
SERVICE MANUAL

DIGITAL PANORAMA AND CEPHALO RADIOGRAPH
B e l m a X C M

Notice to person for after-service

- * Before the repair working, read through this manual.**
 - * Take this Service manual with you to the repair.**
-

TAKARA BELMONT U.S.A. INC.

Before Repair

Repair sometimes might require dangerous working for adjustment, checking, etc.
Therefore, repair should be performed by qualified person or any person who receive proper education or training at our company.
Please read and understand this service manual.

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0 1 . INTRODUCTION

1. Read carefully before operation
2. The operating procedure of the panoramic radiography is the basic. Understand before other radiograph.
3. Observe "Warning" and "Prohibition" matters in the service manual.
4. Read the Operation Manual from 1st page in order to prevent any troubles, accidents and etc.
5. When you have any unclear matter during operation, consult with the operation manual.
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 one year from the date of purchase. The charge-free warranty will be applied only to the cases that breakage, failure, etc. of this equipment occurred through normal use.
8. Available Period for Repair Parts and Service Parts is 10 years form discontinued of the equipment
9. The redemption period of the equipment is six years.
10. The disposal of equipment is within the scope of responsibilities of the customer.
In case to disposal, consult with the dealer you purchased from or with us.

02.WARNING



WARNING

For installation, operation, and maintenance, be sure to follow the instructions included in this manual. If the repair is mistaken by any chance, it causes damage and the accident of the equipment.



NOTE

Details of WARNING are stated as follows in this manual.



DANGER

Used for the immediate danger that causes death, serious injury, serious destruction of the property and occurrence of a fire.



WARNING

Used for indirect danger that causes death, serious injury, serious destruction of the property and occurrence of a fire.



CAUTION

Used for the danger that causes slight injury or medium level of trouble, partial loss of equipment and disappearance of the computer data.



NOTE

In using equipment, used for the helpful information.



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 the usages 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 nearest to you 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 room and install the equipment in the X-ray room.



WARNING

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



WARNING

Concerning to X-raying and approach to equipment must be done under the responsibility of user in case a repairer, a patient, or a nursing attendant use 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 nearest to you when scraping this equipment.



WARNING

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



WARNING

Keep everyone out from X-ray room except repairer when radiating X-rays for repair.



WARNING

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



WARNING

Do not move patient 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.



CAUTION

Do not radiate beam line to patient eye

03.Preparation for Repair

1. Manual

- * BelmaX CM Service manual
- * BelmaX CM Operation manual

2. Measurement Instruments

- 1) Digital Multimeter
- 2) Lead Wire for Measurement
- 3) Measurement Instrument of Insulation Resistance
- 4) X-ray detector paper

3. Tools

- 1) Screwdrivers for Cross Recessed Head Screw (Large, Small)
- 2) Screwdrivers for Slotted Head Screw (Small) (Insulation type)
- 3) Boxing Screwdriver (6,5,4,3mm)
- 4) Hexagon wrench
- 5) Nipper
- 6) Cutting Pliers
- 7) Electrical Soldering Iron (Insulation type), Solder
- 8) Tap
- 9) Tap Handle
- 10) Electric Drill
- 11) Drill
- 12) Crimping tool

4. Tools for adjustment

- 1) Test Piece of BelmaX CM
- 2) Pb Plate for X-ray protection (thickness = 3mm)
- 3) Filter (brass plate)
- 4) Aluminum Filter (thickness = 35mm)
- 5) X-ray detector paper
- 6) Adjustment tools for equipment

5. Parts for replacement

- 1) Prepare parts, printed circuit boards, wire-harness, etc. according to the necessity of repair.

6. Others

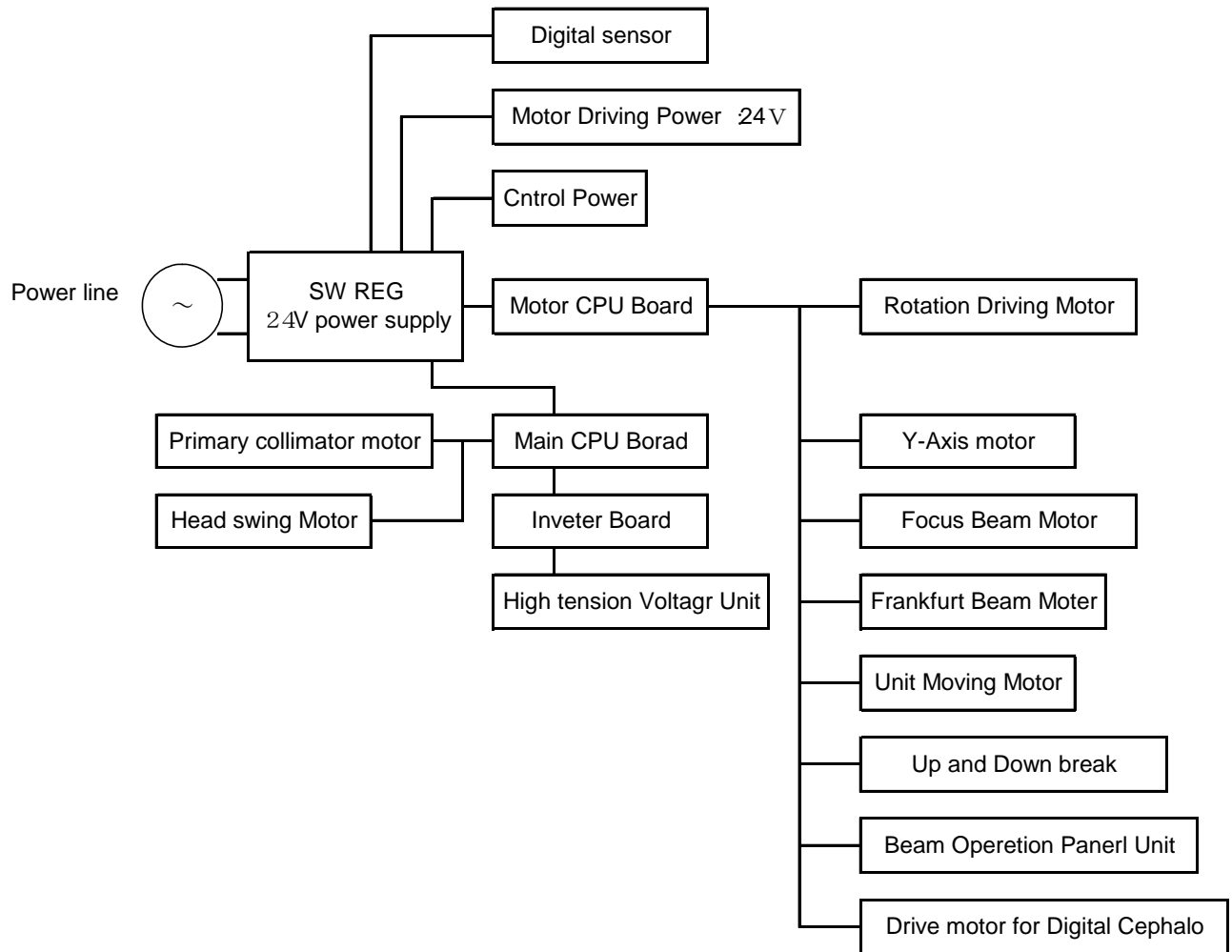
- 1) Prepare screws, nut, crimp terminal, grease, etc. according to the repair.
- 2) Alcohol for disinfection
- 3) Clothe
- 4) Chemicals for cleaning

04. Specifications

| | | |
|------------------------|--|---|
| Model | Digital Panoramic and Cephalometric Radiograph BelmaX CM | |
| Input Power | 120Vac 60Hz 1 ϕ | |
| Power | 2.0kW | |
| High Tension Generator | High Tension Generator (100kHz) | |
| Exposure Method | Manual | |
| Tube Voltage | 60kV~100kV (1kV step) | |
| Tube Current | 2.4.6.8.10.12mA (2mA step) | |
| X-ray Tube | D-052SB (Toshiba) | |
| Focal Spot | 0.5 x 0.5 mm | |
| Total Filtration | 2.5mmAl (Min) | |
| CCD sensor | Both as Panorama and Cephalo | |
| Exposure Mode | | |
| Exposure Time | Panorama : 7sec/12sec Maxillary Sinus : 8sec TMJ Lateral : 3.0sec(x4) TMJ Frontal : 3.0sec(x2) | Cephalo Lateral : 2.9sec(short time mode) 4sec(normal time mode) Frontal : 3.2~5sec |
| Magnification | Panorama : 1.21~1.36 Maxillary Sinus : 1.2~1.22 TMJ Lateral : appr.1.24 TMJ Frontal : appr.1.88 | Cephalo Lateral & Frontal: 1.1 |
| Positioning Beam | 3 beams | |
| Positioning tools | Panorama • Maxillary Sinus : Chin Rest+ Head Holding Rod T M J Lateral • Frontal : Ear Rod | — |
| Weight | 417 lb(189 kg) | |

05. Component

1. Block diagram



06. Setting

Connect an adjustment tools with the main body first.

