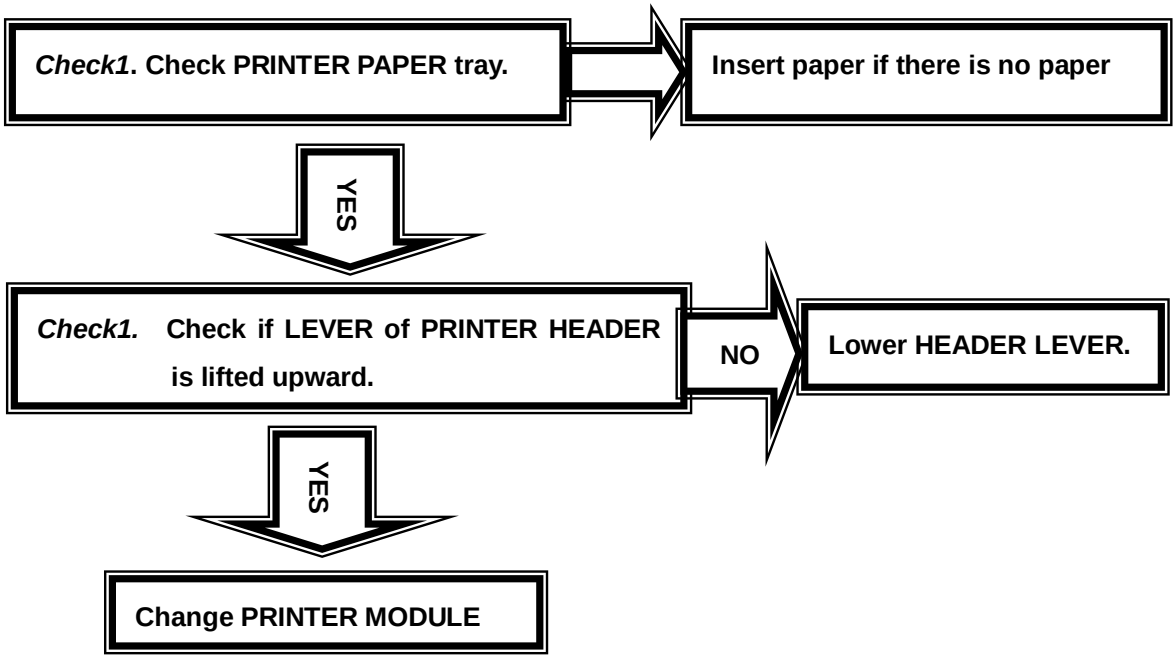
- "PRT: HEAD UP" message is displayed on LCD…

> ***Check1.*** **Open PRINTER COVER and check if HEADER LEVER towards upside.**

- "PRT: PP EMPTY" message is displayed on LCD when pressing PRINTER BUTTON…

> ***Check1.*** **Open PRINTER COVER.**
> ***Check2.*** **Check PRINTER PAPER tray.**
> ***Check3.*** **Fill up PRINTER PAPER if PRINTER PAPER is empty or near empty.**

- PRINTER PAPER doesn't feed properly…



5. How to upgrade the OS program

5.1. Introduction

Downloading program for HLM-9000 with USB cable provide downloading function of the firmware software from PC to Lensmeter.

An administrator of the Lensmeter hardware can receive the Firmware by e-mail or else and load it to his/her lensmeter by this downloading program when the new upgrade version of firmware comes out. If there is PC with Windows operating system and USB cable connected to the Lensmeter, with simple process about 1 minutes, he/she can upgrade the performance of his/her Lensmeter without sending and receiving it to the agency.

This downloading program is DLP application.

Downloading process is checked by HLM-9000 dipslay.

