

Confidential

CXDI-40G COMPACT

Service Manual

Manual Control No.	: BY8-2287-0E2
Name of Product	: CXDI-40G COMPACT
Distribution Control No.	
Issued on	

Service Manual Introduction

This service manual belongs to a series of after-service guides Canon Inc. publishes as part of its comprehensive product quality guarantee program.

This service manual consists of nine chapters; “General”, “Installation Manual”, “Functions”, “Repair Guide”, “Parts Catalog”, “Troubleshooting”, “Service Manual Report”, “Tools” and “Appendix”. It describes an overview of the product, its functions, product configuration, installation procedures, dimensions, specifications, and notes.

If the product undergoes a large modification, a revised edition of the service manual will be sent to you. In other cases, a service manual report will be sent to you to update the manual.

Note 1:

This service manual is published by Canon Inc. in accordance with Article 6 (Furnishing the Referring Materials) of the Service Assignment Contract it has concluded with your company.

Note 2:

This service manual is the property of Canon Inc. and the company may seek to have it returned, depending on the circumstances. You are expected to keep it until then.

Note 3:

You inquiries, suggestions, etc. about the contents of this service manual should be addressed to:

Medical Products Technical Service Dept.
 Canon Inc. Headquarters
 30-2, Shimomaruko 3-chome, Ohta-ku, Tokyo 146-8501, Japan

Caution Regarding Service

This product was precisely assembled under strict manufacturing process control. There are several hazardous locations inside of this product. Careless work while the cover is removed can result in the pinching of fingers or electrical shock. Please perform the work with the following important points in mind:

1. Setup, Repair, and Maintenance

In order to ensure safety, the best performance, setup, repair, and maintenance work can only be performed by technicians who have received service training specified by Canon Inc. If there are order required certificates or restrictions specified by the law or ordinances, those regulations of the country must be observed.

2. Removing the external cover

When removing the cover during maintenance, repair, etc., perform the work after switching the power off. Never touch the device with wet hands, as there is a risk of electric shock.

3. Fuse

When replacing the fuse, first resolve the reason for its failure and then replace the fuse with the specified type. Never use a fuse other than the specified type.

4. Connecting the grounding wire

The provided ground wire must be connected to the ground terminal indoors. Make sure that the device is properly grounded.

5. Alternation prohibition

Never modify the medical device in any way.

6. Waste control

The service provider is responsible for the disposal of used service parts, packing material, etc. resulting from the setup, repair, or maintenance of the medical device. However, the customer is responsible for the disposal of the medical device. Disposal activities must follow the regulations (especially controlled industrial waste) of the country where the device is used.

VORSICHT

**Befolgen Sie die unten angegebenen Sicherheitsanweisungen.
Mißachtung kann zu Verletzungen oder Unfällen führen.**

1. Zerlegung, Zusammenbau, Einstellung und Wartung

Zerlegung, Zusammenbau, Einstellung und Wartung dürfen nur von einem Wartungstechniker durchgeführt werden, der an einem von Canon vorgeschriebenen Wartungslehrgang teilgenommen hat.

2. Entfernen von Abdeckungen

Schalten Sie unbedingt die Stromversorgung des Instruments aus, bevor Sie die Abdeckungen zwecks Wartung und Reparatur entfernen.

Vermeiden Sie auch eine Berührung des Instruments mit nassen Händen.

Anderenfalls können Sie einen elektrischen Schlag erleiden, der zum Tod oder schwerer Verletzung führen kann.

3. Sicherung

Wenn die Sicherung ausgewechselt werden muß, schalten Sie unbedingt die Stromversorgung des Instruments aus, und beheben Sie die Ursache für das Durchbrennen der Sicherung.

Ersetzen Sie die Sicherung nur durch den vorgeschriebenen Typ.

Anderenfalls kann es zu einem Brand oder elektrischen Schlag kommen.

4. Erdleiter

Erden Sie das Instrument unbedingt an einer Schukosteckdose.

Anderenfalls kann es zu einem Brand oder elektrischen Schlag durch Leckstrom kommen.

5. Umbau

Jeder Umbau des Produktes ist strengstens untersagt, da dies zu einem Brand oder elektrischen Schlag führen kann.

6. Bewegliche Teile

Dieses Instrument enthält bewegliche Teile.

Führen Sie während der Bewegung der Teile keine unachtsame Tätigkeit aus.

Anderenfalls können Sie verletzt werden.

7. Schnittstellenanschluß

Wenn andere Geräte über den Schnittstellenanschluß an das Instrument angeschlossen werden, prüfen Sie nach dem Anschluß, daß der Leckstrom innerhalb des zulässigen

Bereichs liegt.

8. Lithiumbatterie

Ersetzen Sie die Lithiumbatterie nur durch den vorgeschriebenen Typ.

Verbrauchte Batterien dürfen nicht ins Feuer geworfen und weder zerlegt noch geladen werden.

Entsorgen Sie verbrauchte Batterien umweltschonend gemäß den Gesetzen oder Vorschriften des Landes, in dem das Instrument benutzt wird.

Caution Regarding the Setup

According to “IEC60601-1-1:2000”, devices installed in the patient environment are restricted to “electric medical devices conforming to IEC60601-1”.

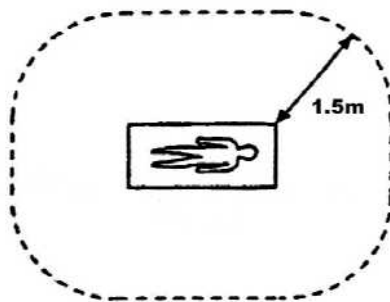
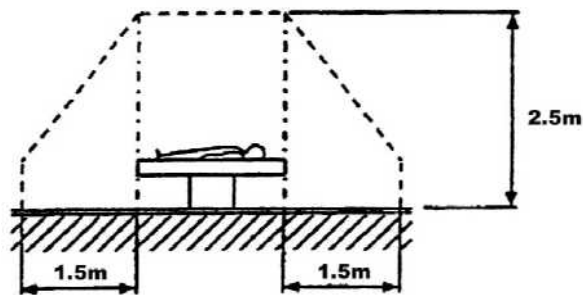
The Control PC and operation unit are classified under the data processing device standard (IEC60950), therefore these items should not be installed in the patient environment.

The patient environment described below is an example cited from “IEC60601-1-1:2000” – the measurements are only guidelines. However, the “IEC60601-1-1:2000” example must be treated as the standard.

Therefore, the Control PC and operation unit must be installed in a location further than the measurements below (outside of the patient environment).

***Areas where the patient moves (not only during imaging but when entering and leaving the room, etc.) are also considered as part of the patient environment, therefore the installation location should be determined upon consultation with the user regarding areas outside of the patient environment.**

Example of patient environment



IEC 2513/2000

Note: These measurements are only guidelines.

CXDI-40G COMPACT

1. General

CONTENTS

1.General	1
2. CXDI-1 System Block Diagram	2
2.1 Standard.....	2
2.2 Plural Connection.....	3
3. System Diagram	4
3.1 Stand-alone System	4
3.2 Total System (CXDI-40G Compact + Plural Connection)	5
4. CXDI Image Processing.....	6
4.1 Processing Flow	6
4.2 Image Types	7
5. Specifications	8

1. General

1.General

CXDI-40G COMPACT

CXDI-40G COMPACT is a large-size sensor unit (430 mm×430 mm) that can be easily installed to a Bucky unit, stand or table and it can be installed without modification to Bucky units compatible with the Liebel-Flarsheim Bucky unit. The CXDI-40G COMPACT also has the same functions as the CXDI-40EG (modifications to reading circuit) and supports Ethernet connections.

Please note that the CXDI-40G COMPACT cannot be used for the following purposes as it is not designed for.

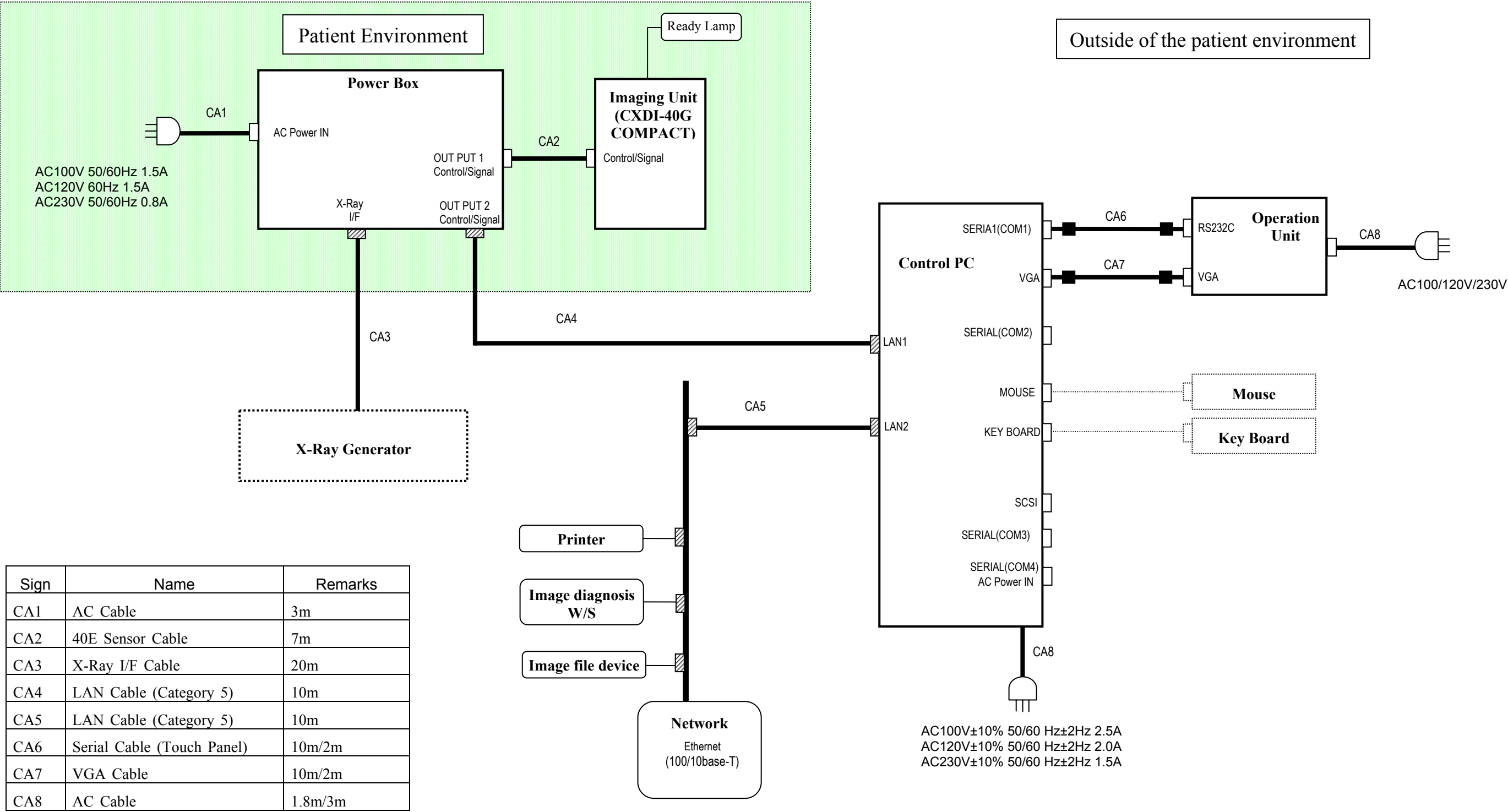
- Portable usage, being separated from Bucky unit, stand or table
- Installation in the vehicle
- Taking images with the sensor directly contacted with a patient.

CXDI System Software	Compatible with version 7.1 and later, or next-generation software
40G COMPACT imaging unit serial number	100001 and higher

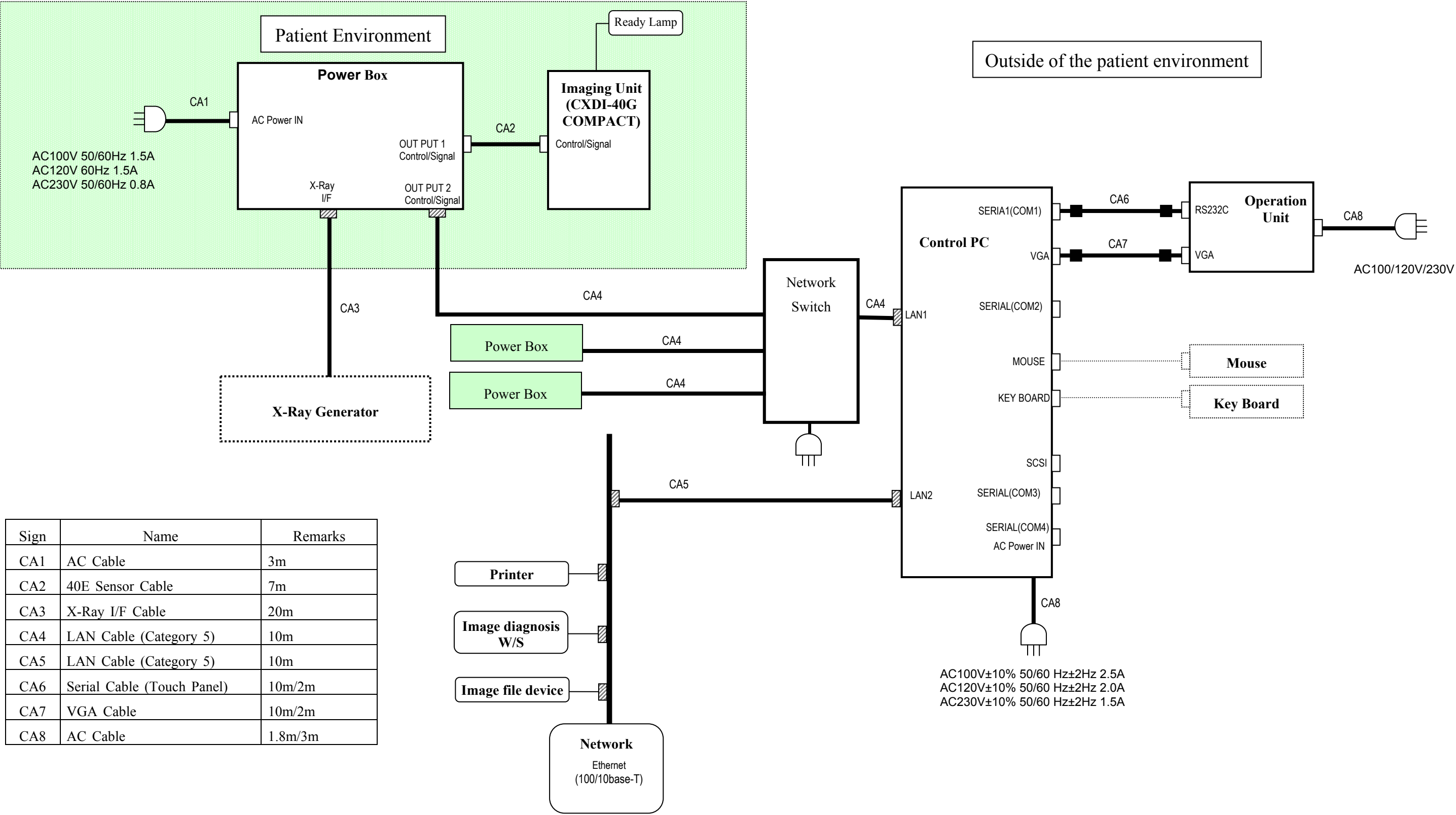
1. General

2. CXDI-1 System Block Diagram

2.1 Standard



2.2 Plural Connection

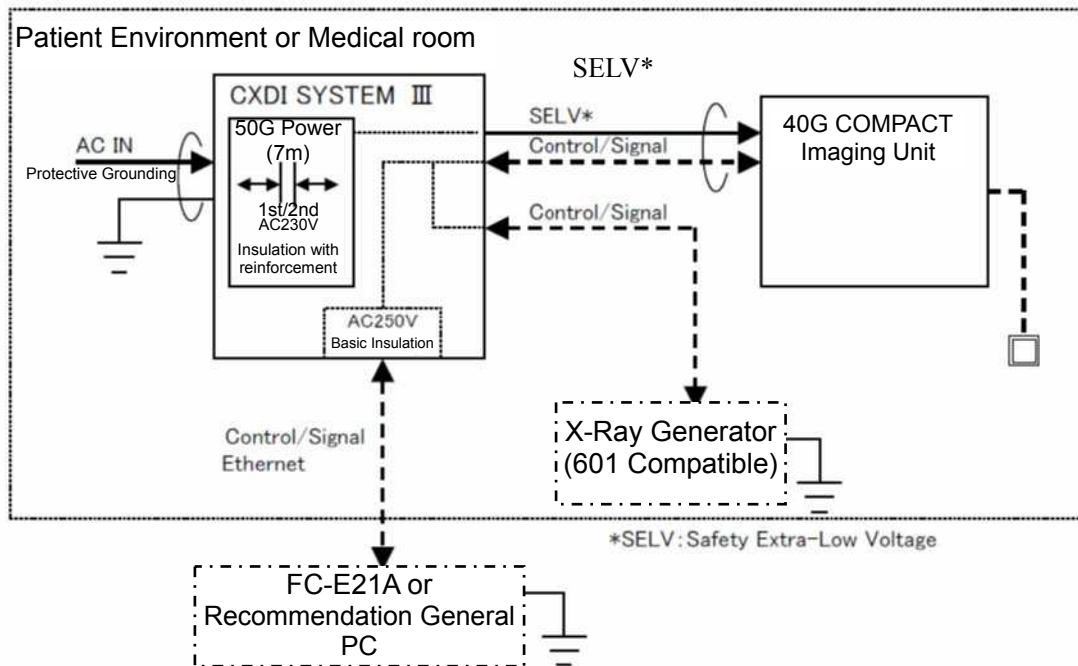


1. General

3. System Diagram

3.1 Stand-alone System

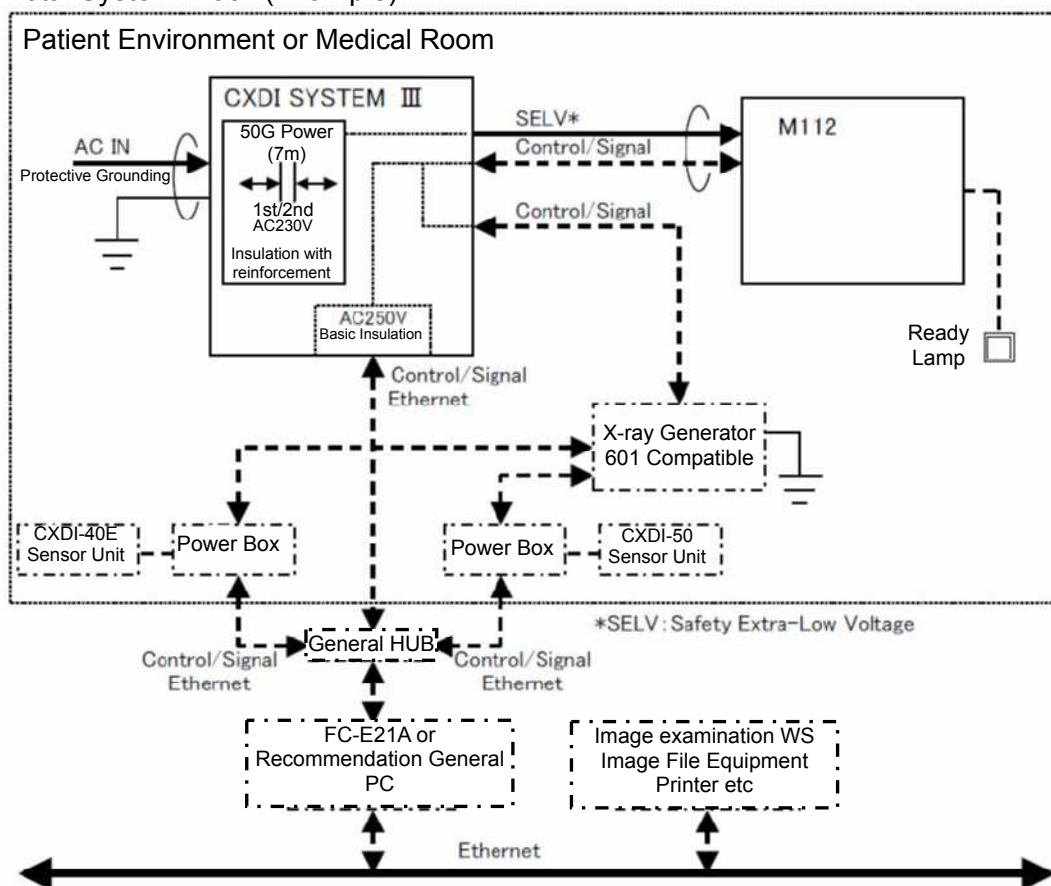
Stand Alone System Block Diagram (Example)



1. General

3.2 Total System (CXDI-40G COMPACT + Plural Connection (Other Imaging Unit))

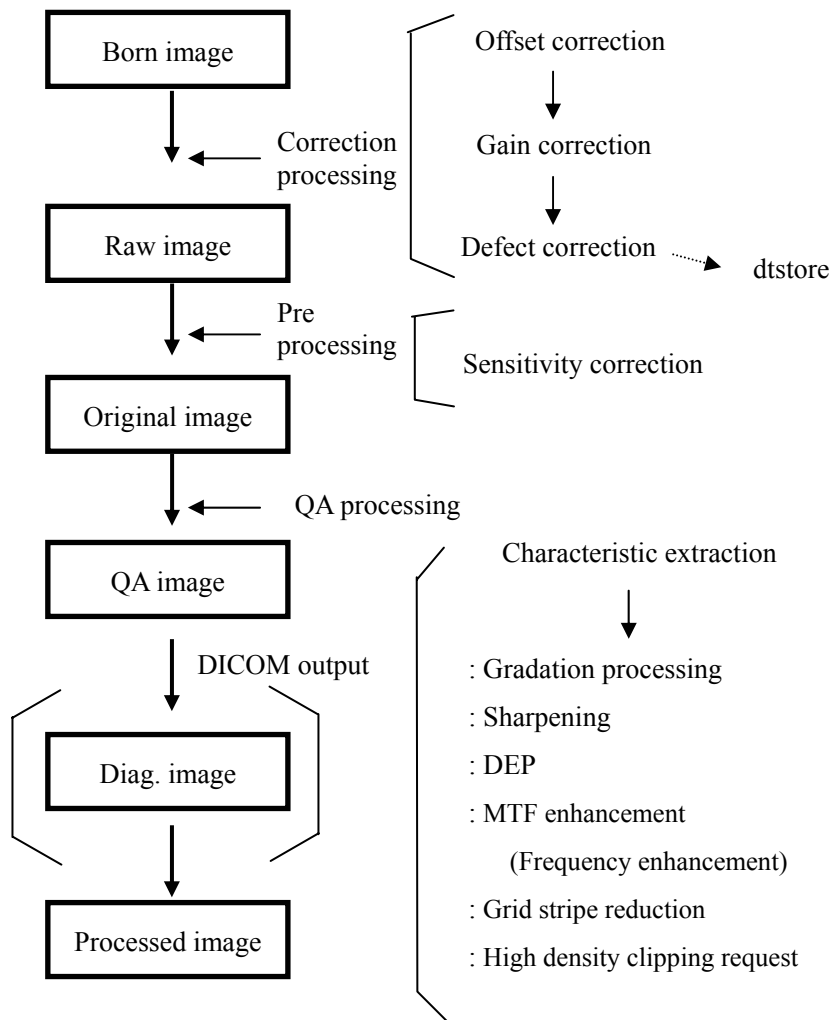
Total System Block (Example)



1. General

4. CXDI Image Processing

4.1 Processing Flow



1. General

4.2 Image Types

(1) Born image

The image obtained with LANMIT before any correction is made.

Outside distribution of these images is prohibited, including dtstore images.

(2) Raw image

Born image after offset processing, gain correction.

This is the image with LANMIT specific characteristics corrected.

(3) Original image

Raw image after preprocessing.

(4) QA image

Original image after gradation processing, sharpening, and other processing.

The CXDI performs image processing up to this point.

(5) Diagnosis image

QA image after further image processing necessary for diagnosis.

Image processed by the user for diagnostic purposes.

(6) Processing image

Diagnosis image after post-processing.

Image modified by the user or the default processed image.

1. General

5. Specifications

The CXDI-40G COMPACT has a secondary scanning drive unit, data reading unit, and A/D conversion unit on one side of the LANMIT, and it is a sensor unit that reads image data from one direction for a single panel.

The X-ray image is converted to photoelectric signals by the sensor unit, and the scanned electrical signals (image signals) undergo A/D conversion, pass through the power box, and are transferred to the control PC over an Ethernet cable.

Item	40G COMPACT	Remarks
Operational format	Upright stand, table, universal stand	Installation on a motor vehicle is not possible.
Effective exposure range	430 x 430 mm	
Total number of pixels	2706 x 2700 pixels	
Number of effective pixels	7.2 million (2688 x 2688 pixels)	
Pixel pitch	160 μ m x 160 μ m	
Fluorescent substance	GOS	LANMIT sensor
Sensor sensitivity	Same as CXDI-40EG	
Exposure time	0 ms to 1 sec., 1 to 3 sec.	
Output gradations	12 bits (4096 gradations), A/D 14 bits	
Transfer method	Ethernet between sensor unit and PC (via power box)	
Preview time	Approx. 3 sec	
Exposure cycle time	15 sec. (typ.)	
External dimensions (Sensor unit)	470(W)×548(L)×32(H) mm	Not including insulation sheet
External dimensions (Power box)	358(W)×212(L)×75(H) mm	
Color of sensor unit exterior	Black (Cathodic electrodeposition coating)	
Mass (Sensor unit)	11.0 kg	Not including cables or ready lamp
Mass (Power box)	4.2 kg	
Distance from exterior CFRP surface to sensor surface (glass surface)	6.6±0.5 mm	
Patient contact surface	None	
Exterior strength (imaging unit)	Excess local weight: 12 kg (118 N) with 15 mm diameter for 1 minute	Incoming X-ray surface only
Exterior strength (imaging unit, power box)	Excess local weight: 20 kg (196 N) with 15 mm diameter for 1 minute	Locations other than incoming X-ray surface

1. General

Item	40G COMPACT	Remarks
Drop	Not applicable	
Water-proofing	Not applicable	
Resistance to chemicals	Not applicable	
IC X-ray protection	No protective lead	
Back-scattering prevention	Not considered	
Imaging unit installation	*The imaging unit can be installed to a Bucky unit, stand or table. *The imaging unit can be installed without modification to the Liebel-Flarsheim Bucky unit and compatible Bucky units.	Imaging unit securing components are obtained from the respective dealer. The attachment of the imaging unit uses M5 screw holes (10 locations) in the imaging unit.
Grid	*Fixed grid *Installation inside imaging unit is not possible *Installed in a Bucky unit, stand or table. *Same specifications as 40EG grid	Grid and the grid securing components are obtained from the respective dealer.
Grid attachment/removal	Can be performed by service staff only. Cannot be performed by users.	
Phototimer	*Installation inside imaging unit is not possible *Installed in a Bucky unit, stand or table. *Except for the external dimensions, the specifications are identical to the 40EG phototimer	Phototimer and the phototimer securing components are obtained from the respective dealer.
Calibration	Can be performed by service staff only. Cannot be performed by users.	Users can conduct a self-diagnostic test.
Environmental friendliness (RoHS supported)	Supported	
Compatible control PC	*FC-E21A for CXDI Control Station *General-purpose PC with same performance as FC-E21A	
Compatible operating system	Windows XP SP3 (or SP2)	
Power ON/OFF control	None	
Stand	Dedicated stand, table or universal stand	
Connectability	*Up to four units can be connected to a single control PC (using a hub) *Up to three identical imaging units are possible *Imaging unit and power box are paired	
X-ray exposure delay	Less than 0.3 sec.	
Exposure preparation time	Normal exposure mode: 10 sec. Long time exposure mode: 30 sec.	
Full image preview time	Approx. 12 sec.	
Exposure cycle time	15 sec. or less in normal exposure mode	
System control unit	Control PC, power box	

1. General

Item	40G COMPACT	Remarks
Sensor DC/DC power supply	Inside power box	
Sensor cable	Overall length of 7 meters, one type	
X-ray monitor	None	
Grid detection	None	
Remote switch	None	
Imaging unit status display	External ready lamp	
Temperature sensor	Included (error when temperature exceeds 49°C)	
Power consumption (when one unit is connected)	Approx. (17) W	Sleep mode/Standby mode
Heat generation	Approx. 35 kcal/h	15-sec. exposure cycle time
	Approx. 15 kcal/h	During sleep, standby
Environmental conditions 1) Transportation and storage		
Temperature	-30 to +60°C	
Humidity	10% to 60% (no condensation)	
Atmospheric pressure	700 to 1060 hPa	
2) Operating environment		
Temperature	+10 to +35°C	
Humidity	30% to 75% (no condensation)	
Atmospheric pressure	700 to 1060 hPa	

CXDI-40G COMPACT

2. Installation

CONTENTS

1. Caution.....	1
1.1 Caution during Operating.....	1
1.2 Installation Restrictions.....	1
1.3 Installation Notes.....	2
2. Unpacking and List of Materials	3
2.1 Packaging Diagram	3
2.2 Product Configuration	5
3 Installation Procedure	8
3.1 Required Tool.....	8
3.2 System Installation Procedure	9
4. Connection to Units	11
4.1 CXDI-40G COMPACT Instalation Flowchart.....	11
4.2 Affixing the Insulation Sheets.....	12
4.3 Attaching the Sensor Cable and Ready Lamp Cable.....	15
4.4 Connecting to the Power Box.....	19
4.5 Connection Diagram for Control PC Rear Panel	23
4.6 Imaging Unit Securing Screws.....	24
5. Adjusting the Alignment.....	25
5.1 Overview	25
5.2 Tools.....	25
5.3 Adjustment	25
5.3.1. Stand.....	25
5.3.2. Table.....	28
6. Installing the Phototimer.....	31
6.1 Overview	31
6.2 Notes	31
7. Starting up and Shutting Down the System	33
8. X-ray Controller Interface	34
8.1 Interface Signal Description.....	34
8.2 When Normal Imaging.....	35
8.3 When Timeout due to RX_REQ not Negating.....	36
8.4 Signal Names and Functions in the Connection with the X-ray Generator.....	37
8.5 The Connection with X-ray Generator Equipment	38
8.6 Rating and Characteristics for Relay and Photo Coupler	39
9. Network Settings	41
9.1. Overview	41
9.2. Preparation	41
9.3. Setup Method	41
9.3.1. TCP/IP Setting for the Control PC Network Card	41
9.3.2. Network Setting for Screwcap.ini	42
9.3.3. Network Setting Stored in Imaging Unit.....	43
9.3.4. Connection Setup for a Multiple Number of Sensor Units	44
9.3.4.1. General Flow for Setup Procedure	44
9.3.4.2. Detailed Setup Procedures.....	45

10. Adjusting the Photo Timer	46
10.1. Overview	46
10.2. Preparation	46
10.3. Adjustment	47
11. Setting the Fixed ROI Area	48
12. Settings	51
12.1 Checking and Setting the Date and Time	51
12.2 Checking the Firmware Version	52
12.3 Installing Firmware and PLD Code	54
12.4 Checking the Sensor Serial No.	55
12.5 Set Up Startup Menu	56
12.6 Identifying the Sensor Units	59
12.7 Entering Control PC Serial Number	60
12.8 Table Setup Settings	61
12.9 Performing the Annotation Settings	62
12.10 Network Connections	63
12.11 Linearity Check of Transfer Image Density	88
12.12 Operation Unit Gamma Correction	96
12.13 Changing the Total Image Count	99
12.14 Backing Up When Installing	101
12.15 Backing up Setting Data to FD	102
12.16 Tool Modes (/np mode)	104
13. Installing the Grid	107
13.1 Overview	107
13.2 Notes	107
13.3 Checking the Grid Angular Misalignment	107
14. Image Quality	110
15. Post-installation Checks	112
16. Dimensional Drawing	114
16.1 CXDI-40G COMPACT Imaging Unit	114
16.2 Power Box	115
18.4 Ready Lamp Unit	116

2. Installation

1. Caution

1.1 Caution during Operating

Please pay attention to the following points when installing the equipment.

- (1) If the equipment is hoisted, lowered or transported, it must be supported at both sides by a minimum of two people so there is no danger of it falling.
- (2) When transporting the equipment with a forklift, lower the load to the lowest possible position that does not impede the running of the forklift.
- (3) When installing the equipment, be sure the site meets the following criteria:
 - 1) There must be no dripping water in the area.
 - 2) The environment must be free of harmful elements, such as humid or acidic air, air with a saline or sulfur content, where there is poor ventilation, or where air pressure or temperature is abnormal.
 - 3) The equipment must not be placed at an angle or subjected to vibration or shock (this includes during transportation).
 - 4) The equipment must not be kept where chemical products are stored or where gasses are generated.
 - 5) The site's power supply must be of the correct voltage and frequency for the equipment.
 - 6) The site must be connected to a fully earthed cable with sufficient ground resistance to meet standard values.
- (4) After installation, be sure to dispose of waste product packaging with care and with full respect for the environment.
- (5) As the imaging unit is easily portable, take special care that it is not knocked, dropped or subjected to strong shocks.

1.2 Installation Restrictions

- (1) Install so that the distance between the imaging unit and power box is at least 300 mm from the imaging unit sides (in four directions) and at least 150 mm from locations other than the imaging unit sides.
- (2) Except for the sensor cable connected to the imaging unit and the cable for the ready lamp unit, the cables must not be used with moving parts.
- (3) Before starting the installation work, discharge any static charge that has built up on your body. Also, be sure that the static charge has been discharged before touching (removing) the PCBs and cable connectors.
- (4) Install the imaging unit, grid, and phototimer to a Bucky unit, stand or table. The parts that secure the imaging unit, grid, and phototimer are obtained from the distributor.
- (5) Do not remove the imaging unit from the Bucky unit, stand or table for cassette-type portable usage.

2. Installation

- (6) The patient must not directly touch the imaging unit when taking exposures.
- (7) Do not install on a motor vehicle.

1.3 Installation Notes

- (1) Noise and artifacts tend to appear on the image in environments with strong electromagnetic fields. Therefore, try to select an installation location that is not near electronic devices.

Examples of applicable devices:

CRT monitors, X-ray generators, medical electronic devices

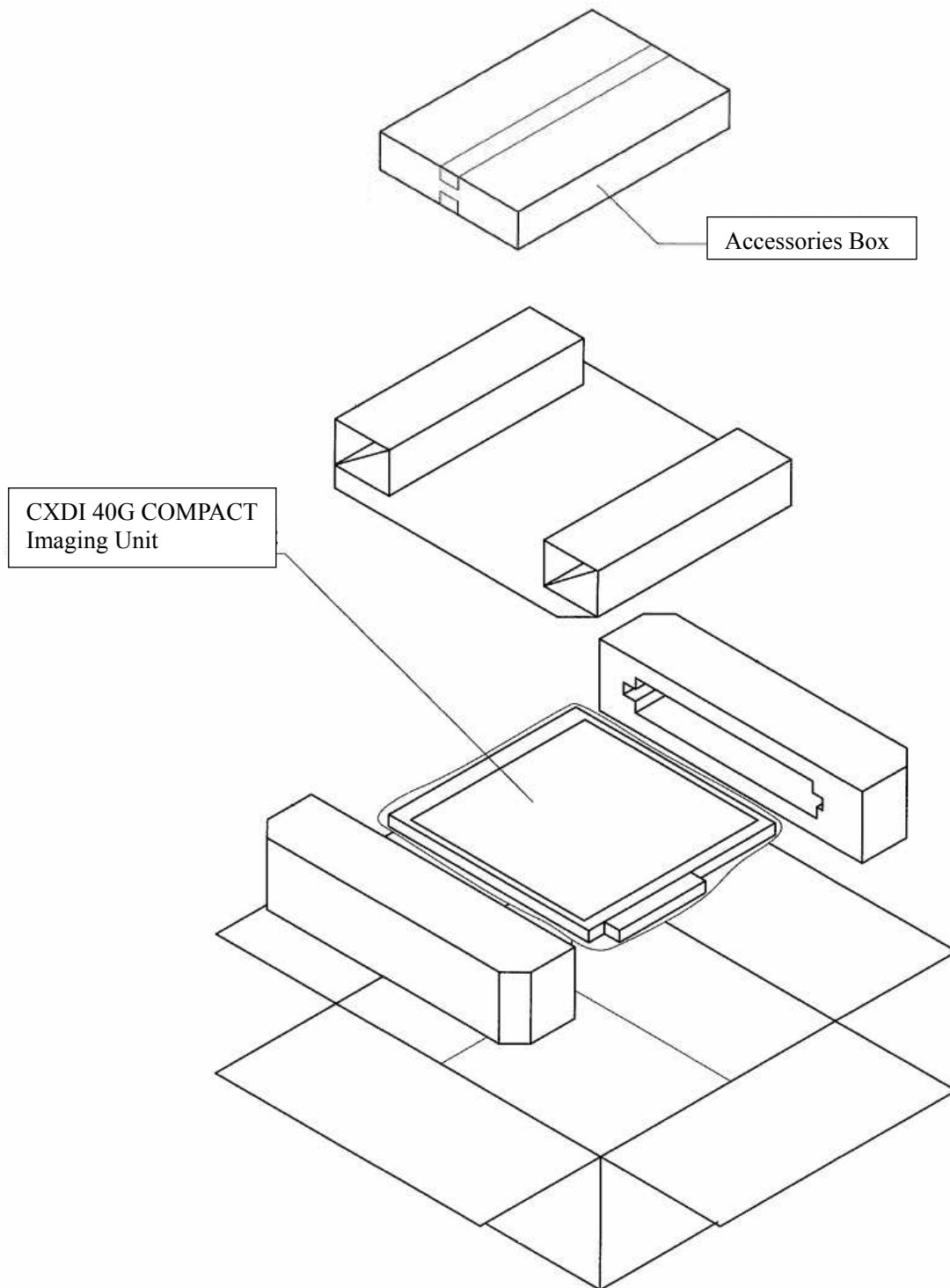
- (2) Before starting the installation work, discharge any electrostatic charge that has accumulated on your body.
- (3) Calibration imaging can be performed by service staff only. It cannot be performed by users.
- (4) Do not perform calibration imaging with the grid installed.
Except for grid, phototimer and other parts that are located in the X-ray entrance surface must be installed when calibration imaging is performed.
- (5) After installing the imaging unit in the Bucky unit, stand or table, if the user cannot confirm the cross lines of the imaging unit surface, attach an indicator mark after adjusting the X-ray tube position if necessary.
- (6) Routing of the cables for the table, upright stand, and universal stand is based on the table, upright stand, and universal stand specifications. However, the bending radius R of the cable (radius of inner cable circumference) is based on the following conditions that incorporate the bending durability and other factors.
 - R at stationary parts (radius of cable inner circumference) = 25 mm or more
 - R at moving parts (radius of cable inner circumference) = 50 mm or more
 - Do not forcibly bend, fold over, or pull out the cable, and secure the cable so that no excessive loads are applied to it in any state.
- (7) Install so that there is sufficient space for maintenance and other work. Imaging unit dimensions: 470 (W)×548 (L)×32 (H) mm
- (8) Do not apply load of over 12kg(118N) to the X-ray entrance surface of the imaging unit outer cover.

2. Installation

2. Unpacking and List of Materials

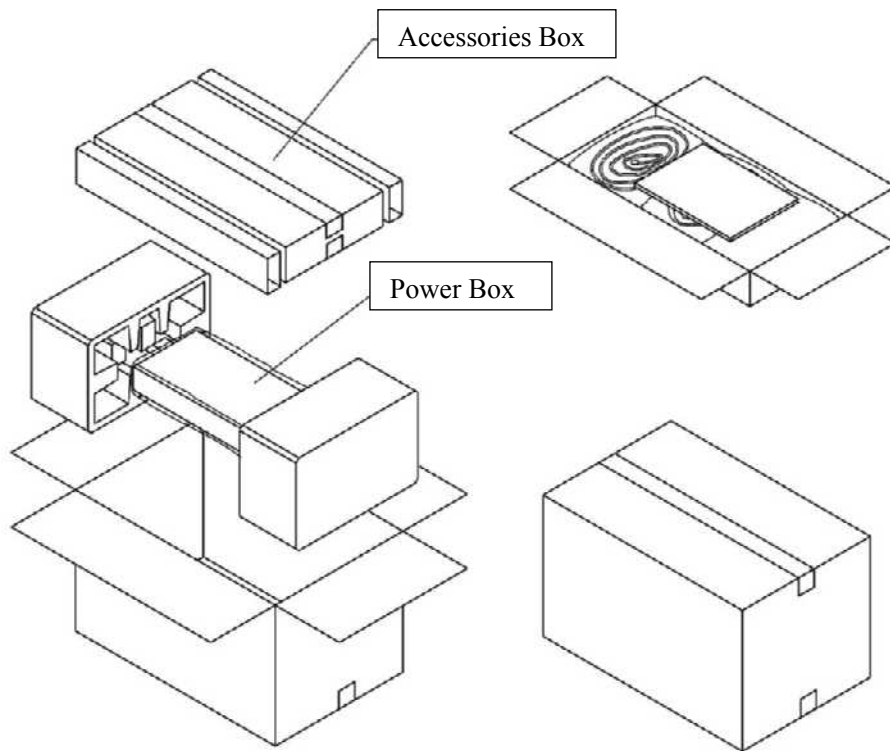
2.1 Packaging Diagram

1) CXDI 40G COMPACT Sensor Unit Assembly Packaging



2. Installation

2) CXDI SYSTEM III Assembly Packaging



2. Installation

2.2 Product Configuration

(1) Product Configuration List

1) CXDI-40G COMPACT

No.	Item Name	Qty	Remarks
1	CXDI-40G COMPACT Imaging Unit	1	
2	Sensor cable	1	7m
3	Ready lamp	1	
4	Ready lamp mounting shaft	1	
5	Insulation sheet	16	
6	Cable tie	3	
7	Screw (M3x8mm)	4	
8	Operation manual (For imaging unit)	-	
9	Attached documents for medical	-	(JPN)
10	Warranty registration	-	(JPN)
11	Warranty card	-	(US)
12	Safety Booklet for German (WEEE directive)	-	(EU)
13	Installation Report	-	(US/EU)

2) CXDI SYSTEM III

No.	Item Name	Qty	Remarks
1	Power Box	1	
2	X-ray I/F cable	1	20m
3	Power supply cable (with AC plug)	1	3m (100/120/230V)
4	Cable clamp	1	
5	Screw (M4x6mm)	1	
6	Operation manual (Power box)	-	

LAN cable for connecting Control PC / Power Box and Network switch (Switching HUB) for connecting the multiple Imaging Units shall be procured at each sales company.

- LAN cable (Over category 5)

Recommended length of the cable is 30m or less.

When Control PC and Power Box are connected directly, Cross type is used, but when they are connected via Network switch, Straight type is used. However, this is not applied when Network switch has AUTO-MDI/MDI-X function*.

- Network switch (Switching HUB)

Sales companies adopt Network switch (Switching HUB) after conducting the test and the operation check for Switching HUB that meets the general standard.