Explanation of the setting content

1. Basic operation

- 1) Turn the power on.
- 2) After finishing initialization of the equipment, set Tube Voltage "0kV"
 - Press "SELECT Key" and blink the display of tube voltage
 - Keep pressing "SELECT DOWN key"
- 3) Change it setting mode.
 - Press "READY" during pressing "SELECT key"
- 4) Select setting content of the equipment by **T E C H U P / D O W N** key.
- 5) Blink setting display of equipment by "SELECT"
- 6) Decide setting content by **S E L E C T U P / D O W N** key
- 7) Release setting mode of the equipment.
 - Press "READY" during pressing "SELECT" key

2. Mode-specific Operations

- 1) With or Without CEPHALO Setting Mode: OFF/R/L
 - Without Cephalo: OFF
 - With Cephalo on the left: R
 - With Cephalo on the left: L
- 2) PREHEAT Voltage Setting Mode: 0 ~ 255
 - Setting of the tube current reference voltage
 - If decreased the value, the rising of tube current becomes slower.
 - If increased the value, the rising of tube current becomes faster.
- 3) EXHIBITION ON/OFF Setting Mode: ON/OFF
 - Operation mode for exhibition
 - When set to ON, release the equipment setting and press RESET key, the equipment repeats return-to-origin operation and radiograph operation.
- 4) XRAY COUNT Display Mode
 - Number of irradiations display mode
 - When press SELECT key and keep pressing SELECT DOWN key, the number of irradiation will be cleared.
- 5) POWER OFF ON/OFF Setting Mode: ON/OFF
 - Auto power-off function setting mode
 - When set to ON, the power turns off automatically in five minutes after the final key operation.
 - When set to OFF, the power will not turn off until turning POWER switch to OFF.

07. Trouble Shooting

1. Unable to Turn On

If the surface of circuit protector is bulging and in a “trip” condition, unplug from outlet, wait for 60 seconds or more, and fully insert the plug into the outlet. The plug can be heat up. Be careful not to get burned.

After eliminating the cause, turn on again.



- Interception of MOTOR CPU BOARD fuse F1(3.15A)
- Check if electric wire is in contact with body of equipment due to braking, pinching, etc.
- Disconnection of wire of rotation axis
- Defect of switching power supply Defect of I N V board
- Interception of MAIN CPU BOARD fuse F1(3.15A)

2. Arm doesn't rotate

- Interception of MOTOR CPU BOARD fuse F3(3.15A)
- Defect of motor driver
- Defect of motor

3. Y axis doesn't move

- Interception of MOTOR CPU BOARD fuse F2(3.15A)
- Defect of motor driver
- Defect of motor

4 Horizontal Beam doesn't Move

- Check if it's position for cephalometric radiograph
- Defective REST SW BOARD (when pressing switch makes no sound)
- Defective horizontal beam motor
- Defective micro switch for detecting vertical position
- Defective MOTOR CPU BOARD
- Defective CNK BOARD

5. Focus beam doesn't move

- Is it for Cephalo radiograph position?
- Defect of REST SW BOARD (In case there is no sound when you depress SW)
- Defect of MOTOR CPU BOARD
- Defect of CNK BOARD

6. Body doesn't move up and down

1) When operating Beam Line Operation Panel

- Defective RESET SW BOARD (No sound when press SW)
- Breaking of curl cord
- Defective sliding unit elevation motor driver
Remove the top cover, turn on power and check the blinking interval of driver's LED.

- ◆ Overload protection function (Number of LED blinks: 2 times)
 1. Eliminate the cause that hinders the vertical motion (obstacle, overload)
 2. Check if it sounds when the operation button is pressed
When it doesn't make any sound, replace BRAKE BOARD
 3. Replace the driver

- ◆ Open-phase protection function (Number of LED blinks: 3 times)
 1. Replace sliding elevation motor
 2. Replace the driver

- ◆ Over voltage protection function (Number of LED blinks: 4 times)
Under voltage protection function (Number of LED blinks: 5 times)
 1. Check if the voltage between MOTOR CPU BOARD check pins, CP1 and CP2, is 24Vdc.
When the deviation is large, replace SW power supply.
 2. Replace the driver

- ◆ Over speed protection function (Number of LED blinks: 6 times)
Defective MOTOR CPU BOARD and replacement
 - Defective MOTOR CPU BOARD
Check that output voltage of CP8 varies while pressing UP/DOWN switch.
If it does not vary, replace the board.

2) When operating CM switch

- Defective CM SW BOARD (when pressing switch makes no sound)
- Defective sliding unit elevation motor driver
Remove the top cover, turn on power and check the blinking interval of driver's LED.
After eliminating the cause, turn on power again.
- Defective MOTOR CPU BOARD
Check that output voltage of CP8 varies while pressing UP/DOWN switch.
- Defective CNK BOARD

7. Primary Slit Doesn't Move

- Blowout of BEAM MOTOR BOARD fuse F1 (3A)
- Defective BEAM MOTOR BOARD
- Defective motor
- Blowout of MAIN CPU BOARD fuse F3 (3.15A)
- Defective MAIN CPU BOARD

8. Head Doesn't Rotate

- Blowout of BEAM MOTOR BOARD fuse F1 (3A)
- Defective BEAM MOTOR BOARD
- Defective motor
- Blowout of MAIN CPU BOARD fuse F2 (3.15A)
- Defective MAIN CPU BOARD

9. Unable to Irradiate X-rays

- Check if Motor CPU Board D16 and Main CPU Board D36 light in Ready on.
- Check which red LED on INV Board lights

Error content

DL1: LV Lights when output voltage drops abnormally such as output short-circuit.

DL2: OV Lights when output voltage rises abnormally

DL3: OC Lights when output current rises abnormally.

DL4: TH Lights when INV BOARD temperature rises abnormally

Response

DL1: Check the wiring from INV BOARD to head
Check the input voltage between 1 and 2 pins of CN1 when READY ON. 120Vac

DL2, DL3: Check between MAIN CPU BOARD check pins CP11 and CP5 (kV),
CP14 and CP5 (PREHEAT), and CP15 and CP5 (mA).

DL4: Turn off power and recheck 30 minutes later.

Table 1: Voltage between kV ref CP11 and CP5

| | 60kV | 70kV | 80kV | 90kV |
|------|------|------|------|------|
| 2mA | 2.82 | 3.27 | 3.71 | 4.14 |
| 4mA | 2.88 | 3.34 | 3.78 | 4.21 |
| 6mA | 2.94 | 3.39 | 3.84 | 4.31 |
| 8mA | 3.00 | 3.45 | 3.91 | 4.40 |
| 10mA | 3.11 | 3.53 | 4.00 | 4.50 |
| 12mA | 3.19 | 3.63 | 4.09 | 4.60 |

Table 2: Voltage between mA ref CP15 and CP5 (Tube voltage is optional)

| Tube Current | CP15-CPCG |
|--------------|-----------|
| 2mA | 1V |
| 4mA | 2V |
| 6mA | 3V |
| 8mA | 4V |
| 10mA | 5V |
| 12mA | 6V |

08. Treatment of Error Message

When errors occur, error messages will display on operation panel for adjustment.

Take proper treatment for the indication.

