
Service Manual

Digital Panoramic Radiograph

Bel-Cypher Pro

SAFETY INSTRUCTION TO SERVICE PERSONNEL

- Be sure to read this "Service Manual" before starting repair work.
 - Be sure to keep this "Service Manual" handy while performing repair work.
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TAKARA BELMONT CORPORATION

Before Starting Repair Work

Please be sure to read this "Service Manual" before starting repair work and fully understand the contents. Some repair works involve risks in adjustment, confirmation, etc. So be very careful about the safety when performing such works. The repair works shall be performed by a qualified personnel or a person who completed the training specialized in repair at our company.

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01. Introduction

1. Before starting repair work, be sure to read Operation Manual of the equipment.
2. The operating procedure of panoramic radiography forms the basis of all operations. So become fully familiar with its procedure before taking other radiograph.
3. Be sure to observe the warnings and prohibited matters in the body of this Service Manual strictly.
4. Read this Service Manual from the beginning in the order it is written. If you read from the middle of this manual and do the repair work, it may cause an accident, breakage of this equipment etc. due to an incorrect repair work.
5. If you find any unclear point during a repair work, read this Service Manual again to check about it and restart the repair work.
6. Exemption from Responsibility
Be sure to observe the contents of Service Manual. The accident and breakage of this equipment due to an incorrect repair work are out of the scope of our responsibilities.
7. Warranty Period for Equipment
The warranty period is two years from the date of purchase. The charge-free warranty will be applied only to the cases where breakage, failure, etc. of this equipment occurred through normal use.
8. Available Period for Repair Parts and Service Parts
The repair parts and service parts are available for 10 years after discontinuing this product.
10. The disinstallation and disposal of equipment are within the scope of responsibilities of the customer. In the case to disinstall the equipment, consult with the dealer you purchased from or with us.

02. Warning

WARNING

When you perform a repair work, read this “Service Manual” and follow its instructions. If repaired wrongly, it may cause a breakage of the equipment or an accident. Especially, be sure to comply with the instructions following the signal words **DANGER**, **WARNING** and **CAUTION**.

NOTE

The warning messages in the Service Manual are defined and classified as follows:

DANGER

Indicates an imminently hazardous situation, which, if not avoided, may result in death, serious injury and/or property damage such as total loss of equipment and fire when the instructions are not followed.

WARNING

Indicates a potentially hazardous situation, which, if not avoided, could result in death, serious injury and/or property damage such as total loss of equipment and fire when the instructions are not followed.

CAUTION

Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury, and/or partial damage to property and loss of computer data when the instructions are not followed.

NOTE

Indicates information helpful for use of the equipment.

**WARNING**

Precautions on use (and safety and hazard prevention) of medical electric/electronic equipment

1. DO NOT allow the person without expertise to use the equipment.**2. Pay attention to the following when installing the equipment.**

- (1) Install the equipment to avoid splashing water.
- (2) Do not install the equipment to the place harmful to it due to atmospheric pressure, temperature, humidity, airflow, direct sunlight, dust, salinity and air including sulfur.
- (3) Pay attention to the safety conditions such as inclination, vibration and impact (including those in transportation).
- (4) Do not install the equipment to the place where chemicals are stored or gas generates.
- (5) Pay attention to commercial frequency of power, its voltage and allowable current (or power consumption).
- (6) Connect the equipment to the ground properly.

3. Check the following before using the equipment.

- (1) Check contact of switches, polarity, dial settings and indicators. Check that the equipment operates normally.
- (2) Check that the equipment is connected to the ground perfectly.
- (3) Check that all cords are connected properly and perfectly.
- (4) Pay attention to parallel use with other equipment as it may cause erroneous diagnosis or danger.
- (5) Recheck the external circuit connected directly to a patient.
- (6) Check the battery power.

4. Pay attention to the following when using the equipment.

- (1) Avoid exceeding the time and the radiation dose rate necessary for diagnosis.
- (2) Always monitor no abnormality in all equipments in use and the condition of a patient.
- (3) When any abnormality is observed in the equipment or the patient, take appropriate action such as to stop the equipment in the condition safe for the patient.
- (4) Do not allow a patient to touch the equipment.

5. Pay attention to the following after using the equipment.

- (1) After returning operation switches and dials to their original position before use in accordance with predetermined procedure, turn off the power.
- (2) Do not pull cords when removing them from the equipment.
- (3) Be careful for the following items for storage.
 - I) Store the equipment where water is not splashed on it.
 - II) Do not store the equipment to the place harmful to it due to atmospheric pressure, temperature, humidity, airflow, direct sunlight, dust, salinity and air including sulfur.
 - III) Pay attention to the safety condition such as inclination, vibration and impact (including those in transportation).
 - IV) Do not store the equipment to the place where chemicals are stored or gas generates.
- (4) After cleaning accessories, cords, and terminals, put them in order.
- (5) Keep the equipment clean for the next use.

6. When the equipment fails, DO NOT attempt to repair it by yourself.

Indicate that the equipment is in failure and consign its repair to special engineer.

7. DO NOT modify the equipment.**8. Maintenance and inspection**

- (1) Be sure to perform regular inspection of equipment and its accessories.
- (2) When resuming to use the equipment that was not used for a long time, be sure to check that the equipment operates normally and safely before use.

 **DANGER**

Liquids on this equipment will cause electric shock accident or equipment damage.
This equipment is electric equipment. Keep liquids away from this equipment.

 **DANGER**

Shock hazard. This equipment is electric equipment and has some high-voltage portions inside.
Turn off the power of equipment and unplug power cable from electrical outlet before opening cover of equipment for repair work.

 **DANGER**

Some repair works involve risks. Only qualified or trained persons may do repair works.

 **DANGER**

Some repair works involve risks. Service personnel must give instructions to outsiders to stay away from repair work area.

 **WARNING**

Do not make alterations to medical electronics equipment!

Alterations by user are prohibited.

Also, relevant pharmaceutical affairs law imposes following regulations on manufacturers.

That is, medical equipments need item-specific approval for manufacture, and "application for partial modification approval" is required when making functional changes in medical equipments.

So unauthorized alterations are prohibited.

 **WARNING**

Radiation Protection in Dentistry

Comply with the contents of each clause regarding protection against radiation exposure prescribed in relevant medical regulations when installing and using dental X-ray equipments.

 **WARNING**

This equipment for radiograph can cause hazard to service personnel if safe exposure conditions and how to use are not complied with.

 **WARNING**

Be sure to sterilize equipment portions to be touched by patient or operator before starting repair work. After completing the repair work, sterilize equipment portions touched by service personnel.

 **WARNING**

While repairing, do not place anything that can be an obstacle within the range of equipment.

 **WARNING**

To avoid damages to equipment, measuring instruments, etc. and electric shock, service personnel must not remove covers of equipment except when necessary.

 **WARNING**

To avoid damages to equipment, measuring instruments, etc. and electric shock, turn off power of equipment and take extra care not to short-circuit with other circuit when connecting lead wire of measuring instrument to a circuit within the equipment during repair work.

 **WARNING**


To avoid damages to equipment, measuring instruments, etc. and electric shock, be sure to turn off power of equipment and use the parts specified by us when replacing machine parts and electric parts of the equipment.

 **WARNING**

To avoid X-ray exposure due to carelessness, be sure to install lead plate for X-ray protection on X-radiation aperture of X-ray generator when radiating X-rays during repair work.


 **WARNING**

Be sure to use positioning attachment specified for each exposure mode when positioning patient.

 **WARNING**
Be sure to make patient and nursing attendant to wear X-ray protective clothing. (Nursing attendant in this sentence means a person allowed by doctor.)

 **WARNING**
Be sure to operate X-ray exposure switch from outside of X-ray room.

 **WARNING**
Operator must instruct patient not to move while X-raying.

 **WARNING**
Watch patient, nursing attendant and equipment constantly while X-raying, and release X-ray exposure switch immediately if you find something abnormal.

 **WARNING**
Contact the dealer you purchased from when scraping this equipment.

 **WARNING**
After completing repair work, be sure to turn OFF power for safety.

 **CAUTION**
When X-raying patient after completing repair work, take extra care for patient safety when positioning patient.

 **CAUTION**
Damage etc. inside X-ray generator cannot be repaired on site. Depending on service personnel's judgment, the equipment will be returned to factory for repair or replacement.

 **WARNING**

Responsibility for managing the use and maintenance of medical equipments lies with the user (hospital or clinic). This equipment must be used by doctor or qualified person only.
As repair or check inside equipment involves risks, contact the company you purchased from.

 **WARNING**

When earthquake warning is issued, do not use this equipment.
After an earthquake, be sure to conduct maintenance check of the equipment and confirm no abnormality before use. Default of the check and/or confirmation can harm patient.

 **WARNING**

Be sure to set up X-ray examination room and install the equipment body in the X-ray examination room.

 **WARNING**

Do not place anything that can be an obstacle within the range of equipment movement.

 **WARNING**

X-raying and approach to equipment must be done under the responsibility of user when repairer, patient, or nursing attendant allowed by doctor has a pacemaker etc.

 **WARNING**

Be sure to use positioning attachment specified for each exposure mode when positioning patient.

 **WARNING**

Be sure to make patient and nursing attendant to wear X-ray protective clothing.
(Nursing attendant in this sentence means a person allowed by doctor.)

 **WARNING**

Operator must instruct patient not to move while X-raying.

 **WARNING**
Be sure to sterilize and disinfect equipment portions touched by patient or operator after X-raying and at daily closing time.

 **WARNING**
Contact our sales office near you when scraping this equipment.


 **WARNING**
After using equipment, be sure to turn OFF power for safety.

 **WARNING**
Keep everyone out of X-ray room except repairer when radiating X-rays for repair.

 **WARNING**
To avoid equipment failure, do not rotate arm by hand.

 **WARNING**
Keep patient unmoved until arm reset operation completed after X-raying.

 **CAUTION**
Take extra care for patient safety when positioning patient.

 **CAUTION**
Take extra care for patient safety when moving sliding unit up and down.

 **CAUTION**
Do not look straight at positioning laser beam for your safety. Also, give this caution to patient and nursing attendant.

 **WARNING**

1. The medical electrical equipment needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in the Operation manual.
 2. The portable and mobile RF communications equipment can affect medical electrical equipment.
 3. The use of accessories, transducers and cables other than those specified, with the exception of transducers and cables sold by the manufacturer of the equipment as replacement parts for internal components, may result in increased emissions or decreased immunity of the equipment.
 4. The cable that suits EN60601-1-2:2007 of standards emission and the requirement of the immunity are recorded below.
 - 1) Power cable (4.5m)
 - 2) Exposure Switch cable (10m)
 - 3) LAN cable(type braided shield) for connection with personal computer (10m)
 5. The equipment should not be used adjacent to or stacked with other equipment.
 6. The equipment should be used only in the specified type of shielded location.
 7. Please use the LAN Cable specified by EC representative.
 8. Essential performance
 - 1) Accuracy of x-ray tube loading factor.
 - 2) Reproducibility of radiation output.
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WARNING

Guidance and manufacturer's declaration – electromagnetic emissions		
<p>The model Bel-Cypher Pro is intended for use in the electromagnetic environment specified below. The customer or the user of the model Bel-Cypher Pro should assure that it is used in such an environment.</p>		
Emission test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR 11	Group 1	The model Bel-Cypher Pro uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	The model Bel-Cypher Pro is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC61000-3-2	Not Applicable	
Voltage fluctuations/ Flicker emissions IEC61000-3-3	Not Applicable	



WARNING

Guidance and manufacturer's declaration – electromagnetic immunity			
The model Bel-Cypher Pro is intended for use in the electromagnetic environment specified below. The customer or the user of the model Bel-Cypher Pro should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Electrostatic discharge (ESD) IEC61000-4-2	±6 kV contact ±8kV air	±6 kV contact ±8kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines ±1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC61000-4-5	±1kV differential mode ±2kV common mode	±1kV differential mode ±2kV common mode	Mains power quality should be that of a typical commercial or hospital environment
Voltage dips, short interruptions and voltage variations on power supply input lines IEC61000-4-11	<5% Ut (>95% dip in Ut) for 0.5 cycle 40% Ut (60% dip in Ut) for 5 cycles 70% Ut (30% dip in Ut) for 25 cycles <5% Ut (>95% dip in Ut) for 5 sec	<5% Ut (>95% dip in Ut) for 0.5 cycle 40% Ut (60% dip in Ut) for 5 cycles 70% Ut (30% dip in Ut) for 25 cycles <5% Ut (>95% dip in Ut) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment
Power frequency (50/60Hz) magnetic field IEC61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment
NOTE Ut is the a.c. mains voltage prior to application of the test level.			



WARNING

Guidance and manufacturer's declaration – electromagnetic immunity			
The model Bel-Cypher Pro is intended for use in the electromagnetic environment specified below. The customer or the user of the Bel-Cypher Pro should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
<p>Conducted RF IEC61000-4-6</p> <p>Radiated RF IEC61000-4-3</p>	<p>3 Vrms 150kHz to 80MHz</p> <p>3 V/m 80MHz to 2.5 GHz</p>	<p>3 Vrms</p> <p>3 V/m</p>	<p>Portable and mobile RF communications equipment should be used no closer to any part of the Bel-Cypher Pro, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.</p> <p>Recommended separation distance</p> $d = 1,2 \sqrt{P}$ <p>$d = 1,2 \sqrt{P}$ 80 MHz to 800 MHz</p> <p>$d = 2,3 \sqrt{P}$ 800 MHz to 2.5 GHz</p> <p>where P is the maximum output power rating of the transmitter in watts(W) according to the transmitter manufacturer and d is the recommended separation distance in metres(m).</p> <p>Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, ^ashould be less than the compliance level in each frequency range.^b</p> <p>Interference may occur in the vicinity of equipment marked with the following symbol:</p>
<p>NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies.</p> <p>NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.</p>			
<p>^a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Bel-Cypher Pro is used exceeds the applicable RF compliance level above, the Bel-Cypher Pro should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the Bel-Cypher Pro.</p> <p>^b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.</p>			



Recommended separation distances between portable and mobile RF communications equipment and the Bel-Cypher Pro			
The Bel-Cypher Pro is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Bel-Cypher Pro can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Bel-Cypher Pro as recommended below, according to the maximum output power of the communications equipment.			
Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter m		
	150 kHz to 80 MHz $d=1,2\sqrt{P}$	80 MHz to 800 MHz $d=1,2\sqrt{P}$	800 MHz to 2.5 GHz $d=2,3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.72
1	1.20	1.20	2.30
10	3.79	3.79	7.27
100	12.00	12.00	23.00
For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts(W) according to the transmitter manufacturer.			
NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.			
NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			

03. Preparation for Repair Work

1. Manuals

- This Service Manual on Bel-Cypher Pro
- Operation Manual on Bel-Cypher Pro

2. Measuring Equipments

- 1) Digital multi-meter
- 2) Oscilloscope
- 3) Lead wire for measurement
- 4) Insulation-resistance meter
- 5) X-ray detecting paper
- 6) Scale

3. Tools

- 1) Phillips-head screwdrivers (Large-size and small-size)
- 2) Flathead screwdriver (Small-size, insulated-type)
- 3) Box drivers (for M3, 4, 5, 6 screws)
- 4) Hexagonal wrench (a set of wrenches)
- 5) Nipper
- 6) Long-nose pliers
- 7) Electric soldering iron (insulated-type), solder
- 8) Taps for thread
- 9) Tap handle
- 10) Electric drill
- 11) Drill
- 12) Crimp tool (for crimping terminal)

4. Jigs for Adjustment

- 1) Test piece for Bel-Cypher Pro
- 2) Lead plate with thickness of 3mm or more (for X-ray protection)
- 3) Brass plate filter
- 4) Aluminum filter with thickness of 35mm
- 5) X-ray detecting paper

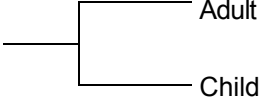

5. Repair and Service Parts

- 1) Depending the contents of repair, please prepare necessary boards, parts, wire harness, etc.

6. Other

- 1) Depending the contents of repair, please prepare screws, nuts, crimping terminals, grease, etc.
- 2) Alcohol for disinfection
- 3) A rag
- 4) Cleaning solution

04. Specifications

General name	Digital Panoramic Radiograph
Model	Bel-Cypher Pro
Power Voltage	120Vac 60Hz 1φ 0.3Ω
Power Capacity	9A
High Tension Generator	High Tension Generator (100kHz)
X-ray Tube Voltage	60kV to 80kV (1kV step)
X-ray Tube Current	2 to 8mA (1mA step and R'10 series)
Exposure method	Manual
X-ray Tube	D-052SB (Toshiba)
X-ray Tube Focal Spot	0.5mm
Total Filtration	2.5mmAl (minimum)
Exposure Mode	<p>Panoramic radiography </p> <p>TMJ Lateral 4 sections</p> <p>Bitewing </p>
Exposure Time	<p>Panorama : 10 sec</p> <p>Panoramic Bitewing : 2.3 sec (x2)</p> <p>TMJ Lateral 4 sections : 2.5 sec (x4)</p>
Magnification Ratio	<p>Panorama : 1.2 to 1.3</p> <p>Panoramic Bitewing : 1.2 to 1.3</p> <p>TMJ Lateral 4 sections : 1.2</p>
Beam for Patient Positioning	3 beams
Dimensions (mm)	W:850mm x D:1,135mm x H:2,275mm
Weight	Approx. 231lb(105kg)

System Requirements

Temperature : 5 ~ 35°C

Humidity : 30 ~ 85%

Pressure : 700 ~ 1060 hPa

Storage Environment

Temperature : -10 ~ 60°C

Humidity : 10 ~ 95%

Pressure : 700 ~ 1060 hPa

Transportation Environment

Temperature : -10 ~ 60°C

Humidity : 10 ~ 95%

Pressure : 700 ~ 1060 hPa

05. Block Diagram

06. Error Messages

The list of Error Messages displayed on PC monitor, which is sent from the x-ray equipment.

Error No.	Error Message
500	F/W Status Error
501	F/W Event Kind Error
503	F/W FLASH Access Error
504	F/W I2C Error
505	Time setting Error
506	F/W SD Access Error
507	Rotation Motor Error
510	Y Axis Motor Error
511	Y Axis time out
515	Sliding Unit Time Out
516	Sliding Unit Encoder Error
524	Inverter Error
525	Tube voltage Over Error
526	Tube voltage Lower Error
527	Tube current Over Error
528	Tube current Lower Error
529	Head thermal Error
530	X-ray switch error. Please turn off the switch and press the reset button.
531	Interlock Error

The list of Error Messages displayed on PC monitor, which is generated by PC software.

Ref. No.	Error Message
S001	This application can not multi execute.
S002	Communication speed to sensor becomes low.
S003	Please check power source of equipment.
S004	TCP/IP circuit open error. Cannot communicate with equipment. Please check power source of equipment.
S005	Communication with equipment is not normal. (Checksum)
S006	Communication with equipment is not normal.
S007	Cannot find density correction data.
S008	Cannot find defect data file.
S009	Could not read INI file. Set default.
S010	The free space of the save destination drive is insufficient. Please delete unnecessary files.
S011	Failed to create the orbit setting image.
S012	Please reconfigure, The Median line is out of the movement limit range.
S013	Failed to set the maximum number of image. Please set exposure condition again.
S014	Failed to set the number of dark current. Please set exposure condition again.

※Ref.No. is the number which is used only in this manual, not displayed on PC monitor.

The list of Error Messages displayed on PC monitor, which is sent from the C-MOS sensor.

Error No.	Error Message
30001	Failed to initialize DCAM-API¥n(dcam_init)
30002	Could not find sensor.
30003	Recognized multiple sensors.
30004	Failed to initialize sensor.
30005	Failed to interrupt sensor capture.
30006	Failed to release buffer.¥n(dcam_releasebuffer)
30007	Failed to set the mode of sensor.¥n(dcam_Sensor_Trig)
30008	Failed to prepare sensor capture.
30009	Failed to acquire bite size in buffer.¥n(dcam_releasebuffer)
30010	Failed to initialize memory.(malloc)
30011	Failed the process of starting sensor capture.
30012	Sensor capturing process is not yet started.
30020	Failed to initialize sensor.
30030	Communication with the sensor is unstable.

Error No. 500~505

This is the error inside a micro-processor chip. Please exchange CPU BOARD.

Error No. 506 “F/W SD Access Error”

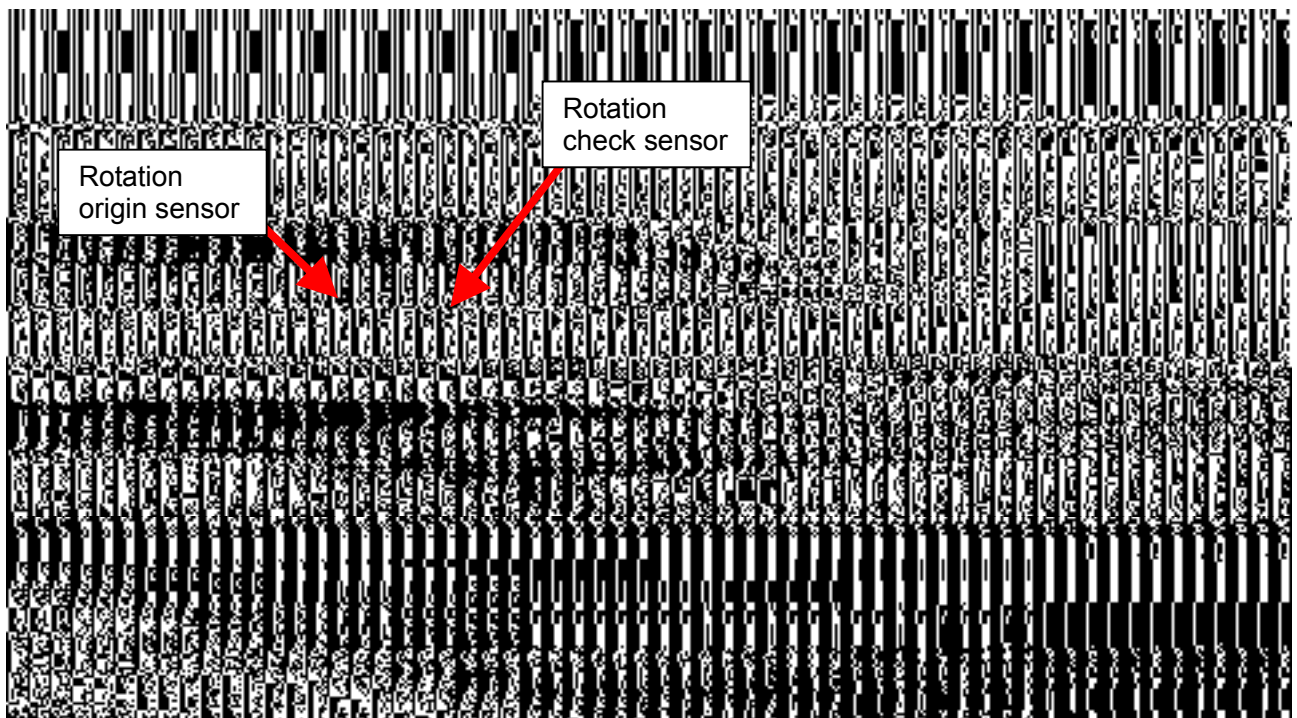
Please check whether the micro SD card is mounted properly on CPU BOARD (connector CNSD). If it does not improve, please replace CPU BOARD.

Error No. 507 “Rotation Motor Error”

Select the one which matches actual trouble in the following conceivable Symptoms 1) ~ 3).

- 1) When you push the reset bottom, the Arm unit does not rotate at all, then the error message is displayed.
- 2) When you push the reset bottom, the Arm unit does not stop at the reset position and run up against a mechanical stopper, then the error message is displayed.
- 3) When you push the reset bottom, the Arm unit stops in the middle of rotation, then the error message is displayed.

Follow each action on error 1) ~ 3).



Action on “Rotation Motor Error” case 1)

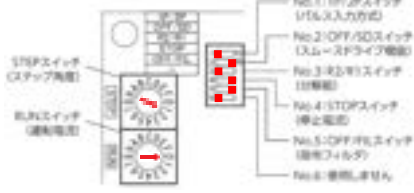
Turn off the main power and remove the cover of Rotation unit. Check the structure of Rotation Mechanism by rotating Arm unit manually. Check that grease is properly applied on Gear.

NG → Correct loose screws and mechanical structure. Apply grease on Gear.

OK → Turn on the main power. Is the LED on the Rotation motor driver glowing green?

NG → Unplug connector CN1 from the Rotation motor driver board. Check the voltage 24Vdc between 1 pin and 2 pin of the housing CN1.

Check the Rotation motor driver setting. (STEP, Run trimmer, and dip switch 1~6)
If it is wrong, correct the setting.



If the LED on a motor driver glowing red. It means the following.

- Red blinking two times:** The temperature of a motor driver board is over 85 °C.
- Red blinking three times:** Over voltage (check the input voltage, sudden stopping.)
- Red blinking five times:** Over current (check the motor, harness, and board burn.)
- Red blinking nine times:** EEPROM trouble of the motor driver (Replace the motor driver.)
- Red lighting:** CPU trouble of the motor driver (Replace the motor driver.)

OK → Check the following harness conduction.

CPU BOARD – Rotation motor driver board	
1 pin of CNRM	– 1 pin of CN1
2 pin of CNRM	– 2 pin of CN1
3 pin of CNRM	– 1 pin of CN3
4 pin of CNRM	– 2 pin of CN3
5 pin of CNRM	– 3 pin of CN3
6 pin of CNRM	– 4 pin of CN3
7 pin of CNRM	– 5 pin of CN3
8 pin of CNRM	– 6 pin of CN3

Rotation motor driver board – Rotation Motor	
1 pin of CN2	– 1 pin of ROT
2 pin of CN2	– 3 pin of ROT
5 pin of CN2	– 4 pin of ROT
4 pin of CN2	– 6 pin of ROT

If it has any disconnection, replace the harness (4-17 or 4-13).

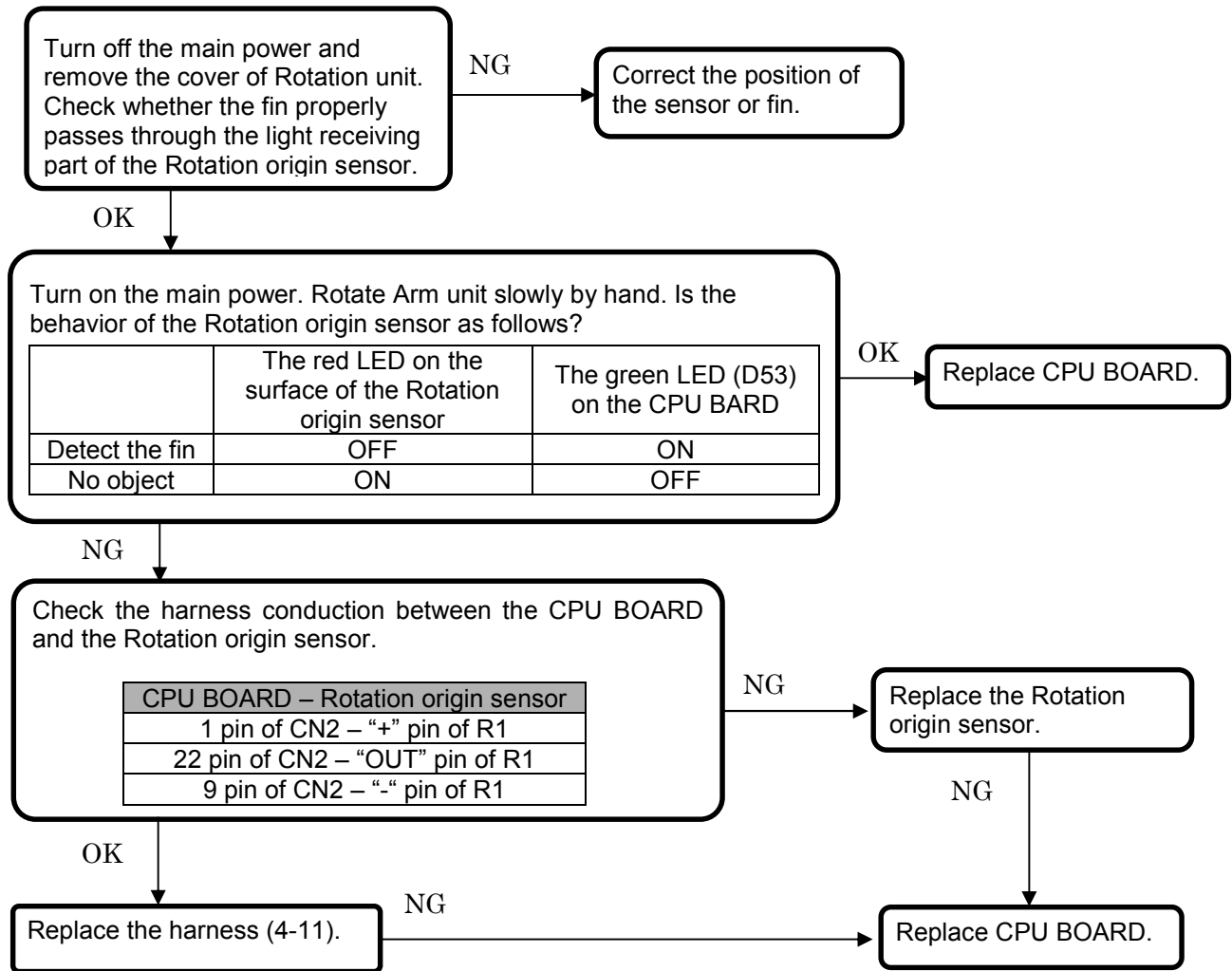
OK → Unplug connector CN2 from Rotation motor driver board. Check the resistance value of Rotation motor winding. It is about 0.6 ohm between Black and Breen wire. It is about 0.6 ohm between Red and Blue wire.

If there is a clear defference between two values, Replace Rotation motor.

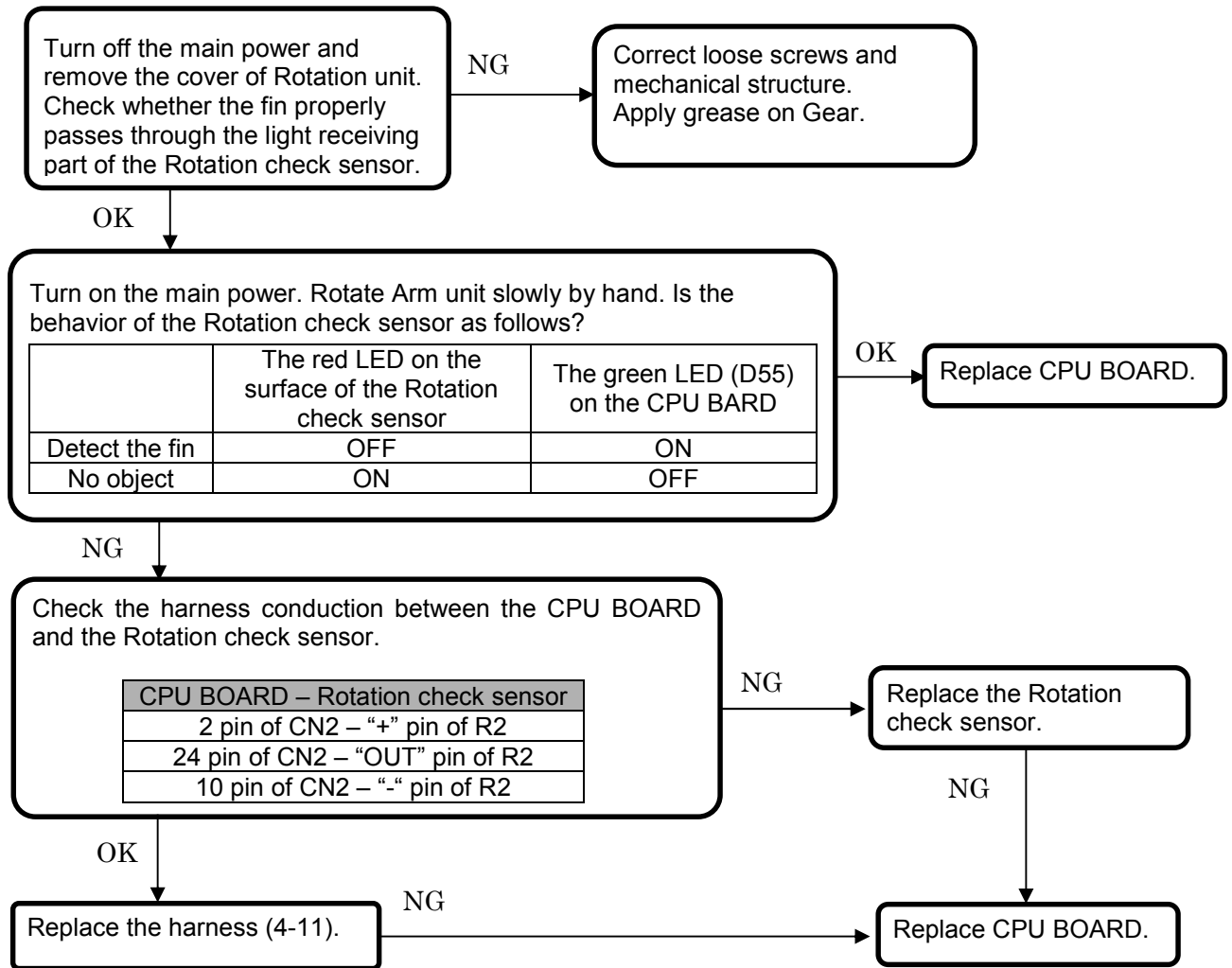
OK → Replace Rotation motor driver board.

NG → Replace CPU BOARD.

Action on "Rotation Motor Error" case 2)



Action on "Rotation Motor Error" case 3)

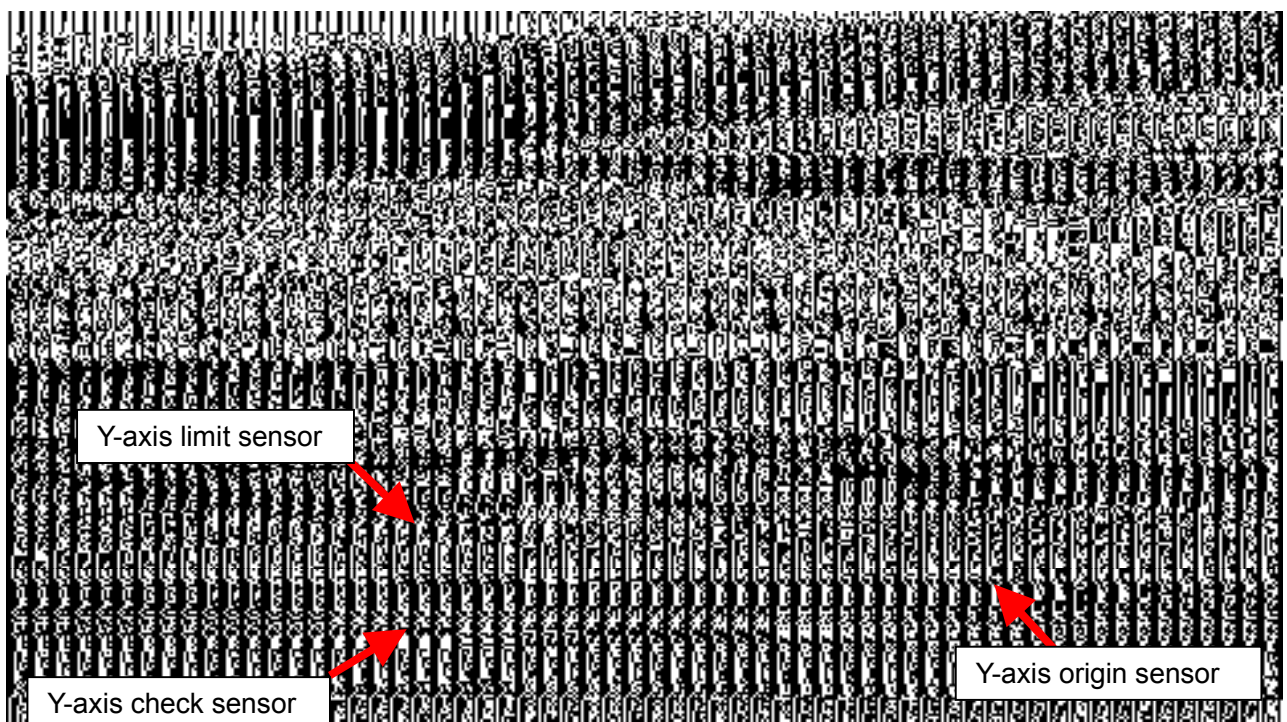


Error No. 510 “Y Axis Motor Error”

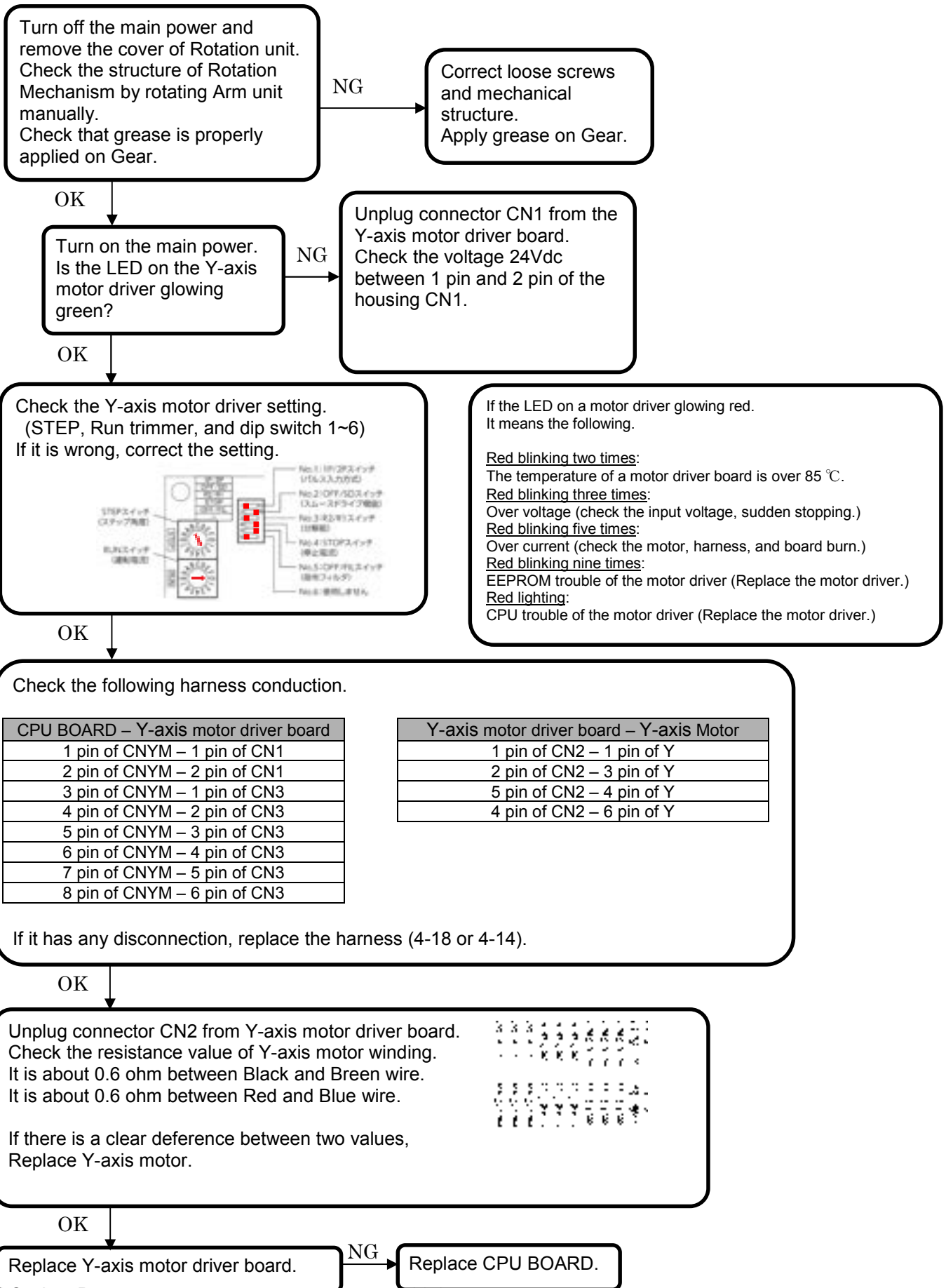
Select the one which matches actual trouble in the following conceivable Symptoms 1) ~ 4).

