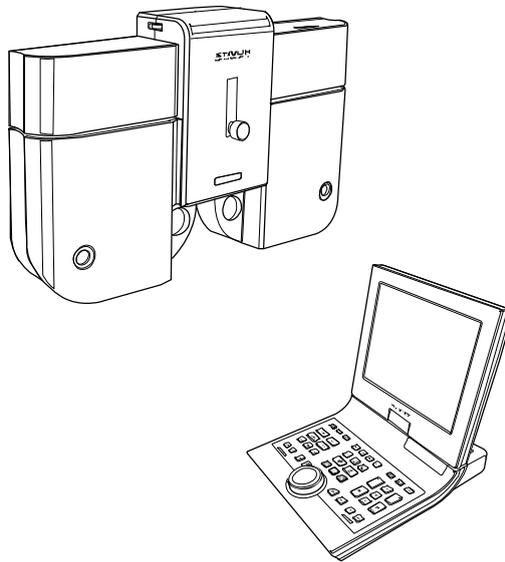


Service Manual

Digital Refractor HDR-7000



HUVITZ Co., Ltd.

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1. Introduction

This manual provides information on the maintenance of HUVITZ refractor Model HDR-7000. For correct maintenance, it is necessary to understand this manual thoroughly before beginning any treatment on the instrument.

In case the instrument cannot be repaired by the procedures described in this manual, contact and inform our technical service department of the detailed information about your problem with product number and software version.

The design or specifications is subject to be modified without advanced notice of improvement.

2. Before Getting Started

2.1 Checking Software Versions

It is very essential for the engineers who perform maintenance or troubleshooting on the Digital Refractor to check version information of the system before starting the job. Also it is always required to check the information before contacting the Technical Support Department at Huvitz.

HDR-7000 Digital Refractor is consists of three parts, Refractor Body, Operation Panel and Junction Box. The Refractor Body is functionally divided into three parts, upper head, right and left battery. Each part of them has its own driving mechanism and driving software. The Operation Panel is functionally divided into two parts, GUI and communication interface. Each part of them also has its own software.

Refer to the appendix for more detailed information and how-to. The appendix also includes information about how you can upgrade the software to latest version.

2.2 Setting-Up Initial System Parameters

It is very common to interface several different optometric instruments with HDR-7000 Digital Refractor. But it varies from customer to customer that what kinds of and how many instruments are interfaced with. So it's required for the engineer who installs and sets up refraction system at customer's place to set up initial system parameters according to customer's needs and environment.

Parameters in the following are the most common parameters that are required to set after installation.

- ◆ Chart device and connection style
- ◆ Chart connection type (serial / IR)
- ◆ Chart notation (decimal / feet / meter) & Controller type
- ◆ Whether to use PC interaction or not (yes / no)

There are more parameters that customer can set up according to his or her flavor. Just refer to the Operator's Manual and find the chapter that explains 'System Configuration' menu.

2.3 Using Engineer Menu Mode

When you're referring this manual you may often encounter parts that ask you to execute 'Engineer Menu' mode to check or fix something. The Engineer Menu mode provides special functions to aid engineers easily perform maintenance and troubleshooting. Refer to the appendix for more detailed

information about the mode.

3. Confirmation Check Procedure

3.1 Purpose of confirmation check

The purpose of inspecting the Huvitz product before taking it out for installation at customer's place is to find out possible defects or changes on original alignment made on them during the shipping and to confirm the settings for normal operation.

3.2 Confirmation check

Confirmation check includes the procedures listed below.

- ◆ Checking the initialization :
After test installation, check if it finishes its initialization sequence without any abnormal symptom such as strange noise or smell, abnormal movement.
- ◆ Checking normal operation by self-execution :
Once it's turned on and ready, perform the self-execution mode to see if it operates without problem. It's also aimed to give some stress on the mechanical parts of the Refractor Body.
- ◆ Eye inspection on the Refractor Body :
After the self-execution, check with your eyes if the Refractor Body functions and responses correctly.
- ◆ Eye inspection on the Operation Panel :
Check with your eyes if the Operation Panel functions correctly.
- ◆ Checking data communication :
Install and interface more optometric instruments with Digital Refractor and check if they are interacts well with it.

3.2.1 Checking the initialization

Preparations

Install a HDR-7000 digital refraction system to be checked.

Check if the HDR-7000 system is performing the initialization sequences correctly..

Procedure

To begin a aging test, press the following key sequences on the Operation Panel.

- ALT + MENU
- ALT + START

- ALT + NEXT

3.2.2 Post aging test procedures for Main Body

Check the PD adjustment function.

- Press PD button.
- Check if the PD-check lenses are inserted properly.
- Turn the dial clockwise or counter-clockwise several times.
- Press PD button again to finish this step.

Check the convergence function.

- Press FAR and NEAR button on the display several times.
- Check if the Refractor Body is converging correctly.
- Stop this step when the HDR-7000 Refractor Body is in FAR mode.

Check the initialization sequences again.

- Turn off the power.
- Turn on the power again.
- Check if the disk plates in the Refractor Body are aligned properly after the initialization sequences.
- Repeat this step 3 to 5 times.

Check the auxiliary lenses.

- To enter the lens-checking mode, press the following key sequences.

ALT + MENU

ALT + START

ALT + TEST

CheckLens(F3)

- Change the selection of eye to binocular:

By pressing the OU button.

- Skip SPH and CYL lenses by pressing '+' button 4 times.
- Check the auxiliary lenses one by one.

By comparing the lenses in the test windows of Refractor Body with the information on the LCD of the Operation Panel.

- Finish this step when all the auxiliary lenses are checked.

By pressing the MENU button and CANCEL(F7).

Check the direction of rotary prism lenses.

- Reset the Refractor Body
By pressing the CLEAR button twice.
- Select rotary prism lenses
By pressing the BIBO or BDBU button.
- Check if the direction of prism base is down.

Check the initial position of the dual cross cylinder lenses in cylinder mode.

- Select dual cross cylinder lenses on the right
By pressing the dots group chart button twice.
- Check if the split line of the lens is vertical.
- Change the selection of eye to left
By pressing the LEFT button.
- Check if the split line of the lens is vertical
(The split line is horizontal in <+> cylinder mode).

3.2.3 Checking procedures for the Operation Panel

Check the touch panel.

- By touching small icons on the display to see if touched position is correctly recognized.

Check if the printer prints properly.

Check the buttons.

- Check the buttons by the Button Test menu in the Engineer menu mode.
 - Execute Engineer menu mode.
 - Execute Button Test menu by pressing SHIFT+F1(BUTTON).
 - Press the buttons indicated on the menu screen. If a button is not recognized correct, it gives 2 more times of trial. If it finally fails recognizing a button, it records the button as failed.
 - Press CANCEL(F7) to stop the test and return to menu mode.

3.2.4 Checking procedures for data communication

Checking with Ref/Keratometer.

- Check the Option menu of MRK or HRK for the communication.
Set the BPS option to 9600.

- Measure a model eye or a patient.
- Press PRINT button for transferring the measured data.
- Press MRK button with SHIFT pressed on the Operation Panel after the MRK or HRK finishes printing.
- Select and load the data received.
- Check if the data is correct.

Checking with Lensmeter.

- Check the Option menu of CLM or HLM for the communication.
 - Set the RS232 option to LMTORK.
 - Set the BPS option to 9600.
- Measure a lens.
- Press PRINT button for transferring the measured data.
- Press CLM button with SHIFT pressed on the Operation Panel after the CLM or HLM finishes printing.
- Select and load the data received.
- Check if the data is correct.

Checking with CCP-3100

- Check the System Settings menu of the Operation Panel for CCP-3100.
 - Set the Chart Connection option to SERIAL.
 - Set the Chart Device option to CCP-3100.
- Store the change by pressing the button EXE, SET or OK.
- Press some chart buttons and check the response of CCP-3100.

Checking with CDC-4000

- Check the System Settings menu of the Operation Panel for CDC-4000.
 - Set the Chart Connection option to SERIAL.
 - Set the Chart Device option to CDC-4000.
- Store the change by pressing the button EXE, SET or OK.
- Press some chart buttons and check the response of CDC-4000.

Checking with HDC-7000

- Check the System Settings menu of the Operation Panel for HDC-4000.
 - Set the Chart Connection option to SERIAL or IR.
 - Set the Chart Device option to HDC-7000.

- Store the change by pressing the button EXE, SET or OK
- Press some chart buttons and check the response of HDC-7000.

4. Disassembling procedure and Parts Description

4.1 Removing of the main body covers

4.1.1 Removing the Rear cover of the main body

- Unscrew the screws and remove the Rear cover Ass'y R
(or Rear cover Ass'y L)