2. Installation

(2) Configuration

- CXDI-40G COMPACT

No.	1	No.	2
Name	Imaging Unit	Name	Sensor Cable
Qty	1	Qty	1
Remarks		Remarks	Imaging Unit / Power Box
			
No.	3	No.	4
Name	Ready lamp unit	Name	Ready lamp mounting shaft
Qty	1	Qty	1
Remarks		Remarks	
			
No.	5	No.	6
Name	Insulation sheet	Name	Cable tie
Qty	16	Qty	3
Remarks	t=0.4mm	Remarks	
			

2. Installation

- CXDI-CXDI SYSTEM III

No.	1	No.	2
Name	Power box	Name	X-ray I/F cable
Qty	1	Qty	1
Remarks	I/F and Power Supply	Remarks	To connect with X-ray generator
			
No.	3	No.	4
Name	Power supply cable	Name	Cable clamp
Qty	1	Qty	1
Remarks	For Power Box (100/120/230V)	Remarks	
			
No.		No.	
Name		Name	
Qty		Qty	
Remarks		Remarks	

2. Installation

3 Installation Procedure

3.1 Required Tool

No.	Tools name	Qty	Remarks
1	General tools	1 set	JIS Screw Driver Set
2	Laptop PC	1	PC/AT compatible (OS: Windows XP)
3	LAN card	1	For laptop PC (If necessary)
4	Mouse	1	PS/2 type
5	Keyboard	1	PS/2 type
6	Hub	1	For connection between control PC and Laptop PC
7	10/100 BASE-Tx cable	2	Straight type (For connection between Laptop PC and control PC)
8	Software for service maintenance	1	BY9-6538-XXX (Check the version of the software)
9	CXDI application and firmware	1	
10	CXDI software version compatibility table	1	
11	Mirror, oil-based marker, etc.	1	For adjusting the alignment with the X-ray tube
12	Tester	1	Used to verify the electrical isolation between the Bucky unit (stand or table) and imaging unit

2. Installation

3.2 System Installation Procedure

No.	Step	Conditions and checkpoints	Reference
1	Unpack and check the product's constituent parts	- There are no missing parts, damage, scratches, or other imperfections.	
2	Affix the insulation sheets to the sensor unit	- Affix to the specified locations on the imaging unit without making any raised or bent sections.	
3	Install the imaging unit	- Install and secure in place in the Bucky unit, stand or table. Obtain the imaging unit fixture pieces from a distributor. - Be careful not to drop the imaging unit.	
4	Connect the imaging unit and power box	- The cables must be routed so that no unreasonable loads are placed on them. - R at stationary parts (radius of cable inner circumference) = 25 mm or more - R at moving parts (radius of cable inner circumference) = 50 mm or more	
5	Connect the power box and the control PC	- The cables must be routed in such a way that no unreasonable loads are brought to bear upon them.	
6	Attach and connect the operation unit	- The cables must be routed in such a way that no unreasonable loads are brought to bear upon them.	
7	Adjust the alignment	- Be careful not to scratch the imaging unit.	
8	Install the phototimer	- Install in the Bucky unit, stand or table. - Be careful not to scratch the sensor.	
9	Start the system		
10	Identifying the imaging units and setting the number of units to be connected (inputting the sensor serial numbers)		"Identifying the Sensor Unit" in "Setting"
11	Install control PC unit serial number.		"Entering Control PC Serial Number" in "Setting"
12	Check the software program's version	- The compatibility of the sensor unit and the control PC must be checked on the compatibility list, and the software program must be installed or upgraded as required.	"Checking the Firmware Version" in "Setting"
13	Check date and time	- Date and time must be changed according to the area where the instrument is installed.	"Checking and Setting the Date and Time".
14	Connect the power box and X-ray generators	- The manufacturer of the X-ray generators must be asked to handle the connections with the generators.	
15	Adjusting the timing with the X-ray generators	- This is generally not necessary.	
16	Perform calibration imaging	- No errors must be displayed. - Calibration imaging must be performed by service staff only.	

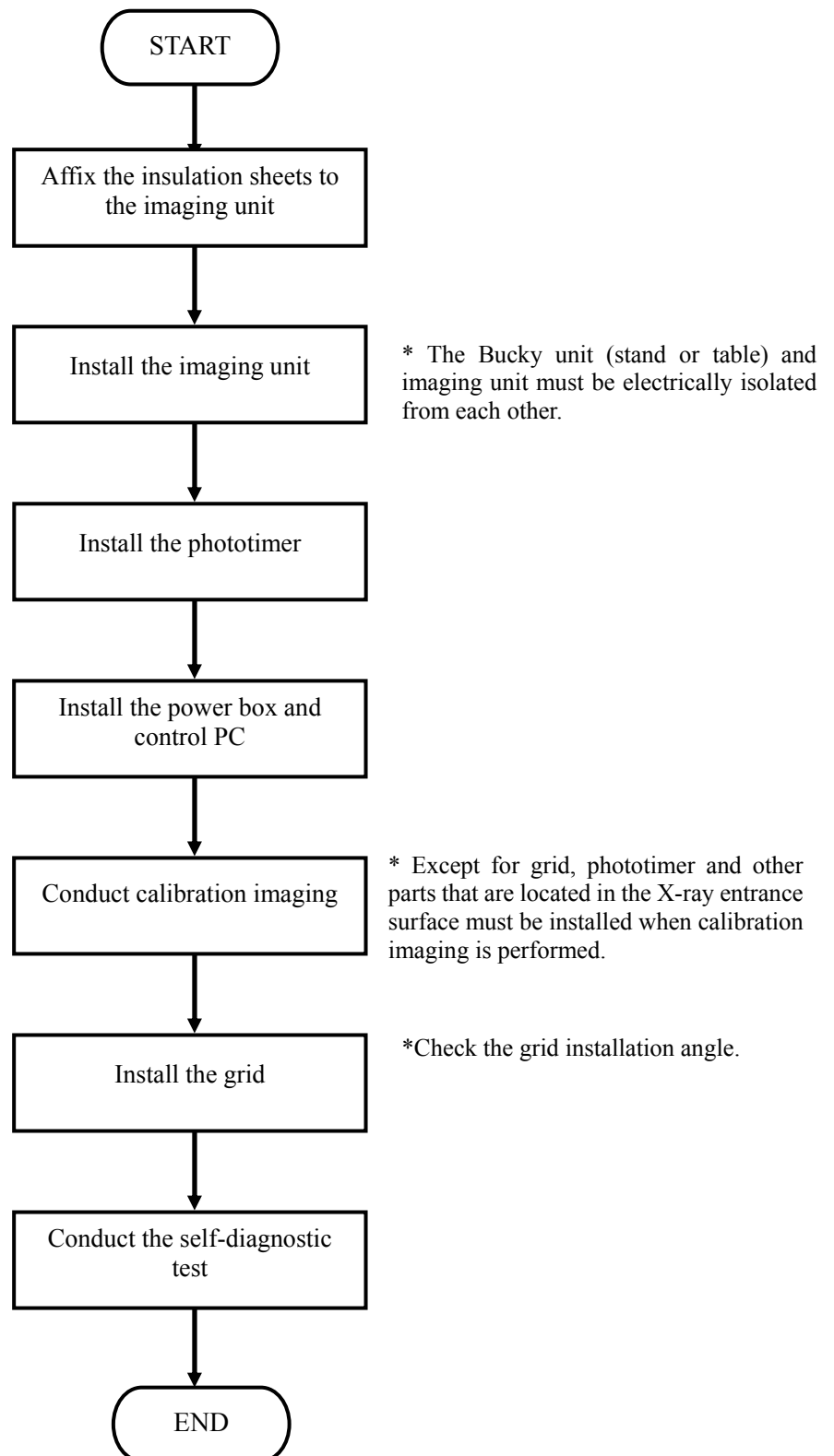
2. Installation

No.	Step	Conditions and checkpoints	Reference
17	Set the Fixed ROI areas	- If necessary, to set the ROI area.	“Set the Fixed ROI areas”
18	Set exposure parameter table	- Set it in consultation with the technician.	“Table Setup Setting”
19	Set annotation	- Set it in consultation with the technician.	“Performing the Annotation Setting”
20	Connect the network and set the output destination		“Network Connections” in “Setting”
21	Startup settings		“Set Up Startup Menu” in “Setting”
22	Check the linearity of the transferred image density		“Linearity Check of Transfer Image Density” in “Setting”
23	Correct operation unit gamma		“Operation Unit Gamma Correction” in “Setting”
24	Install the grid	- Install in the Bucky unit, stand or table. - Check the grid installation angle. - Use as a fixed grid.	
25	Self-diagnostic testing	- No errors must be displayed.	
26	Radiographic testing	- Check the image quality and transfer operation to printer and storage.	“Image Quality Check”
27	Body parts settings	- The engineer in charge must be consulted prior to performing these settings.	Operation Manual
28	Check and perform the system settings	- The engineer in charge must be consulted prior to performing these settings.	“Setting”
29	Perform the overall adjustment and delete unneeded data	- Check according to the check sheet. - Delete unneeded data.	“Post Installation Check” in “Setting”
30	Clean		
31	Explain operation to the user		Operation Manual
32	Adjust final parameters	- The engineer in charge must be consulted prior to narrowing down the adjustments to the final values.	Operation Manual
33	Backing up valuable data	- Back up when setting, and back up the setting data to FD.	“Backing Up when Setting” and “Backing Up Setting Data to FD” in “Setting”

2. Installation

4. Connection to Units

4.1 CXDI-40G COMPACT Installation Flowchart



2. Installation

4.2 Affixing the Insulation Sheets

This section describes the affixing positions and affixing procedure of the insulation sheets (accessories) used to electrically isolate the Bucky unit and imaging unit when an imaging unit is mounted on the Bucky unit.

The affixing positions of the insulation sheets in this manual are based on installation of the imaging unit on the Liebel-Flarsheim Bucky unit rail.

*Notes

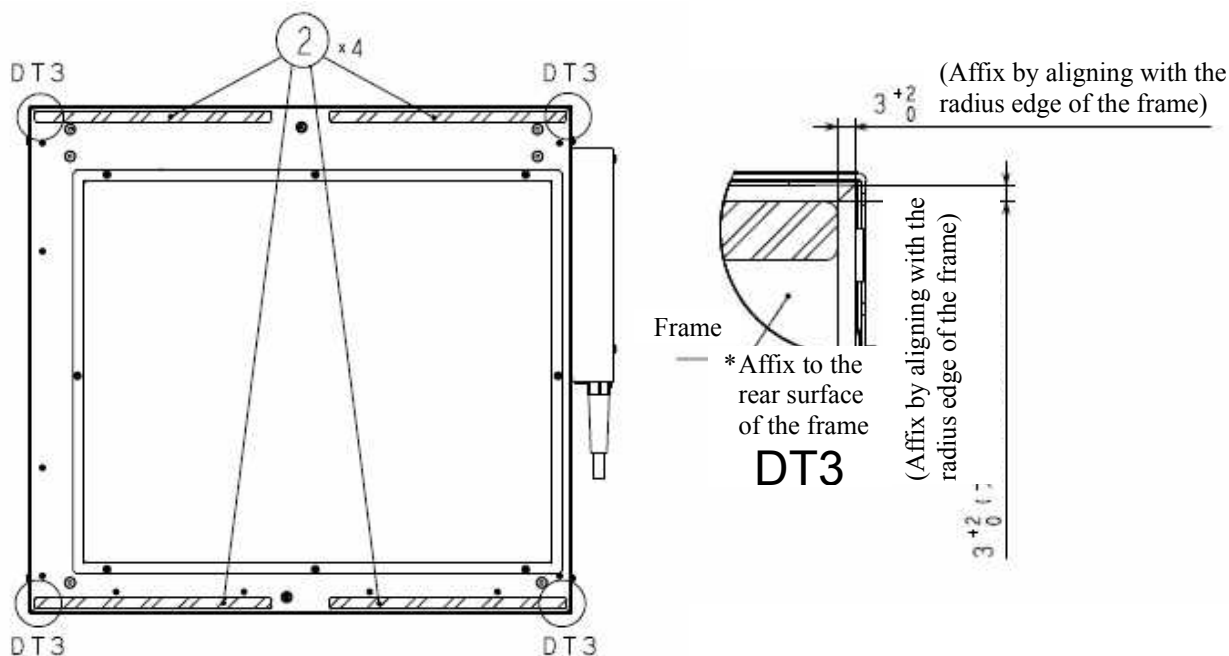
1. If installing an imaging unit to a Bucky unit other than a Liebel-Flarsheim Bucky unit, stand or table, obtain installation sheets from the distributor, and affix the insulation sheets to ensure that the Bucky unit, stand or table is electrically isolated from the imaging unit.
2. The parts used to secure the imaging unit to the Bucky unit, stand or table must be obtained from the distributor. The securing parts (including the mounting screws) must also be electrically insulated by insulation sheets or other means to ensure that the imaging unit is electrically isolated.
3. After installation of the imaging unit in the Bucky unit, stand or cable is complete, use a tester or other instrument to check that the imaging unit is electrically isolated.

4.2.2 Insulation Sheets Affixing Procedure (Using the attached insulation sheets)

(1) Remove any oils from the surface where the insulation sheets will be affixed on the imaging unit (grounding surface with the Bucky unit).

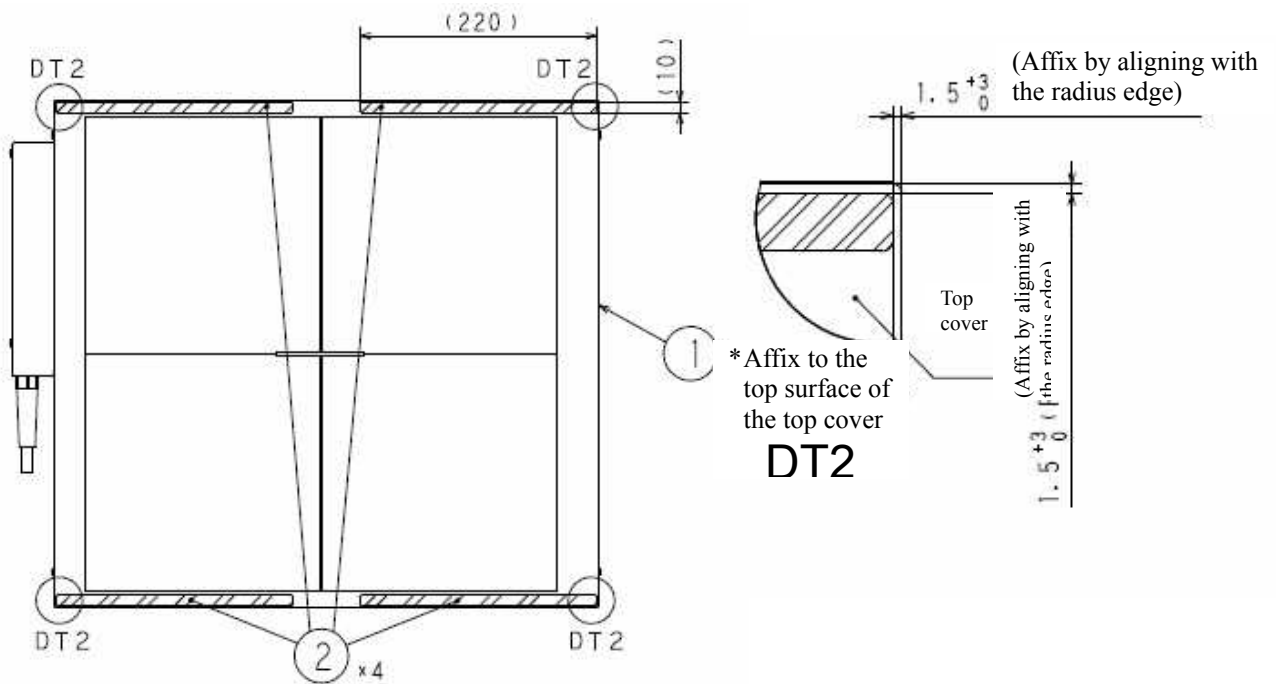
(2) Affix the four (2) insulation sheets to the (1) imaging unit rear side.

Note: Avoid making bent or raised sections when affixing.



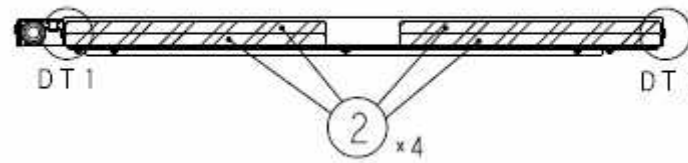
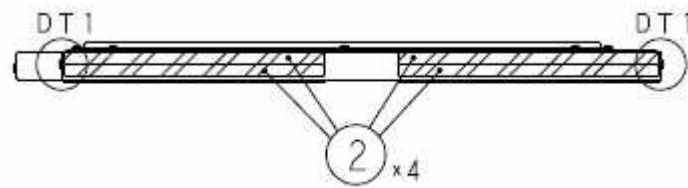
2. Installation

- (3) Affix the four (2) insulation sheets to the (1) imaging unit front side.
 Note: Avoid making bent or raised sections when affixing.

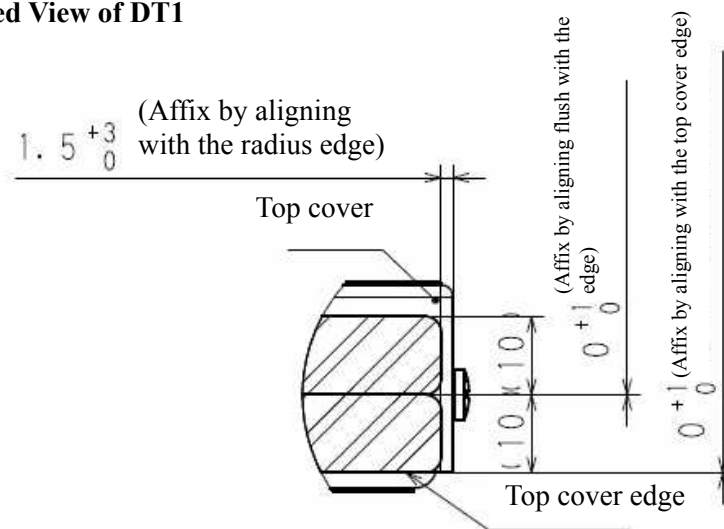


2. Installation

- (4) Affix eight (2) insulation sheets to the (1) imaging unit side surface.
Note: Avoid making bent or raised sections when affixing.



*Enlarged View of DT1



*Affix to the top cover side surface

DT 1

*Enlarged View of DT1

2. Installation

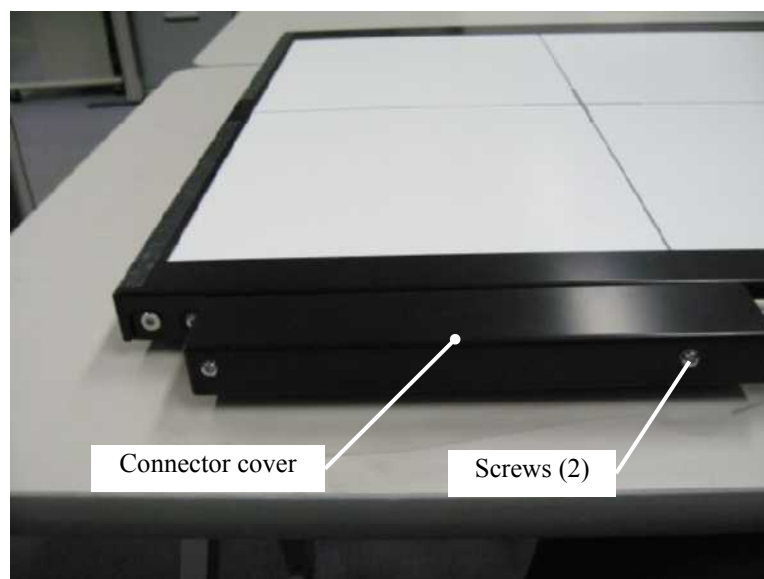
4.3 Attaching the Sensor Cable and Ready Lamp Cable

The sensor cable and ready lamp cable can be attached to the imaging unit either before or after the imaging unit is installed in the Bucky unit, stand or table. Check the structure of the Bucky unit, stand or table obtained from the distributor, and attach the sensor cable and ready lamp cable using the easiest procedure. This manual describes the procedure for attaching the cables before installing the imaging unit.

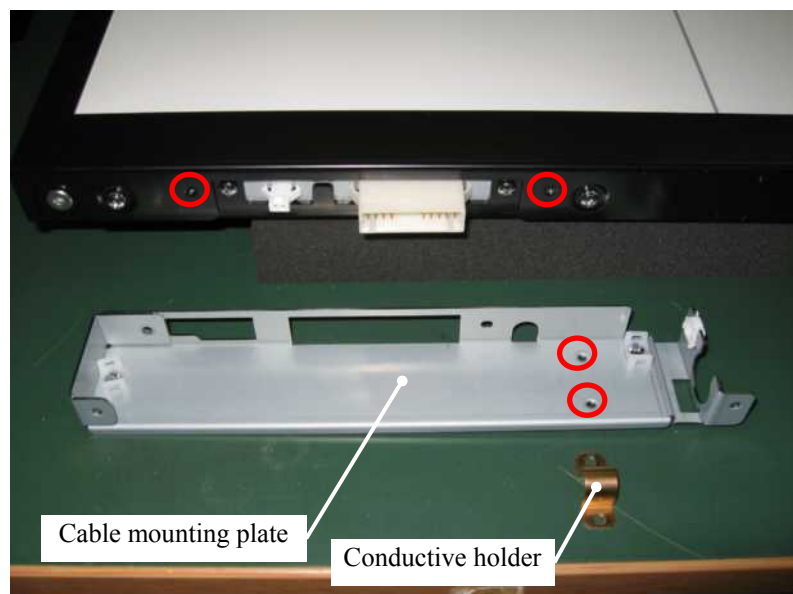
Notes

*** If the imaging unit is installed to the Bucky unit, stand or table by a single operator when the sensor cable and ready lamp cable are already connected, there is a risk of the cables getting pinched or bent. Therefore, be sure to install the imaging unit to the Bucky unit using two or more operators.**

- 1) Remove the two screws on the connector cover, and remove the connector cover.

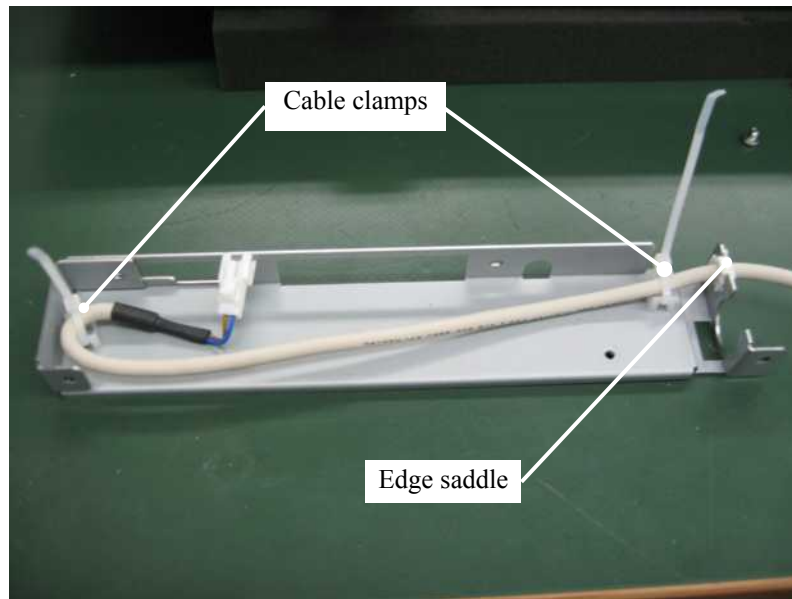


- 2) Remove the two screws on the cable mounting plate, and attach the cable mounting plate from the imaging unit. Next, remove the two screws on the conductive holder, and remove the conductive holder from the cable mounting plate.

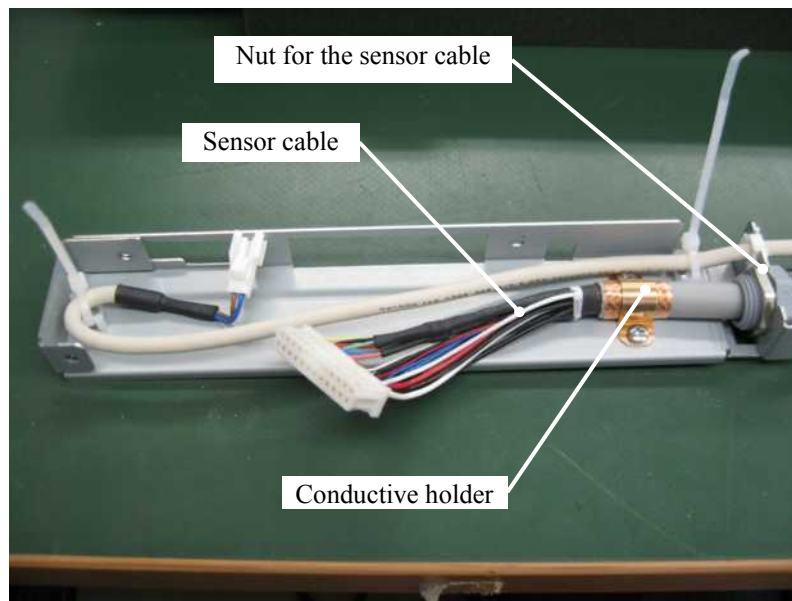


2. Installation

- 3) After passing the ready lamp cable through the edge saddle, use two cable ties to secure the cable to the cable clamps (two locations).



- 4) Loosen the nut of the sensor cable, lay the sensor cable on the cable mounting plate, tighten the sensor cable nut; then securely tighten the conductive holder over the copper foil covering.



Note

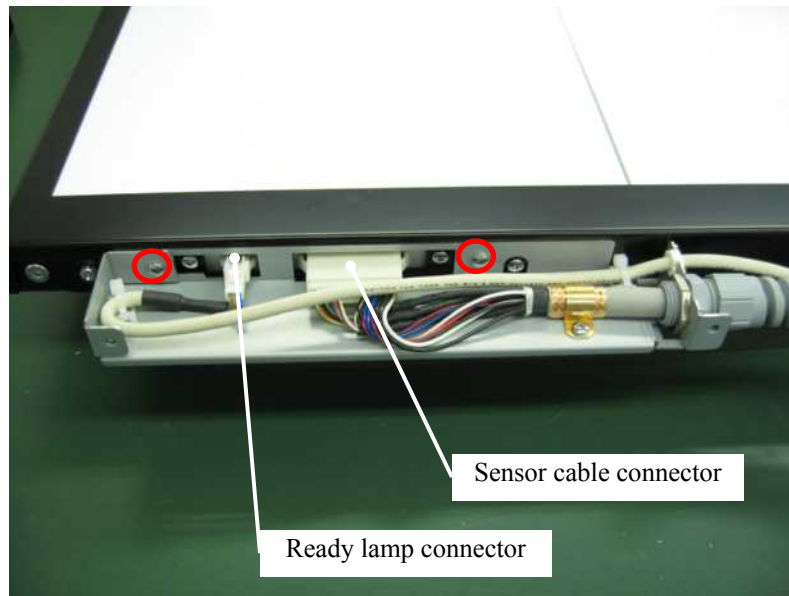
- Loosen a SKINTOP spiral of the sensor cable so that the sensor cable connector can be connected to the connector of the imaging unit as needed.
- Route the sensor cable while taking care that excessive force is not applied to it.
- To prevent damage in case the cable is pulled by a strong force, adjust by tightening a SKINTOP spiral as shown in the figure below.

2. Installation



<SKINTOP spiral of Sensor cable>

5) Attach the cable mounting plate to the imaging unit. Next, connect the ready lamp connector and sensor cable connector to the imaging unit connector. After checking that the cables are routed properly and the length is adjusted properly, secure with the two cable ties.

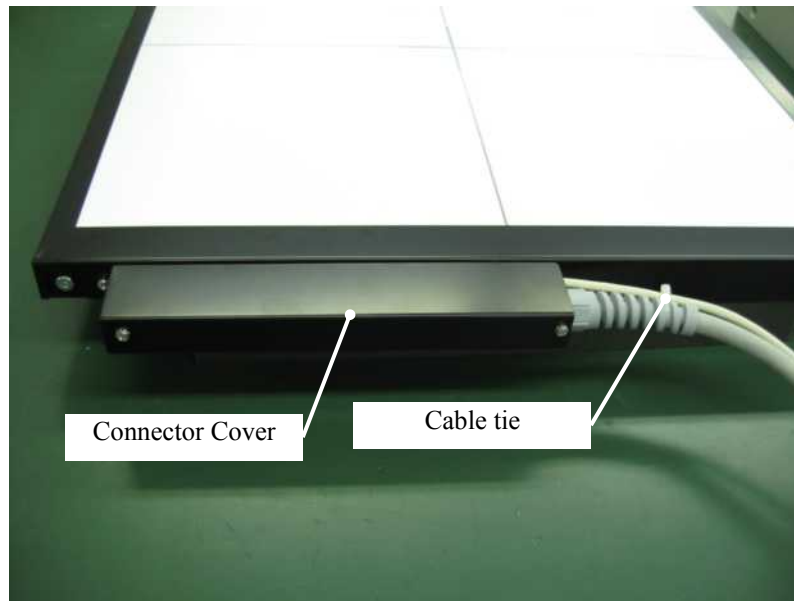


Note

- Allow enough length and route the sensor cable while taking care that excessive force is not applied to it.
- Allow enough length and route the ready lamp cable while taking care that excessive force is not applied to it.

2. Installation

6) Use the two screws to mount the connector cover. Next, use the cable ties to bundle the sensor cable and ready lamp cable.

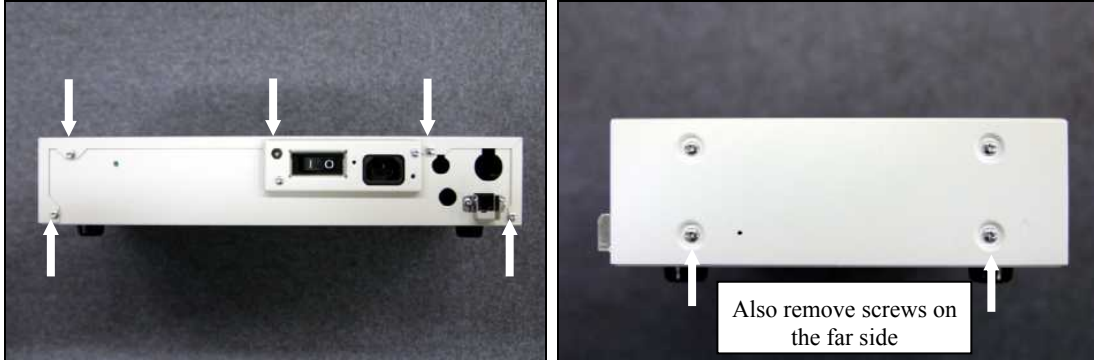


2. Installation

4.4 Connecting to the Power Box

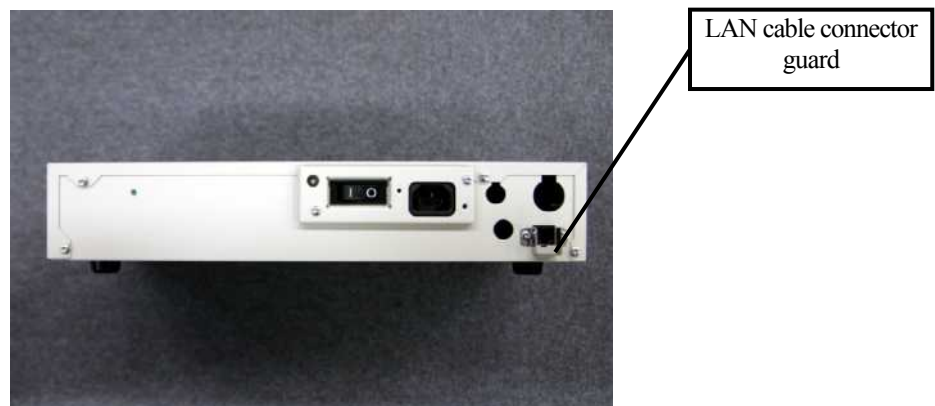
(1) Removing the cover

Remove the 5 screws from the back of the power box and the 2 screws on each side at the bottom of the power box.



(2) Removing the LAN cable connector guard

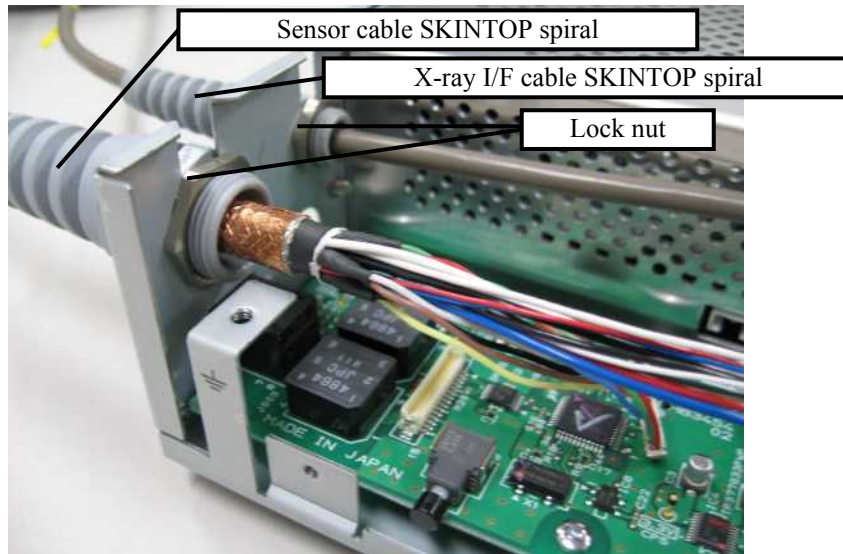
Remove the LAN cable connector guard to prevent injury when connecting the sensor cable and X-ray I/F cable.



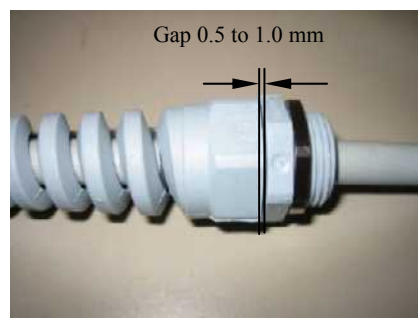
2. Installation

(3) Cable connections

- 1) Loosen the SKINTOP spirals and lock nuts for the sensor cable and X-ray I/F cable, mount the cables to the power box, and then use a wrench to secure the SKINTOP spirals and lock nuts. Be sure that the cables have enough length to connect to the power box connectors.



Note: To prevent damage in case the cable is pulled by a strong force, adjust by tightening a SKINTOP spiral as shown in the figure below.

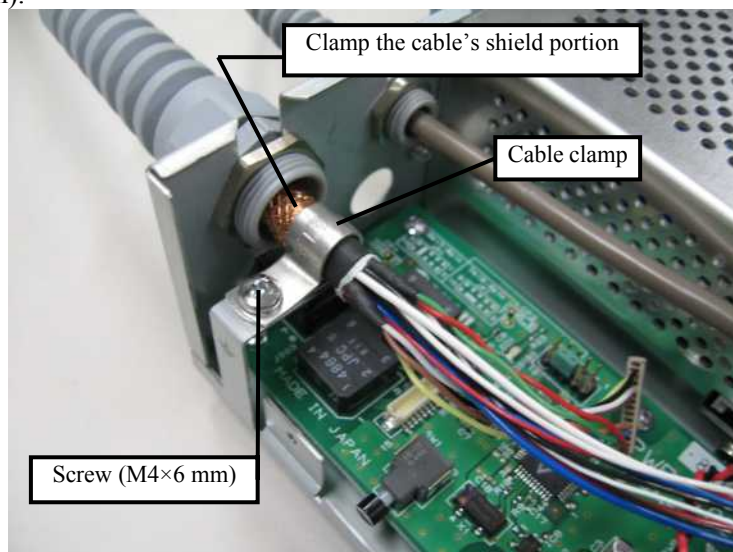


<Sensor cable>



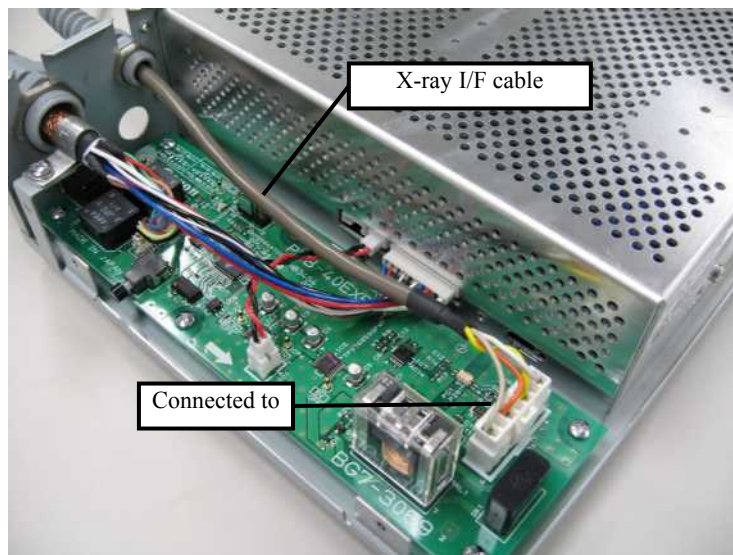
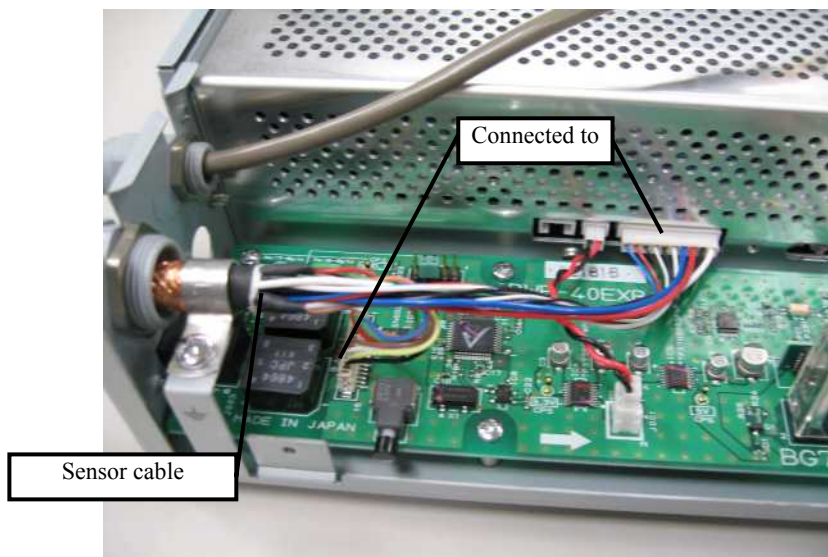
<X-ray I/F cable>

- 2) Attach the cable clamp to the sensor cable, and then fix it to the power box using the screw (M4×6 mm).



2. Installation

- 2) Connect to the connectors for the sensor cable and X-ray I/F cable.



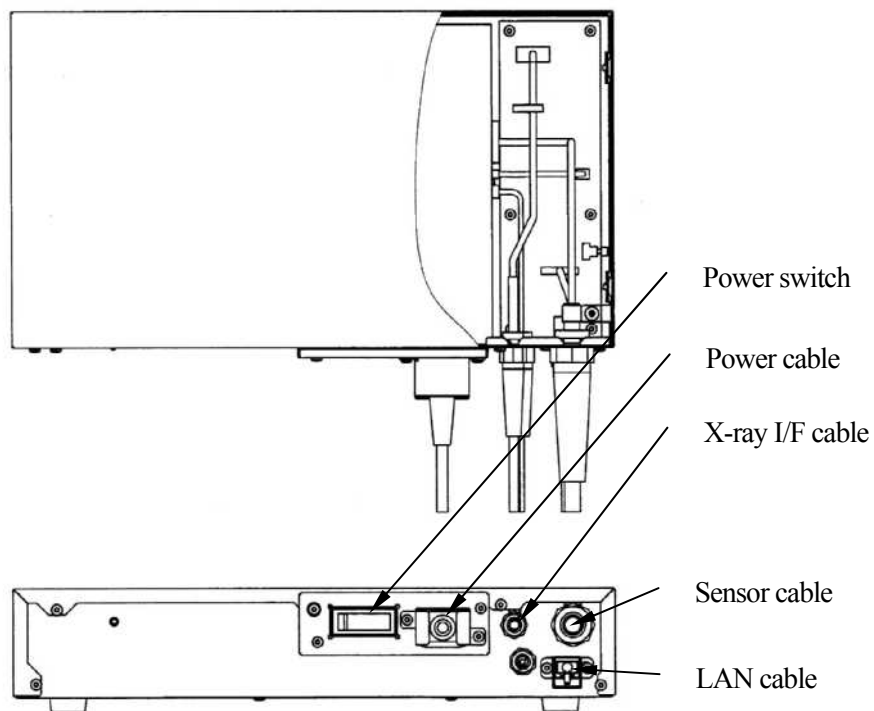
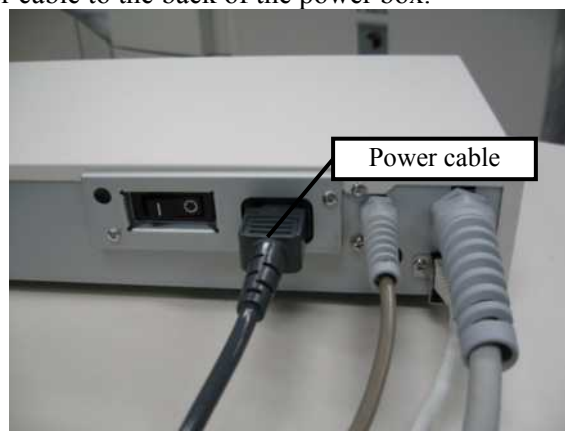
- 4) After completing the cable connections, attach the power box cover. Then, attach the LAN cable connector guard.

2. Installation

5) Connect the LAN cable to the back of the power box.



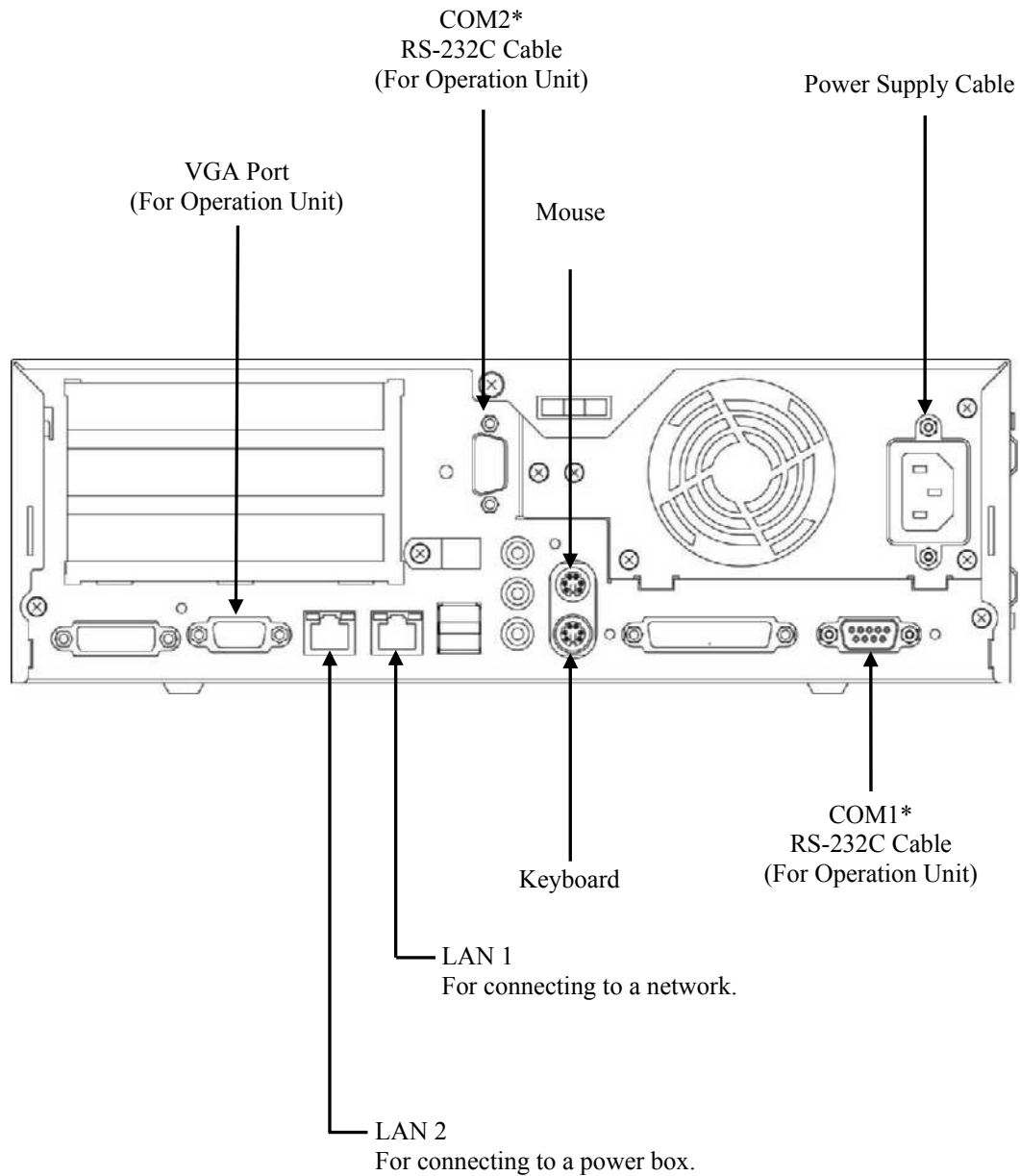
6) Connect the power cable to the back of the power box.



2. Installation

4.5 Connection Diagram for Control PC Rear Panel

FC-E21A



*Connect the RS-232C cable to the COM port, COM 1 or COM2, specified as the port in the driver for Operation Unit.