Check the following item and process before installing and running this software:

- Version of the Lensmeter
- Connect USB port between PC and Lensmeter
- Power on Lensmeter
- Check COM port of the PC connected to Lensmeter(if it is first time connection, you may wait some time to recognize COM port)
- New firmware binary image file for the Lensmeter

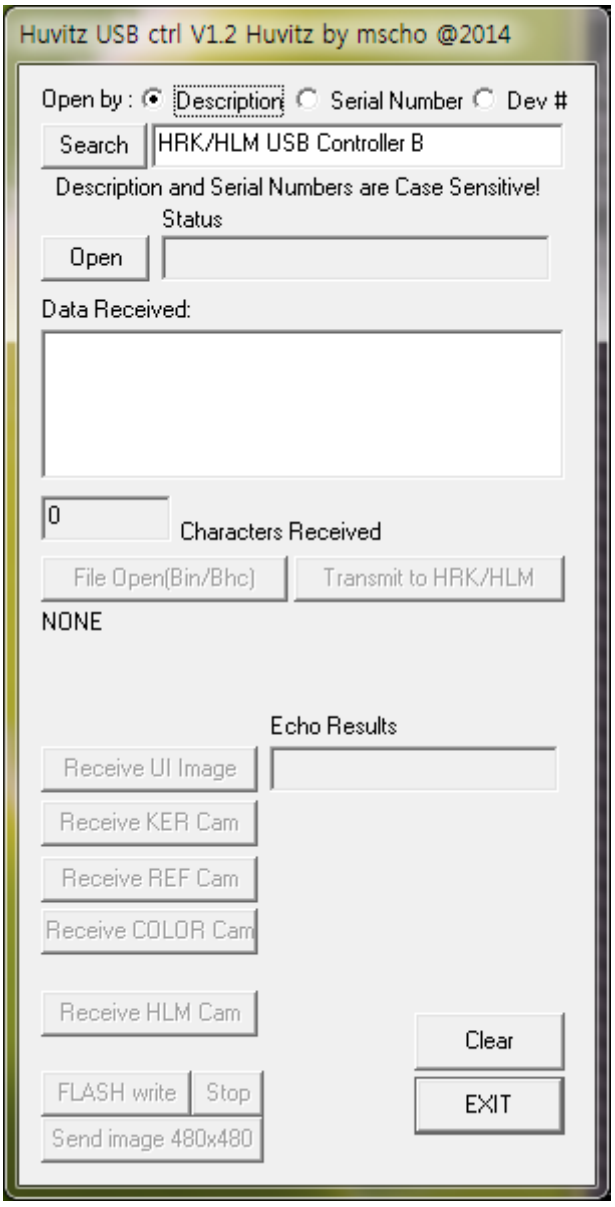
See the operation manual for the Lensmeter to learn how to upgrade OS program.

.

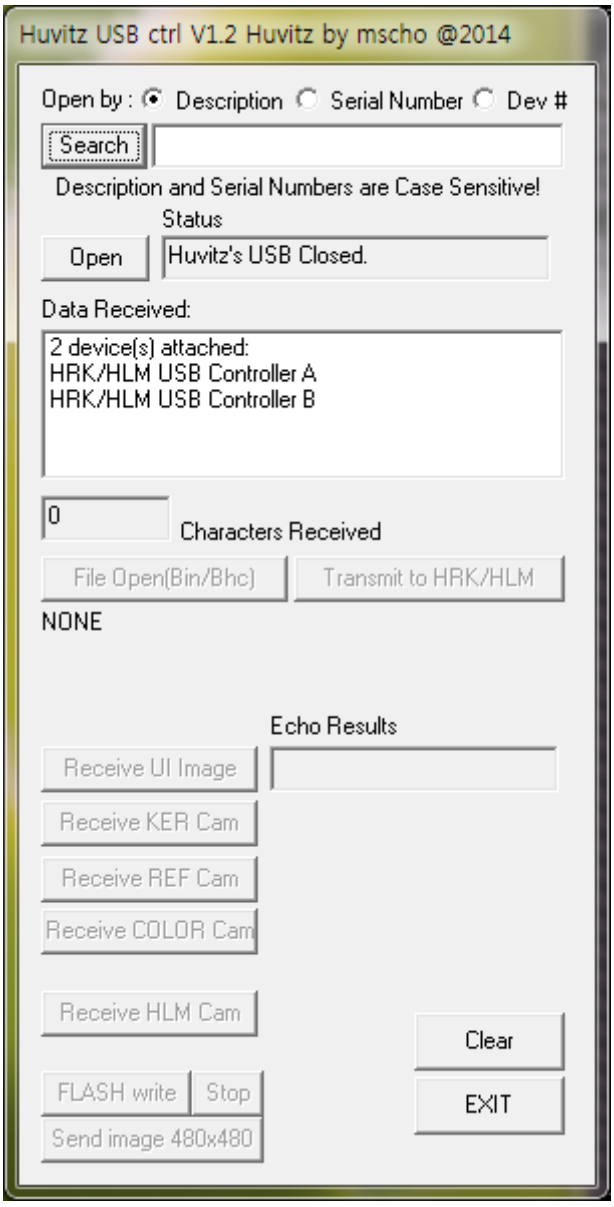
5.2. How to upgrade the OS program using DLP application in HLM Machines