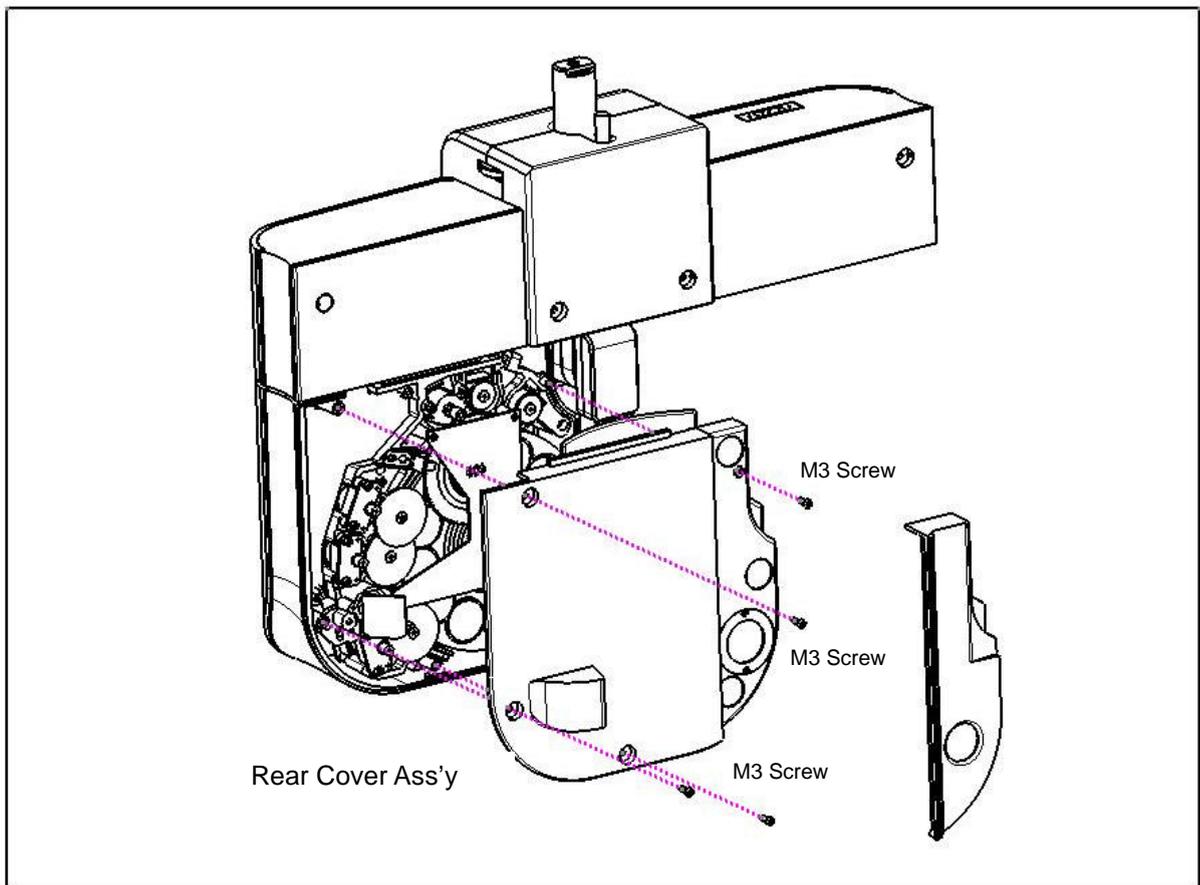


Fig. 3-1-1

4.1.2 Removing the Front covers of the main body

- Unscrew the screws and remove the Front cover Ass'y R (or Front cover Ass'y L)

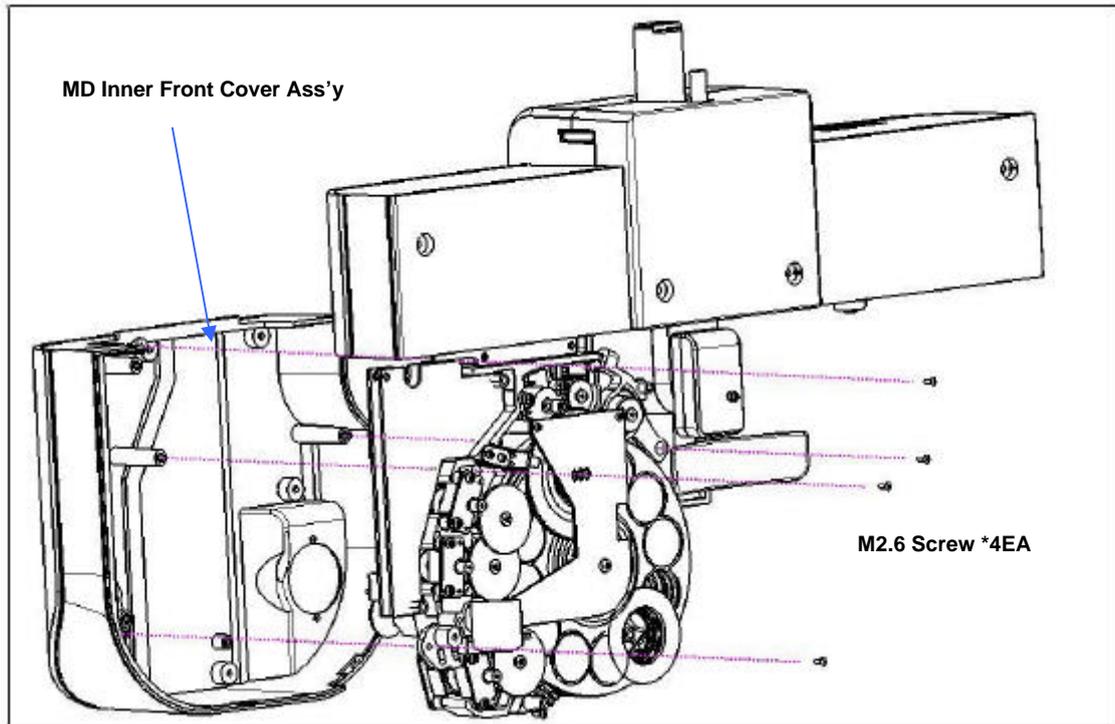
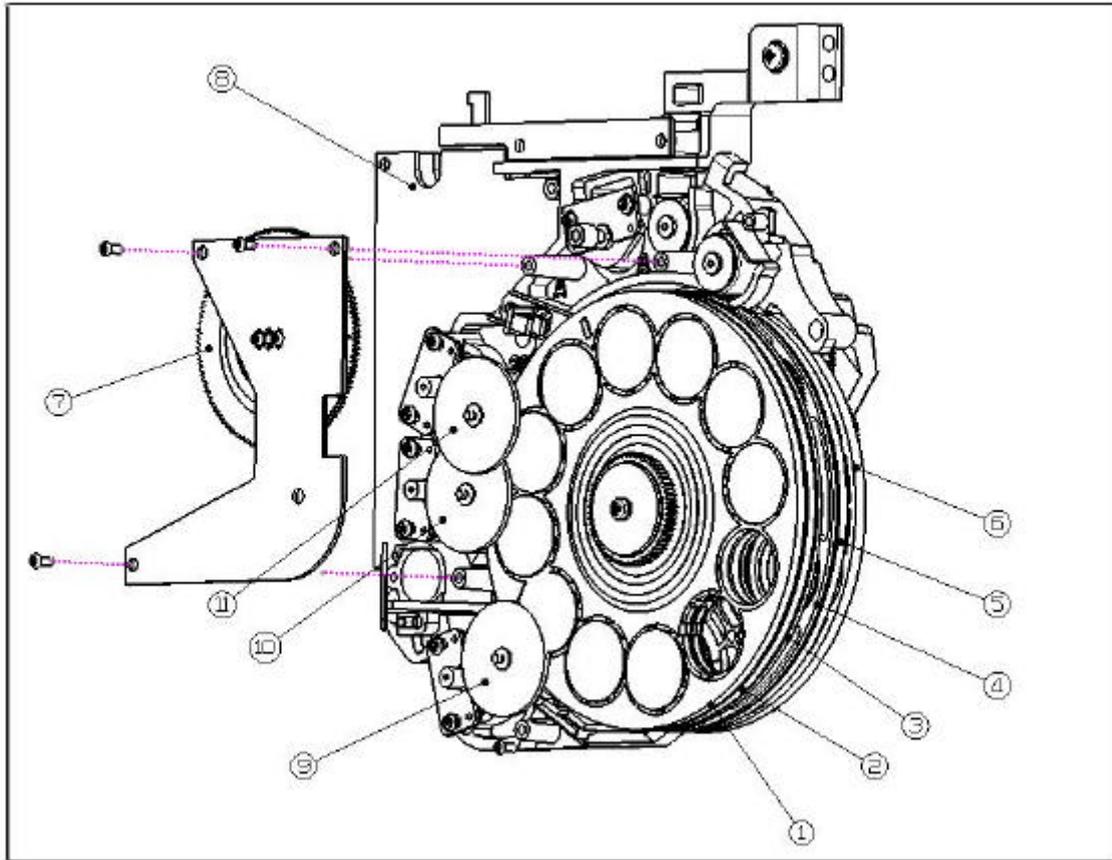