2. Installation

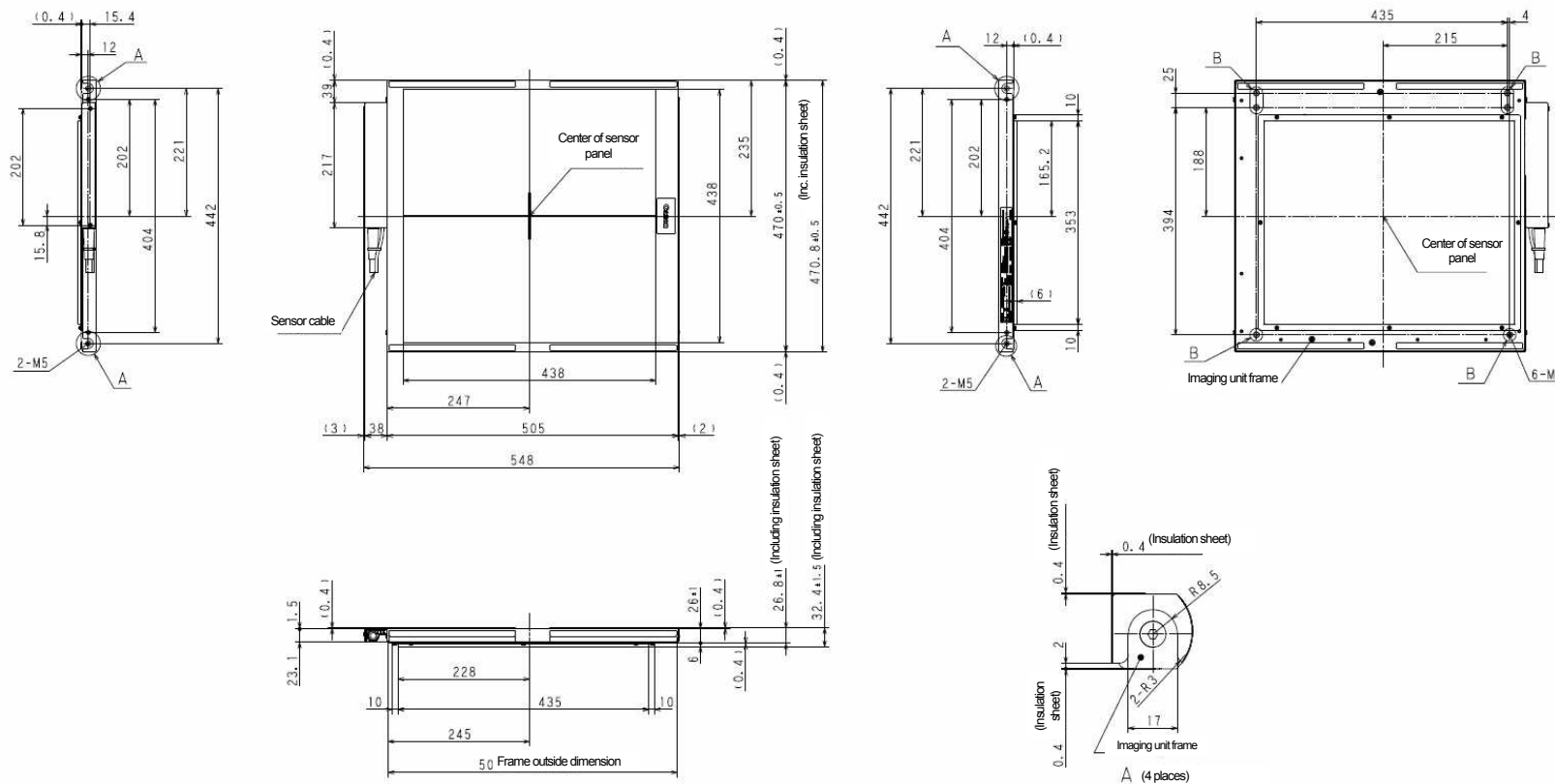
4.6 Imaging Unit Securing Screws

M5 screws are used for installing Imaging unit to Bucky unit, stand or table. The four M5 screws are used for the sides of imaging unit frame and the six screws for the rear. Allowable length of M5 screws from the frame surface are as follows:

Position A (4 places): Less than 14mm

Position B (6 places): Less than 8mm

M5 screws are secured to the image unit frame before shipment. The screws must not be removed for light shielding even they are not used for installing the imaging unit.



2. Installation

5. Adjusting the Alignment

5.1. Overview

Align the center of the sensor unit with the center of the X-ray tube. Be sure that the crossing angle is perpendicular.

Note

Alignment of the sensor should be performed based on the assumption that the X-ray generator is set in the correct horizontal and vertical position. If the X-ray generator is displaced to a large extent, the alignment of the sensor may not compensate the misalignment of the X-ray generator. In this case, you need to ask the manufacturer of X-ray generator to align the position of the X-ray generator again.

Note

After installing the imaging unit in the Bucky unit, stand or table, the cross lines on the imaging unit surface cannot be confirmed by the user. As a result, after adjusting the X-ray tube position, attach an indicator mark if necessary. For installation facilities where the X-ray tube is moved, be sure always attach an indicator mark, and perform positioning of the exposure area before taking the exposure.

Note

If the table type is used, align the sensor unit before mounting a top panel, photo timer and grid.

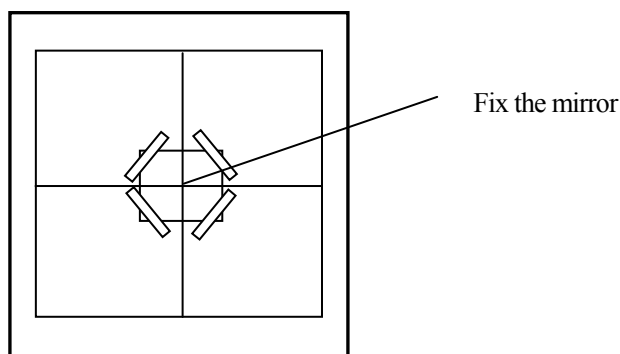
5.2. Tools (should be prepared by distributors)

Alignment Adjustment Spacer, Mirror (first-face mirror), Tape, Oil-based Marker, Measure, Rope, and other requirements.

5.3. Adjustment

5.3.1 Stand

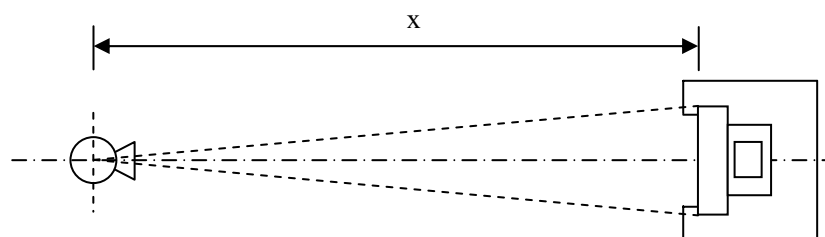
(1) Fix the mirror (first-face mirror) at the center of the sensor unit.



(2) Place the stand temporarily in the position to space enough distance for the exposure.

Distance from the tube to the sensor unit should be 180cm.

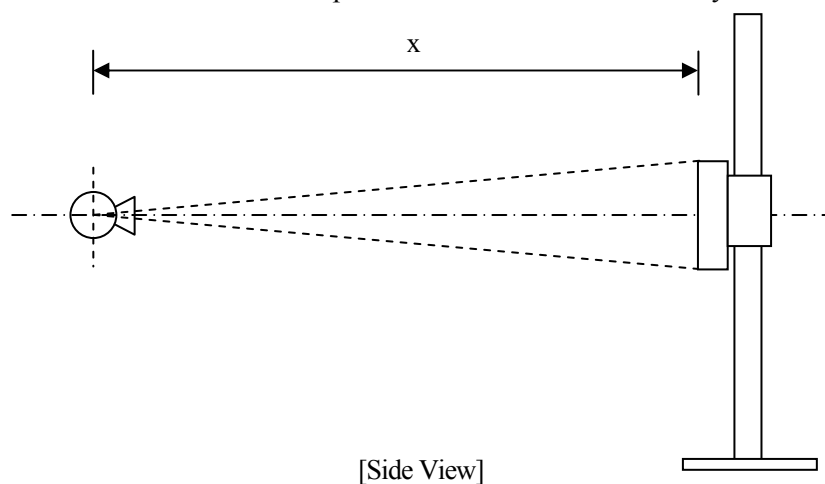
- Using a measure or rope, align the horizontal position of the sensor unit to the center of the tube so that the distance from the tube to the right and left side of the sensor is symmetric.



[Top View]

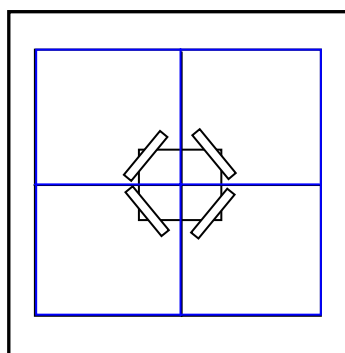
2. Installation

- Using a measure or rope, align the vertical position of the sensor unit to the center of the tube so that the distance from the tube to the top and bottom side of the sensor is symmetric.

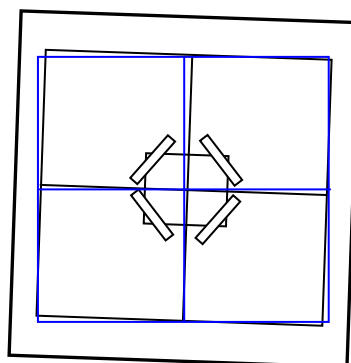


- (3) Turn on the irradiation ramp of the X-ray generator, cross line of the X-ray tube is cast over the sensor unit. Align the position to meet the requirements described in 1) and 2) below.

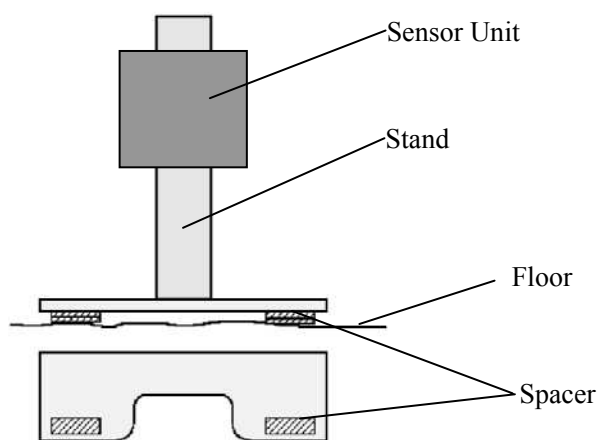
- 1) Align the cross line of X-ray tube with the cross line of the sensor unit. If the position is mismatched as shown in [NG] below, the sensor unit and the stand are not horizontal. In this case, put the spacer between the stand base and the floor to align the slight differences.



[OK]

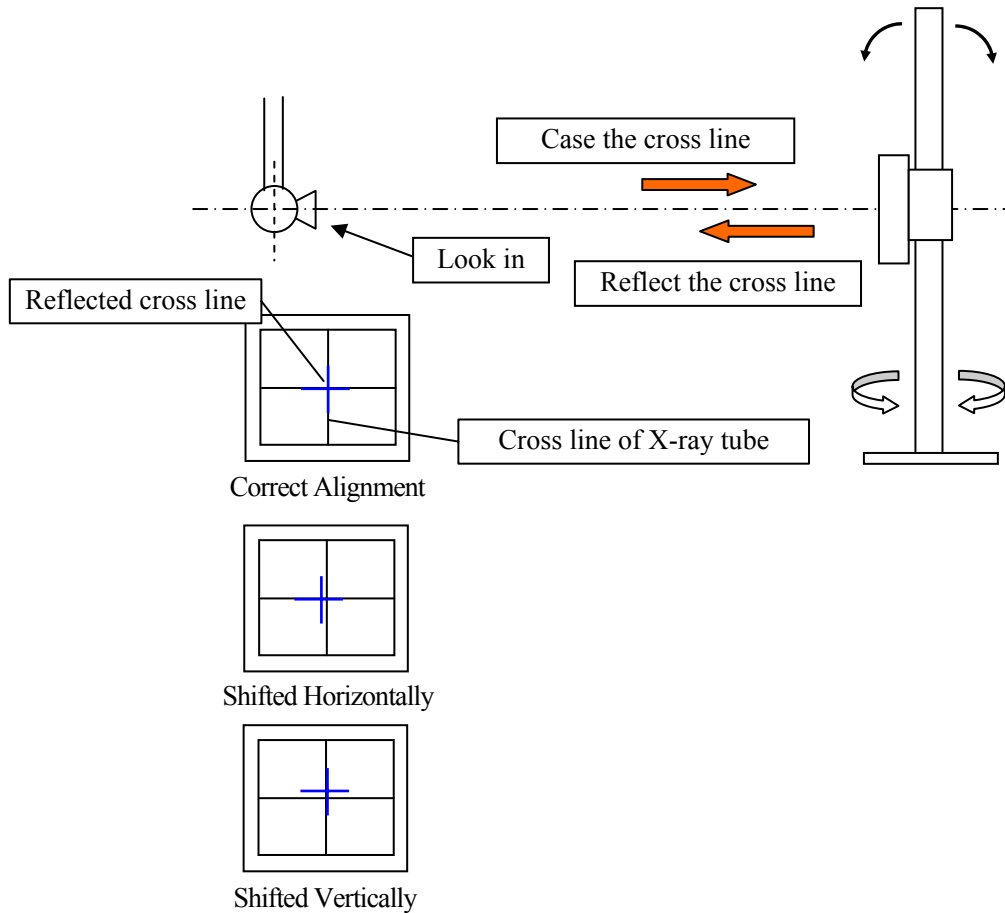


[NG]

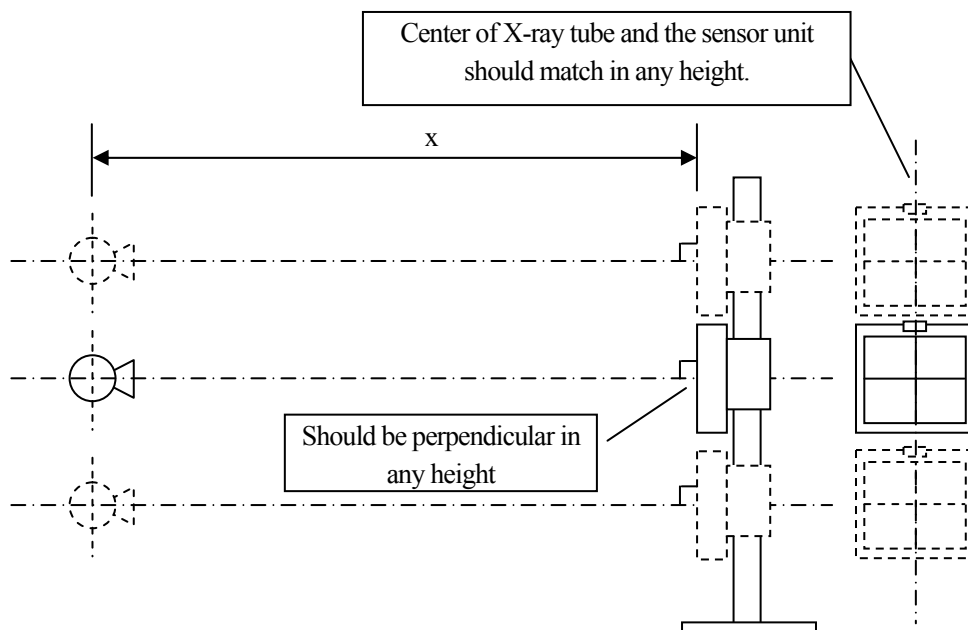


2. Installation

- 2) Look in the X-ray tube to check the cross line reflected from the mirror matches the cross line on the X-ray tube. If it does not match, move it right and left or put the spacer before and behind the stand base to align the slight differences.



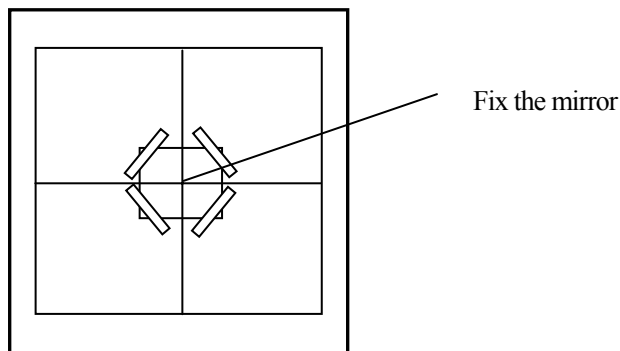
- (4) Regardless the height of the X-ray tube and the sensor unit, it should keep the positional relation aligned in step (3) above.



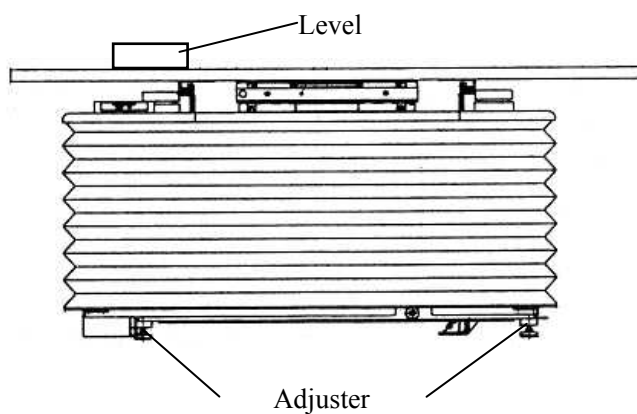
2. Installation

5.3.2 Table

- (1) Fix the mirror (first-face mirror) at the center of the sensor unit.



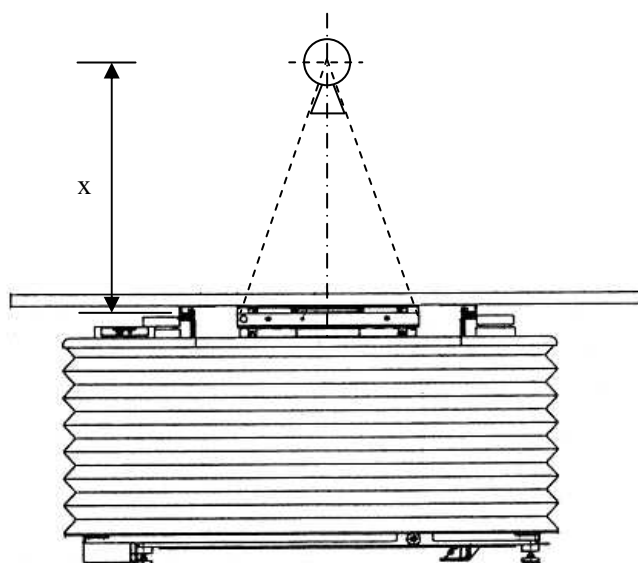
- (2) Place the level on the sensor unit. Align the table and the sensor horizontally by the adjuster of the table or the spacer.



- (3) Adjust the height of the table to space the appropriate exposure distance.

Distance from the tube to the sensor unit should be 150cm.

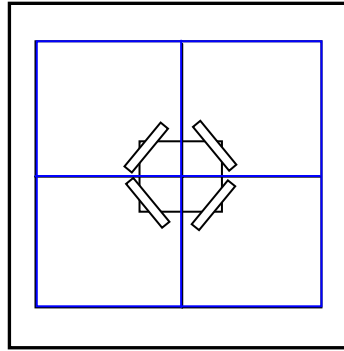
- Using a measure or rope, align the vertical and horizontal position of the sensor unit to the center of the tube so that the distance from the tube to side to side and up and down of the sensor is symmetric.



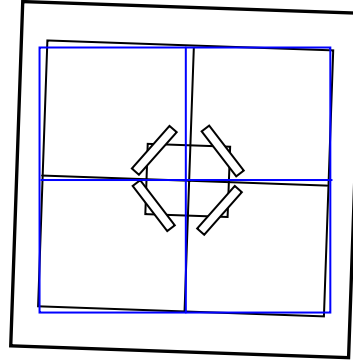
2. Installation

(4) Turn on the irradiation ramp of the X-ray generator, cross line of the X-ray tube is cast over the sensor unit. Align the position to meet the requirements described in 1) and 2) below.

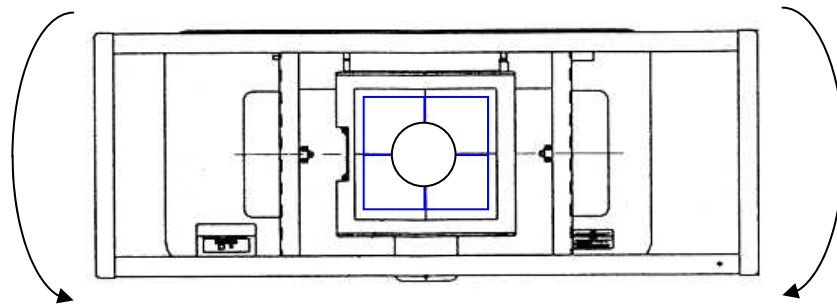
- 1) Align the position so that the cross lines of X-ray tube and the sensor unit exactly match. If the position is mismatched as shown in [NG] below, the sensor unit and the stand are not aligned horizontally to the X-ray tube. In this case, put the spacer between the base of the stand and the floor to align the slight differences.



[OK]



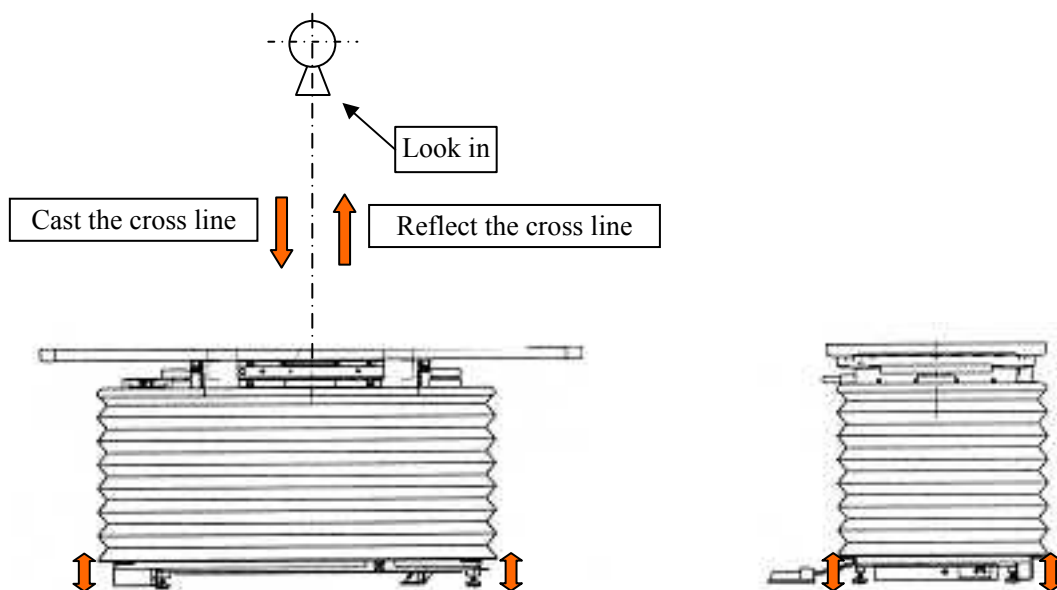
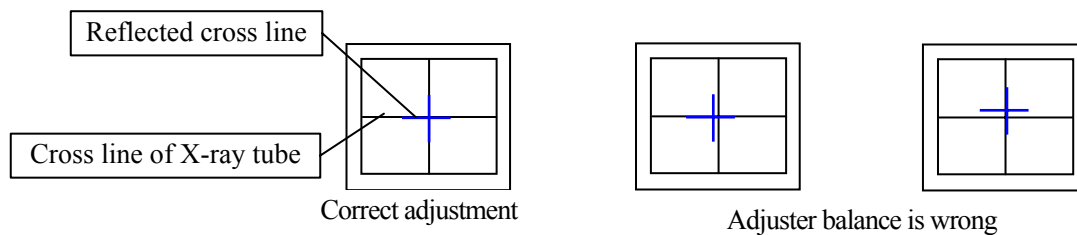
[NG]



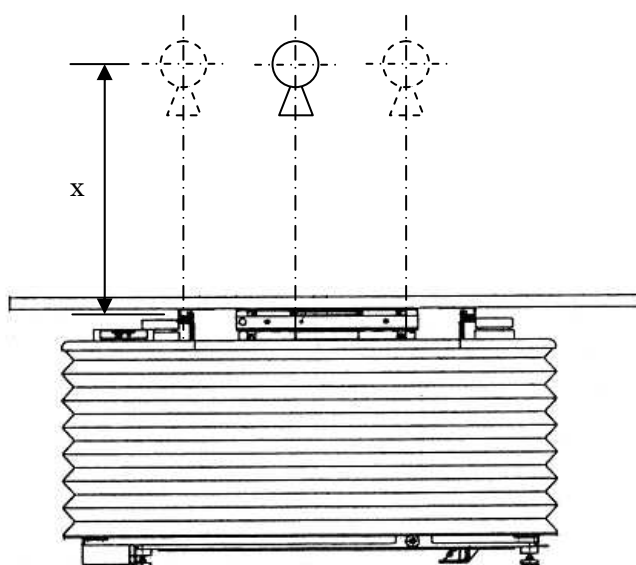
[Top View]

2. Installation

- 2) Look in the X-ray tube to check the cross line reflected from the mirror matches the cross line on the X-ray tube. If it does not match, adjust the height of the table by the adjuster or the spacer to align the slight differences.



- (5) Regardless the height of the X-ray tube and the sensor unit, it should keep the positional relation aligned in step (4) above.



2. Installation

6. Installing the Phototimer

6.1 Overview

Obtain a phototimer and fixture piece from a distributor, and install it in the Bucky unit, stand or table.

6.2 Notes

1) Cable routing

The routing for the Bucky unit and table/stand cables connected to the phototimer are based on the specifications of the respective phototimer, but they must satisfy the conditions below.

Do not forcibly bend, fold over, or pull out the cables, and secure the cables so that no excessive loads are applied to them in any state.

2) Selecting the phototimer

The recommended phototimers should be structurally identical to the recommended phototimer models for the CXDI-40E series. Note that quality cannot be guaranteed if phototimers not listed here are installed.

Obtain a phototimer with suitable light sensor dimensions for installing in the Bucky unit, stand or table. The table below shows phototimers that are installed in the series 40E imaging units. Note that other phototimers with identical light sensor dimensions to those in the table below cannot be installed.

Reference: Recommended phototimers for the CXDI-40E series

Manufacturer	Hitachi (for upright stand)	Hitachi (for table type)	Hitachi (for upright stand)	Hitachi (for table type)
Manufacturer's model name	PDS-CXDI-11	PDS-CXDI-12	PDS-CXDI-11-2CH	PDS-CXDI-12-2CH
Light-sensor system	Photomultiplier	Photomultiplier	Photomultiplier	Photomultiplier
Number of lighting fields	1	1	2	2
Light sensor dimensions (W x H)	454 x 460	454 x 460	454 x 460	454 x 460
Light sensor thickness	2.5	2.5	2.5	2.5

Manufacturer	Hitachi (for upright stand)	Shimadzu	Shimadzu (for table type)	Toshiba (for upright stand)
Manufacturer's model name	PDS-CXDI-11-3CH	SPT-XD-S01		PTF-20L/22
Light-sensor system	Photomultiplier	Ion chamber	Photomultiplier	Optical fiber
Number of lighting fields	3	4	1	1
Light sensor dimensions (W x H)	454 x 460	450 x 450	454 x 460	454 x 460
Light sensor thickness	3.5	2.5	2.5	2.5

2. Installation

Manufacturer	Toshiba (for table type)	AID	COMET	Siemens (thin type)
Manufacturer's model name	PTF-20B/20	ICX122	B3 remodeled B3A remodeled	8167538X1651
Light-sensor system	Optical fiber	Ion chamber	Solid	Ion chamber
Number of lighting fields	1	3	3	3
Light sensor dimensions (W x H)	454 x 460	449.3 x 449.3	465 x 465	449 x 455
Light sensor thickness	2.5	7.1	3.4 (6 including external frame cover)	6.4

Manufacturer	Siemens (Thick type)	VACUTEC	GILLARDONI	
Manufacturer's model name	8354599X1181	70145	10305800/10358400	
Light-sensor system	Ion chamber	Ion chamber	Solid	
Number of lighting fields	3	3	3	
Light sensor dimensions (W x H)	465 x 465	458 x 450	460 x 460	
Light sensor thickness	11.4	6.2	4.5	

2. Installation

7. Starting up and Shutting Down the System

Perform the following sequences when starting up and shutting down the system.

1. Sequence for Starting up the System

Perform the following sequence when turning the system power on.

If you do not perform the correct sequence, the imaging unit cannot be recognized, resulting in an error.

(This is because the system communicates with the imaging unit when turning the system on.)

The power box cannot be turned on in conjunction with turning on the control PC.

1) Turn on the main power of the power box.

2) Turn on the control PC.

Note:

Ccrstart.bat should be registered in Windows Startup.

2. Sequence for Turning the Power off (Shutdown)

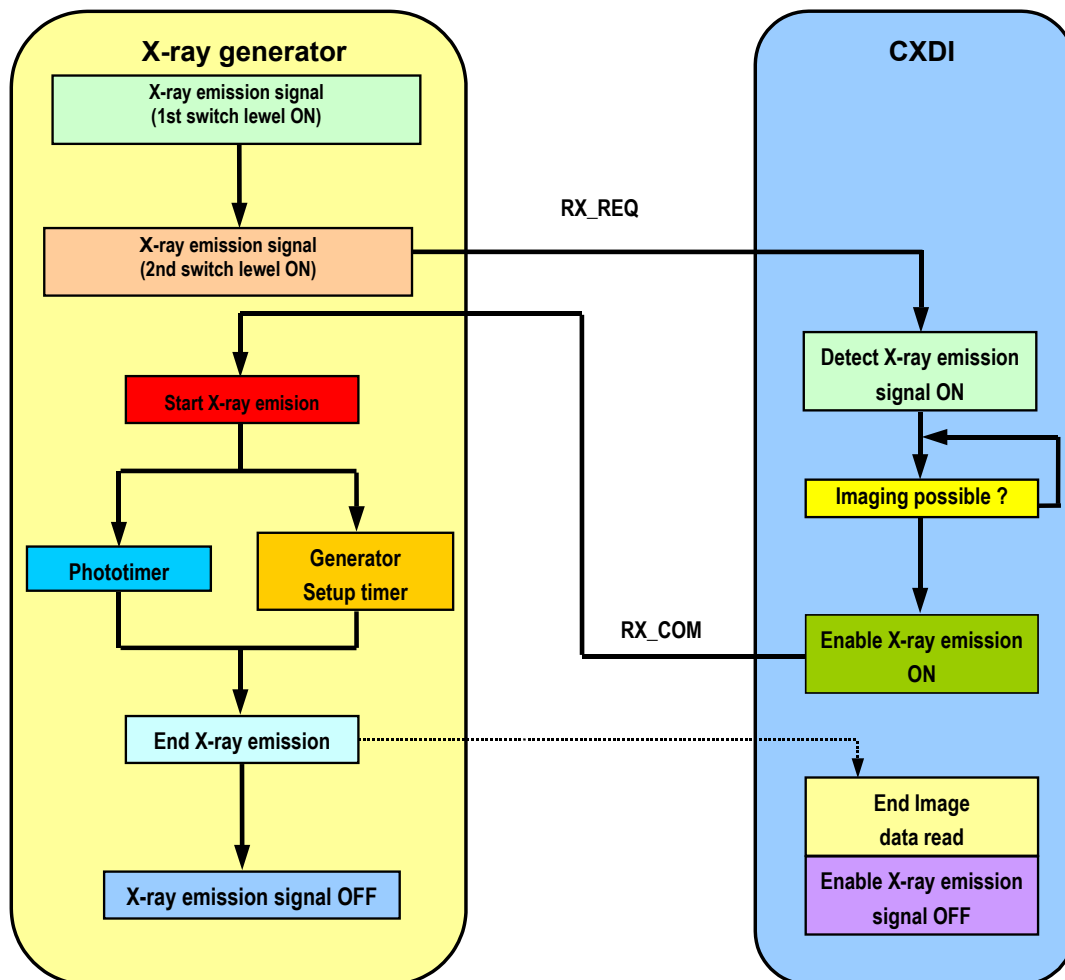
1) From OPU, select SYSTEM → [SHUTDOWN] or [SHUTDOWN after transfer]

The control PC automatically turns off.

2) Turn off the main power of the power box.

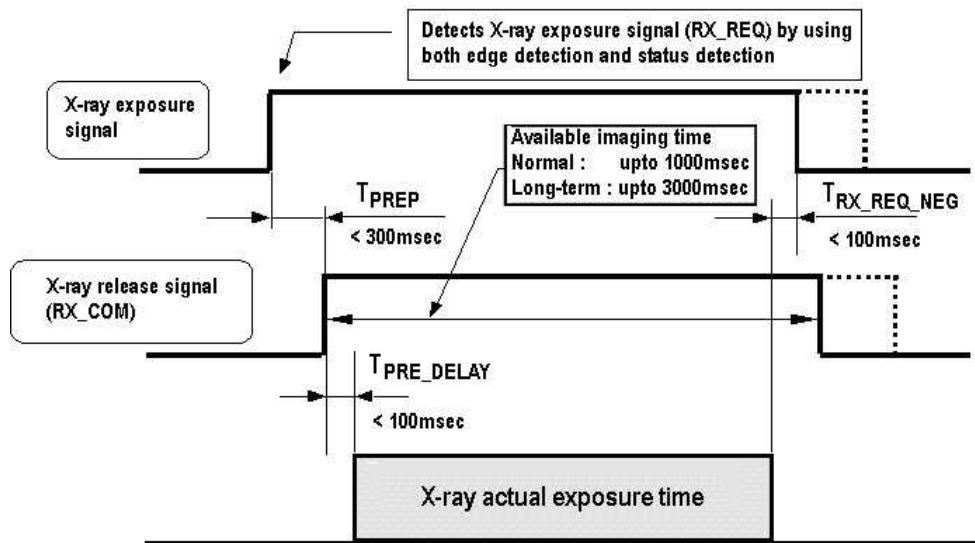
8. X-ray Controller Interface

8.1 Interface Signal Description



2 Installation

8.2 When Normal Imaging



T_{PREP}

Time taken to assert the X-ray exposure authorization signal (RX_COM) after the X-ray exposure request (RX_REQ rise) from the X-ray generator has been received.

T_{ACC_enable}

Output period of X-ray exposure authorization signal (RX_COM)

$T_{RX_REQ_NEG}$

Time taken for the X-ray exposure request signal (RX_REQ) to be negated after X-ray exposure is completed

T_{PRE_DELAY}

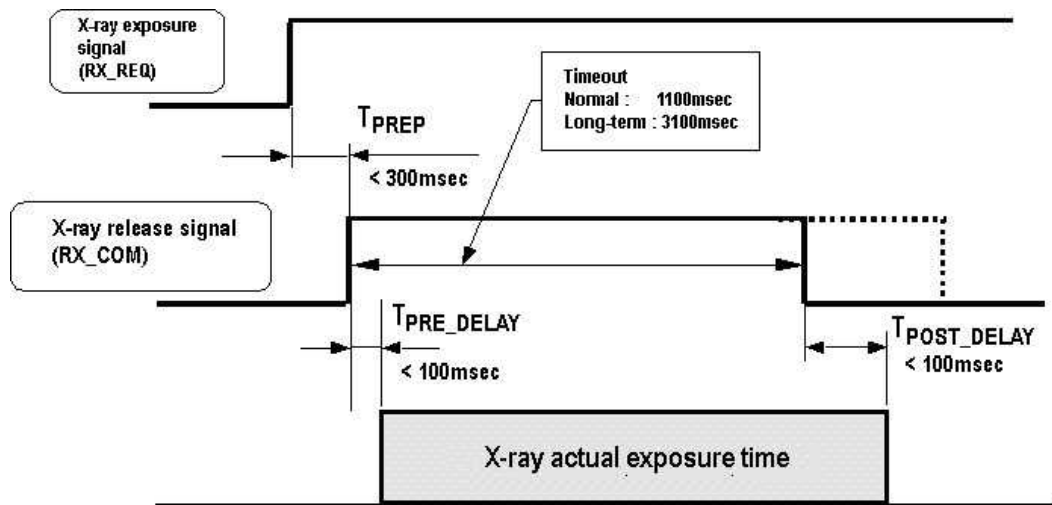
Time taken for the exposure to the X-rays after the X-ray exposure authorization signal (RX_COM) has been asserted

T_{POST_DELAY}

Time taken for stopping the X-rays after the X-ray exposure authorization signal (RX_COM) has been negated

2 Installation

8.3 When Timeout due to RX_REQ not Negating



2 Installation

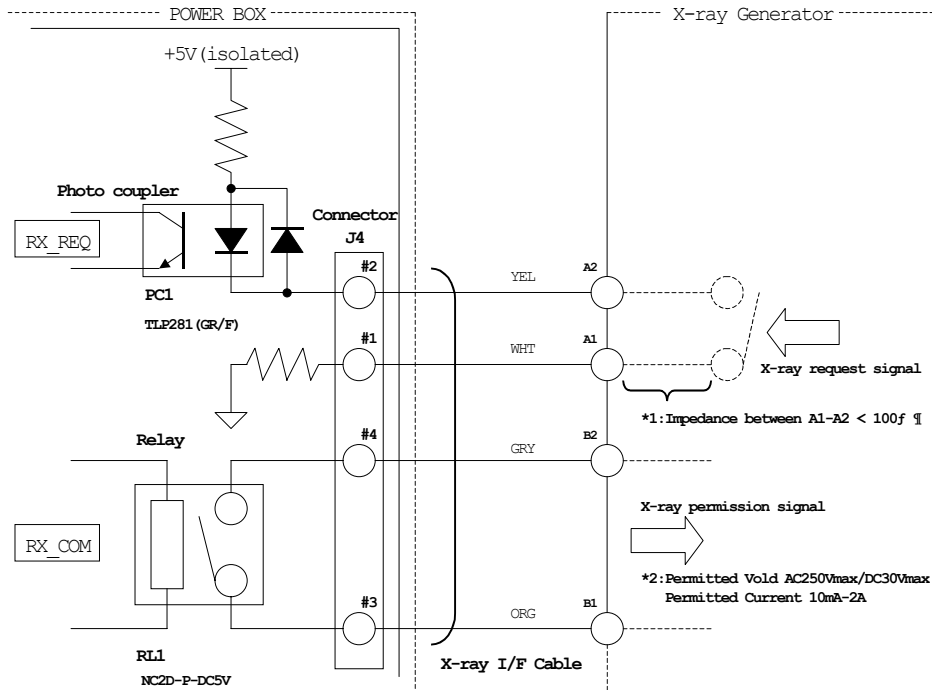
8.4 Signal Names and Functions in the Connection with the X-ray Generator

<X-ray Sync Signal>

Signal name	Functions
RX_REQ	X-ray exposure signal Indicates that an X-ray exposure is ordered at the X-ray generator side. This signal needs to be retained at least for T_{PREP} period. X-ray release signal (RX_COM) is not output if the T_{PREP} is less than the necessary period. It takes about 1 second in the worst case scenario before the operation can be resumed when RX_REQ is negated in this period. Time required to assert RX_COM after receiving the RX_REQ from the X-ray generator T_{PREP} Max. 300 ms Since a captured image is read from the sensor when RX_REQ is negated (or RX_COM is time out) as a trigger, reading action is delayed if RX_COM does not negate and time out is used as the trigger, resulting in delay of image display timing. We recommend using a configuration in which RX_REQ is negated. Time required from X-ray exposure completion to negating RX_REQ $T_{RX_REQ_NEG}$ min.0 max.100ms * Image display timing is delayed if this is not fulfilled.
RX_COM	X-ray release signal Checks whether or not imaging is ready at the CXDI side after receiving X-ray exposure signal (RX_REQ) from the X-ray generator. This signal is output to the X-ray generator side when imaging is ready. Time required from asserting RX_COM to exposing X-ray T_{PRE_DELAY} min.0 max.100ms * Available imaging time is reduced if this is not fulfilled. Time required to stop X-ray exposure after RX_COM halts T_{POST_DELAY} min.0 max.100ms * Shading could occur on images if this is not fulfilled.

2 Installation

8.5 The Connection with X-ray Generator Equipment



Connections Between System and X-ray Generator

Connection conditions

1. The X-ray exposure signal line (including switching mechanism) must be insulated, and its total impedance must be 100 ohms or less.
2. The maximum contact voltage of the X-ray exposure authorization signal line is AC 250V and DC 30V, and its current ranges from 10mA to 2A.
Only the insulated secondary power supply can be connected.
3. The protective installation of the X-ray generator must have the same electrical potential as the system.

2 Installation

8.6 Rating and Characteristics for Relay and Photo Coupler (on PWB-40EXRAY Board)

(1) RL1 (Power Relay/Plug-in terminal type)

1) Rating (Operational coil)

Rated voltage (V)	Rated current	Coil resistance	Coil Inductance (mH)		Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption
	(mA)	(Ω)	Armature OFF	Armature ON	(V)	(V)	(V)	(mW)
DC5V	72	69.4	69.5	86.0	80% and lower	10% and higher	135% (at 50 °C)	Approx 360

2) Rating (Switch/Contact)

types	Single stable
arrangement	2 Form C
Contact material	Au-clad AgNi type
Relating capacity	AC250 5A DC30V 5A
Max. switching power	1250VA 150W
Max. switching voltage	250V AC
Max. switching current	5A
Min. switching capacity	100μA 1V DC

3) Characteristics

Item		Content
Operate time		Max. 20ms
Reset time		Max. 10ms
Maximum open/close frequency	Mechanical	18,000 times/hour
	Rated load	1,800 times/hour
Withstand voltage	Between coil contacts	2,000 Vrms
	Between same poles	1,000 Vrms
life	Mechanical	5x10 ⁷ times
	Electrical	10 ⁵ at 5A 250V AC 5x10 ⁵ at 5A 30V DC
Ambient temperature		-40°C to +70°C (no freezing nor condensation)
Maximum operating frequency		50 times/Sec.

2 Installation

(2)PCI (Photo-coupler)

1) Maximum Ratings (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING
LED	Forward Current	$I_F(\text{RMS})$	50 mA
	Forward Current	$\Delta I_F/^\circ\text{C}$	-0.7(Ta $\geq$ 53°C)
	Pulse forward current ¹	I_{FP}	1 A
	Reverse Voltage	V_R	5 V
DETECTOR	Collector-Emitter Voltage	V_{CEO}	80 V
	Emitter-Collector Voltage	V_{ECO}	7 V
	Collector Current	I_C	50 mA
	Collector Power Dissipation (1 Circuit)	P_C	150 mW
Total Package Power Dissipation (1 Circuit)		P_T	200 mW
Isolation Voltage ²		BVs	2500 Vms

2) Electrical Characteristics(Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP	MAX.	UNIT
LED	Forward Voltage	V_F	$I_F=10\text{ mA}$	1.0	1.15	1.3	V
	Reverse Current	I_R	$V_R=5\text{ V}$	-	-	10	μA
	Capacitance	C_t	$V=0, f=1\text{ MHz}$	-	30	-	pF
	Max. Forward voltage	V_{FM}	$I_{FM}=0.5\text{ A}$	-	3	4	V
DETECTOR	Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C=0.5\text{ mA}$	80	-	-	V
	Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	$I_E=0.1\text{ mA}$	7	-	-	V
	Collector Dark Current	I_{CEO}	$V_{CE}=48\text{ V}$ Ambient Light Below (100lx)	-	0.01 (2)	0.1 (10)	μA
			$V_{CE}=48\text{ V}$, Ta=85 Ambient Light Below (100lx)	-	2 (4)	50 (50)	
SWITCH CHARACTERISTIC	Rise Time	t_r	$V_{CC}=10\text{ V}$ $I_C=2\text{ mA}$ $R_L=100\Omega$	-	2	-	μs
	Fall Time	t_f		-	3	-	
	Turn-On Time	t_{ON}		-	3	-	
	Turn-Off Time	t_{OFF}		-	3	-	
	Turn-On Time	t_{ON}	$V_{CC}=5\text{ V}$ $I_F=16\text{ mA}$ $R_L=1.9\text{ k}\Omega$	-	2	-	μs
	Storage Time	t_S		-	25	-	
	Turn-Off Time	t_{OFF}		-	40	-	

Note: Because of the construction, leak current might be increased by ambient light. Please use photo-coupler with less ambient light

¹ pulse amplitude 100 μs , frequency 100Hz

² AC, 1min R.H. $\leq$ 60 LED side pins shorted together and DETECTOR side pins shorted together

2. Installation

9. Network Settings

9.1 Overview

CXDI-40G COMPACT imaging part communicates with the control PC by using Ethernet [IEEE802.3u (100Base-TX)] to transfer X-ray images.