A. Copy the DSP application files. DSP consists of two files: the executable file (= HFCUSB.exe), the dll files(= cv100.dll, cxcore100.dll and highgui100.dll). It is no need to install it in your desktop computer. Therefore just copy the files to the specified directory.

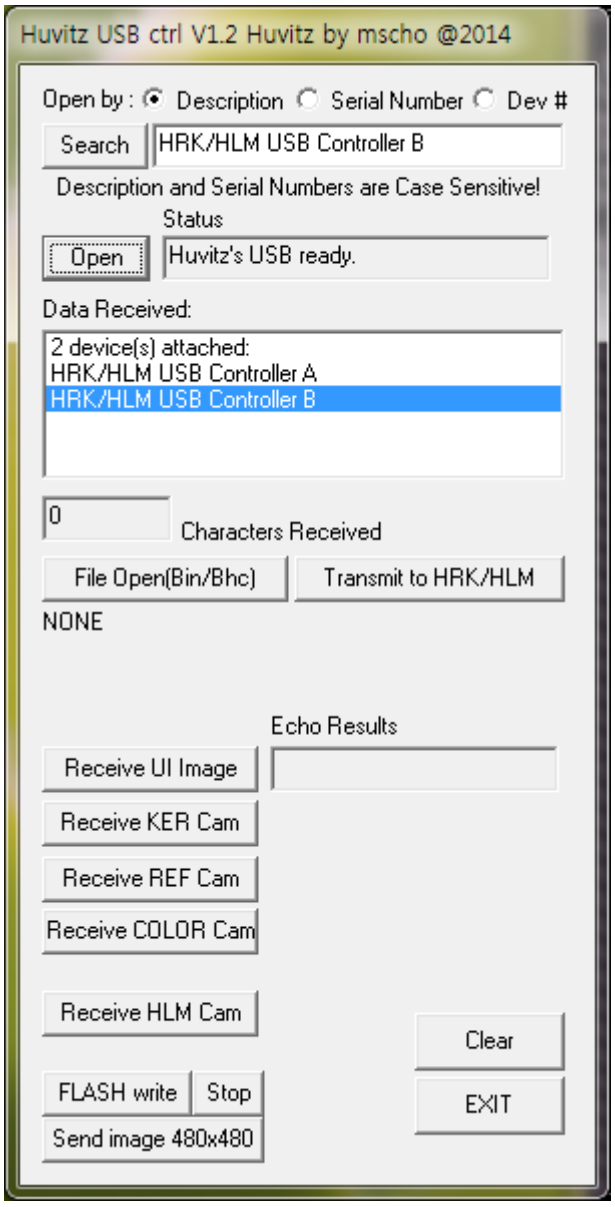
B. Execute the DSP application.