Fig. 3-1-2

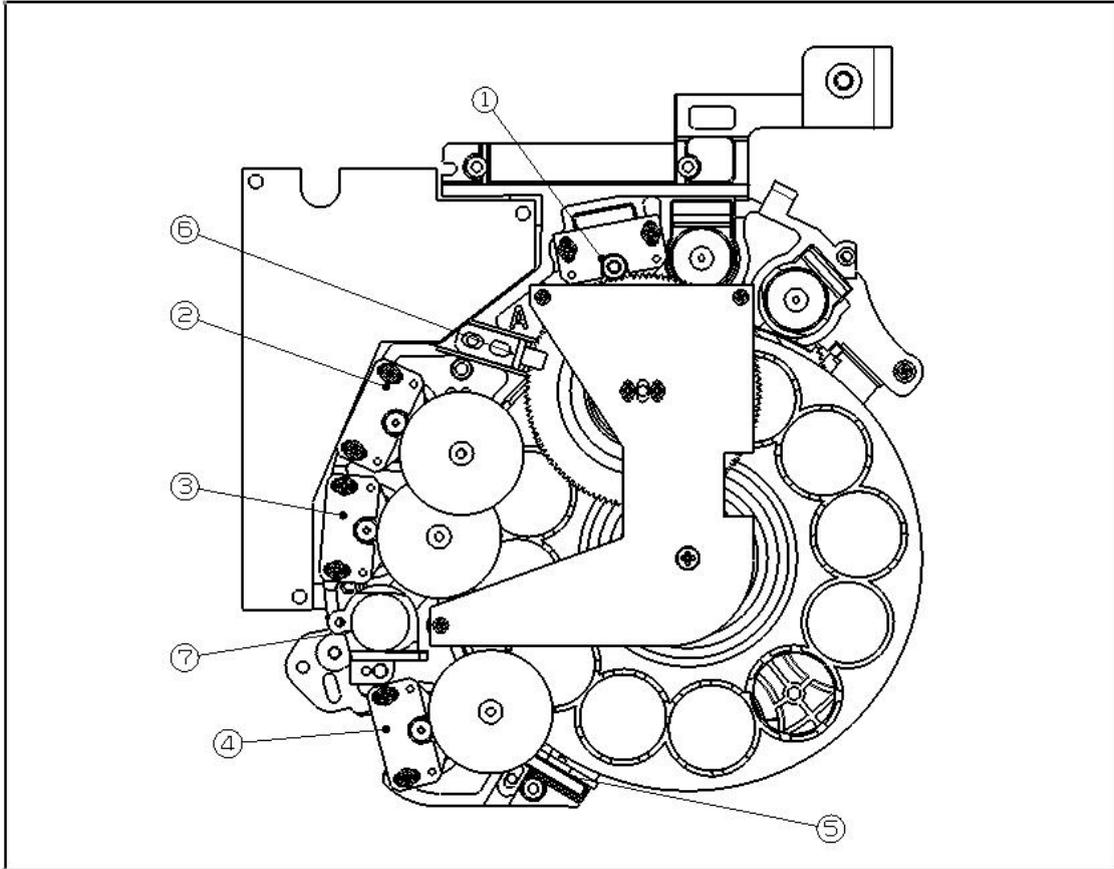
4.2 Description of Parts

4.2.1 Main body (#1)



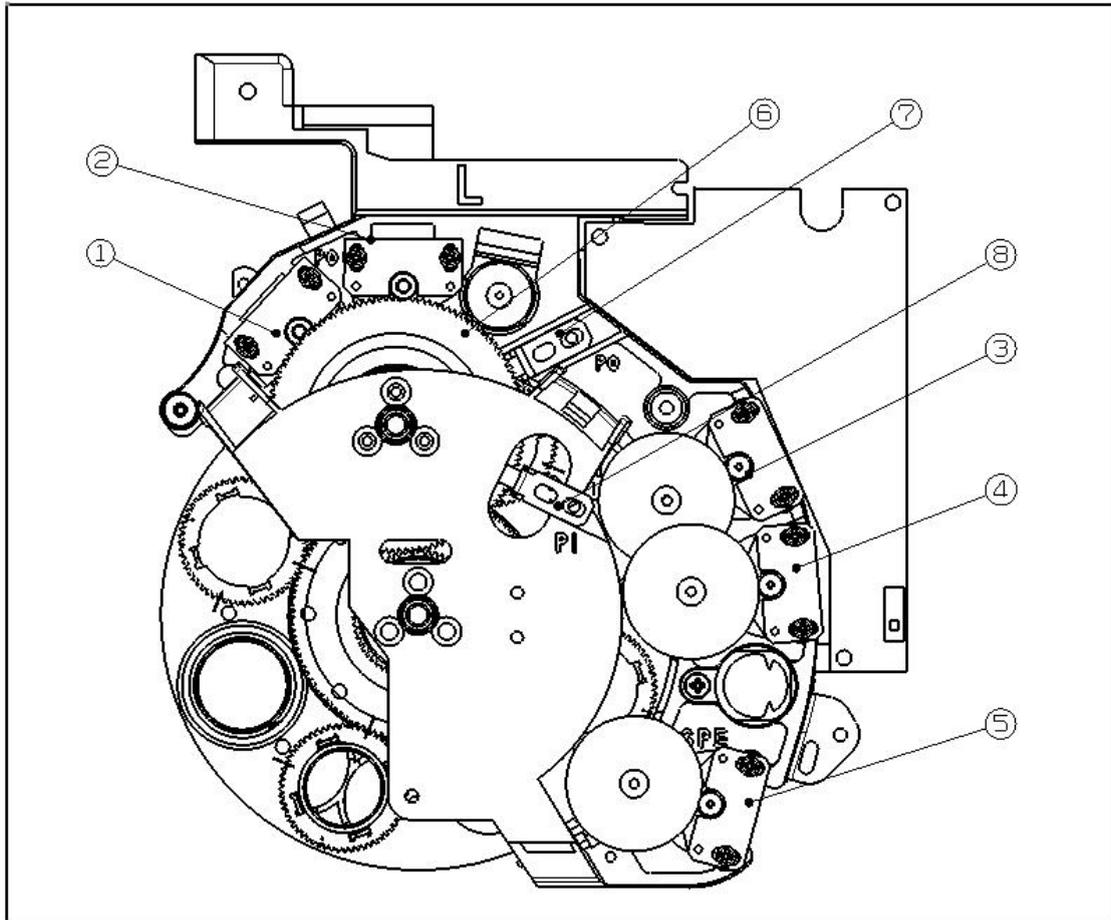
NO.	PART NAME
1	DISK_1 ASS'Y
2	DISK_2 ASS'Y
3	DISK_3 ASS'Y
4	DISK_4 ASS'Y
5	DISK_5 ASS'Y
6	DISK_6 ASS'Y
7	SUB1 GEAR 120 ASSY
8	MOTOR_BOARD
9	CONNECTION_GEAR SERIES
10	CONNECTION_GEAR SERIES
11	CONNECTION_GEAR SERIES

4.2.2 Main body (#2)



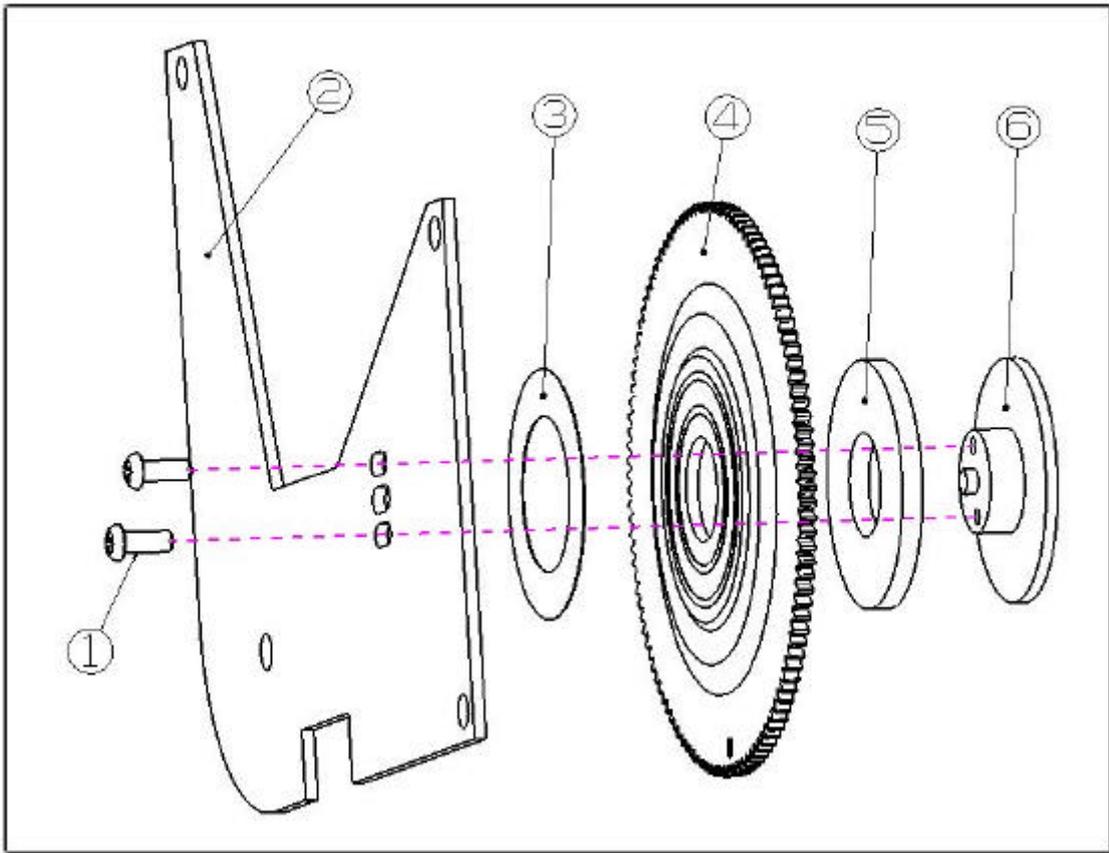
NO.	PART NAME
1	Gearer Motor Ass'y
2	Disk_1 Motor Ass'y
3	Disk_3 Motor Ass'y
4	Disk_2 Motor Ass'y
5	Hole Sensor Ass'y
6	Sylinder PI Ass'y
7	Frame Sub Ass'y

4.2.3 Main body (#3)



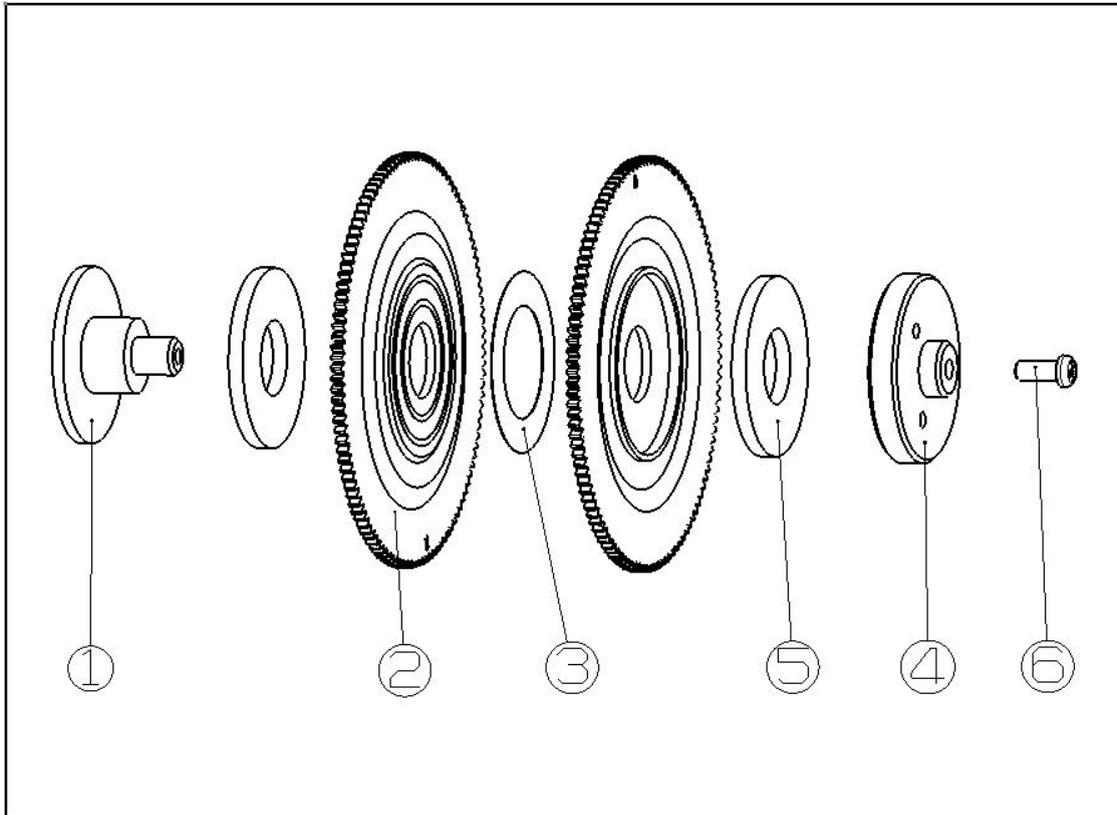
NO.	PART NAME
1	Prizm Out Motor Ass'y
2	Prizm Inner Motor Ass'y
3	Disk_4 Motor Ass'y
4	Disk_5 Motor Ass'y
5	Disk_6 Motor Ass'y
6	SUB1 GEAR 120 DUAL ASSY
7	Prizm Out PI Ass'y
8	Prizm Inner PI Ass'y