The control PC performs DICOM transfer in order to use Ethernet to transfer the obtained images to the printer and storage device.

This section describes how to set up the TCP/IP that is necessary for the network connection.

Set up the following four items:

- 1) TCP/IP setting for the control PC network card
- 2) Network setting for Screwcap.ini
- 3) Network setting stored in the imaging unit
- 4) Connection setup for a multiple number of sensor units

9.2 Preparation

- Keyboard
- Mouse

Connect the keyboard and mouse to the back of the control PC.

Check if the system is connected, and then turn the system on.

If restrictions have been set on the operation of the operating system, release them.

9.3 Setup Method

9.3.1 TCP/IP Setting for the Control PC Network Card

Perform the set up by referring to “FC-24VE for CXDI Control Station Service Manual” -> the chapter “System Manual” -> “Network Setup”.

Default values

IP Address:192.168.100.10

SubnetMask:255.255.255.0

2. Installation

9.3.2 Network Setting for Screwcap.ini

The CXDI software communicates with the imaging part through screwcap.dll by using the communication protocol for sending and receiving commands and responses.

In conjunction with the communication, Screwcap.ini retains the information of the connected imaging unit and control PC such as network addresses.

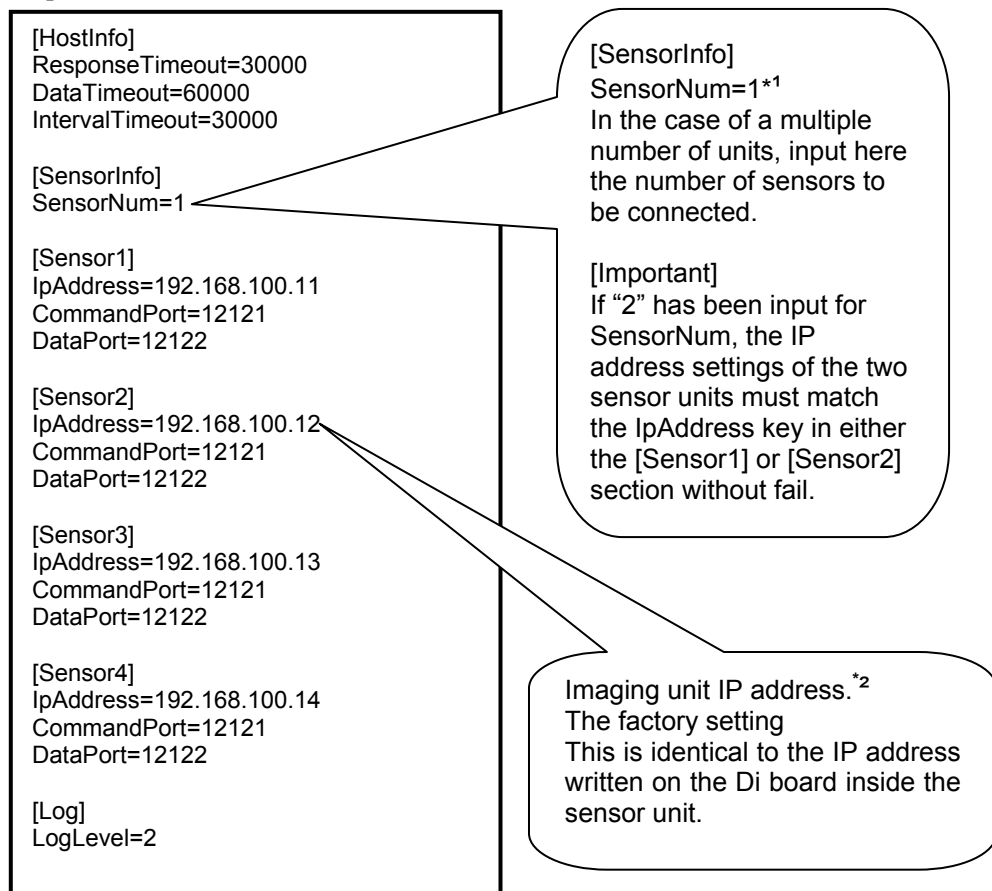
It is necessary to edit Screwcap.ini to communicate with the imaging part.

Screwcap.ini factory setting is the following default setting (see the figure below). If a single sensor unit to be connected to the control PC, Screwcap.ini does not require editing, and only a check need be conducted.

If a multiple number (2 or more) of sensor units are to be connected to the control PC, Screwcap.ini must be edited. (* Refer to “9.3.4. Connection setup for a multiple number of sensor units.”)

Screwcap.ini is located in the following directory:

D:\ccr\screwcap.ini



*1 “SensorNum=1” is the default value for the installer of the system software.

Only the [Sensor1] section is supported.

When the SensorNum key has been set to “2,” “3” or “4” (SensorNum=2, 3 or 4), the [Sensor1, Sensor2], [Sensor1, Sensor2, Sensor3] or [Sensor1, Sensor2, Sensor3, Sensor4] sections are supported, respectively.

*2 Imaging unit IP address: This must be identical to the IP address stored in “9.3.3 Network settings stored in imaging unit” in the next section.

Note: All editing using keys other than the SensorNum keys is forbidden.

2. Installation

9.3.3 Network Setting Stored in Imaging Unit

The factory default setting is shown in the table below.

There is no need to change the settings when a single sensor unit is to be connected to the control PC.

If a multiple number (2 or more) of sensor units are to be connected to the control PC, the IP address setting for one or more of the sensor units must be changed. (* Refer to “9.3.4. Connection setup for a multiple number of sensor units.”)

Item to be set	Factory default value
Imaging unit IP address	192.168.100.11
Subnet mask	255.255.255.0
Gateway address	000.000.000.000
Host IP address	192.168.100.10
Port number for command	12121
Port number for data	12122

To change the settings, follow the instructions in “7. Imaging Unit IP Address setting” found in the “Tool Software Operation Manual for Ethernet.”

2. Installation

9.3.4 Connection Setup for a Multiple Number of Sensor Units

When the control PC is to be connected to a multiple number (2 or more) of sensor units, it is recommended that the equipment be connected via a hub using straight cables (supporting category 5 or higher). You can use both straight and crossover cables when using a hub that provides Auto MDI/Auto MDI-X function.

Use of units other than a hub, such as a dual-port LAN card or multiple number of LAN cards, is not recommended (since no guarantees are made for operation).

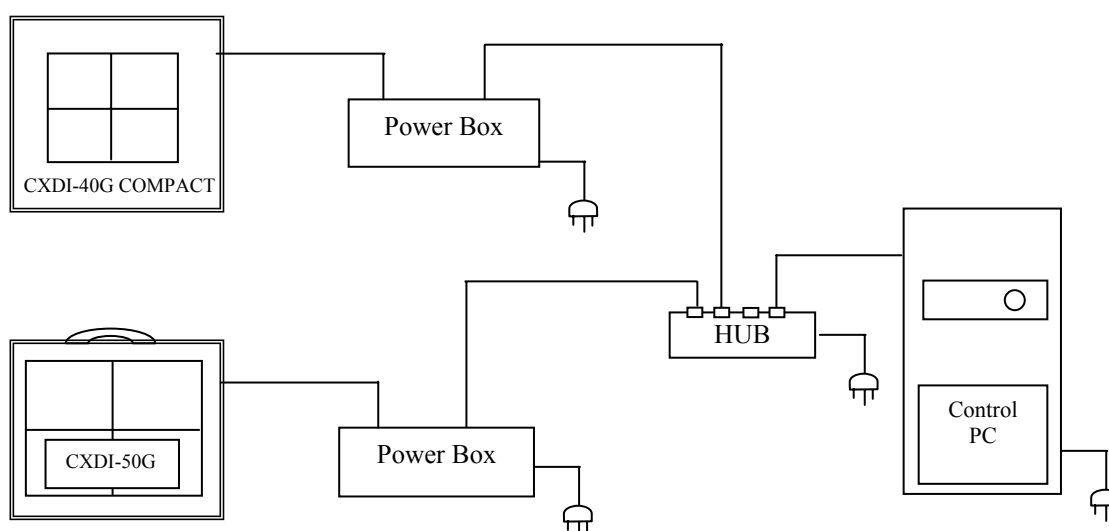
When the control PC is to be connected to a single sensor unit, connect the equipment using a crossover cable as in the past.

* **Note:** Bear in mind that when connecting the equipment to a hospital LAN, for instance, if the environment is not a favorable one for Ethernet (there is too much traffic or high noise levels), the equipment may not be able to demonstrate its performance to the full. Therefore, the construction of a network consisting solely of the CXDI system is strongly recommended.

*Up to three identical sensors can be connected. Each sensor must be paired with a power box.

*The LAN cables and hub are procured from the sales companies (or distributor).

Connect as shown below if a multiple number of sensor units are to be connected. Example: CXDI-40G COMPACT + CXDI-50G + control PC



9.3.4.1 General Flow for Setup Procedure

- 1) Proceed with the system connections between the single sensor unit and control PC.
- 2) Change the IP address settings.
- 3) Check the IP address and subnet mask settings.
- 4) Perform steps 1) to 3) for every sensor to be connected.
- 5) Edit the screwcap.ini file.
- 6) Start up the system software.
- 7) Set the CCR console menu.
- 8) Reboot the system software.

2. Installation

9.3.4.2 Detailed Setup Procedures

Example: CXDI-40G COMPACT + CXDI-50G + Control PC

*1: Sensor1: CXDI-40G COMPACT

*2: Sensor2: CXDI-50G

*1: [Sensor1] section in screwcap.ini file

*2: [Sensor2] section in screwcap.ini file

Note: Do not connect a multiple number of sensor units simultaneously by following steps 1) to 3).

- 1) First, connect the first sensor unit (here, the CXDI-50G) to the control PC via the hub.
- 2) Change the IP address setting to “192.168.100.12” in order to allocate CXDI-50G as [Sensor2]. The purpose of allocating the first sensor unit as [Sensor2] is to avoid conflict between the two sensor IP addresses when the second sensor unit has been connected.

To change the setting, follow the instructions in the “Tool Software Operation Manual for Ethernet” and then the instructions under “7. Imaging Unit IP Address setting.”
- 3) Be absolutely sure to check that the IP address setting of the CXDI-50G has been changed. To check the setting, use the ping command of the command prompt or follow the instructions in the “Tool Software Operation Manual for Ethernet.” and then the instructions under “7. Imaging Unit IP Address setting.”
- 4) Connect the second sensor unit (here, the CXDI-40G COMPACT) to the control PC via the hub. There is no need to change the IP address of [Sensor1] since it is allocated to the CXDI-40G COMPACT as the default.
- 5) After connecting the multiple number of sensor units, edit the SensorNum key in the [SensorInfo] section of the screwcap.ini file to “SensorNum=2,” and save the file.
- 6) After editing the screwcap.ini file, start up the system software.
- 7) Switch over to the CCR console menu on the DOS screen, select 1 => 0 => 7 to set “Max Capture Devices=2,” and input the fixed sensor serial numbers of the sensor units.
- 8) Upon completion of the CCR console menu setting, restart the system software.

This completes the connection of the multiple sensor units.

****Reference***

- When connecting three or four sensor units to the control PC, the units must be connected one by one, and the above steps 1) to 8) must be followed to ensure that there is no conflict between the sensor IP addresses by allocating the IP addresses in the sequence of the [Sensor3] to [Sensor1] or [Sensor4] to [Sensor1] sections in the screwcap.ini file.
- If the number of CXDI-50G/50C imaging units is to be increased in an environment where the control PC is connected to a single CXDI-40G COMPACT imaging unit, they are connected with LAN cables via a hub. In a case like this, the additional sensor units are first connected via the hub to the control PC, and their imaging unit IP address settings are changed. After confirming the setting change, the existing sensor units must be connected with LAN cables via the hub and the above steps 5) to 8) must be followed.

2. Installation

10. Adjusting the Photo Timer

10.1 Overview

The photo timer installed in the imaging unit is adjusted so that the exposure time of the X-rays generated by the X-ray generators is to OFF using the optimal value.

* This work necessitates performing some adjustments inside the X-ray generators. In order to ensure that the work will proceed smoothly, discuss the schedule and other details with the representative of the manufacturer of the X-ray generators.

10.2 Preparation

(1) Start up the CXDI system. (Normal radiography mode)

(2) Perform calibration.

Note

Do not install grid or table top.

(3) Change parameters of VPT button as follows.

* This operation must be done by the “VPT” button which uses “fixed ROI”. The adjustment cannot be performed properly by the body parts buttons which use auto ROI.

1) From SYSTEM > EDIT EXPOSURE MODE, select VPT button.

2) Press the NEXT PAGE button to enter the parameter editing screen and then set the following parameters.

(A) GENERATOR PARAMETER SCREEN

Set only the center of the fixed ROI area to ON.

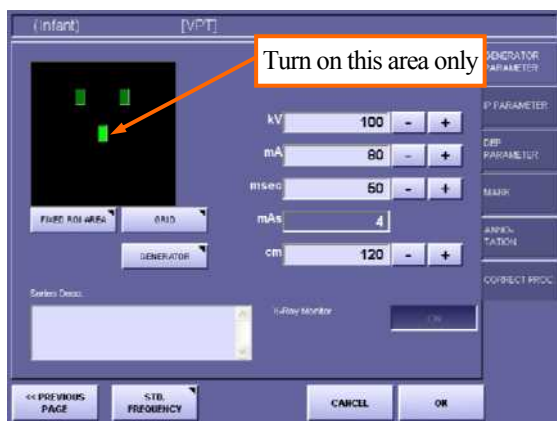
(During the adjustment, the acrylic sheet may be used to cover the fixed ROI area selected here.)

(B) IP PARAMETER SCREEN

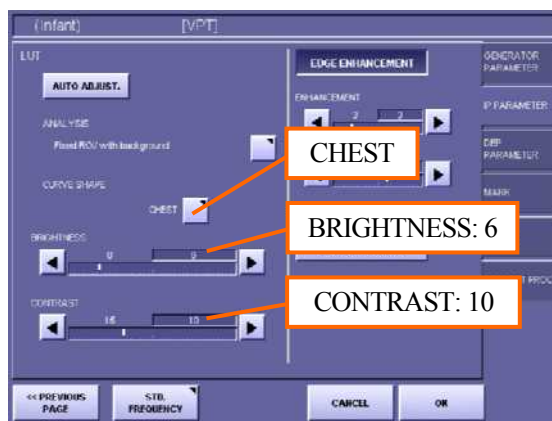
CURVE SHAPE: CHEST

BRIGHTNESS: 6

CONTRAST: 10



[GENERATOR PARAMETER SCREEN]



[IP PARAMETER SCREEN]

3) Press the OK button to save the parameters you changed.

2. Installation

10.3 Adjustment

It is advisable to leave the photo timer adjustments in the hands of the individual representing the manufacturer of the X-ray generators.

Basically, it is essential that the manufacturer's representatives perform these adjustments at the same time as the film screen and/or screen system adjustments.

(1) Have ready the 5cm, 10cm, and 20cm photo timer adjustment acrylics sheets, proceed to X-ray at 70k V, 100kV and 120kV, respectively, and adjust the photo timer so that the Rex value is 650. (At this step, it is mainly the sensitivity difference that is based on the radiation quality of the photo timer which is adjusted.)

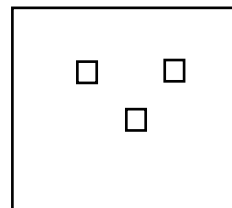
(2) Adjust the radiation dosage gradually using the option buttons (such as the H.S button, L.S button, “+” (plus) and “-” (minus) button) on the X-ray generator, and decide on the final dosage.

For instance, the L.S button is for providing about 1.5 times the default dosage.

If, in overall terms, the sensitivity has shifted slightly or it differs slightly from one body part to another, use the H.S, L.S, “+” and “-” buttons on the X-ray generator to adjust the sensitivity as required.

Reference: If the Rex value is set as in the list when the acrylic sheet was X-rayed under the conditions set by the above “Adjustment button”, this value will be in the order of 300 to 350 when the “Chest front” button is used and the chest front of a person is X-rayed under the following conditions.

Automated ROI#3(CHEST PA)/ with back ground
CURVE SHAPE: CHEST
BRIGHTNESS: 16
CONTRAST: 10



With auto ROI, all the areas are turned off.

2. Installation

11. Setting the Fixed ROI Areas

(1) Purpose

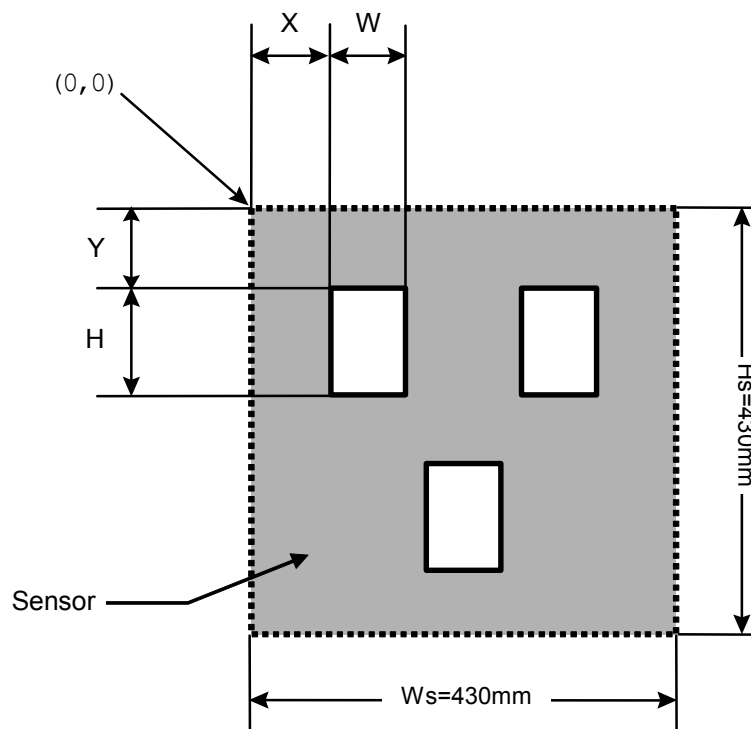
Set the fixed ROI area on the sensor to expose by the fixed ROI area because user cannot get the proper image by the Auto ROI area.

(2) Setting method

1) Investigate the actual size and position of the ROI that is required.

2) Designate the SIZE, POSITION, and NUMBER (max 5) on the sensor.

* However, in the case of using the new function “Display of AEC (Automated Exposure Control) Field in Preview Screen” added from CXDI System Software Ver.6.2, NUMBER that can be specified is max 3.



3) Convert the size and position of the ROIs in 2) to pixel values. The pixel size of the sensor is $160\mu\text{m}$. For multiple values, use X' , Y' , W' , H' , X'' , Y'' , W'' , and H'' for calculations.

$$X/160\mu\text{m}$$

Let this value equal A

$$Y/160\mu\text{m}$$

Let this value equal B

$$W/160\mu\text{m}$$

Let this value equal C

$$H/160\mu\text{m}$$

Let this value equal D

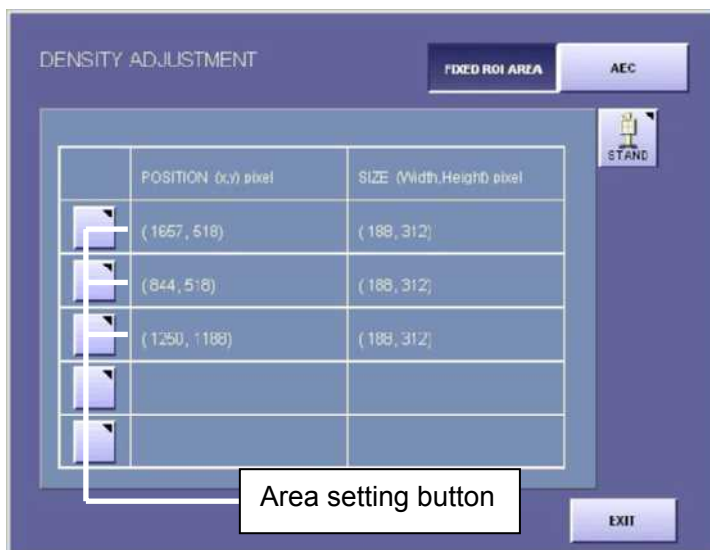
4) Open the “DENSITY ADJUSTMENT CONTROL” screen when the normal imaging screen is active.

**SYSTEM→SETUP MENU→SYSTEM SETTINGS→
ADJUSTMENT CONTROL**

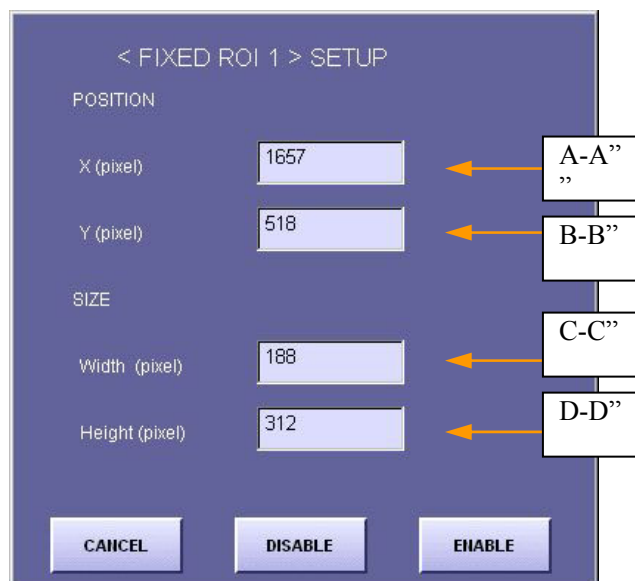
DENSITY

2. Installation

- 5) The “DENSITY ADJUSTMENT CONTROL” screen appears. Confirm that the sensor is set with a sensor switch button. Press the [Fixed ROI Area] key.
- 6) Press the [Area setting] key.

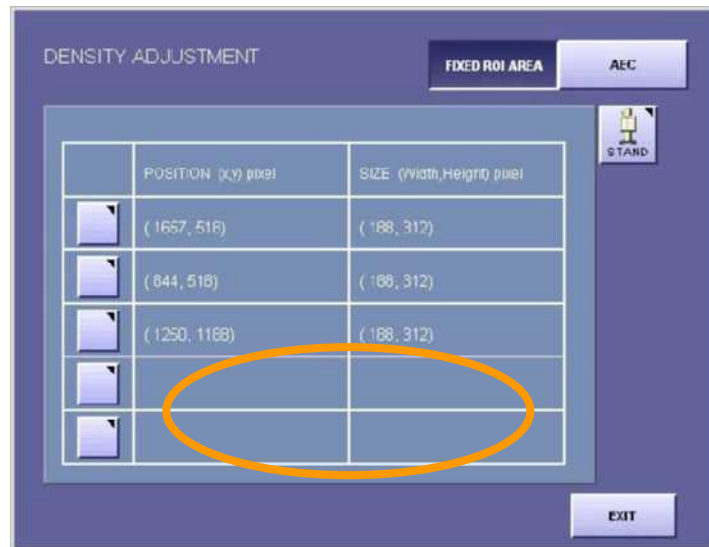


- 7) The fixed ROI 1 setting screen appears. Input values A to D from step 3) into the edit box, and press [ENABLE]. To set multiple fixed ROIs, input A' to D' and A'' to D'' into fixed ROI 2 settings and fixed ROI 3 settings respectively.



2. Installation

- 8) The display returns to the “DENSITY ADJUSTMENT CONTROL” screen. Confirm that POSITION and SIZE fields not set in step 5) to step 7) are disabled (dimmed). If they are not dimmed, press the [Area setting] key, and press [DISABLE] in fixed ROI * settings.



- 9) After Confirming all settings, and press [EXIT].
- 10) The display returns to the system settings screen. Press [OK].
- 11) “Change settings?” appears. Press [OK]. Be careful, because if [CANCEL] is pressed, all changes made to the settings are deleted.
- 12) Return to the normal imaging screen, and turn off the power to the CXDI.

2. Installation

12. Settings

12.1 Checking and Setting the Date and Time

1) Purpose

The date and time is set to Japan standard time at factory shipment.

Reset the date and time to your local value as necessary.

2) Procedure

2-1) When CXDI application start, open the ADMINISTRATOR SETUP MENU.

SYSTEM → SETUP MENU → ADMINISTRATOR SETUP

2-2) When the “ADMINISTRATOR SETUP MENU” appears, and presses the [DATE] button.

2-3) The dialog (Date / Time Properties) appears, and set the value properly each of the fields which the tab sheet (Date Time and Time Zone sheet) has. And then press [OK].

2. Installation

12.2 Checking the Firmware Version

1) Purpose

- 1-1) Failing to use the proper versions of the firmware and PLD code with the CXDI application can result in an error, and system operation cannot be guaranteed. Therefore, the versions of the firmware must be checked to ensure that they are correct.

2) Notes

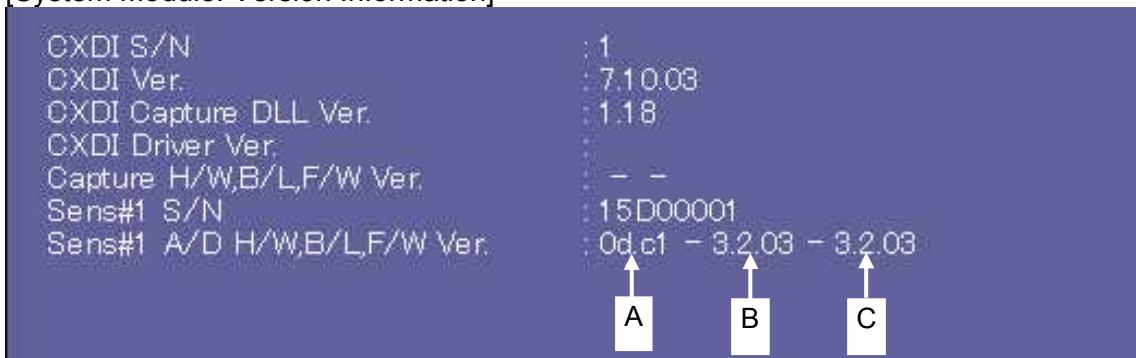
- 2-1) This check should always be performed at installation, and if necessary, the firmware versions should be upgraded.
- 2-2) This check cannot be performed with only the control PC. Connect the imaging units and other equipment, and start up in the normal imaging status.

3) Procedure

3-1) Checking the firmware alone

- a. Start up the CXDI system.
- b. Display the version information from the user mode.
SYSTEM > SETUP MENU > VERSION INFORMATION
- c. Confirm the firmware version.

[System Module: Version Information]



A. Hardware version

Product type and Sub No.: Product type is identified from Sensor serial No. set to the Imaging unit. Sub No. indicates the states of the PWB-Di board dipswitch2-1 to 4. (0d.**=40G COMPACT)

B. Firmware initialization code version

This is the version of the initialization code written on the PWB-Di board.

Initialization code will be downloaded and settings will be reset to the default (factory)

Settings by turning ON the power while pressing the initialization switch on the power Box.

Display of “3.2.03” on the screen indicates version 3.02.03.

C. Firmware normal code version

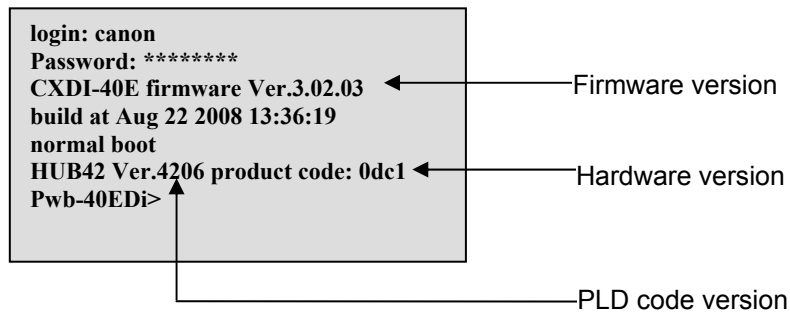
This is the version of the normal code installed on the PWB-Di board. Usually the system operates with this code. It must be updated as required.

Display of “3.2.03” on the screen indicates version 3.02.03.

2. Installation

3-2) Checking the firmware and PLD code

- (1) Connect the keyboard and mouse.
- (2) Start up the CXDI system.
- (3) Close the CXDI host software if it starts up.
- (4) Connect Telnet by referring to “Concerning Telnet Connections” in the Tool Software Operation Manual.
- (5) Check the versions of the firmware and PLD code on the screen displayed after the login.



- (6) After you finish checking, close HyperTerminal.

2. Installation

12.3 Installing Firmware and PLD Code

1) Purpose

Install the Firmware and PLD code into the Flash ROM of the PWB-Di board in the imaging unit.

2) Notes

Be sure to check that the CXDI is connected to the system.

3) Procedure

3-1) Installing the firmware

Write the firmware by referring to “3.Firm Write Tool Software (Firmwrite.exe)” in the Tool Software Operation Manual.

Where to write: PWB-Di board

3-2) Installing PLD code

Write PLD code by referring to “2.HUB PLD Write Tool Software (pldwrite.exe)” in the Tool Software Operation Manual.

Where to write: PWB-Di board

2. Installation

12.4 Checking the Sensor Serial No.

1) Purpose

If the sensor serial number stored in PWB-Di and the sensor serial number stored on the hard disk of the control PC fail to match as a result of replacing the PWB-Di board or sensor unit, it will not be possible to detect the connected sensors when the CXDI application is launched, and a sensor error message will be displayed. For this reason, check the numbers and rewrite them if necessary.

2) Notes

2-1) Check the sensor serial No. whenever:

- a When the PWB-Di board has been replaced
- b When a sensor unit has been replaced

2-2) This checking procedure must be performed with the Control PC, Imaging Unit and all the other equipments connected and started up.

3) Procedure

3-1) Refer to “6 Sensor serial number setting” in the “Sensor serial number setting,” and check the sensor serial numbers. Rewrite them if necessary.

2. Installation

12.5 Set Up Startup Menu

1) Purposes

- 1-1) Register the CXDI application software to the “Startup Group”.

The CXDI application software is scheduled to start automatically at the CXDI system starting

- 1-2) Change the window view size

Hide the other application screen view except the CXDI application software.

* Reference: The CXDI runs with the console window minimized with system software version 6.06.00 and up.

- 1-3) Delete the CXDI application software from the “Startup Group”.

The CXDX application software is not started at the CXDI system starting.

2) Notes

- 2-1) The CXDI application software is not registered in the “Startup Group” at the factory setting.

Therefore register the CXDI application software to the “Startup Group” after the system installation.

- 2-2) The window view size of the program registered in “Startup Group” has one own size with the each short-cut icon. Be sure to set the window view size of CXDI application software at the same time with the register to the “Startup Group”.

3) Register the CXDI application software to the “Startup Group” procedure.

- 3-1) Connect keyboard and mouse to the control PC.

- 3-2) Turns the all CXDI system power on after the all installation finished. And after that Windows XP starts.

- 3-3) Open the “Taskbar and Start Menu” from the Start Menu.

Start⇒Settings⇒Taskbar and Start Menu

- 3-4) “Taskbar and Start Menu Properties” appears. Click “Start Menu” tab, and then click Taskbar and Start Menu Properties⇒Start Menu⇒Classic Start⇒Menu Customize

- 3-5) Click Add, and Create Shortcut appears. Click Browse.

- 3-6) Browse appears. Find a file named “ccrstart.bat” in drive [D:\ccr] and click OK.

- 3-7) D:\ccr\ccrstart.bat appears in the Command line. Click Next.

- 3-8) Select Program Folder appears. Select Startup folder and click [Next].

- 3-9) Select a name for the shortcut appears. Type ccrstart.bat. Click [Finish].

- 3-10) Close the Taskbar [Start], and login again to Windows XP.

Start⇒Shut Down⇒Log off cxdi.

- 3-11) After login the computer, make sure that the CXDI application starts up.

2. Installation

- 4) Change the window view size
 - 4-1) After the CXDI application software start, press [Alt] + [Tab] key to show the “Debug mode” prompt screen.
 - 4-2) After the command prompt screen appears, click the icon (called System icon) where is in right-top of its window.
 - 4-3) System icon menu appears. Select Properties from the menu. [Fig 1]



[Fig 1]

- 4-4) Click the “Font” tab from the “ccrstart.bat” properties and change its size to “6 x 13”.
- 4-5) Click the “Layout” tab and change the “Height” of the “Screen Buffer Size” to 5000. Click [OK].
- 4-6) The “Apply Properties to Shortcut” appears and check the item of the “Modify shortcut which started this window”. Click [OK].
- 5) Delete CXDI application software from the “Startup Menu Group”.
 - 5-1) Connect the keyboard and the mouse to the control PC.
 - 5-2) Turns the CXDI system power on, Windows XP start.
 - 5-3) After the CXDI application software start, press [Alt] + [Tab] key to show the “Debug mode” prompt screen.
 - 5-4) Select “8 – Exit” to close the CXDI application software on the “Welcome to CCR”.
 - 5-5) After the CXDI application software closed and Window XP Desktop appear, open the “Taskbar & Start Menu...” with “Start Menu” tab clicking.
Start>Settings>Taskbar and Start Menu

2. Installation

- 5-6) “Taskbar and Start Menu Properties” appears. Click “Start Menu” tab, and then click Taskbar and Start Menu Properties⇒Start Menu⇒Classic Start⇒Menu Customize
- 5-7) The “Remove Shortcuts/Folders” dialog box appears after click the “Remove” button. And double-click the “Startup folder”
- 5-8) Remove the “ccrstart.bat” item from it.
- 5-9) After “Remove” button clicked, the confirmation of deleting file appears. If you are going to remove it, click “Yes” button.
- 5-10) After confirm that the “ccrstart.bat” item is removed from “Startup Group”, close all the application on the desktop and re-login to Windows XP.
- 5-11) Make sure that the CXDI application software will not start automatically after login to Windows XP. And then shutdown Windows XP, turn the CXDI system power off.
 - When the CXDI application is deleted from the Start menu due to repair or other reasons, be sure to always perform the procedures outlined in “Adding CXDI application software onto the Start menu” and “Changing the window size” when the repair is complete.

2. Installation

12.6 Identifying the Sensor Units

1) Purpose

In order for the control PC to identify the sensor units connected, the sensor serial number of each sensor unit is input to the Control PC.

2) Notes

2-1) These operations must always be implemented at the installation stage and when any of the Imaging Units (sensor) or Control PC (hard disk) has been replaced or when the combination of equipment has been changed.

2-2) The sensor serial numbers must always be input. If the serial numbers of the sensor unit and Control PC do not match, "Sensor Unit: Detect Error (-5100)" will be displayed on starting up the system. These numbers are the same as what is input to the PWB-Di. (Refer to "Checking the sensor serial numbers".)

3) Preparations (What to have ready)

Tool keyboard, tool mouse

4) Procedure

4-1) Start up the CXDI unit.

4-2) Once the normal sensor screen has appeared on the operation unit, use the keyboard to enter the debugging mode (Use [ALT] + [TAB].).

4-3) "Welcome to CCR" appears. Select "1 Set-Up..."

4-4) "Setting Mode (0:Normal, 1:Expert)[0=0x0]:" appears. Select "0:Normal."

4-5) "CCR SETUP MENU" appears. Select "7 Scan Sensor Setup."

4-6) The "Capture Device Configuration Table" now appears. Input the number of sensor units connected to the control PC in the underlined () section of "Max Capture Devices" below.

4-7) Enter the serial number to "A/D Board Serial Number for SensorID#1".

@@@@@@ Capture Device Configuration Table @@@@@@@@
Max Capture Devices [1=0x1]:1
@@@@@@ Capture Device Configuration No.0 (SensorID#1 OPU)@@@@@@
-----A/D Board Serial Number 0-0 -> 40GC: 0x15D00001
A/D Board Serial Number for SensorID#1 [0x15D00001=365953025]: 15D00001
Custom Type [0:NO CUSTOM 1:STAND 2:TABLE 3:UNIV 4:CASSETTE
5:CASSETTE 14X17] [0=0x0]:0
Field of View Rotation (0:No 1:Yes) [0=0x0]:0
Constant for Exposure Index [0.000000]: 0.000000
---- Need to re-start program to validate this change.

Enter the serial number here.

4-8) When "CCR SETUP MENU" appears, press the [Esc] key to return to "Welcome to CCR."

4-9) Select the command "8 - Exit" from "Welcome to CCR" menu to exit the CXDI application.

4-10) After "Windows XP desktop" screen appears, start the CXDI application again.

*When restarting the CXDI application, the alert system information management error "A/D board management information was updated" is displayed, and so click [OK].

2. Installation

12.7 Entering Control PC Serial Number

1) Purpose

Set the product serial number (Control PC) to the “Device Serial Number” of the “DICOM header”.

2) Procedure

2-1) Start up the CXDI system.

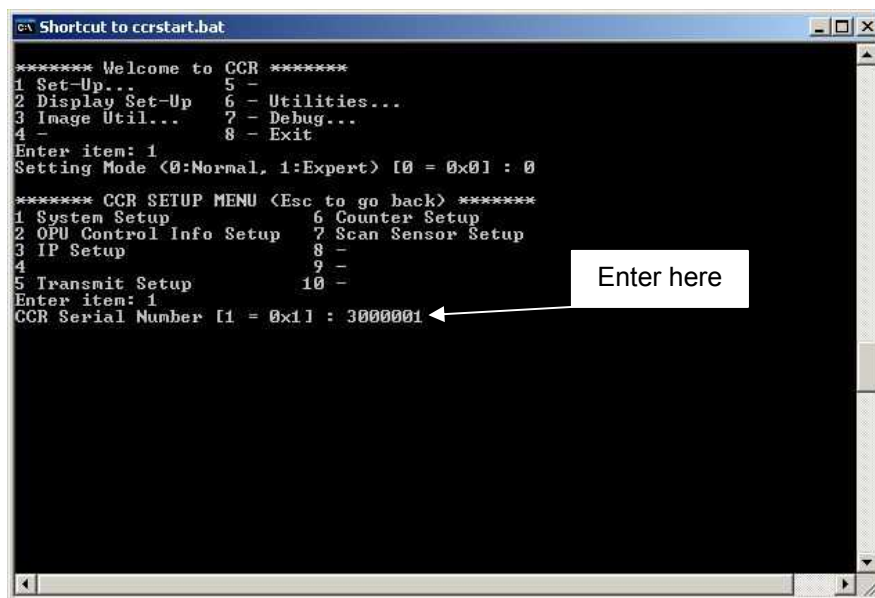
2-2) After the exposure screen appears on the operation unit, use the keyboard to enter Debug mode. (Use [Alt] + [Tab].)

2-3) “Welcome to CCR” screen appears. Select the command “1. Set-Up...”

2-4) The “Setting Mode (0: Normal, 1: Expert) [0=0x0]:” is prompted. Select “0: Normal”

2-5) “CCR SETUP MENU” appears. Select the command ”1. System Setup”.

2-6) “CCR Serial Number [0=0x0] : ” appears. Enter the six-digit number indicated on the naming label of the control PC unit. Press [Enter] key until “CCR SETUP MENU” appears. [Fig 1]



[Fig 1]

2-7) Press [Esc] key after “CCR SETUP MENU” appears to return to “Welcome to CCR” screen.

2-8) Select “8-Exit” to exit CXDI application software.

2-9) This returns you to the Windows NT desktop. Restart the CXDI application, and perform the procedure from steps 2) to 5). Check that the serial number for the “CCR Serial Number” item was entered correctly in step 6).

*** Restart the CXDI application. The screen displays the following message:**

Alert System Info Error (-6) A/D board info is updated. Click “OK”

2. Installation

12.8 Table Setup Settings

1) Purpose

Adjust the CXDI operation unit's TABLE SETUP to match the exposure conditions (X-ray tube voltage, X-ray tube current, msec or mAs value) of the X-ray generator.

2) Procedure

2-1) Start the CXDI system.

2-2) Open the TABLE SETUP Change window from the Normal Exposure window.

System ⇒ SETUP MENU ⇒ SYS. SETUP ⇒ TABLE SETUP

2-3) Select the tabs to be changed and change the X-ray tube voltage, X-ray tube current, and msec value data to match the exposure conditions of the X-ray generator.

* See the operation manual for the details of settings.

2-4) After finishing the changes, return to the Normal Exposure window and check that the TABLE SETUP has been changed.

2. Installation

12.9 Performing the Annotation Settings

1) Purpose

The settings for imprinting the annotation onto the film and the settings of the characters used for the annotation are performed.

2) Procedure

2-1) Once the normal radiographic screen has started, open the annotation setting screen.

SYSTEM → SETUP MENU → SYS. SETUP → ANNOTATION

2-2) The annotation setting screen now appears. Proceed with the settings that will make it possible to put the data desired by the user.

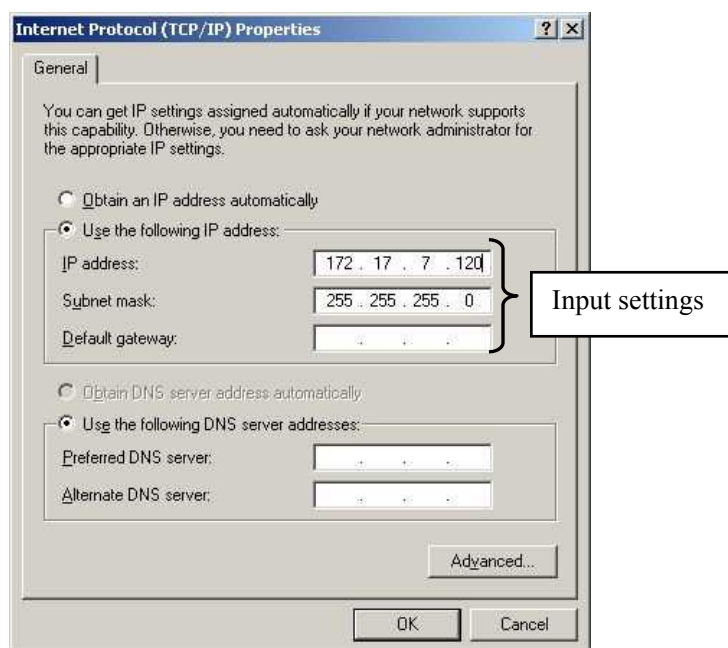
*** See the operation manual for the details of settings.**

2. Installation

12.10 Network Connections

Network settings

- 1) Purpose
These settings are for connecting the CXDI to the network.
 - 1-1) Set the CXDI's IP address, subnet mask and default gateway in Windows XP.
 - 1-2) Set the printer and storage output destinations and parameters on the user screen.
- 2) Checkpoints
 - 2-1) This item involves checking the details of the checks performed on network setting parameters among the pre-installation inspection details and setting these parameters.
*** Refer to “Appendix: Investigation Report” for the pre-installation investigation details.**
 - 2-2) Perform the settings of this item carefully since any errors made in these settings will make it impossible for connection to be made to the network or the images to be transmitted properly, etc.
- 3) Windows XP settings
 - 3-1) Connect the keyboard and mouse to the control PC.
 - 3-2) After turning on the Operation unit's power and then the Control PC's power, start Windows XP.
 - 3-3) The Windows XP desktop screen appears. Right-click the [My Network] icon, and select My Network Places from the menu.
 - 3-4) When [Network Connection] appears, double click on Local Area Connection 3Com Gigabit Lom (3C904).
 - 3-5) When Local Area Connection Properties appears, click on the General tab, select [Internet Protocol (TCP/IP)], and click Properties.
 - 3-6) Based on the pre-install of inspection details set the IP address, subnet mask and default gateway.



[Fig 1]

- 3-7) Upon completion of the setting, restart the Windows XP.

2. Installation

3-8) Check the communication test in the sequence below to verify whether the CXDI is now part of the network. To check the connections at the TCP/IP level, use the “ping” command from the command prompt.

Start → Programs → Command Prompt

When the IP address of the connection destination is “173.17.7.123,” for instance, the following messages will be repeated.

- If the CXDI has been connected properly:
Pic:>ping 172.17.7.123 (input on the DOS screen)
Pinging 17217.7.123 With 32 bytes of data:
Reply from 172.17.7.123:bytes=32 time <10ms TTL=255
Reply from 172.17.7.123:bytes=32 time <10ms TTL=255
Reply from 172.17.7.123:bytes=32 time <10ms TTL=255
Reply from 172.17.7.123:bytes=32 time <10ms TTL=2550
- If the CXDI has not been connected properly:
Pic:> ping 172.17.7.123 (input on the DOS screen)
Pinging 17217.7.123 With 32 bytes of data:
Request time out
Request time out
Request time out
Request time out

2. Installation

- 4) Set the printer and storage device which serves as the external output destinations.
In this case, one printer and one storage device are set.

4-1) Printer settings

- A. Open the output destination setting screen from the user menu.
System → SETUP MENU → DESTINATION → PRINTER

* Up to four printers (2 of which can be used for output at the same time) can be set.