1. SENSOR UNIT ERROR

- 1) Sensor is not installed in the proper place
Install sensor in the proper place

2. 1COL MT: First Collimator Motor Operation Error

- 1) Abnormality of first collimator detection sensor
Adjust the sensor position or replace the sensor
- 2) Blowout of BEAM MOTOR BOARD F1 (3A)
Replace the fuse or BEAM MOTOR BOARD
- 3) Defective motor
Replace the motor
- 4) Blowout of MAIN CPU BOARD fuse F3 (3.15A)
Replace the fuse.
Replace MAIN CPU BOARD.

3. HEAD MT: Head Rotation Motor Operation Error HEAD

- 1) Abnormality of head rotation motor detection sensor

Adjust the sensor position or replace the sensor.
- 2) Blowout of BEAM MOTOR BOARD F1 (3A)
Replace the fuse or BEAM MOTOR BOARD
- 3) Defective motor
Replace the motor.
- 4) Blowout of MAIN CPU BOARD F3 (3.15A)
Replace the fuse.
Replace MAIN CPU BOARD.

4. INVERTER: Inverter Error

- 1) Check if MOTOR CPU BOARD D16 and MAIN CPU BOARD D36 light when READY ON.
 1. When D16 doesn't light
 - Breaking of electric wire of rotary shaft
 - Defective MOTOR CPU BOARD
 - Defective MAIN CPU BOARD
 2. When D36 doesn't light
 - Breaking of electric wire of rotary shaft
 - Defective MAIN CPU BOARD
 - Defective MOTOR CPU BOARD
 3. When D16 and D36 light
 - Defective K-L1
 - Defective MOTOR CPU BOARD

2) Check which red LED of INV BOARD lights.

Error contents

DL1: LV Lights when output voltage drops abnormally such as output short-circuit.

DL2: OV Lights when output voltage rises abnormally

DL3: OC Lights when output current rises abnormally.

DL4: TH Lights when INV BOARD temperature rises abnormally.

Response

DL1: Check the wiring from INV BOARD to head

Check the input voltage between 1 and 2 pins of CN1 when READY ON. 120Vac

When the voltage is lower than 120Vac

Breaking of electric wire of rotary shaft

Defective K-L1

DL2, DL3: Check between MAIN CPU BOARD check pins CP11 and CP5 (kV), CP14 and CP5 (PREHEAT), and CP15 and CP5 (mA).

DL4: Turn off power and recheck 30 minutes later.

Table 1. Voltage between kV ref CP11 and CP5

| | 60kV | 70Kv | 80kV | 90Kv |
|------|------|------|------|------|
| 2mA | 2.82 | 3.27 | 3.71 | 4.14 |
| 4mA | 2.88 | 3.34 | 3.78 | 4.21 |
| 6mA | 2.94 | 3.39 | 3.84 | 4.31 |
| 8mA | 3.00 | 3.45 | 3.91 | 4.40 |
| 10mA | 3.11 | 3.53 | 4.00 | 4.50 |
| 12mA | 3.19 | 3.63 | 4.09 | 4.60 |

Table 2 Voltage between mA ref CP15 and CP5 (Tube voltage is optional)

| Tube Current | CP15-CPCG |
|--------------|-----------|
| 2mA | 1V |
| 4mA | 2V |
| 6mA | 3V |
| 8mA | 4V |
| 10mA | 5V |
| 12mA | 6V |

5. THERMAL: Tube Temperature Error

- 1) As the head temperature is abnormally high, leave the equipment for 30 minutes or more before taking next radiograph.

6. RS CPU: Communication Error with MOTOR CPU BOARD

- 1) Check the continuity of rotary shaft harness.

In case of breaking, replace the harness, use spare wire as a temporary measure.

In the case where the continuity exists, replace MOTOR CPU BOARD or MAIN CPU BOARD.

7. Y MT: Y-axis Motor Operation Error

- 1) Abnormality of Y-axis detection sensor
Adjust the sensor position or replace the sensor.
- 2) Blowout of MOTOR CPU BOARD F2 (3.15A)
Replace the fuse or MOTOR CPU BOARD
- 3) Defective motor driver
Replace the motor driver.
- 4) Defective motor
Replace the motor.

8. ROT MT: Rotation Motor Operation Error

- 1) Abnormality of rotation detection sensor
Adjust the sensor position or replace the sensor.
- 2) Blowout of MOTOR CPU BOARD F3 (3.15A)
Replace the fuse or MOTOR CPU BOARD.
- 3) Defective motor driver
Replace the motor driver.
- 4) Defective motor
Replace the motor.

9. BEAM MT: Indicator Operation Error

When indicator (beam operation portion) is operating

- 1) Replace the sensor.

When indicator (beam operation portion) is not operating

- 1) Replace the motor.
- 2) Replace MOTOR CPU BOARD.

10. UNIT MT: Planetary Portion Operation Error

1) When operating Beam Line Operation Panel

- Defective sliding unit elevation motor driver

Remove the top cover, turn on power and check the blinking interval of driver's

LED.

After eliminating the cause, turn on power again.

- ◆ Overload protection function (Number of LED blinks: 2 times)
 1. Eliminate causes that hinder the elevation motion (obstacle, overload)
 2. Check if pressing operation button makes a sound of brake.
When it makes no sound, replace BRAKE BOARD.
 3. Replace the driver
- ◆ Open-phase protection function (Number of LED blinks: 3 times)
 1. Replace sliding unit elevation motor.
 2. Replace the driver.
- ◆ Over voltage protection function (Number of LED blinks: 4 times)
Under voltage protection function (Number of LED blinks: 5 times)
 1. Check if the voltage between MOTOR CPU BOARD check pins CP1 and CP2 is 24Vdc.

2. Replace the driver.

◆ Overspend protection function (Number of LED blinks: 6 times)

1. Defective MOTOR CPU BOARD

Check that output voltage of CP8 varies while pressing UP/DOWN switch.

If it does not vary, replace the board.