4.2.4 SUB1 GEAR 120 DUAL ASS'Y



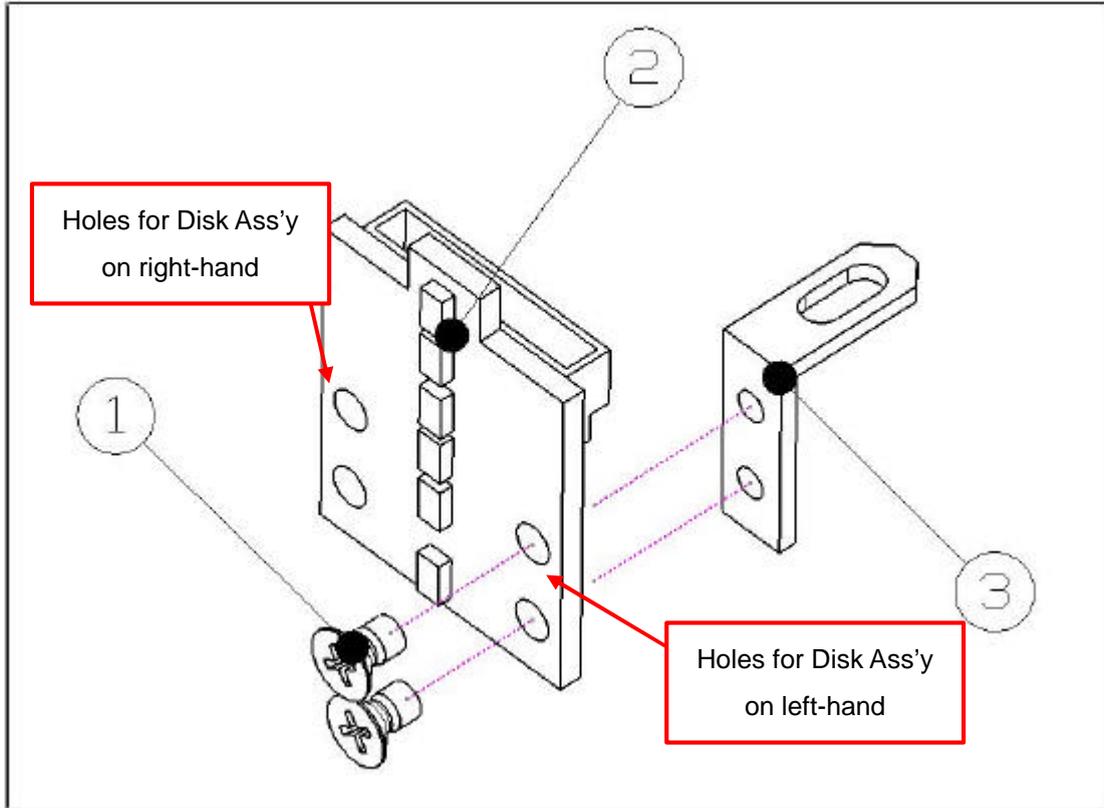
NO.	PART NAME
1	M2*5 Screw
2	main_shaft_fixer
3	Teflon_dia24*dia15*T0.1
4	sub1_gear120
5	NTB1024
6	sub_gear_axis

4.2.5 SUB1 GEAR 120 ASS'Y



NO.	PART NAME
1	sub_gear_2_shaft
2	NTB1024
3	sub1_gear120
4	Teflon_dia24*dia15*T0.1
5	main_shaft_fixer
6	M2*5 Screw

4.2.6 HALL Sensor Ass'y



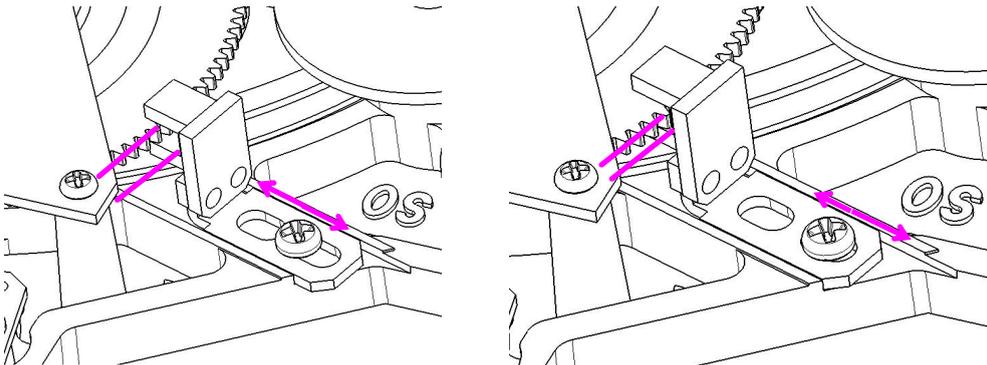
NO.	PART NAME
1	PCB ASSY
2	magnet sensor guide
3	Flat M3*6 Screw

4.3 Replacement procedure of each sensor

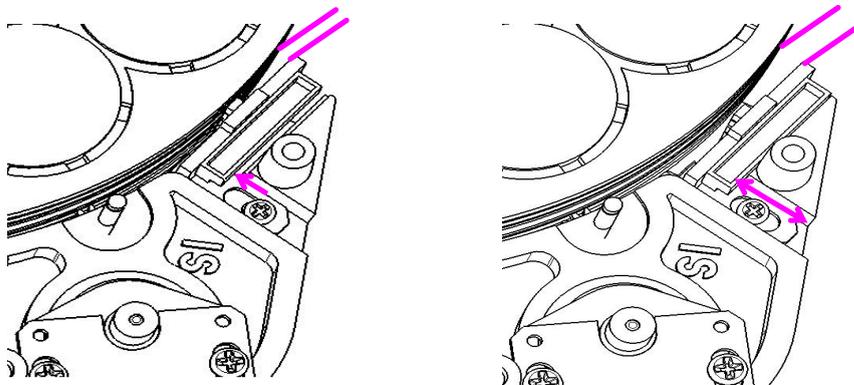
- (1) Remove the upper front, upper Rear covers of the main body, and front and Rear covers
- (2) Disconnect the connector of the sensor to be replaced.
- (3) Unscrew the screws and remove PI or HALL sensor.

* With a cutter knife, draw lines along the sensor board shape on a metal plate as shown in the right figure, so that you can see the original fixing position later.

- (4) Adjust the position of sensor so that it has proper distance from sensing target.