- B. Press the “Printer1” button, and input the following items based on the pre-installation investigation details.

- a. Printer host name (IP address) b. Port number c. Transmission destination title

The screenshot shows the 'PRINT SETTING' screen with a 'ON' status and a 'Check the change(s)' button. It lists four printers (No.1 to No.4). For No.1, the 'PRINTER1' button is highlighted, and the 'SET' button is also highlighted. The settings for No.1 are: HOST NAME: 192.168.7.123, PORT No.: 5040, and AE TITLE: 8900. Arrows labeled 'a', 'b', and 'c' point to these fields respectively. The other printers (No.2, No.3, No.4) have empty input fields. At the bottom, there are 'CANCEL' and 'EXIT' buttons.

[Fig 2]

- C. Press the “SET” button, and input the parameters of the printer to be connected based on the pre-installation inspection details. (Refer to another sheet for details of the parameters.)

* **A space delimiter must be input between each of the parameters.**

By pressing the “Override” button, you can select a printer from all the registered printers. In this case, basically you do not have to enter parameters. However, if “?” is displayed within the parameters, you may have to enter the required parameter at the user’s site.

The screenshot shows the printer parameter input screen. The 'Printer Name' is 'PRINTER1'. There is an 'Override' button and a 'Pixel Pitch' field set to '39' um. The 'Parameter' field contains the text '-A 300 -T NO -M CUBIC -S "LUT=0,2" -r'. An arrow points to this field with the label 'Input parameters'. Below the parameter field, there is a table with 'Film Size' and 'Value' columns. The table has four rows: 14x17in, 14x14in, 11x14in, and 10x12in. Each row has two 'Value' fields and a 'CURRENT' button. At the bottom, there are 'CANCEL' and 'EXIT' buttons.

[Fig 3]

2. Installation

4-2) Storage settings

- A) Open the output destination setting dialog from the user menu.
System → SETUP MENU → DESTINATION → STORAGE
* Up to four storage units (2 of which can be used for output at the same time) can be set.
- B) Press the “Storage1” button, and input the following items based on the pre-installation investigation details.
 - a. Storage host name (IP address)
 - b. Port number
 - c. Transmission destination title

The screenshot shows a dialog box for setting storage units. It contains four sections for No.1, No.2, No.3, and No.4. Each section has a 'STORAGE' button and a 'SET' button. For No.1, the fields are filled: HOST is 'CXDI_STORAGE1', PORT No. is '5040', and AE TITLE is 'CXDI_STORAGE1'. Arrows labeled 'a', 'b', and 'c' point to the HOST, PORT No., and AE TITLE fields respectively. The other sections (No.2, No.3, No.4) have empty fields. At the bottom, there are 'CANCEL' and 'EXIT' buttons.

[Fig 4]

- C. Press the “SET” button, and input the parameters.
(Normally, the parameters need not be set. They must be input only when the need arises.)
 - A space delimiter must be input between each of the parameters.

The screenshot shows a dialog box titled 'STORAGE1'. It has two input fields: 'Parameter' and 'Storage Name'. The 'Storage Name' field is pre-filled with 'STORAGE1'. An arrow points from a text box 'Input parameters as needed' to the 'Parameter' field. At the bottom, there are 'CANCEL' and 'OK' buttons.

[Fig 5]

2. Installation

- D. After setting the output destinations, follow the procedure below to check whether images can actually be transmitted. Return to the user menu, capture a sample image (one X-ray image), and transmit the image to the printer and storage. There are two errors that may result if the image cannot be transmitted:
- a. “DICOM Connect Error. Cannot connect to the target. Check network or port number setting. Retry?”
 - b. “DICOM Transfer Error. Error occurred during the association. Retry?”

Message (a) indicates that connection at the TCP/IP level is not possible and that the physical connections or the subnet mask and other settings must be checked again.

Message (b) indicates that communication at the TCP/IP level is problem-free but that DICOM level communication has failed. In this case, check again that AE_TITLE of CXDI has been sent properly to the transmission destination and that the IP address, port number and AE_TITLE of the transmission destination which are set with CXDI have been set properly.

“AE_TITLE” of the transmission destination is case sensitive fields. (Permit upper-case letter or lower case letter, etc)

2. Installation

Parameter List (Separate Document 1)

DICOM storage device

In the CXDI, DICOM data transfer is performed using the transfer software module "send_image". The settings for these parameters are described below.

Parameter	Meaning	Description
-m maxPDU Maximum PDU value in byte units	* The CXDI automatically uses 131072 internally for operation. * Designating a specific value allows overwriting of the above value.	* The DICOM standards do not allow values of 1301073 or higher to be set. * This is used when the operator who manages the connected storage device requests a size change. * In DICOM printing, note that the argument title changes to -u. (→ See the printing parameters.)
-t calledTitle Called App Entity Title	* The AE Title setting field is automatically applied to this setting. * Designating a specific value allows overwriting of the above value.	* Note that the meaning is opposite of the DICOM printing argument -t. (→ See the printing parameters.) * The entry for the OPU output device title is used here.
-c callingtitle calling App Entity Title	* The CXDI automatically uses CANON_CCR internally for the operation. * Designating a specific value allows overwriting of the above value.	* Note that the meaning is opposite of the DICOM printing argument -c. (→ See the printing parameters.) * This is used when the operator who manages the connected storage device requests a change in the installed identification information (version).
-s SOPName (for reference) This parameter designates whether class be connected for performing association at the beginning of transfer.(CR/T/MR/NM/S C/US)	* This is not used in the CXDI.	
-I A-RELEASE-RES is ignored.	* This parameter is used simply as "-I"	* This is used when the error message "130012 Peer aborted Association (or never connected)" occurs even though the DICOM data transfer was successful. → This is used differently based on the connected storage devices.
-d FAC This parameter dumps a specific facility log. (DCM/DUL/SRV)	* This parameter is used simply as "-d" * This parameter is used to make the transfer software put the debugging character string on the console.	* This parameter does not affect DICOM data transfer. * This parameter outputs the CXDI log based on Windows NT.

2. Installation

Parameter	Meaning	Description
-v This parameter dumps the transfer log.	* This parameter is used simply as “-v”. * DUL and SRV are dumped. * This parameter is used to make the transfer software put the debugging character string on the console.	* This parameter does not affect DICOM data transfer.
-jn This is the time to take timeout.	* Sets the time to take timeout in seconds.	* This parameter is to be changed when taking timeout.
-k level=0 1 2 3	* A variety of specifications have since been needed in conjunction with DICOM modality LUT support.	If DICOM Modality LUT OD is enabled, set appropriate options to suit each output destination.

Argument: Values necessary for executing a function, subroutine, procedure, or other operation is passed to them. Arguments are assigned to functions and subroutines when executed. For example, the argument in f (x) is x.

PDU: Protocol data unit

The types of PDU's include get-request, get-next-request, get-response, set-request, nd trap.

Note

For details about the “-v” parameter, see “Checking the Error Log”.

Note

The parameters “-v” and “-d” put the log on the console. Therefore, be sure to always erase these parameters before operation by the user.

If -k:DICOM Modality LUT OD is enabled, set appropriate options to suit each output destination.

level = 0: Do not delete (default when not specified)

1: Delete Window Center/Width

2: Delete Window Center/Width and Rescale Intercept/Slope/Type

3: Delete Rescale Intercept/Slope/Type (compatible with releases up to Ver.4.20)

Other than a loadable LUT or $\gamma=1.0$ has been specified with the output destination-specific LUT function.

For storage: Specify -k3(or -k2).

If IMG Rescale Type = 0D is unidentifiable to storage, resulting in an error: Specify -k3. (If only one storage is connected, simply set DICOM Modality LUT OD to "Disabled.")

The implementation allows Window Center/Width with Rescale Type = 0D specified to be interpreted as "optical densityx1000."

For storage: Specify -k1.

The CXDI Window Center/ Width output value (implementation) is fixed at 2048/4096.)

Note

With AGFA impax Ver. 4.5.0, the specification of -k0 demonstrated a successful density-intensity conversion. But because the corresponding text in the DICOM specifications document is ambiguously written such that the status of implementation by other manufacturers is unknown, please be advised to consult the storage manufacturer for each connection destination or work out on a trial and error basis. Also note that an external storage option specification (if (DICOM modality LUT OD is set to "Enabled," OD tags <0028, 1052 - 1054> are assigned and Level: 0 is assumed) is not supported.

2. Installation

Parameter List (Separate Document 2)
DICOM printer

In the CXDI, DICOM printers are administered separately according to printer product.

The transfer software module is “print_stuff”. The settings for these parameters are described below.

Parameter	Meaning	Description
-C copies This parameter uses a number to designate the number of copies.(1/2/...)	* This parameter is used in the DICOM Basic Film Session (2000, 0010). * When the number of copies is designated, film sheets are printed in the quantity specified in a single printing operation. * This parameter is necessary when printing multiple sheets for a single data transfer operation.	* This parameter is set according to the user's requirement. * In the DICOM library TYPE3, the value is transferred together with the Tag. However, if the value is unknown, the value is either transferred as a character string with length 0, or the element itself is not transferred. → The printer default values are used if this parameter is not entered.
-y priority Priority in the DICOM printer (HIGH/MED/LOW)	* This parameter is used in the DICOM Basic Film Session (2000, 0020). * This parameter determines where this transfer image is inserted into the queue in the DICOM printer. At HIGH, the image is printed first among the queued images.	* This parameter is set according to the user's requirement. * In the DICOM library TYPE3, the value is transferred together with the Tag. However, if the value is unknown, the value is either transferred as a character string with length 0, or the element itself is not transferred. → The printer default values are used if this parameter is not entered. * Note this parameter does not determine where this transfer image is inserted into the CXDI queue.
-D destination Film destination (MAGAZINE/PROCESSOR/BIN_i)	* This parameter is used in the DICOM Basic Film Session (2000, 0040). * Film is sent to the output device designated by RECEIVE MAGAZINE or the automatic developer.	→ The printer default values are used if this parameter is not entered. * The film is usually discharged to the default output device.
-F film type Film media type (“BLUE FILM” / “CLEAR FILM” / “PAPER”)	* This parameter is used in the DICOM Basic Film Session (2000, 0030). * Film is printed as the designated film type.	→ The printer default values are used if this parameter is not entered. * Although many types of films cannot be detected, the film type can be selected in the KELP2180. * In this parameter, be sure to put quotation marks (“ ”) around 0x20 since it comes between BLUE and FILM.

2. Installation

Parameter	Meaning	Description
-L sessionLabel Film session label (character string)	* This parameter is used in the DICOM Basic Film Session (2000, 0050). * The label for the film session is for designation purposes only, and generally it is not displayed directly on the print image.	→ The parameter is not transferred over DICOM if it is not designated. * This parameter may be displayed in some form or another depending on the installed printer. For example, it may be displayed in the Control Panel for the printer or in the corner of the film.
-f films Number of film box to be printed	* Currently, this parameter is not operating.	
-i Format Format at print	* This parameter is used in the DICOM Basic Film Box (2010, 0010). * This is not necessary, as for automatically designated on CXDI.	* If this parameter is not designated, transfer software uses automatically STANDARD1 1, for reason this parameter must be transferred in the DICOM.
-l FilmSizeID Film size 14 inch x 17 inch / 17 inch x 14 inch / 11 inch x 14 inch / -l FilmSizeID / 10 inch x 14 inch 10 inch x 12 inch / 24 cm x 24 cm / 24 cm x 30 cm	* This parameter is used in the DICOM Basic Film Box (2010, 0050). * This parameter designates the size of the film to be printed	→ The parameter is not transferred over DICOM if it is not designated. In this case, the printer default values are used. When this parameter is not transferred, problems can occur since unsuitable default values may be used. * Some printers do not print until a supply magazine of the designated size is loaded, and others print even though the designated size is different from the currently loaded supply magazine.
-M magnification Interpolation method (NONE/REPLICATE/BILINEAR/CUBIC)	* This parameter is used in the DICOM Basic Film Box (2010, 0060). * This parameter designates the interpolation method since the printer has a higher resolution than the CXDI in most cases. * Generally, CUBIC provides the best results, followed by BILINEAR. The REPLICATE option is not suitable for CXDI image applications.	→ The printer default values are used if this parameter is not entered. When this parameter is not transferred, problems can occur since unsuitable default values may be used.
-m smoothing Type of smoothing (character string)	* This parameter is used in the DICOM Basic Film Box (2010, 0080). * This parameter designates the smoothing method for the image. * In the DICOM standards, this parameter setting is valid only when CUBIC is selected for the magnification parameter above. * In the DICOM standards, value to be transferred is not predetermined.	→ The parameter is not transferred over DICOM if it is not designated. In this case, the printer default values are used. When this parameter is not transferred, problems can occur since unsuitable default values may be used. * This parameter is determined by asking the printer engineer or by viewing the conformance statement.

2. Installation

Parameter	Meaning	Description
	* The designation method varies according to the printer. For example, the MLP190 uses -m NORMAL.	
-S configuration Adjustment information (character string)	* This parameter is used in the DICOM Basic Film Box (2010, 0150). * This parameter sets the printer (image quality) adjustment from the SCU side. * In the DICOM standards, value to be transferred is not predetermined. * The designation method varies according to the printer.	→ If this parameter is not designated, it is not transferred over DICOM. In this case, the printer default values are used. When this parameter is not transferred, problems can occur since unsuitable default values may be used. * This parameter is determined by asking the printer engineer or by viewing the conformance statement.
-O Orientation Film orientation (PORTRAIT/LANDSCAPE)	* This parameter is used in the DICOM Basic Film Box (2010, 0040). * In versions before 2.0, printers must operate based on this parameter. * When using image cutout from 17 x 17 inch size in the CXDI, this parameter is set and transferred automatically.	→ If this parameter is not designated, it is not transferred over DICOM. In this case, the printer default values are used. * Starting from version 2.0, the image can be rotated from the CXDI side without using this parameter.
-A max_density Maximum density (Dx100)	* This parameter is used in the DICOM Basic Film Box (2010, 0130). * This parameter designates the density of the digital value for 0 (4095 for reverse display) of the CXDI transfer data image pixels. (In the CXDI, 0 indicates black.) * In the CXDI, this parameter is used to adjust the density. Therefore, be sure to always check that it is operating.	→ If this parameter is not designated, it is not transferred over DICOM. In this case, the printer default values are used. When this parameter is not transferred, problems can occur since unsuitable default values may be used.
-a min_density Minimum density (Dx100)	* This parameter is used in the DICOM Basic Film Box (2010, 0120). * This parameter designates the density of the digital value for 4095 (0 for reverse display) of the CXDI transfer data image pixels. (In the CXDI, 4095 indicates white.) * This parameter is not transferred in many cases since the minimum density cannot be increased in most printers.	→ If this parameter is not designated, it is not transferred over DICOM. In this case, the printer default values are used. When this parameter is not transferred, problems can occur since unsuitable default values may be used.

2. Installation

Parameter	Meaning	Description
-B border_density Border density (Dx100) (BLACK/WHITE/D x 100)	* This parameter is used in the DICOM Basic Film Box (2010, 0100). * This parameter determines the area density around the image on the film.	→ If this parameter is not designated, it is not transferred over DICOM. In this case, the printer default values are used.
-G empty_image_density Empty image density (BLACK/WHITE/D x 100)	* This parameter is used in the DICOM Basic Film Box (2010, 0110). This parameter designates the density of the empty image area during multi-formatting.	→ If this parameter is not designated, it is not transferred over DICOM. In this case, the printer default values are used.
-T trim Trimming (NO/YES)	* This parameter is used in the DICOM Basic Film Box (2010, 0140). * This parameter adds lines around the image. * The CXDI is normally adjusted so that the trimming does not appear.	→ If this parameter is not designated, it is not transferred over DICOM. In this case, the printer default values are used. * For example, the default value for this parameter in Agfa printers is YES. Therefore, the NO option needs to be specifically designated if it is desired.
-P polarity Polarity (NORMAL/REVERSE)	* This parameter is used in the DICOM Basic Image Box (2020, 0020). * Reverse image density	→ If this parameter is not designated, it is not transferred over DICOM. In this case, the printer default values are used.
-r pixel_pitch Transfer pixel pitch for designating the request image size (Pixel Pitch in um)	* This parameter is used in the DICOM Basic Image Box (2020, 0010). * Position of the image on film * The cumulative value for the horizontal size of the image (raw) at the designated pixel pitch is used for the request image size. * The CXDI automatically uses 131072 internally for operation. * The above value can be overwritten by designating a specific value.	→ If this parameter is not designated, it is not transferred over DICOM. In this case, the type of image that is printed depends on the settings at the printer side.
-N annoFmt Annotation position (1/2/3)	* This parameter is used in the DICOM Basic Annotation Box (2030, 0010). * This parameter designates the position of the character string to be annotated.	* If using annotation, always be sure to transfer the annotation position.
-n annotation Annotation (character string)	* This parameter is used in the DICOM Basic Annotation Box (2030, 0020). * This parameter designates the character string to be annotated.	* If this parameter is not designated, it is not transferred over DICOM. In this case, the printer default values are used. * Also, in this case, the type of image that is printed depends on the settings at the printer side.

2. Installation

Parameter	Meaning	Description
-u maxPDU Maximum PDU value in byte units	* The CXDI automatically uses 131072 internally for operation. * The above value can be overwritten by designating a specific value.	* The DICOM standards do not allow values of 1301073 or higher to be set. * This parameter is used when the operator of the connected storage device requests a size change. * In DICOM storage devices, note that the argument title changes to -m. (→See the storage device parameters.)
-c callingTitle Called App Entity Title	* The AE Title setting field is automatically used in this setting. * The above value can be overwritten by designating a specific value.	* Note that the meaning is opposite of the argument -c for DICOM storage devices. (→See the storage device parameters.) * The entry for the OPU output device title is used here.
-t callingTitle Calling App Entity Title	* The CXDI automatically uses CANON_CCR internally for the operation. * The above value can be overwritten by designating a specific value.	* Note that the meaning is opposite of the argument -t for DICOM storage devices. (→See the storage device parameters.)
-g N-GET Printer compatibility mode	* This parameter is used simply as “-g”. * In the CXDI default settings, the printer information is not designated. In this case, the printer side sends all the information that it has (DICOM official specifications). * When the -g option is added, the essential information only is collected. This information includes the Printer Status and Printer Status Info. (To prevent installation when the printer does not satisfy the above DICOM specifications.)	→ Normally, this option is not used. This parameter has been provided as a remedy when a printer error occurs when optional devices are not used.
-S Silent mode	* This parameter is used simply as “-s”. * This parameter is used to prevent the transfer software from displaying the debugging character string on the console.	* This parameter does not affect DICOM data transfer. → Silent mode does not need to be designated since the CXDI automatically makes the setting internally.
-p This parameter dumps the association parameter.	* This parameter is used simply as “-p”. * This parameter is used to set the transfer software so that the debugging character string is displayed on the console.	* This parameter does not affect DICOM data transfer.

2. Installation

Parameter	Meaning	Description
-v This parameter dumps the transfer log.	* This parameter is used simply as “-v” * This parameter is used to set the transfer software so that the debugging character string is displayed on the console. * Both the -p and -v parameters should be used. These settings override the -s parameter.	* This parameter does not affect DICOM data transfer.
-V filename This parameter dumps the transfer log.	* The parameter is used for analysis after the transfer software saves the debugging character string displayed on the console to a file with a designated filename. It is used only when problems occur.	* This parameter does not affect DICOM data transfer.
-I A-RELEASE-RES is ignored.	* This parameter is used simply as “-I”	* This is used when the error message [130012 Peer aborted Association (or never connected)] occurs even though the DICOM data transfer was successful. → This is used based on the connected printers.
-jn This is the time to take timeout.	* Sets the time to take timeout in seconds.	* This parameter is to be changed when taking timeout.
-k level = 0 1 2	* The -k option has been implemented to normalize DICOM headers	

Note

The parameters -p, -v, and -V filename display the log on the console. Therefore, be sure to always erase these parameters before operation by the user.

In the past, -k2 was used to fix troubles, but it has now been set as the default has been changed to -k2 to ensure precise compliance with the DICOM code. At sites wishing to adhere to their existing window values, -k1 should be used.

level: 0:Do not delete DICOM tags. (Transfer all headers similar to storage.)

1:Delete Groups 0008, 0010, 0018, 0019 and 0020.

2:Delete Groups 0008, 0010, 0018, 0019, 0020 and Elements (0028,0030), (0028,1050), (0028,1051), (0028,1052), (0028,1053), (0028,1054). Default

Note

In Ver.4.21, attach -k2 expressly to produce similar output. The previous option had -k1 as its default. The k option defaults to -k2, if k option is not specified.

Image Pixel Spacing (0028,0030)

Window Center (0028,1050)

Window Width (0028,1051)

Rescale Intercept (0028,1052)

Rescale slope (0028,1053)

Rescale Type (0028,1054)

For groups 0008, 0010, 0018, 0019, 0020, refer to DICOM conformance statement.

2. Installation

Examples of parameters used with different makers and types of printers (reference)

Name	Default Parameters	Significance
Kodak MLP190	-A 320 -T NO -M CUBIC -m NORMAL -S CS000 (entered in param member) 80 (entered in pixelPitch member) 14 x 17 4096 (entered in W member) 5120 (entered in H member)	• Trimming OFF • Cubic spline interpolation • Smoothing: normal • Maximum density: 3.20 • Curve shape 0 (density linear) as Config Info
Kodak KELP2180 + Kodak Print Spooler Model 100	-A 320 -T NO -M CUBIC -m NORMAL -S CS000 (entered in param member) 79 (entered in pixelPitch member) 14 x 17 4090 (entered in W member) 5120 (entered in H member) 11 x 14 3194 (entered in W member) 4096 (entered in H member)	• Trimming OFF • Cubic spline interpolation • Smoothing: normal • Maximum density: 3.20 • Curve shape 0 (density linear) as Config Info
Agfa DryStar 3000	-A 320 -T NO -M CUBIC -m 140 -S “PERCEPTION_LUT=200” (entered in param member) 80 (entered in pixelPitch member) 14x17 4256 (entered in W member) 5174 (entered in H member)	• Trimming OFF • Cubic spline interpolation • Smoothing: slightly sharp (edges emphasized) • Maximum density: 3.20 • S “PERCEPTION_LUT=200(LINEAR)” (If the output fails to be linear with “LINEAR”, on-site adjustments with the printer manufacturer must be performed.
Kodak Imation DryView 8700 + Pacs LINK IMN 9410	-A 310 -T NO -M CUBIC -m ? -S LUT=0?, 2? (? : Site Dependent) (entered in param member) 78 (entered in pixelPitch member) 14x17 4096 (entered in W member) 5220 (entered in H member)	• Trimming OFF • Cubic spline interpolation • Smoothing must be adjusted at the user’s site. • Maximum density: 3.10 • S LUT = m, n is designated as the Config Info but m and n are adjusted on-site by the Kodak service engineer. Basically, adjustment is performed to achieve a linear output.
Kodak Imation DryView 8700 + GW	-A 310 -T NO -M CUBIC -m ? -S LUT=?, ? (? : Site Dependent) (entered in param member) 78 (entered in pixelPitch member) 14x17 4096 (entered in W member) 5220 (entered in H member)	• Trimming OFF • Cubic spline interpolation • Smoothing must be adjusted at the user’s site. • Maximum density: 3.10 • S LUT = m, n is designated as the Config Info but m and n are adjusted on-site by the Kodak service engineer. Basically, adjustment is performed to achieve a linear output.
Kodak Imation DryView 8700+8800	-A 320 -T NO -M CUBIC -S “LUT=m, n”-m (on-site adjustment) (entered in param member) 78 (entered in pixelPitch member) 4096 (entered in W member) 5220 (entered in H member)	• Trimming OFF • Cubic spline interpolation • Maximum density: 3.20 • S LUT = m, n is designated as the Config Info but m and n are adjusted on-site by the Kodak service engineer. Basically, adjustment is performed to achieve a linear output.

2. Installation

		• The Kodak service engineer is responsible for setting the smoothing type on-site since it can be changed with each printer. • The rest is done by the printer itself.
Kodak Imation DryView 8700+9440	-A 320 -T NO -M CUBIC -S “LUT=m, n”-m (on-site adjustment) (entered in param member) 78 (entered in pixelPitch member) 4096 (entered in W member) 5220 (entered in H member) The model 8800 has a rotation function but we understand that Imation has not publicly acknowledged the use of this function.	• Trimming OFF • Cubic spline interpolation • Maximum density: 3.20 • S LUT = m, n is designated as the Config Info but m and n are adjusted on-site by the Kodak service engineer. Basically, adjustment is performed to achieve a linear output. • The Kodak service engineer is responsible for setting the smoothing type on-site since it can be changed with each printer. • The rest is done by the printer itself.
Kodak Imation Dry View 8500+	-A 310 -T NO -M CUBIC -m ? -S LUT=0?, 2? (?: Site Dependent) (entered in param member) 78 (entered in pixelPitch member) 14x17 3388 (entered in W member) 4277 (entered in H member)	• Trimming OFF • Cubic spline interpolation • Smoothing must be adjusted at the user’s site. • Maximum density: 3.10 • -S • LUT = m, n is designated as the Config Info but m and n are adjusted on-site by the Kodak service engineer. Basically, adjustment is performed to achieve a linear output.
Nishimoto EL2000N	-A 320 -T NO -M CUBIC -S 15 (entered in param member) 80 (entered in pixelPitch member) 4444 (entered in portraitW member) 5296 (entered in portraitH member) 5296 (entered in landscapeW member) 4444 (entered in landscapeH member) “Prepare images using CXDI” : Yes A simple calculation yields a resolution of 4444 x 5400 for the display area of the model EL2000. However, 5376@80 µm is set in the perpendicular direction of the model EL2000 since the maximum size of the CXDI images is 2688@160 µm. In this case, a small non-image area should be output as the border in the up/down direction on the film according to the calculation. In actual fact, however, the image will protrude in some cases depending on how the transport speed and other factors have been adjusted.	• Trimming OFF • Cubic spline interpolation • Maximum density: 3.20 • “15” in Config Info is linear. • The rest is done by the printer itself. Up to 5376 pixels can be set for H.

2. Installation

	The specifications are as follows although they cannot be set at the present time: 14" x 14" : W=4444, H=4444 (for portraits) 11" x 14" : W=4444, H=3660 (for portraits)	
Fuji CR-DPL/LPD/FM-DPL + FN-PS551	-A 300 -T NO -M CUBIC -m MEDIUM -S -P NORMAL -B BLACK -k 2 -S ? (Site Dependent) (entered in param member) 14x17 3520 (entered in W member) 4280 (entered in H member) 14x14 3520 (entered in W member) 3490 (entered in H member) 11x14 2540 (entered in W member) 3600 (entered in H member)	• Trimming OFF • Cubic spline interpolation • SHARP, MEDIUM or SMOOTH can be selected from among the presettings as the smoothing type. An AVR of 0.8 or so is appropriate. The setting is performed for each printer on-site. • -S should be adjusted at the user's site. • LUT can be selected from among the eight presettings 1 through 8 using Config Info. The setting is performed for each printer on-site. • With -k 2, the Window Center/Level for DICOM TAG (0028,1050) and (0028, 1051) are also deleted. • Maximum density: 3.00 A density of 3.20 cannot be designated. For this reason, a non-linear LUT is required.
Konica Drypro 722 + Printlink	-A 320 -T NO -M CUBIC -m 2 -S "KC_LUT=1" -O PORTRAIT -P NORMAL -B BLACK (entered in param member) 80 (entered in pixel pitch member) 14x17 4424 (entered in W member) 5324 (entered in H member) 14x14 4424 (entered in W member) 4372 (entered in H member) 11x14 3436 (entered in W member) 4424 (entered in H member)	• Trimming OFF • Cubic spline interpolation • Smoothing type 1: BILINEAR 2: Sharp by spline interpolation 3: Slightly weak by spline interpolation 4: Weaker by spline interpolation • Maximum density: 3.20 Maximum density 3.20 could not be achieved before.
Konica Li-62P + Printlink	-A 320 -T NO -M CUBIC -m 2 -S "KC_LUT=1" -O PORTRAIT -P NORMAL -B BLACK 80 (entered in pixel pitch member) 14x17 4268 (entered in W member) 5108 (entered in H member) 14x14 4268 (entered in W member) 4104 (entered in H member) 11x14 3204 (entered in W member) 4268 (entered in H member)	• Trimming OFF • Cubic spline interpolation • Smoothing type 1: BILINEAR 2: Sharp by spline interpolation 3: Slightly weak by spline interpolation 4: Weaker by spline interpolation • Maximum density: 3.20 Before, maximum density 3.20 could not be achieved.

2. Installation

Printer Model Specifications (Reference)

Name	Specifications	Maximum equivalent area in CXDI
Kodak MLP190	80μm x 4096 x 5120	2048 x 2560 (@160 μm)
Kodak KELP2180 + Kodak Print Spooler Model 100	79 μm x 4090 x 5120 (value after passing through the print spooler) • The above settings are the size of the effective area when the image passes through the print spooler and the image is plotted up to the annotation area. In other words, these settings do not display an annotation area, instead handling it as an image area. • If the data is transferred without setting [Image creation in CXDI], the Requested Image Size setting is used in DICOM. In this case, the annotation area is automatically displayed in the 2180 printer. As a result, a maximum image area of 79 μm x 4090 x 4996 must be designated. In this case, the CXDI relies on the 2180 for image rotation (Film Orientation), but images larger than 1.7 MB cannot be rotated by the 2180. Therefore, operation without the setting for [Image creation in CXDI] cannot be performed in the 2180. (Although operation is possible by setting Requested Image Size only for using DICOM without the setting for [Image creation in CXDI], this option is not installed in the CXDI.) • Although the resolution of the printer itself is 79 μm x 4090 x 5260, this complete resolution cannot be used when the image passes through the spooler. When “_” is used in AE Title, the association is rejected. Use the Disable function for N-EVENT-REPORT to disable this setting. The FilmSize parameter can be used. The MediaType (BLUE, CLEAR) parameter is also supported. • Although the Film Orientation parameter is supported up to 1.7 MB, in actuality, DR images cannot be rotated. Like the DryView8700, the images must be rotated by the CXDI side. • When Requested Image Size is expanded, the maximum plotting size is limited (79 μm x 4090 x 4996) so that the annotation area can be obtained. When a Requested Image Size expansion error occurs, the image is interpolated and printed at the suitable size. In this case, the error does not return to the CXDI side. For example, the image is printed at 310 mm even if 326 mm is designated. • If an expansion error occurs in the spooler when Multi Display Format is used, the print queue cannot be processed. • The system is in a critical state when a Failure status is indicated. A user message is displayed indicating this state, and images are no longer transferred. (Fully installed) • During the Warning status, image transfer is performed while the user message is displayed (Fully installed). • If operation is aborted due to an error, a new association could not be established when the data was resent from the CXDI. GW was reset to recover the error.	2018 x 2528(@160 μm)

2. Installation

	• Inserting annotations in the image can lead to problems at the hospital. In the QCW, use annotations that are outside of the image. • The designated film size is 11 x 14 inch film, and automatic selection of the magazine and printing has been confirmed. • Annotations in the image are problematic in the US and EU. Thus, although DICOM annotation was used, it was not printed. Although annotation can be transferred without any errors in DICOM, an annotation error occurred in the log when transferring from the gateway to the 2180, and printing was not performed. Data was transferred from KCR to the validation tool, and the DICOM transfer method was compared to CXDI. However, the only differences were in the image size, aspect ratio, and annotation position. • Although the annotation position is 1 in terms of conformance, it is 0 as sent from KCR. The result did not change even after the change.	
Agfa DryStar 3000	80 µm x 4256 x 5174 • In the standard Agfa system, the annotation option is selected. Therefore, the full image area will not be printed correctly unless you ask the serviceman to deselect the annotation option.	2128 x 2587 (@160 µm)
Imation DryView 8700+8800	78 µm x 4096 x 5220 Note: The 8700 printer cannot display in landscape orientation. Also, the maximum density is 3.1. If the 8800 box is not added, this printer cannot be used by the CXDI. However, it can be used starting from CXDI version 2.0. • If there is an Imager Pixel Spacing tag (0018, 2264), the imager will fail.	1996 x 2544 (@160 µm)
Fuji CR-DPL /FM-DPL + FM-PS551	100 µm x 3520 x 4280 (value after passing through the print spooler) • The above settings are the allowable area size in a configuration not using annotation. • Annotation will be supported from the next version. Annotation is currently possible in US-ASCII only. IDs are designated 1 to 6 and correspond to the top left, top center, top right, bottom left, bottom center, and bottom right, respectively. The maximum area size with annotation support is 3500 x 4170 for 35 cm x 43 cm and 2538 x 3522 for B4. • Use the Disable function for N-EVENT-REPORT to disable this setting. • A function is provided for disabling the returning of warning messages. 0107 (Attribute list error) Return/Not return 0116 (Attribute Value out of Range) Return/Not return B604 (Image has been demagnified) Return/Not return • The Film Size parameter can be used. The Media Type (BLUE, CLEAR) parameter can also be used. • The Film Orientation parameter is fully supported. • The following presets are made so that LUT has the	2200 x 2675 (@160 µm)

2. Installation

	DMAX = 3.2D equivalent curve required by CXDI. Gamma type #17 (SAR system) Density Shift Contrast Point 1 1.57 0.10 1.00 Point 2 2.29 0.15 1.00	
--	---	--

2. Installation

Error Return Values and Log Output for print_stuff (Reference)

Error example	Return value and log output
Success	Return value: 0x00 There is no log output in this case.
Invalid parameter	Return value: 0x00000001 CXDI description : DICOM connection error (CCRTRANS_ERR_DICOMPARAM) The log output in this case is shown below. ----- ** -s Silent mode; do not print results of all print commands ** -v Use verbose mode for DUL and SRV facilities ** x Canon Hidden Special Mode node The host name that is running a print server port TCP/IP port number of print server file One or more files that contain preformatted images for printing -----
The server has not started up.	Return value: 0x00180012 CXDI description : DICOM connection error (CCRTRANS_ERR_NOT_CONNECT) ----- The log output in this case is shown below. 18-135933[d2]ERR: d0012 Attempt to connect to unknown host: test 18-135933[d2]ERR: 130012 Peer aborted Association (or never connected) 18-135933[d2]ERR: 180012 Failed to establish association -----
After a command request was sent to the server, an error was returned in response.	Return value: 0x10 CXDI description: DICOM response error (CCRTRANS_ERR_RESP) The log output in this case is shown below. ----- (Not determined) -----
After a command request was sent to the server, a warning was returned in response.	Return value: 0x18 CXDI description : DICOM response warning (CCRTRANS_WRN_RESP) The transfer process was successful, but a warning was returned from the server. The log output in this case is shown below. ----- (Not determined) -----
The printer status has returned an error.	Return value: 0x20 CXDI description : DICOM printer status error (CCRTRANS_ERR_PRN_STATUS) The log output in this case is shown below. ----- (Not determined) -----

2. Installation

The printer status has returned a warning.	Return value: 0x28 CXDI description: DICOM printer status warning (CCRTRANS_WRN_PRN_STATUS) The transfer process was successful, but a warning was returned as the printer status. The log output in this case is shown below. ----- (Not determined) -----
Other errors	Return value: Values other than those above CXDI description : DICOM communications error (CCRTRANS_ERR_DICOM_TRANSE) The log output in this case depends on the specific error. A typical example is shown below. ----- 18-140933[d2]ERR : c0082 SRV Send (DATA SET) failed in SRV_SendDataSet 18-140933[d2]ERR : 190082 SRV Request failed in SRV_NCreateRequest 18-140933[d2]ERR : 70012 NULL_key passed to routineDUL_ReleaseAssociation -----

2. Installation

Precautions for connecting the server (reference)

Equipment	Restrictions on connections
Kodak Miil	Transmitting the 0019 shadow group causes a failure, and the group is not received properly with the default. Its reception is enabled by setting the strictValidation parameter to Off in Miil.
Fujitsu Dr. ABLE	• Transmission is currently performed with the “1 study multi series/1 series 1 image” setting. However, since a multi format is used for the screen displays for each series under the Dr.ABLE specifications, the switching operations are a hassle. The user will find it more convenient if it is at all possible to change the setting to “1 study 1 series/1 series multi image.” (These unusual data specifications were requested with the full understanding of their unusualness.) • With DICOM, the body parts (such as the abdomen and head) and their directions (such as PA and AP) belong to the series information. It therefore follows that a different series is required for a different body part or body part direction. This aspect is restricted by the DICOM standard rather than by the installation and other steps taken by us. To put it the other way around, multiple images with different body parts and their directions cannot be put together as a series. To remedy this problem, devising a way of enabling the viewers to reference different series at the same time at some future point in time will be helpful.
Hitachi	• Transmission is currently performed with the “1 study multi series/1 series 1 image” setting. However, since a multi format is used for the screen displays for each series, the switching operations are a hassle. The user will find it more convenient if it is at all possible to change the setting to “1 study 1 series/1 series multi image.” • This problem arises with the Fujitsu equipment as well. Refer to the section on Fujitsu.

send_image error return values and log output (reference)

Example of error	Return value and log output
Successful	Return value: 0x00 No log output at this time
Invalid parameter exists.	Return value: 0x00000001 CXDI interpretation: DICOM connect error (CCRTRANS_ERR_DICOMPARAM) See below for the log output at this time: ----- -t Set called AE title to title in Association RQ -v Place DUL and SRV facilities in verbose mode node Node name for network connection port TCP / IP port number of server application image A list of one or more images to send -----
Server fails to start.	Return value: 0x00180012 CXDI interpretation: DICOM connection error (CCRTRANS_ERR_NOT_CONNECT) See below for the log output at this time: ----- 18-132600[127]ERR: 60012 TCP Initialization Error: Invalid argument 18-132600[127]ERR: 130012 Peer aborted Association (or never connected) 18-132600[127]ERR: 180012 Failed to establish association -----
As a result of providing the server with a command request, an error was returned as response.	Return value: 0x10 CXDI interpretation: DICOM response error (CCRTRANS_ERR_RESP) See below for the log output at this time: ----- (To be determined) -----

2. Installation

As a result of providing the server with a command request, a warning was returned as response.	Return value: 0x18 CXDI interpretation: DICOM response warning (CCRTRANS_WRN_RESP) The transmission processing was successful but a warning was returned from the server. See below for the log output at this time: ----- (To be determined) -----
Other errors	Return value: other than above CXDI interpretation: DICOM communication error (CCRTRANS_ERR_DICOM_TRANSE) The log output is many and varied. It depends on the error. One example is shown below. ----- 18-140933[d2]ERR: c0082 SRV Send (DATA SET) failed in SRV_SendDataSet 18-140933[d2]ERR: 190082 SRV Request failed in SRV_NCreateRequest 18-140933[d2]ERR: 70012 NULL key passed to routine: DUL_ReleaseAssociation -----

2. Installation

Concerning the Dry View 8700 (reference)

LUT (Lookup Table)

- Image adjustment parameters that can be changed by users

Density : This can be set up to the maximum density of 3.1D.

Contrast : This can be set from 1 to 15.

- Image adjustment parameters that cannot be changed by users

Lookup tables called TFTs (Transfer Function Tables) are provided internally, and changes can be made only in the service mode.

Fifteen types of characteristic curves are registered in one of these TFTs, and users can change one of these curves as the contrast.

Over 30 TFTs are registered in the printer, and a name is allocated to each one.

For instance, 15 types of linear straight lines are registered in the TFT called "WRKST2A."

By setting this WRKST2A TFT, adjustments can be made by combining 15 types of linear straight lines (which cannot be changed by users) with 15 types of characteristic curves (which can be changed by users).

Concerning connections

Two types of the Dry View 8700 are available.

- Dry View 8700 Plus

The 8700 Plus is a printer which can be connected to two diagnostic units. When used in combination with the 8800 multi input manager, it can be connected to up to eight diagnostic units. Images are processed as described above.

- Dry View 8700 Dual

It is possible to connect two 8700 Dual units to the 8800 multi input manager. By using these in combination, up to seven diagnostic units can be connected. The 8700 Dual does not come with image processing functions

Modality connection I/F

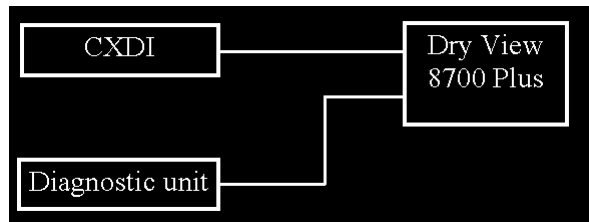
This I/F is the external interface which connects "Dry View 8700" with each modality. Select the following item depending on the modality which would be connected.

- Digital Signal: DEIB (Digital External Interface Box)
- Video Signal: EVEIB (Enhanced Video External Interface Box)
- Keypad, Auto Filming: UKEIB (Universal Keypad External Interface Box)

2. Installation

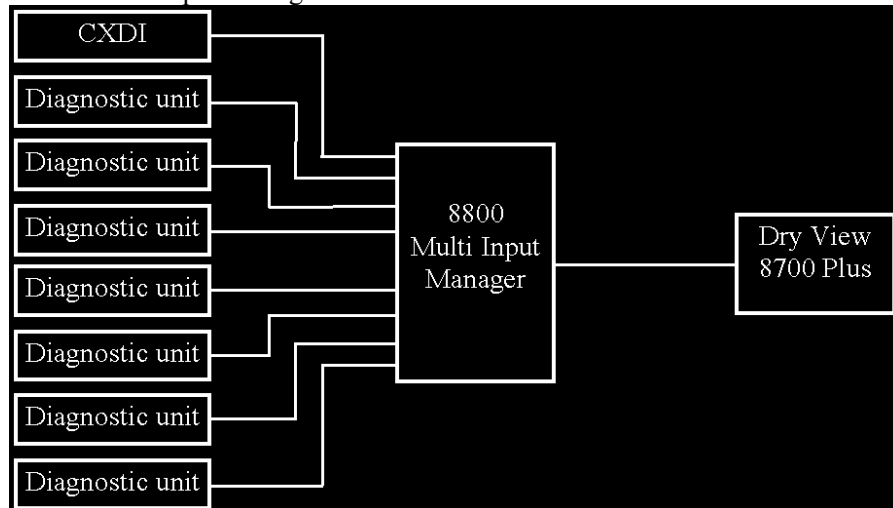
Dry View 8700 Plus

Up to 2 units can be connected.



Dry View 8700 Plus + 8800 Multi Input Manager

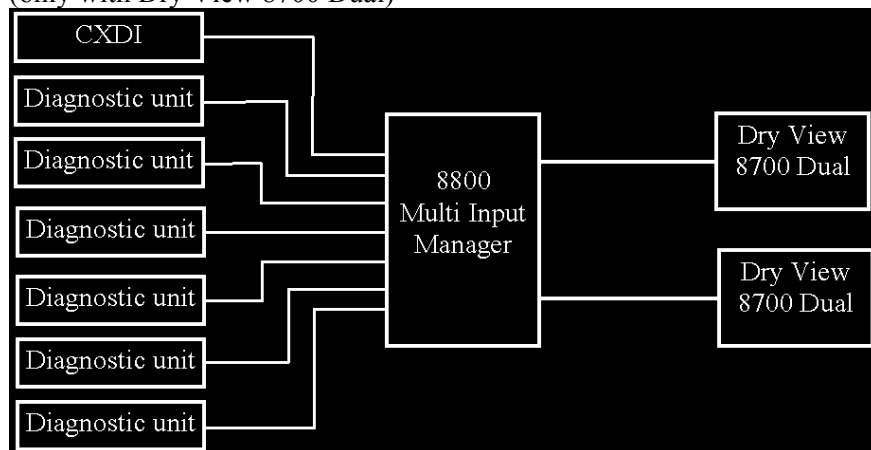
Up to 8 units can be connected.



Dry View 8700 Dual + 8800 Multi Input Manager

Up to 2 printers can be connected
(only with Dry View 8700 Dual)

Up to 7 units can be connected.



2. Installation

12.11 Linearity Check of Transfer Image Density

1) Purpose

An SMPTE image is used to check whether the density linearity of the image printed out by the printer and the image displayed on the high-definition monitor matches the density linearity of the image transferred by the CXDI.

2) Notes

2-1) This checking procedure should be performed before the procedure in the section of “Operation Unit Gamma Correction”.

2-2) The adjustment and checking procedures below should be completed before performing this procedure.

A) The printer and high-definition monitor connections and setting adjustments should be completed. The printer and monitor image output settings should be set to LINEAR.

For example, if the KODAK MLP190 is connected, the printer parameter “-S configuration” must be set to “-S CS000”. For other printers, refer to “Printers and Parameter Examples Reference” in “Network Connections”, and set so that the curve shape is 0 (density linear).

B) Be sure to calibrate the printer and high-definition monitor units separately before performing this procedure.