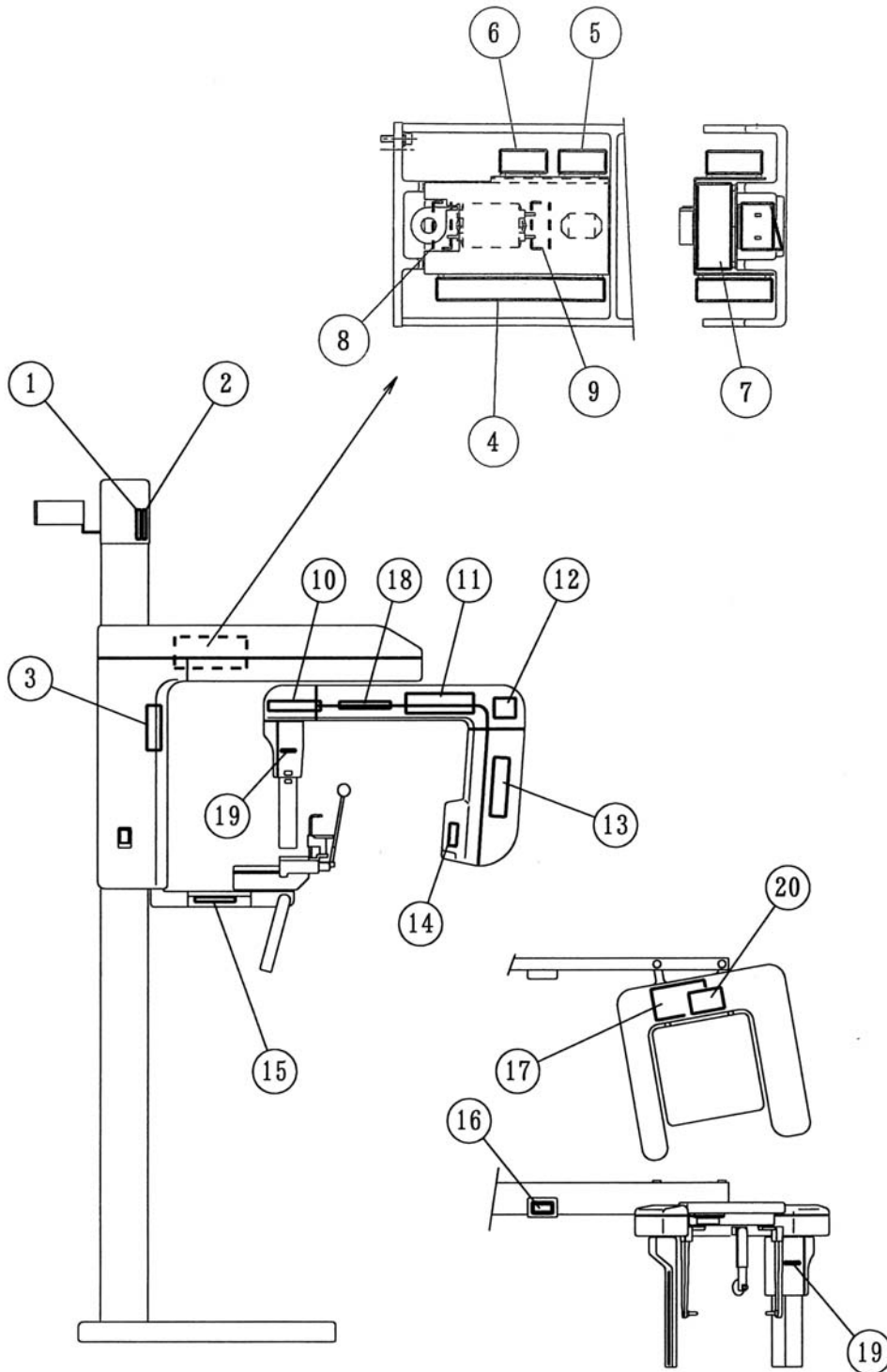
2)When operating CM switch

- Defective CM SW BOARD (when pressing switch makes no sound)
 - Defective sliding unit elevation motor driver
 - Remove the top cover, turn on power and check the blinking interval of driver's LED.
After eliminating the cause, turn on power again.
- Defective MOTOR CPU BOARD
- Check that output voltage of CP8 varies while pressing UP/DOWN switch.
- Defective CNK BOARD

09. PRINTED CIRCUIT BOARD LAYOUT DRAWING

1. Overall View

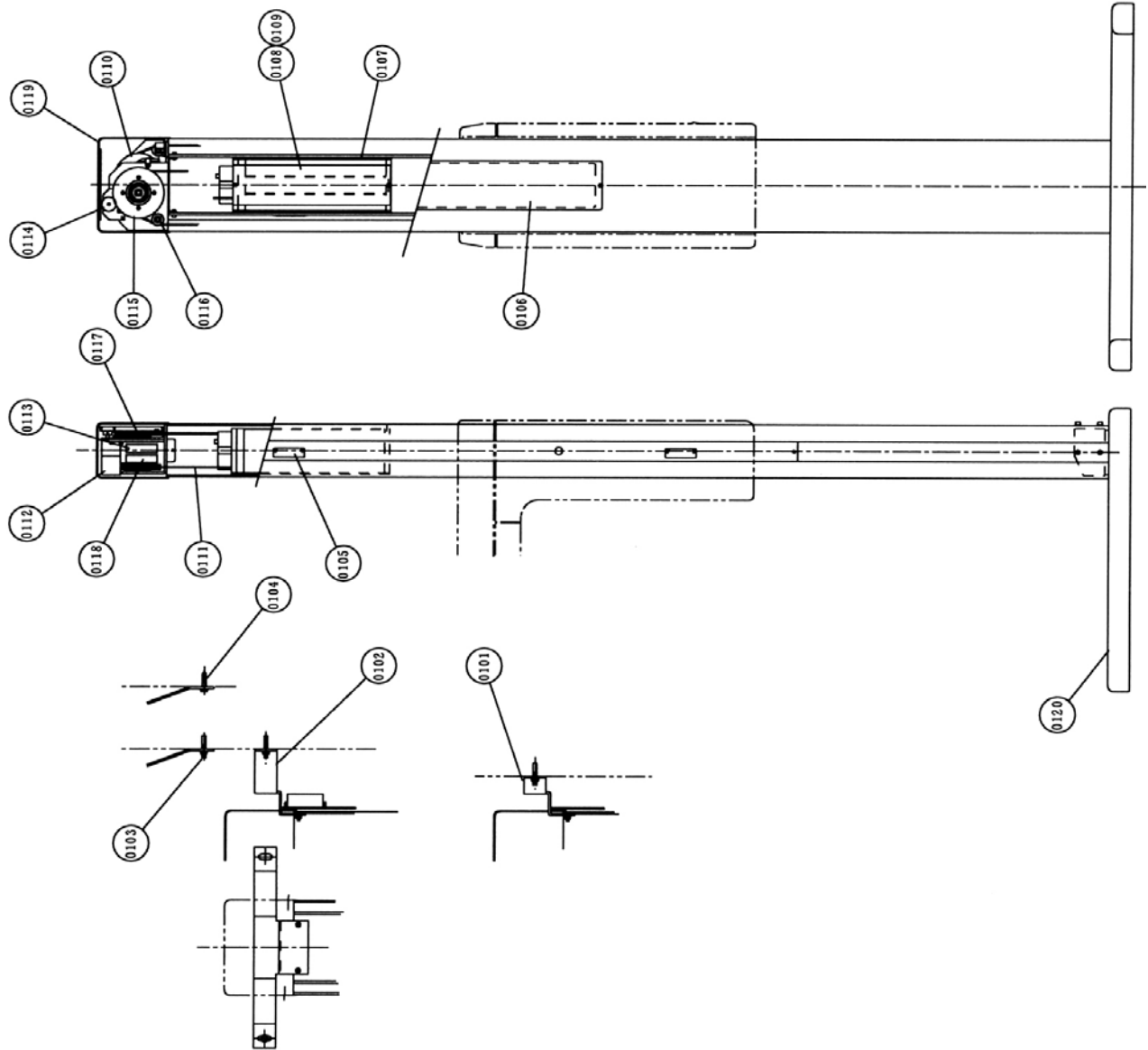
The printed circuit board assemblies are housed in the portions shown in the drawing.



| No. | Board Name |
|-----|--------------------------------------|
| 1 | DC brushless motor driver |
| 2 | Brake board |
| 3 | CNK board |
| 4 | Motor CPU Board |
| 5 | Rotation motor driver |
| 6 | Y-axis motor driver |
| 7 | Switching power supply |
| 8 | NF1 board |
| 9 | NF2 board |
| 10 | Film motor driver |
| 11 | High frequency inverter power supply |
| 12 | Head swing motor driver |
| 13 | High-voltage generator board |
| 14 | Collimator motor board |
| 15 | Main CPU board |
| 16 | LCD indicator |
| 17 | Switch board |
| 18 | Beam switch board |
| 19 | Vertical motion switch board |