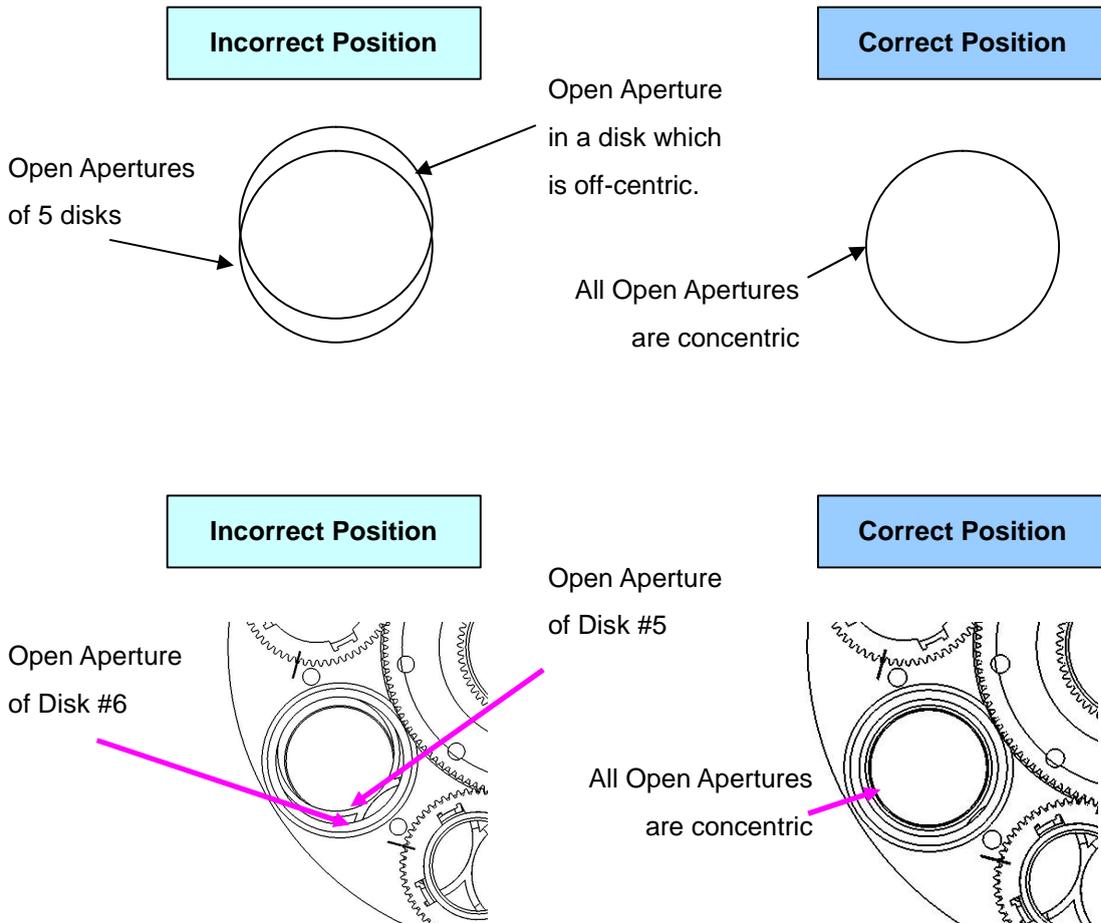


<Adjusting the position of PI sensor>

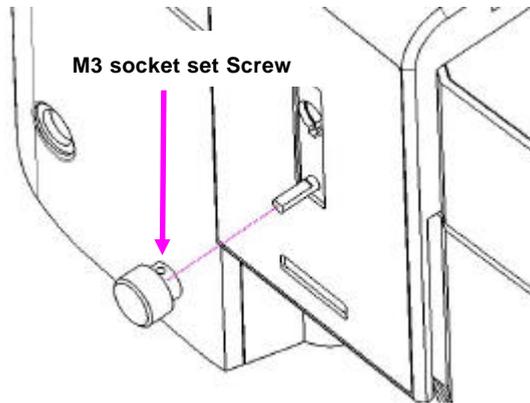


<Adjusting the position of HALL sensor>

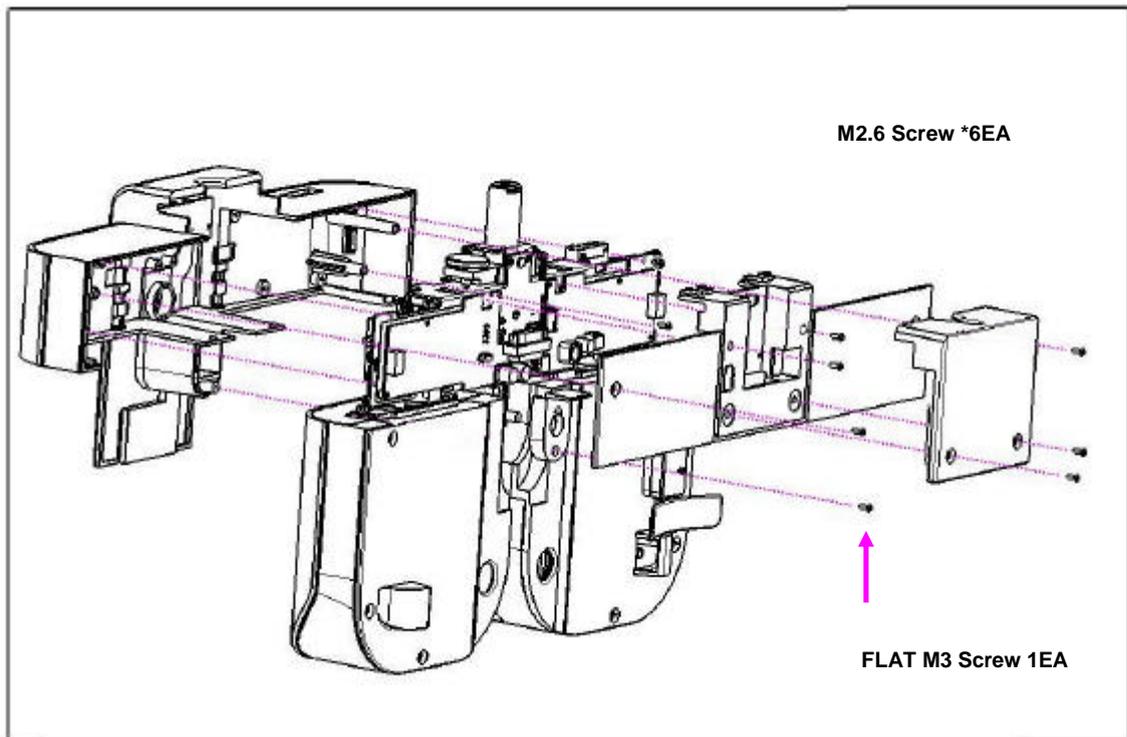
- Once you replace sensor with this procedure , you must check its original position line carefully.
- After turning on power, check the Initial positions of Open Apertures. All disk's Open Aperture must be concentric.



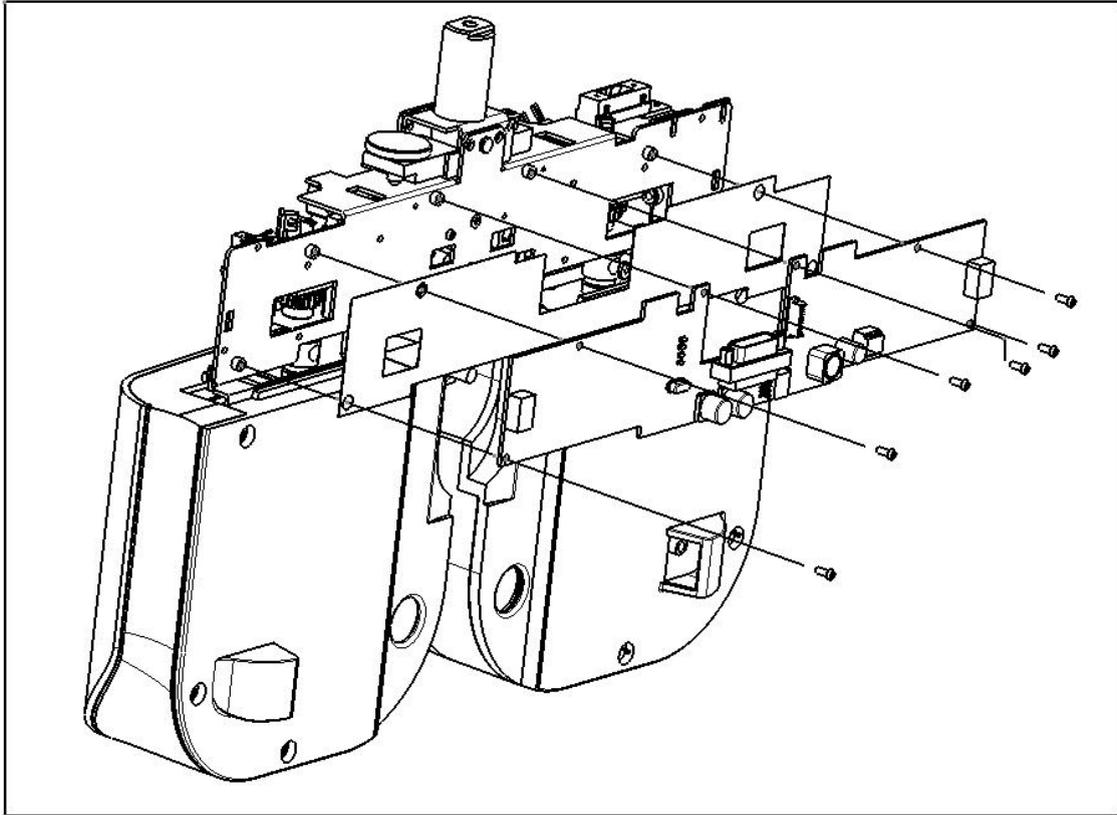
4.4 Removing procedure of the main body covers.



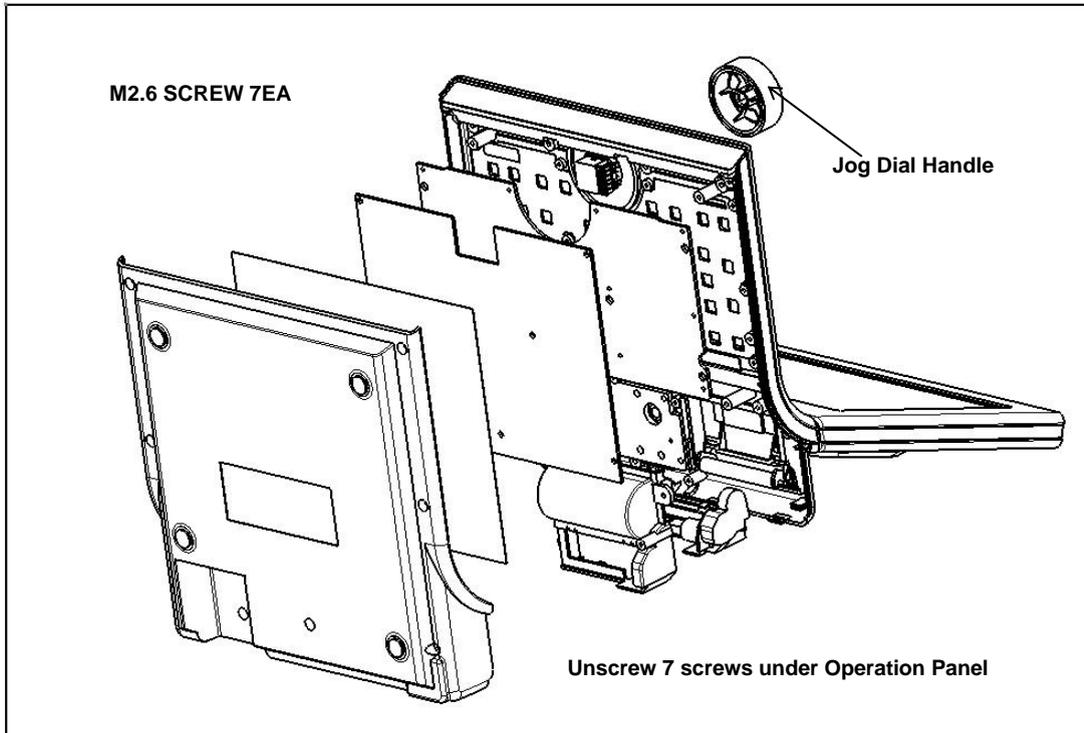
Remove the Forehead Adjustment knob first.



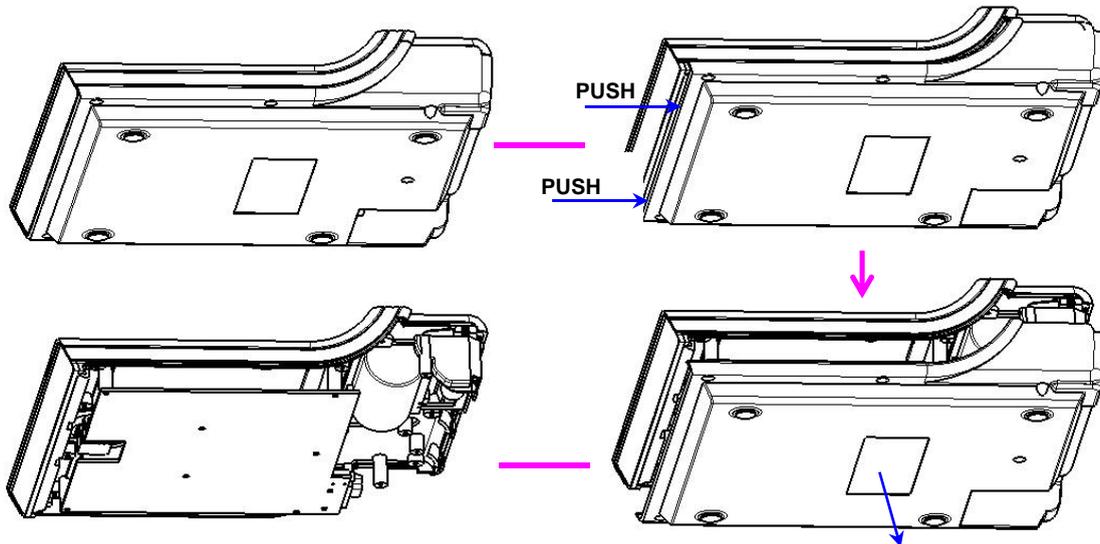
4.5 Replacement procedure of the PT BOARD.