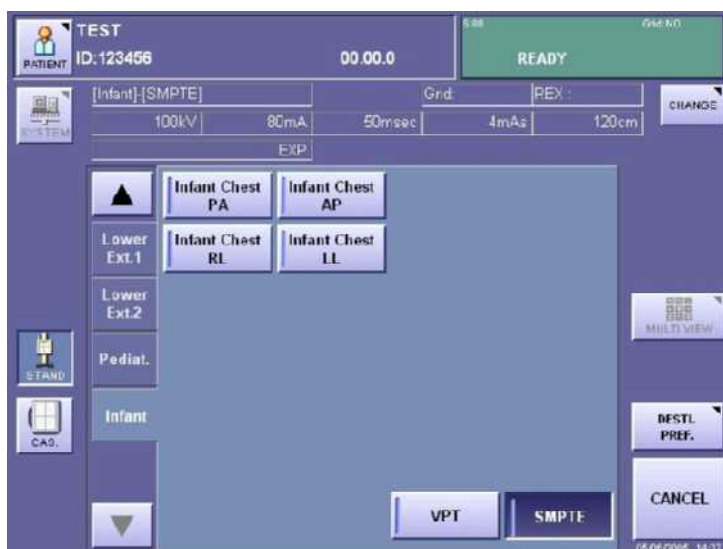
C) When the imaging screen is “tray type”, change it to “category type” by selecting:
System → SETUP MENU → CUSTOMIZE DISPLAY.

3) Rough adjustment

3-1) Start up the CXDI system.

3-2) Using the two knobs at the rear of the operation unit, adjust the brightness and contrast of the touch panel screen for optimum visibility.

3-3) On the exposure screen, select the exposure mode “SMPTE” and wait until “READY” appears. [Fig. 1]



[Fig. 1]

2. Installation

- 3-4) Press the exposure switch on the X-ray generator, and after the exposure, press the END STUDY button. Transfer the SMPTE pattern image to the printer or the high-definition monitor. [Fig. 2]



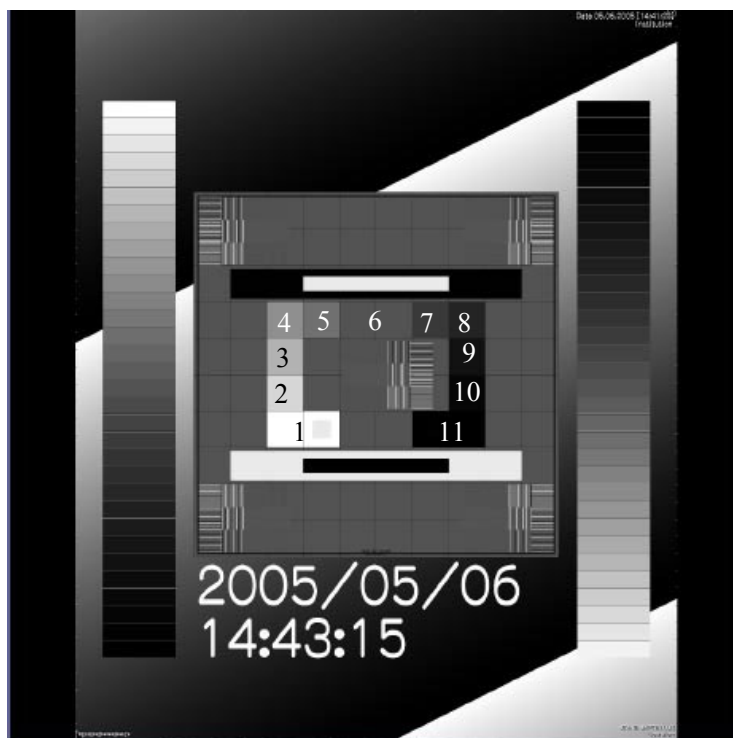
[Fig. 2]

- 3-5) Measure the densities of the 11 locations (0% to 100%) of test image grayscale on the film or on the monitor. [Fig. 3]

- Measure the SMPTE image density on the film is measured using a densitometer.

Measure the SMPTE image density on the high-definition monitor using the gradation analysis software.

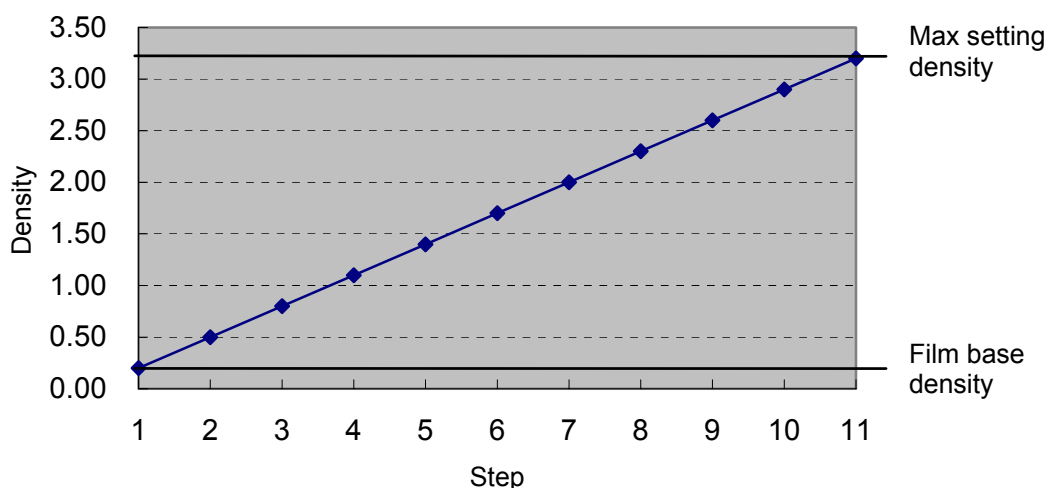
- The data for the SMPTE test image grayscale transferred by the CXDI are the values for the maximum density (3.20 in the case of the MLP 190) in the printer settings which have been changed in 11 uniform steps.



[Fig. 3]

2. Installation

3-6) Create the graph below based on the data measured in step 5).



As shown in the above graph, the measurement values need only to nearly form a straight line from the minimum density to the maximum density.

The important point here is that the measurement values make a straight line and a maximum density corresponding to the settings is output.

If the measurement values deviate too far from the straight line and a maximum density corresponding to the settings is not output, printer and monitor output linearity settings, calibration, and other adjustments are necessary.

* The above graph is an example of measurements when the maximum density is set to 3.2 D and the printed film is measured with a densitometer. Refer to the data below when the maximum density is set to 3.1 D, or when gradation analysis software is used to take measurements on the monitor.

* The LINEAR output cannot be set for some printer models.

In this case, try to select an output setting as close as possible to LINEAR.

Ideal density values in LINEAR LINE

Step	1	2	3	4	5	6	7	8	9	10	11
3.2 D	0	0.32	0.64	0.96	1.28	1.60	1.92	2.24	2.56	2.88	3.20
3.1 D	0	0.31	0.62	0.93	1.24	1.55	1.86	2.17	2.48	2.79	3.10
12 Bit	0	410	819	1229	1638	2048	2457	2867	3276	3686	4095
8 Bit	0	26	51	77	102	128	153	179	204	230	255

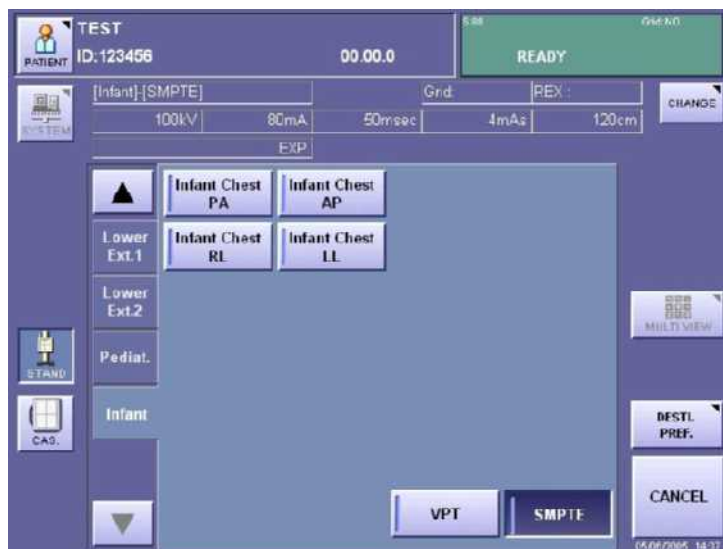
Possible causes of non-linearity in measurement values:

- * Inadequate calibration of printer and high-definition monitor
- * Inadequate settings for CXDI printer parameters
- * Faults in printer or high-definition monitor

2. Installation

4) Fine adjustment

- 4-1) As the step (3)-3) above, make the system “READY” by selecting the exposure mode “SMPTE” on the exposure screen. [Fig. 4]



[Fig. 4]

- 4-2) On the X-ray generator press the exposure button. After the exposure, adjust the trim so that the gray scale may be located in the center of the image. [Fig. 5]

- For correct density measurement of the 32-step chart, the gray scale must be printed in the center of an image to eliminate the shading feature.
- * Data may not form a straight line near the minimum and maximum densities due to characteristics of the printer. Rotate the image 90 degrees on the QA screen, and reprint or retake measurements.



[Fig. 5]

2. Installation

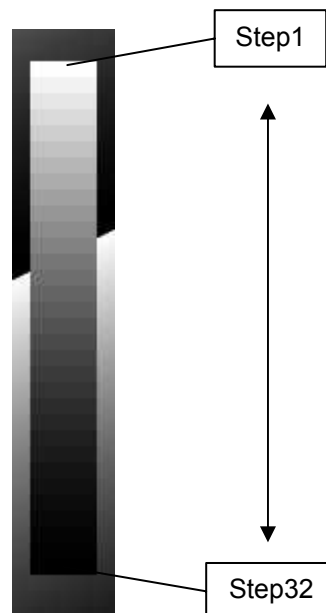
- 4-3) Select the END STUDY and transfer the SMPTE pattern image to the printer or the high-definition monitor. [Fig. 6]



[Fig. 6]

- 4-4) On a printed film or on the monitor, measure the density of 32 steps of the grayscale on the test image. [Fig. 7]

- *1: Measure the SMPTE image density on the film using a densitometer. The SMPTE image density on the high-definition monitor is measured using the gradation analysis software.
- *2: The data for the SMPTE test image grayscale transferred by the CXDI are the values for the maximum density (3.20 in the case of the MLP 190) in the printer settings which have been changed into 32 uniform steps.

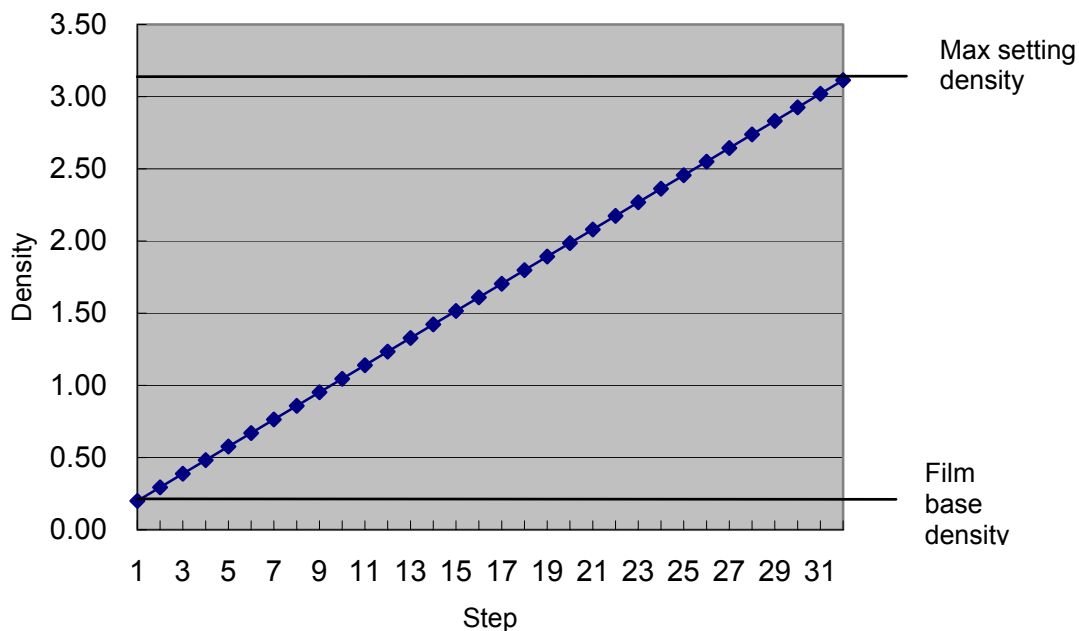


[Fig. 7]

2. Installation

- 4-5) As the step (3)-6), create a graph based on the data measured in step 4), and make sure that the data from the minimum density to the maximum density nearly form a straight line.

Characteristics of the printer may prevent the data from forming a straight line near the minimum and maximum densities. Rotate the image on the QA screen, and reprint or retake measurements.



Ideal Density Data for Linear Line

Step	1	2	3	4	5	6	7	8	9	10	11
3.2 D	0	0.10	0.21	0.31	0.41	0.52	0.62	0.72	0.83	0.93	1.03
3.1 D	0	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
12 Bit	0	132	264	396	528	660	792	924	1056	1188	1320
8 Bit	0	8	16	24	32	41	49	57	65	74	82

Step	12	13	14	15	16	17	18	19	20	21	22
3.2 D	1.14	1.24	1.34	1.45	1.55	1.65	1.75	1.86	1.96	2.06	2.17
3.1 D	1.10	1.20	1.30	1.40	1.50	1.60	1.70	1.80	1.90	2.00	2.10
12 Bit	1453	1585	1717	1849	1981	2113	2245	2377	2509	2641	2774
8 Bit	90	98	106	114	122	131	139	147	155	164	172

Step	23	24	25	26	27	28	29	30	31	32
3.2 D	2.27	2.37	2.48	2.58	2.68	2.79	2.89	2.99	3.10	3.20
3.1 D	2.20	2.30	2.40	2.50	2.60	2.70	2.80	2.90	3.00	3.10
12 Bit	2906	3038	3170	3302	3434	3566	3698	3830	3962	4095
8 Bit	180	188	196	205	213	221	229	238	246	255

2. Installation

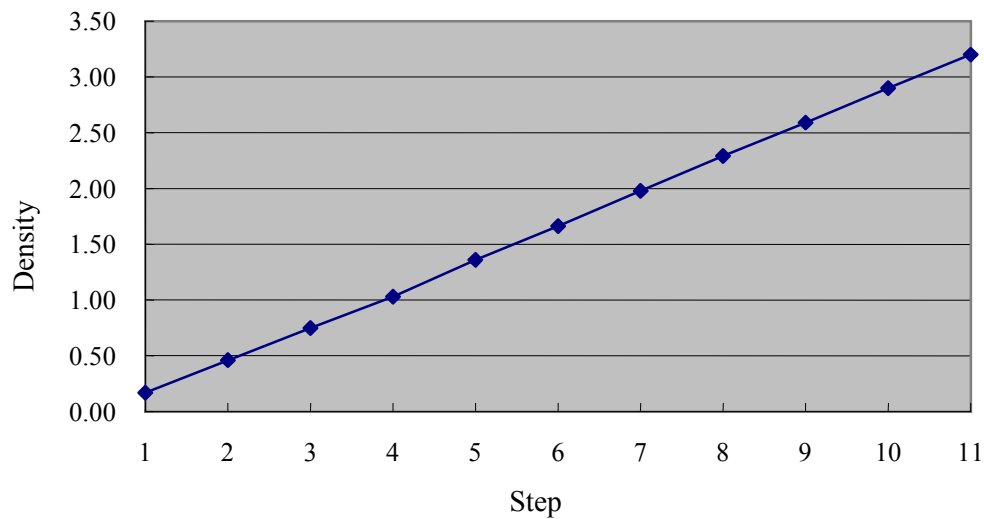
<Reference 1>

In the data and graph below, the data was obtained by setting the Kodak MLP 190 to curve shape 0 (density linear), a maximum density of 3.20, the SMPTE test image was printed out, and the image data was measured.

As shown in the graph, the data from the minimum density (film base density) to the maximum density nearly form a straight line.

SMPTE Density_____

Step	1	2	3	4	5	6	7	8	9	10	11
Percentage	0	10	20	30	40	50	60	70	80	90	100
Density (D)	0.17	0.46	0.75	1.03	1.36	1.66	1.98	2.29	2.59	2.90	3.20



* The printer parameter settings in this case are:

A 320 -T NO -M CUBIC -m NORMAL -S CS000

2. Installation

<Reference 2>

Example when the graph does not form a straight line

In the data and graph below, the data was obtained by using the Kodak MLP 190 to print out the SMPTE test image, and the image data was measured.

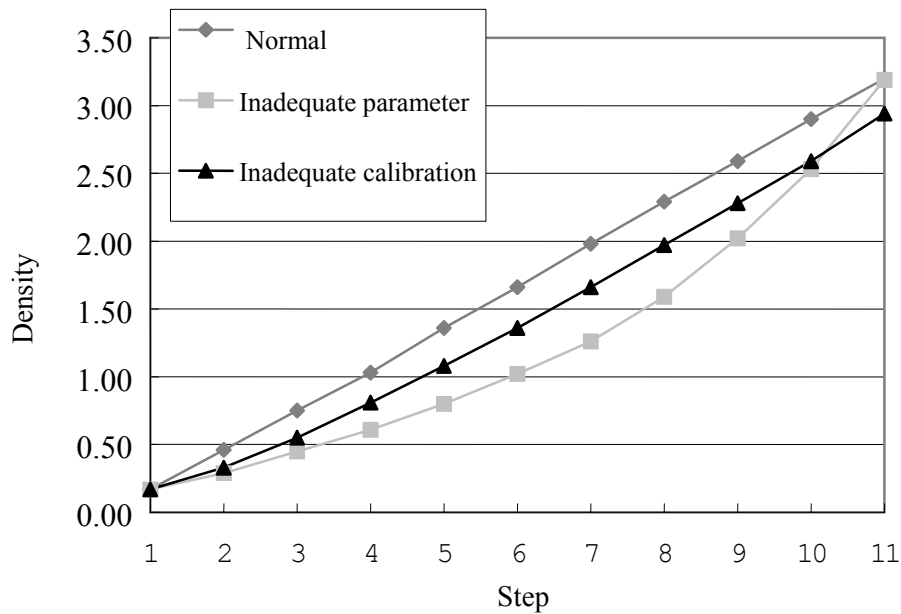
(1): Shows normal data.

(2): Shows the case when the CXDI printer parameters are not set linearly.

(3): Shows the case when the printer was not calibrated properly.

SMPTE Density

Step	1	2	3	4	5	6	7	8	9	10	11
Percentage	0	10	20	30	40	50	60	70	80	90	100
(1) Normal	0.17	0.46	0.75	1.03	1.36	1.66	1.98	2.29	2.59	2.90	3.20
(2) Inadequate parameter settings	0.17	0.29	0.45	0.61	0.80	1.02	1.26	1.59	2.02	2.53	3.19
(3) Inadequate	0.17	0.33	0.55	0.81	1.08	1.36	1.66	1.97	2.28	2.59	2.94



* For improper parameters, the printer parameter “-S CS000” was not entered.

* For the inadequate calibration, the printer calibration data was set too low.

2. Installation

12.12 Operation Unit Gamma Correction

1) Purpose

This procedure is performed so that the image that is printed out or displayed on a high-definition monitor conforms exactly to the exposure image on the operation unit.

2) Notes

2-1) The procedure in “Linearity Check of Transfer Image Density” must be completed.

2-2) If image adjustment for the printer or high-definition monitor has not been made, use the “Gamma Correction Calculation Tool” in order to correct the gamma of high definition monitor image to be a same as printer image.

2-3) Gamma correction is an image correction process for monitors and film. It is different from the contrast setting or grayscale setting.

This procedure is simply a visual adjustment. As a result, differences may occur depending on the operator performing the procedure. Therefore, be sure to consult with the responsible technician before performing this adjustment.

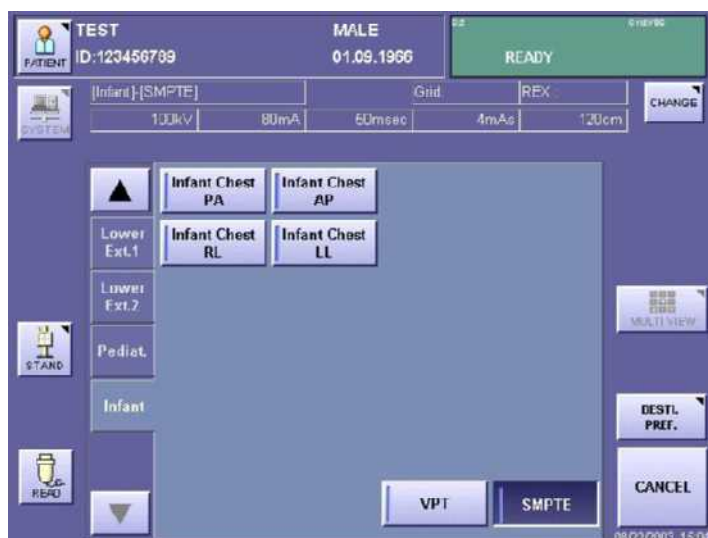
2-4) To make the gamma of operation unit adjust in detail, use the “Gamma Correction Calculation Tool”.

3) Comparison of operation unit image and print image or monitor image.

3-1) Start up the CXDI system.

3-2) Use the two adjustment knobs at the rear of the operation unit to adjust the brightness and contrast of the touch panel screen for optimum visibility.

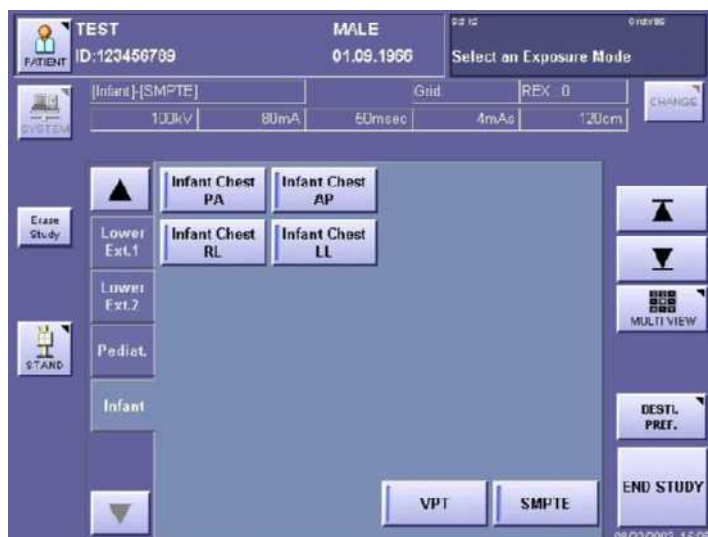
3-3) On the exposure screen, select the exposure mode “SMPTE” and wait until “READY” appears. [Fig. 1].



[Fig. 1]

2. Installation

- 3-4) On the X-ray generator, press the exposure button, and after the exposure, select “END STUDY”. Transfer the SMPTE pattern image to the printer or the high-definition monitor. [Fig. 2]



[Fig. 2]

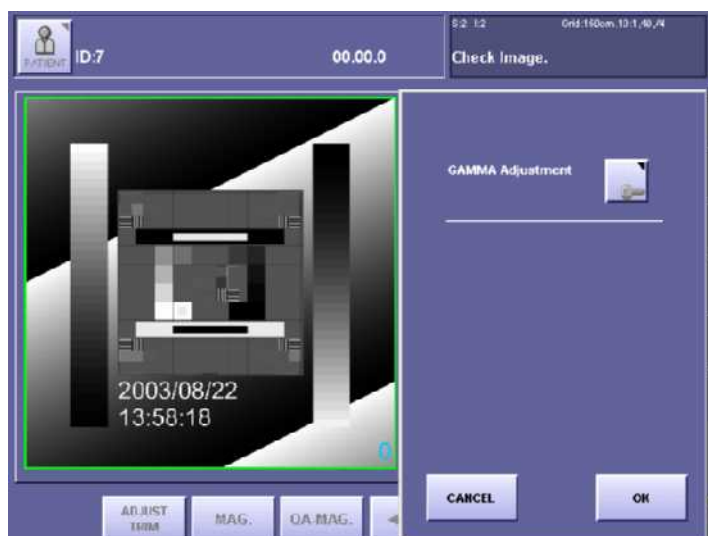
- 3-5) Take the SMPTE pattern image again. On the QA screen, compare the image displayed on the operation unit screen with the film image printed in Step 3-4) above or with the image on the high-definition monitor. Make sure there is no difference in contrast and gradation between those images. Check both preview and magnify images.

If there are any differences between these images, perform the procedure described in “4) Operation Unit Image Gamma Correction”

If there are no differences between these images, the steps are complete.

4) Operation Unit Image Gamma Correction

- 4-1) On the QA screen displayed on Step (3) 5) above, select the “Option” tab and the “Gamma Adjustment” button is appeared, and then press this button. [Fig. 3]



[Fig. 3]

2. Installation

- 4-2) The “Gamma Adjustment” window appears. Change the value for the PREVIEW IMAGE, and press OK. The gamma correction for the operation unit screen is performed. [Fig. 4]

(Make sure the gamma value for the test image has changed on the operation unit screen.)

The gamma value is adjustable from 1.00 to 2.50.

When the image on the operation unit is lighter (whiter) than the film image, increase the value. On the contrary, if the image on the operation unit is darker (blackier) than the film image, decrease the value. The default gamma value is 1.60.



[Fig. 4]

- 4-3) When the gamma value for the preview image is adjusted, then adjust the gamma value for the magnify image. The default gamma value for the magnify image is 1.60.
- 4-4) The correction steps are complete.

2. Installation

12.13 Changing the Total Image Count

1) Purpose

When the imaging unit is replaced (including the replacement of the LANMIT) for servicing, the total image count displayed on the user screen can be returned to “0” if necessary.

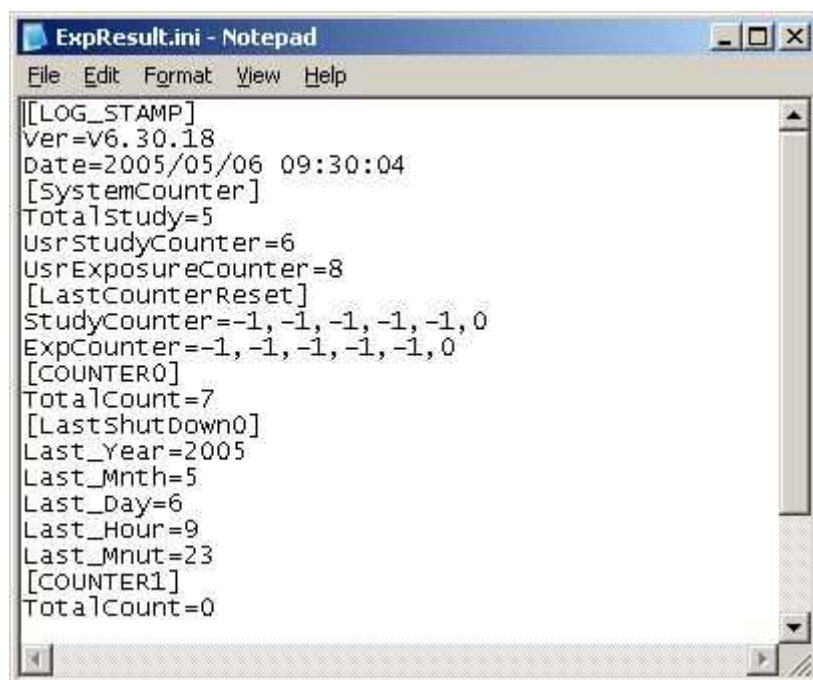
2) Notes

- 2-1) The CXDI is connected by the system.
- 2-2) Set the CXDI application so that it does not start up.
- 2-3) Files are overwritten, and so be careful when performing the procedure.
- 2-4) As an extra precaution, write down the numerical values before overwriting them.
- 2-5) The overwritten counter becomes valid the next time that the CXDI is started up.

3) Procedure

- 3-1) Turn on the control computer, and then start up Windows XP.
- 3-2) Right click on My Computer on the Desktop screen of Windows XP, and open Explorer.
- 3-3) A file called “ExpResult.ini” is contained in the CCR folder.

Open this file. (D:\CCR\ExpResult.ini) [Fig 1]



[Fig 1]

2. Installation

3-4) Changing the items below contained in the file allows you to change the settings for the counter in the user screen.

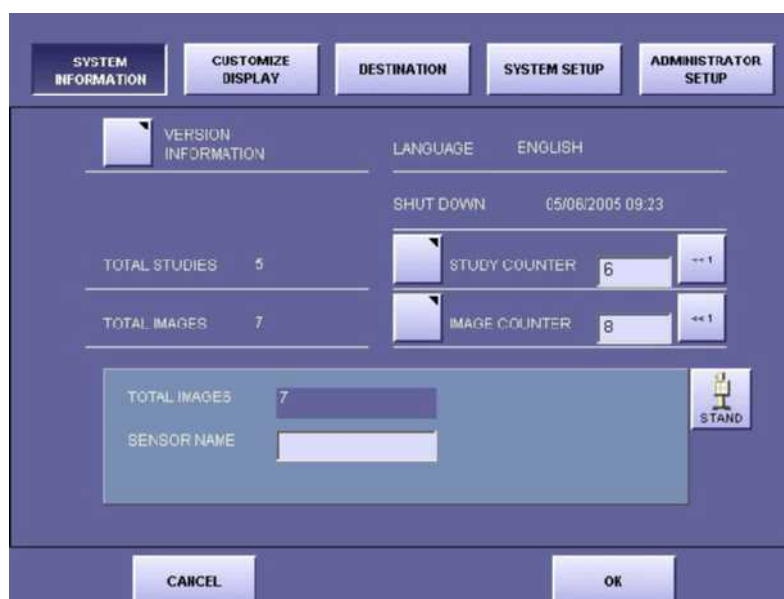
ExpResult.ini file	Screen Display	Note
[SystemCounter]		
TotalStudy=	TOTAL STUDIES	
UsrStudyCounter=	STUDY COUNTER	Can be overwritten at the user screen
UsrExposure Counter=	IMAGE COUNTER	Can be overwritten at the user screen
[LastCounterReset]		
StudyCounter=	Year, month, day, hour, minute	
ExpCounter=	Year, month, day, hour, minute	
[COUNTER 0]		
TotalCount=	Total number of images obtained with sensor unit 1.	
[COUNTER1]		
TotalCount=	Total number of images obtained with sensor unit 2.	
[COUNTER2]		
TotalCount=	Total number of images obtained with sensor unit 3.	
[COUNTER3]		
TotalCount=	Total number of images obtained with sensor unit 4.	

3-5) After overwriting the values, overwrite the file “ExpResult.ini” and save.

3-6) Close all windows that are open on the Desktop, and then start up the CXDI application.

3-7) Open the “System Information” screen, and check that the changed items have been set correctly. [Fig 2]

“TOTAL IMAGES” indicates the total number of images obtained with all sensors automatically.



[Fig.2]

2. Installation

12.14 Backing Up When Installing

1) Purpose

In case of re-installing the CXDI application, the necessary files ex) the exposure position and other parameters must be backed up so that can be restored at the status of first installation.

2) Necessary items

- 2-1) Removable drive such as MO drive, USB memory or external HDD that can connect to USB 2.0

3) Notes

- 3-1) Before performing backup procedure, delete any “BodyPart” and image data exposed for tests.

Deleting image data: Refer to the “Deleting Data” item.

Deleting “BodyPart”: Refer to the CXDI Series Operation Manual.

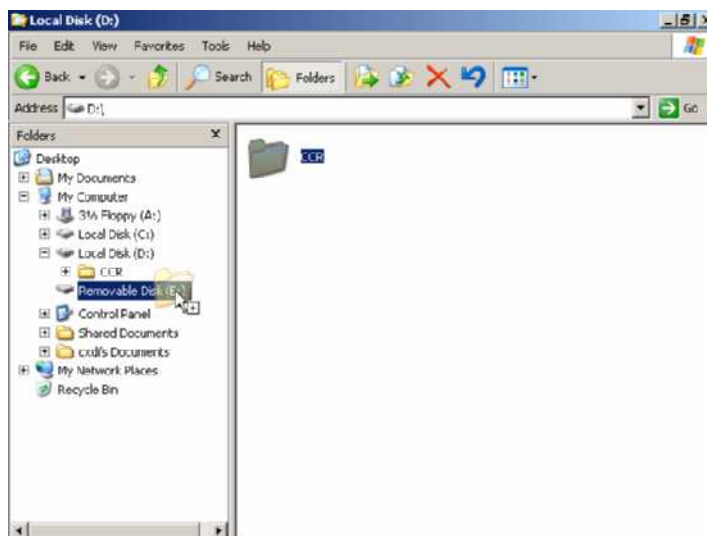
- 3-2) Backup should be performed immediately before handing over the product to the customer only for new installations.

4) Connections

- 4-1) Check that all equipment is turned off.
- 4-2) Connect the keyboard and mouse removal drive to the control PC.

5) Settings

- 5-1) Turn on the operation unit power and then the control PC power.
- 5-2) The CXDI application starts. Press the [Alt] + [Tab] keys to switch the program to the Command Prompt screen.
- 5-3) The message “Welcome to Canon CXDI” appears. Input [8] and press the [Enter] key. (Select “8 Exit”.)
- 5-4) The Windows XP desktop screen appears.
- 5-5) Right click on My Computer on the Desktop screen, and select Explorer from Menu.
- 5-6) Explorer appears. Copy the CCR folder onto Removable Drive.



2. Installation

12.15 Backing up Setting Data to FD

1) Purpose

“Important setting data (setting information which differs for each customer.)” is backed up to floppy disks and hard disks in consideration of possible setting data loss, hard disk corruption or other data errors.

In the event that setting data is lost or the hard disk is corrupted, this “Important setting data” can be quickly restored to the condition before the trouble occurred by copying from the backup data.

2) Notes

- 2-1) Performing this backup work means that the CXDI system will be used with the floppy disk inserted in the floppy disk drive.
Be sure to eject the floppy disk from floppy disk drive in order to avoid damaging it, in case of changing the layout or moving the control PC.
Likewise, when mounting the system in a vehicle, vibrations may cause damage to the floppy disk drive.
Therefore, after backing up the latest data to the floppy disk, **be sure to eject the floppy disk.**
- 2-2) Based on the reason in note 1) above, **do not perform backups in an environment that is exposed to vibrations. Therefore, never perform backups when the control PC is loaded in a car.**
In V4.0 and later versions, the default FD-Buck Up setting is ON. When backup to a floppy disk is not allowed, set it to OFF.
- 2-3) At the product shipment stage, it must be checked that [Boot/1. Removable Device] in the system BIOS settings is set to [Disabled]. However, as a precaution, check that “Boot/1. Removable Device” is actually set to “Disabled”. If the setting is changed to “Legacy Floppy”, the control PC may not start properly when a floppy disk is inserted.
For more information, see “System BIOS Settings” under “CXDI-C3/C3S”
- 2-4) Be sure to always format the floppy disk that you are using before performing backups.
- 2-5) The backup procedure described here covers the case when backing up for the first time after installation. For the second and subsequent times, data is automatically backed up to the floppy disk whenever the user changes the exposure mode buttons or other settings.
- 2-6) This backup procedure cannot be performed with just the control PC. Connect the imaging units and other equipment, and start up in the normal exposure status.

2. Installation

3) Procedure

3-1) Insert a formatted floppy disk (1.44 MB) in the floppy disk drive of the control PC.

- **Make sure the write protect of the floppy disk is unlocked at this time.**

3-2) Start up the CXDI system. If you have changed the parameters including the exposure mode button, back up all “ini.files” to a floppy disk when you restart the system again.

- When you first back up the files, the back up operation may take some time because there are many files to be copied.

3-3) Make sure that all files have been copied and switch off the CXDI system.

The files copied to a floppy disk are the “C:\ccrbup”, and they are the latest backup data. If the data stored in the drive D is damaged and there is no trouble in the drive C, restore the CXDI setting data using the data in “C:\ccrbup”.

4) FD-Back Up Off

If FD-Back Up is not necessary, open the “Service tool” window, select “FD-Back Up Off” and press “Start”.

System > Set Up menu > Administrator Setup> Service Tool.

2. Installation

12.16 Tool Modes (/np mode)

1) Purpose

The tool modes (startup options) are used to launch the CXDI application on the control PC by itself, however, the tool modes are not available for the CXDI-40G COMPACT imaging unit.

2) Notes

The following operation must be performed before using the “/np” mode. Especially, be sure to back up the exposure mode names and the customized settings before the operation.

2-1) When using “/np” with the same settings as that of the connected sensor unit

“BodyPart**.ini” file can be used as it is.

Example:

	Connection	/np setting
Sensor1	Table	Table
Sensor2	Stand	Stand

2-2) In case of using “/np” with different settings from that of the connected sensor unit

Move the “BodyPart**.ini” file in the “BodyParts” folder to the desktop, etc. However, do not move the Reference folder. If the “BodyPart**.ini” file is left in the “BodyParts” folder, system will not be able to be started, as the sensor type of the “BodyPart” and the settings do not match.

Example:

	Connection	/np setting
Sensor1	Table	Stand
Sensor2	Stand	Table

3) Preparation

3-1) Connect the keyboard and the mouse to the control PC.

3-2) Delete the “ccrstart.bat” file from startup.

3-3) Disconnect the imaging unit from the control PC.

4) Startup method

4-1) Start up Windows XP.

4-2) Start the Command Prompt screen.

Start ⇒ Program ⇒ Accessories ⇒ Command Prompt

4-3) Command Prompt screen appears, type the commands following instruction below to start the CXDI application. (Press the [Enter] key after typing the command.)

No.	Command Prompt	Command	Note.
1	C:\>	d:	
2	D:\>	cd ccr	“Space” delimiter is required between “cd” and “ccr”.
3	D:\ccr>	ccrxxxxx /np	“Space” delimiter is required between “xxxxxx” and “/”. “xxxxxx” is different in version.

4-4) If the message “Sensor not connected” appears at starting of the CXDI application, click [OK] button, Change to the “Debugging mode” with the keys ([Alt] + [Tab]) using.

4-5) When Welcome to CCR appears, select “1. Set-Up...”.

2. Installation

- 4-6) When Setting Mode (0: Normal, 1: Expert) [0=0x0]: appears, select "0: Normal."
- 4-7) When CCR SETUP MENU appears, select "7 Scan Sensor Setup".
- 4-8) When Capture Device Configuration Table appears, enter the number of sensor to which make the "Max Capture Device" recognized.
- 4-9) The dummies of "A/D Board Serial Number" are appeared: Enter the sensor serial number for necessary type.

-----A/D Board Serial Number 0 0 -> 50G : 0x199
-----A/D Board Serial Number 0-1 -> 12 : 0x2009
-----A/D Board Serial Number 0-2 -> 31 : 0x3002
-----A/D Board Serial Number 0-3 -> 40G : 0x123

For example, when the upright stand model is connected to Sensor 1, and the 50G cassette 14x17 connected to Sensor 2:

Enter "**123**" for "A/D Board Serial Number for Sensor ID#1"

Enter "**199**" for "A/D Board Serial Number for Sensor ID#2"

The CXDI application can now be launched on the control PC with the same conditions in effect as if an imaging unit were connected.

@@@@@@@@ Capture Device Configuration Table @@@@@@@@@@

Max Capture Devices [2 = 0x2] : **2** <= Number of imaging units to be connected.

@@@@@@@@ Capture Device Configuration No.0 (SensorID#1 OPU) @@@@@@@@@@

-----A/D Board Serial Number 0-0 -> 50G : 0x199
-----A/D Board Serial Number 0-1 -> 12 : 0x2009
-----A/D Board Serial Number 0-2 -> 31 : 0x3002
-----A/D Board Serial Number 0-3 -> 40G : 0x123

A/D Board Serial Number for SensorID#1 [0x7900005 = 126877701] : **123**

Custom Type[0:NO CUSTOM 1:STAND 2:TABLE 3:UNIV 4:CASSETTE 100um
5:CASSETTE 14X17_160um 6:CASSETTE 9X11_160um] [0 = 0x0] : 0

Field of View Rotation(0:No 1:Yes) [0 = 0x0] : 0

Constant for Exposure Index [1.800000] : 1.800000

@@@@@@@@ Capture Device Configuration No.1 (SensorID#2 OPU) @@@@@@@@@@

-----A/D Board Serial Number 0-0 -> 50G : 0x199
-----A/D Board Serial Number 0-1 -> 12 : 0x2009
-----A/D Board Serial Number 0-2 -> 31 : 0x3002
-----A/D Board Serial Number 0-3 -> 40G : 0x123

A/D Board Serial Number for SensorID#2 [0x10000004 = 268435460] : **199**

Custom Type[0:NO CUSTOM 1:STAND 2:TABLE 3:UNIV 4:CASSETTE 100um
5:CASSETTE 14X17_160um 6:CASSETTE 9X11_160um] [0 = 0x0] : 0

Field of View Rotation(0:No 1:Yes) [0 = 0x0] : 0

Constant for Exposure Index [1.800000] : 1.800000

---- Need to re-start program to validate this change.

2. Installation

- 4-10) When CCR SETUP MENU appears, press the [Esc] key to return to Welcome to CCR.
- 4-11) Select the command "8 - Exit" in the "Welcome to CCR" menu to exit the CXDI application.
- 4-12) After exit the CXDI application and Windows XP desktop appears, starts the command prompt screen (Start ⇒ Program ⇒ Command Prompt). And type the command "ccrxxxxx /np" to start the CXDI application again.
 - a. When the CXDI application program is starting up, the message "There is no BodyPart for SensorID#*. ** TYPE BodyPart will be created" appears. Click [OK]. (* differs according to the type of the sensor.)
 - The above message appears when a /np mode is used with a setting different to that of the connected sensor.
 - b. The messages "System X-ray tube parameters (APERTURE,OFFSET) are wrong. will you reset these wrong parameters??" and "The X-ray tube parameters (APERTURE,OFFSET) in the BodyPart.ini file are wrong. Do you want to reset the wrong parameters?" appear. Click [OK] for each.
 - These above messages might be appeared if /np mode is used with a different setting.
- 5) Going out of /np mode
 - Connect the sensor unit to the control PC.
 - Before using the system in normal condition, perform the following steps:
 - 5-1) If /np mode has been used with a different setting as that of the connected sensor, as mentioned in "(3) Notes", delete the BodyPart**.ini file made in the BodyParts folder, and return the BodyPart**.ini file which has been moved into the BodyParts folder.
 - 5-2) Enter the command "ccrstart.bat" on command prompt to boot the CXDI application.
 - Follow the procedure from 3) to 9) in previous section. And check these one will be preformed properly without any problems.
 - 5-3) Register the ccrstart.bat file to the StartUp.

2. Installation

13. Installing the Grid

13.1 Overview

Obtain a grid and fixture piece from a distributor, and install it on the Bucky unit, stand or table.

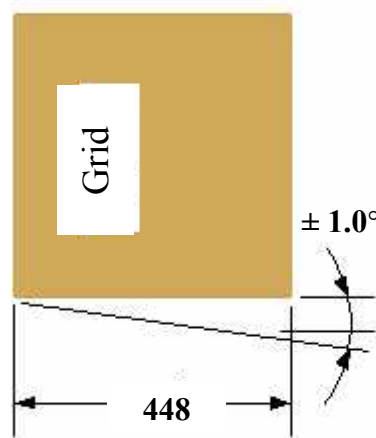
The grid is used as a fixed grid, and the grid vibrations are controlled if necessary.

13.2 Notes

1) Grid installation angle

The relative angular misalignment between the imaging unit sensor glass plate and the grid must be $\pm 1.0^\circ$ or less. For the checking method of the angular misalignment, see the next section (13.3).

*Reference: The relative angular misalignment with respect to the imaging unit outer cover is $\pm 0.6^\circ$ or less.



2) Selecting the grid

The recommended grids should be structurally identical to the recommended models for the CXDI-40E series. The recommended grid specifications are shown below. Canon standard grids that are set as options are identical to those in the CXDI-40E series.

*Grid density: 40 LP/cm $\pm$ 5% (Variation in line quantities per sheet is 1% or less)

*Dimensions: 448 mm (width) $\times$ 438 mm (height) $\times$ 1.5 to 3.8 mm (thickness)

However, this limitation does not apply due to the layout limitations of the Bucky unit.

*Grid constant: Compliant with the Canon optional grid.