C. Press ‘Search’ button of left-upper area, then you can see as below if connecting is corrected.

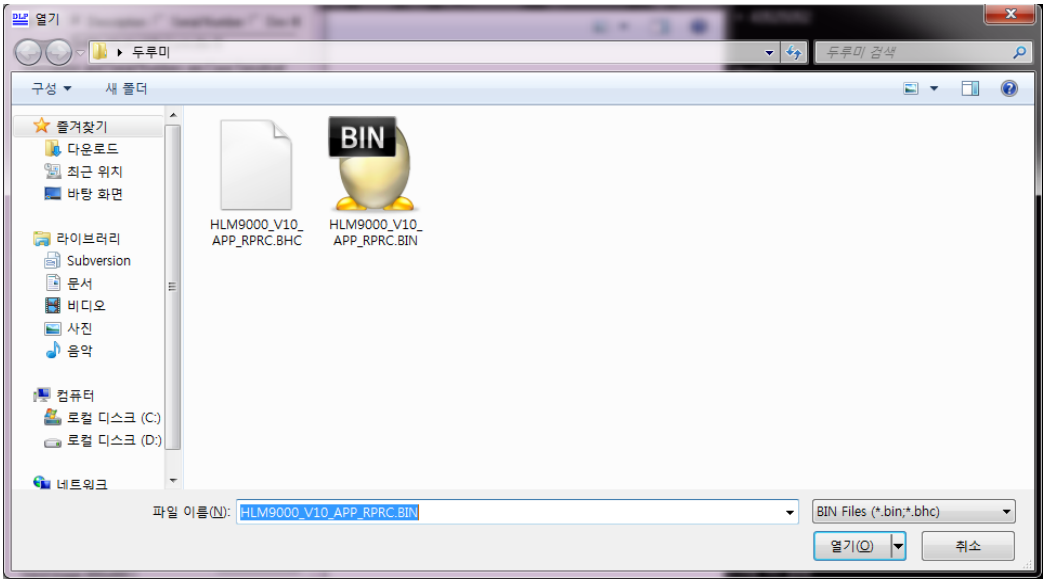


D. Select ‘USB Controller B’ of ‘Data Received’ display and press ‘Open’ button. Then you can see below screen if connecting is corrected



E. Check the ‘Status’ which located right side of ‘Open’ button.

F. Press ‘File Open (Bin/Bhc)’ button to select upload file.



G. Press ‘Transmit to HRK/HLM’ button to transmit.

H. Then you can see the transmission process on HLM-9000 display.

I. Finally turn off and on the machine.

Appendix:

Compare HLM-7000 and HLM-9000

Model	HLM-7000	HLM-9000
Sphere	0D ~ ±25D (0.01/0.125/0.25)	0D ~ ±25D (0.01/0.06/0.12/0.25)
Cylinder	0D ~ ±10D (0.01/0.125/0.25)	0D ~ ±10D (0.01/0.06/0.12/0.25)
Axis	0° ~ 180° (1° step)	0° ~ 180° (1° step)
Add	0 ~ 10D (0.01/0.125/0.25)	0 ~ 10D (0.01/0.06/0.12/0.25)
Wavelength	630nm(Red)	545nm(Green)
Prism	0 ~ 10△ (0.01/0.125/0.25)	0 ~ 20△ (0.01/0.06/0.12/0.25)
Measurable lens diameter	Ø 15 to 115mm	Ø 15 to 120mm
Method	4 point	Hartmann Sensor with 81 Multiple Measuring Points
UV	0~100%	0~100%
Design/Size	190(W)X237(D)X377(H), 5.5kg	222(W)X240(D)X370(H), 5.4kg
Monitor size	70° Tiltable 5.7" Color LCD Panel(320*240)	85° Tiltable 7" Color LCD IPS Panel(800*480)
Touch panel	X	O
Blue lens measurement	X	O
Interface	RS-232C	RS-232C, USB A Port
Wireless Interface	X	O
Printer	Manual cutter Printer	Auto cutter Printer
Foot switch	O	X
RF emissions CISPR 11	Class A	Class B