- 1) The Arm unit does not move to Y-direction at all, then the error message is displayed.
- 2) The Arm unit does not stop at the Y-axis origin sensor and run up against a mechanical stopper, then the error message is displayed.
- 3) The Arm unit does not stop at the Y-axis check sensor and run up against a mechanical stopper, then the error message is displayed.
- 4) The Arm unit stops in the middle of Y-axis moving, then the error message is displayed.

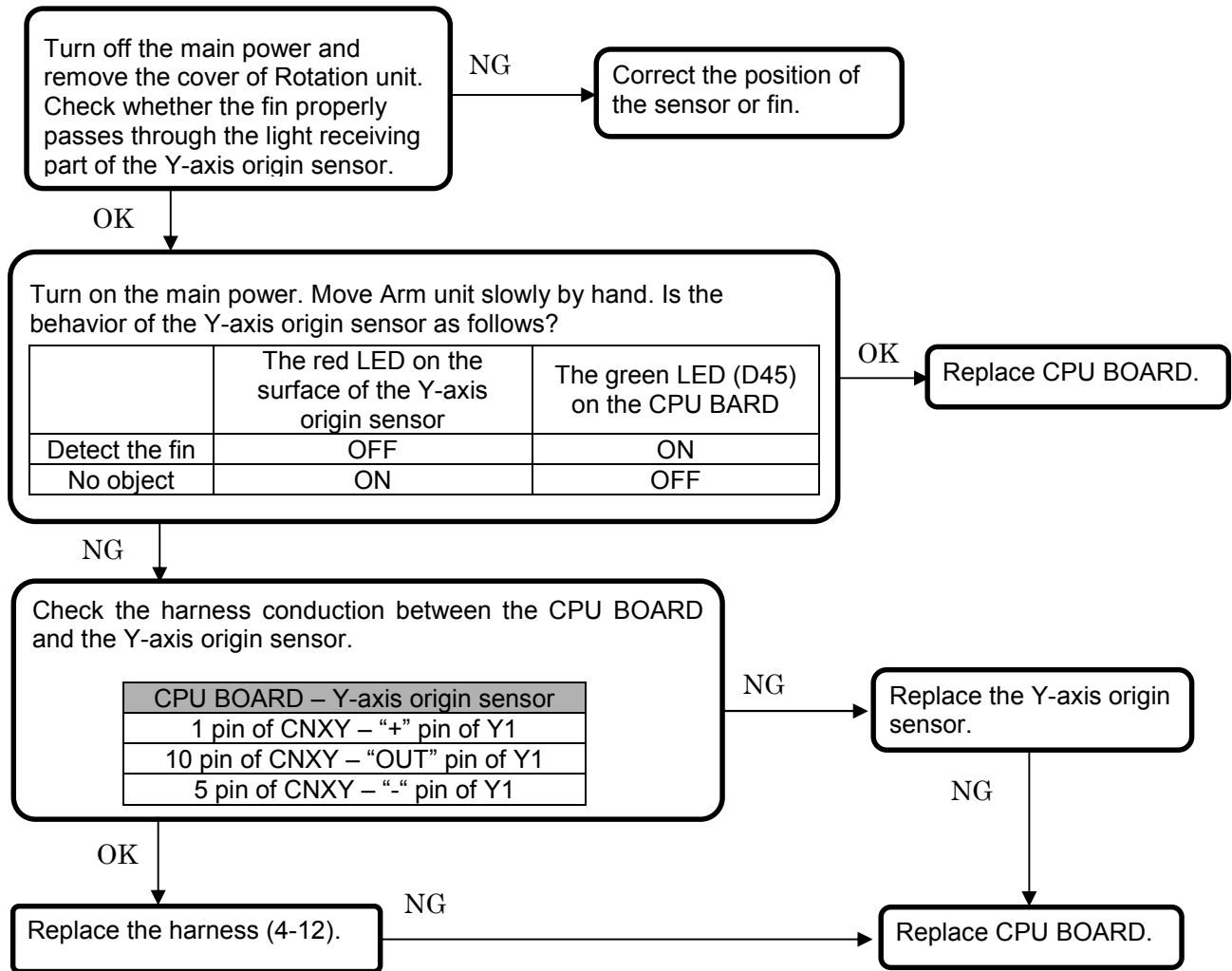
Follow each action on error 1) ~ 4).



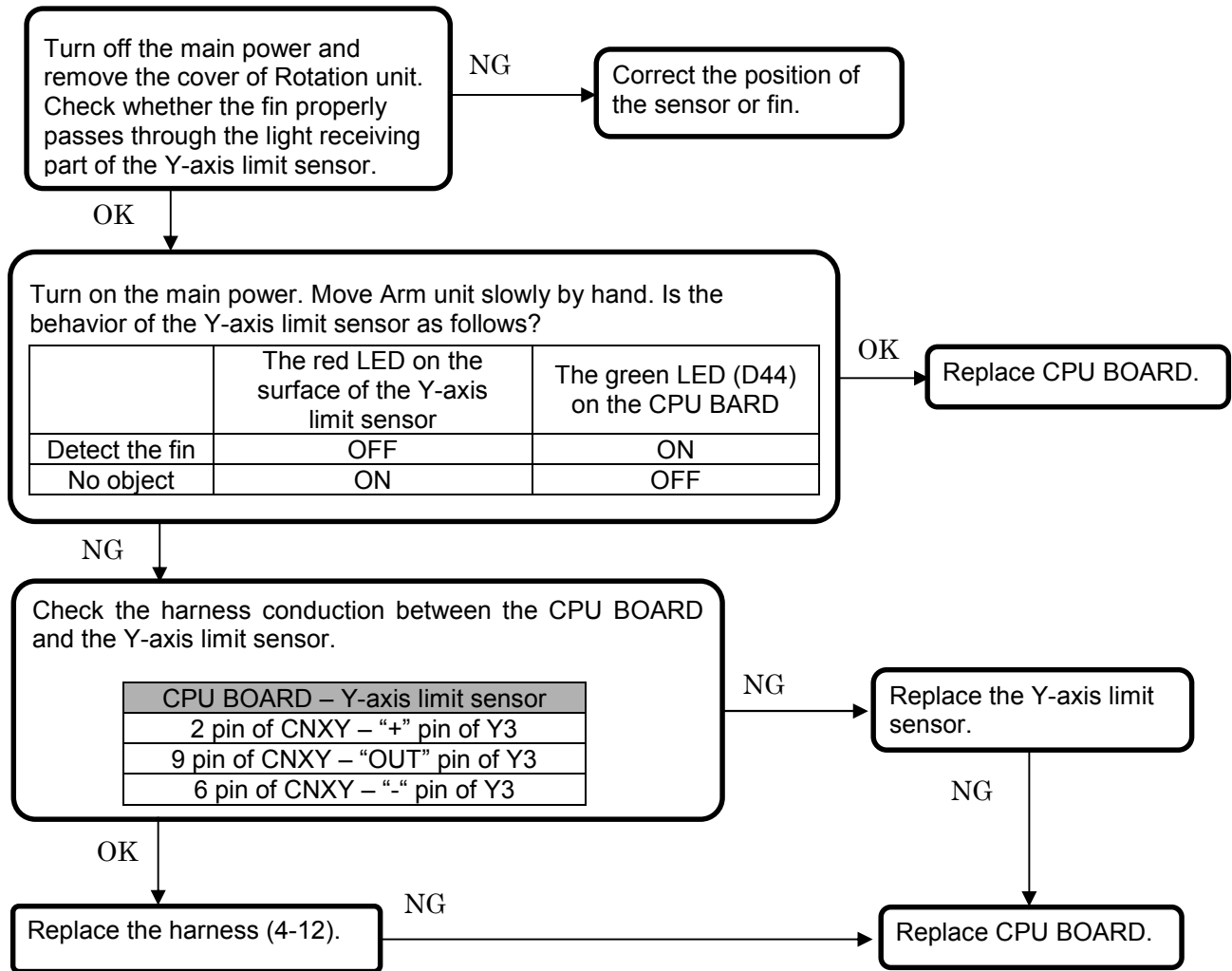
Action on “Y Axis Motor Error” case 1)



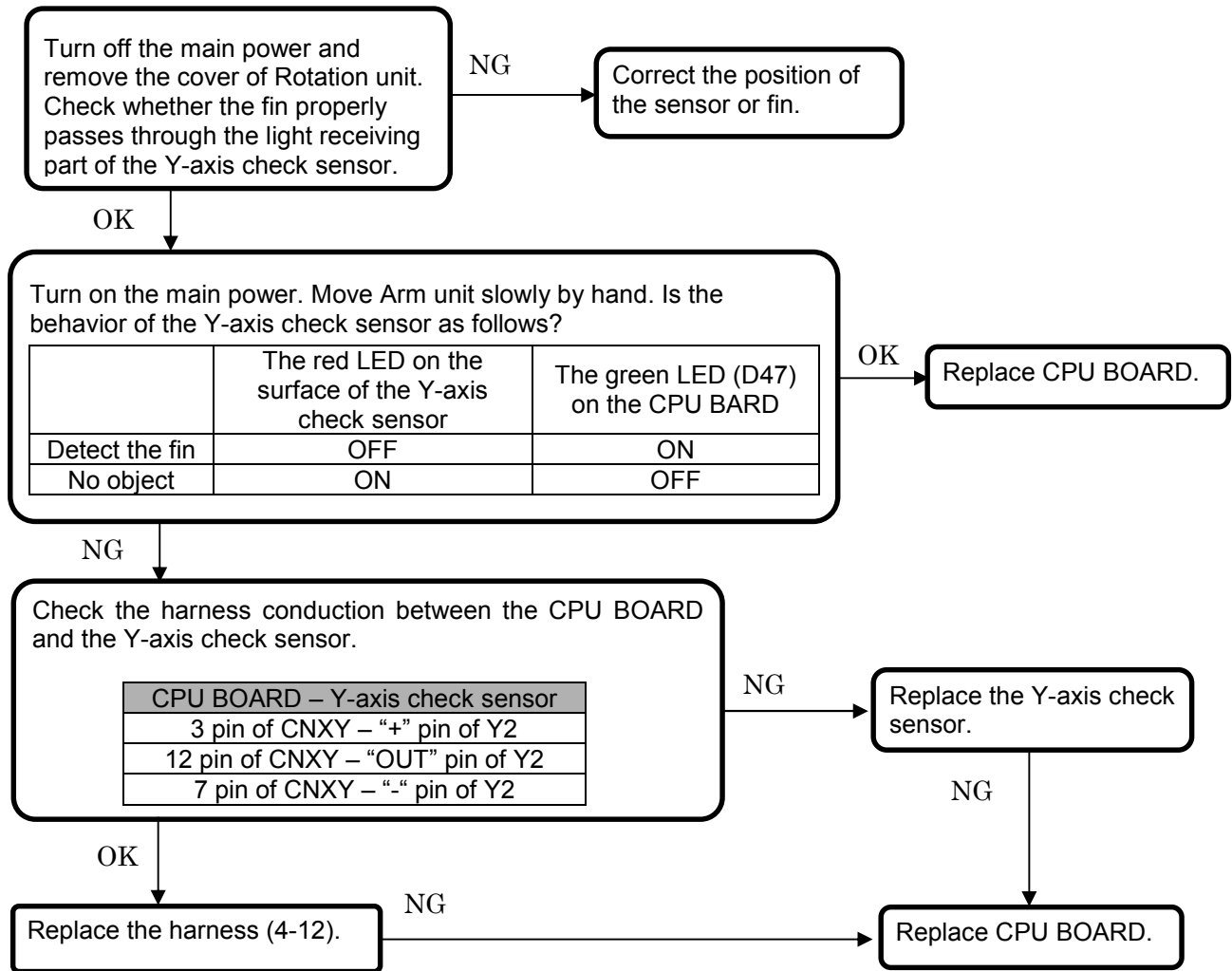
Action on "Y Axis Motor Error" case 2)



Action on "Y Axis Motor Error" case 3)



Action on “Y Axis Motor Error” case 4)



Error No. 511 “Y Axis time out”

This error occurs when the signal of Y-axis origin sensor does not come to CPU BAORD within the first 30 seconds of Y-axis motion, but it is unlikely to happen because “Y Axis Motor Error” happens before it occurs.

Error No. 515 “Sliding Unit Time Out”

This error occurs when the signal of upper limit sensor or bottom limit sensor does not come to CPU BAORD within the first 50 seconds of Sliding Unit motion, but it is unlikely to happen because “Sliding Unit Encoder Error” happens before it occurs.

Error No. 516 “Sliding Unit Encoder Error”

Select one which match actual trouble in the following conceivable Symptoms 1) ~ 3).

- 1) The linear actuator does not move though the UP/DOWN button is pressed.
- 2) The linear actuator does not stop at the upper limit sensor or the bottom limit sensor and overrun, then the error message is displayed.
- 3) The error occurs when an operator hits a button of an operation panel in high speed continuously in an excessive number of times.

Follow each action on error 1) ~ 3).

- 1) If you hear the invalid sound (PiPiPi), “Sliding unit Bottom safety switches” or "Sliding unit up/down limit sensors" is working.

If “Sliding unit Bottom safety switches” is pressed, the LED (D58) turns off the light on CPU BOARD.
Check the harness (3-5, 3-15. 3-1)

If "Sliding unit up/down limit sensors" is working,
Check the behavior of “Sliding unit up limit sensor” and “Sliding unit down limit sensor” in the STAND unit.

Check the behavior of LEDs on CPU BOARD.
(D56: Sliding unit up limit sensor, D57: Sliding unit down limit sensor)

	The red LED on the surface of the sensor	The green LED (D56 or D57) on the CPU BARD
On the limit	OFF	ON
Not limit	ON	OFF

If it is OK, replace the CPU BOARD.

If it is not good, check the harness between sensors and CPU BOARD (3-6, 3-4, 3-3, 3-1).

Check whether BRAKE CONTROL BOARD works normally, it has a clicking sound when main power turn on and when you press a Sliding Unit UP/Down button.

If this sound is OK, check the harness between the linear actuator and BRAKE CONTROL BOARD, the linear actuator and CPU BOARD.

If no sound, check the harness between BRAKE CONTROL BOARD and CPU BOARD.

If it is not resolved, replace BRAKE CONTROL BOARD and CPU BOARD.

If the problem is not resolved by doing the above, replace the linear actuator.

2) Check the behavior of “Sliding unit up limit sensor” and “Sliding unit down limit sensor” in the STAND unit.

Check the behavior of LEDs on CPU BOARD.

(D56: Sliding unit up limit sensor, D57: Sliding unit down limit sensor)

	The red LED on the surface of the sensor	The green LED (D56 or D57) on the CPU BOARD
On the limit	OFF	ON
Not limit	ON	OFF

If it is OK, replace the CPU BOARD.

If it is not good, check the harness between sensors and CPU BOARD (3-6, 3-4, 3-3, 3-1).

3) Be careful not to press a button of an operation panel in high speed continuously.

Error No. 524 "Inverter Error"

Check the condition of LEDs on the INVERTER BOARD and CPU BOARD when errors occurred.

	The LEDs on INVERTER BOARD	The LEDs on CPU BOARD
CPU BOARD is sending the working signal to "INV POWER ON RELAY".		Green LED "D4" turns on during ready and exposure.
CPU BOARD is sending "Preheat on" signal to INV.		Green LED "D77" turns on during ready and exposure.
CPU BOARD is sending "x-ray on" signal to INV.		Green LED "D76" turns on during exposure.
INV BOARD Normal operation	Green LED "NO(D14)" turns on during exposure.	
Inverter Error	Red LED "LV(D11)" turns on during error.	Green LED "D94" turns off during error.
Tube voltage OverError (OV)	Red LED "OV(D12)" turns on during error.	Green LED "D96" turns off during error.
Tube voltage Lower Error (LV)	Red LED "LV(D11)" turns on during error.	Green LED "D97" turns off during error.
Tube current Over Error (OC)	Red LED "OC(D13)" turns on during error.	Green LED "D98" turns off during error.
Tube current Lower Error (LC)	Red LED "LC(D45)" turns on during error.	Green LED "D99" turns off during error.

Tube voltage Lower Error (LV) is most likely to happen. If it occurs, check the following.

Unplug the housing CN1 connected to PFC module.

Check the voltage between 1 pin and 2 pin of housing CN1 during Ready ON.

If it is normal, main power voltage is supplied.

If it is no voltage, check harnesses (especially 7-1).

Check the voltage between TB2 and TB3 on INVERTER BOARD during Ready ON.

If it is no voltage, check "the Fuse F1" and "the resistor with thermal fuse R1"

Check the setting voltage and feedback voltage of Tube voltage and Tube current on CPU BOARD.

EPSET- CPGND 60kV: 3.0V, 70kV: 3.5V, 80kV: 4.0V

IPSET- CPGND 2mA: 1.0V, 4mA: 2.0V, 6mA: 3.0V, 8mA: 4.0V

EPRET-CPGND 60kV: 1.5V, 70kV: 1.75V, 80kV: 2.0V

IPRET-CPGND 2mA: 0.5V, 4mA: 1.0V, 6mA: 1.5V, 8mA: 2.0V

*Bel-Cypher Pro's feedback voltage on CPU BOARD is half value of the setting voltage.

Error No. 529 "Head thermal Error"

Check the temperature of X-ray Head and wait until it cools down.

If it does not work, check the connection of the harness from a thermal switch to CPU BOARD (5-5, 5-4, 4-23).

The LED (D95) on CPU BOARD turns off when Head thermal error occurs. If it is not, replace the CPU BOARD.

Error No. 530 "X-ray switch Error. Please turn off the switch and press the reset button"

Check the timing of pressing a x-ray switch.

If you press the button too early after ready on, this error will occur.

If it is OK, check the connection of the harness from a x-ray switch to CPU BOARD (0-3, 0-4, 1-1, 4-3)

The LED (D8) on CPU BOARD turns on during a x-ray switch is pressed. If it is not, replace the CPU BOARD.

Error No. 531 "Interlock Error"

Check the interlock connector in Relay Box and the harness to CPU BOARD (1-3, 1-1, 4-3).

The LED (D7) turns off a light when interlock connector is being opened. If it is not, replace the CPU BOARD.

Ref.No. S001 "This application can not multi execute."

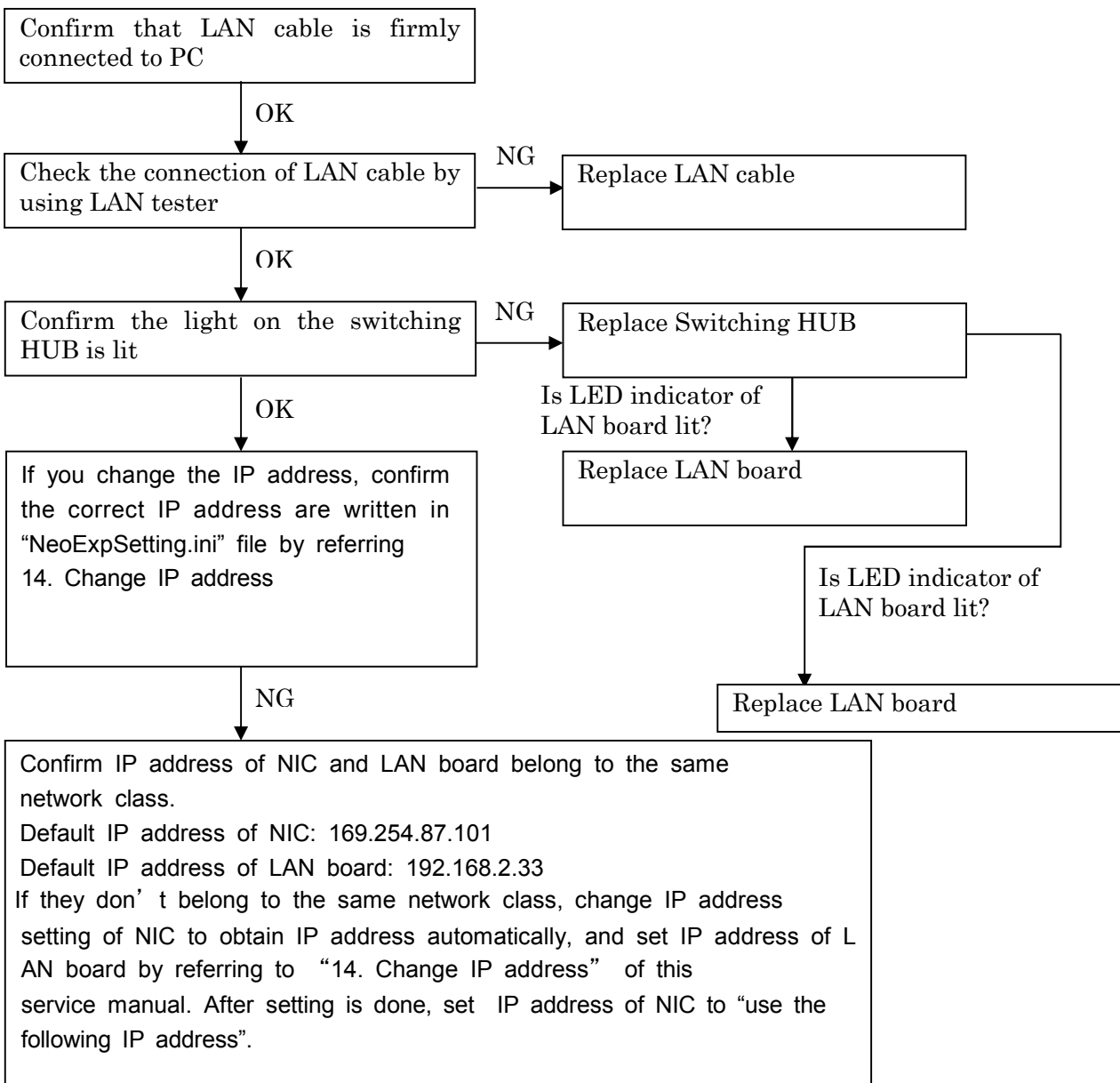
Please restart the PC.

Ref.No. S002 "Communication speed to sensor becomes low."

Please check HUB and LAN cable.

Ref.No. S003 "Please check power source of equipment."

This is Communication failure between PC (NIC) and Bel-Cypher Pro (LAN board).



Ref.No. S004 "TCP/IP circuit open error. Cannot communicate with equipment. Please check power source of equipment."

This error will occur when exposure display is opened.

This error is communication problem between PC and LAN board

Confirm that LAN cable is firmly connected to PC.

Check the connection of LAN cable by using LAN tester. If it is bad, replace that LAN cable.

Ref.No. S005 "Communication with equipment is not normal. (Checksum)"

If this error occurs please contact the manufacturer.

Ref.No. S006 "Communication with equipment is not normal."

This is Communication Error between PC and CPU BOARD. Please check HUB and LAN cable.

Ref.No. S007 "Cannot find density correction data."

This error will occur when calibration data is not exist.

Please confirm 0001.raw and 0002.raw are saved in the following folder.

C:¥Bel-CypherPro¥app¥NeoExpGroup¥CORR_DATA¥PANORAMA

Ref.No. S008 " Cannot find defect data file."

This error will occur when defect data is not exist.

Please confirm 0001.raw and 0002.raw are saved in the following folder.

C:¥Bel-CypherPro¥app¥NeoExpGroup¥CORR_DATA¥PANORAMA

Ref.No. S009 "Could not read INI file. Set default."

This error will occur when TWAIN is started.

Ini file doesn't exist in C:¥Bel-CypherPro¥app¥NeoExpGroup folder

Please use the attached CD of Bel-CypherPro and install the shooting program again.

Ref.No. S010 "The free space of the save destination drive is insufficient. Please delete unnecessary files."

Please check the free space of the HDD.

Ref.No. S011~S014

Ref.No. S011~S014 is unlikely to occur.

If these errors occur please the manufacturer.

Error No. 30001~30020

These errors are problems inside the C-MOS sensor.
If this error occurs please contact the manufacturer.

07. Response to troubles without any error messages

The list of troubles without any error messages.

Ref. No.	Symptoms of trouble
E001	Unable to Turn On Power
E002	Device initialization is not completed (After powering on the device, an error tone sounds several times and the operation panel flashes.)
E003	It does not react even if you push the operation panel. (without any error messages.)
E004	Sliding unit doesn't move up or down. (without any error messages.)
E005	Positioning Beam doesn't light (Focus Beam / Frankfurt Plane Beam / Median Beam)
E006	Arm doesn't rotate normally. (without any error messages.)
E007	Y-axis doesn't move normally. (without any error messages.)
E008	Unable to Irradiate X-rays. (without any error messages.)

※Ref.No. is the number which is used only in this manual, not displayed on PC monitor.

08. Response to troubles related to images

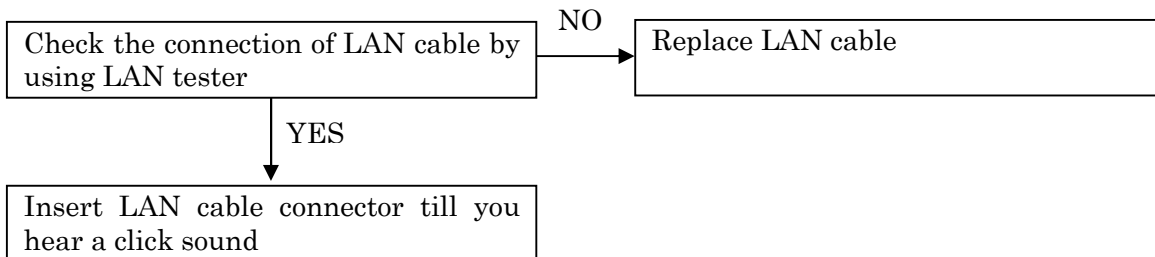
The list of troubles related to images

Ref. No.	Symptoms of trouble
001	Saving a file takes long time.
002	Horizontal lines at equal interval on the image
003	Lines on the top and bottom portion of the image
004	Upper or bottom portion of the image is not displayed
005	The image stretches from the certain point
006	Shrank dentition in the image
007	Vertical lines on the image
008	Nothing is shown in the image

※Ref.No. is the number which is used only in this manual, not displayed on PC monitor.

Ref. No. 001 "Saving a file takes long time."

Possible cause	Loose connection of LAN cable between PC and CMOS sensor
----------------	--



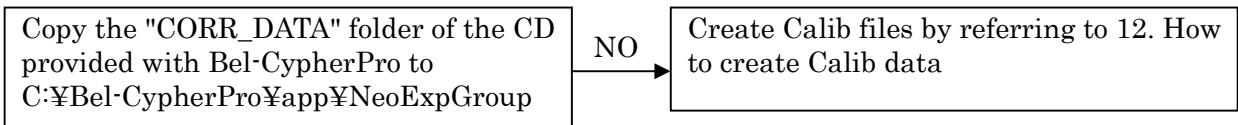
Possible cause	Connected at 100Mbps
----------------	----------------------

Replace NIC, Switching Hub and LAN Cable to Gigabit type

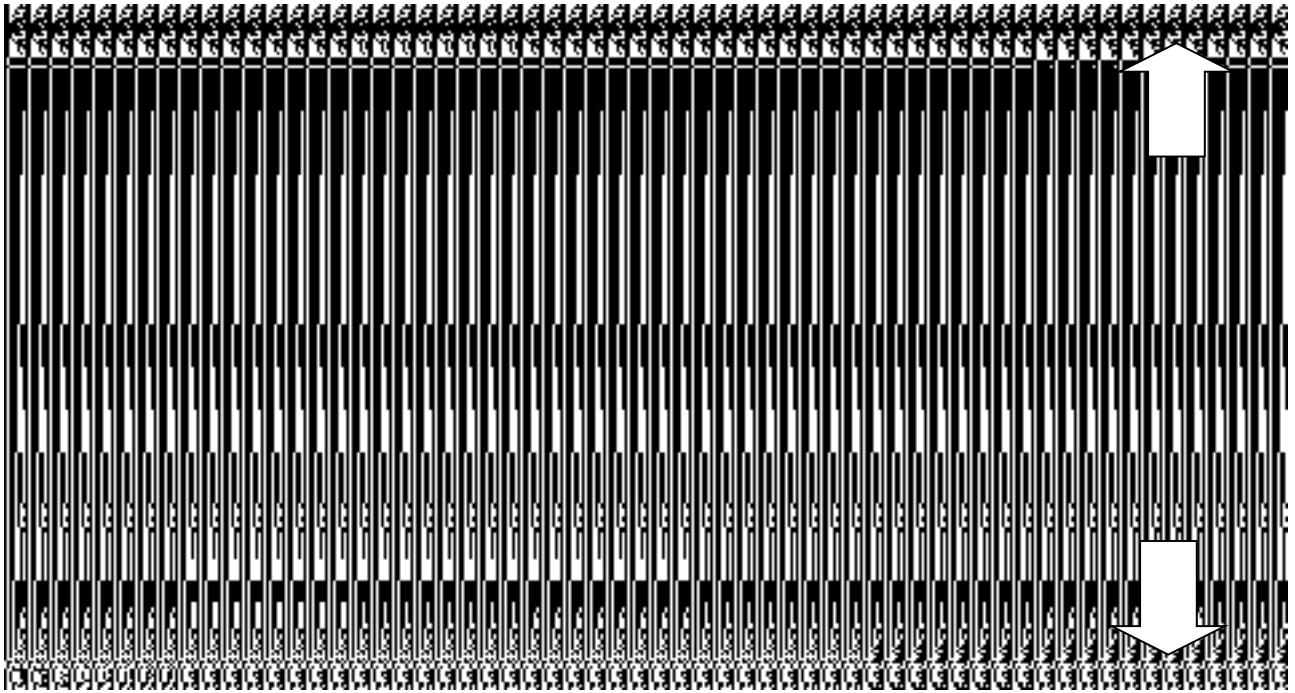
Ref. No. 002 "Horizontal lines at equal interval on the image"



Possible cause	Image is not corrected because right calib files are not used. (Calib files for other Bel-Cypher Pro is used)
----------------	--



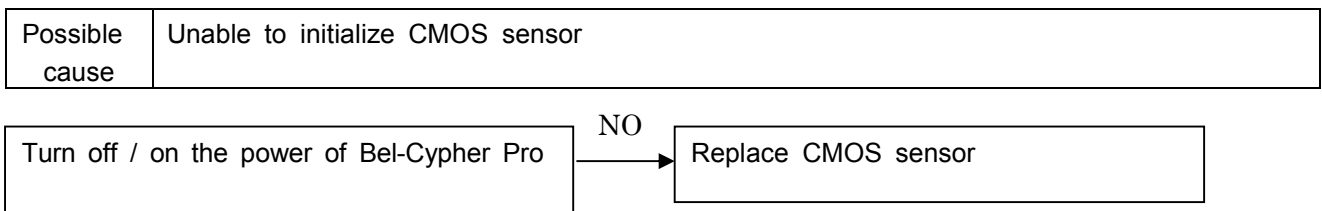
Ref. No. 003 "Lines on the top and bottom portion of the image"



Possible cause	Wrong ini file is used. (ini file for other Bel-Cypher Pro is used)
----------------	---

Copy "PanoramaSetting.ini" stored in the calib folder of the CD provided with Bel-Cypher Pro to C: ¥ Bel-CypherPro ¥ app ¥ NeoExpGroup ¥ 2DReCon ¥ BelCypherPro.

Ref. No. 004 "Upper or bottom portion of the image is not displayed"



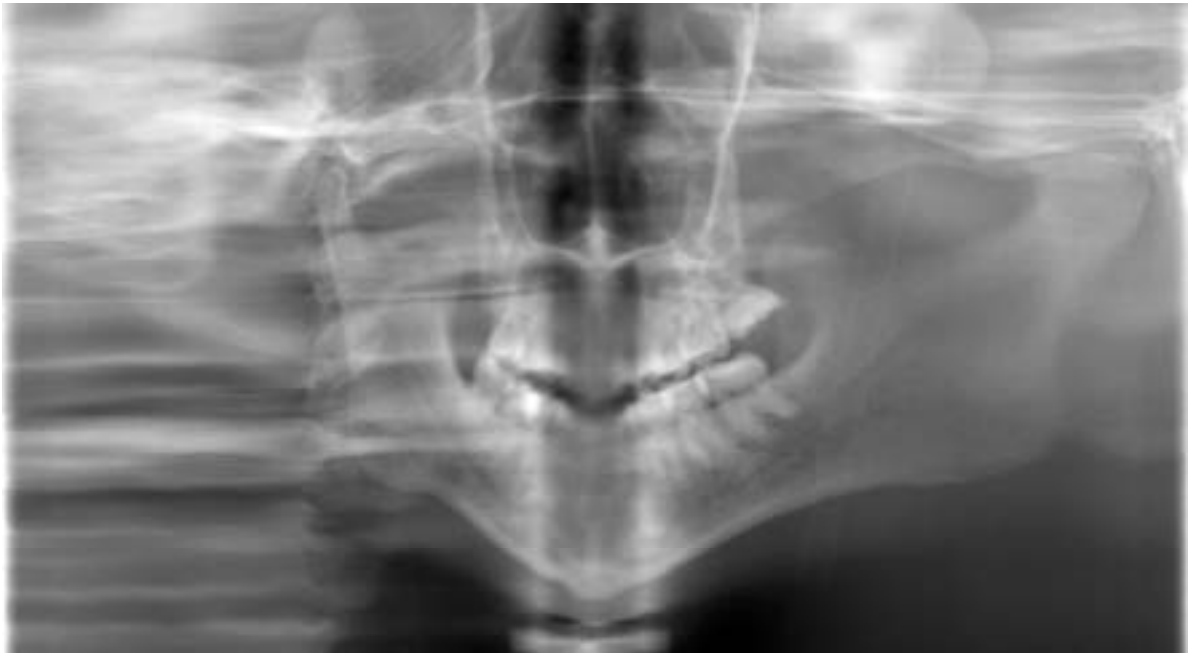
Ref. No. 005 "The image stretches from the certain point"



Possible cause	Rotation stops in the middle of exposure
----------------	--

Follow the Trouble Shooting. 6.2. Arm doesn't rotate

Ref. No. 006 "Shrank dentition in the image"



Possible cause	The movement of Y-axis is stopped in the middle of exposure
----------------	---

Check whether Y-axis motor error has occurred.

Ref. No. 007 "Vertical lines on the image"

Possible cause	The mask is not properly adjusted
----------------	-----------------------------------

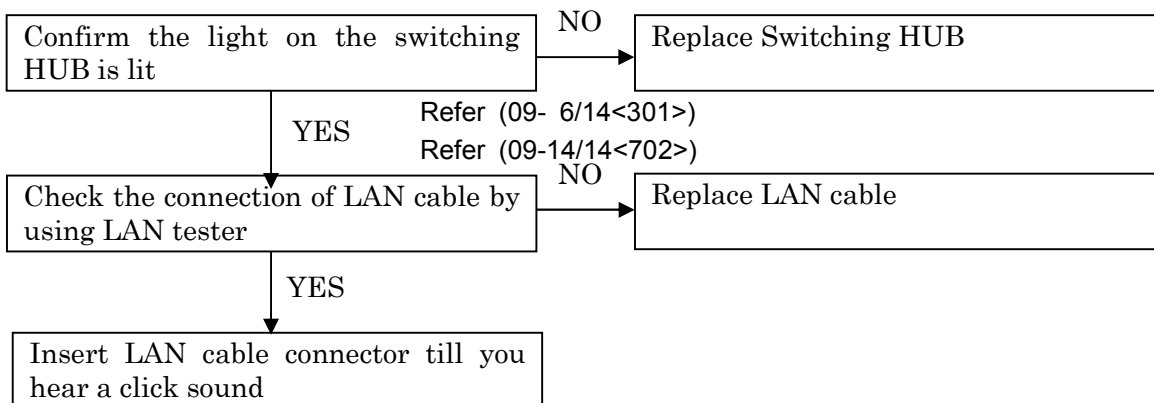
Follow M102. X-ray Irradiation Field Check and M105. Mask Position: Check/Adjustment.