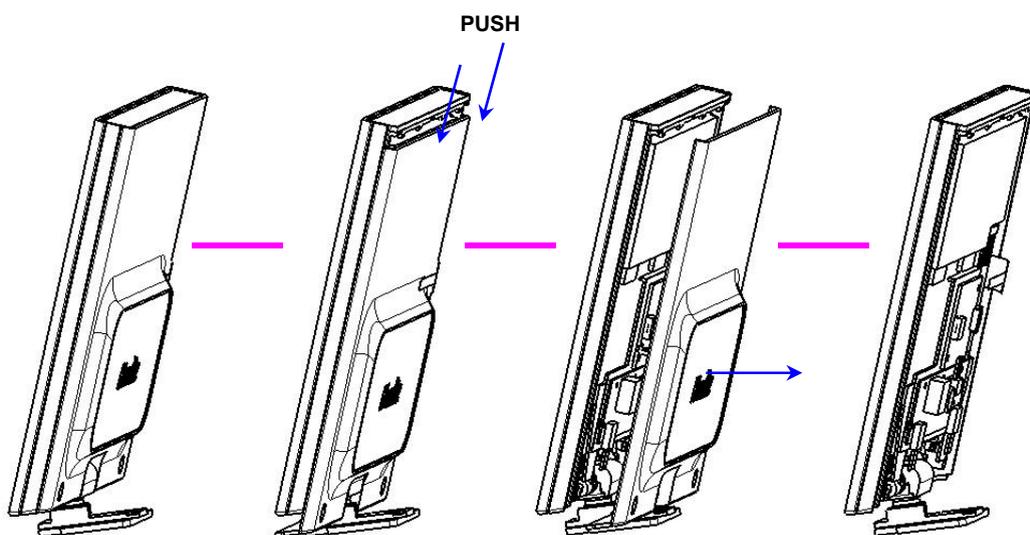
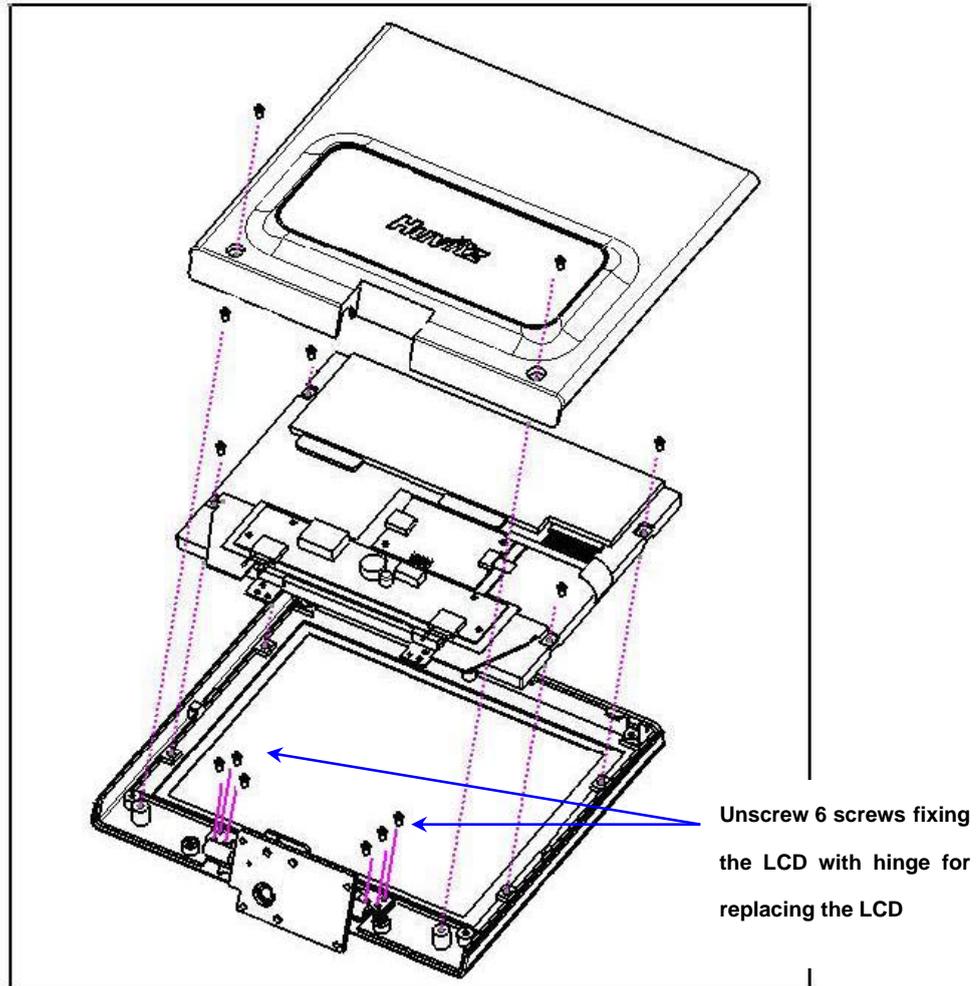
4.6 Operation panel disassemble procedure.



- Removing procedure of the OP bottom case



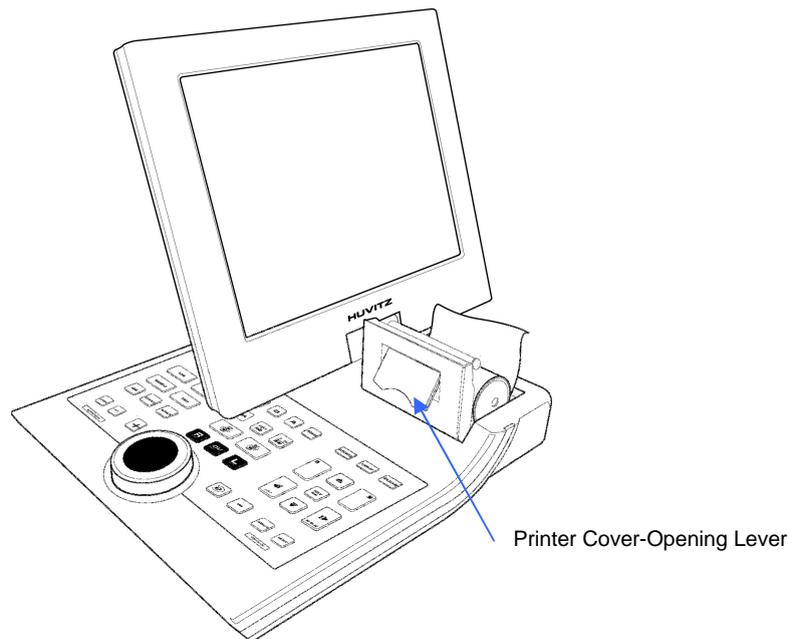
4.7 Replacement of Operation panel LCD



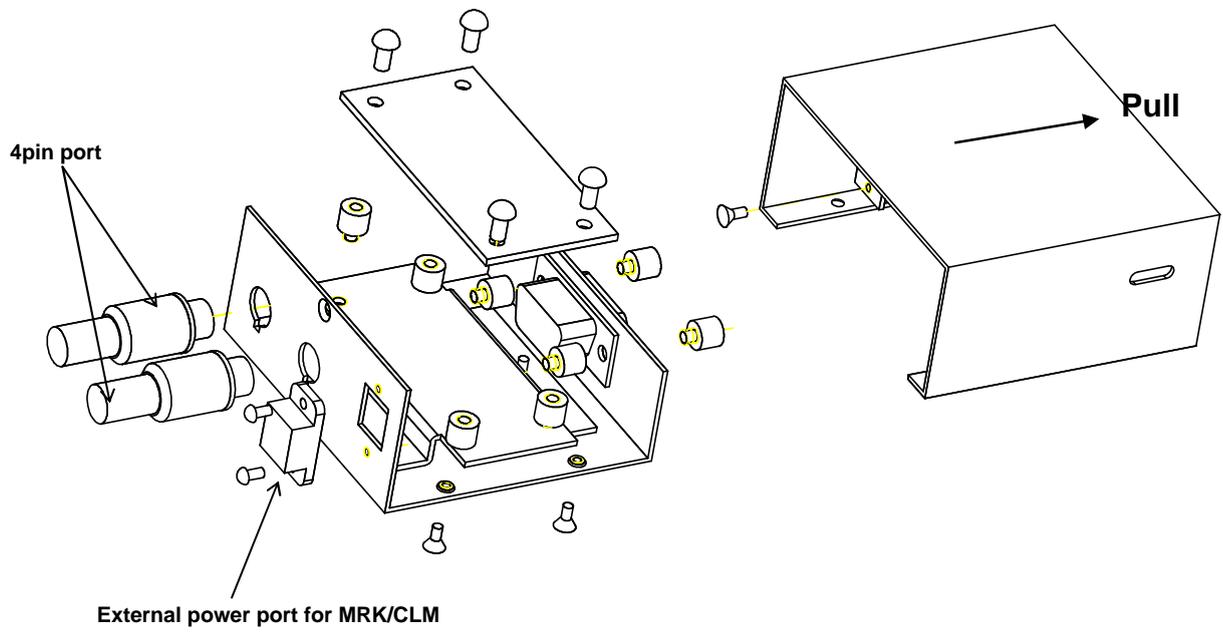
4.8 Replacing Printing Paper

Replace the roll of printing paper as soon as possible after the red line appears on the paper according to the procedure below:

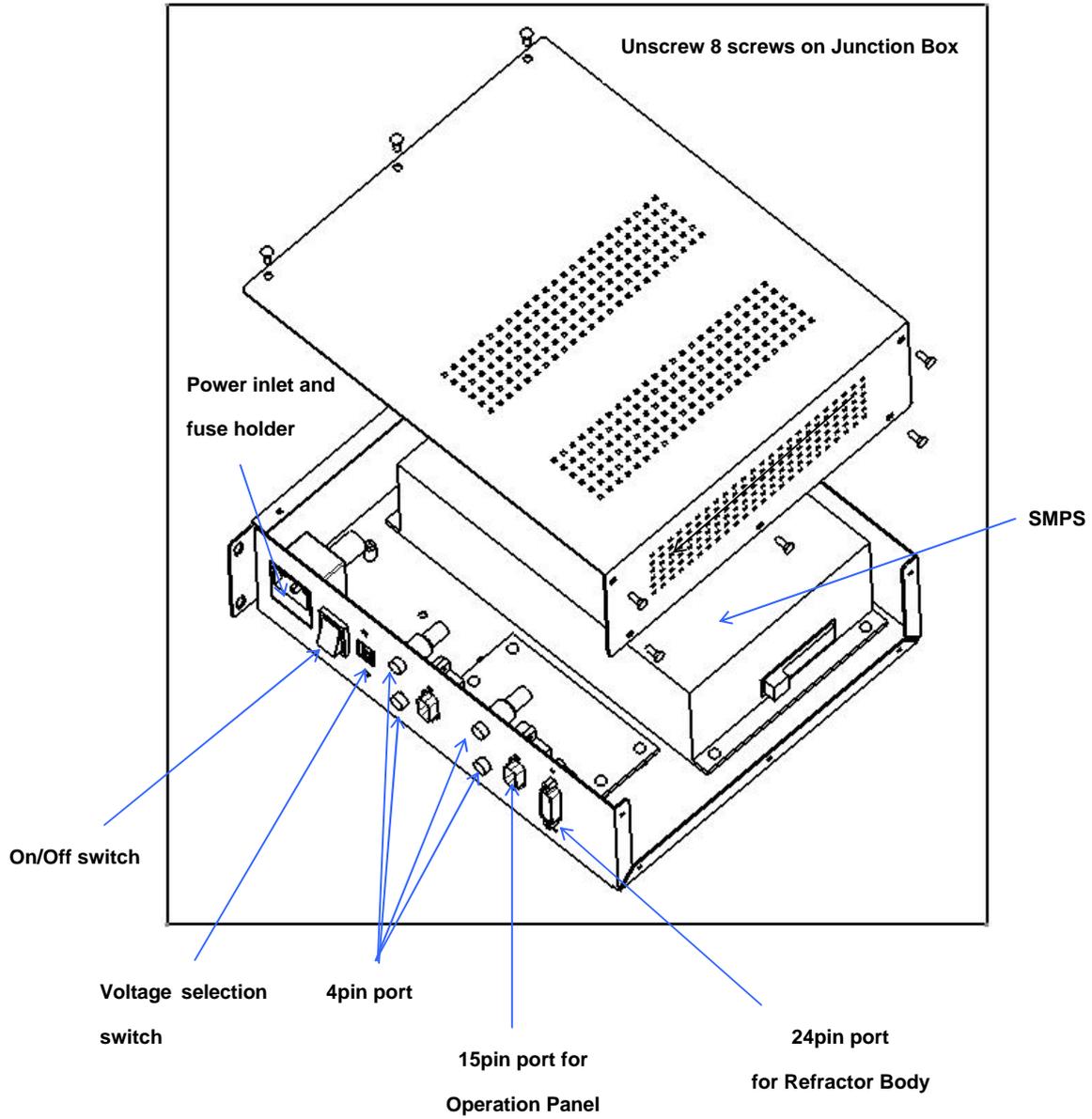
1. Tilt the LCD monitor 90° degree to open the printer cover.
2. Pull the opening lever on the printer cover.
3. Pull the remaining paper out.
4. Load a new roll of paper into the printer case.
5. Check the printing side (smooth side must face upside)
6. Pull out the end edge of the paper from the printer cover slot and close the cover.



4.9 Converter Box Disassemble



4.10 Junction Box Disassemble



4.11 Cleaning lens

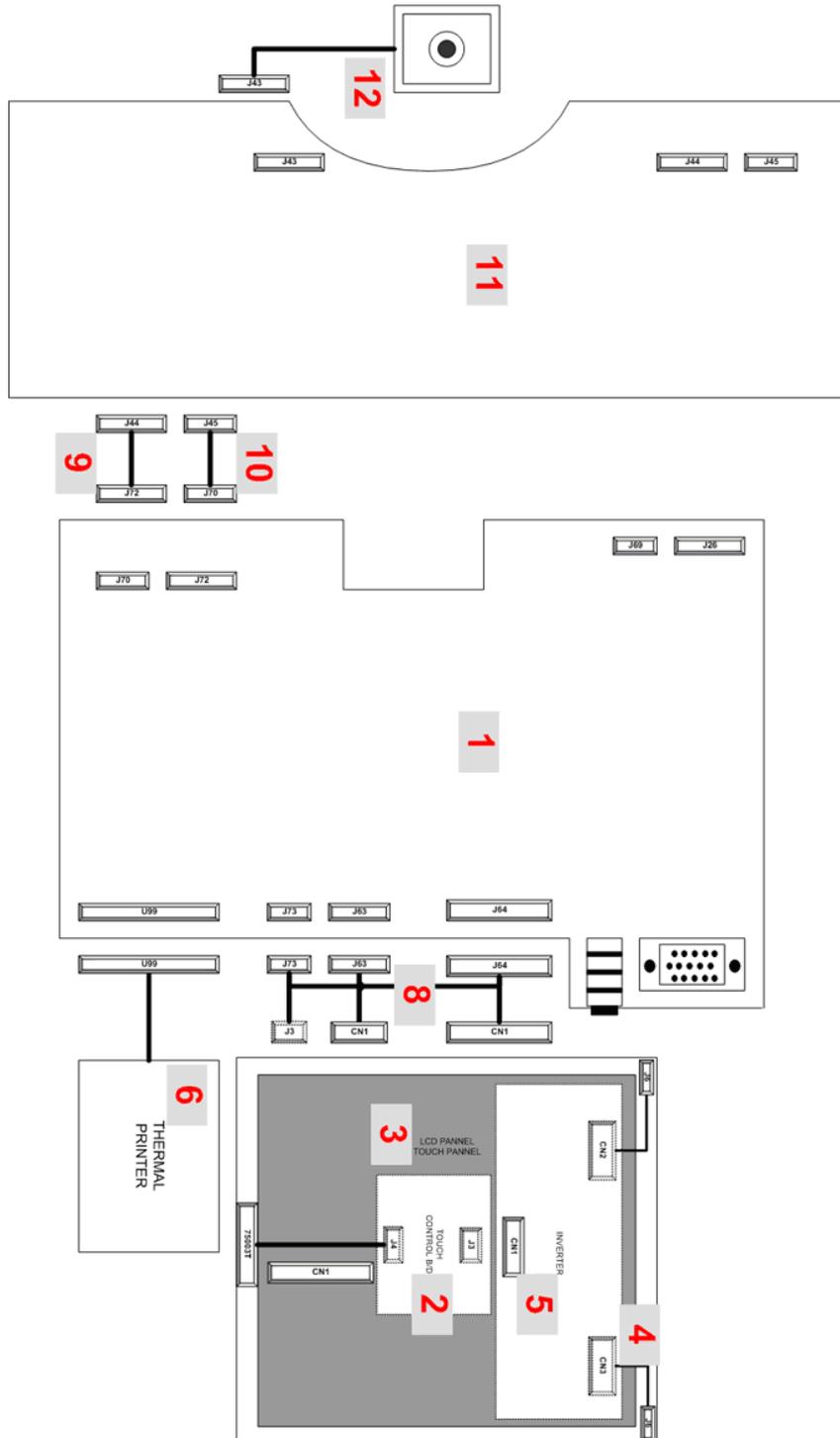
Clean the lenses in the Refractor Body by following the procedure below.

- (1) Remove the cover glasses from the test window of Refractor body at both the examinee's and examiner's side.
- (2) Execute the Lens Check function in the Engineer Menu mode.
- (3) Use R/L or OU button to select body.
- (4) Turn the dial in clock-wise insert lenses one by one.
- (5) Clean the lenses gently by using alcohol swabs.
- (6) Assemble the parts in reverse order after the cleaning procedure is completed.