10. Parts List

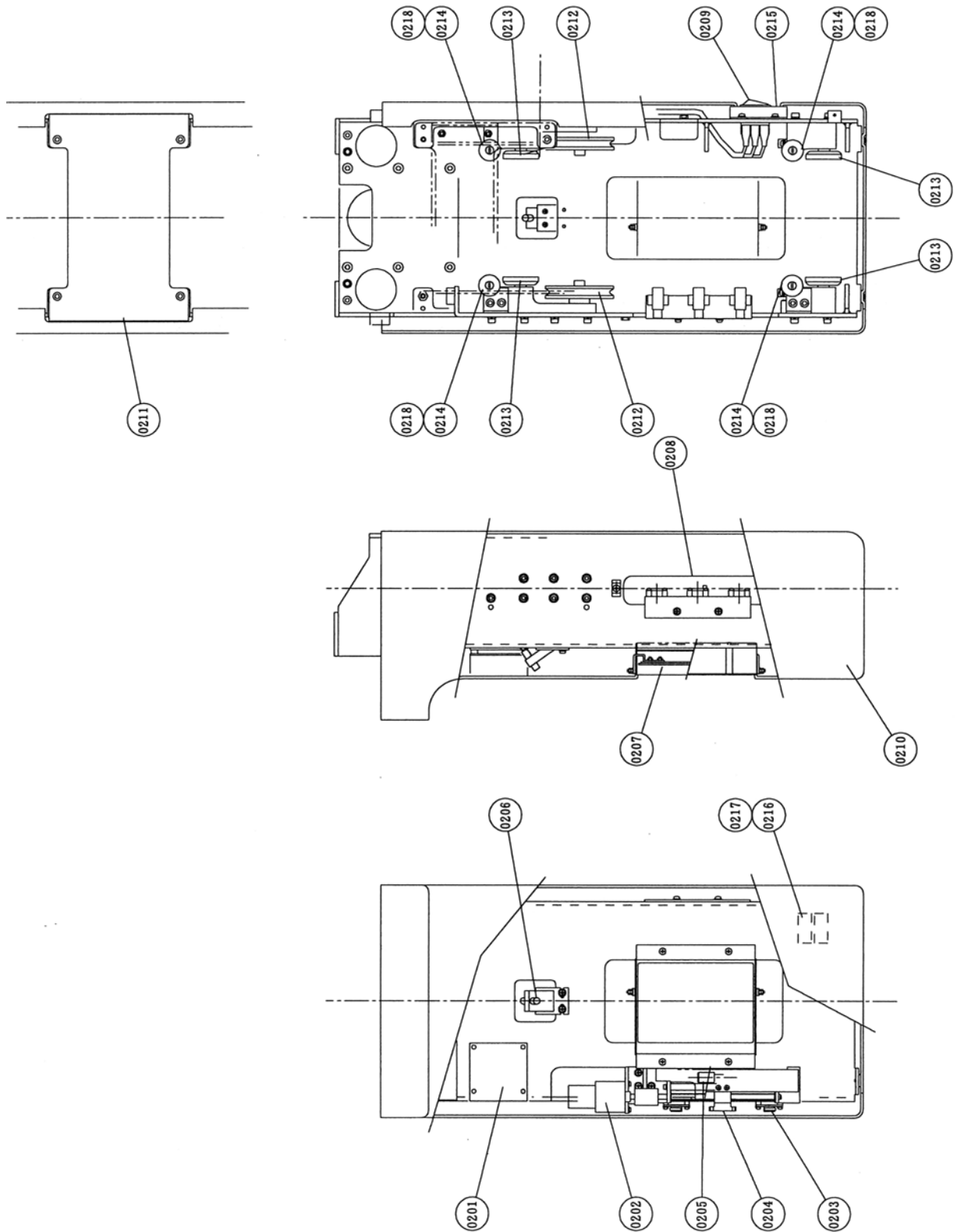
1. Stand



PART LIST: Stand

| No | Drwing No | Part Name | Qty. | | Remarks |
|------|--------------|------------------------------|---------|------------|---------------------|
| | | | Hyper-X | Hyper-X CM | |
| 0101 | 408-10311 | Bracket for securing to wall | 1 | - | For Hyper-X only |
| 0102 | 408-10312 | Bracket for securing to wall | - | 1 | For Hyper-X CM only |
| 0103 | — | High anchor Ø8'50 | 2 | 2 | Alternative |
| 0104 | — | Coach bolt C8-50 | 2 | 2 | |
| 0105 | 408-10304 | Visor | 2 | 2 | |
| 0106 | 408-10305 | Stand rear cover | 1 | 1 | |
| 0107 | 308-03621 | Weight frame | 1 | 1 | |
| 0108 | 408-10398 | Weight (A) | 2 | 3 | Silver |
| 0109 | 408-10399 | Weight (B) | 1 | - | Black |
| 0110 | 408-10326 | Brake | 1 | 1 | |
| 0111 | 408-10307 | Wire | 1 | 1 | |
| 0112 | 977-79030-04 | Brushless motor AXH015K-20 | 1 | 1 | |
| 0113 | 977-79030-08 | Motor driver board | 1 | 1 | |
| 0114 | 408-10315 | Gear (Small) | 1 | 1 | |
| 0115 | 408-10314 | Gear (Large) | 1 | 1 | |
| 0116 | 408-10318 | Pulley (2) | 2 | 2 | |
| 0117 | 408-10313 | Pulley (1) | 2 | 2 | |
| 0118 | 408-10321 | Brake board | 1 | 1 | |
| 0119 | 408-09036-02 | Stand top cover | 1 | 1 | |
| 0120 | 208-01776-03 | Stand bottom cover | 1 | 1 | |

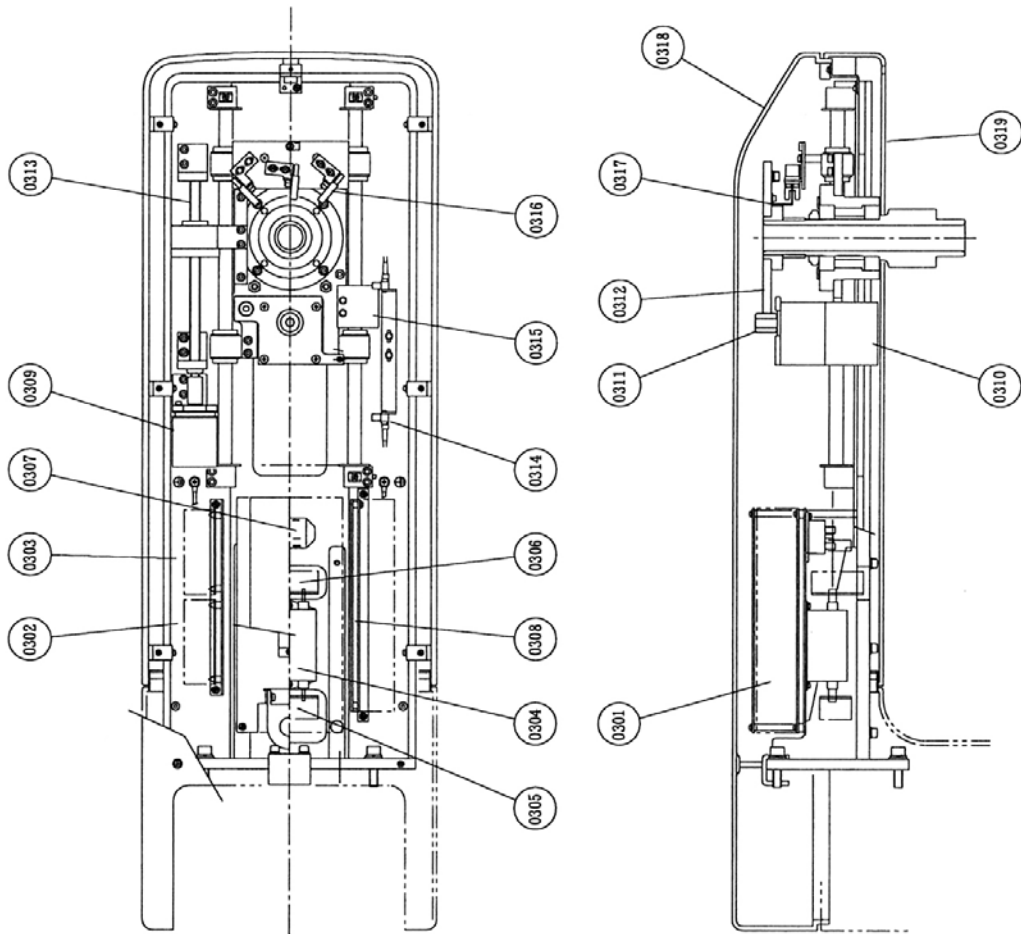
2. Sliding Unit



PART LIST: Sliding Unit

| No | Drwing No | Part Name | Qty. | | Remarks |
|------|--------------|----------------------------------|---------|------------|-------------------|
| | | | Hyper-X | Hyper-X CM | |
| 0201 | 408-10156 | CNK board | 1 | 1 | |
| 0202 | 977-60001-07 | DC motor TG-38E-LG66 | 1 | 1 | |
| 0203 | 964-30012-13 | Microswitch ABJ241441 | 2 | 2 | |
| 0204 | 408-10296 | Dog | 1 | 1 | |
| 0205 | 962-05006 | Laser marking projector LDV167LS | 1 | 1 | Horizontal beam |
| 0206 | 962-05003 | Laser marking projector LDV167LA | 1 | 1 | Median beam |
| 0207 | 408-08591 | Mirror | 1 | 1 | |
| 0208 | 978-60007-02 | Photomicrosensor EE-SY671 | 3 | 3 | |
| 0209 | 964-28001-02 | POWER switch A8G-107-1G-24 | 1 | 1 | |
| 0210 | 108-01181 | Sliding unit cover | 1 | 1 | |
| 0211 | 408-10309 | Rear cover | 1 | - | |
| 0212 | 408-09751 | Pulley | 2 | 2 | |
| 0213 | 408-05331 | Shaft | 4 | 4 | Bundled with 0218 |
| 0214 | 408-09751 | Roller (2) | 4 | 4 | |
| 0215 | 408-10253 | Membrane sheet | 1 | 1 | |
| 0216 | 965-85012-69 | Circuit protector 15A | 2 | 2 | For 100V-spec. |
| 0217 | 965-85012-67 | Circuit protector 8A | 2 | 2 | For 200V-spec. |
| 0218 | 030-03000-01 | Bearing 6000ZZ | 4 | 4 | Bundled with 0213 |