Ref. No. 008 "Nothing is shown in the image"

Possible cause	There is a possibility that X-ray didn't irradiate.
----------------	---

Follow the Trouble Shooting. 6.6. Unable to Irradiate X-rays

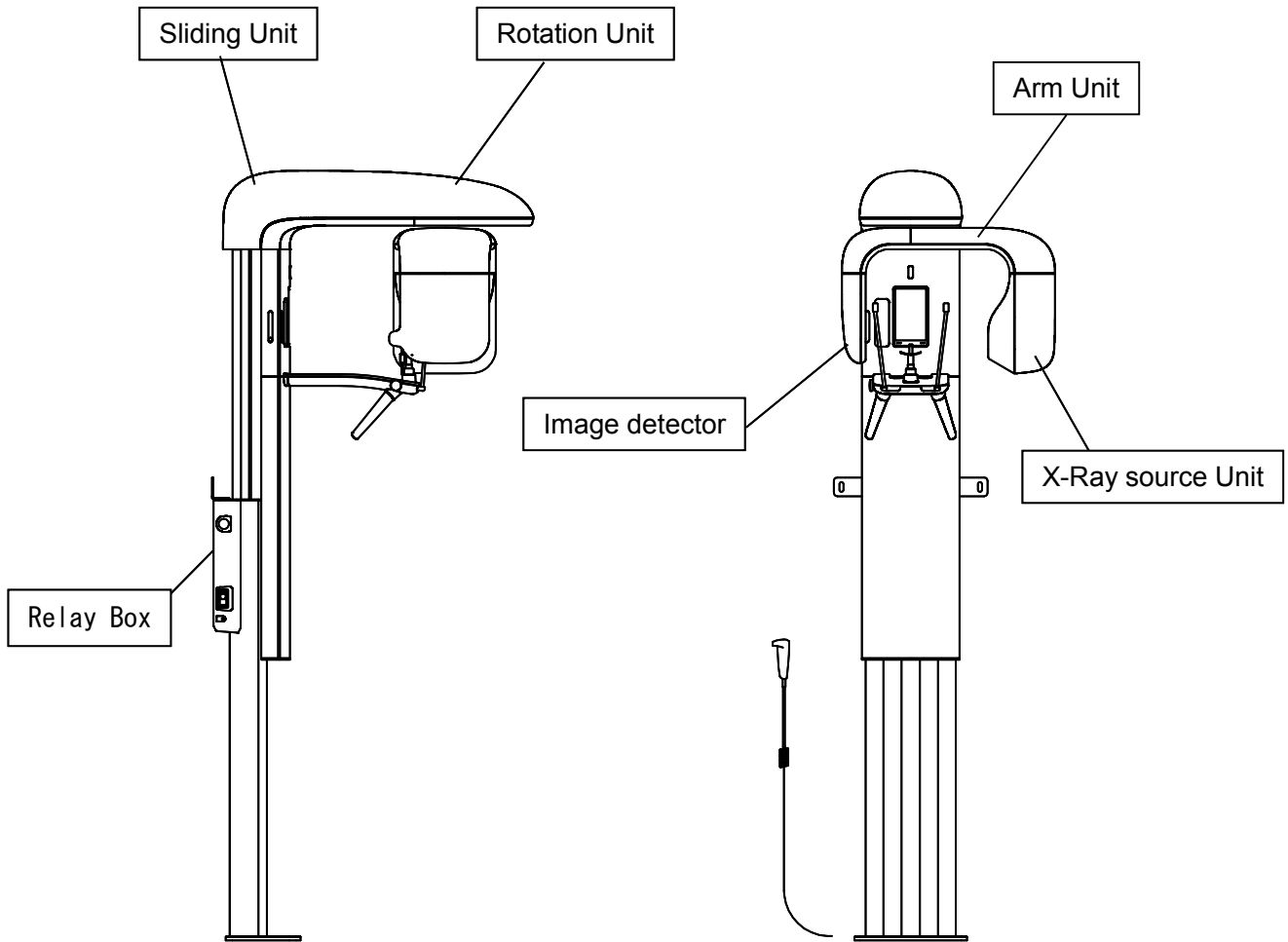
Possible cause	LAN connection between PC and CMOS sensor is not stable.
----------------	--



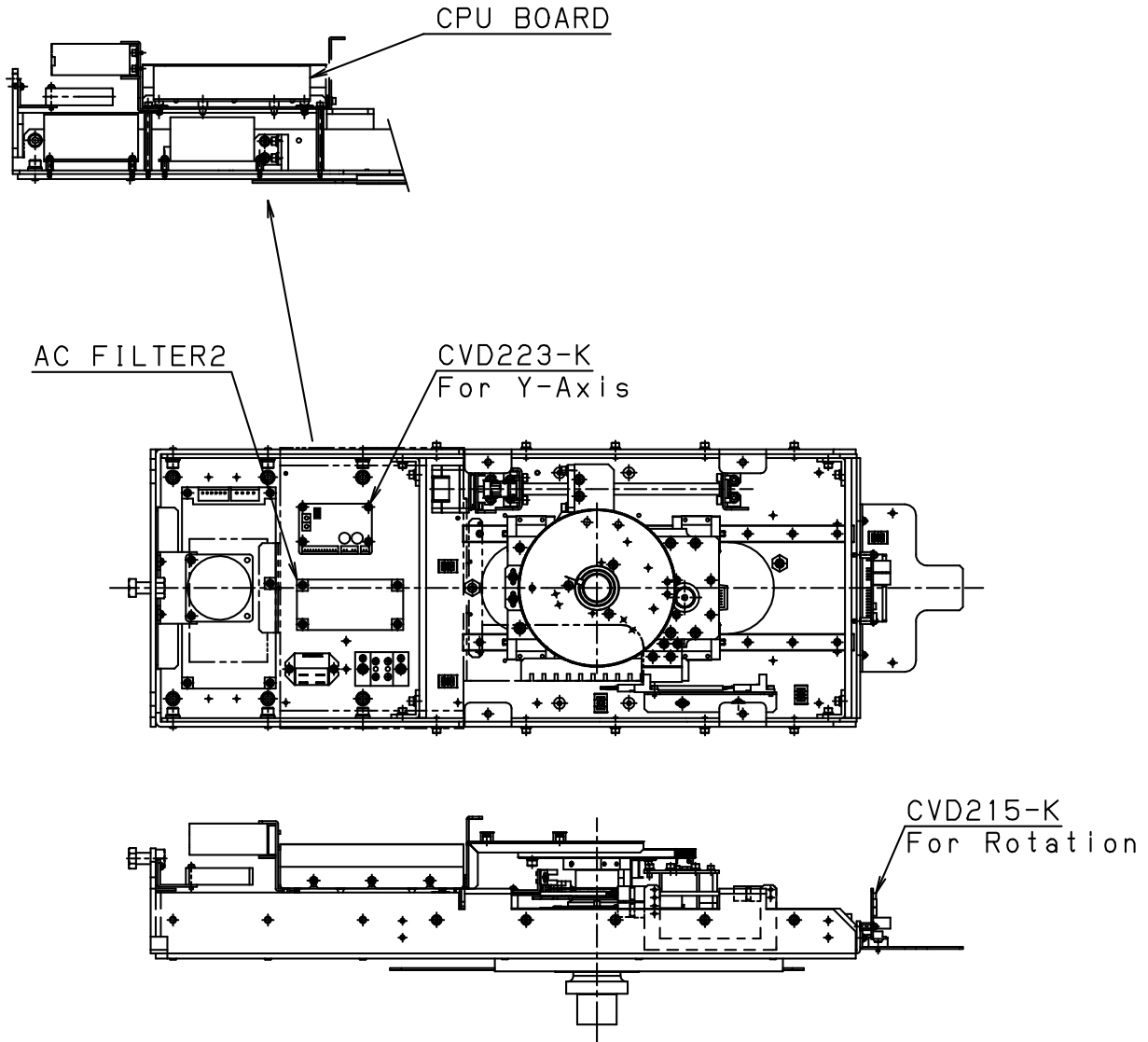
09. PRINTED CIRCUIT BOARD LAYOUT DRAWING

1. Overall View

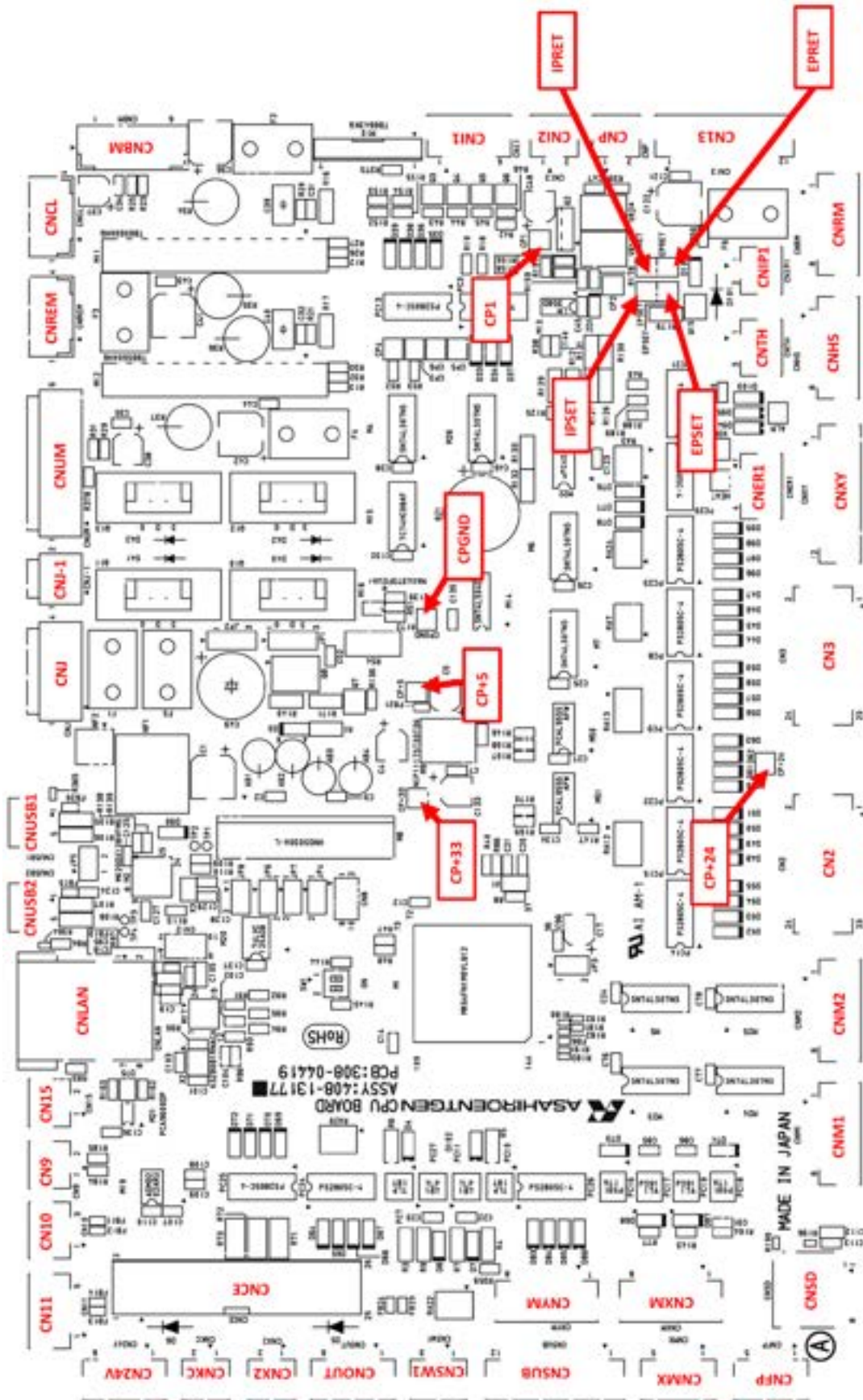
The printed circuit board assemblies are housed in the portions shown in the drawing.



2. Rotation Unit



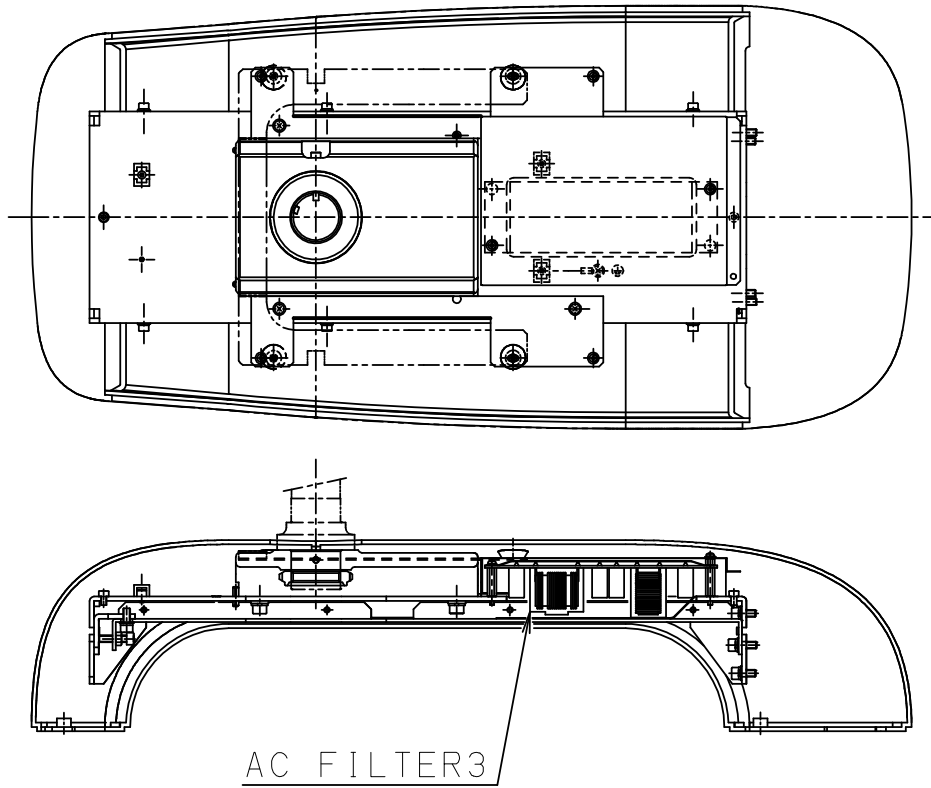
CPU BOARD



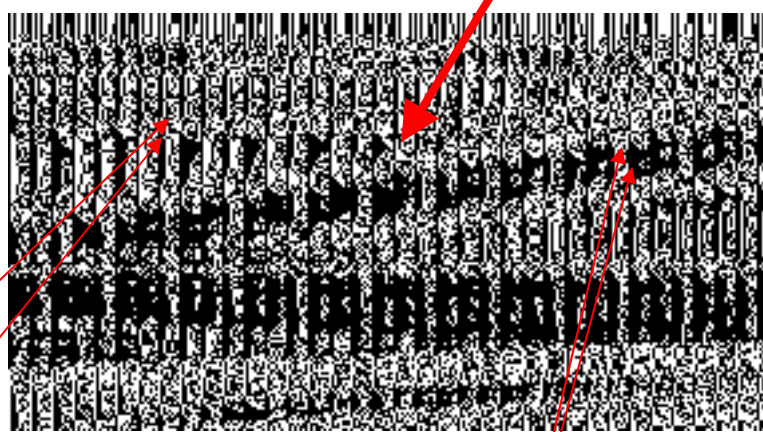
The table of descriptions of LEDs on CPU BOARD

LED's No.	Meaning	Behavior
D3(Green)	CPU BOARD is supplied power.	This LED is lighting constantly.
D4(Green)	INV POWER ON RELAY is working.	This LED lights during "ready on" and "exposure".
D7(Green)	INTERLOCK signal	This LED turns off a light when Interlock connector is being opened.
D8(Green)	EXPOSURE SWITCH signal	This LED lights while EXPOSURE SWITCH is being pushed.
D38(Green)	Encoder signal A of the linear actuator	This LED blinks while the linear actuator is moving.
D39(Green)	Encoder signal B of the linear actuator	This LED blinks while the linear actuator is moving.
D44(Green)	Y-axis limit sensor signal	This LED lights during detection a fin. (The LED on the surface of a sensor is turn off.)
D45(Green)	Y-axis origin sensor signal	This LED lights during detection a fin. (The LED on the surface of a sensor is turn off.)
D47(Green)	Y-axis check sensor signal	This LED lights during detection a fin. (The LED on the surface of a sensor is turn off.)
D53(Green)	Rotation origin sensor signal	This LED lights during detection a fin. (The LED on the surface of a sensor is turn off.)
D54(Green)	Rotation limit sensor signal	This LED lights during detection a fin. (The LED on the surface of a sensor is turn off.)
D55(Green)	Rotation check sensor signal	This LED lights during detection a fin. (The LED on the surface of a sensor is turn off.)
D56(Green)	Sliding Unit top limit sensor	This LED lights when the sliding unit is on the top limit. (The LED on the surface of a sensor is turn off.)
D57(Green)	Sliding Unit bottom limit sensor signal	This LED lights when the sliding unit is on the top limit. (The LED on the surface of a sensor is turn off.)
D58(Green)	Sliding Unit bottom Safty switch signal	This LED turn off a light during the sliding unit bottom safety switch is pushing.
D69(Green)	Remote control signal for DC 12 V 2 BOARD	This LED lights while 9V is being supplied to the CMOS sensor from DC 12V 2 BOARD.
D74(Green)	UserSync signal to image receptor	This LED blinks at the high speed while UserSync signal is being sent to the CMOS sensor.
D76(Green)	X-ray ON signal	This LED lights while X-ray ON signal is being to INVERTER BOARD , that is during exposure.
D77(Green)	Preheat signal	This LED lights while Preheat signal is being to INVERTER BOARD , that is during "ready on" and "exposure".
D78(Green)	INV alarm reset signal	This LED lights for a moment when INV alarm reset signal is sent to INVERTER BOARD.
D94(Green)	Inverter error	This LED turns off a light during "Inverter error".
D95(Green)	Head thermal error	This LED turns off a light during "Thermal error".
D96(Green)	Over Tube Voltage error	This LED turns off a light during "Over Tube Voltage error".
D97(Green)	Low Tube Voltage error	This LED turns off a light during "Low Tube Voltage error".
D98(Green)	Over Tube Current error	This LED turns off a light during "Over Tube Current error".
D99(Green)	Low Tube Current error	This LED turns off a light during "Low Tube Current error".

3. Arm Unit



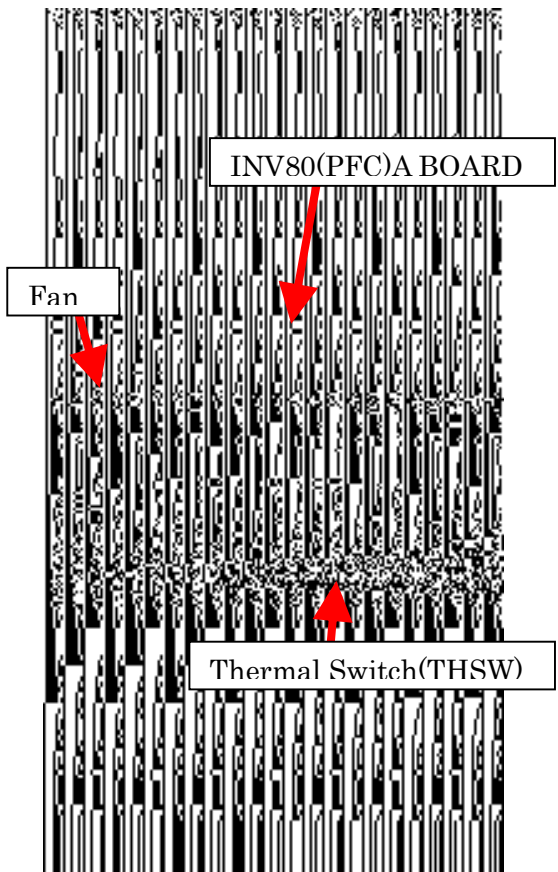
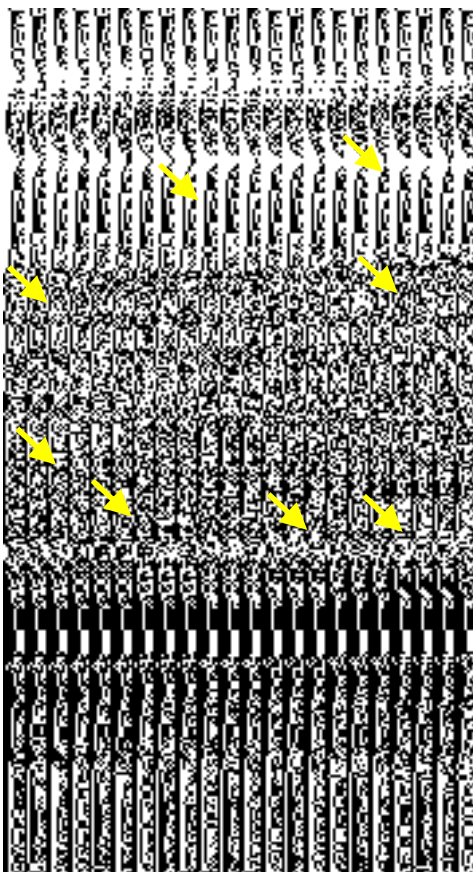
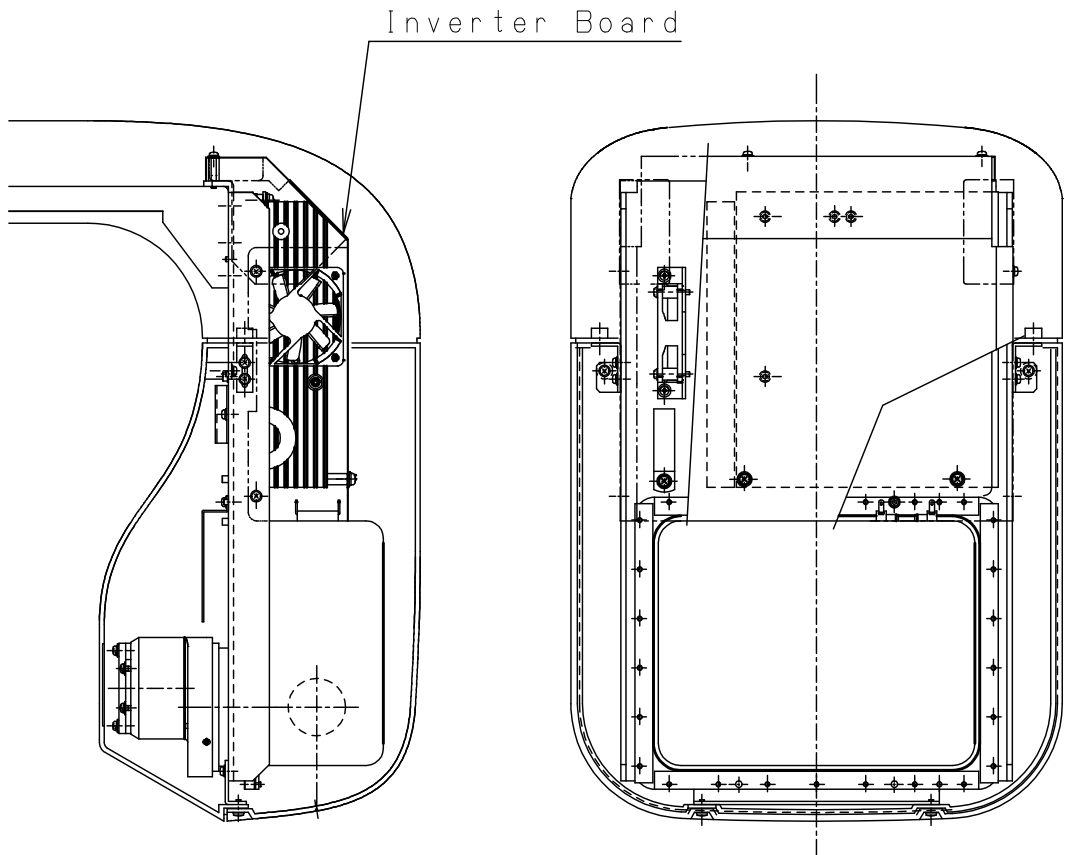
AC FILTER 3 BOARD

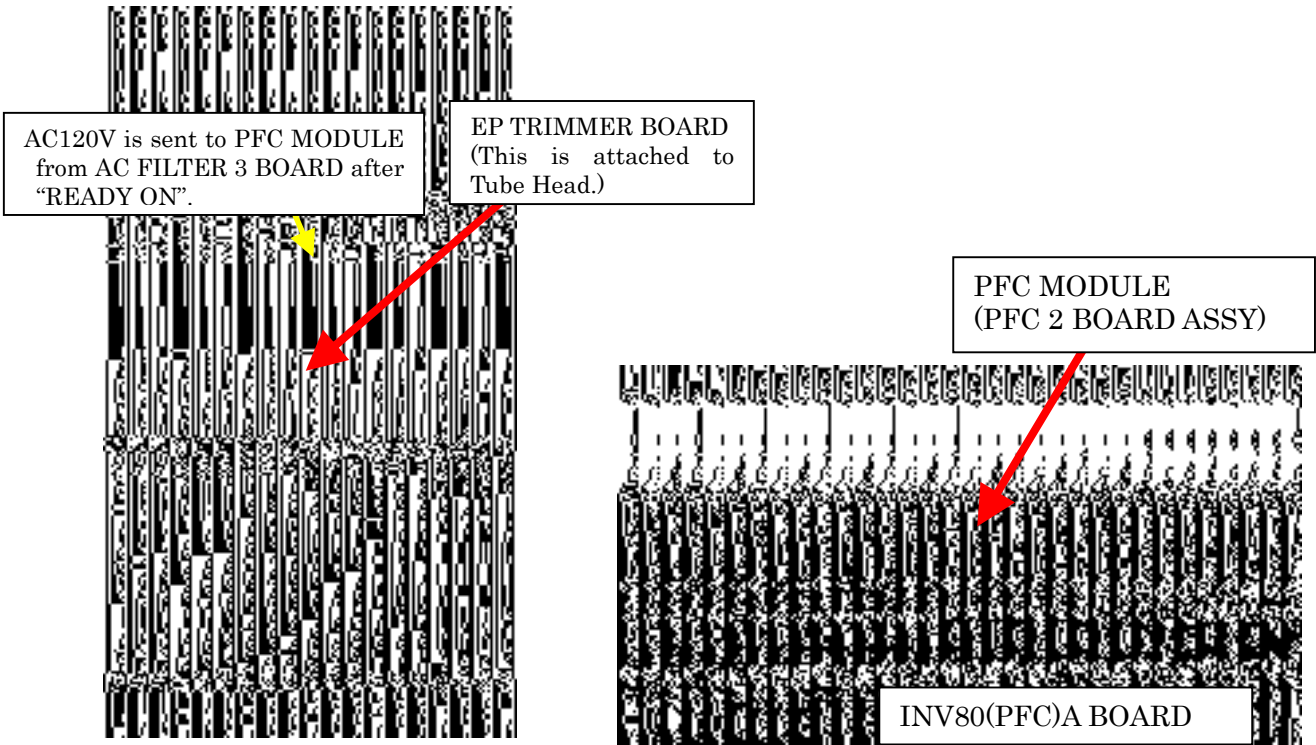


AC120V to PFC module attached INVERTER BOARD after "READY ON".

AC120V from "INV POWER ON RELAY" on Rotation Unit after "READY ON".

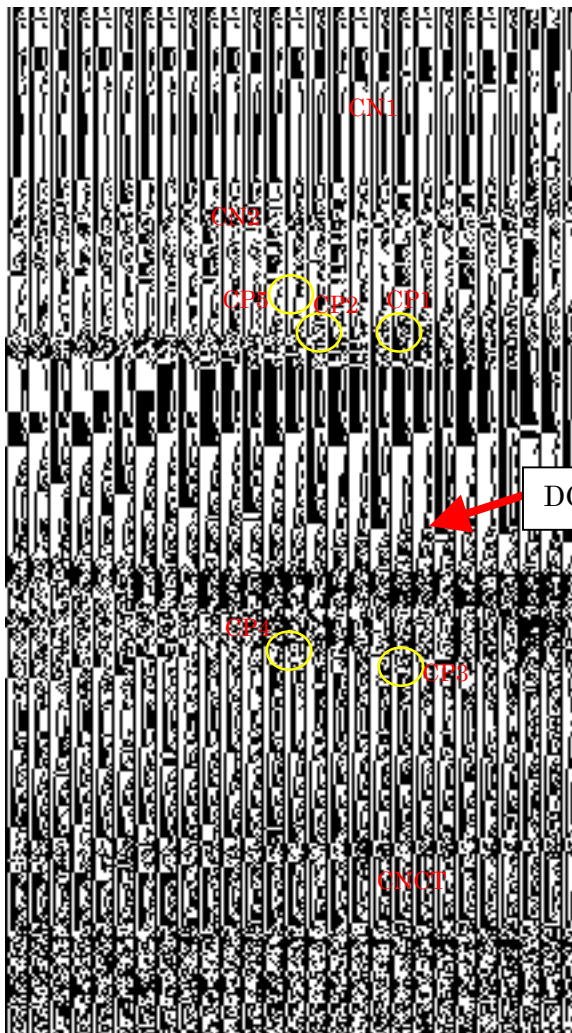
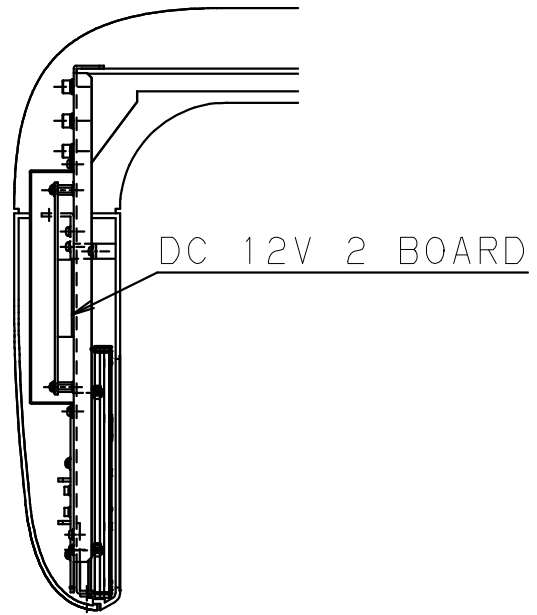
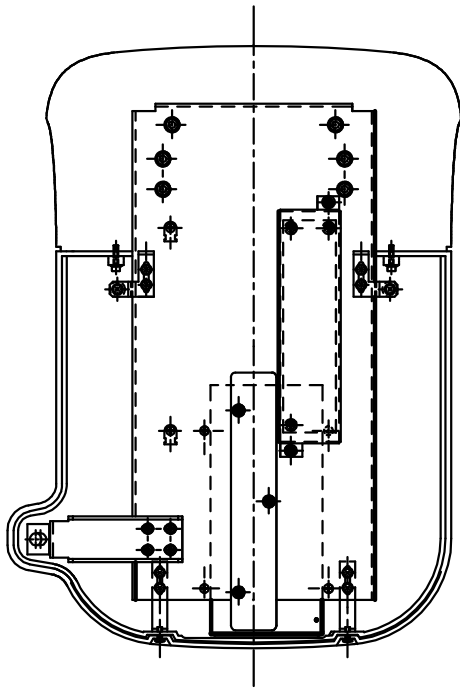
4. X-ray source Unit





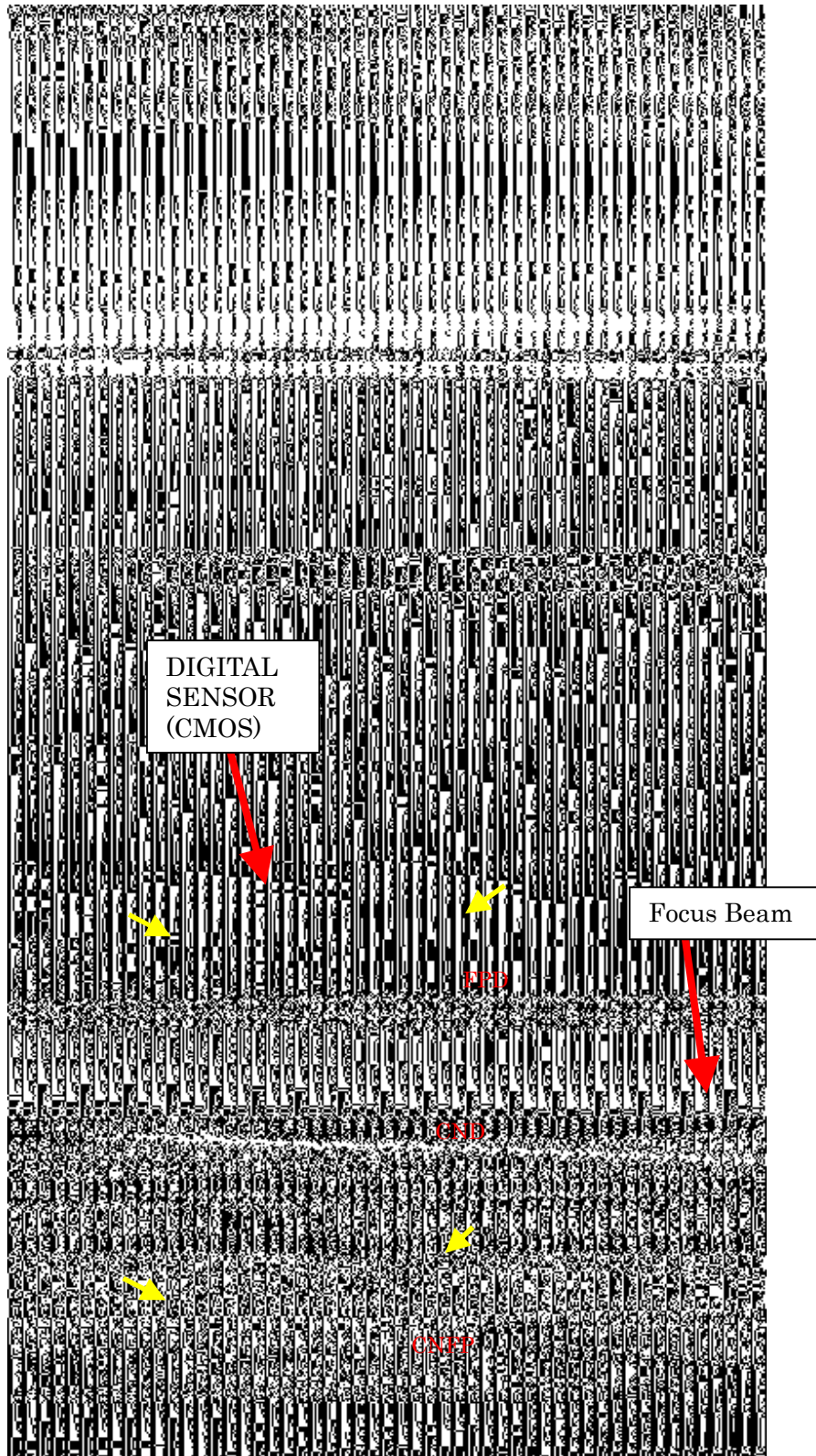
Inverter Board

5. Image detector

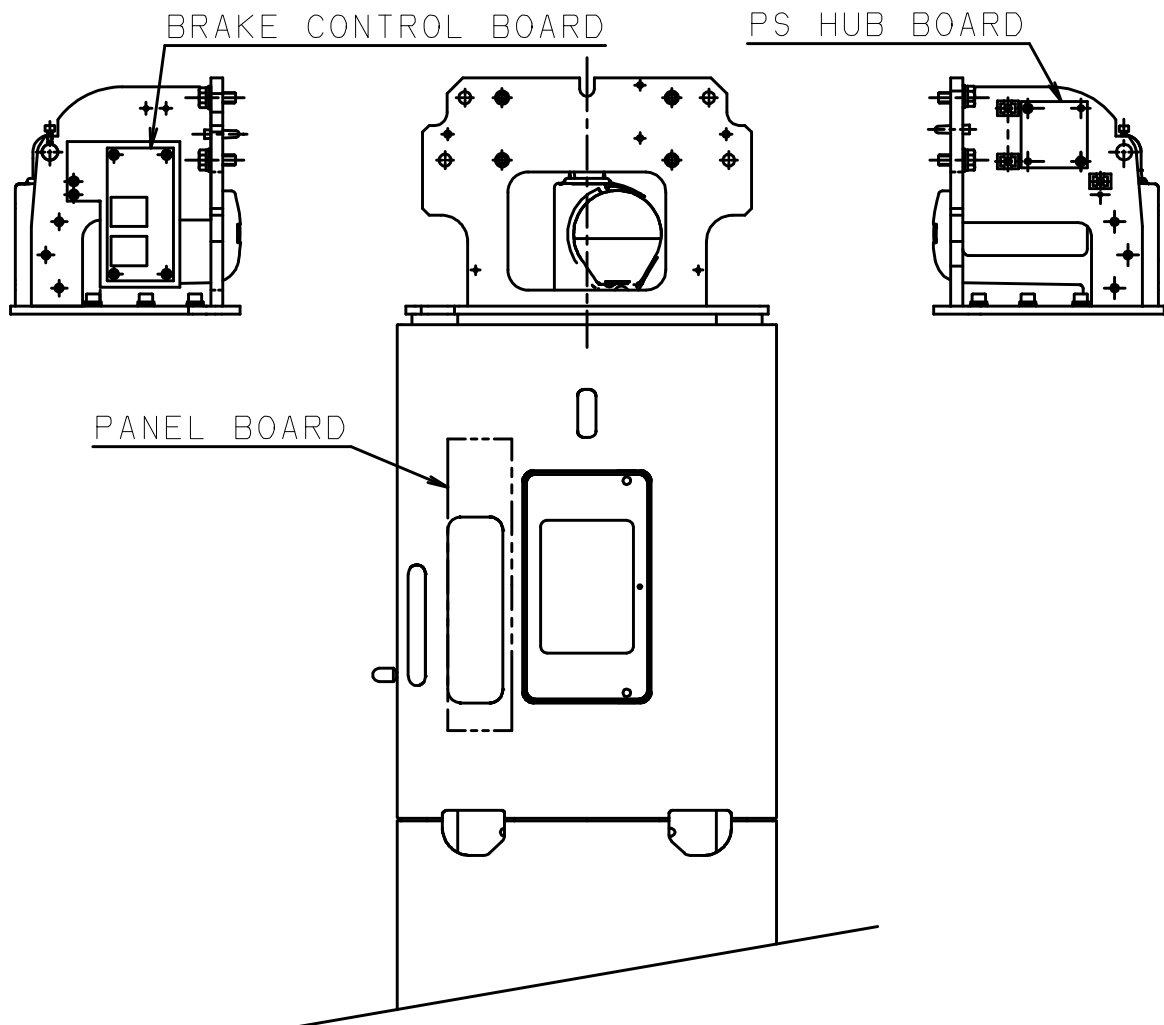


DC 12V 2 BOARD

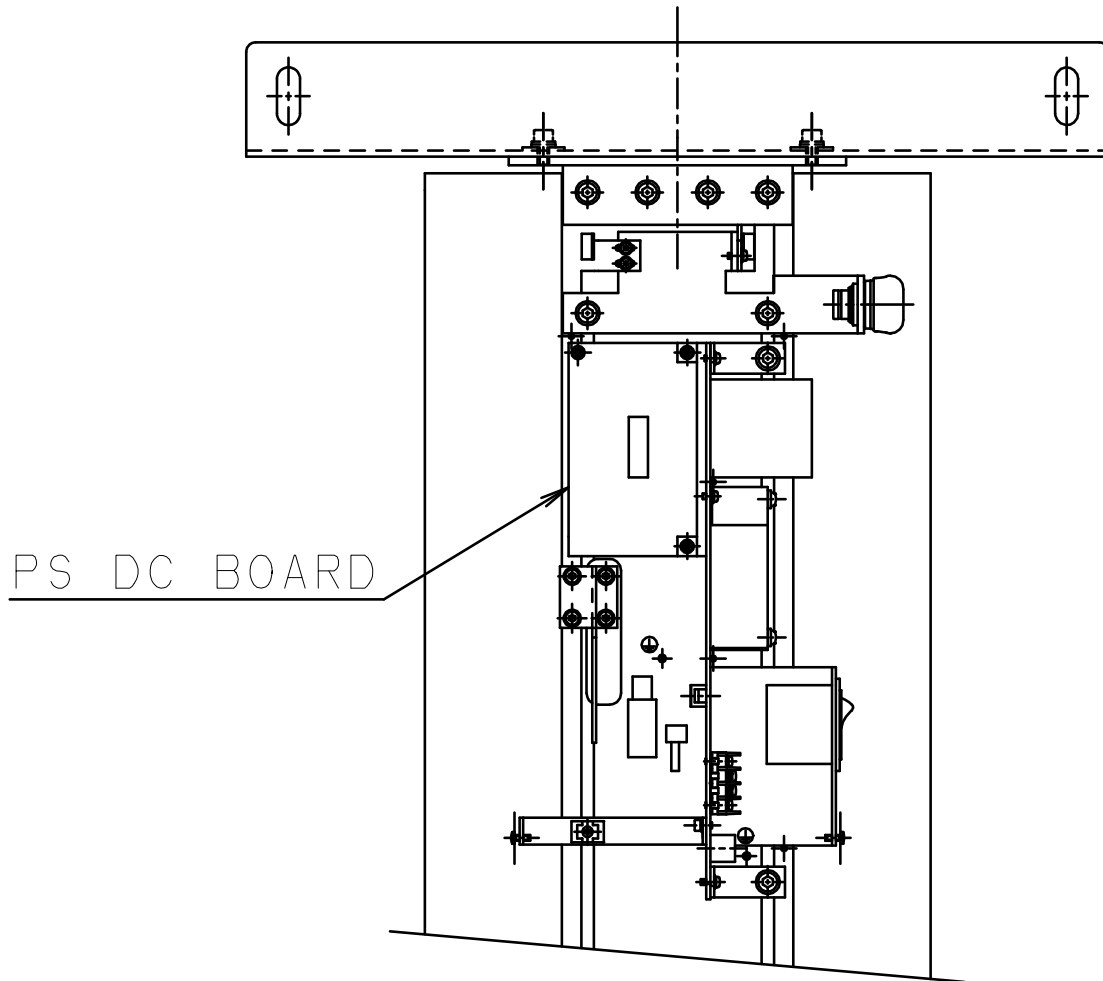
CP1-CP2: 24Vdc
CP3-CP4: 9Vdc (when CP5-CP2 is 0V.)
CP3-CP4: 0Vdc (when CP5-CP2 is 5Vdc.)