5 Trouble shooting

5.1 Wiring diagram and boards description

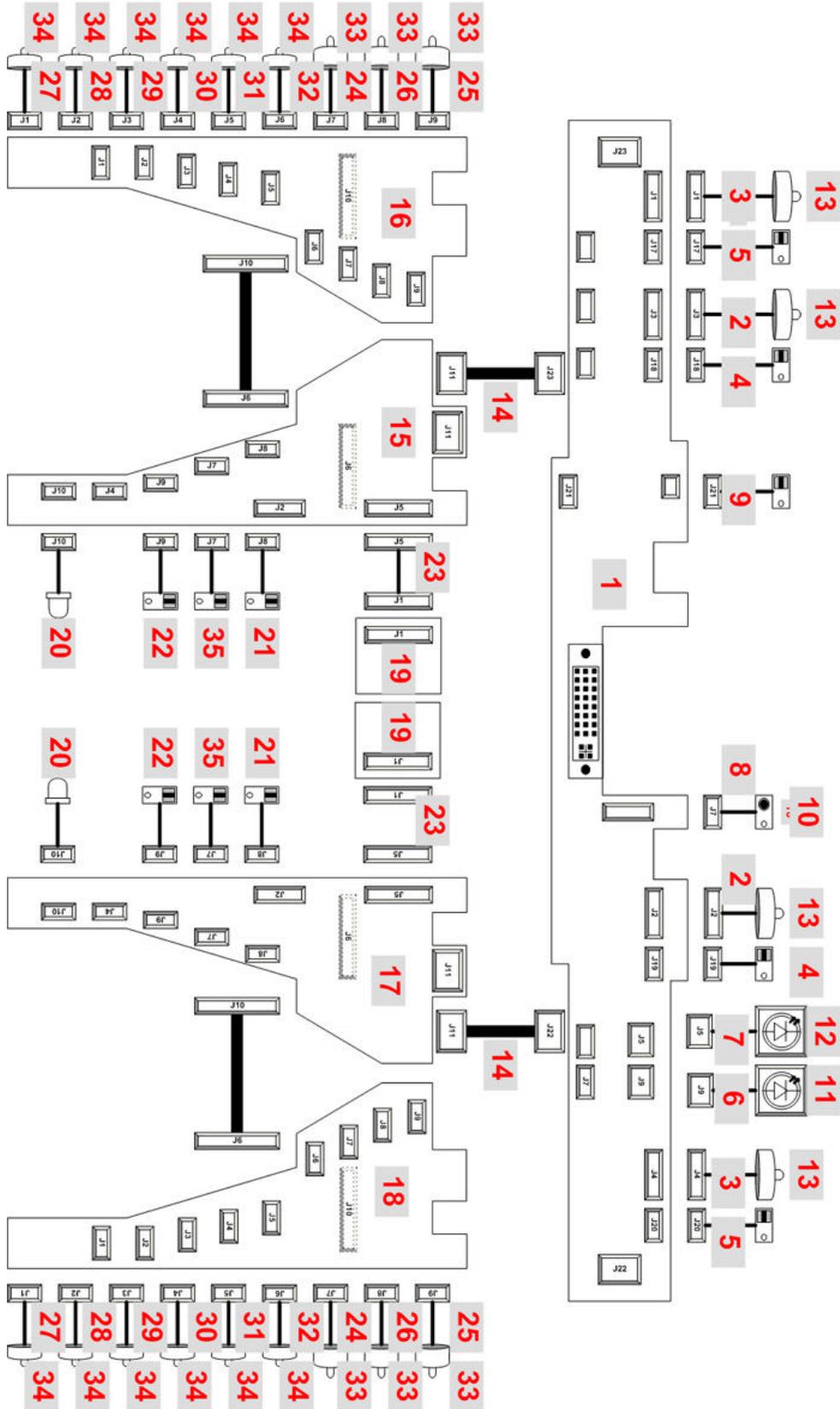
5.1.1 Operation panel board



HDR-7000 OP PART ELECTRIC WIRE DIAGRAM

Item	QTY	Description	Remarks
1	1	PCB ASSY	HDR OP GUI BOARD (ROB-300)
2	1	PCB ASSY	BLOCKER TOUCH DRIVER BOARD (BTD-100)
3	1	LCD MONITOR	AA084SA01
4	1	HARNESS ASSY	LCD MONITOR INVERTER
5	1	LCD INVERTER	ja442_cxa0271
6	1	THERMAL PRINTER	THERMAL PRINTER
7	1	HARNESS ASSY	OP UPGRADE
8	1	HARNESS ASSY	OP LCD HINGE ASSY
9	1	HARNESS ASSY	OP TO BT SERIAL
10	1	HARNESS ASSY	OP TO BT CAN
11	1	PCB ASSY	HDR OP GUI BOARD (RBT-300)
12	1	HARNESS ASSY	OP ENCODER

5.1.2 Refractor Body

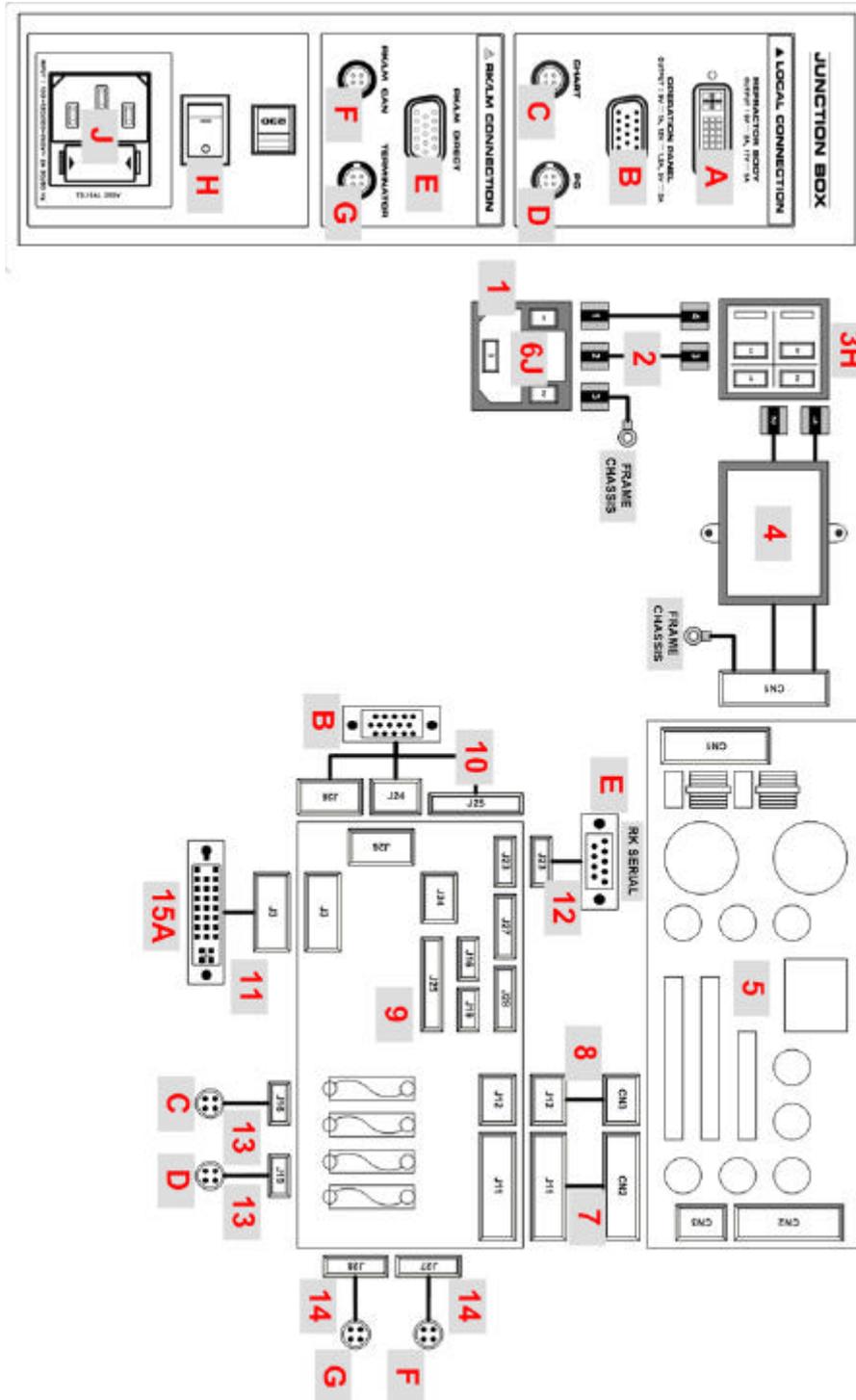


HDR-7000 MOTOR PART ELECTRIC WIRE DIAGRAM

Item	QTY	Description	Remarks
1	1	PCB ASSY	REFRACTOR BODY HEAD (RBH-100)
2	2	HARNESS ASSY	STEP MOTOR-PD
3	2	HARNESS ASSY	STEP MOTOR-TILT
4	2	HARNESS ASSY	PI-PD
5	2	HARNESS ASSY	PI-TILT
6	1	HARNESS ASSY	FOREHEAD CHECK LED
7	1	HARNESS ASSY	CHART LED
8	1	HARNESS ASSY	IR TRANSMIT LED
9	1	HARNESS ASSY	PI-FOREHEAD-CHECK
10	1	PCB ASSY	INFRA RED BOARD (IRB-002)
11	1	PCB ASSY	BLUE LED BOARD (BLUE-V101)
12	1	PCB ASSY (BPLED-100)	POWER LED BOARD, W222, BPLED-100
13	4	MOTOR(STEP)	25BY48L
14	2	HARNESS ASSY	HEAD TO MOTOR BOARD
15	1	PCB ASSY	REFRACTOR BODY UPPER LEFT (RBM-UL-100)
16	1	PCB ASSY	REFRACTOR BODY LOWER LEFT (RBM-LL-100)
17	1	PCB ASSY	REFRACTOR BODY UPPER RIGHT (RBM-UR-100)
18	1	PCB ASSY	REFRACTOR BODY LOWER RIGHT (RBM-LR-100)
19	2	PCB ASSY	HALL SENSOR BOARD (HSB-002)
20	2	HARNESS ASSY	VD LED
21	2	HARNESS ASSY	PI-AXIS
22	2	HARNESS ASSY	PI-INNER-PRISM
23	2	HARNESS ASSY	HALL SENSOR
24	2	HARNESS ASSY	STEP MOTOR-AXIS
25	2	HARNESS ASSY	STEP MOTOR-INNER-PRISM
26	2	HARNESS ASSY	STEP MOTOR-OUTER-PRISM
27	2	HARNESS ASSY	STEP MOTOR-SYL-0
28	2	HARNESS ASSY	STEP MOTOR-SYL-1
29	2	HARNESS ASSY	STEP MOTOR-CYL-0
30	2	HARNESS ASSY	STEP MOTOR-CYL-1
31	2	HARNESS ASSY	STEP MOTOR-SPECIAL
32	2	HARNESS ASSY	STEP MOTOR-XC

33	6	MOTOR(STEP)	15BY45-63-G
34	12	MOTOR(STEP)	15BY45-62
35	2	HARNESS ASSY	PI-OUTER-PRISM

5.1.3 Junction Box



HDR-7000 SMPS PART ELECTRIC WIRE DIAGRAM

Item	QTY	Description	Remarks
1	1	AC SOCKET CONNECTOR	4301.0503 + 4301.1403
2	1	HARNESS ASSY	JUNCTION - INLET TO POWER SW
3	1	POWER SWITCH	R9D2KKG00F1
4	1	HARNESS ASSY	JUNCTION - NOISE FILTER
5	1	SMPS	PK-HV0702
6	2	FUSE	50T, 250V, 3.15A, 5.2F, 20mm
7	1	HARNESS ASSY	JUNCTION - SMPS TO JB BD 1
8	1	HARNESS ASSY	JUNCTION - SMPS TO JB BD 2
9	1	PCB ASSY	JUNCTION BOX (RJB-201)
10	1	HARNESS ASSY	JUNCTION - JB BD TO OP
11	1	HARNESS ASSY	JUNCTION - JB BD TO HEADER
12	1	HARNESS ASSY	JUNCTION - RK SERIAL PORT
13	2	HARNESS ASSY	JUNCTION - JB LCAN 1
14	2	HARNESS ASSY	JUNCTION - JB LCAN 2
15	1	PCB ASSY	JUNCTION DVI CONNECTOR (DVI-100)