*Reference: Canon optional grids (Grid constant)

- 40LP/cm 8:1 f=110 cm (1.5 kg, t=1.9 mm)
- 40LP/cm 10:1 f=110 cm (1.8 kg, t=2.3 mm)
- 40LP/cm 10:1 f=150 cm (1.8 kg, t=2.3 mm)
- 40LP/cm 10:1 f=180 cm (1.8 kg, t=2.3 mm)
- 40LP/cm 12:1 f=180 cm (2.1 kg, t=2.7 mm)

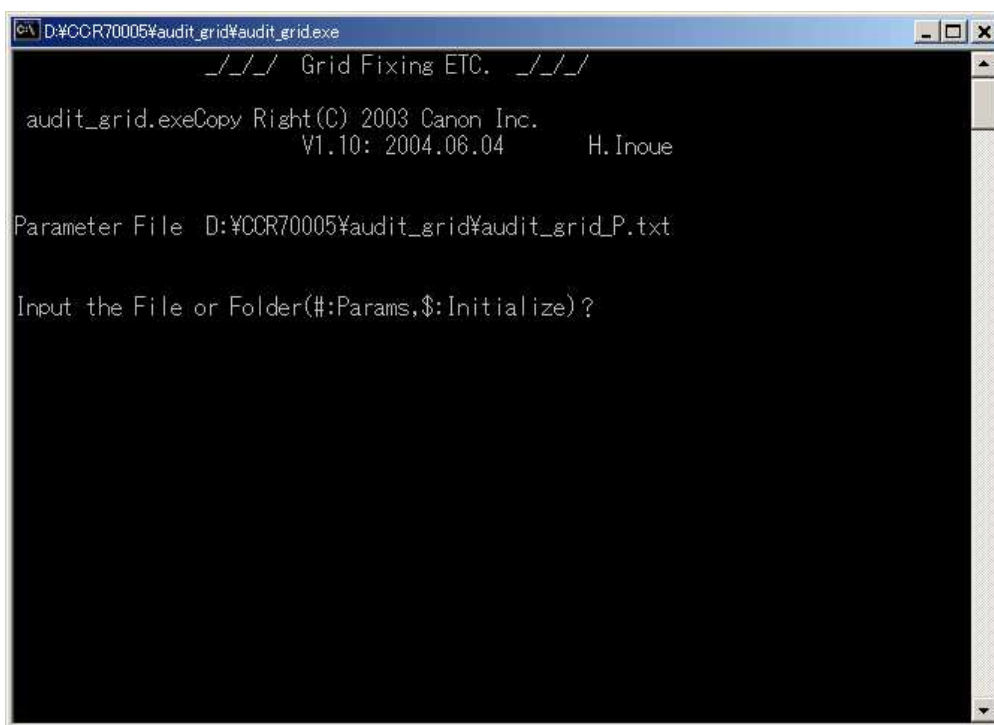
13.3 Checking the Grid Installation Angle

- (1) After the grid installation, prepare the “audit_grid.exe” for the grid installation angle. ***The tool is exclusively for CXDI-40G COMPACT. (Cannot be used with other models).**



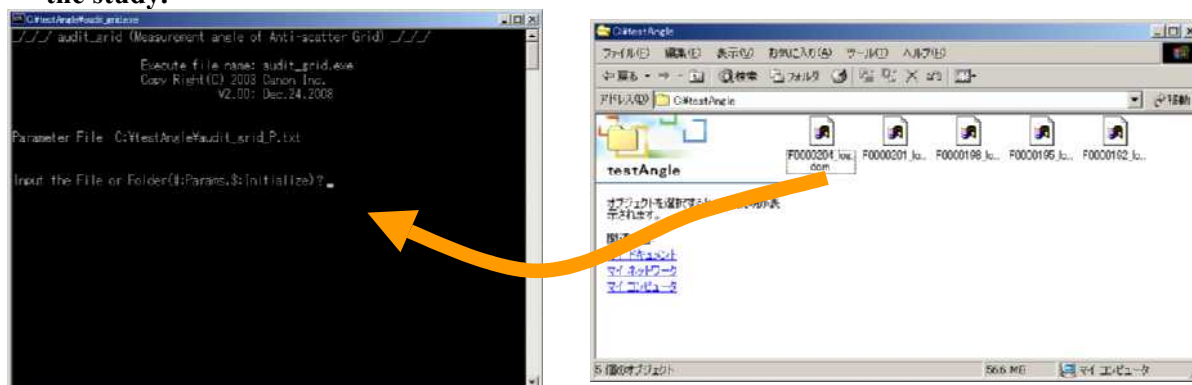
2. Installation

- (2) Copy the "audit_grid.exe" file to the CCR folder of the Control Station.
- (3) Start the CXDI host, and open the imaging screen.
- (4) Perform the pre-imaging preparation and checks.
 - **Adjust the distance between the focal point of the X-ray tube and the CXDI sensor unit according to the grid being used.**
 - **No subject, full-screen exposure**
 - **Perform calibration and note that phototimer and other parts except for grid that are located in the X-ray entrance surface are be installed in advance.**
 - **Do not perform calibration with the grid installed.**
- (5) Set the exposure dosage of the X-ray generator (same as calibration dosage).
- (6) Press Patient Information ⇒ Imaging Part, and then press the X-ray Exposure button to take three images.
- (7) After imaging is completed, exit the CXDI host. (The three images are saved to dtstore.)
- (8) Double-click the "audit_grid.exe" file in the CCR folder.



- (9) The message "Input the File or Folder(#{Params,\$:Initialize})?" is displayed. Drag and drop onto the screen the first image file that was taken in step (6) and saved to dtstore.

- * **DICOM files must have the "dcm" extension.**
- * **If a folder is dragged and dropped, all DICOM files in the folder become the target of the study.**



Drag and drop

2. Installation

- (10) Check that the “AG” value on the screen is ± 1.0 or less.
 - AG: Grid installation angle (deg)
 - + indicator: Tilt in the clockwise direction (CW)
 - - indicator: Tilt in the counter-clockwise direction (CCW)
 - Note that when the AG value is more than ± 1.0 , the grid stripe reduction process does not function.

```

D:\CCR70005\audit_grid\audit_grid.exe
audit_grid.exeCopy Right(C) 2003 Canon Inc.
V1.10: 2004.06.04      H.Inoue

Parameter File D:\CCR70005\audit_grid\audit_grid_P.txt

Input the File or Folder(Params,Initialize)? D:\CCR70005\dtstore\F0000741.DCM
M
FILES...
0 D:\CCR70005\dtstore\F0000741.DCM 2688 2688 23250

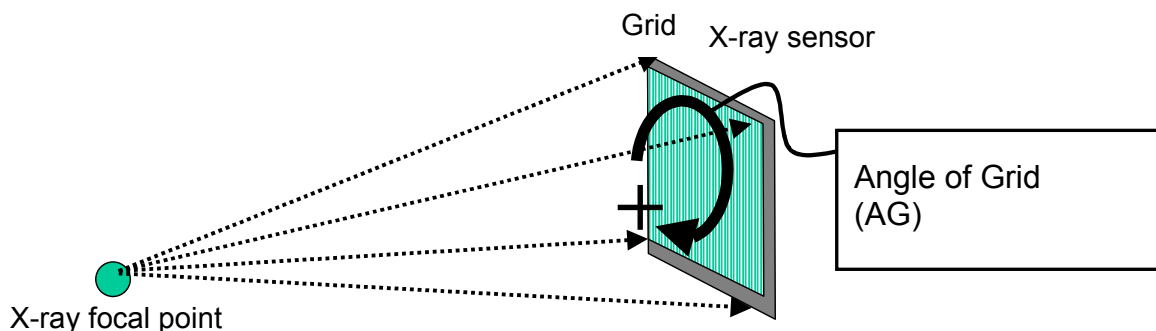
*** Number of files : 1 ***
legend
GD   Direction of Grid
AG   Angle Of Grid[deg](CW+)
FG   Freq Of Grid[cyc/mm]
AI   Stripe Angle On Image[deg](CW+)
FI   Stripe Freq On Image[cyc/mm]
GQ   GridQuality

GD   AG   FG   AI   FI   GQ   File
V   0.261 3.34 -0.618 2.91 0.39 F0000741.DCM
Press any key to exit
  
```

- (11) Press the Enter key to exit the screen.
 - (12) Perform steps (8) to (11) on the remaining two images, and check the grid installation angle.
 - (13) If any of the three images has a grid installation angle of more than ± 1.0 , correct the grid installation position, and take the images again.
 - (14) The procedure is complete when the grid installation angle of the three images is ± 1.0 or less.
- The “audit_grid.exe” file that was copied to the CCR folder does not need to be deleted.

*Definition of Grid Installation Angle

The grid installation angle that is output is defined as the angle made from the X-ray focal point during X-ray exposure when viewing the grid or imaging unit as shown in the figure below. The angle is expressed as a positive value for clockwise rotation and as a negative value for counter-clockwise rotation. The expression of this angle is not dependent on the grid stripe direction.



2. Installation

14. Image Quality

1) Purpose

To check the CXDI final image quality

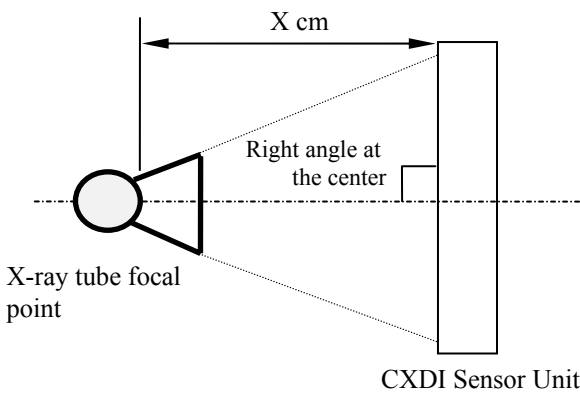
To check that the images are not affected by extraneous magnetic noise (emanating from CT or MRI apparatus, CRT monitors and other equipment that generate magnetic fields near the sensor unit)

2) Purpose

(1) Phantom

(2) High-resolution monitor or DICOM printer

<Procedure>

Procedure/Item	Operation/Conditions
[Positioning] Position the X-ray tube and CXDI Sensor Unit ↓ Calibration ↓ Install the grid ↓	- Adjust the distance between the focal point of the X-ray tube and the CXDI sensor unit. X cm: Differs according to the grid being used.  - Perform calibration SYSTEM > CALIBRATION - Perform calibration and note that phototimer and other parts except for grid that are located in the X-ray entrance surface must be installed in advance. - Do not install the grid. - Install the grid. - Check the grid installation angle.

2. Installation

Procedure/Item	Operation/Conditions
<pre> graph TD A[Self-test] --> B[Exposure] B --> C[Output the image] C --> D[High-resolution monitor] C --> E[DICOM printer] D --> F[Check image quality] E --> F </pre>	4. Perform self-test. Refer to V7.1 New Function Description Manual. ▪ Must pass all the tests. ▪ Perform self-test and note that phototimer and other parts including grid that are located in the X-ray entrance surface must be installed. 5. Irradiate X-ray and capture the image of a phantom. ▪ Use the imaging phantom. 6. Output the image to a high-resolution monitor or DICOM printer. 7. Set the high-resolution monitor and DICOM printer by referring to their instruction manuals. 8. Check that there is no artifacts, shading, grid stripes, etc. on the image.

2. Installation

15 Post-installation Checks

Check sheet

Checkpoint	Checkpoint details	Check
Checking the imaging unit	Align the unit with the X-ray tube	☐
	Check the indicator mark for the X-ray tube positioning.	☐
	Check that the unit does not interfere with the cables.	☐
Checking the date and time	Set the date.	☐
	Set the time.	☐
	Set the time zone.	☐
Checking the software version	Check that the CXDI application, firmware and PLD code versions all match.	☐
Identifying and registering the imaging units	Register the serial numbers of the sensors	☐
Inputting the control PC serial number	Input the serial number of the control PC to be used.	☐
Checking the operation unit	Set the contrast.	☐
	Set the brightness.	☐
	Set the gamma correction.	☐
Checking the exposure condition table	kV	☐
	mA	☐
	msec or mAs	☐
Checking the annotation	Check that the setting have been made in accordance with the customer's request.	☐
Network connections	IP address	☐
	Subnet mask	☐
	Default gateway	☐
Preparations prior to exposure	Perform calibration.	☐
	Perform self-test.	☐
Checking image transfer to printers and storages	Check that the setting have been made in accordance with the customer's request. - Data checks Checking that several sets of test data are transferred to the storage and PACS and that there are no discrepancies in the data (1) The IDs, names and other data must be correct. (2) The transfer sequence must be correct.	☐
Checking image transfer to external memory device	Check that the image is transferred properly.	☐
Checking the image quality	Use SMPTE pattern to check the density on a linear chart. Check that there is no artifacts, shading, etc.	☐

2. Installation

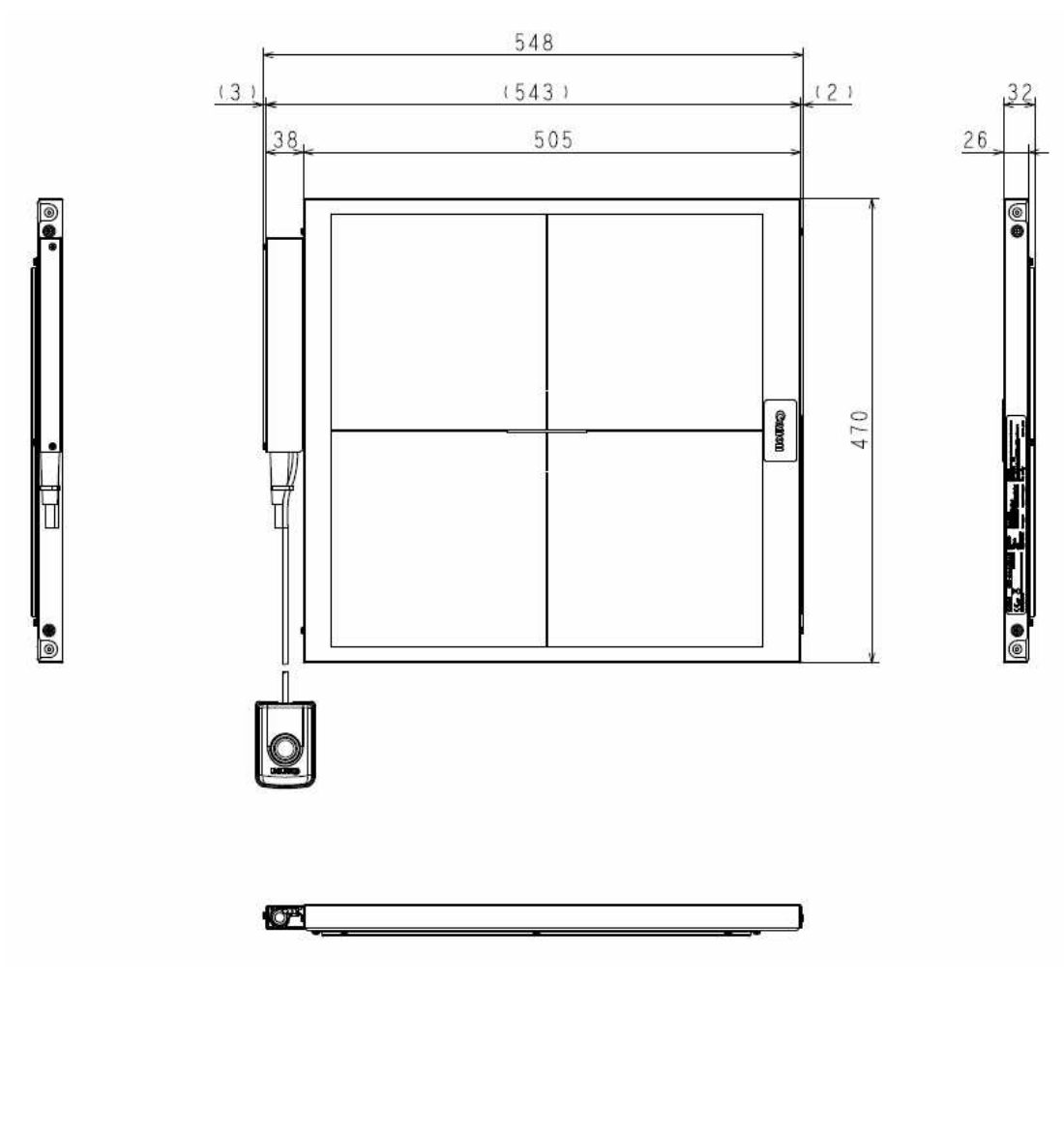
Checkpoint	Checkpoint details	Check
Deleting unnecessary data (there must be no unnecessary data such as the images used for testing)	dtque	☐
	dtstore	☐
	dttmp	☐
	old	☐
	Windows XP trash box	☐
Checking the window displays (no unnecessary windows must appear; the same applies after rebooting)	Operate from the Windows XP desktop.	☐
	Taskbar	☐
Inserting the backup floppy disk and checking the backup files	Create the backup files in floppy drive by re-starting. (Cannot be used in automobile)	☐
Backing up ccr folder	D:ccr	☐
Registering in startup. (Check by rebooting)	Check that the CXDI application starts.	☐
	Check that no /d, /np or other flags have been raised.	☐
Communication with X-ray generators	kV, mA, msec, body part settings, etc.	☐

[Table.1]

2 Installation

16 Dimensional Drawing

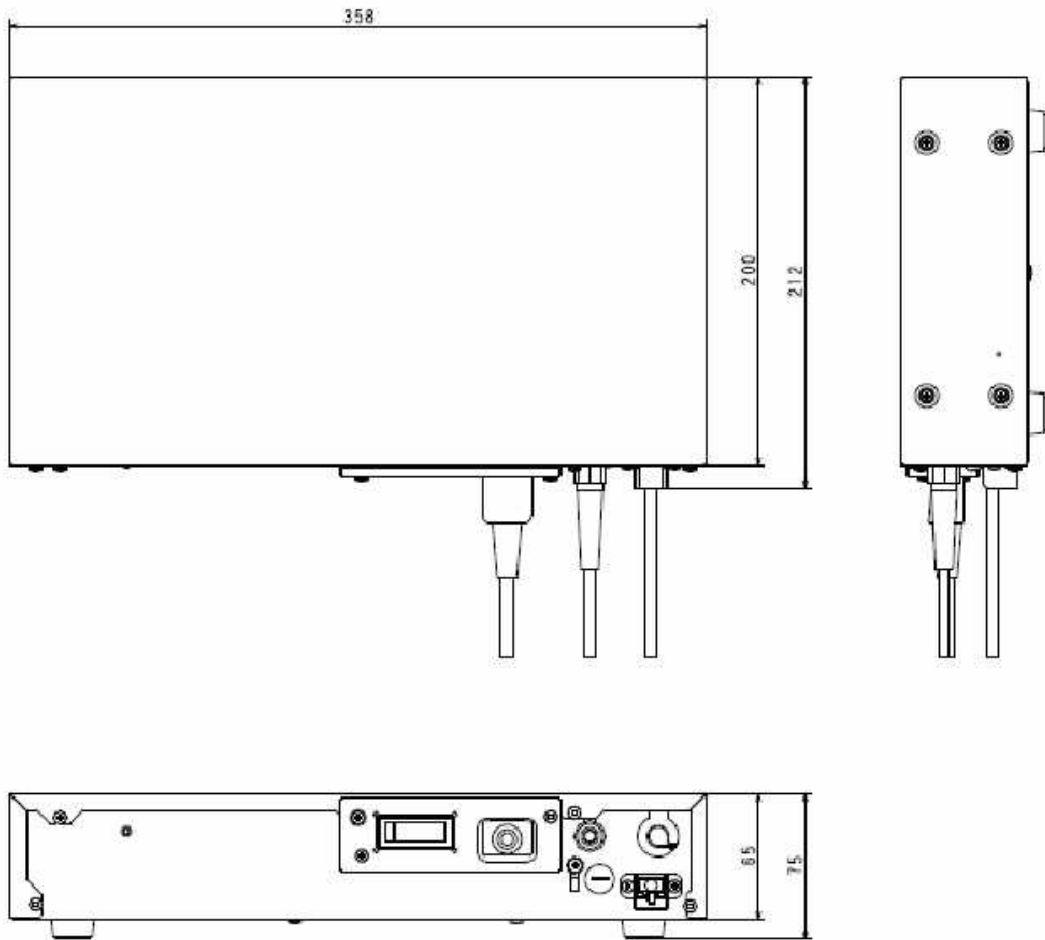
16.1 CXDI 40G COMPACT Imaging Unit



Mass: 11.0 Kg (not including cable or ready lamp)
Unit: mm

2 Installation

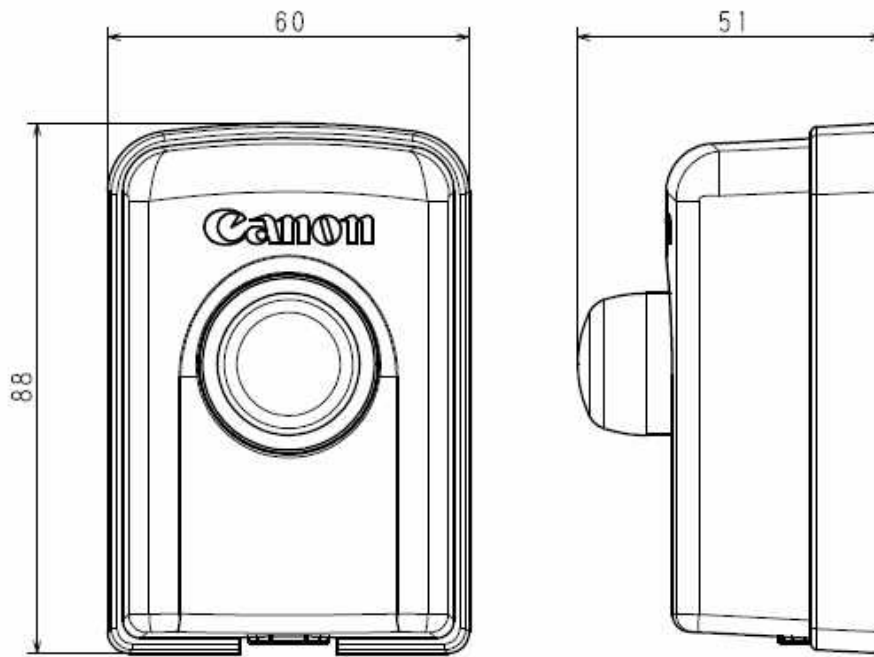
16.2 Power Box



Mass: 4.2 Kg (not including cable)
Unit: mm

2 Installation

16.3 Ready Lamp Unit



Mass: 0.5 Kg
Unit: mm

CXDI-40G COMPACT

3. Function

Contents

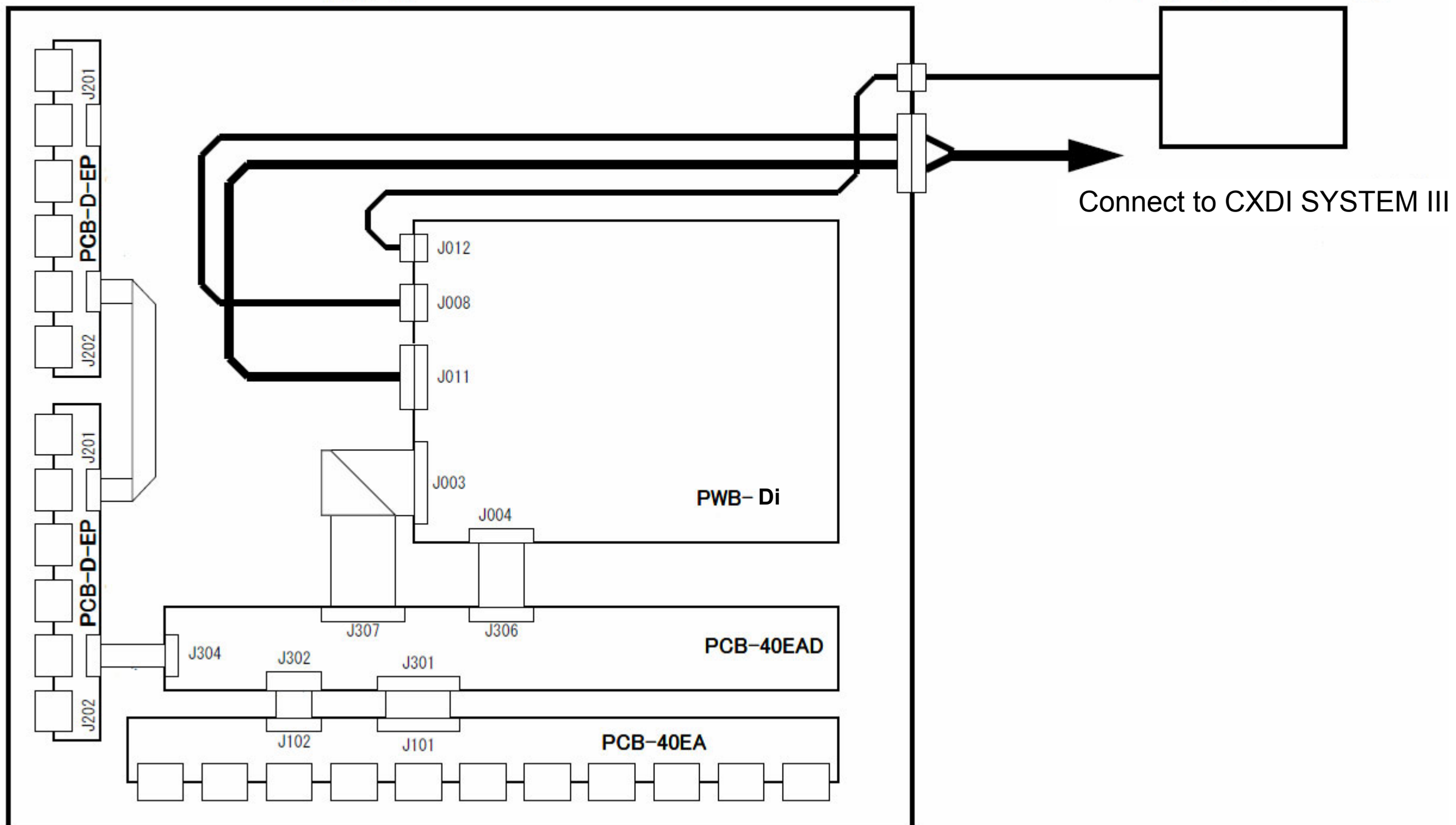
1.	Imaging Unit.....	1
1.1	Imaging Unit Block Diagram.....	1
1.2	LANMIT UNIT Block Diagram	2
1.3	PWB-Di Block Diagram	3
1.4	Sensor Unit.....	4
1.4.1	Sensor Data File.....	4
1.4.2	Sensor Cable	4
1.4.3	PWB-Di Board.....	4
1.4.4	PCB-40EAD board.....	5
2	Power Box	6
2.1	PWB-40EXRAY board.....	6
2.2	Power Supply Unit.....	7
3	Available Imaging Time (Normal Imaging/Long-term Imaging)	8
4	About the Power Box Initialization Switch.....	11
5	Operating system access method.....	12
5.1	What to have ready	12
5.2	Precautions	12
5.3	Procedures.....	12

3. Function

1. Imaging Unit

1.1 Imaging Unit Block Diagram

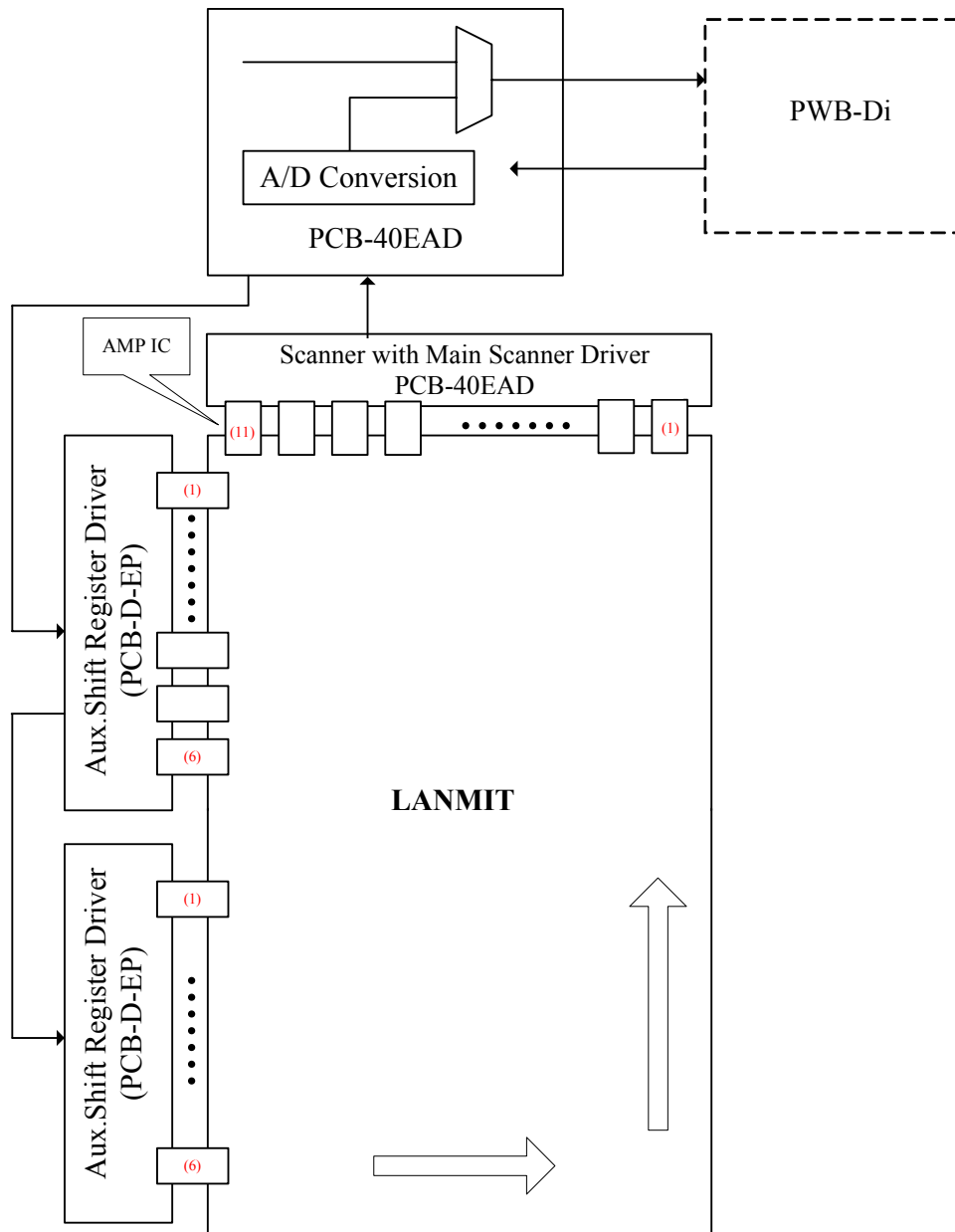
CXDI-40G COMPACT Imaging Unit



3. Function

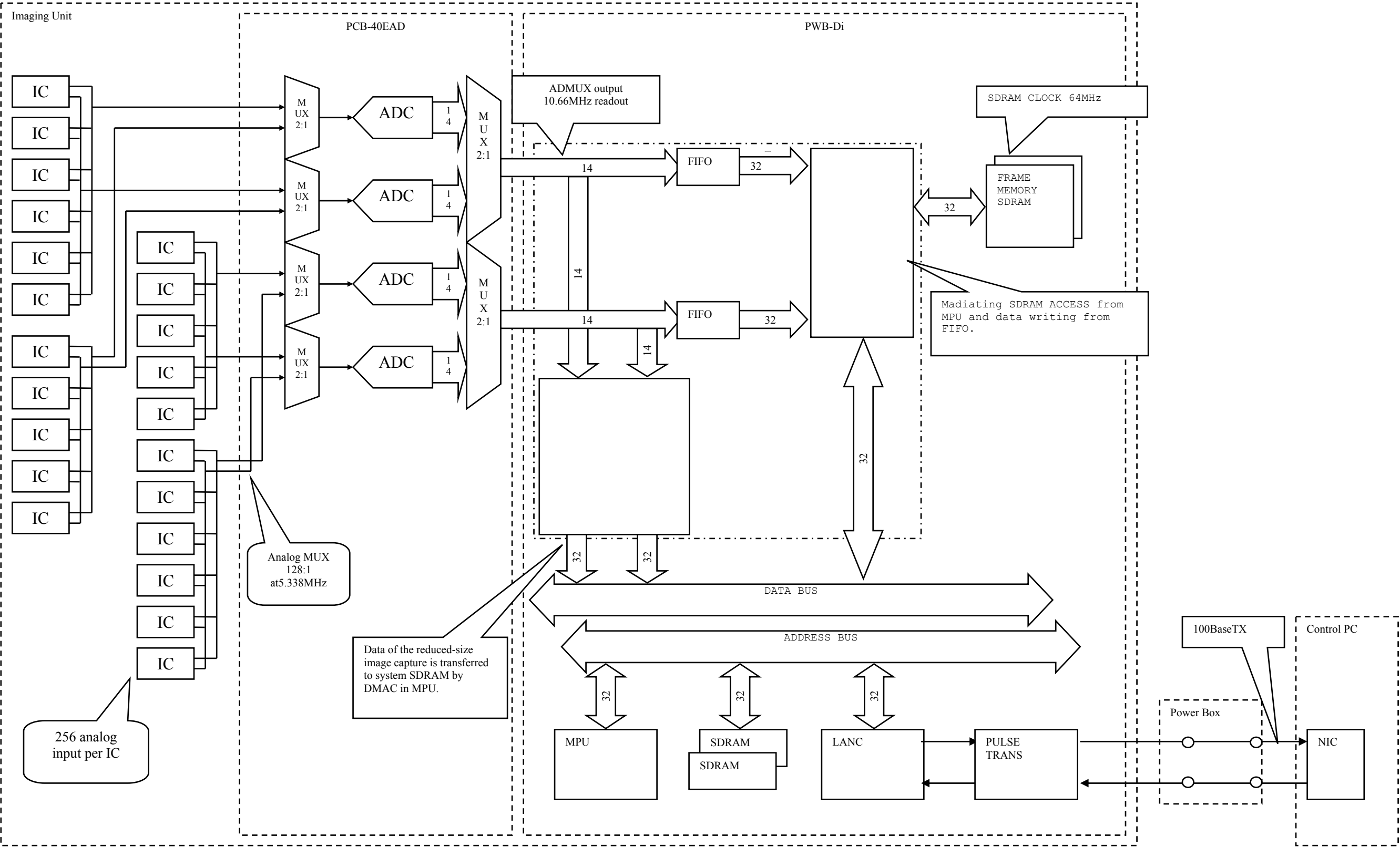
1.2 LANMIT UNIT Block Diagram

Reads in the direction of arrows on LANMIT



3. Function

1.3 PWB-Di Block Diagram



3. Function

1.4 Sensor Unit

The sensor unit consists mainly of the basic sensor unit (LANMIT sensor, AD board, Di board, cover, etc.), the sensor cable and the ready lamp unit.

After the X-ray images are converted into visible light using a fluorescent screen, they are electrically stored in the sensor.

The electrical signals (images) stored in the sensor are read out, A/D converted, and stored in the frame memory for the time being.

At the same time as the images are stored, they are reduced in size, and transferred through the power box to the control PC via the general-purpose interface (Ethernet 100Base-TX).

Upon completion of the reduced-size image capture, the images in the frame memory are now transferred in the same way.

1.4.1 Sensor Data File

The "sensor data" refers to the sensitivity, deficiencies and other data unique to the sensor unit.

The sensor data is recorded inside the sensor unit (PWB-Di), and automatically downloaded to the control PC as sensor data files by the control software.

1.4.2 Sensor Cable

The cable is used to connect the basic sensor unit with the power box.

- Communication line connected via the power box between the basic sensor unit and control PC
- Power line for supplying power from the power box to the basic sensor unit
- Communication line (7 meters long) between the basic sensor unit and power box

1.4.3 PWB-Di Board

This board has the functions described below.

(1) LANMIT-40E drive

The LANMIT-40E (henceforth "LANMIT") is driven through the PCB-40EAD and PCB-D-EP boards connected to this board.

(2) X-ray exposure synchronization

Communication with the X-ray generator is conducted in synchronization with the LANMIT operation and X-ray exposure in synchronization with the image capture operation is provided.

(3) Image data capture, transfer and command communication

The data (14 bits/pixel, 2688 x 2688 pixels) resulting from the A/D conversion of the LANMIT output signals performed on the PCB-40EAD boards are received, and stored in the SDRAM.

The image data captured via Ethernet (100Base-TX) is output to the control PC. The commands specifying the operation mode of the PWB board or LANMIT are also communicated through Ethernet.

3. Function

(4) Temperature detection

The ambient temperature is detected by thermal sensors on the PWB, and if the prescribed temperature has been reached, a warning, etc. is displayed.

A warning appears when the thermal sensor detects 48 °C (exposure remains enabled), and an error occurs when it detects a temperature of 49 °C or more (exposure is disabled).

(5) Serial communication

Communication with an externally connected general-purpose terminal is enabled under the RS-232C standards. (Debugging applications)

(6) Ready lamp control

(7) Log recording

The power-on time, number of exposures, exposure sequence and other data are recorded in the flash ROM. Logs can be read out by serial communication via Ethernet.

(8) Sensor information storage

The data unique to the sensor is stored in the flash ROM. It can be read out to an external device using commands via Ethernet.

(9) Remote updating

The firmware and HUB41 PLD codes are updated from the control PC via Ethernet.

(10) Voltage levels inside PWB

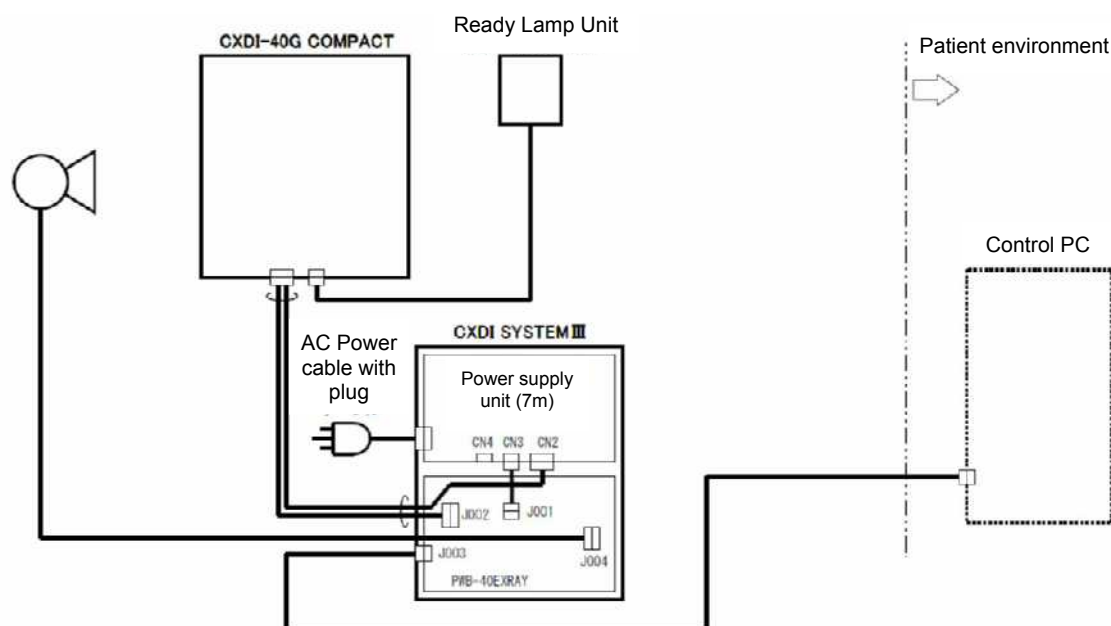
	GND side	+ side	Rating
1	J011_2	J011_1	8 [V] or more
2	J011_4	J011_3	5.15-6.5 [V]
3	J011_6	J011_5	8 [V] or more
4	J011_8	J011_7	20 [V] or more
5	J011_10	J011_9	-10 [V] or less
6	IC14_10	C3 + connector	3.3 [V] ± 2 %
7	IC4_10	C4 + connector	1.8 [V] ± 2 %
8	IC17_10	C5 + connector	1.5 [V] ± 2 %
9	I24_1	C282 + connector	5 [V] ± 2 %

1.4.4 PCB-40EAD board

The data (14 bits/pixel, 2688 x 2688 pixels) resulting from the A/D conversion of the LANMIT output signals performed on the PCB-40EAD boards are transferred to the PWB-Di board.

3. Function

2 Power Box



Main functions

- (1) Supply of power to the sensor unit (internal power supply 7m unit)
- (2) Interfacing with the X-ray generator
- (3) Relay of Ethernet communications while simultaneously providing isolation from the network to ensure safety (AC 230V, basic insulation)
- (4) Provision of switches for starting the sensor unit firmware, initializing codes

The power box consists of the PWB-40EXRAY board (X-ray interface) and power supply, and it comes with functions to transfer signals to and from the sensor unit, supply power, and transfer signals to and from the X-ray generator.

Each sensor unit must be connected to one power box and vice versa, and multiple numbers of units cannot be connected to one box and vice versa.

2.1 PWB-40EXRAY Board

This board comes with the functions described below.

- (1) Interfacing with the X-ray generator
- (2) Relay of Ethernet communications while simultaneously providing isolation (AC 230V, basic insulation)
- (3) Power supply 7m setting (JP1 #6-#8 shorted)
- (4) Provision of switches for starting the sensor unit firmware, initializing codes

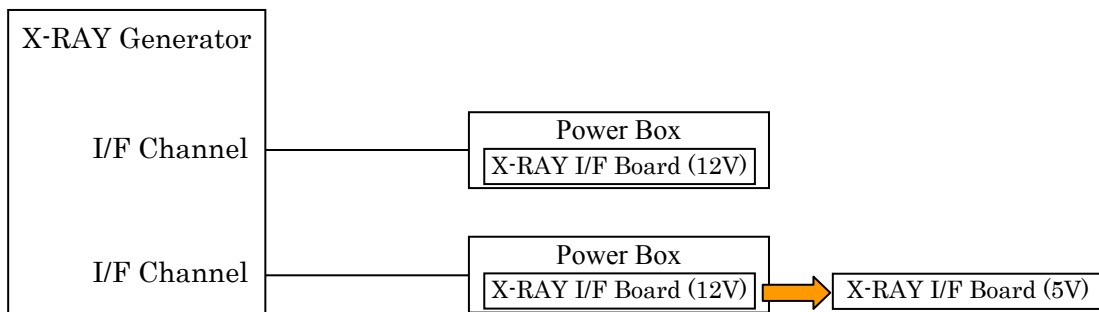
3. Function

***Note**

When connecting an X-ray generator and a power box, generally, one power box should be connected to one X-ray interface (I/F) channel. However, in certain rare cases, such as when there are not enough X-ray I/F channels, multiple power boxes are connected in parallel to a single X-ray I/F channel. In this connection method, if all PWB-40EXRAY boards in the power box have an operating voltage of 12 V, and one of them is replaced with a PWB-40EXRAY board with an operating voltage of 5 V, the replaced board can be damaged.

To prevent this from occurring, extended X-ray I/F channels must be added if possible to distribute I/F channels.

*If the I/F channels are distributed, 5V and 12V PWB-40EXRAY boards can be used together without a problem.



2.2 Power Supply Unit

(1) AC/DC power supply used mainly for the sensor unit

Rated input voltage: AC 100-120V, AC 200-240V

Rated output voltage: 9.5V for CH1, 9.5V for CH2, 6.8V for CH3, -11.5V for CH4, 27V for CH5

(2) Additional functions

a. Overcurrent protection: Suspended auto reset when an overcurrent is detected

CH1, CH2: Detection/suspended auto reset at 105% or more of peak current (3.5A)

CH3: Detection/output OFF at 200% or more of nominal current (2.5A)

CH4: Detection/suspended auto reset at 105% or more of nominal current (0.2A)

CH5: Detection/suspended auto reset at load current (500mA)

Note: Output OFF is also initiated for CH4 and CH5 when the CH3 function has been activated.

b. Overvoltage protection: Shutdown of output when an overvoltage is detected

An overvoltage is detected at 115% or more of the rated voltage.

3. Function

3 Available Imaging Time (Normal Imaging/Long-term Imaging)

[Overview]

There are two available imaging times as follow:

- 1) Normal imaging (0 - 1000 msec)
- 2) Long-term imaging (1001 - 3000 msec)

The maximum imaging time is now 3 seconds for the CXDI-40G Compact sensor, which can be set on the GUI.

[Precaution]

- The preview display becomes slower when using long-term imaging.
- The preview display may also become slower when performing normal imaging using the part button that is set to long-term imaging (imaging time settings: 1001 msec to 3000 msec).
- Imaging preparation time: 10 seconds for normal imaging and 30 seconds for long-term imaging. In imaging preparation time, the imaging unit changes from sleep status (sensor in standby status) to ready status (possible to perform imaging).
(The imaging cycle time^{*1} becomes longer.)