6. Sliding Unit

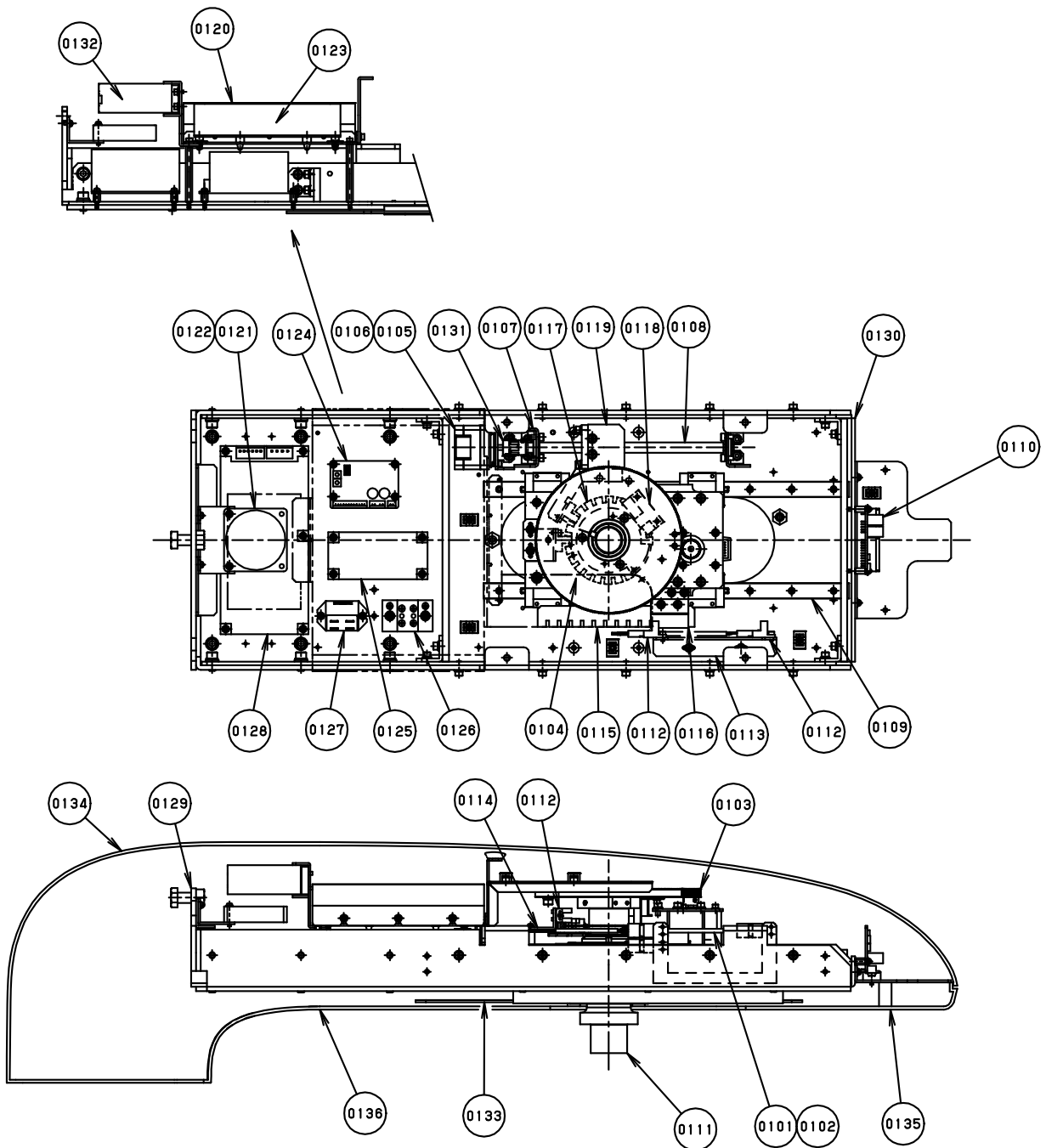


7. Relay Box



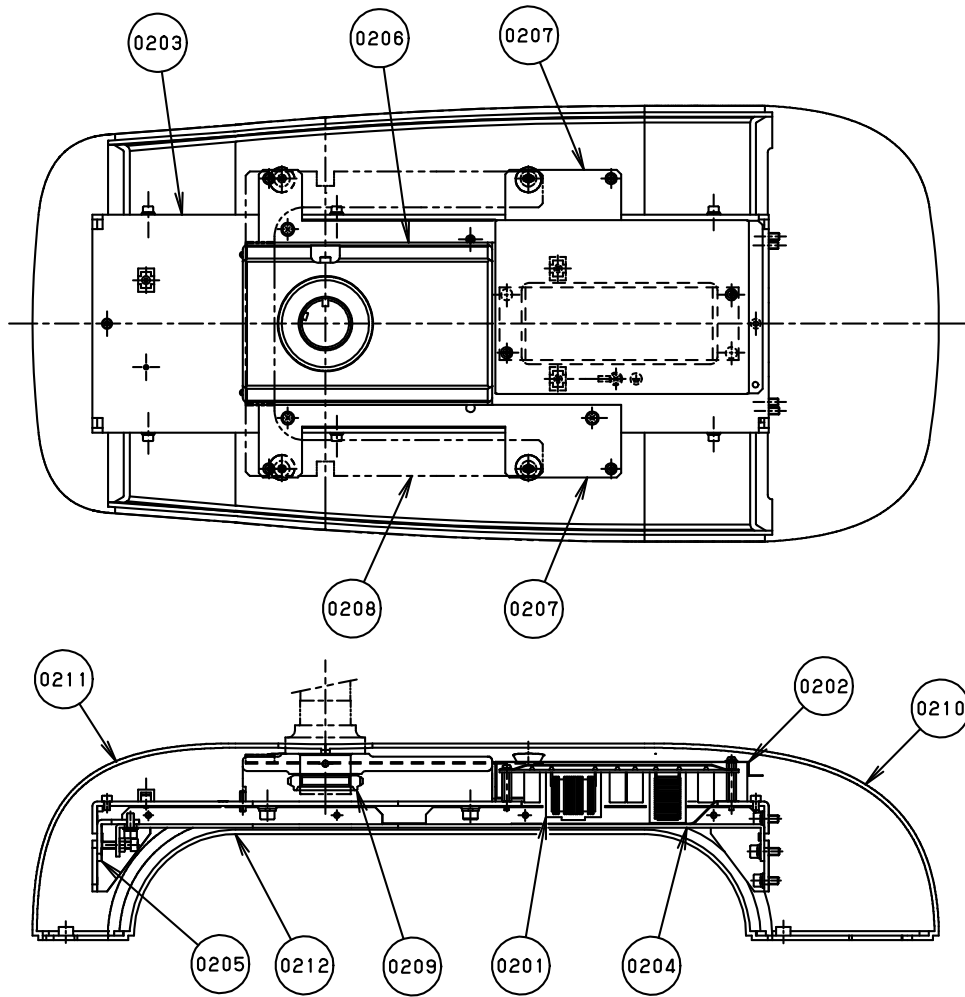
10. Parts List

1. Rotation Unit



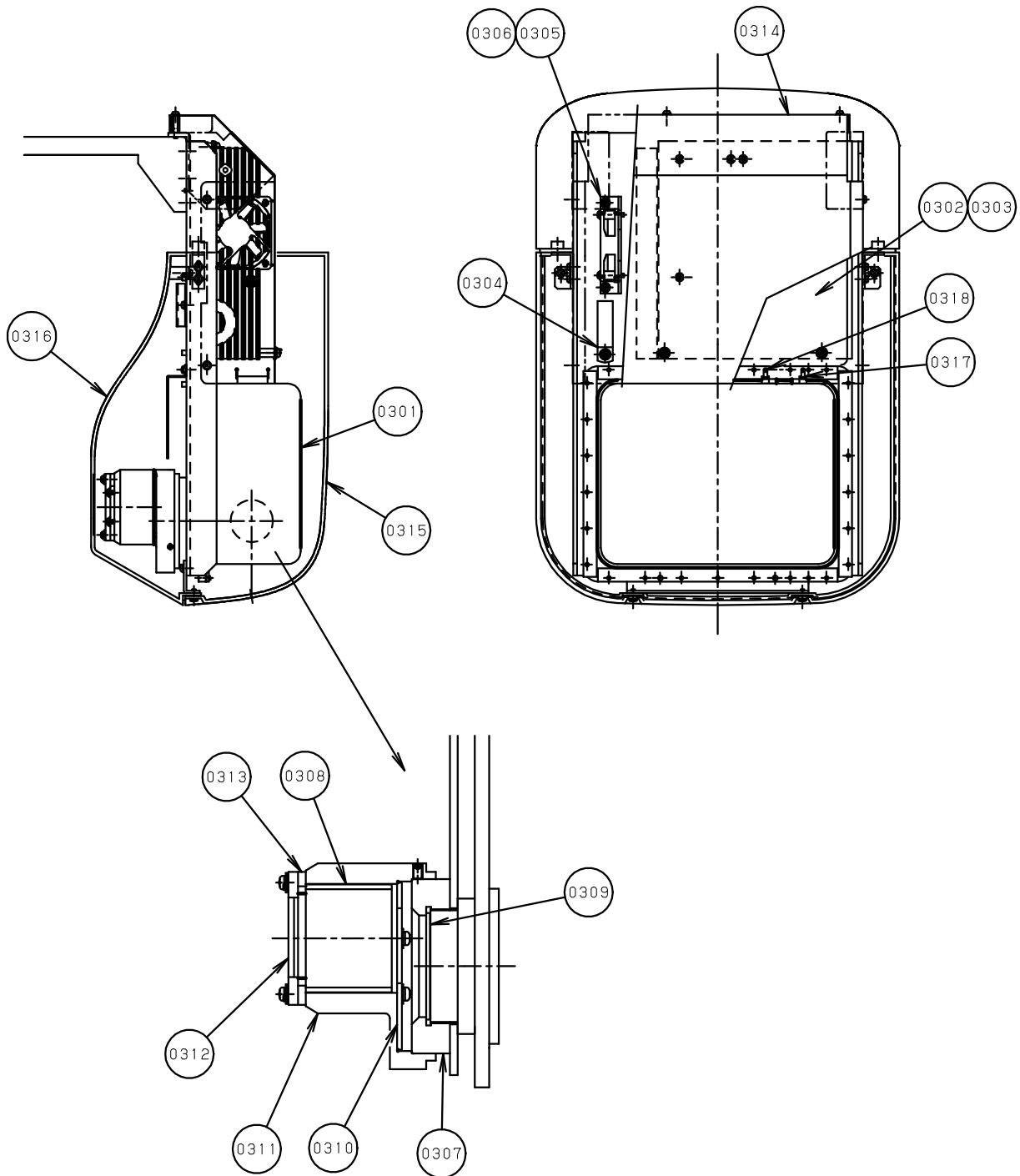
No.	Drawing No.	Part Name	Quantity
0101	977-79057-01	Motor(PKP243D15A-SG36-L)	1
0102	408-13481-00	Motor Base	1
0103	408-13477-00	Gear(Small)	1
0104	308-02560-00	Gear(Large)	1
0105	977-79053-01	Motor(PKP243D23A-L)	1
0106	408-13229-00	Motor Bracket	1
0107	408-13230-00	Bearing Holder	2
0108	931-50023-00	Ball screw	1
0109	931-70060-04	LM Guide	2
0110	977-79054-03	Driver(CVD215-K)	1
0111	308-03360-00	Axis Suspension	1
0112	978-60016-09	Photo micro sensor (PM-Y65)	5
0113	408-13489-00	Sensor Bracket (B)	1
0114	408-13482-00	Sensor Bracket (C)	1
0115	408-13479-00	Fin(Y-axis check)	1
0116	408-13480-00	Fin(Y-axis origin)	1
0117	308-04568-00	Fin(Rotation check)	1
0118	408-13478-00	Fin(Rotation origin)	1
0119	408-13474-00	Nut Bracket	1
0120	408-13464-00	Shield Plate(CPU BOARD)	1
0121	942-60027-05	Fan	1
0122	408-13467-00	Fan Bracket	1
0123	408-13177-01	CPU BOARD	1
0124	977-79054-01	Driver(CVD223-K)	1
0125	408-11145-03	AC FILTER2	1
0126	971-00045-01	Terminal Block	1
0127	408-11350	Relay	1
0128	974-80081-00	Switching Power Supply	1
0129	208-02261-00	Rotation Frame Bracket	1
0130	208-02262-00	Rotation Frame	1
0131	932-41025-01	Coupling(ALS-014-Y-5-6)	1
0132	408-13463-00	HUB	1
0133	408-13484-00	Protection plate	1
0134	208-02264-00	Rotation unit cover A	1
0135	308-04574-00	Rotation unit cover B	1
0136	208-02265-00	Rotation unit cover C	1

2. Arm Unit



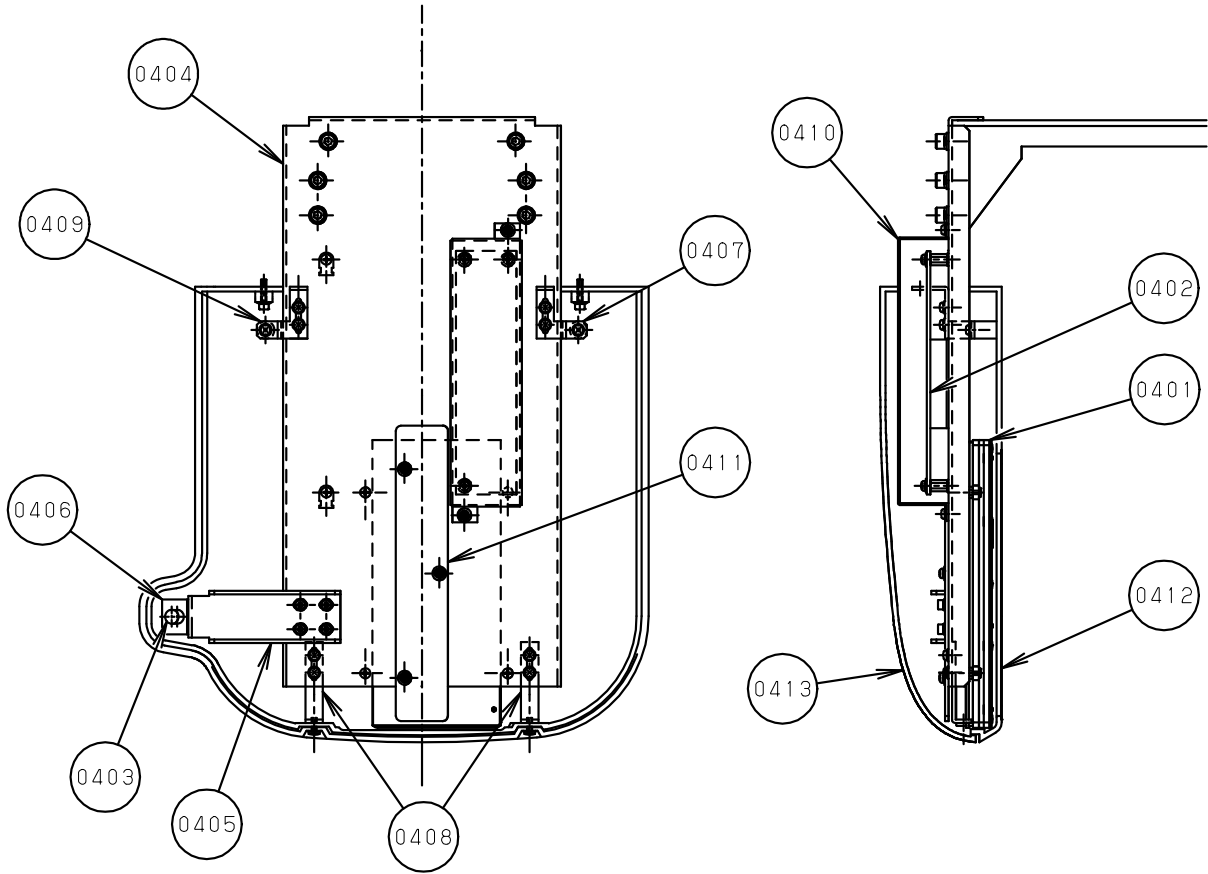
No.	Drawing No.	Part Name	Quantity
0201	408-11325-07	AC FILTER 3	1
0202	308-04530-00	Shield Plate(AC FILTER 3)	1
0203	308-04551-00	Arm Frame A	1
0204	308-04552-00	Arm Frame B	1
0205	308-04565-00	Bracket	1
0206	308-03369-00	Holder	1
0207	408-13472-00	Cover Bracket A	2
0208	308-04566-00	Cover Bracket B	1
0209	923-92004-08	Nut	1
0210	208-02257-00	Arm Cover A	1
0211	208-02258-00	Arm Cover B	1
0212	208-02259-00	Arm Cover C	1

3. X-ray source Unit



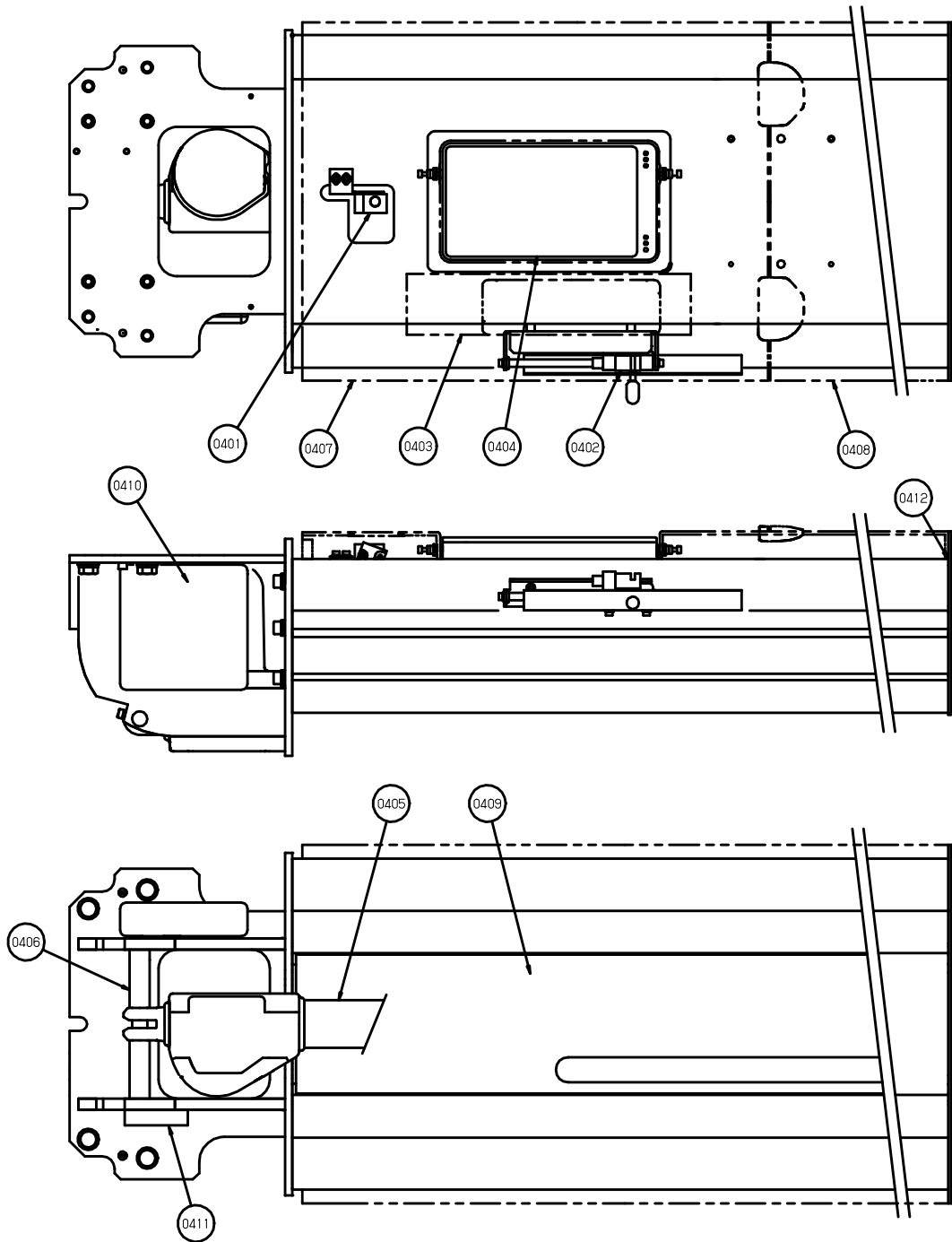
No.	Drawing No.	Part Name	Quantity
0301	308-04186-01	X-ray generator	1
0301-01	614-01845-00	X-RAY HEAD LABEL (UL)	2
0301-02	614-01848-00	X-RAY HEAD LABEL (Canada)	2
0302	408-13244-00	Inverter Board	1
0302-01		F1 FUSE 15A 125V	1
0303	408-11852-00	PFC 2 BOARD	1
0304	075-08003-01	Line Filter	1
0305	408-07867-00	Fan Bracket	1
0306	942-60027-05	Fan	1
0307	408-11368-01	Fixing Plate for Front Panel	1
0308	408-11366-01	Shielding Tube	1
0309	408-10017-00	Filter	1
0310	408-11365-00	Shielding lead	1
0311	308-03924-00	Tube	1
0312	408-12104-00	Mask	1
0313	408-12691-00	Mask adjustment plate	1
0314	308-04534-00	Shield Plate(Inverter Board)	1
	408-13454-00	Insulating sheet	1
0315	208-02247-00	Head Cover A	1
0316	208-02248-00	Head Cover B	1
0317	408-13505-05	Thermal Guard (OHD3-55B)	1
0318	961-00020-57	Thermal Guard (OHD3-70B)	1

4. Image detector



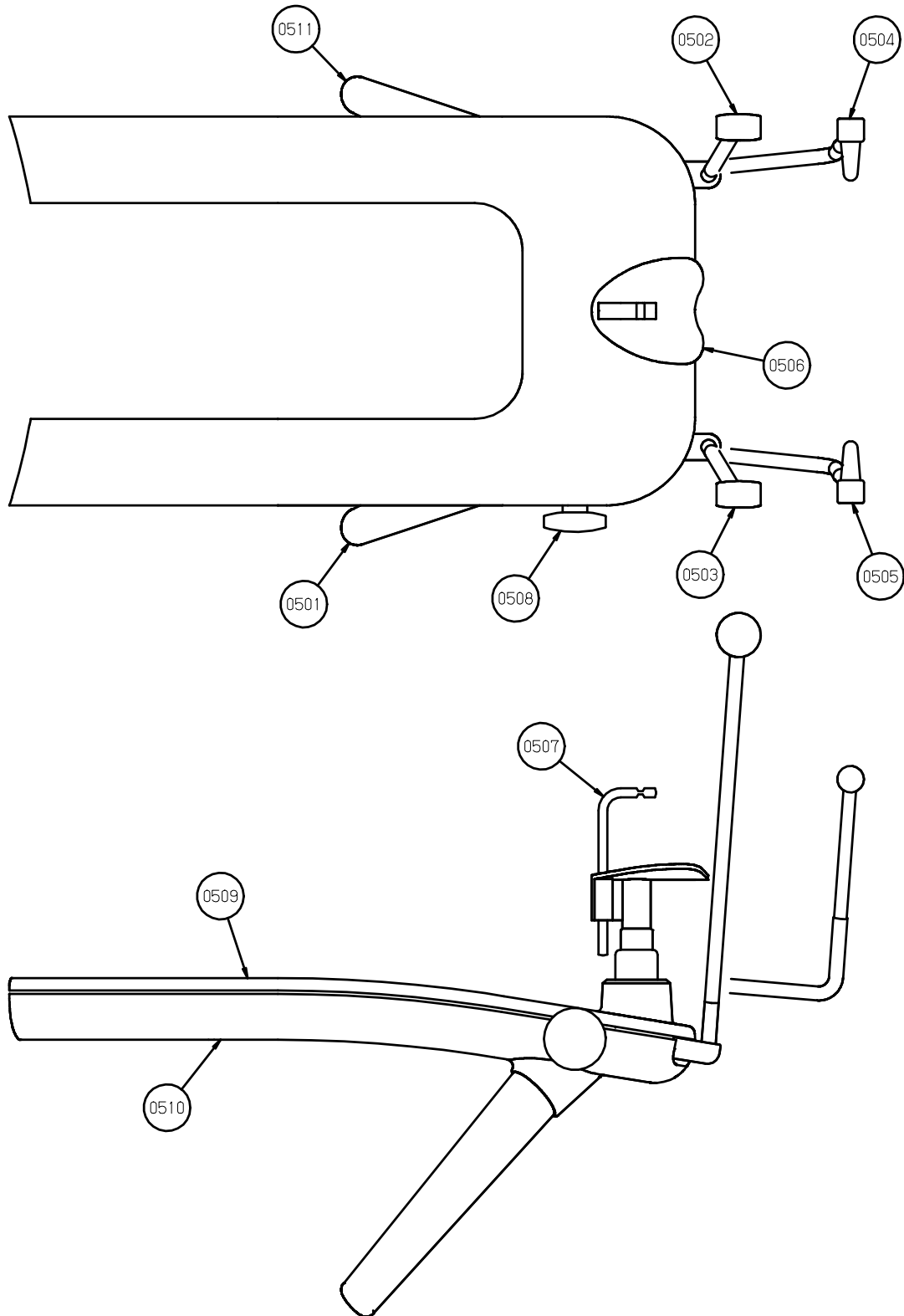
No.	Drawing No.	Part Name	Quantity
0401	988-50304-00	CMOS Sensor	1
0402	408-12628-01	DC 12V 2 BOARD	1
0403	408-13506-02	Laser marking projector	1
0404	308-04539-00	Frame	1
0405	408-13404-00	Beam Bracket	1
0406	408-13208-00	Beam Holder	1
0407	408-13406-00	Cover Bracket A	1
0408	408-13407-00	Cover Bracket B	2
0409	408-13408-00	Cover Bracket C	1
0410	408-12629-00	Shield Plate(DC 12V 2 BOARD)	1
0411	408-13405-00	Shield Plate	1
0412	208-02249-00	Image detector Cover A	1
	408-13409-00	Carbon plate	1
0413	208-02250-00	Image detector Cover B	1

5. Sliding Unit



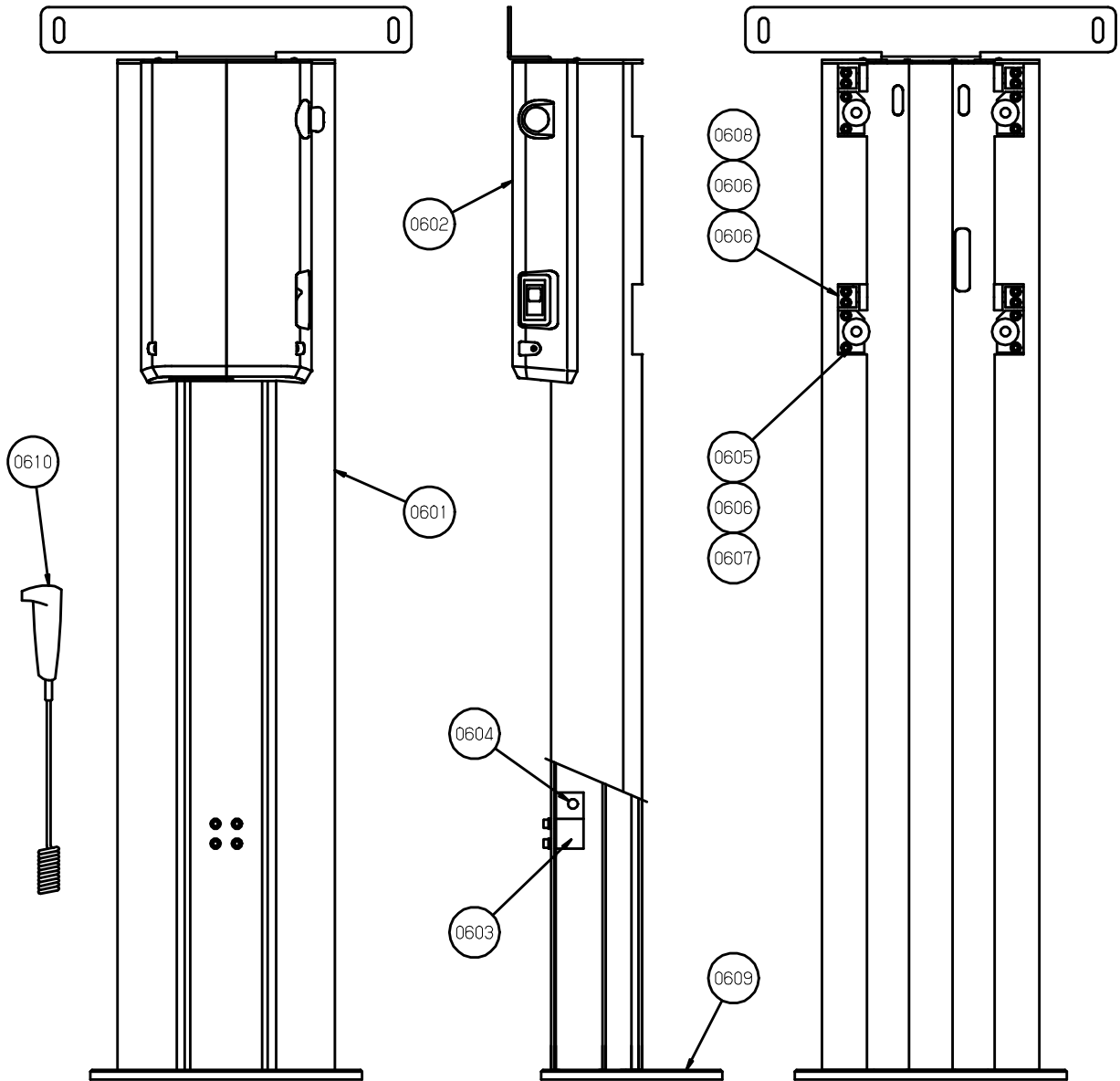
No.	Drawing No.	Part Name	Quantity
0401	408-13510-10	Laser marking projector	1
0402	408-13510-11	Laser marking projector	1
0403	308-04544-00	Operation Panel	1
0404	308-04441-00	Mirror	1
0405	408-13456-02	Actuator	1
0406	408-13225-00	Shaft(R-1)	1
0407	208-02251-00	Sliding Unit Cover A	1
0408	208-02252-00	Sliding Unit Cover B	1
0409	308-04444-00	Back Cover	1
0410	408-13538-02	BRAKE CONTROL Board	1
0411	408-12308-01	PS HUB Board	1
0412	408-13503-05	Micro switch	2

6. Rest Unit



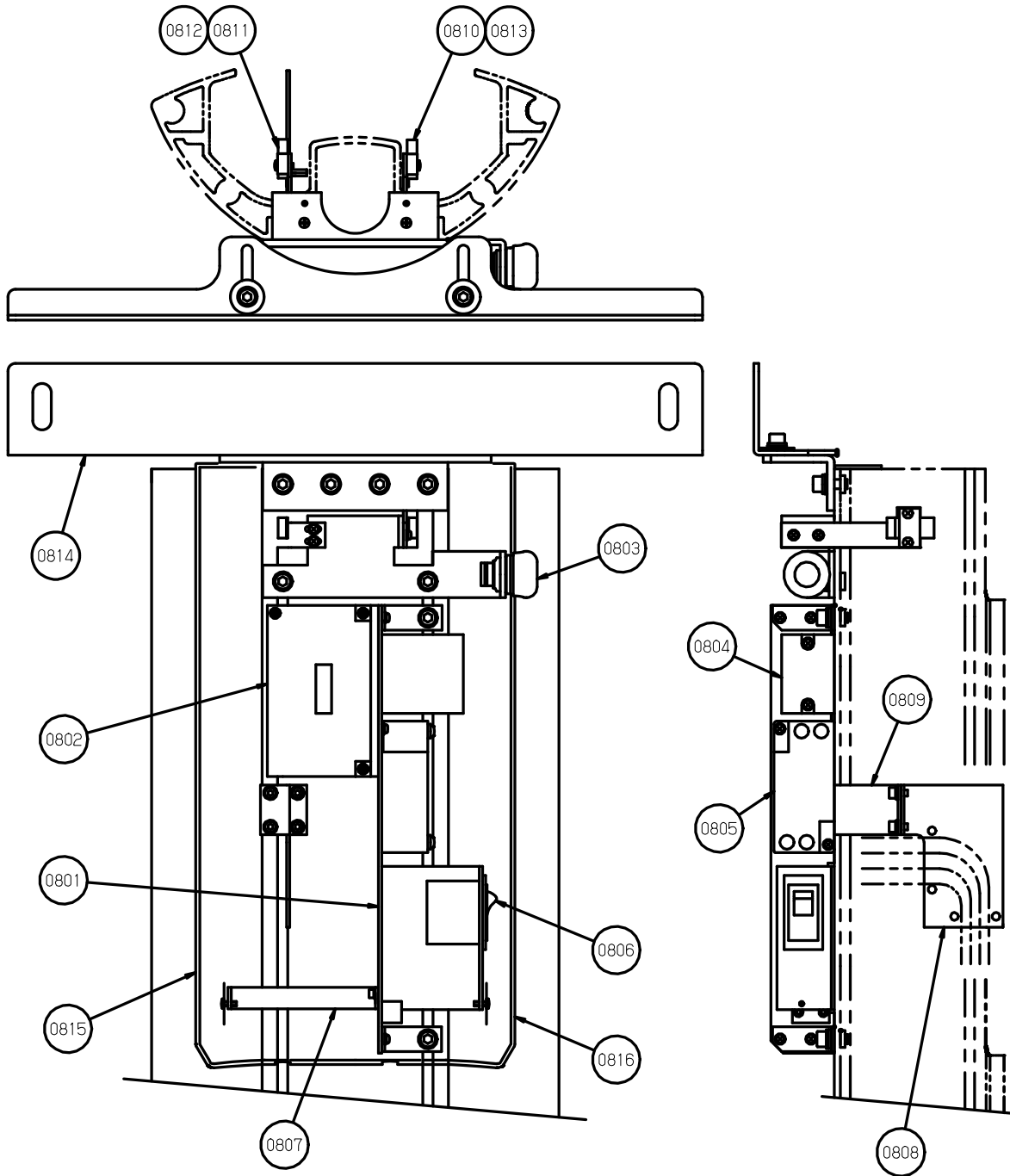
No.	Drawing No.	Part Name	Quantity
0501	408-13370-00	Grip(L)	1
0502	308-04531-02	Temporal support Assy (Right)	1
0503	308-04531-01	Temporal support Assy (Left)	1
0504	308-04532-02	Ear rod Assy (Right)	1
0505	308-04532-01	Ear rod Assy (Left)	1
0506	408-13355-00	Chinrest	1
0507	408-05861-00	Bite block	1
0508	408-13434-00	Knob	1
0509	208-02254-00	Rest Unit Cover A	1
0510	208-02255-00	Rest Unit Cover B	1
0511	408-13371-00	Grip(R)	1

7. Stand



No.	Drawing No.	Part Name	Quantity
0601	308-04428-00	Stand Pipe	1
0602	308-04431-00	Relay Box	1
0603	408-13192-00	Bracket	1
0604	408-12356-00	Shaft B	1
0605	930-00031-03	Bearing	8
0606	408-13188-00	Shaft(S-1)	8
0607	408-13190-00	Bracket(S-2)	4
0608	408-13189-00	Bracket(S-1)	4
0609	308-04538-00	Flange	1
0610	408-13457-01	Exposure switch	1
0611	308-03984-00	Emergency stop switch box (option)	1

8. Relay Box



No.	Drawing No.	Part Name	Quantity
0801	308-04432-00	Base(S-1)	1
0802	408-12976-03	PS DC BOARD	1
0803	408-12022-01	Emergency Stop Switch	1
0804	408-13416-00	Relay	1
0805	975-00044-04	Noise Filter(EAM-16-000)	1
0806	964-28004-01	Power Switch	1
0807	408-13196-00	Cover Bracket(S-1)	1
0808	408-13195-00	Cable Bracket(S-2)	1
0809	408-13194-00	Cable Bracket(S-1)	1
0810	978-60007-02	Photo micro sensor (EE-SY672)	1
0811	978-60007-01	Photo micro sensor (EE-SY671)	1
0812	408-13346-00	Sensor Bracket A	1
0813	408-13347-00	Sensor Bracket B	1
0814	308-04502-00	Wall Bracket Assy.	1
0815	408-13174-00	Relay Box Cover A	1
0816	408-13175-00	Relay Box Cover B	1

11. MAINTENANCE CHECK

WARNING

High voltage is applied to some parts inside the equipment. Take extra care when removing the covers.
 Before beginning repair work, turn OFF the power of equipment and unplug from electrical outlet.
 After unplugged the equipment, wait for 10 minutes or more before starting a repair work.

Specialized knowledge, experience and special measuring instruments are required to check this equipment. To maintain the performance of equipment, please perform daily check (with eyes) and implement periodic maintenance by dealer service personnel.

Dental X-ray Equipment Maintenance Check List

Maintenance by service personnel: 1 or 2 times/year

Check Item	Purpose of Check	Contents of Check	Method
Electricity Condition	Check power supply voltage range	Check the compatibility between the power supply voltage connected to the equipment and the specified voltage for the equipment.	○
Appearance and Indication	(1) Appearance of equipment	a. Deformation, flaw, nameplate b. Cautions	○
	(2) Inside of equipment	Check defacement and dust.	○
Installation Environment	Temperature, humidity, gas	Check the compatibility of environmental ambient of the place where the equipment will be used.	●
	Levelness of equipment	Check the effect on the equipment	●
	Floor and equipment stabilizing condition	Check vibration and movement stability of the equipment.	●
	Check obstacles	Check that there is no obstacle within the movement range of the equipment.	○
	Rust development condition	Check the condition of rust development functional safety.	○
Operation Test	Operation test before check	Check operating condition of the equipment.	⊙
	Operation test after check	Check operating condition of the equipment.	⊙
Safety Test for Electric Shock	Insulation resistance	Check resistance between power line and the earth.	●
	Leaked current from the outer cover	Check the current leaking from the outer cover of the equipment to the earth.	●
	Earthing resistance	Check the resistance between exposed metal portion of the equipment and the earthing point.	●
	Resistance of earthing wire	Check the resistance between the earth terminal of the equipment and earthing point.	●

Check Item	Purpose of Check	Contents of Check	Method
Operation Accuracy of Equipment	Check operation of power supply circuit	Check the voltage of power supply circuit.	●
	Check operation of radiographic circuit	Check the operating waveform and setting values of control circuit.	●
	Check operation of operation circuit	Check operation of operation sequence.	●
	Accuracy of positioning mechanism	Check deterioration of the positioning mechanism.	●
	Check operation of protection circuit	Check the setting values and operating condition of protection circuit.	●
	Check operating condition indicator	Check the circuit function to indicate the operating condition.	●
Indication during X-ray irradiation	Check irradiation of X-ray and the indication are in sync	Check the operation of indicator during X-ray irradiation.	⊙
X-ray Generator	X-ray tube housing	Check leakage of insulating oil.	○
	Low voltage cable	Check wear, flaw, tension and twist.	○
	Irradiation cone	Check looseness, deformation and damage.	○
	Filter	Check coming off and damage.	○
	Slit Plate (Collimator)	Check off-alignment of irradiation field and irradiation width.	○
Radiographic Mechanism	Rotation and movement of X-ray generator	Check slip, abnormal sound and stopping accuracy.	⊙
	Movement of arm		
	Patient positioning mechanism	Play, looseness, operability and stability.	●
	Positioning Beams	Check the brightness and positioning accuracy.	○
Elevating Mechanism	Wire rope	Check breaking of wire and end portion.	○
	Braking mechanism	Check the movement.	⊙
	Electromagnetic lock		
	Upward and downward movement condition	Check smoothness of movement	○
X-ray Output	X-ray tube voltage	Check X-ray tube voltage.	●
	X-ray tube current	Check X-ray tube current.	●
	Exposure time	Check exposure time.	●

Symbol	Checking Method
○	Check with eyes
●	Check by using measuring instruments etc.
⊙	Check by operating the equipment.