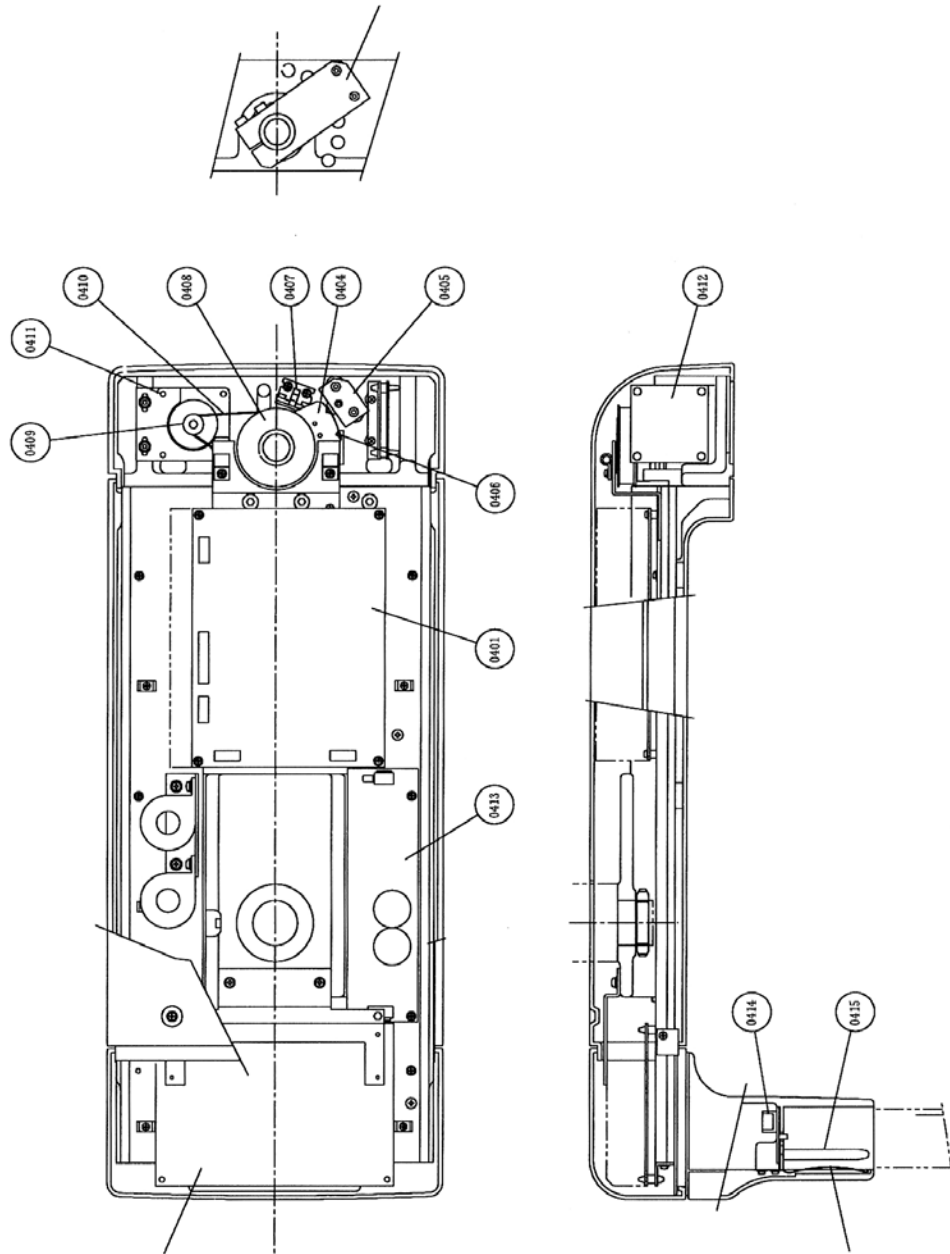
3. Rotation Unit



PART LIST:Rotation Unit

| No | Drawing No | Part Name | Q ty. | | Remarks |
|------|--------------|------------------------------------|---------|------------|----------|
| | | | Hyper-X | Hyper-X CM | |
| 0301 | 974-80057 | Switching power supply AWM-1C150S- | 1 | 1 | |
| 0302 | 408-09935-02 | Motor driver board | 1 | 1 | Y-AXIS |
| 0303 | 408-09935-03 | Motor driver board | 1 | 1 | ROTATION |
| 0304 | 975-00003-03 | Noise filter GT-215FJ | 1 | 1 | |
| 0305 | 408-08757-00 | NF(1) board | 1 | 1 | |
| 0306 | 408-08758 | NF(2) board | 1 | 1 | |
| 0307 | 965-60041-17 | Relay JM1aN-ZTM-DC24V | 2 | 2 | |
| 0308 | 408-10151 | Motor CPU board | 1 | 1 | |
| 0309 | 977-79021-02 | Stepping motor PK543-NA | 1 | 1 | Y-AXIS |
| 0310 | 977-79024-03 | Stepping motor PK564AN-TG20 | 1 | 1 | ROTATION |
| 0311 | 408-10340 | Gear (Small) | 1 | 1 | |
| 0312 | 308-02560 | Gear (Large) | 1 | 1 | |
| 0313 | 408-09682 | Ball screw | 1 | 1 | |
| 0314 | 978-60004-04 | Photomicrosensor EE-SX671 | 2 | 2 | Y-AXIS |
| 0315 | 408-10345 | Sensor fin (Y) | 1 | 1 | Y-AXIS |
| 0316 | 978-60004-10 | Photomicrosensor EE-SX673 | 1 | 2 | ROTATION |
| 0317 | 408-10343 | Sensor fin (R) | 1 | 1 | ROTATION |
| 0318 | 108-01182 | Rotation unit cover (Top) | 1 | 1 | |
| 0319 | 108-01183 | Rotation unit cover (Bottom) | 1 | 1 | |