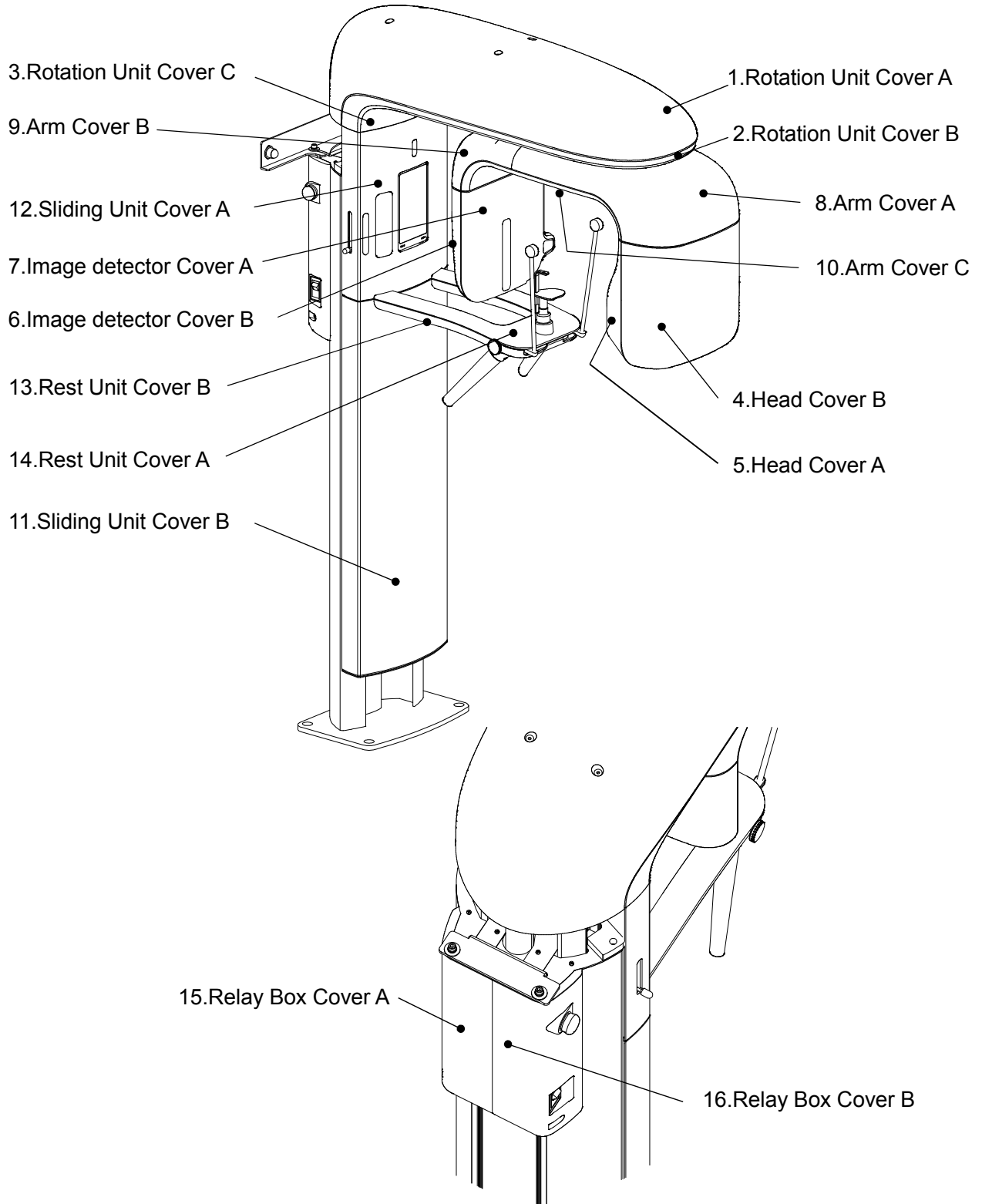
12. Procedure

The list of procedures for parts replacement, changing settings, and other tasks.

Procedure #	Contents
M101	Cover removal and installation method
M102	X-ray Irradiation Field Check
M103	Operation of Photo-microsensor: Check/Replacement
M104	-
M105	Mask Position: Check/Adjustment
M106	-
M107	-
M108	-
M109	-
M110	Motor: Check/Replacement
M111	CMOS Sensor Error: Check, CMOS Sensor: Replacement
M112	Oil Leakage within Inner Case Assembly: Check/Replacement
M113	Panoramic Test Piece: Check
E101	Board: Replacement
E102	Thermal Guard: Replacement
E103	Relay: Replacement
E104	Hub: Replacement
E105	Microswitch: Replacement
E106	Switching Power Supply: Replacement
E107	Circuit Protector: Replacement
E108	Emergency stop button switch: Replacement
E109	Noise Filter: Replacement
E110	Beam: Replacement
E111	Wire Harness: Replacement
E112	-
E113	HUB LED: Check
S101	How to take Calib image / How to register Defect
S102	How to change IP Address
S103	-
S104	Software: Uninstallation
S105	Software: Check
S106	How to use ExCap.exe
S107	How to set the initial value of image process.
S108	Description of ini file

M101. Cover removal and installation method

1. Name of each cover



2. Removal procedure of each cover

the Cover you want to remove	Cover removal procedure
1.Rotation Unit Cover A	1
2.Rotation Unit Cover B	1→2
3.Rotation Unit Cover C	1→2→3
4.Head Cover B	4
5.Head Cover A	4→5
6.Image detector Cover B	6
7.Image detector Cover A	6→7
8.Arm Cover A	4→8
9.Arm Cover B	(8)→6→9
10.Arm Cover C	1→8→9→7→10
11.Sliding Unit Cover B	11
12.Sliding Unit Cover A	1→12
13.Rest Unit Cover B	13
14.Rest Unit Cover A	13→14
15.Relay Box Cover A	15
16.Relay Box Cover B	16

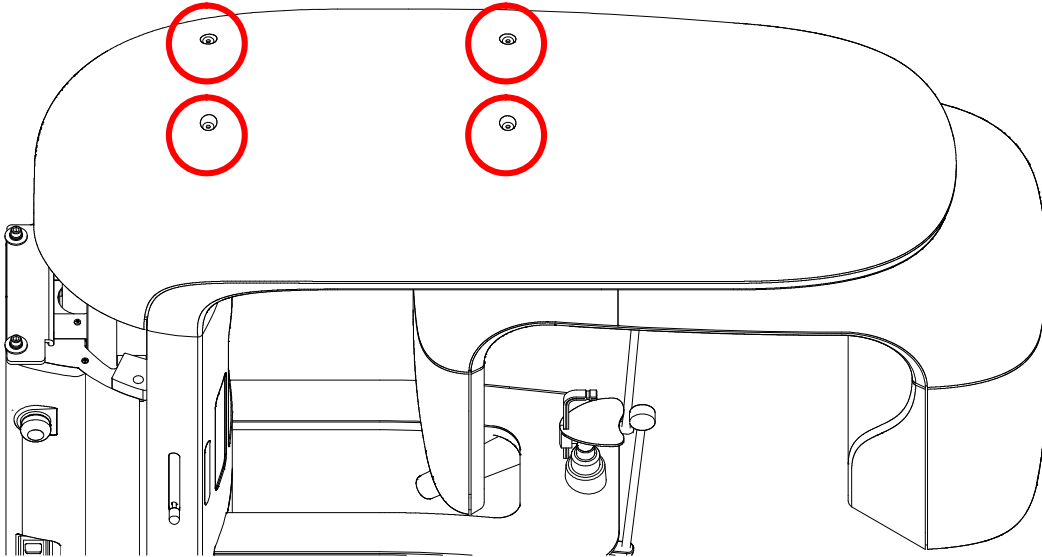
3. Cover installation procedure

For the installation of each cover please reverse the removal procedure.

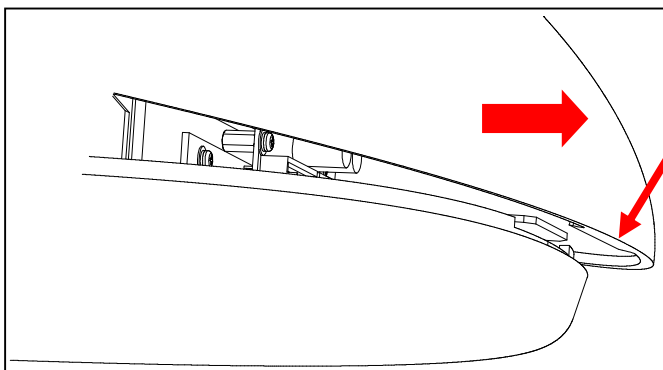
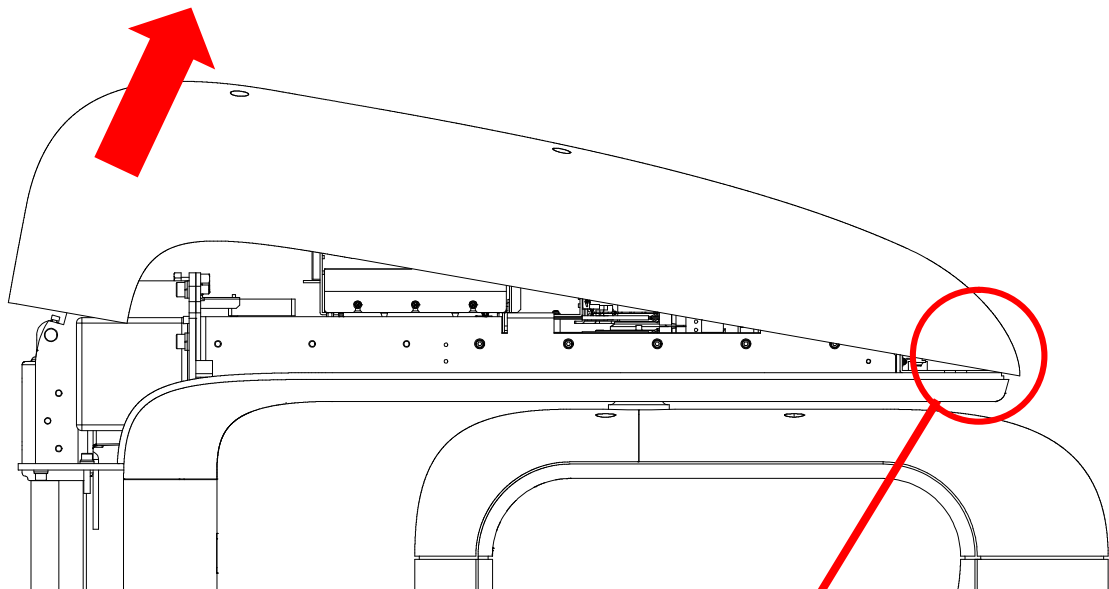
4. How to remove each cover

1. How to remove "Rotation Unit Cover A"

1). Remove 4 screws.



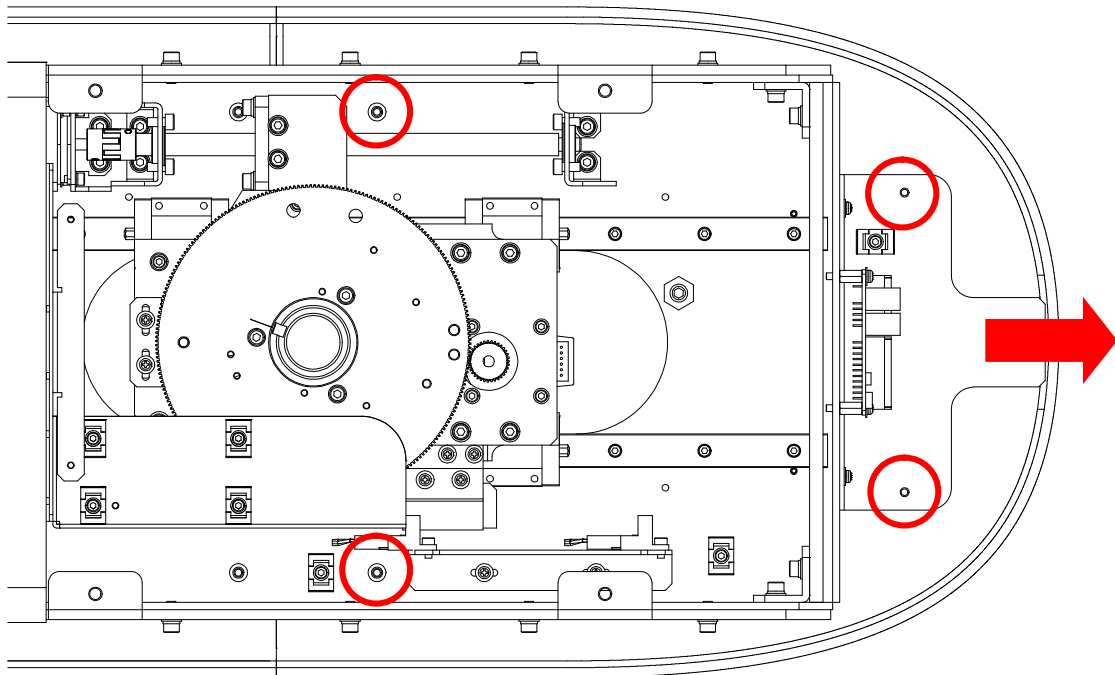
2). Move "Rotation Unit Cover A" in the direction of the arrow.



Please move the cover forward to release from the hook at the rotating part.

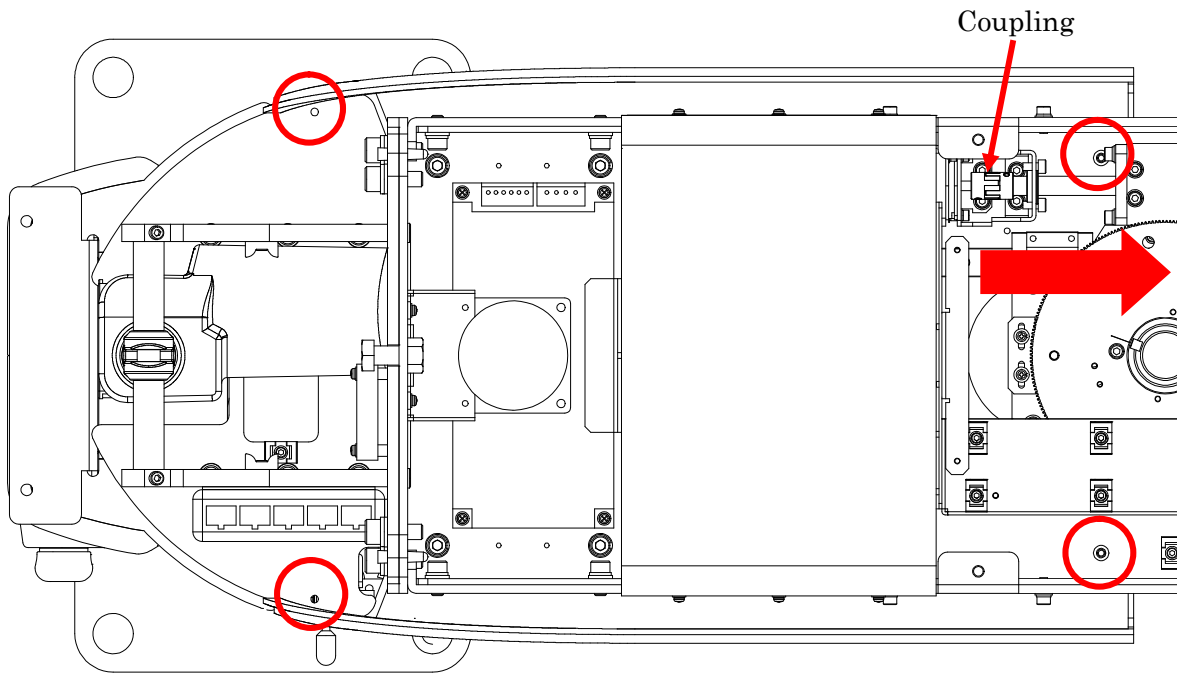
2. How to remove "Rotation Unit Cover B"

Remove 4 screws and move "Rotation Unit Cover B" in the direction of the arrow.

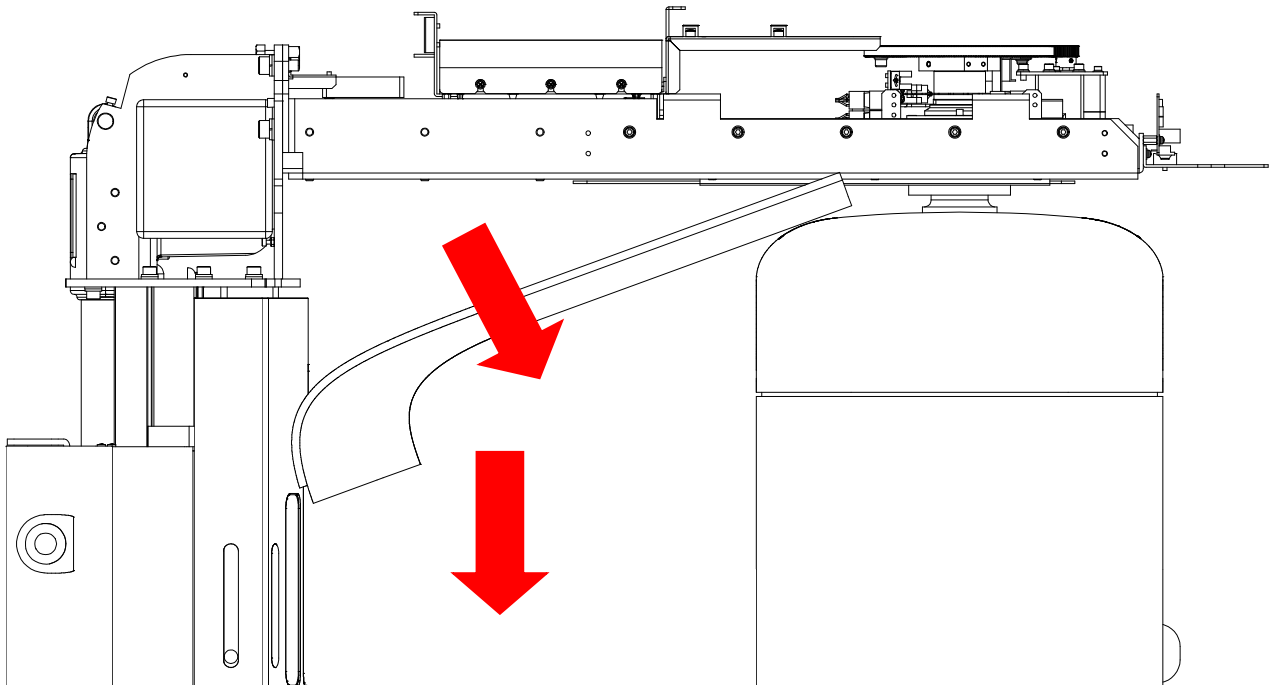


3. How to remove "Rotation Unit Cover C"

- 1). Turn the coupling and move the Arm Unit in the direction away from the Stand.
- 2). Remove 4 screws.

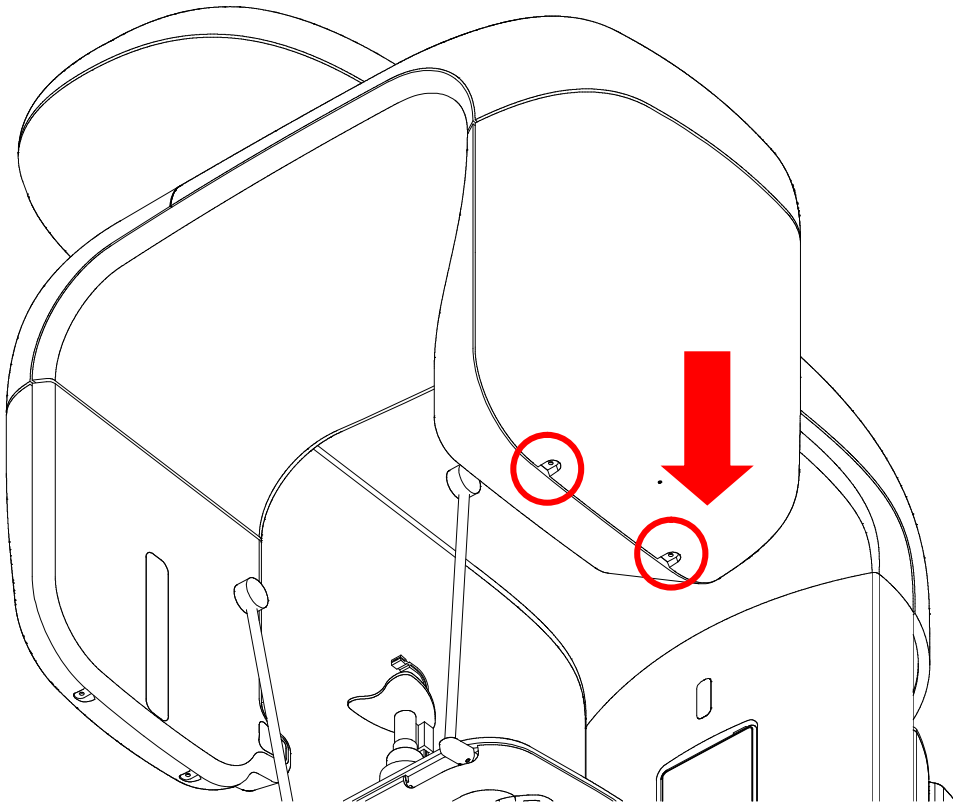


- 3). Remove "Rotation Unit Cover C" while moving it in the direction of the arrow.



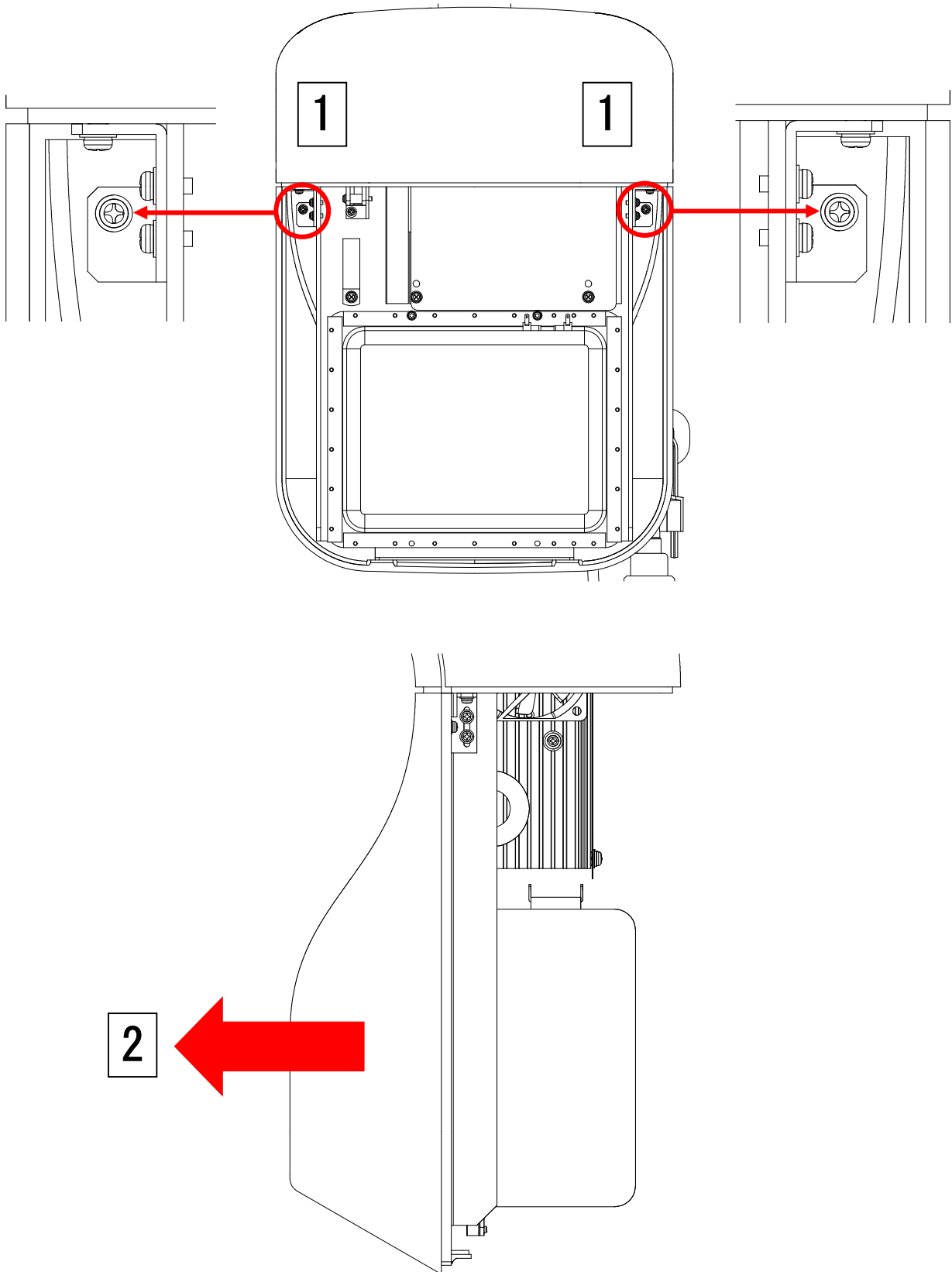
4. How to remove “Head Cover B”

Remove the two screws and move “Head Cover B” in the direction of the arrow.



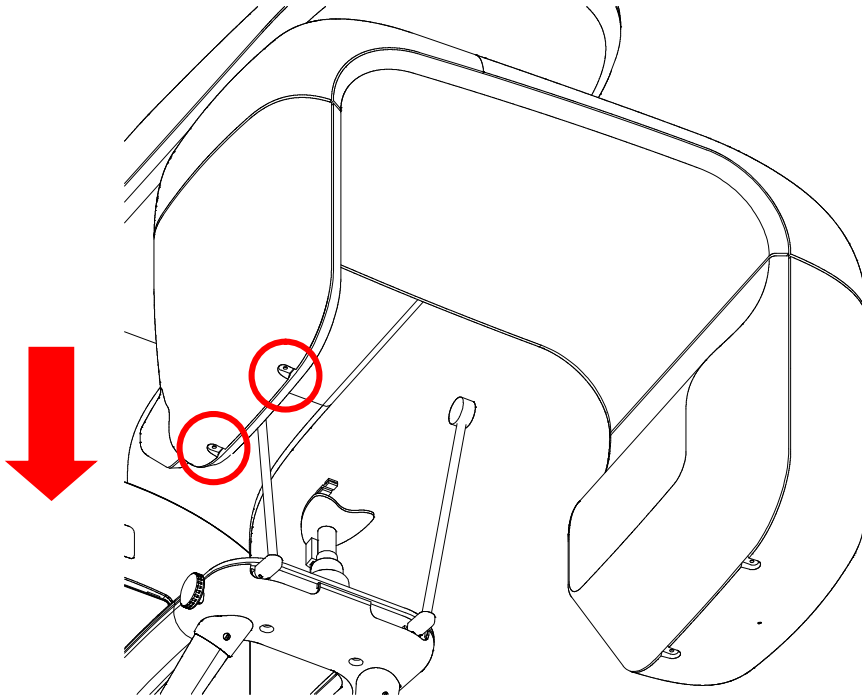
5. How to remove "Head Cover A"

- 1). Remove the two screws.
- 2). Move "Head Cover A" in the direction of the arrow.



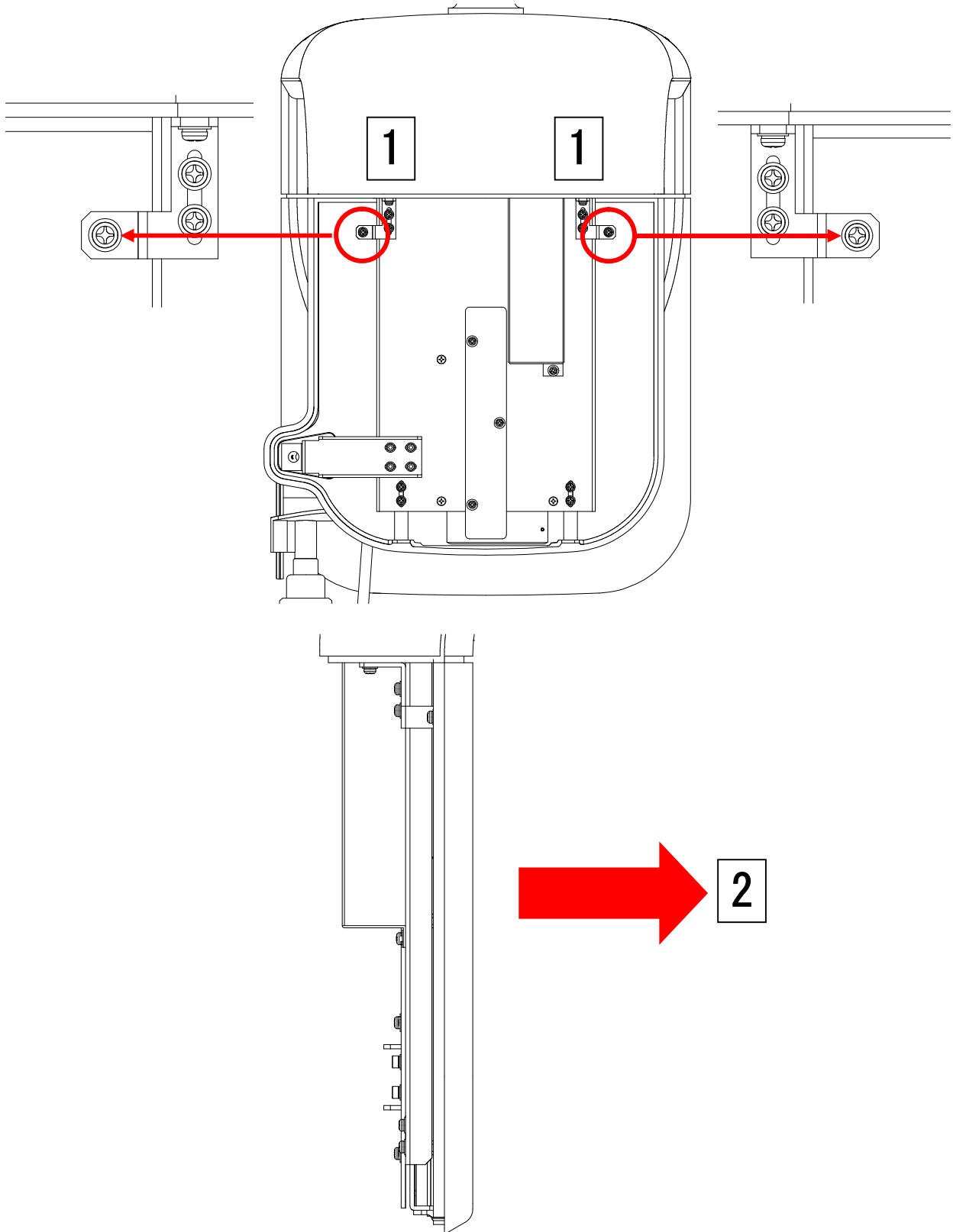
6. How to remove "Image detector Cover B"

Remove the two screws and move "Image detector Cover B" in the direction of the arrow.



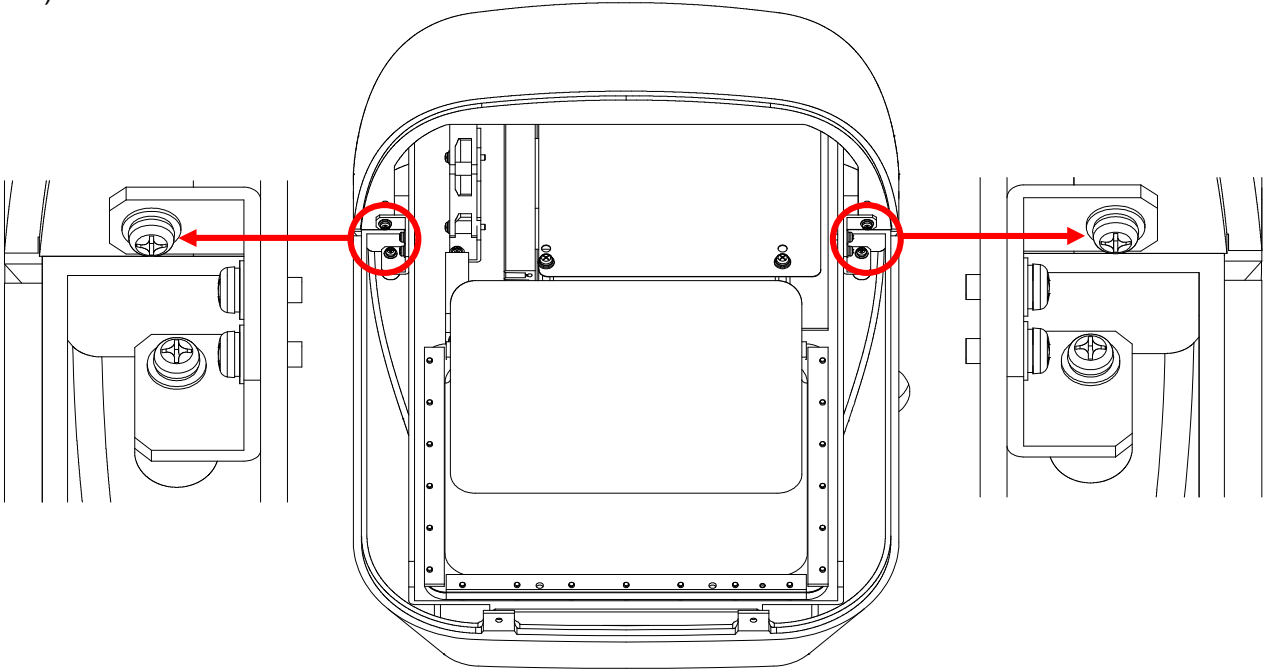
7. How to remove "Image detector Cover A"

- 1). Remove the two screws.
- 2). Move "Image detector Cover A" in the direction of the arrow.

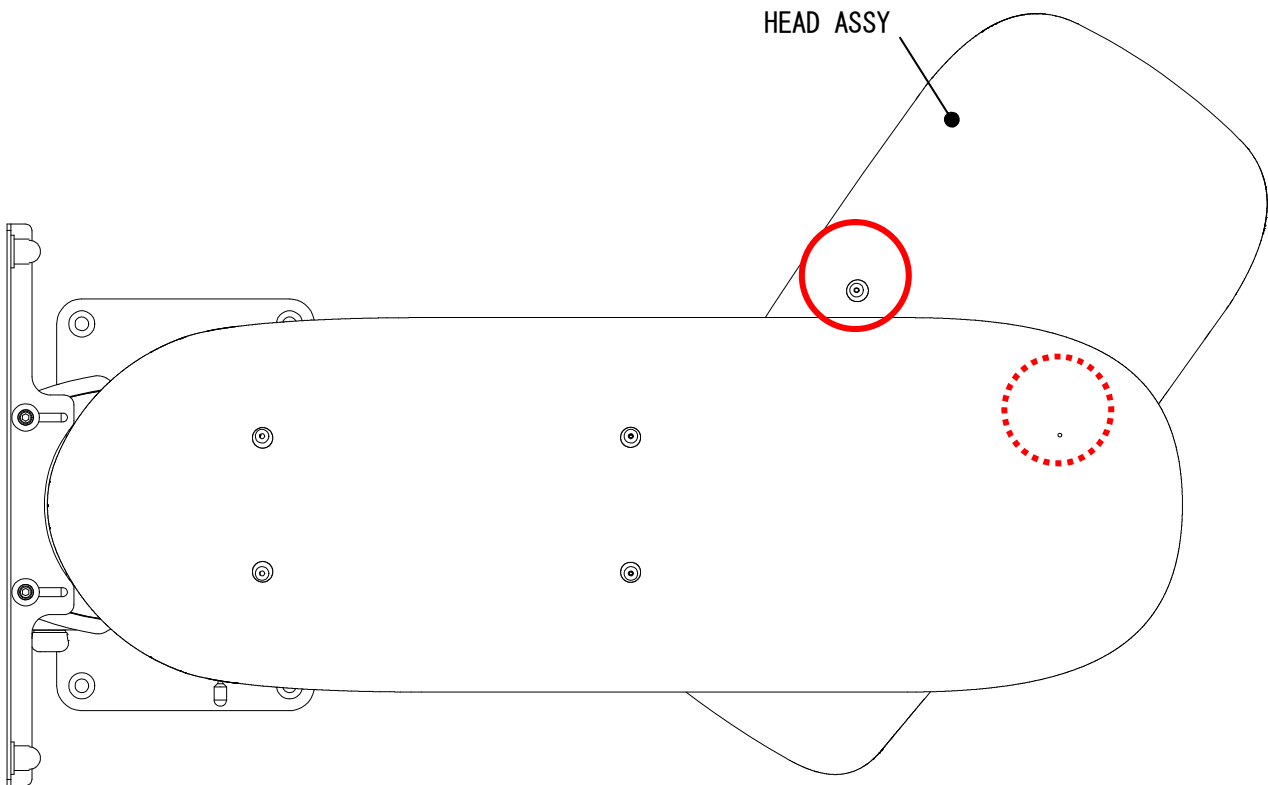


8. How to remove "Arm Cover A"

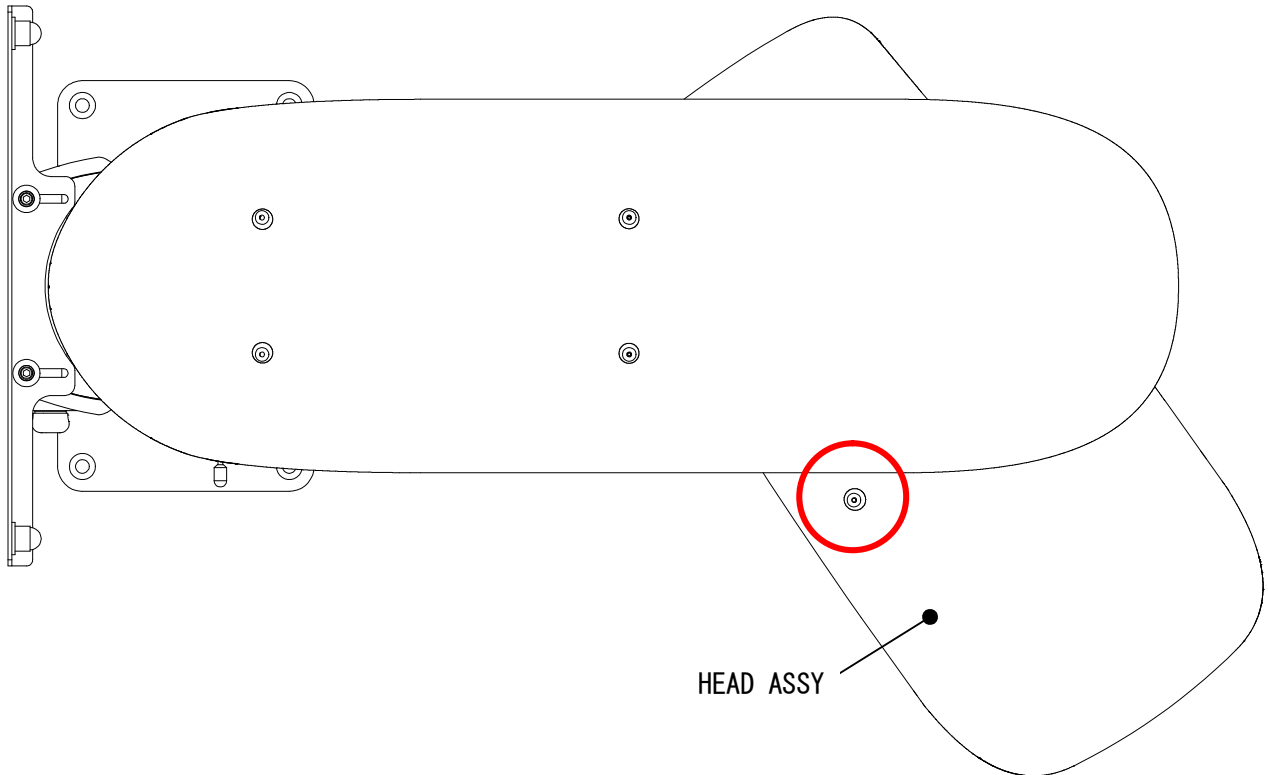
- 1). Remove the two screws.



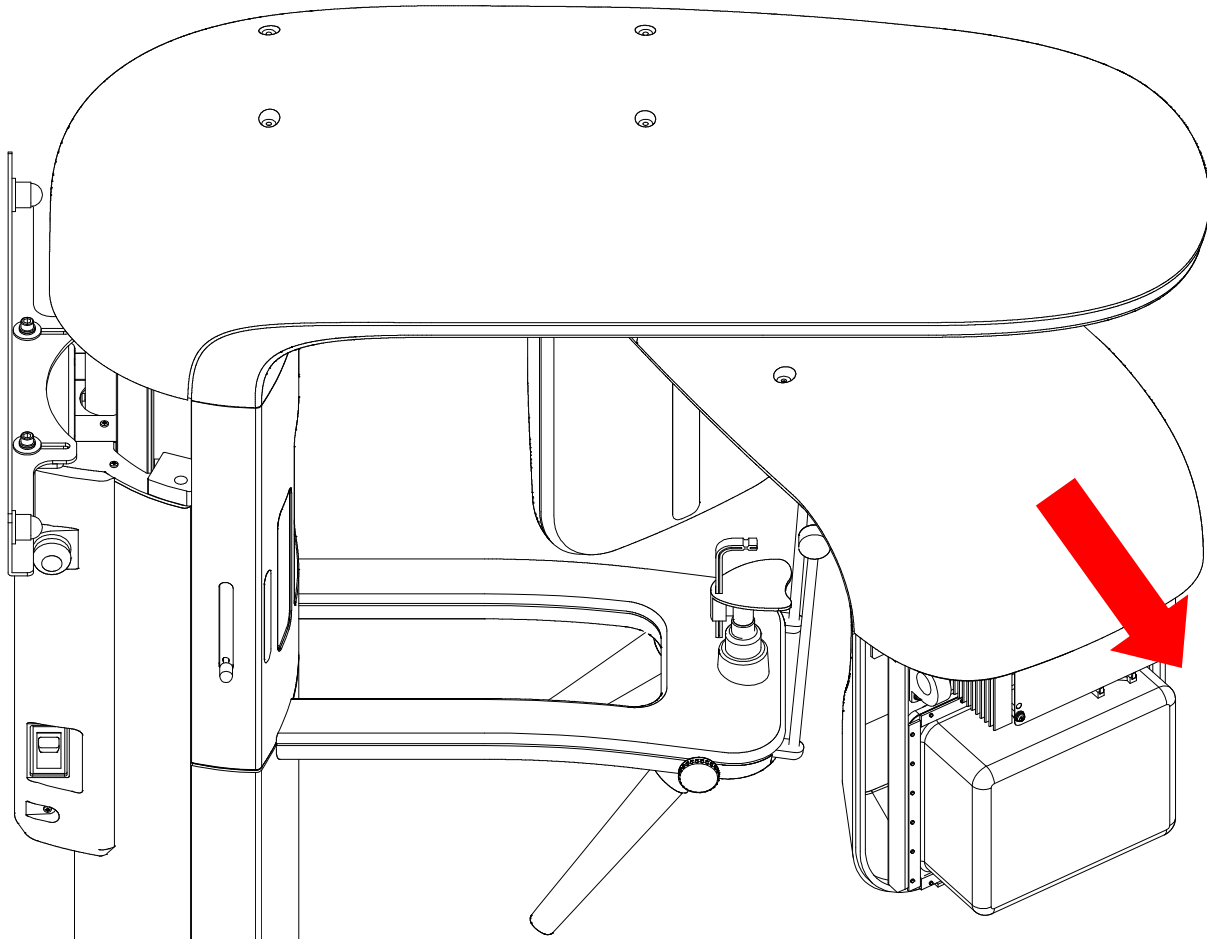
- 2). Remove the two screws fixing "Arm Cover A", slowly rotate the Arm Unit.
- 3). Remove accessible screws.



4). Rotate the Arm Unit slowly to the position where the other fixing screw is accessible.

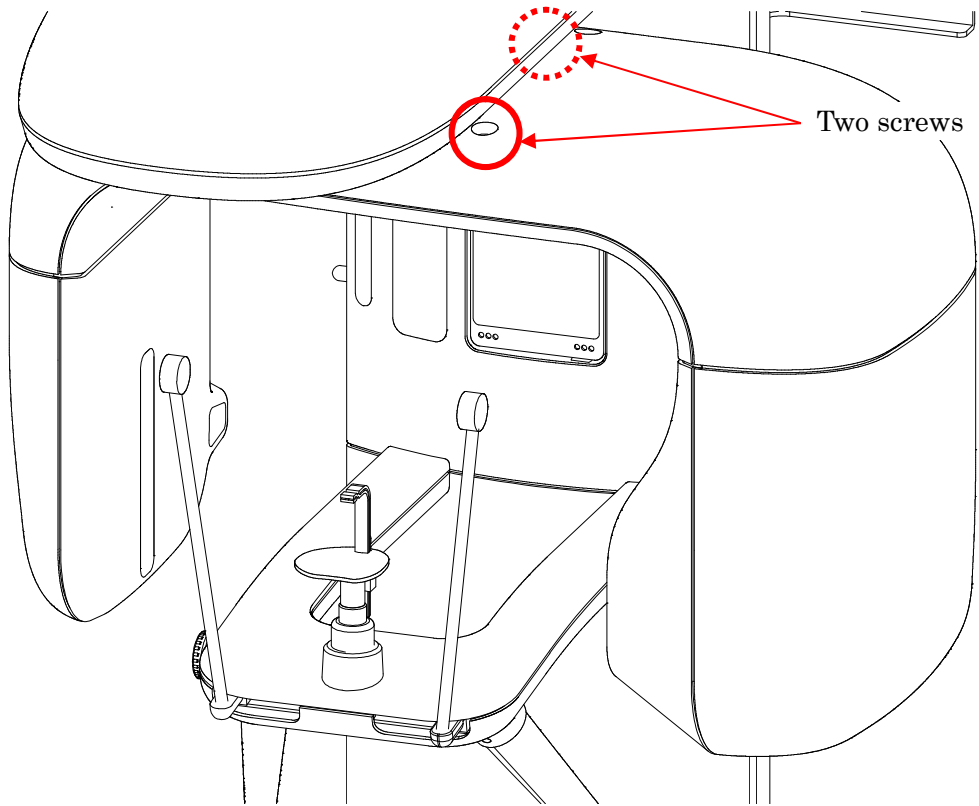


5). Move "Arm Cover A" in the direction of the arrow.

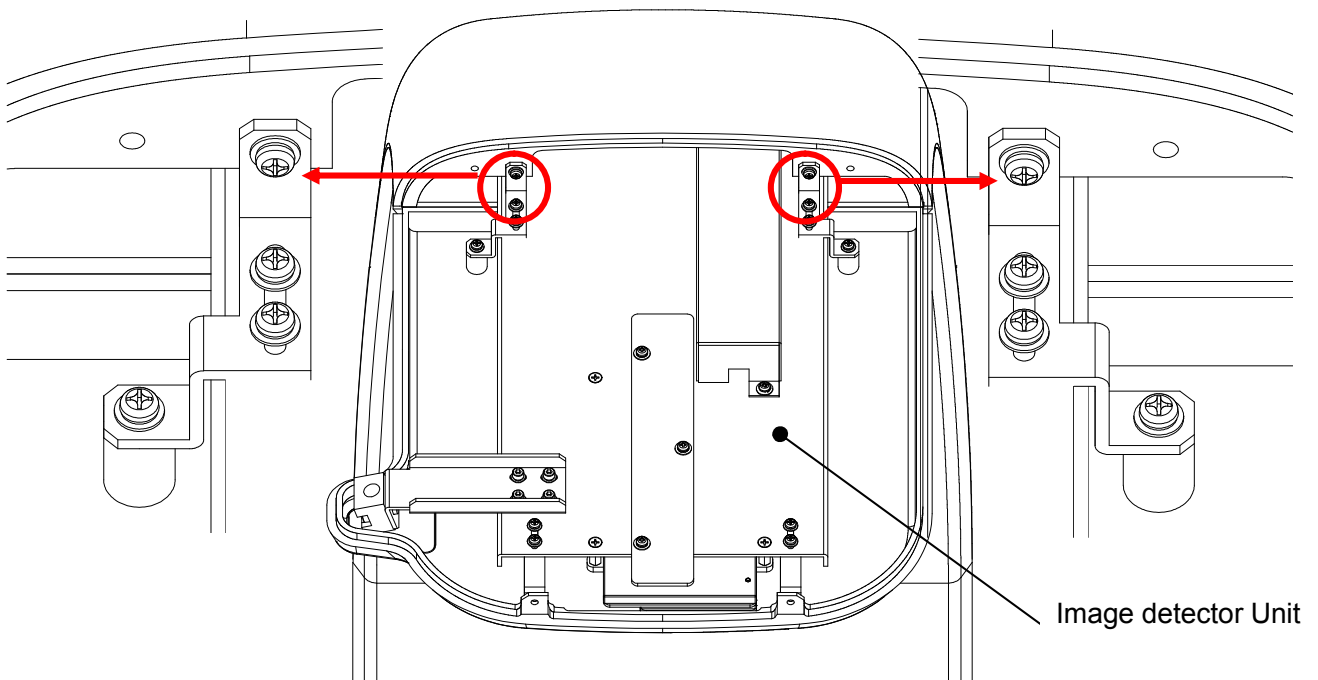


9. How to remove "Arm Cover B"

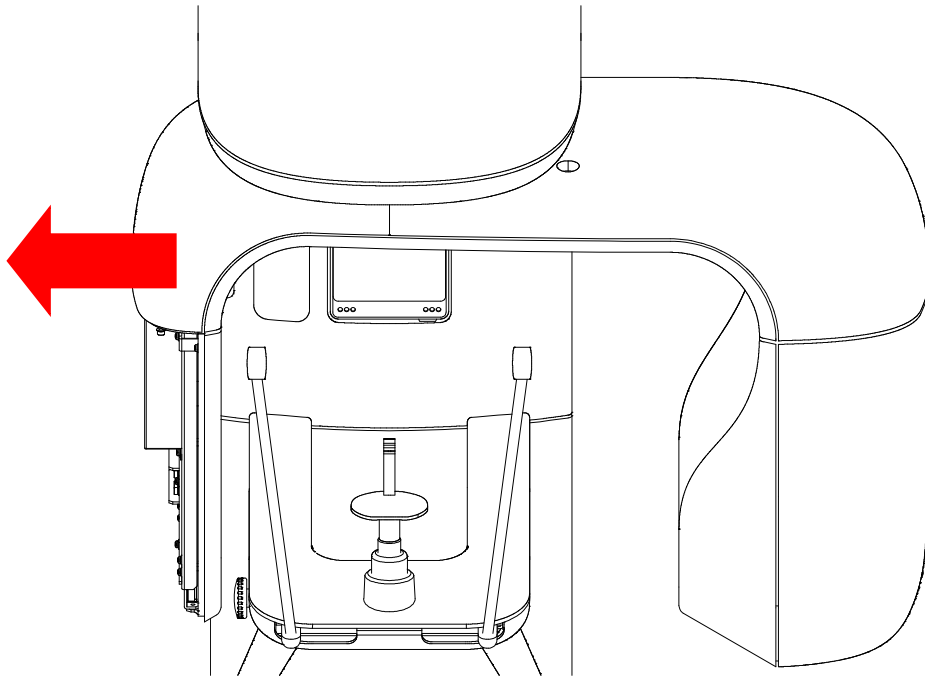
1). Remove the two screws fixing "Arm Cover A".



2). Remove the two screws.

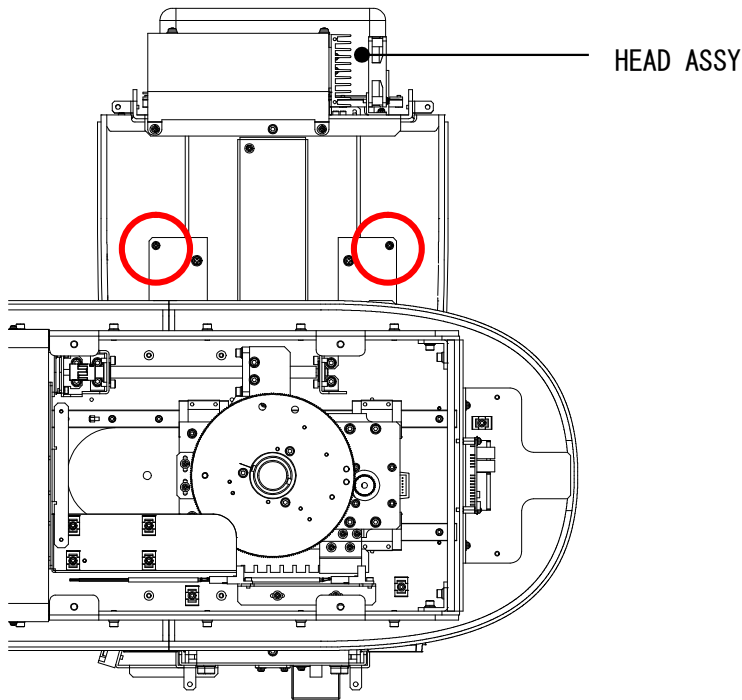


3). Move "Arm Cover B" in the direction of the arrow.

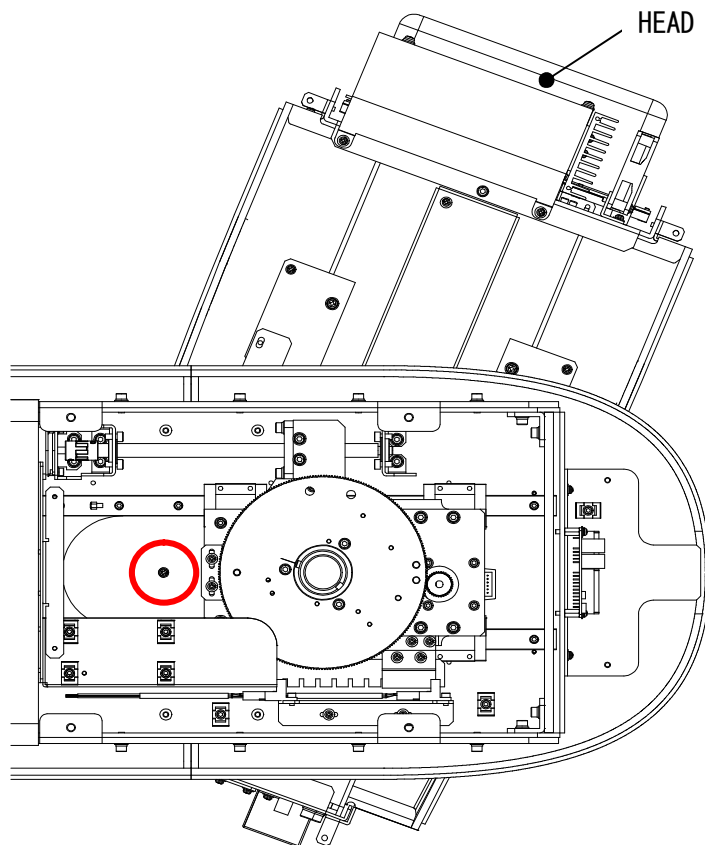


10. How to remove "Arm Cover C"

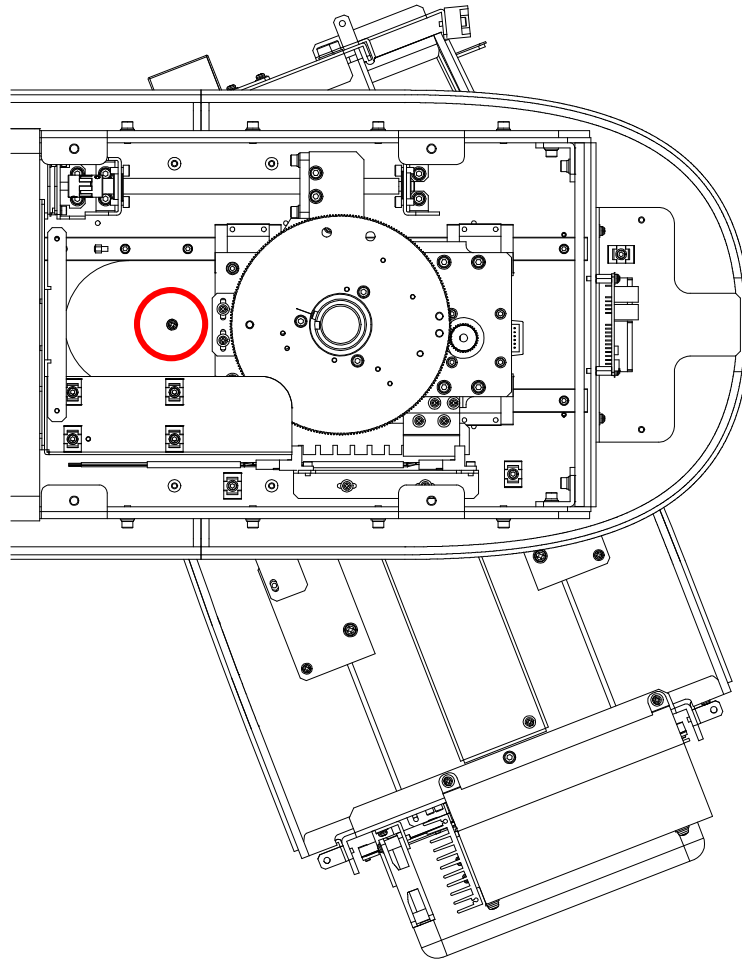
- 1). Remove the two screws on the HEAD ASSY side



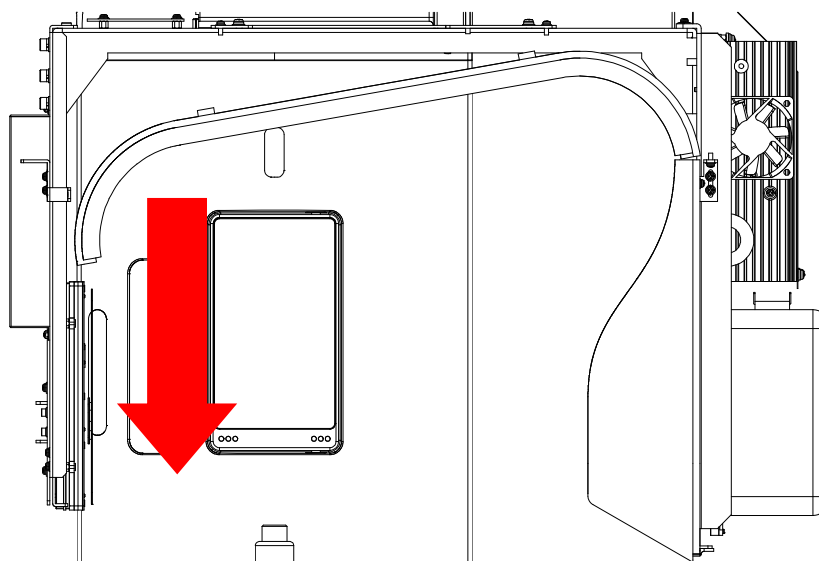
- 2). Remove one screw on the image receptor side, rotate the Arm Unit to the position where the screw fixing "Arm Cover C" can be seen from the upper of the Rotation Unit.
- 3). Remove a visible screw.



- 4). Rotate the Arm Unit to the position where you can see the other fixing screw on the image receptor side.
- 5). Remove a visible screw.

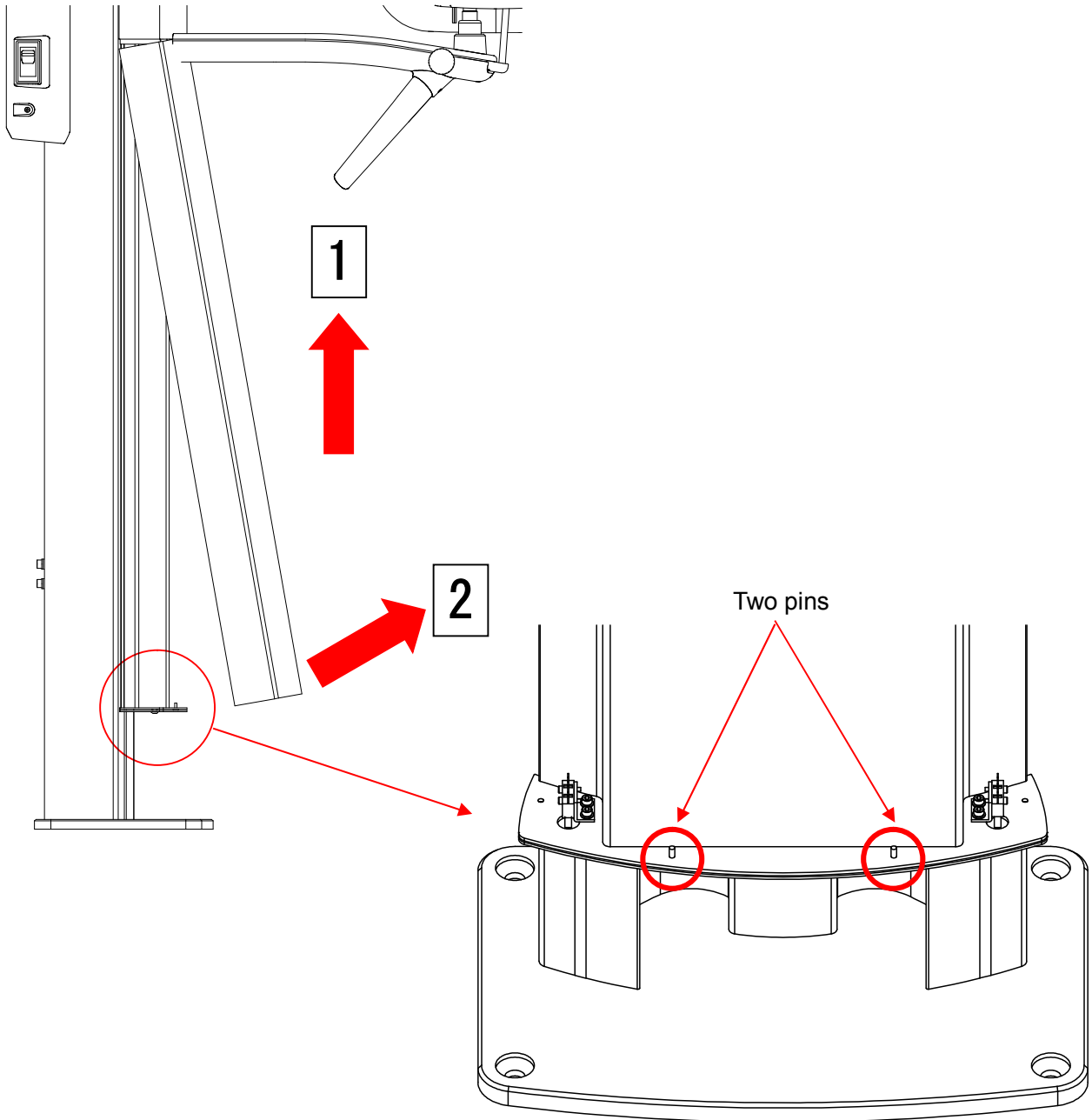


- 6). Move "Arm Cover C" in the direction of the arrow.



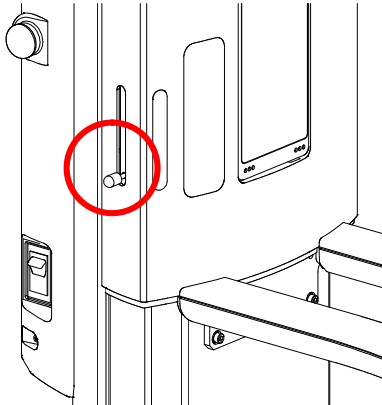
11. How to remove Sliding Unit Cover B

The lower side of "Sliding Unit Cover B" is inserted in the pins.
Lift "Sliding Unit Cover B" upward and move it in the direction of the arrow.
If "Sliding Unit Cover B" does not come off the pins, rotate the pin counterclockwise with a screwdriver to reduce the protrusion of the pins.

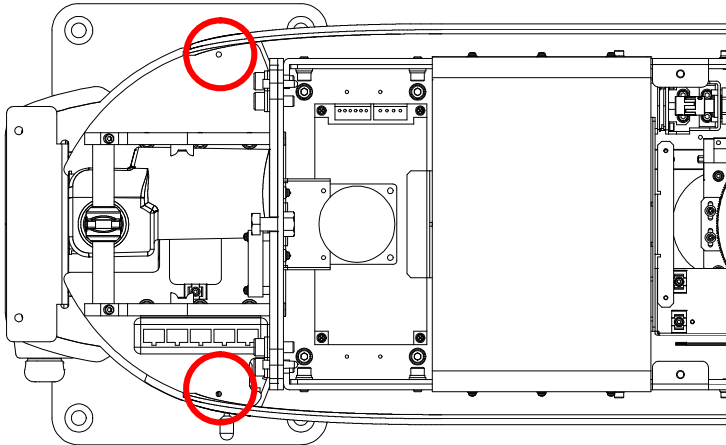


12. How to remove "Sliding Unit Cover A"

1). Remove a Frankfurt Plane knob.

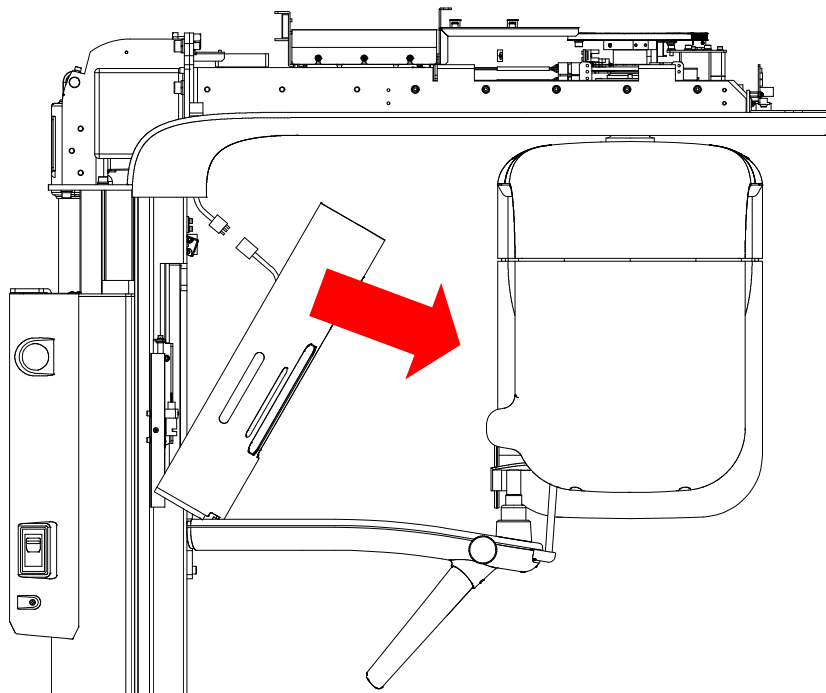


2). Remove two screws.



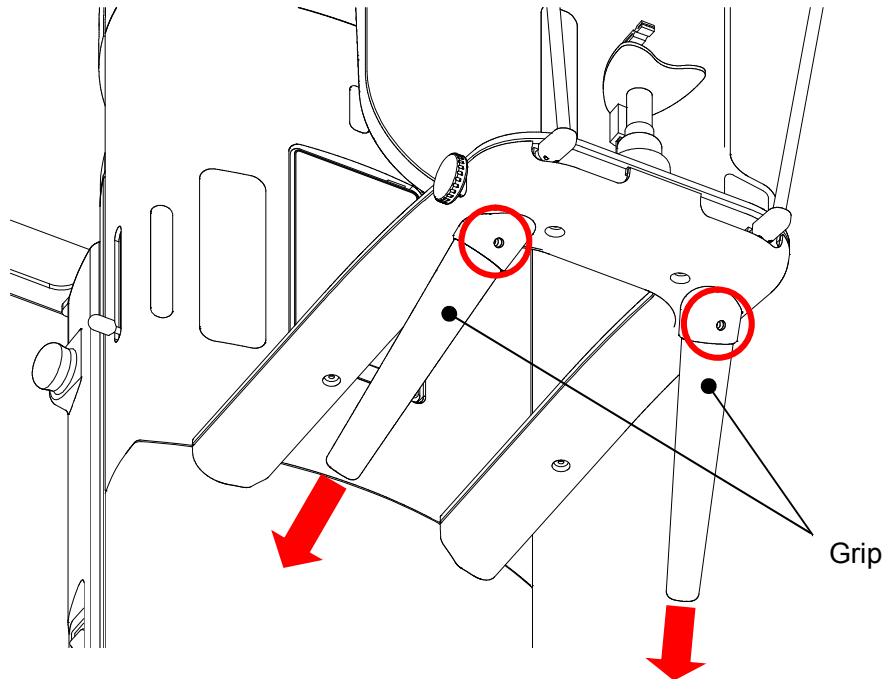
3). Move "Sliding Unit Cover A" in the direction of the arrow.

4). Remove the relay connector of the operation panel in the Sliding Unit.

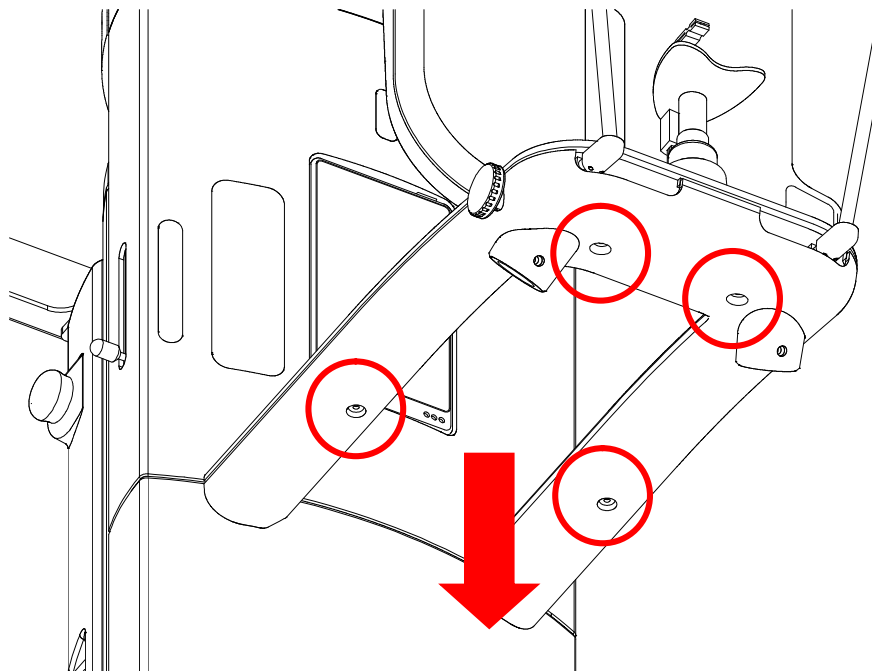


13. How to remove "Rest Unit Cover B"

1). Loosen the hexagon socket set screw and remove the grip.

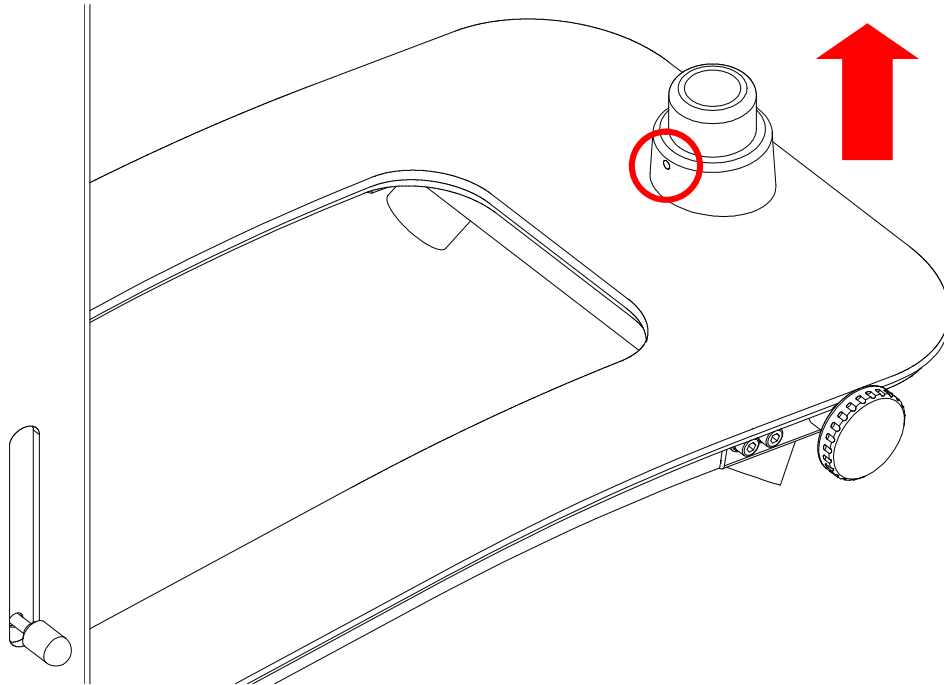


2). Remove the four screws and move "Rest Unit Cover B" in the direction of the arrow.

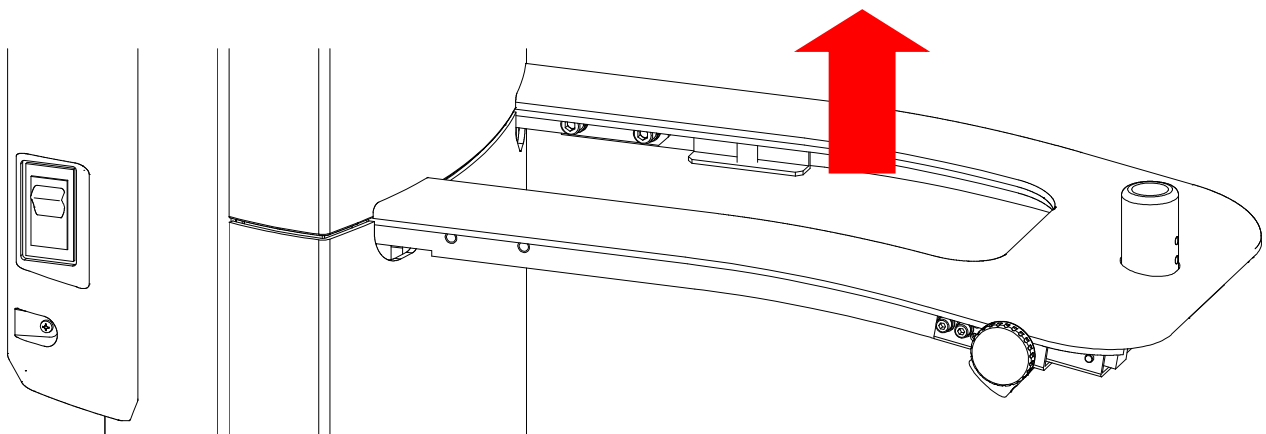


14. How to remove "Rest Unit Cover A"

- 1). Loosen the hexagon socket set screw and remove the cover retainer in the direction of the arrow.

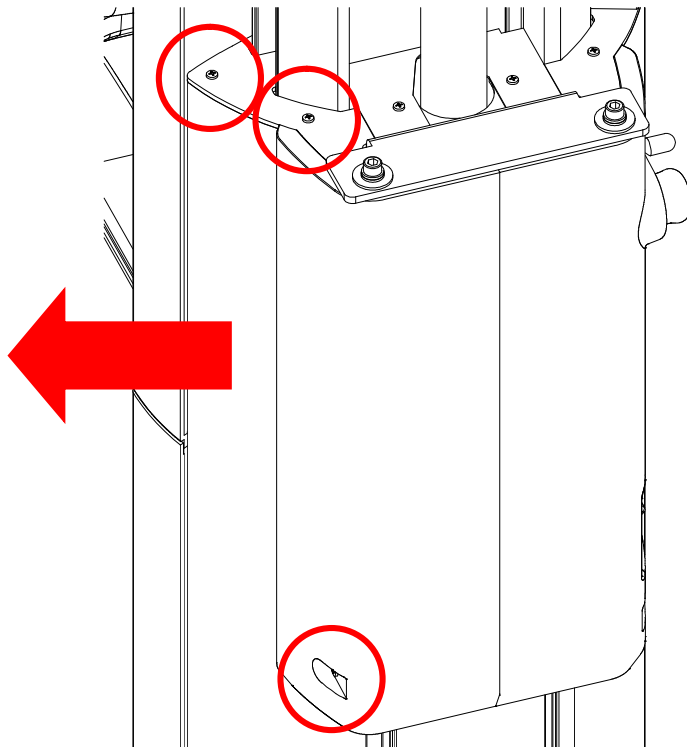


- 2). Move "Rest Unit Cover A" in the direction of the arrow.



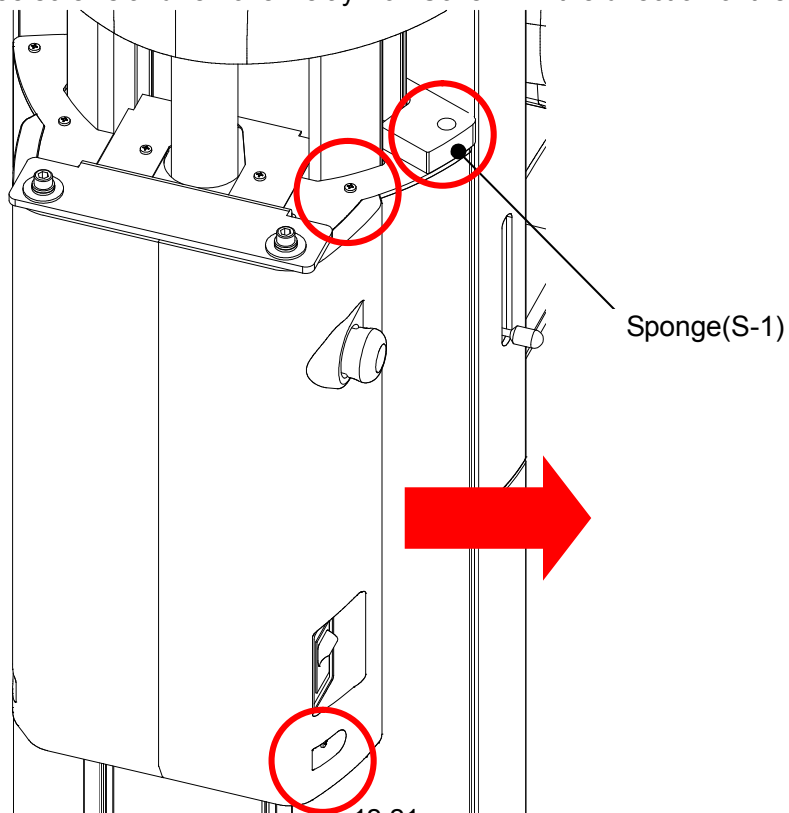
15. How to remove Relay Box Cover A

Remove the three screws and remove "Relay Box Cover A" in the direction of the arrow.



16. How to remove Relay Box Cover B

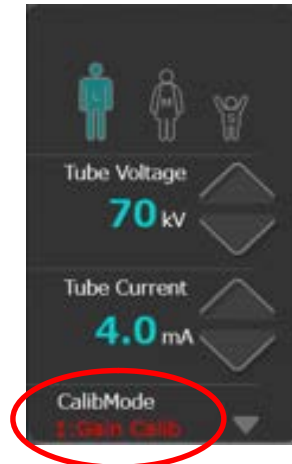
- 1). Remove the sponge(S-1) fixed with double-faced tape.
- 2). Remove the three screws and remove Relay Box Cover B in the direction of the arrow.



M102. X-ray Irradiation Field Check

1. Preparation for X-ray photography

- 1). Start up your digital image management & processing software.
Refer to Operation Manual of your own digital image management & processing software.
- 2). Set the exposure mode "panorama".
- 3). Set "CalibMode" on server PC. (Push Ctrl + Alt + C on key board.)



2. Set the exposure condition.

- 1). Set 70kV setting click ▲(up) and ▼(down) on right side of kV value.
- 2). Set 4mA setting click ▲(up) and ▼(down) on right side of mA value.

3. Obtaining images

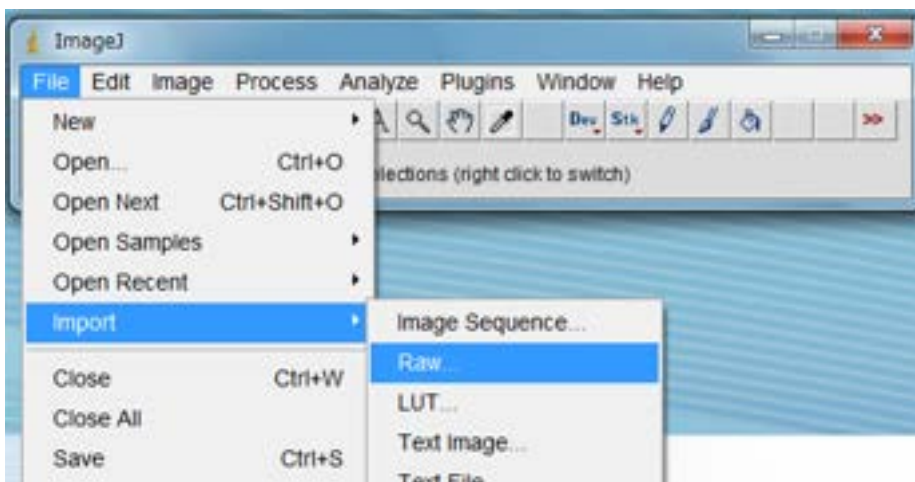
- 1). Click READY.
- 2). After the READY completed, push X-ray irradiation SW to perform X-ray photography.