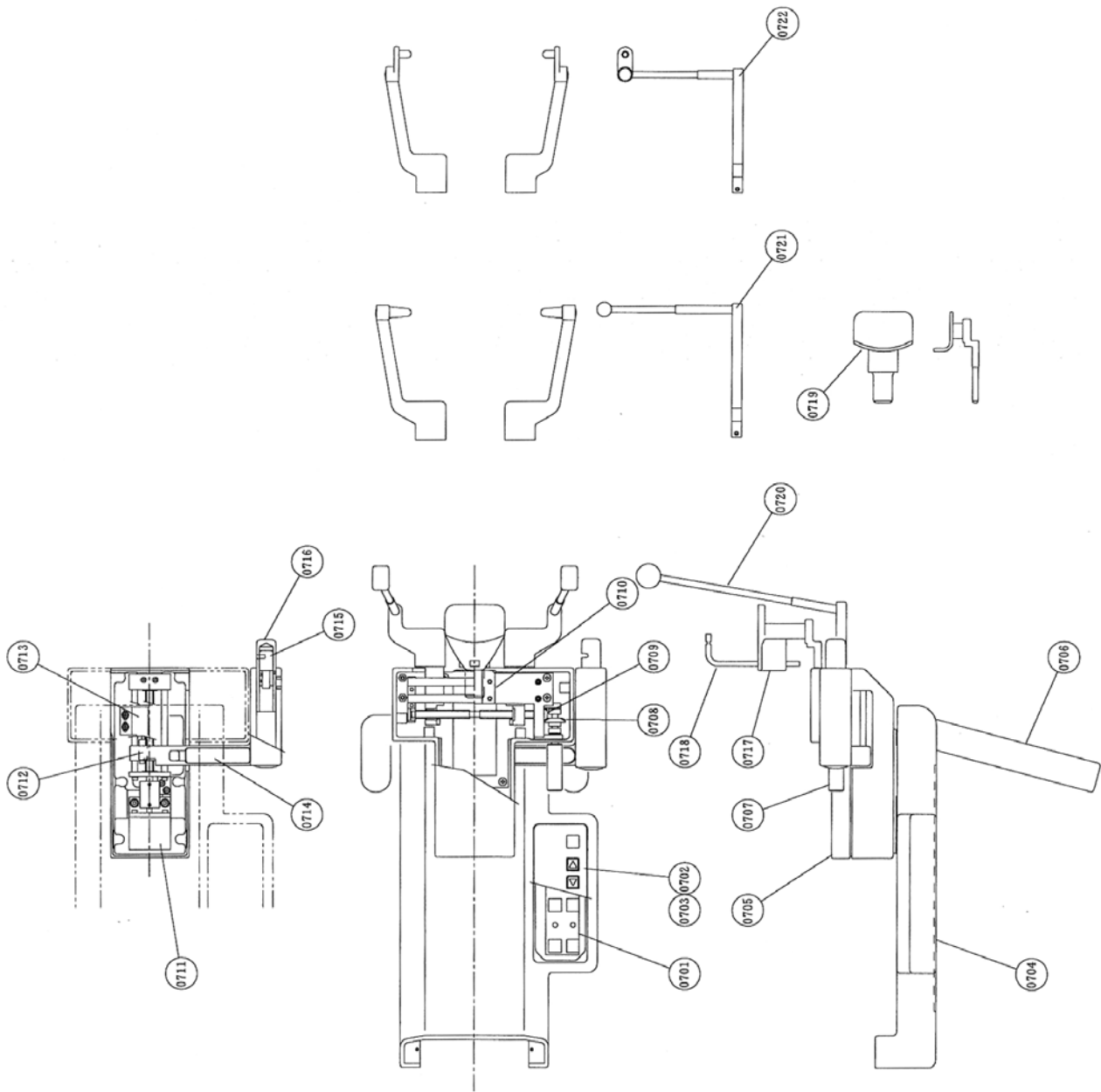
4. Arm



PART LIST:Am

| No | Drawing No | Part Name | Qty. | | Remarks |
|------|--------------|--------------------------------------|---------|------------|---------------------|
| | | | Hyper-X | Hyper-X CM | |
| 0401 | 974-10056-01 | High-frequency inverter power supply | 1 | 1 | |
| 0402 | 408-10145 | MAIN CPU BOARD | 1 | 1 | |
| 0403 | 408-10423 | Stationary plate | 1 | - | For Hyper-X only |
| 0404 | 408-10416 | Angle plate | - | 1 | For Hyper-X CM only |
| 0405 | 937-50022-04 | Plunger PBF-10-KSN | - | 1 | For Hyper-X CM only |
| 0406 | 408-10419 | Sensor fin | - | 1 | For Hyper-X CM only |
| 0407 | 978-60004-07 | Photomicrosensor EE-SX672 | - | 2 | For Hyper-X CM only |
| 0408 | 408-10415 | Pulley (Large) | - | 1 | For Hyper-X CM only |
| 0409 | 408-10414 | Pulley (Small) | - | 1 | For Hyper-X CM only |
| 0410 | 932-21005-18 | Timing belt B 100 S 3M 252 | - | 1 | For Hyper-X CM only |
| 0411 | 977-79031-05 | Stepping motor PK266M-02A | - | 1 | For Hyper-X CM only |
| 0412 | 408-07586-00 | Motor driver board | - | 1 | For Hyper-X CM only |
| 0413 | 974-80058-07 | Switching power supply LDA500 | 1 | 1 | |
| 0414 | 408-10450 | CNP BOARD | 1 | 1 | |
| 0415 | 408-10483 | Shaft | 1 | 1 | |
| 0416 | 408-10486 | Plate spring | 1 | 1 | |

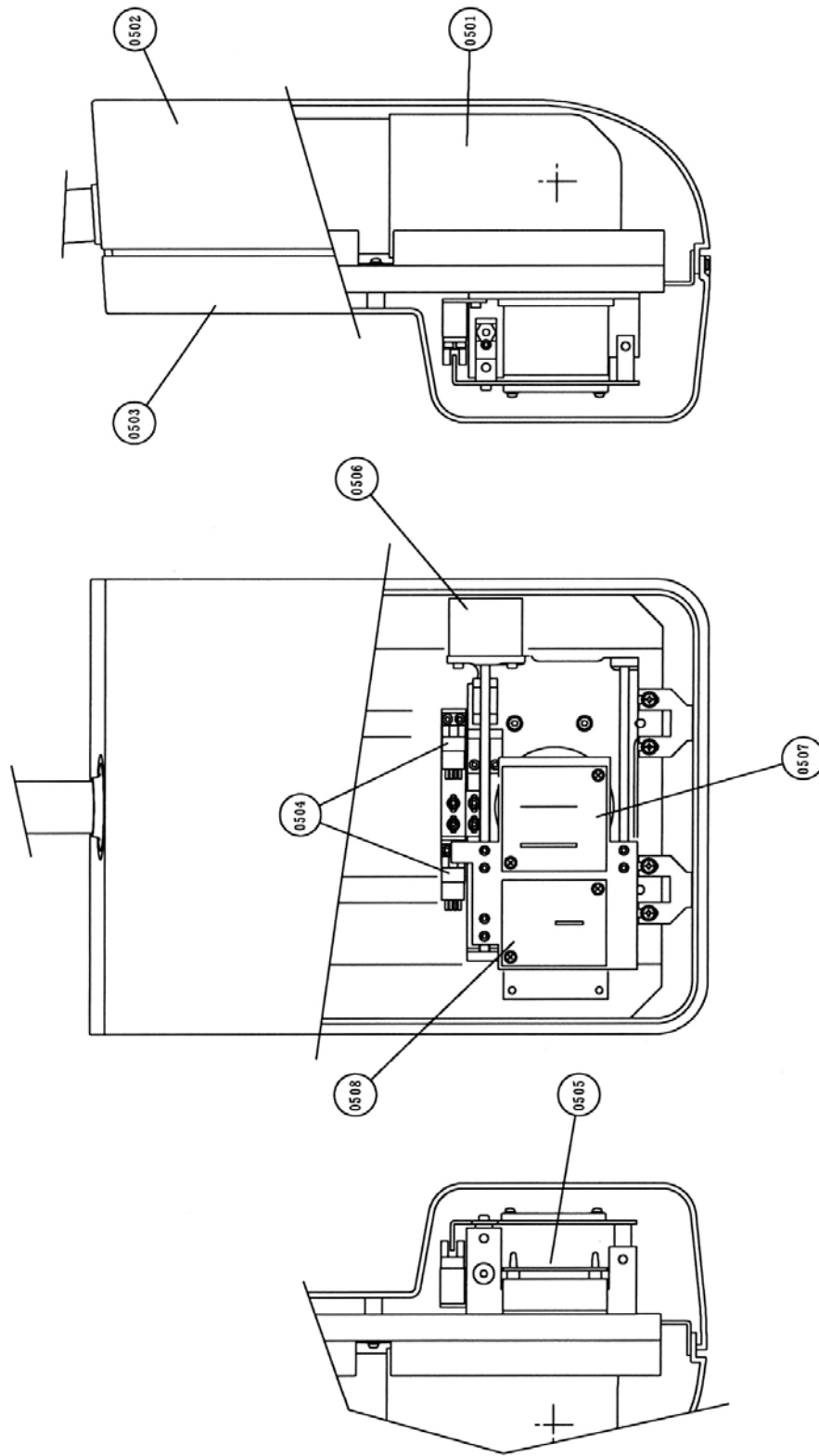
4. Chinrest Unit



PART LIST: Chinrest Unit

| No | Drawing No | Part Name | Qty. | Remarks |
|------|------------------|--------------------------|-----------------------|-----------|
| | | | Hyper-X Hyper-X CM | |
| 0701 | 408-10152 | Switch board | 1 | |
| 0702 | 408-10379 | Frame | 1 | |
| 0703 | 408-10331 | Membrane sheet | 1 | |
| 0704 | 408-10381 | Bottom cover | 1 | |
| 0705 | 108-01188 | Holding portion cover | 1 | |
| 0706 | 408-10380 | Handle | 2 | |
| 0707 | 408-06071 | Knob | 1 | |
| 0708 | 408-06081 | Gear (Large) | 1 | |
| 0709 | 408-06082 | Gear (Small) | 1 | |
| 0710 | 408-10396 | Holder guide | 1 | |
| 0711 | 977-79010-05 | Stepping motor | 1 | PX243-03A |
| 0712 | 978-60011 | Proximity sensor | 1 | APS4-12S |
| 0713 | 408-10387 | Sensor fin | 1 | |
| 0714 | 408-10388 | Lid | 1 | |
| 0715 | 962-05006 | Laser marking projector | 1 | LDV167LS |
| 0716 | 408-09316 | Beam projector mount | 1 | |
| 0717 | 308-02261 | Rest for bite | 1 | |
| 0718 | 408-05861 | Bite fork | 1 | |
| 0719 | 408-05083-02 | Rest for maxillary sinus | 1 | |
| 0720 | 308-03599-01/-02 | Head holding rod | 1set | |
| 0721 | 308-03600-01/-02 | Ear rod for TMJ lateral | 1set | |
| 0722 | 308-03601-01/02 | Ear rod for TMJ frontal | 1set | |

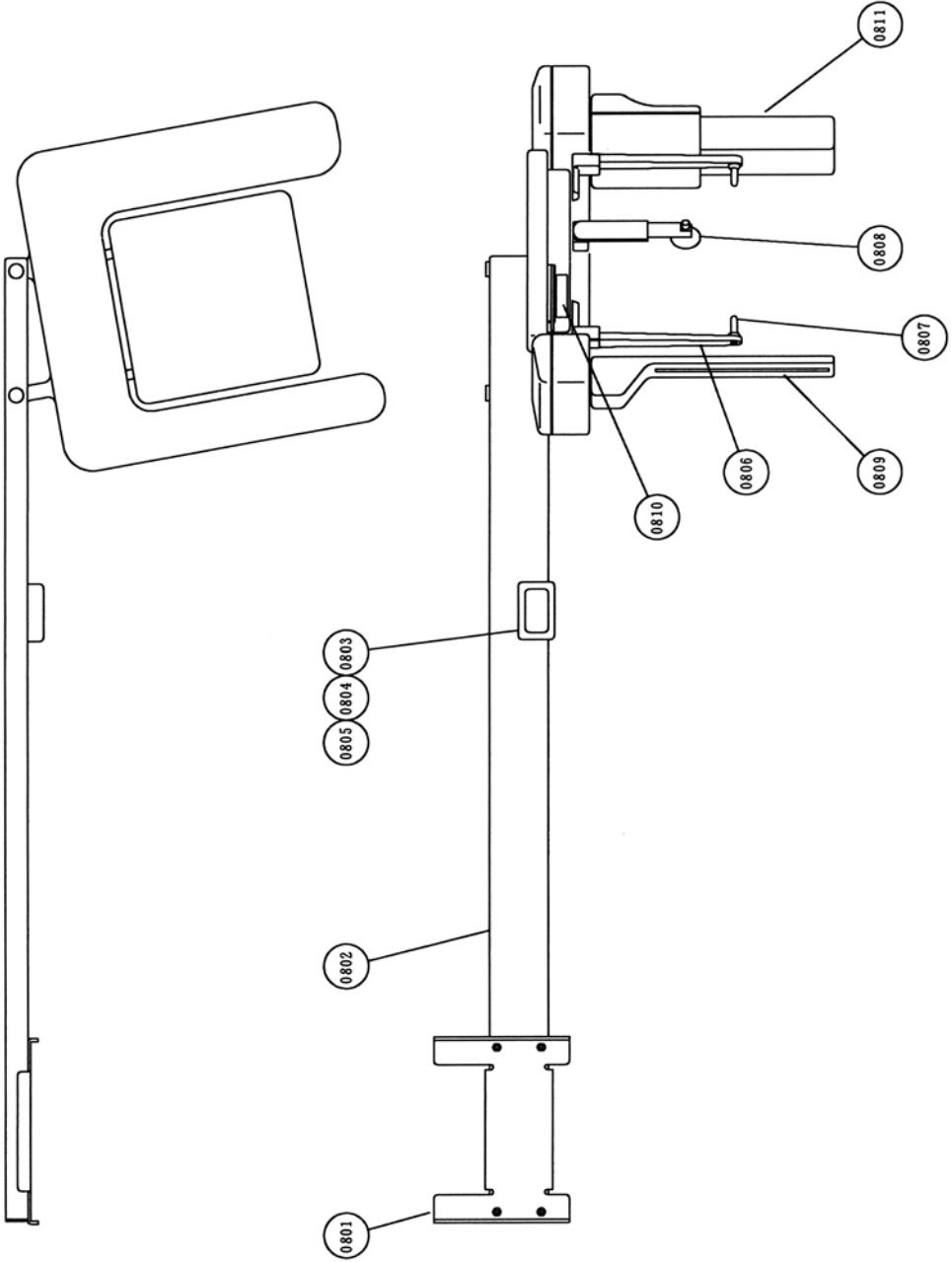
6. Head



PART LIST:Head

| No | Drawing No | Part Name | Qty. | | | Remarks |
|------|---------------|-------------------------|---------|------------|------------|------------|
| | | | | CM (R) | CM (L) | |
| | | | Hyper-x | Hyper-X CM | Hyper-X CM | |
| 0501 | 108-01177 | X-ray generator Assy | 1 | 1 | 1 | |
| 0502 | 108-01179 | Generator cover (Rear) | 1 | 1 | 1 | |
| 0503 | 108-01178-01 | Generator cover (Front) | 1 | 1 | 1 | |
| 0504 | 978-600004-13 | Photomicrosensor | 1 | 2 | 2 | |
| 0505 | 408-07586-02 | Motor driver board | 1 | 1 | 1 | |
| 0506 | 977-79010-05 | Stepping motor | 1 | 1 | 1 | |
| 0507 | 408-10478 | Mask (Panorama) | 1 | 1 | 1 | |
| 0508 | 408-10479 | Mask (Cephalo) | - | 1 | 1 | Hyper-X CM |

7. Cephalometric Radiography Unit



PART LIST: Cephalometric Radiography Unit

| No | Drawing No | Part Name | Q ty. | | Remarks |
|------|--------------|--------------------------|------------|------------|---------|
| | | | CM (R) | CM (L) | |
| | | | hyper-X CM | hyper-X CM | |
| 0801 | 408-10243 | Mounting plate | 1 | 1 | |
| 0802 | 308-03624-01 | Arm | 1 | 1 | |
| 0803 | 308-030652 | Case | 1 | 1 | |
| 0804 | 408-10246 | Membrane sheet | 1 | 1 | |
| 0805 | 408-1062 | CM SW BOARD | 1 | 1 | |
| 0806 | 408-05027 | Ear rod arm | 2 | 2 | |
| 0807 | 408-05028 | Ear rod | 2 | 2 | |
| 0808 | 308-03627 | Forehead Holding Rod (2) | 1 | 1 | |
| 0809 | 308-03626 | Second slit | 1 | 1 | |
| 0810 | 408-02531-03 | Label | 1 | 1 | |
| 0811 | 988-50054 | CCD sensor | 1 | 1 | |

1 1 . CONTACT

Please contact our sales office or a distributor near you.

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1 2. MAINTENANCE CHECK

WARNING

High voltage is applied to some parts inside the equipment. Take extra care when removing the case of equipment.

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 Place | 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. | ● |
| | Light for positioning | Check the brightness and position 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. |