4. Display the image

- 1). Execute a following application. PC\C:\¥ImageJ¥ImageJ.exe

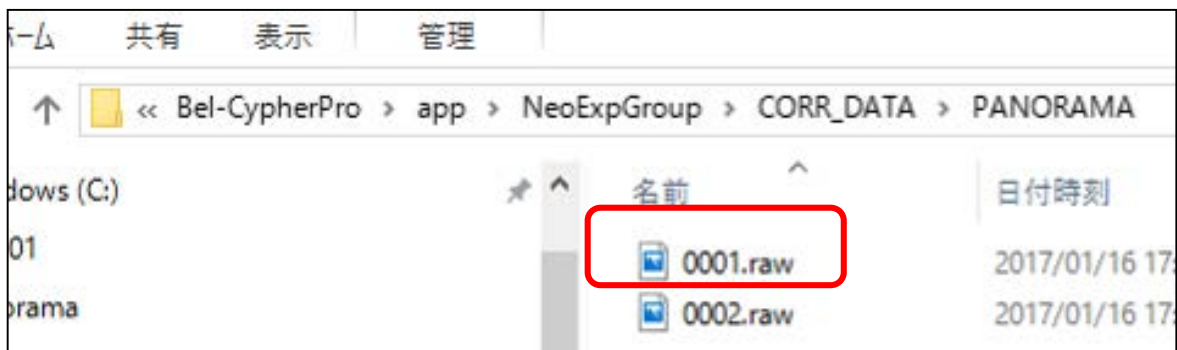


- 2). Click [File] →[Import] →[Raw] from the tool bar.



3). Select the image file from the folder.

- Save folder : PC\C : ¥Bel-CypherPro¥app¥NeoExpGroup¥CORR_DATA¥PANORAMA
- The image file : 0001.raw



4). Specify the display range.

1234

50

- Select [Image type] ⇒ [16-bit Unsigned].
- Input the following values: [Width = 1234, Height = 50]
- Check [Little-endian byte order].
- Click [OK].
- The image opens.

M105. Mask Position: Check/Adjustment

1. Checking the Mask Position

Check the position of the X-ray irradiation field during panoramic exposure.
(Reference: M102 X-ray Field: Check)

- Figure A indicates the normal positioning of the X-ray irradiation field.
- Figures B to D indicate abnormal positioning of the X-ray irradiation field.

Please go to provision 2, if you have abnormal positioning of the X-ray irradiation field.

⚠ CAUTION

The bottom part of the CMOS SENSOR is displayed on the left side of the image view of the ImageJ screen.

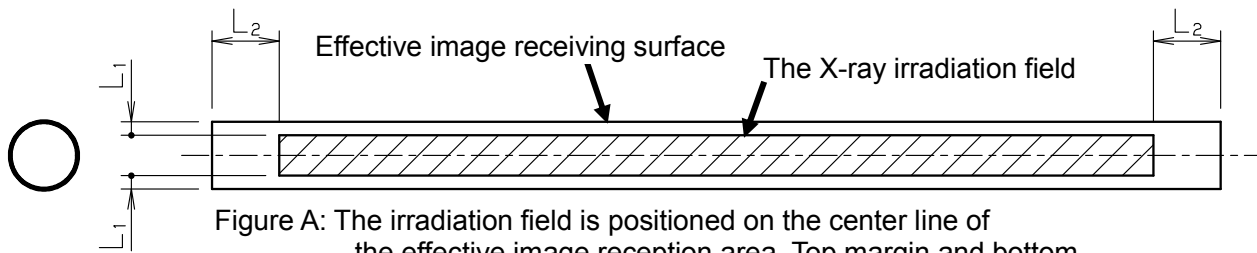
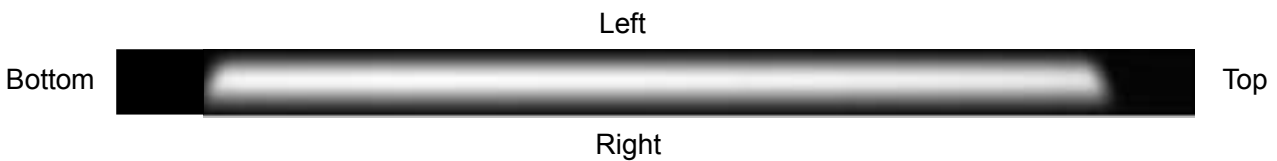


Figure A: The irradiation field is positioned on the center line of the effective image reception area. Top margin and bottom margin is equal. Right margin and left margin is also equal.

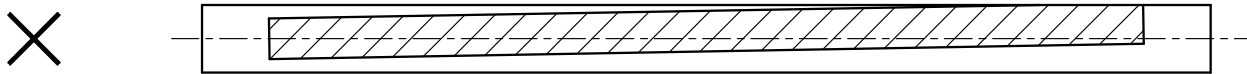


Figure B: The irradiation field and effective image receiving area are not parallel.

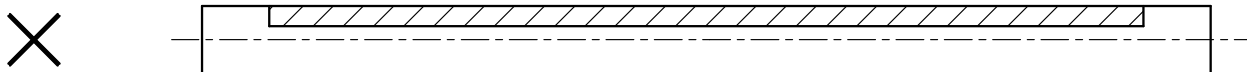


Figure C: The irradiation field is too close to the left or right side. Left margin and right margin is not equal.

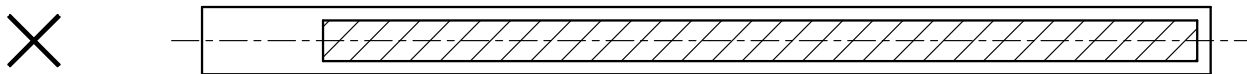


Figure D: The irradiation field is too close to the top or bottom side. Top margin and bottom margin is not equal.

2. Adjustment of the Mask Position

- 1). Remove "Head Cover A" (Reference: M101 Cover removal and installation method)
- 2). In case like Figure B, adjust the position of the Tube.

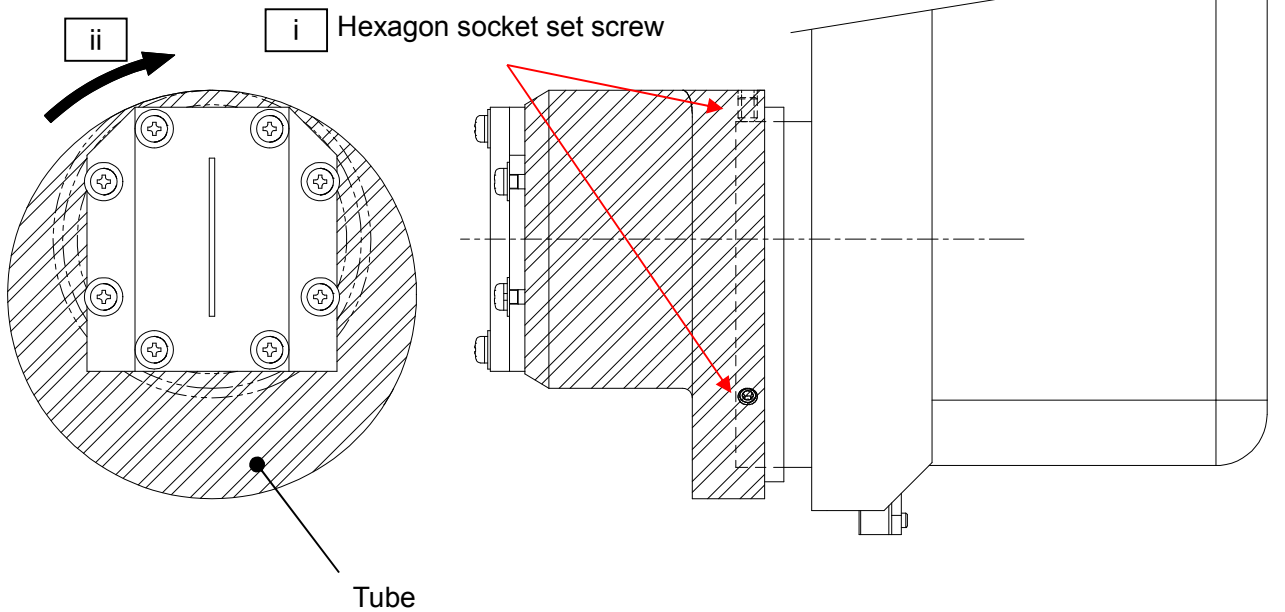


CAUTION

Before moving the Tube, mark the original position of the Tube using a fine-point pen.

The adjustment is as follows.

- i. loosen the two Hexagon socket set screws.
- ii. Rotate in the direction of the arrow.



- iii. Check the position of the X-ray irradiation field.

(Reference: M102 X-ray Radiation Field: Check)

- iv. If the confirmed image is in the state of Figure C and D, refer to 3) and 4) which will be described later, Adjust to be the normal position of the X-ray irradiation field of Figure A.

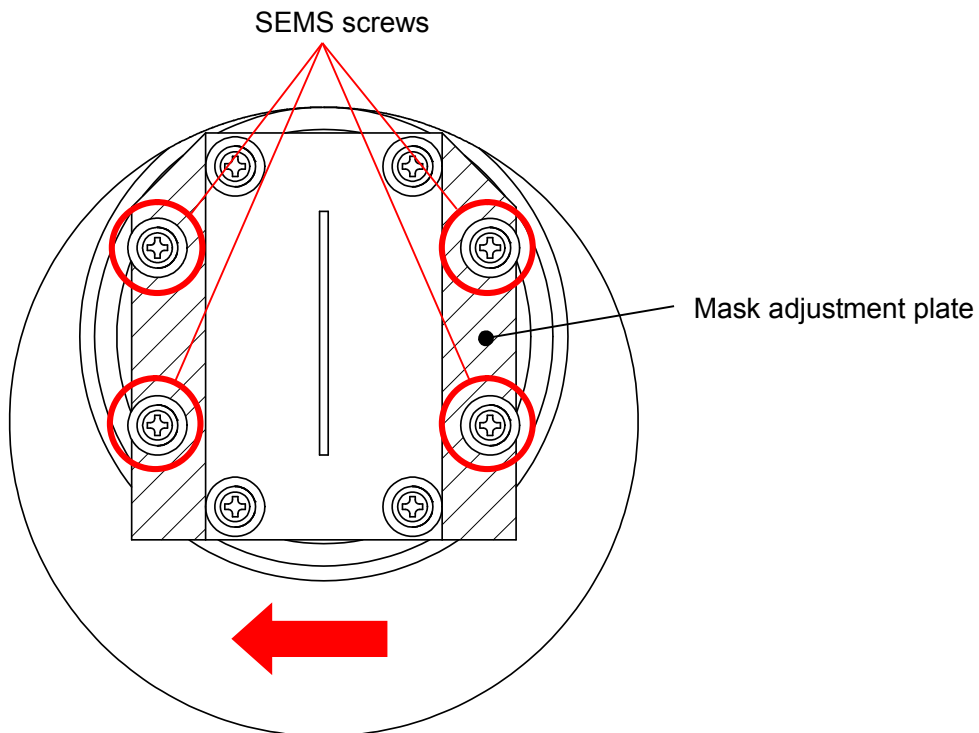
3). In case like Figure C, adjust the position of the Mask adjustment plate.



CAUTION


Before moving the Mask adjustment plate mark the original position of the Mask adjustment plate using a fine-point pen.

- i. The irradiation field is positioned to the left of the center line, loosen the four SEMS screws fixing the Mask adjustment plate, and move the Mask adjustment plate a little to the left.
(If the irradiation field is positioned to the opposite of the above-mentioned position, move the Mask adjustment plate a little to the right.)



- ii. Check the position of the X-ray irradiation field.
(Reference: M102 X-ray Radiation Field: Check)
- iii. Repeat the above procedures i and ii, and adjust the position of the irradiation field to the appropriate position as shown in Figure A.

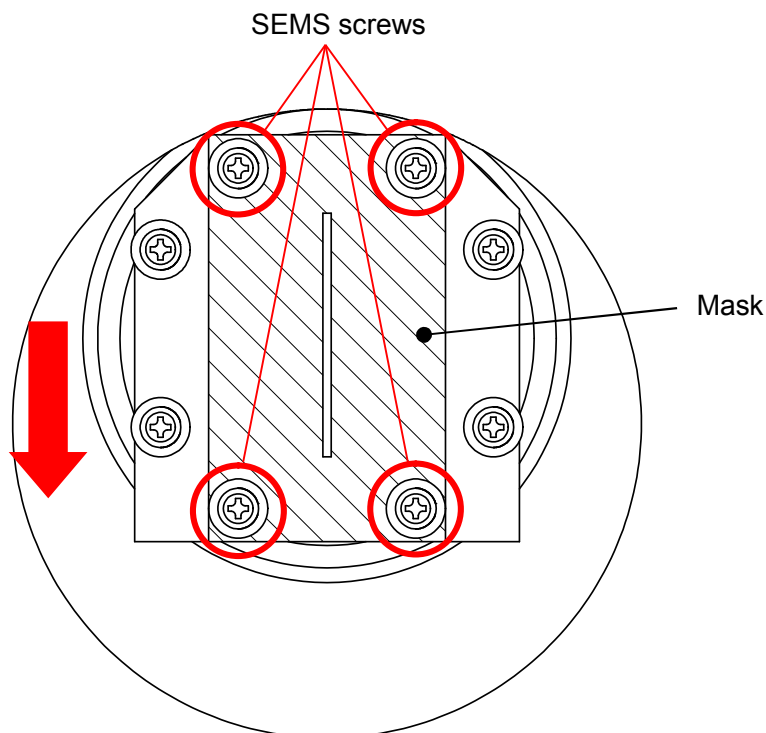
4). In such a case as in Figure D, adjust the position of the Mask.

 **CAUTION**

Before moving the Mask, mark original position of the Mask using a fine-point pen.

i. If the irradiation field is on the center line of the Effective image reception area but is positioned closer to the top side, loosen the SEMS screws fixing the Mask, and move the Mask downward.

(Move the Mask upward in the case the irradiation field is closer to the bottom side.)



ii. Check the position of the X-ray irradiation field.

(Reference: M102 X-ray Radiation Field: Check)

iv. Repeat the above procedures i and ii, and adjust the position of the irradiation field to the appropriate position as shown in Figure A.

5). After adjustment, attach "Head cover A".

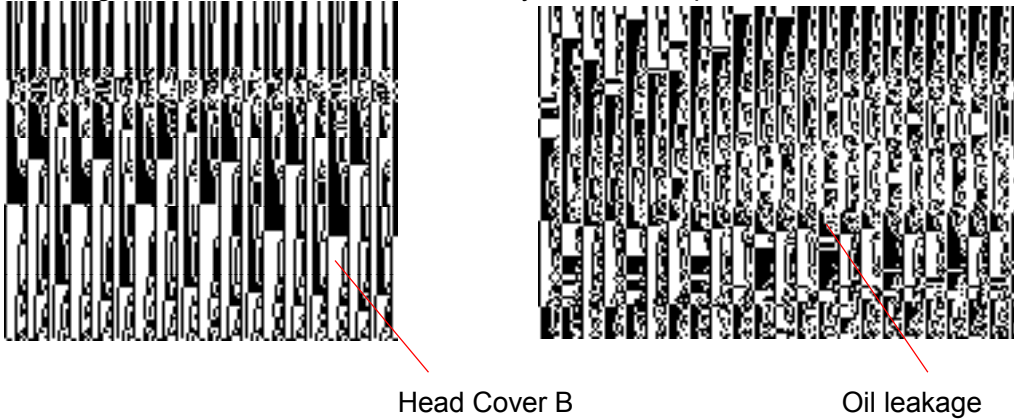
(Reference: M101 Cover removal and installation method)

M112. Oil Leakage within Inner Case Assembly: Check/Replacement

1. Checking Oil Leakage within Inner Case Assembly

1) Check that no oil is adhering to the bottom of the Head Cover B.

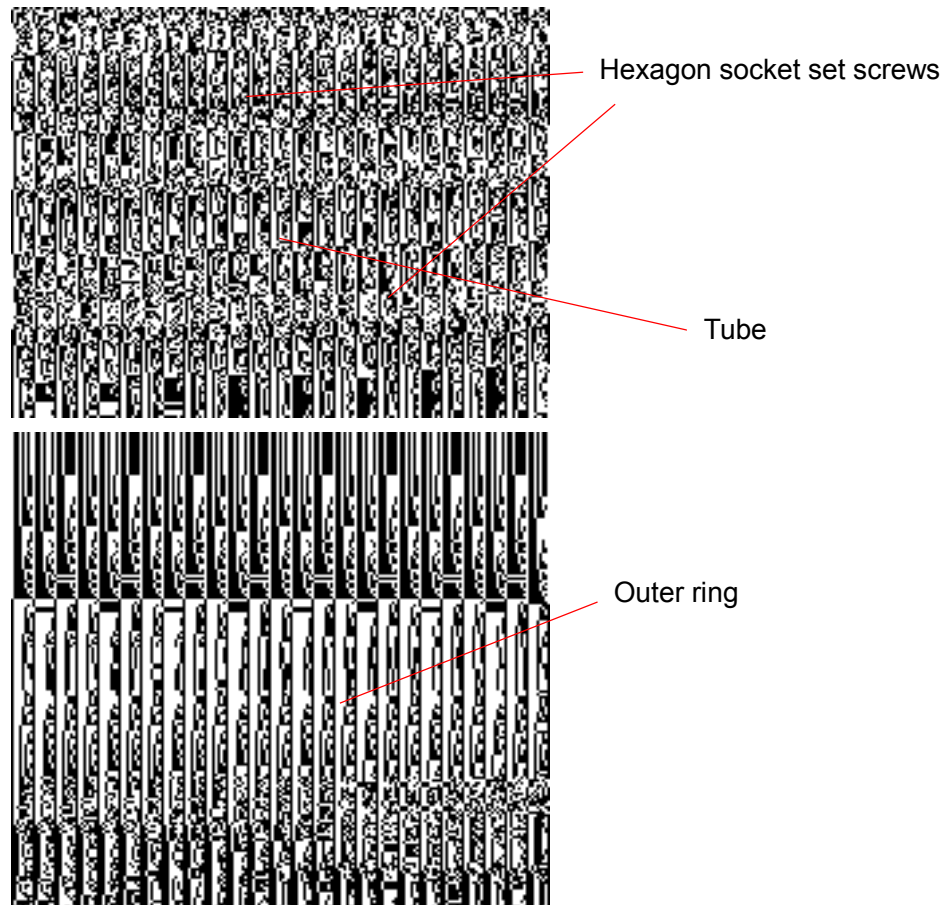
NOTE: If oil leakage is found, inner case assembly must be replaced.



2. Replacement of Inner Case Assembly

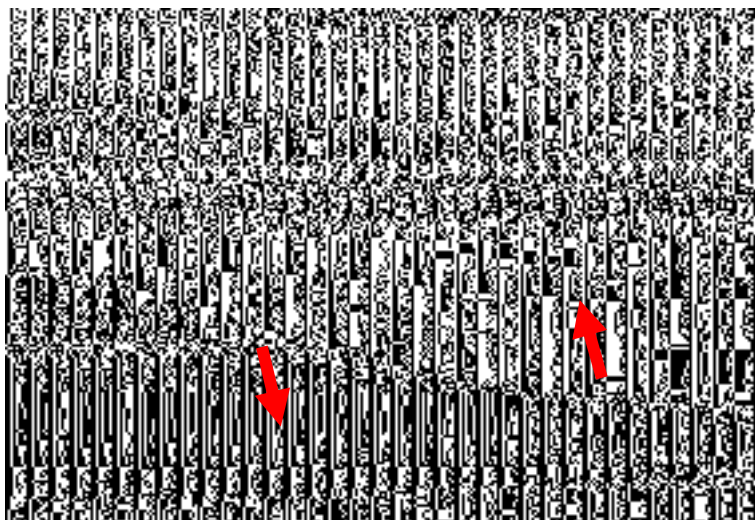
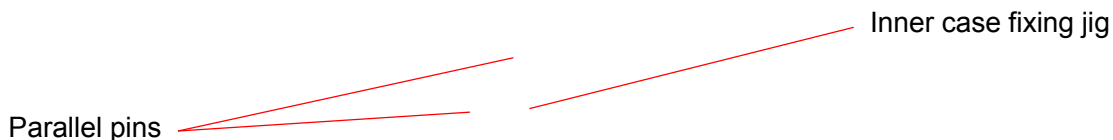
1) Remove Head Cover B and Head Cover A.

2) Unscrew the two hexagon socket set screws to remove the tube.



3) Insert the parallel pins of the inner case fixing jig into the holes of the outer ring.

4) Loosen the outer ring using the inner case fixing jig, remove the inner case assembly, and replace with a new one.



⚠ CAUTION

Be sure that replacement of the inner case assembly is performed by two persons. When replacing the inner case assembly, one of the persons shall remove the outer ring while the other is holding the case assembly.

10) Follow the steps described in the previous section in reverse order that is, from step 8) to 1) to re-install the removed parts, and reconnect the connector.

11) Replace two X-RAY HEAD LABELS on the Inner case assembly and Head Cover.

12) Check the position of the X-ray irradiation field using Panoramic, Cephalometric, and CT exposure modes.

(See "M102. X-ray Field: Check")

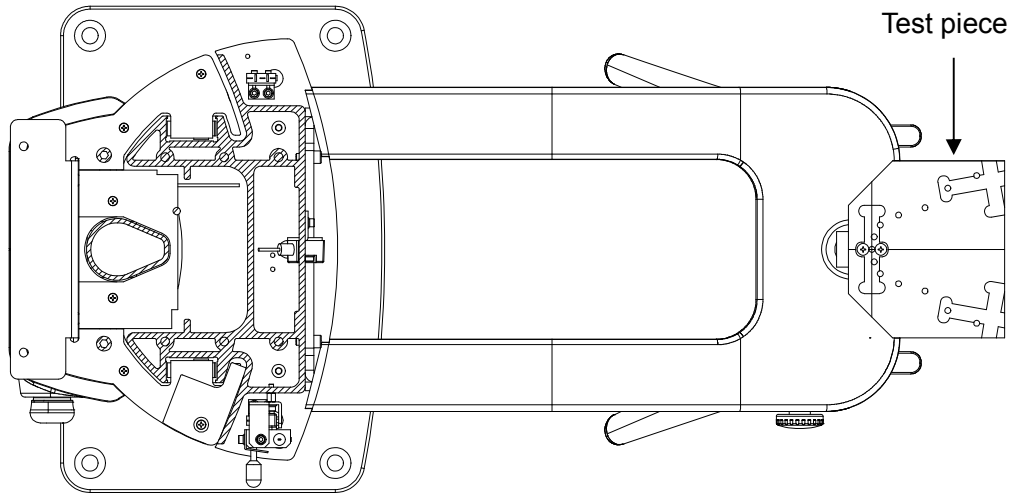
REFERENCE: For the position of the X-ray irradiation field, refer to:

"M105 Mask Position (Panoramic, CT, Cephalometric): Check/Adjustment "

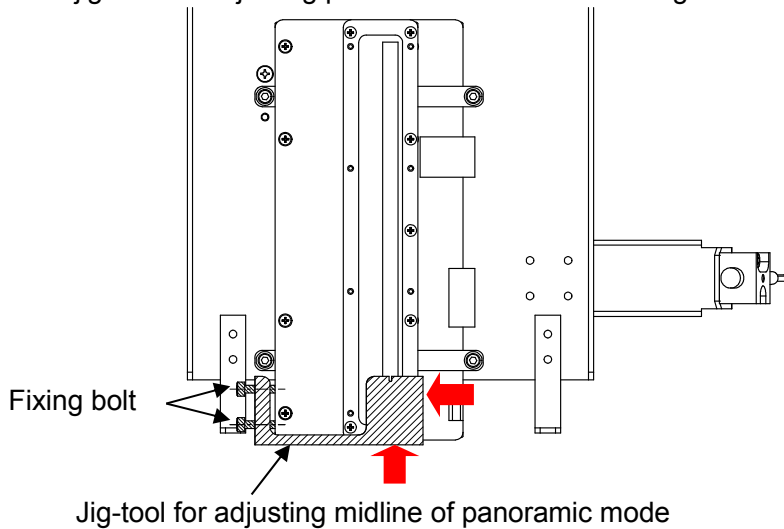
M113. Panoramic Test Piece: Check

1. How to divide and confirm panoramic test piece.

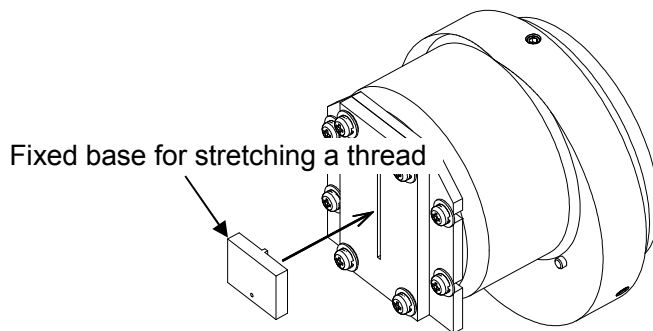
1. Attach panoramic test piece to rest unit.



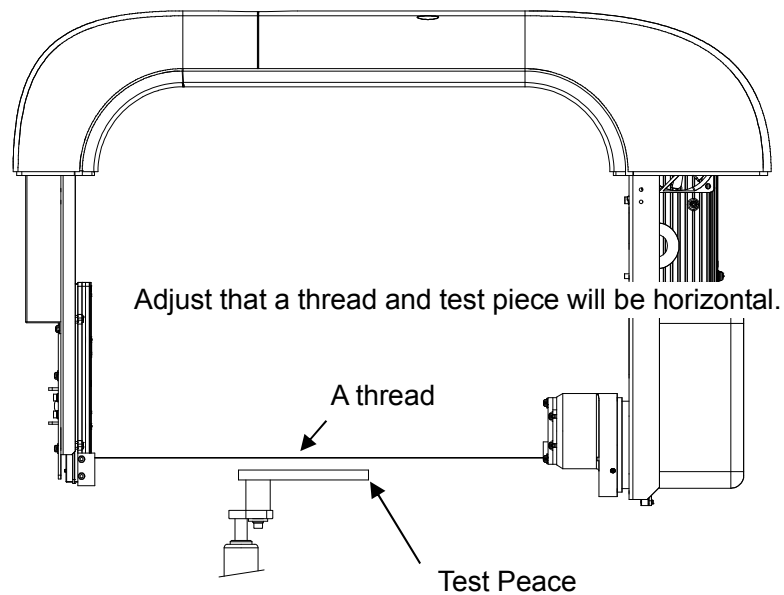
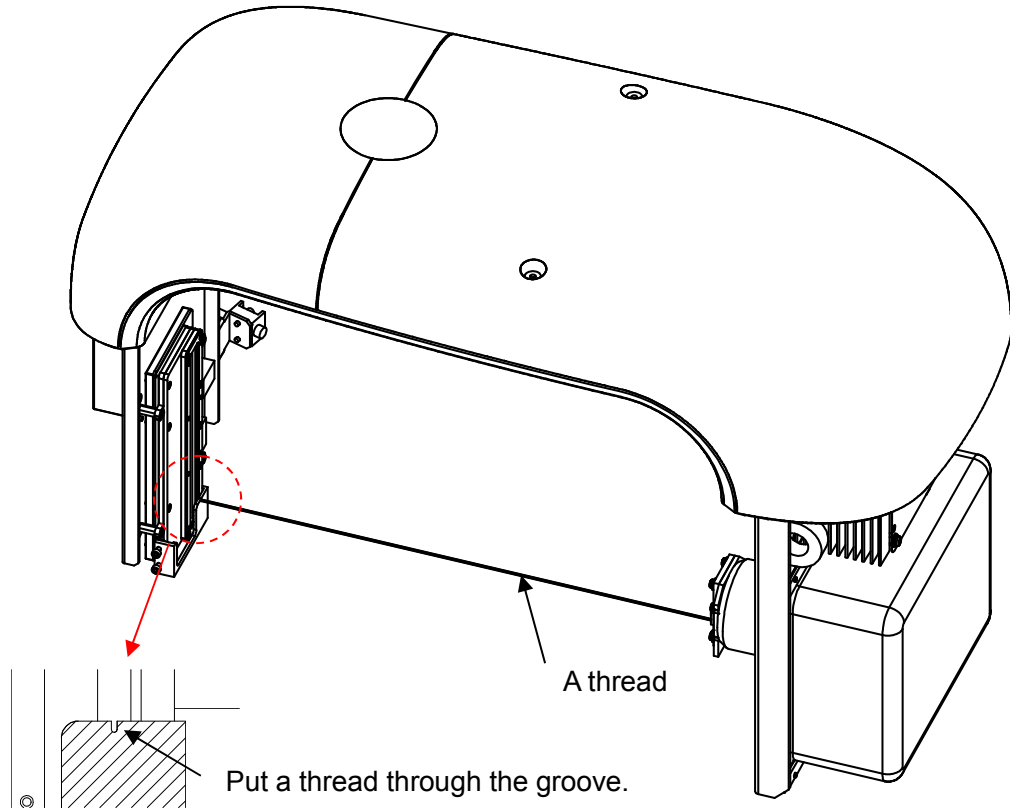
2. Attach jig-tool for adjusting panoramic midline contacting the sensor.



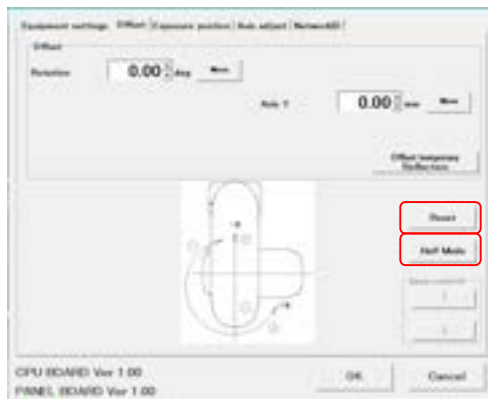
3. Attach fixed base for stretching a thread, and fix it by using tape
4. Insert protrusion part of fixed base for stretching a thread into slit of mask.
5. Fix fixed base for stretching a thread temporarily by using tape.



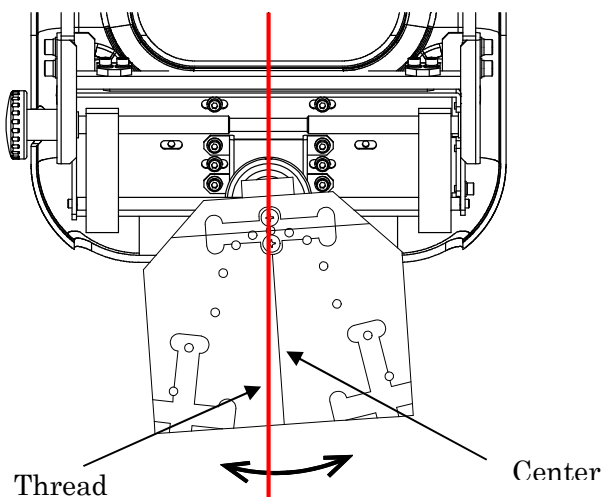
6. Put the edge of thread through u-typed ditch of jig-tool, and fix it temporarily for a thread being tangled.
7. Adjust the position of fixed base for stretching a thread to make sure that a thread has to be horizontal to test piece. In case of a thread being slackened, fix it again.



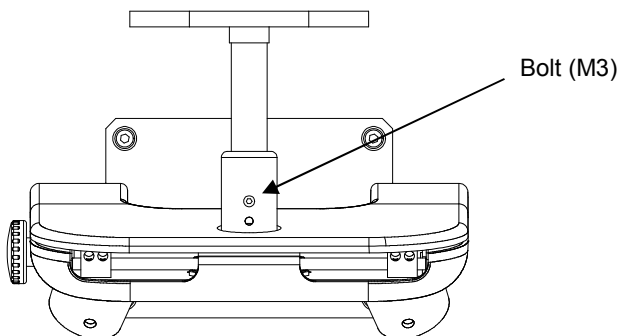
8. Activate shooting panel on the screen of PC.
9. Switch to test mode on shooting panel.
10. Click 「test mode button」 and display setting screen of an equipment.
11. Double-click 「off-set」 on setting screen of an equipment.
12. Click 「Reset」
13. Select 「half mode」 and move arm unit to the position (half mode)



14. Adjust test piece that make sure center line of test piece will be horizontal to the thread



15. After adjusting, fix it with a bolt(M3), so test piece can't be moved.
 ※Bolt (M3) is not along with the equipment, so please remove it when you remove rest piece.



16. After completing adjustment of test piece, Jig-tool, a thread, fixed base for stretching a thread need to be removed

2. Shooting test piece

1). Shooting by panoramic mode

① Change setting.

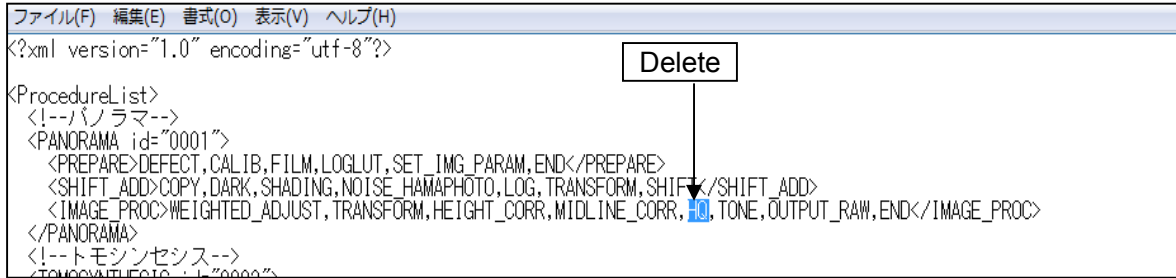
A) A folder where you save a file to change.

C : ¥ B e l - C y p h e r P r o ¥ a p p ¥ N e o E x p G r o u p ¥ 2 D R e C o n
¥ B e l C y p h e r P r o

B) Changing file name 「 2DProcedure.xml 」 can be opened by MEMO or etc.

C) Delete 「HQ,」 which is in the changing detail : <i--Panoramic-->

D) Overwrite it, save and then close it.



② Activate shooting panel and make it following condition, then take a shoot.

Shooting mode	Panoramic Adult
Voltage	6 4 k V
Current	4 m A
Shooting time	1 2 s e c

2). Confirm an image.

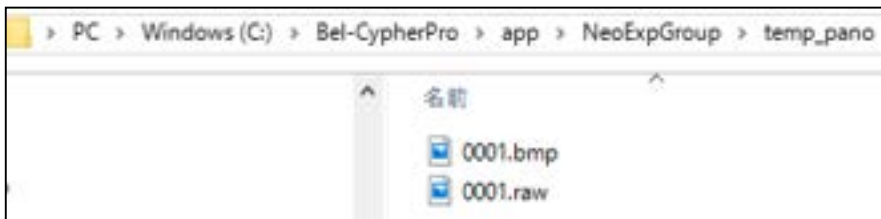
① Open saving image by using 「Image J」

(M102. Refer to provision 4 How to confirm exposure filed)

• An image where it will be saved :

P C ¥ C : ¥ B e l - C y p h e r P r o ¥ a p p ¥ N e o E x p G r o u p ¥ t e m p _ p
a n o

• Name of saving file : 0 0 0 1 . r a w or、 0 0 0 1 . b m p

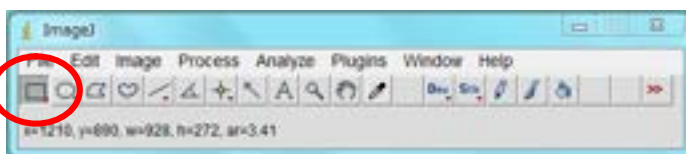


② Confirm an image of each ball should be perfect circle.

• If it is not perfect circle, then go on to ⑤

• If it is perfect circle, then go on to ③

③ An image will be displayed so you will write rectangle between 「left side of the center ball」 and 「the inside of the ball in the left side most」 by using rectangle tool.(refer to drawing 2)

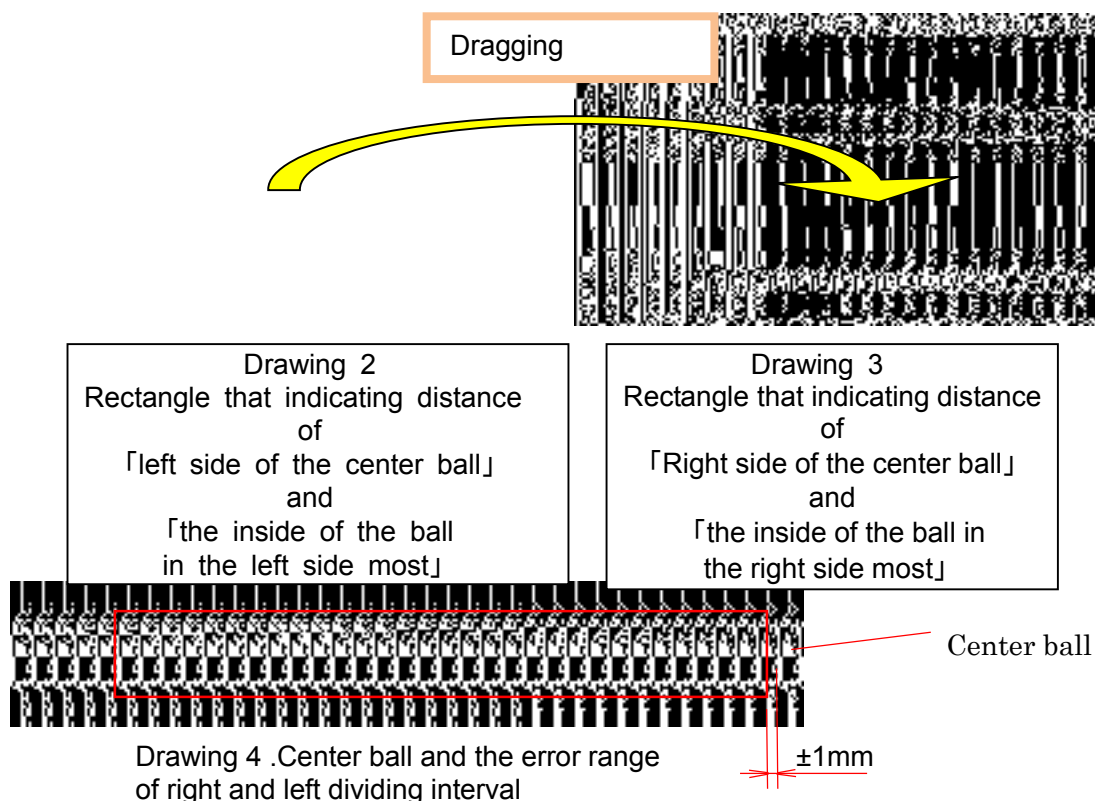


Drawing 1. Image J Tool window

The rectangle which was written at Above ③ will be changed, use mouse dragging it to 「right side of the center ball」 and 「the inside of the ball which is in the right side most」 and then confirm the distance. (Refer to drawing) 。

Center ball and the error range of right and left dividing interval ± 1 mm
(Refer to drawing 4)

- If the error range is more than ± 1 mm, then go on to ⑥.
 - If the error range is within ± 1 mm, then no need to adjust an equipment.
 - i. Please remove test piece, fixing bolt for test piece.
However if you had done ⑤ and ⑥, then please remove after adjustment of each beam.
- 1) Please recover 「HQ,」 which was deleted at ①.



- ④ Adjust Y-axis origin sensor at rotation unit, in case that each ball is ellipse.
- In case of being vertically long : To close Y-axis origin sensor to the test piece.
 - In case of being horizontally long : To keep Y-axis origin sensor away from test piece

Please execute ③ after adjusting each ball as perfect circle.

After adjusting Y-axis sensor, then adjust focus beam。⇒Refer to M***.

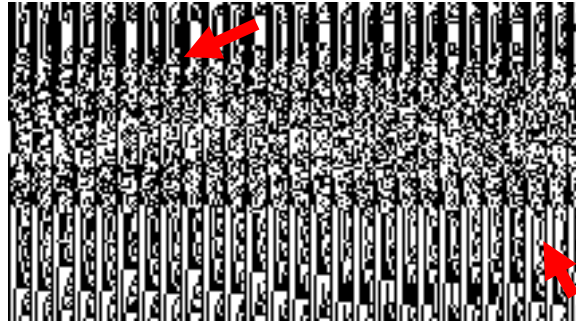
- ⑤ In case that center ball and left and right dividing are not equal, then adjust chinrest assy.
- In case that left side is longer, then move 「Chinrest Assy」 to left side looking at from front of sliding unit.
 - In case that right side is longer, then move 「Chinrest Assy」 to right side looking at from front of sliding unit.

When you confirm an image, please start it from ②

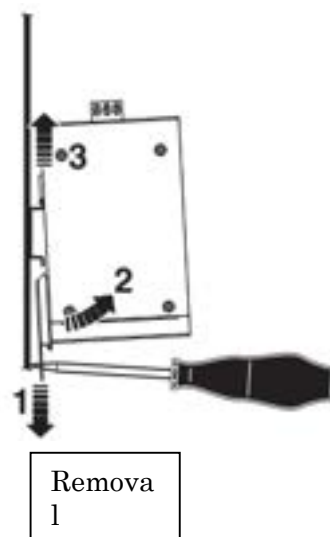
After adjusting chinrest assy, then adjust midline beam ⇒ Refer to M***.

E104. HUB: Replacement

- 1) Remove the Rotation Unit cover.
- 2) Unplug the LAN cable connected to the HUB.
- 3) Unplug the power connector of the HUB or the connector CN2 connected to the PS HUB BOARD.



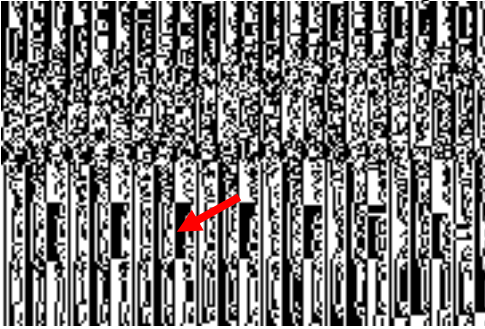
- 4) Pull the release lever open using a screwdriver or a hand. Rotate the device and remove from DIN rail.



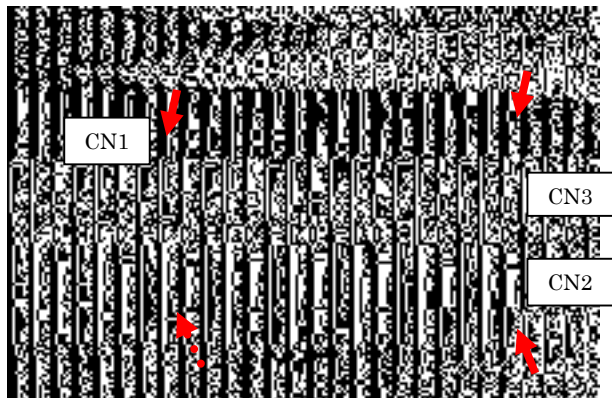
- 5) Please do the reverse procedure for the exchange to the new hub

E105. Switching Power Supply: Replacement

- 1) Remove the Rotation Unit cover.
- 2) Remove the HUB with reference to [E104].
- 3) Remove two screws holding the Fan bracket and unplug the relay connector CNSWFN.



- 4) Unplug the connectors CN1, CN2, CN3 connected to switching power supply and remove four screws.



- 5) Please do the reverse procedure for the exchange to the new switching power supply.

E108. Emergency stop button switch : Replacement

CAUTION

Before using the Emergency stop button switch [NO.0607], be sure to complete the connection and wiring works required.

- 1) Remove Relay Box Cover B. (Refer to M101)
- 2) Disconnect the relay connector CNEM which is connected to the Emergency stop button switch



- 3) Turn the nut of the emergency stop button counterclockwise to loosen it.



- 4) Remove the Emergency stop button switch from the Frame.



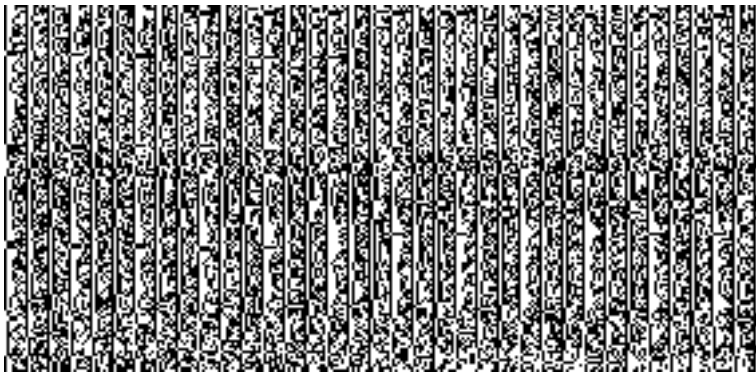
- 5) Attach a new Emergency stop button switch in reverse procedure.

E111. Wire Harness: Replacement

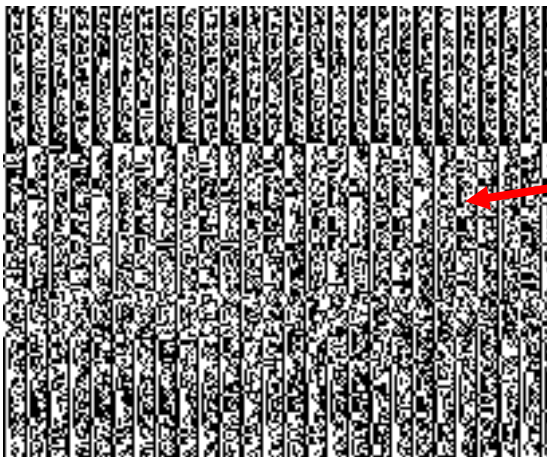
1. Restoration of Each Harness
2. Restoration of LAN Cable Plug

1. Restoration of Harness

- 1) Identify the disconnected location of the Wire Harness.
Connect a digital meter at both ends of the Wire Harness, and move the Wire Harness in four directions (front/back, right/left) or pull both ends of the Wire Harness to identify the location of disconnection, while checking the conductivity.
- 2) Once the location of disconnection is known, cut the location by using a pair of nippers.
- 3) From the Wire Harness end, strip the insulation coating in 10 mm by using a pair of nippers.



- 4) Connect the Wire Harness by using the Connecting terminal CE1 or others.



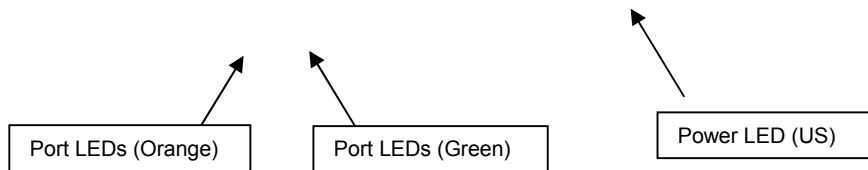
Connecting terminal: CE1

When using the Connecting terminal CE1, the Connecting terminal and crimping tool below are required:

- Connecting terminal
CE1 (PPS : 971-03001-00) Necessary amount
- Crimping tool
YS-2216

E113. HUB LED: Check

1. In the case of “FL SWITCH SFN 5GT – 2891444” (PHOENIX CONTACT)



Port LEDs

Label	Status	Meaning
100/ACT	Solid green	Port is linked at 100 Mbps.
	Flashing green	Port is transmitting or receiving data.
	Off	Port is not connected.
1000/ACT	Solid orange	Port is linked at 100 Mbps.
	Flashing orange	Port is transmitting or receiving data.
	Off	Port is not connected.
100/ACT and 1000/ACT together	Solid	Port is linked at 10 Mbps.
	Flashing	Port is transmitting or receiving data.
	Off	Port is not connected.

Switch LEDs

	On	Off
Us	Power is present.	Power is not present.

2. In the case of “GS105-500JPS” (NETGEAR)

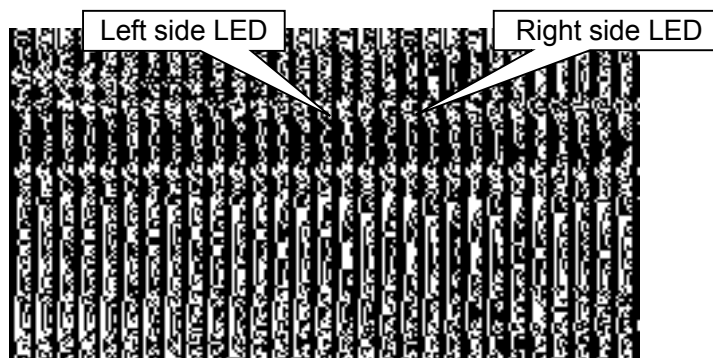
Left side LED only is ON: 100Mbps connection link is established without communication

Right side LED only is ON: 10Mbps connection link is established without communication

Both LEDs ON: 1000Mbps connection link is established without communication

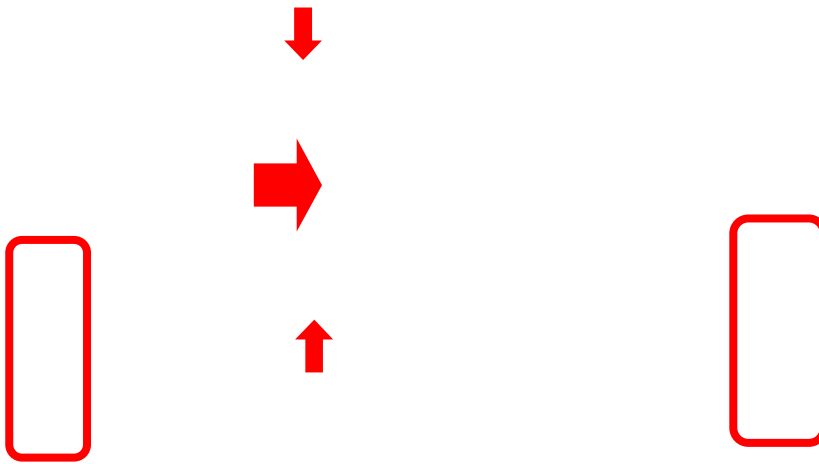
LED is flashing: Communication is in process

Both LEDs OFF: No connection has been established



E107. Circuit Protector: Replacement

- 1) Remove Relay Box Cover B
(Refer to M101 Cover removal and installation method, 16.)
- 2) Remove the wire Harnesses.
- 3) Push the circuit protector out while pinching the side parts.

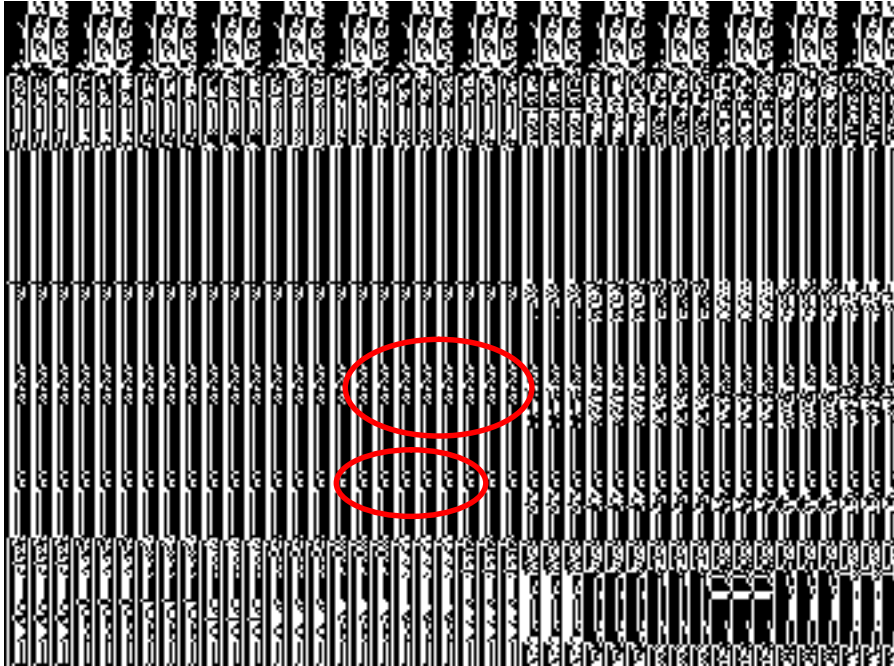


- 4) Attach a new circuit protector in reverse procedure.

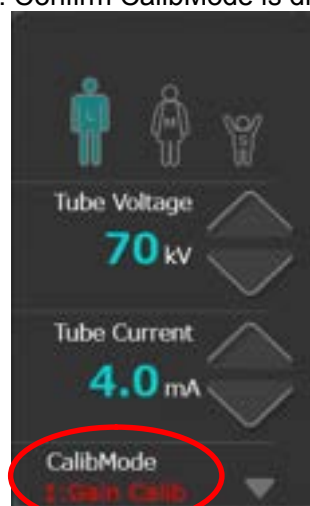
S101. How to take Calib image/How to register Defect

1. How to take Calib image

1. Remove the ear rod or the chin rest if these are put on
2. Start TWAIN



3. Click Rset
4. Choose "Adult" and "Normal"
5. Hit [Ctrl]+[Alt]+[c] simultaneously. Confirm CalibMode is displayed.



6. Click Ready and take a radiograph
7. Confirm 0001.raw and 0002.raw are saved in
C:\¥ Bel-CypherPro¥app¥NeoExpGroup¥CORR_DATA¥PANORAMA folder

2. How to register defects

1. Please open "0001.raw" of folder
C:\Bel-CypherPro\app\NeoExpGroup\CORR_DATA\PANORAMA
With ImageJ and check the image.
If a defect has occurred, please follow the procedure below.
2. On the defect line of the image opened with ImageJ, on the defect pixel
Take the mouse cursor and note the coordinates displayed on ImageJ.
3. Open C:\Bel-CypherPro\app\NeoExpGroup\CORR_DATA\DEFECT\DefectPan.dat
in Notepad and register coordinates you have memorized.

If a horizontal line defect occurs, register the Y coordinate in the [Horizontal_Line] item.

Ex)
 HL1=yy
 HL2=yy
 :

If a vertical line defect occurs, register the X coordinate in the [Vertical_Line] item.

Ex)
 VL1=xx
 VL2=xx
 :

When registering a defect pixel, please register the X coordinate and Y coordinate in the [Pixel] item

Ex)
 PX1=xx
 PY1=yy
 PX2=xx
 PY2=yy
 :

After registering all the coordinates, please save the file and close it.

※ Caution

Please replace the sensor if the following conditions are satisfied

- When there are more than 6 defective lines vertically and horizontally aligned.
- When two or more defect lines occur consecutively.
- When 361 or more defect pixels are generated.
- A defect of 3 × 3 pixels or more has occurred.
- When 7761 or more defects have occurred.

S102. How to change IP Address

Caution!

※1 : Change IP address only when it is required

※2 : When you change IP address, do 「6.1 Change IP address of sensor」 、 「6.2 Change IP address of Bel-Cypher Pro」 & 「6.3 Change IP address of NIC」 according to the order

Below are default IP address and default subnet mask

Default IP address / Subnet mask for sensor

IP address : 192.168.2.34

Subnet mask:255.255.0.0

Default IP address / Subnet mask for Bel-Cypher Pro

IP address : 192.168.2.32

Subnet mask:255.255.255.0

Default IP address / Subnet mask for PC(NIC)

IP address : 192.168.2.33

Subnet mask:255.255.255.0

S102.1. Change IP address of sensor

※ **Set up for PC and set up for Bel-Cypher should be completed before changing IP address**

1. Start TWAIN program of Bel-Cypher Pro

2. When above TWAIN screen is shown, click L, M or S, then hit 「Ctrl」 + 「Alt」 + 「t」 simultaneously

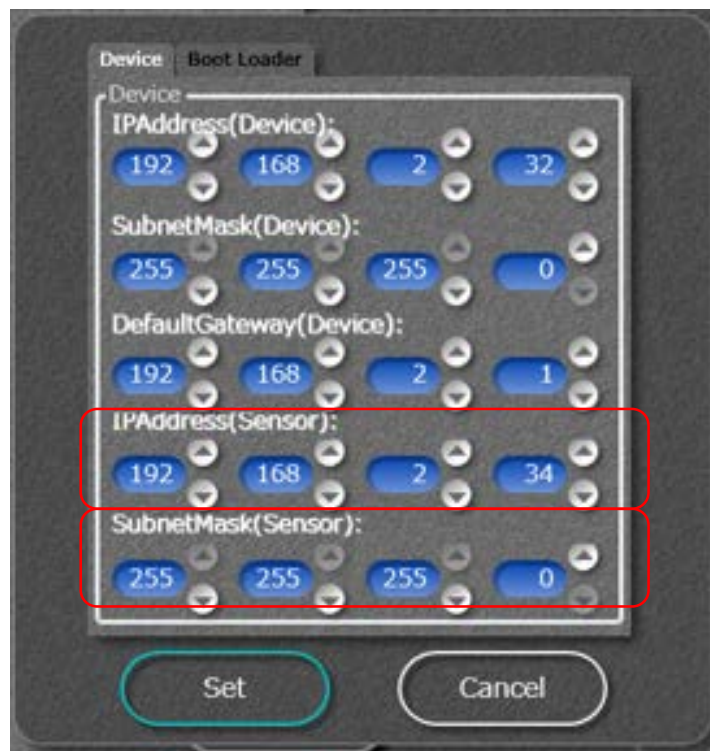
3. Then hit 「Ctrl」 + 「Alt」 + 「i」 simultaneously.

4. IP address set up screen comes up



5. Enter new IP Address(Sensor) and SubnetMask(Sensor).

✘ Set IP address and Subnet Mask as Bel-Cypher Pro is included within sensor network.



6. Click 「Settings」



7. When 「Turn on the the power of the X-ray equipment again.」 is displayed, then turn off and on the power of Bel-Cypher Pro



S102.2. Change IP address of Bel-Cypher Pro

8. Start TWAIN program of Bel-Cypher Pro

9. When above TWAIN screen is shown, click L, M or S, then hit 「Ctrl」 + 「Alt」 + 「i」 simultaneously

10. IP address set up screen comes up



11. Enter new IP Address and SubnetMask

※ Set IP address and Subnet Mask as Bel-Cypher Pro is included within sensor network.



12. Click 「Set」



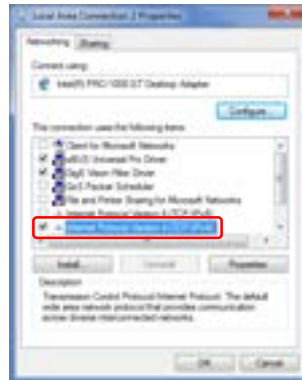
13. When 「Turn on the the power of the X-ray equipment again.」 is displayed, then turn off and on the power of Bel-Cypher Pro



S102.3.Change IP address of NIC

※ Change IP address of NIC, after you changed IP address of Bel-Cypher Pro and IP address of sensor.

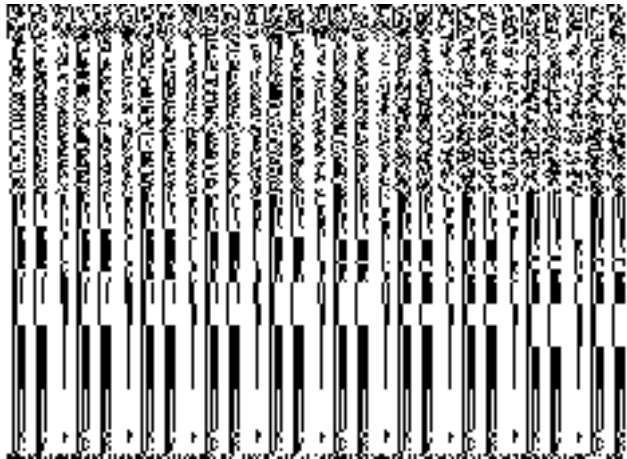
1. Go to 「Control Panel」 → 「Network and Internet」 → 「Network and Sharing Center」 → 「Change adapter settings」
2. Right click LAN Connection that is connected to Bel-Cypher Pro. Choose property.
3. Double click 「Internet Protocol Version 4(TCP/IPv4)」 in 「The connection uses the following items:」



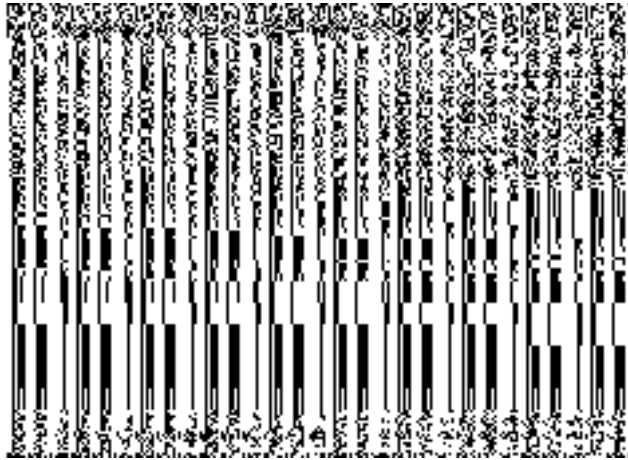
3. Start Control Panel, click "User Accounts and Family Safety"



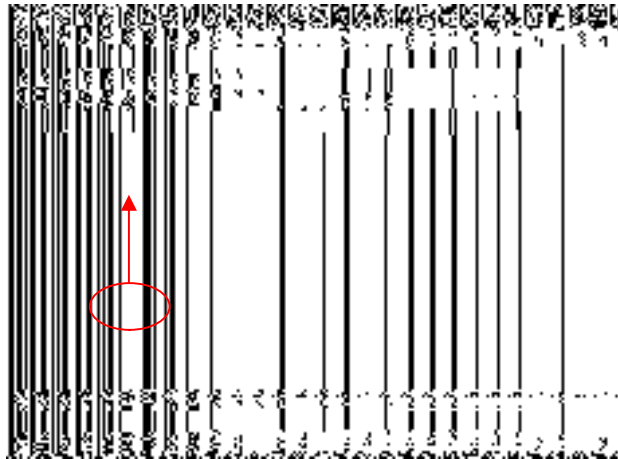
4. Choose "Change your Windows password"



5. Choose "Change User Account Control settings"



6. Slide the bar to "Default", then click OK

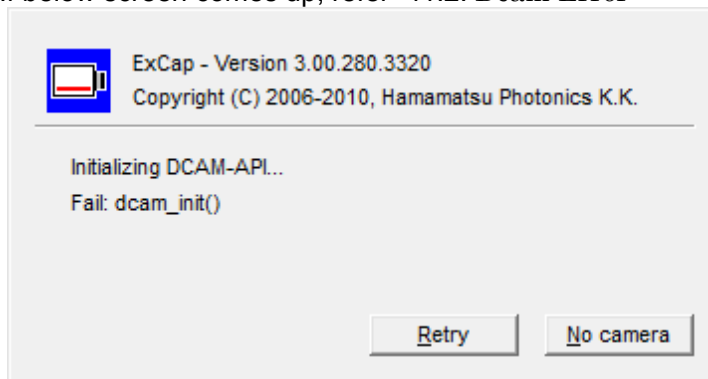


S106. How to use Excap.exe

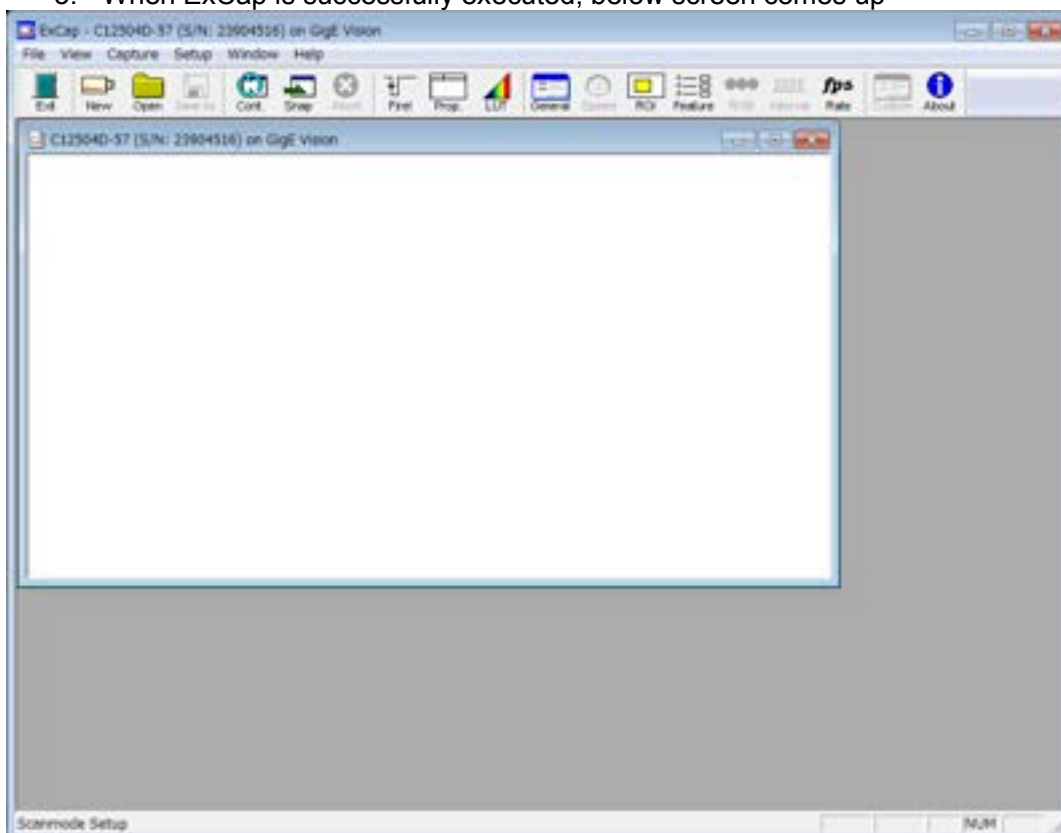
1. Run C:\¥Bel-CypherPro¥app¥NeoExpGroup¥ExCap.exe

BEL_CYPHER_CLM.exe	2014/05/13 17:02	アプリケーション	794 KB
ExCap.exe	2013/04/18 8:03	アプリケーション	1,793 KB
AdrPan2.dll	2013/08/09 19:11	アプリケーション...	179 KB

2. If below screen comes up, refer “11.2. Dcam Error”



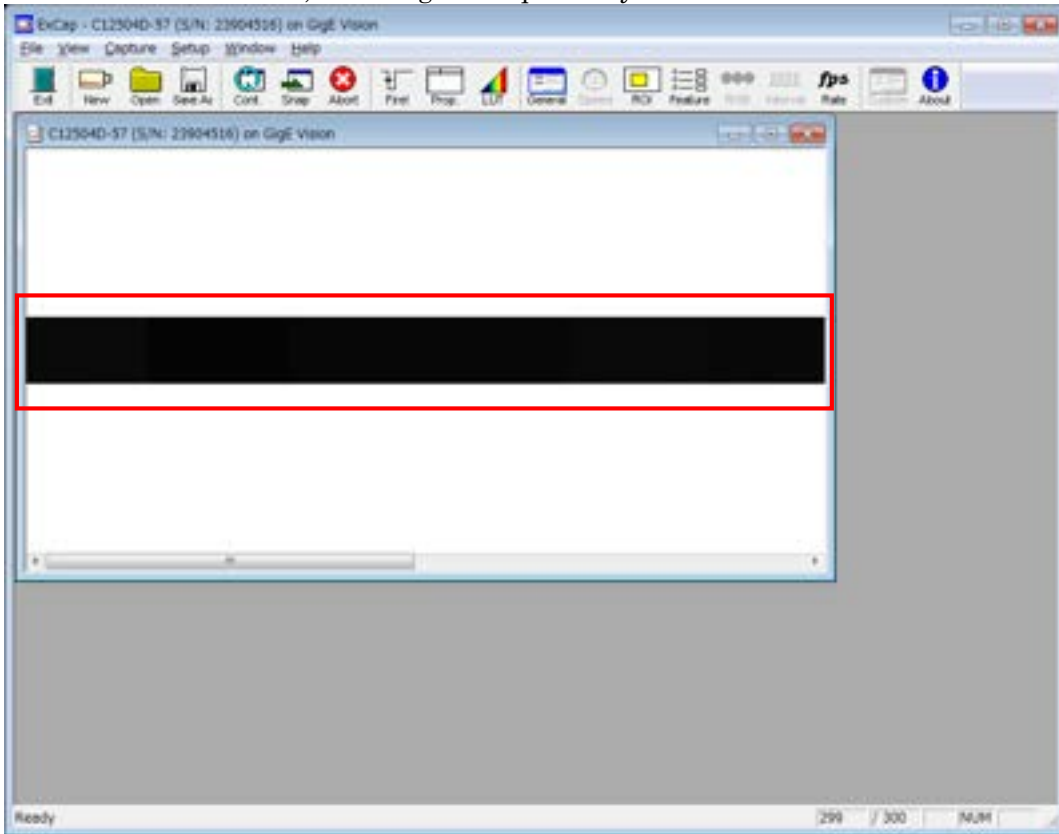
3. When ExCap is successfully executed, below screen comes up



4. Click “Cont.” icon



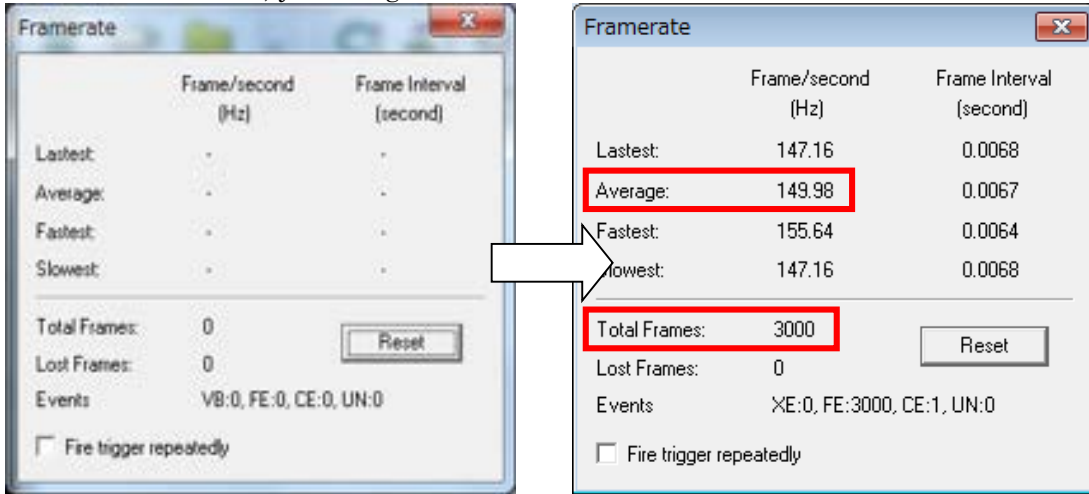
5. As shown below, the image is acquired by sensor



6. Click “Rate” icon

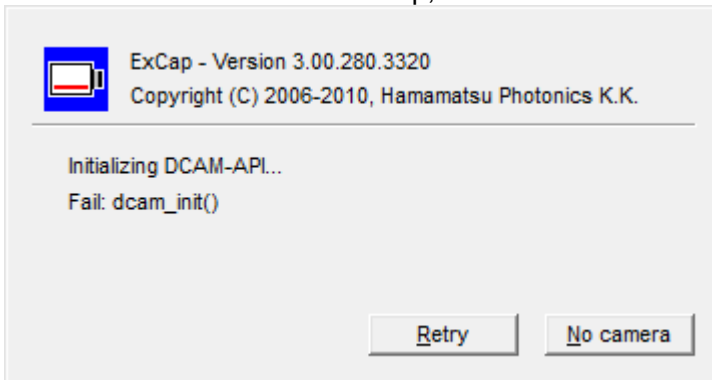


7. In Framerate screen, you can get frame rate information

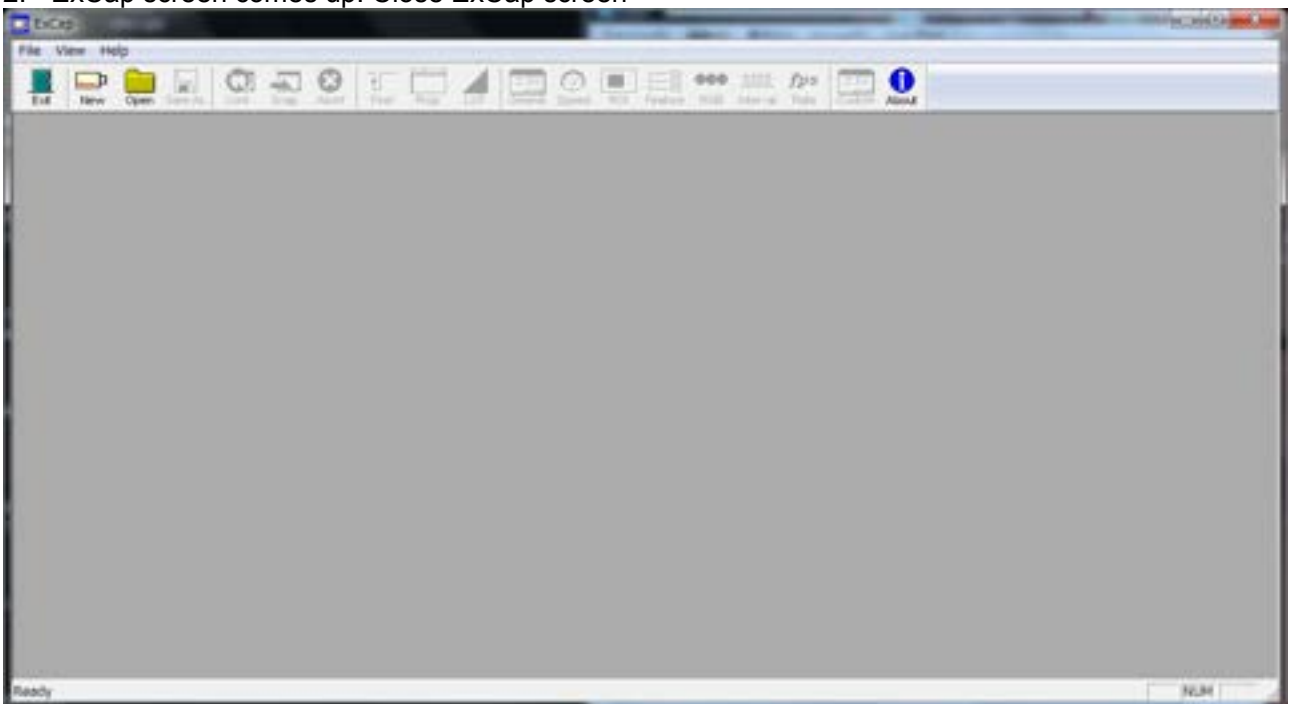


Dcam Error

1. When below screen comes up, click No camera



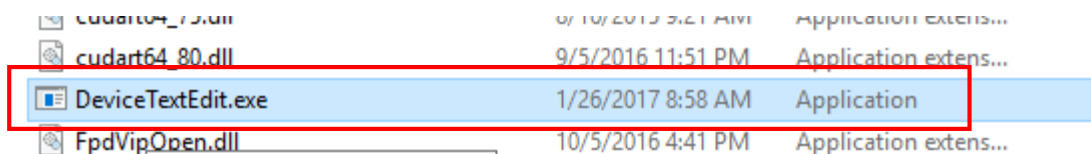
2. ExCap screen comes up. Close ExCap screen



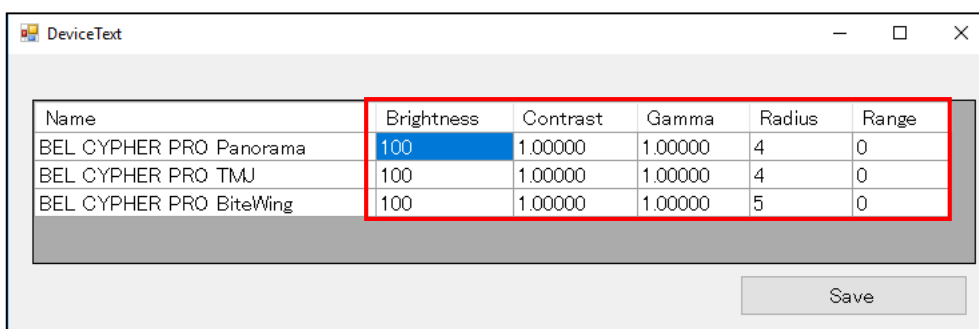
- If you run ExCap.exe right after powering Bel-Cypher Pro on, the communication error between PC and Bel-Cypher Pro may occur.
Wait for a while, and restart ExCap.exe
- If above doesn't solve the problem, reset both PC and Bel-Cypher Pro and run ExCap.exe
 - If above two doesn't solve the problem, check IP address of PC and Bel-Cypher Pro.
You may also need to check the LAN communication.

S107. How to set the initial value of image process

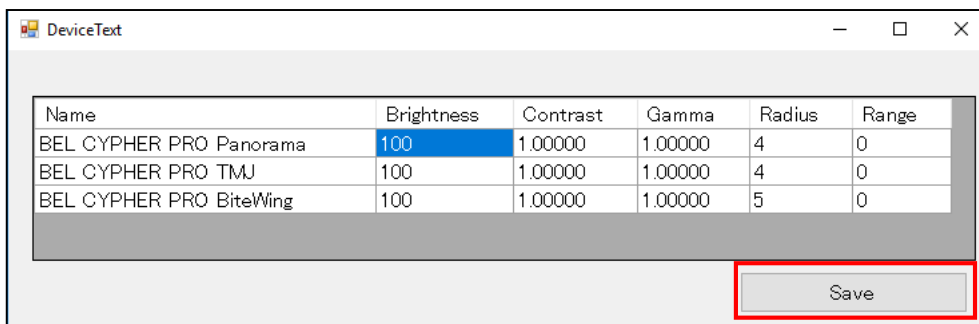
1. Run C:\¥Bel-CypherPro¥app¥NeoExpGroup¥DeviceTextEdit.exe.



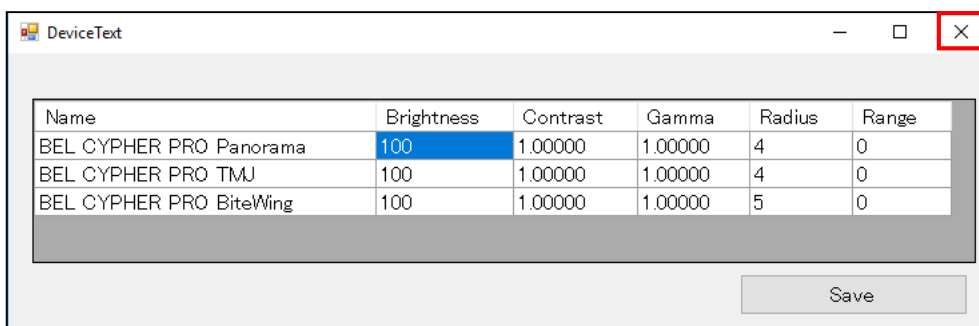
2. Select the item you want to change and change the value.



3. After changing the setting, click the Save button. The changes are saved.



4. Please click "x" button after completion of setting change or end change.



※DeviceTextEdit.exe should be used when Shooting program is not running.

The setting change is not reflected while the shooting software is running.

※Tomosynthesis mode is included in panorama mode.

S108. Description of ini file

■ NeoExpSetting.ini

[SYSTEM]

Output the original image. (1=output, 0=no output)

Set the save destination of the original image with the NeoExp.ini file

// Whether or not to output the original image (1: output, 0: not output)

SaveOrgPic=0

Enable or disable tomosynthesis function (1:Enable, 0:Disable)

// Whether or not to display the tomosynthesis button (1: display, 0: not display)

TsEnabled =0

Display "Close" icon in the image save screen (1: display, 0: not display)

// whether or not to display the Close button in the Save screen (1: display, 0: not display)

SaveDispCloseBtnEnabled=0

IP address of NIC is recorded

If you want to change the IP address of NIC, change the value

//IP address of the NIC

SELFIP=169.168.2.33

IP address of LAN board is recorded

If you change the IP address of LAN board, IP address change software automatically change the IP address in ini file.

You are not needed to change IP address manually.

//IP address of the device

IP= 192.168.2.32

■ NeoExpSetting.ini

[ORG_PIC]

Sets the save path of the original image

//---- Projective Image Saving Folder -----

PIC_PATH=C:¥neobackup¥ORG_PIC

13. CONTACT INFORMATION

Please contact our sales office or a distributor near you.

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14. Revision data of this manual

This manual was created in Sep 2016.

Revised in April 2017

Document number : B04-S216E