^{*1} Time required preparing for the next imaging after a single imaging is done. Normal imaging: 15 sec, long-term imaging: 30 sec.

[Technical Description]

1. The maximum value for imaging condition

- When using the CXDI-40G Compact sensor, the maximum value of the exposure time is 3000 msec, which can be set on the screen.
- The maximum value of the tube current is 1600mA. The maximum value of the mAs value is changed from the 3000 maximum value of the exposure time to 4800 mAs.

[Reference]

	Exposure time	Tube current	mAs value
Up to CXDI V5.1	1000msec ↓	5000mA ↓	5000mAs ↓
CXDI-11- CXDI-31, 60G sensor	1000msec	1600mA	1600mAs
Other sensors	3000msec	1600mA	4800mAs

3. Function

2. Imaging condition check at the time of upgrade

If any of the kV, mA, mAs, cm (except msec) values recorded in the imaging condition table or in each body part information exceeds the limit of the sensor, when the CXDI starts up, a warning message will be displayed (Fig. 4-1) and the value will be automatically modified to be at or below the limit. (However, thinking from the range of values that can be used with the generator, the probability of the warning message is very low.)

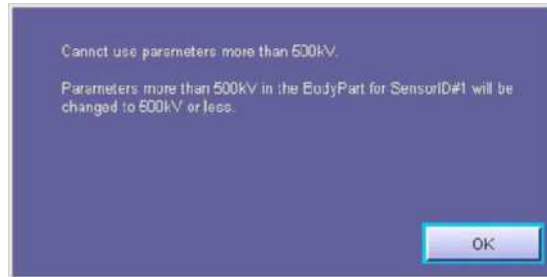


Figure 3-1

3. Adding values to the imaging conditions table

It is possible to add values up to 3000 msec, 4800 mAs to the imaging conditions table. However, if the exposure is performed with a CXDI-11 - CXDI-31 or CXDI-60G sensor, it is not possible to set values higher than 1000 msec, 1600 mAs.

4. Imaging conditions table

It is possible to add values up to 3000 msec and 4800 mAs to the system settings - imaging conditions table on the settings screen. However, if 1001 - 3000msec, 1601 - 4800mAs values are added, a warning message will be displayed only once, saying the values cannot be used with the CXDI-11 - CXDI-31 and CXDI-60G sensors. [Figure 3-]

If at the time of a regular exposure or a calibration exposure, the imaging body part of a CXDI-11 - CXDI-31 or CXDI-60G sensor was selected, values higher than 1000 msec, 1600 mAs cannot be selected from the imaging conditions table.

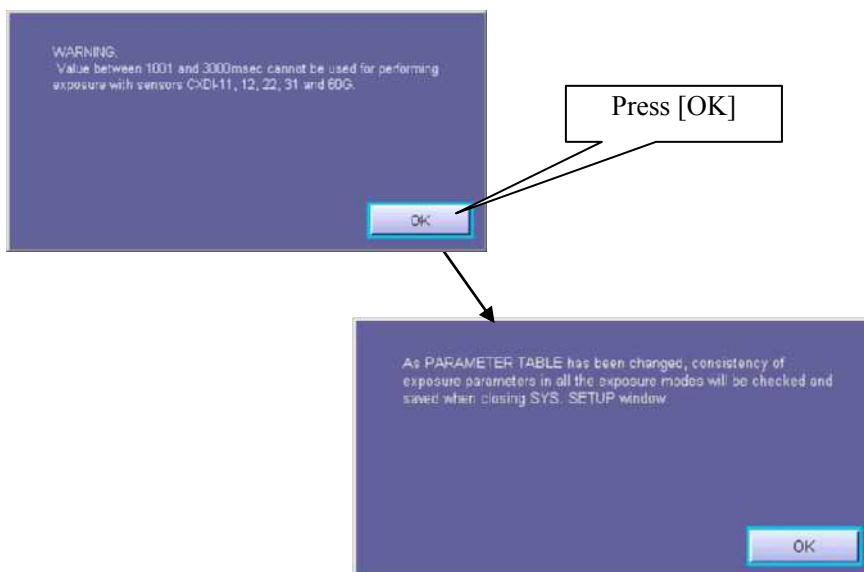


Figure 3-2

3. Function

5. msec maximum value checking

Even if the values recorded in the msec values of calibration/imaging body part within the BodyPart.ini exceed the maximum msec value of the sensor, the OPU can perform the exposure using those values without checking. (This function was already implemented before CXDI v5.1.)

It is the same when using the msec imaging conditions table, if a value bigger than the sensor's maximum msec value is written in the BodyPart.ini file, the value will not be automatically replaced with the value of the imaging conditions table, but can be used for the exposure as it is.

Note:

In the case of mAs lead, the msec will be automatically recalculated based on the mA, mAs, and the msec value will be automatically overwritten.

6. kV, mA, mAs, cm maximum value check

If any of the kV, mA, mAs, cm values of the calibration/imaging body part recorded within the BodyPart.ini file exceeds the maximum value of the sensor, when the CXDI starts up, a warning message will be displayed and the value will be automatically modified to be at or below the limit. (If the imaging conditions table is used, a table value not exceeding the maximum value of the sensor will be specified.)

3. Function

4 About the Power Box Initialization Switch

Initialization Switch

The LAN can be started with the factory settings when you turn on the power (the main power of the power box and remote switch) by holding down the initialization switch (see figure *¹) of the power box.

The firmware contains the initialization and normal codes.

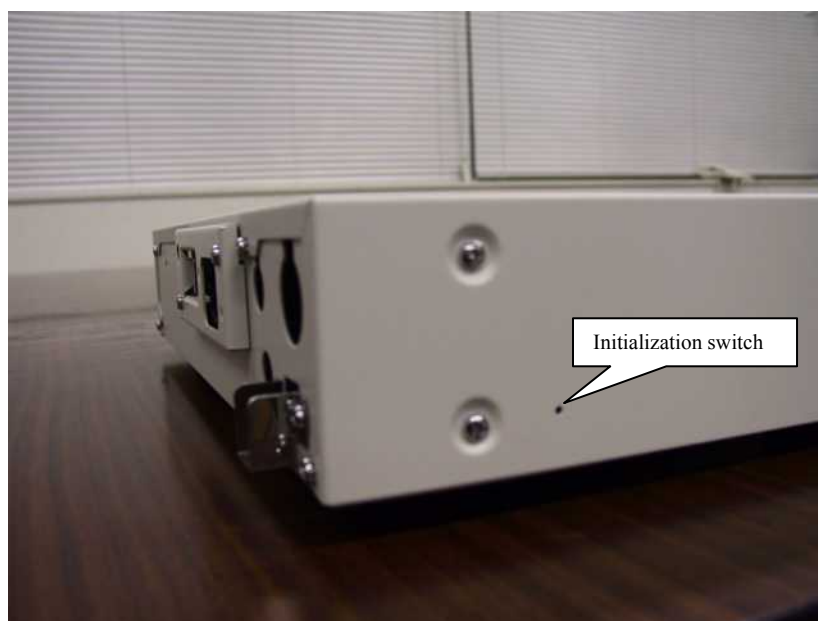
(They are stored in the PWB-Di flash ROM)

Normally, the normal code runs on a steady basis, and only normal code is updated when upgrading the firmware.

Use the initialization code when the normal code cannot start for some reason or when you have lost the Ethernet settings. Using the initialization code sets the Ethernet-related settings to the default settings and allows you to perform the startup operation for the initialization code.

In this case, the connection can be made by setting the Ethernet settings in the control PC by default *².

This default connection allows you to upgrade the firmware again and also check and set the Ethernet settings again in order to recover the system.



*¹ Initialization Switch: Switch 1 mounted on PWB-40EXRY

*² Default settings: IP Address=192.168.100.11 (**factory setting**)

3. Function

5 Operating System Access Method

This section describes the procedure for closing the CXDI screen and accessing Windows XP.

5.1 What to Have Ready

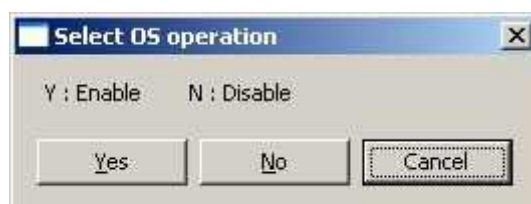
Keyboard, mouse

5.2 Precautions

- This procedure must not be undertaken while the CXDI host is operating (while image QA processing, image transfer or communication with RIS or with X-ray generator is underway, etc.).
- The procedure must be undertaken by service engineers only.
(It must not be undertaken by the user. Since important settings and files are stored, the system may no longer operate properly and trouble may occur in the CXDI equipment if any mistakes are made in this operation.)
- Users operating the HIPAA (Health Insurance Portability and Accountability Act) must release the restrictions placed on the operating system's operations since a keyboard has been connected.
As soon as the objectives of the service have been accomplished, the restrictions on the operating system's operations must be put back in place.

5.3 Procedures

- (1) Procedure for releasing the restrictions placed on the operating system's operations
The following steps must be taken to release the restrictions on the operating system's operations.
To take these steps, the keyboard must be connected while the restrictions on the operating system's operations are in place, and the CXDI system software must be running.
 - 1) Press the [SYSTEM] button.
 - 2) Press the [CXDI RESTART] button.
 - 3) Press the [OK] button while holding down the shift key.
 - 4) The operating system's logon screen now appears. Log on using [cxdiadmin] as the user name and [ccrdebug] as the password.
 - 5) Execute SelectOsOperation.bat which is in the CCR folder.
 - 6) The Select OS operation window shown below now appears. Press the [Yes(Y)] button.

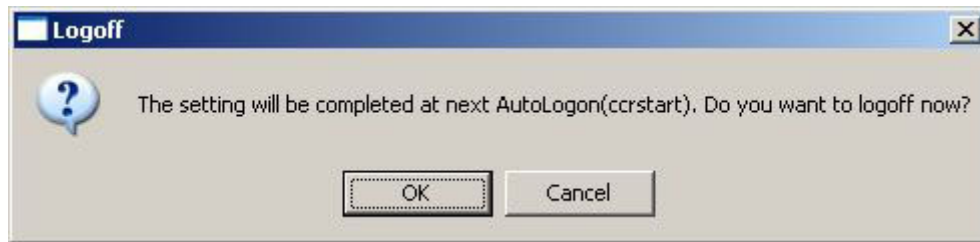


3. Function

- 7) The Enable OS operation window shown below now appears. Press the [OK] button.



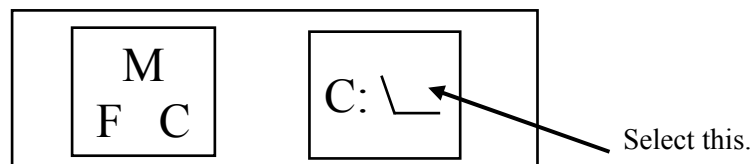
- 8) The Logoff window shown below now appears. Press the [OK] button.



Once auto logon is set under the [cxdi] user name and ccrstart.bat is set to be executed automatically, the restrictions placed on the operating system's operations will be released automatically.

If the setting established will not initiate auto logon, log on under the [cxdi] user name, and execute ccrstart.bat.

- 9) As soon as the CCR operation screen appears, press [Tab] while holding down [Alt] on the keyboard.
- 10) The selection screen shown below now appears on the screen. Press [Tab] while holding down [Alt] on the keyboard to select the command prompt screen.



- 11) The Ccr Console Menu now appears. Press the [Esc] key to display the [***Welcome to CCR***] screen (see Fig. 1), input [8], and press the [Enter] key.

```
***** Welcome to CCR *****
1 Set-Up... 5 -
2 Display Set-Up      6 - Utilities...
3 Image Util...      7 - Debug...
4 -                  8 - Exit
Enter item:
(Fig. 1)
```

- 12) The "Press any key to continue..." message is shown. Press any key to close the CCR startup software.
- 13) The Windows XP desktop screen appears.

3. Function

(2) Procedure for placing the restrictions on the operating system's operations

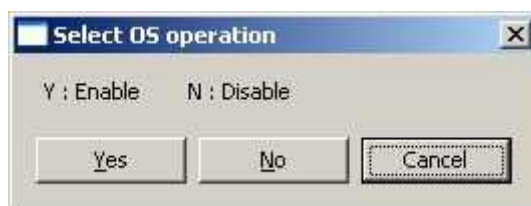
The following steps must be taken to place the restrictions on the operating system's operation.

To take these steps, the keyboard must be connected while the restrictions on the operating system's operation are not in place, and it must be possible to operate the files in the CCR folder.

1) Close CCR (by selecting 8. Exit on Ccr Console Menu).

2) Execute SelectOsOperation.bat which is in the CCR folder.

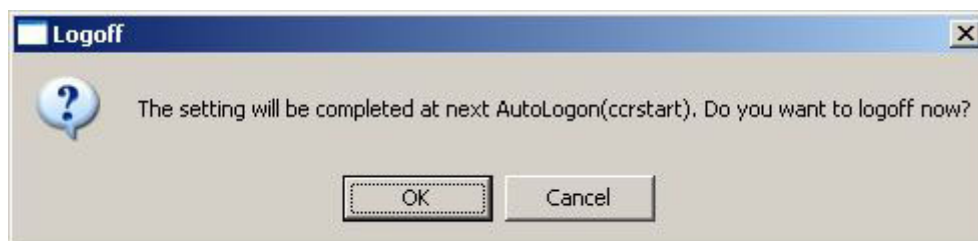
The Select OS window shown below now appears. Press the [No(N)] button.



3) The Disable OS operation window shown below now appears. Press the [OK] button.



4) The Logoff window shown below now appears. Press the [OK] button.



5) Once auto logon is set under the [cxdi] user name and ccrstart.bat is set to be executed automatically, the restrictions on the operating system's operations will be placed automatically. If the setting established will not initiate auto logon, log on under the [cxdi] user name, and execute ccrstart.bat.

Notes

- To ensure that the placement of the restrictions on the operating system's operation will take effect, first execute SelectOsOperation.bat. It is then necessary to log on under the [cxdi] user name which is used during operation, and execute ccrstart.bat.
- It must be borne in mind that if a user name other than [cxdi] is used to log on before executing ccrstart.bat, the placement of the restrictions on the operating system's operation will be set for the user who has logged on. It must be ensured that the placement of the restrictions on the operating system's operation is not set for the [cxdiadmin] user name.

CXDI-40G COMPACT

4. Repair Guide

CONTENS

1. Precautions 1

2. Assembly / Disassembly 2

 2.1 Imaging Unit 2

 2.2 Removing the PWB-40EXRAY 5

3. PCB Settings 6

4. Operation Required for Replacing Parts 8

4. Repair Guide

1. Precautions

Observe the following precautions when assembling or disassembling;

- (1) Be sure that turn off the power before assembling or disassembling.
- (2) Assembly procedure is omitted because it is basically reverse of disassembly procedure.
- (3) Minor parts such as washers are omitted to simplify the description.
Be sure to attach them in the same location when assembling.
Also, be sure to always replace toothed washer with a new one to ensure good electric conductivity.
- (4) **The sensor unit is sensitive to static electricity. Be sure to take anti-static measures when replacing.**
- (5) Do not remove the outer covers of the imaging unit except for the maintenance cover. Do not leave the imaging unit with the maintenance cover removed.
- (6) Handle the imaging unit with utmost care to avoid scratching or damaging the front cover of the imaging unit that may cause the image deterioration.
- (7) **Pay attention not to drop screws in the gaps in the imaging unit when the maintenance cover is removed for repair.**

4. Repair Guide

2. Assembly / Disassembly

2.1 Imaging Unit

(1) Disassembly

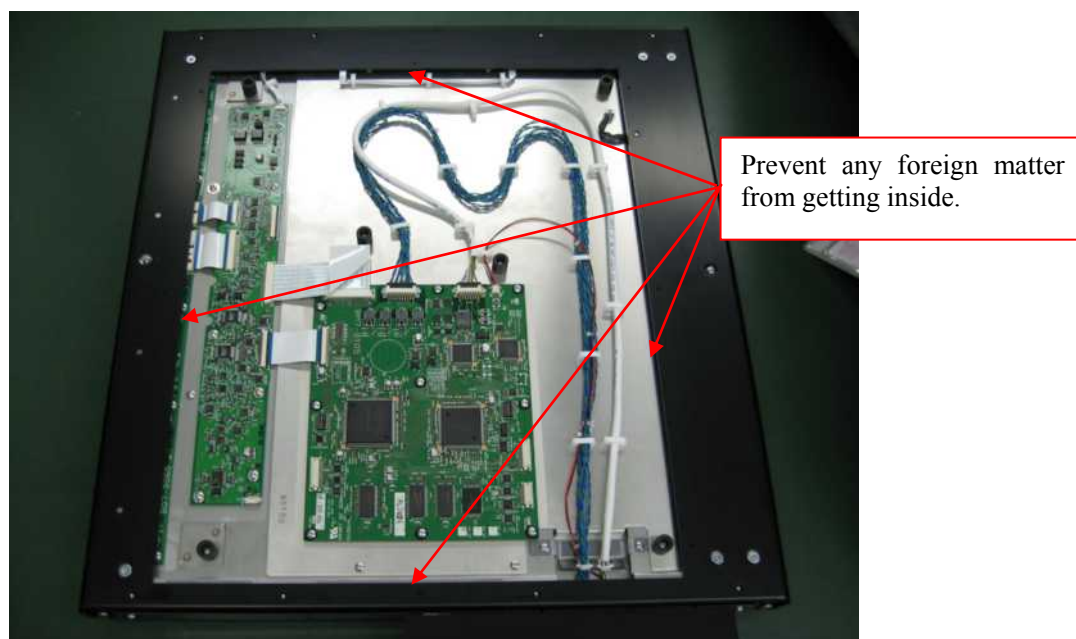
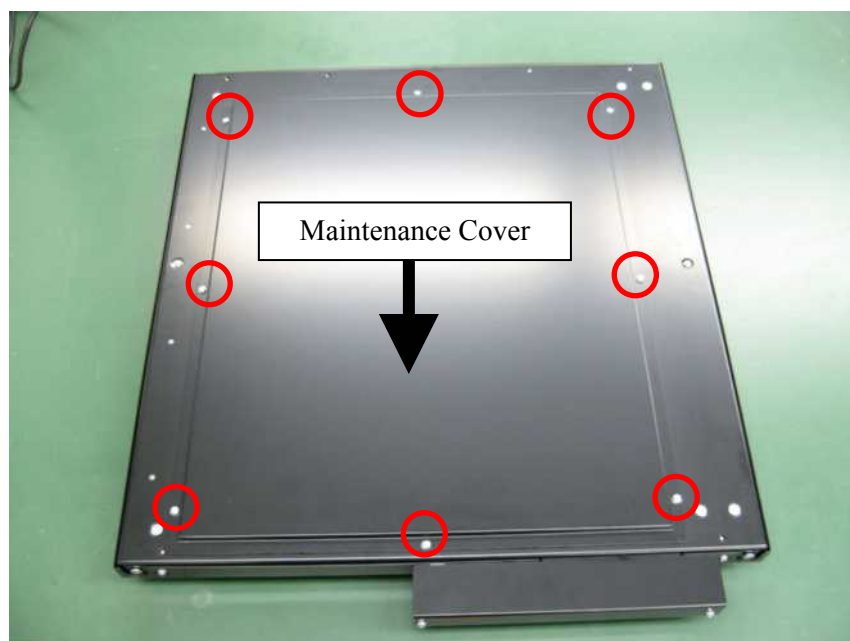
Disassembling the Maintenance Cover

Turn the sensor unit over.

Remove the maintenance cover with the screws (x 8) taken off.

Notes:

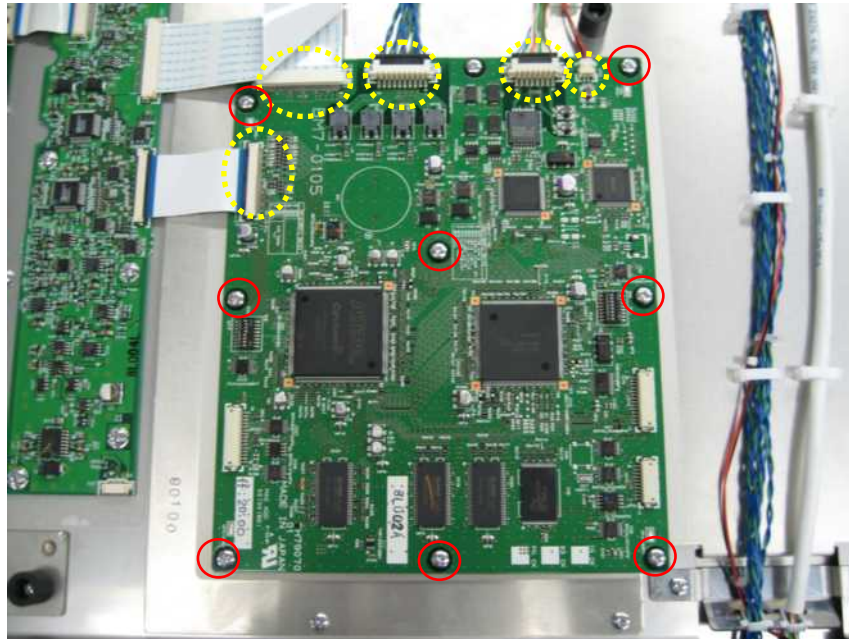
Prevent any foreign matter from getting inside the gaps in the imaging unit when the maintenance cover is removed.



4. Repair Guide

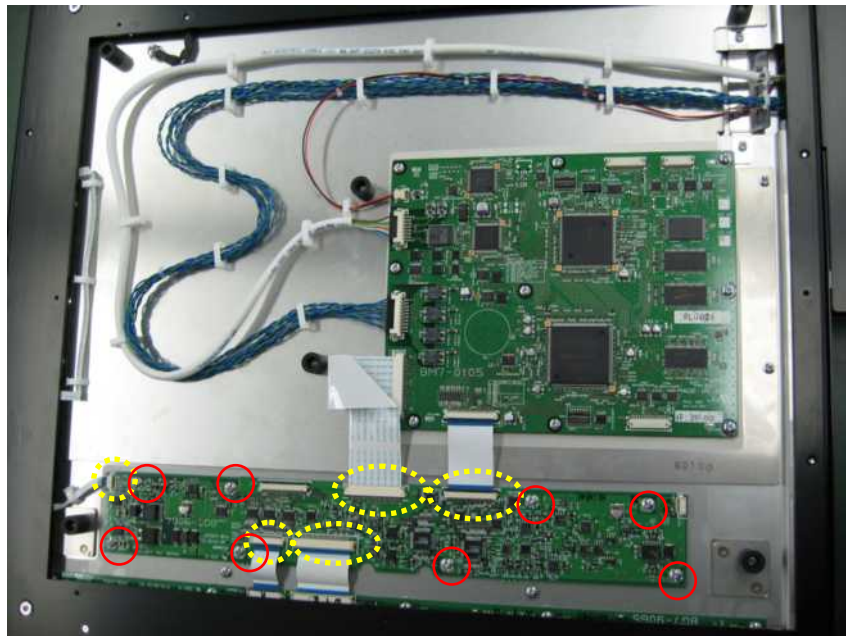
Removing PWB-Di

Remove the screws (x9) and pull out the cables from the connectors (x5) to remove PWB-Di.



Removing PCB-40EAD

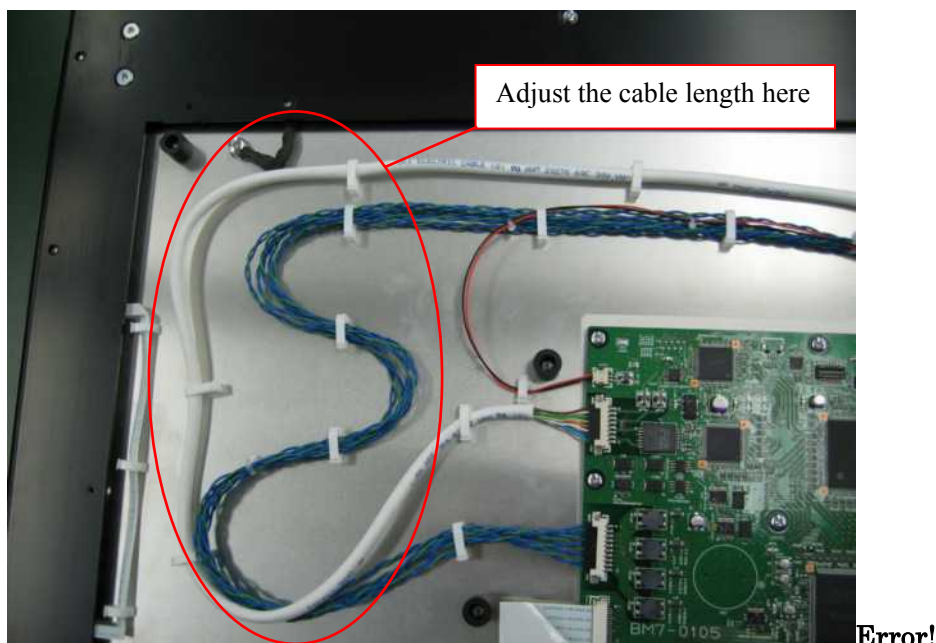
Remove the screws (x8) and pull out the cables from the connectors (x5) to remove PCB-40EAD.



4. Repair Guide

Sensor Interface Cable Wiring

Adjust the length of the sensor interface cable when you replace it.



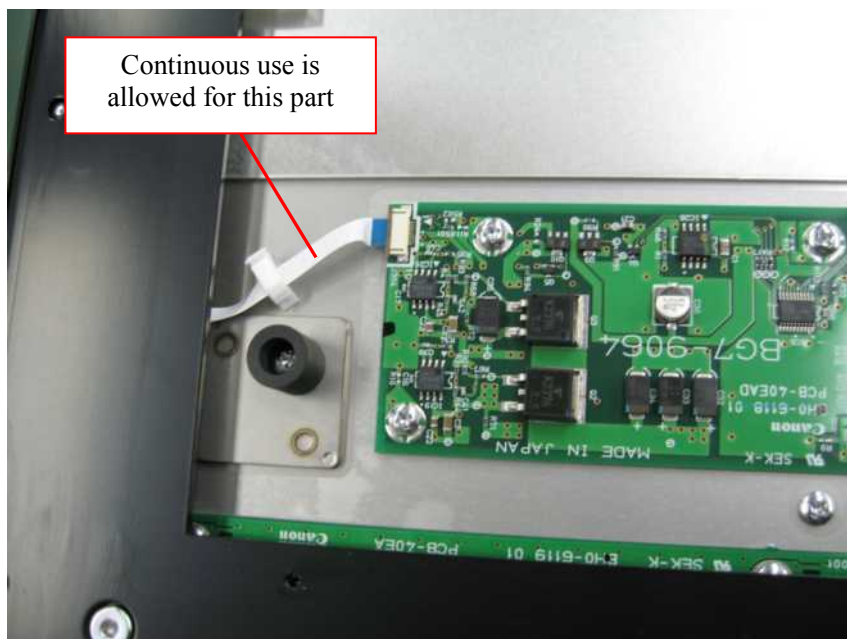
(2) Assembly

Assembling is reverse of disassembling basically.

Flat cable connector is not quite resistant to wear. (The reliability of the communication will decrease). As the cable manufacturer recommends, flat cables should be exchanged once removed.

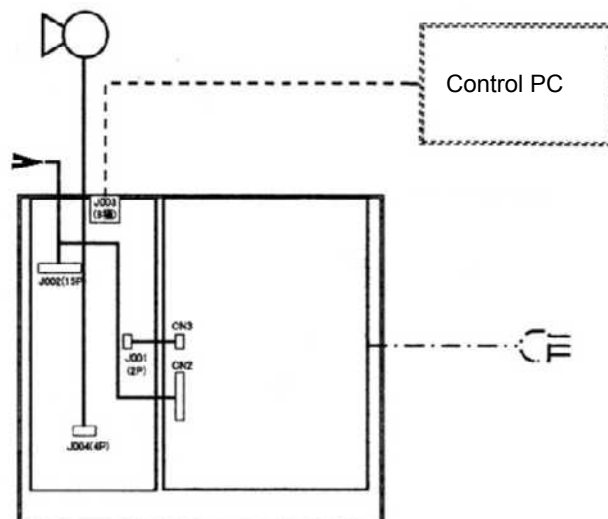
However, the flat cable between PCB-40EAD and PCB-D can be continuously used after it is removed for the PCB-40EAD replacement considering the service's profitability. If any problems arise after the replacement, check the possible failure parts and take appropriate action.

Note: Connect and disconnect the connector of the flat cable carefully. Connection and disconnection of the cable is allowed up to three times.



4. Repair Guide

2.2 Removing the PWB-40EXRAY



1. Remove the connector of each cable.
 - (1) Sensor cable (J002/CN2)
 - (2) X-ray I/F cable (J004)
 - (3) PWB-40EXRAY board/Power supply unit (J001/CN3)
2. Loosen the screws (M3x6) fixing the PWB-40EXRAY and remove them.

Note:

The power supply cable must be removed before assembling.

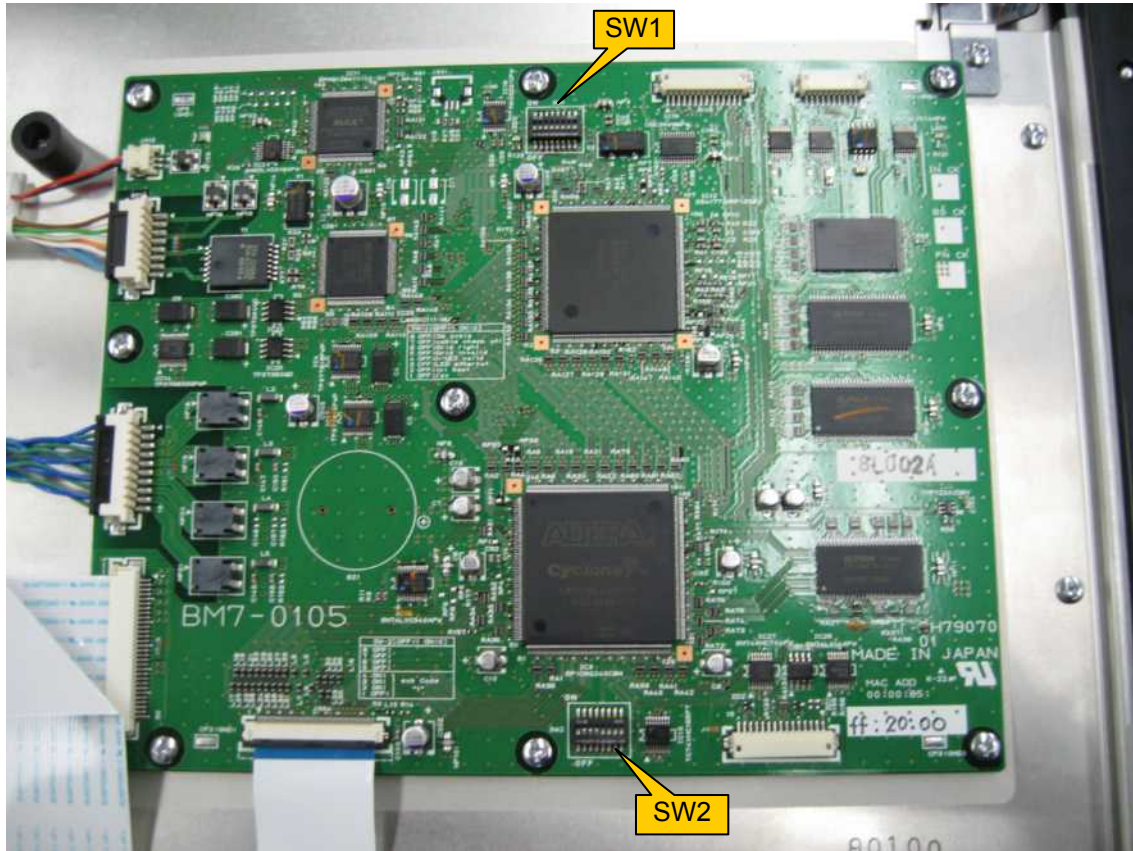
4. Repair Guide

3. PCB Settings

(1) Sensor Unit

1) PWB-Di

Use BG7-0105 for repair.



<SW1> Factory Defaults

SW1	Factory Default	Function
1	OFF	Not used.
2	OFF	Ini boot On: Ibboot OFF: Default
3	OFF	LED ETHERNET ON: for Ethernet busy LED OFF:Default
4	OFF	H-UDI ON:H-UDI used OFF:Default
5	OFF	Not used
6	OFF	Not used
7	OFF	Not used.
8	OFF	Not used.

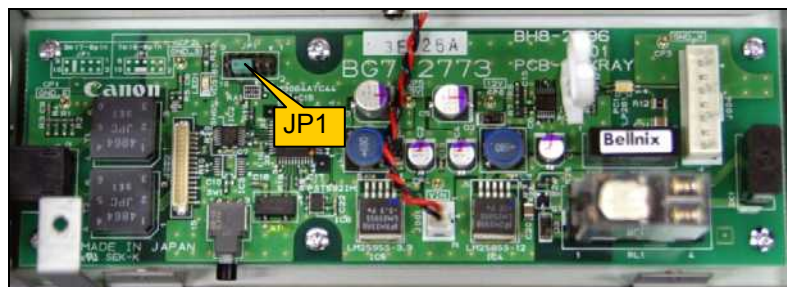
4. Repair Guide

<SW2> Factory Defaults

SW2	Factory Default	Function
1	OFF	PWB revision number. It changes when PWB is changed, etc.
2	ON	
3	ON	
4	ON	
5	OFF	Not used
6	OFF	
7	OFF	
8	OFF	

(2) Power Box

1) PWB-40EXRAY



<JP1>

JP1	Function
6-8 Short	Sensor cable 7m

4. Repair Guide

4. Operation Required for Replacing Parts

Perform the following operations when the unit is replaced.

1) Sensor unit

(1) When sensor unit is replaced

- 1) Set the IP address. (This operation is not required if the default IP address is used.)
Refer to “Imaging unit IP address setting” in the Tool Software Operation Manual.
- 2) Check the version of firmware and PLD code version.
Refer to “12.2 Checking the Firmware Version” in “12 Settings” in “2. Installation”.
- 3) Install the firmware and PLD code as required.
Refer to “12.3 Installing Firmware and PLD Code” in “12 Settings” in “2. Installation”.
- 4) Identify the sensor unit.
Refer to “12.6 Identifying the Sensor Units” in “12 Settings” in “2. Installation”.
- 5) Change total number of exposures. (Basically the counter should be reset to “0” when the sensor unit is replaced.)
Refer to “12.13 Changing the Total Image Count” in “12 Settings” in “2. Installation”.
- 6) Check the image quality.
Refer to “14 Image Quality” in “2. Installation”.
- 7) Back up the data. (Back up the data to FD as required.)
Refer to “12.14 Backing Up when Installing” and “12.15 Backing Up Setting Data to FD” in “12 Settings” in “2. Installation”.

(2) When PWB-EDi is replaced

- 1) Set the PWB dipswitches.
Refer to “3 PCB Settings” of “4. Repair Guide”.
- 2) Set the IP address. (This operation is not required if the default IP address is used.)
Refer to “Imaging unit IP address setting” in the Tool Software Operation Manual.
- 3) Check the version of firmware and PLD code version.
Refer to “12.2 Checking the Firmware Version” in “12 Settings” in “2. Installation”.
- 4) Install the firmware and PLD code as required.
Refer to “12.3 Installing Firmware and PLD Code” in “12 Settings” in “2. Installation”.
- 5) Install the sensor serial number.
Refer to “12.4 Checking the Sensor Serial Number” in “12 Settings” in “2. Installation”.
- 6) Install the sensor data file.
Refer to “DP File Write Tool Software” in the Tool Software Operation Manual.
- 7) Check the image quality.
Refer to “14 Image Quality” in “12 Settings” in “2. Installation”.

4. Repair Guide

(3) When PCB-40EAD is replaced

1) Check the image quality

Refer to “14 Image Quality” in “12 Settings” in “2. Installation”.

2) Power box

(1) When PWB-40EXRAY is replaced

1) Set the jumper pins on the PCB.

Refer to “3 PCB settings” in “4. Repair Guide”.

Check that the system starts up normally and that operations such as exposure, images capture and data transfer are performed normally.

CXDI-40G COMPACT

5. Parts Catalog

CONTENTS

CXDI-40G COMPACT 1

IMAGING UNIT 2

POWER BOX 3

INDEX OF PARTS NUMBERS 4

CXDI-40G COMPACT

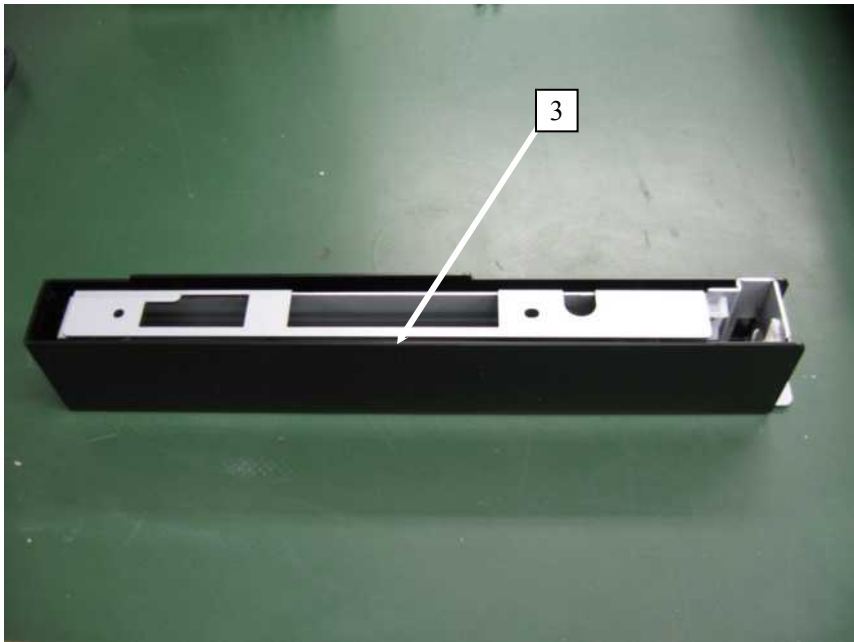
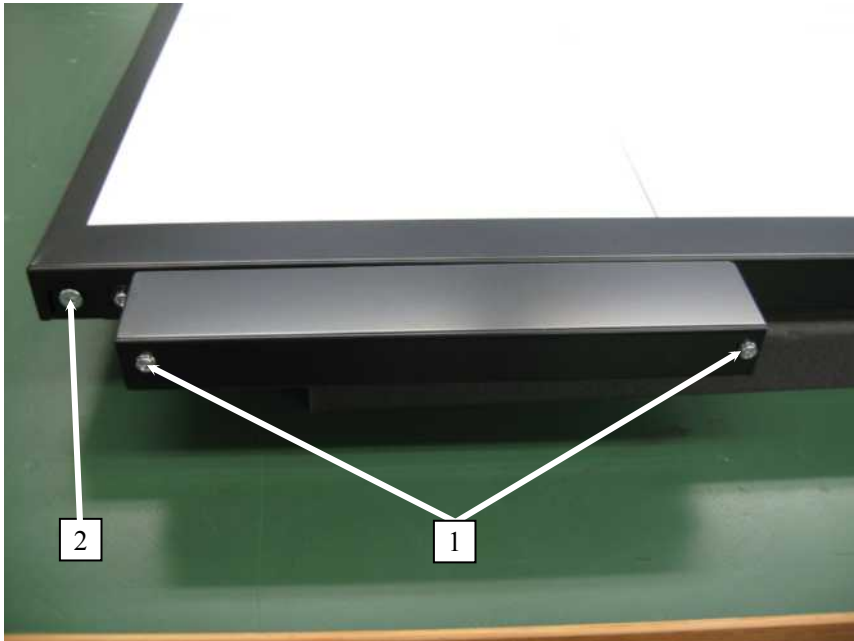
Key NO.	Description	Part No.	Q'ty
1.....	IMAGING UNIT		1
2.....	POWER BOX		1
3.....	SHEET, INSULATION	BA5-0392-000	16
4.....	LAMP UNIT, READY	BG7-2172-110	1
5.....	CABLE UNIT, X-RAY I/F.....	BH6-5728-040	1
6.....	CABLE UNIT, POWER, 100V	BG7-2145-030	1
7.....	CABLE UNIT, POWER, 120V	BH4-2385-100	1
8.....	CABLE UNIT, POWER, 230V	BH4-6217-030	1
9.....	CLAMP, CABLE.....	WT2-5859-020.....	1
10.....	SCREW	XB1-1400-603	1
11.....	TIE, CABLE, T18R, TAITON	BH4-1063-000	3

Key No.1	Key No.2
	
Key No.3	Key No.4
	

Key No.5	Key No.6
	
Key No.7	Key No.8
	
Key No.9	Key No.10
	
Key No.11	
	

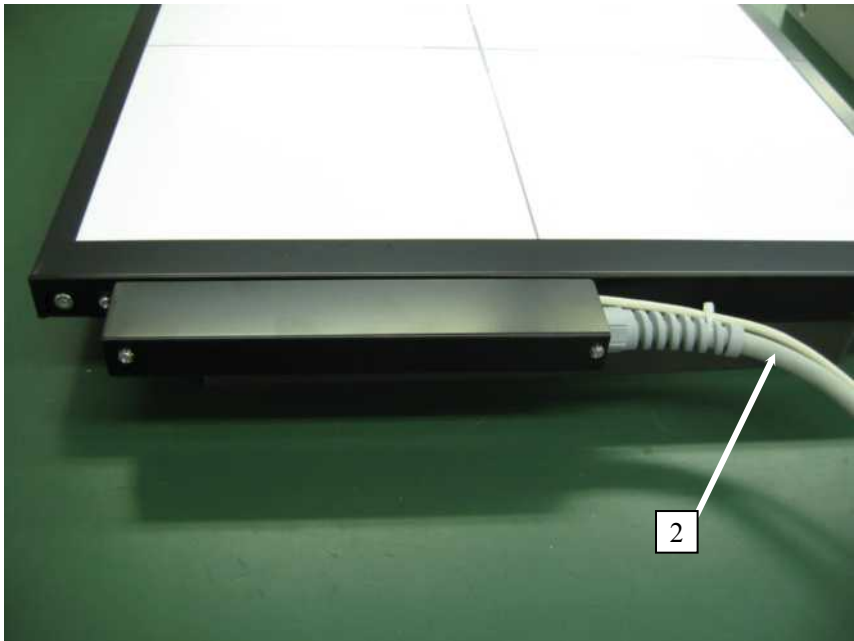
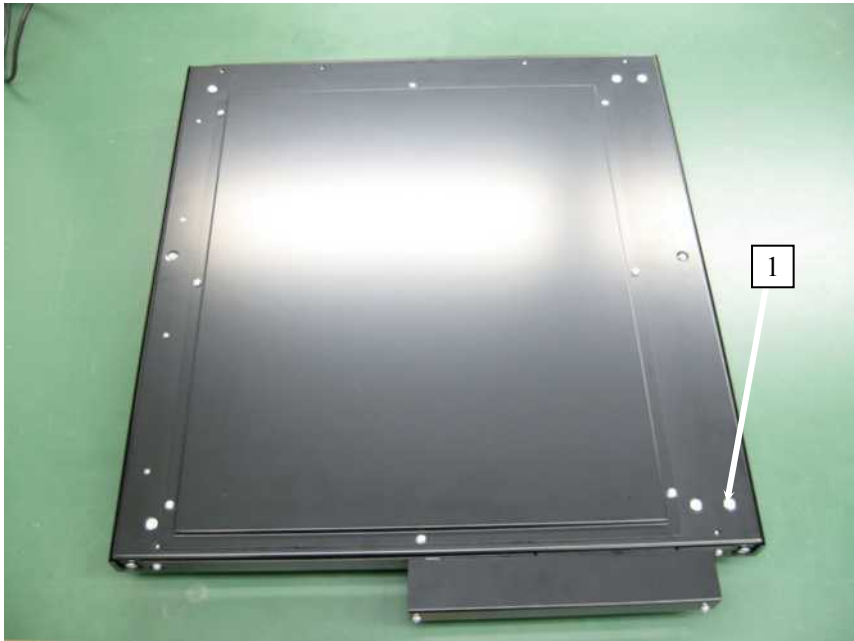
IMAGING UNIT

KEY NO.	PARTS NO.	Q'TY	DESCRIPTION	MEMO
1	XA9-0828-000	2	SCREW, W/STAR WASHER, M3X4	
2	BA5-0390-000	4	BOLT, SCM	
3	BM7-0104-000	1	CONNECTOR BOX UNIT	



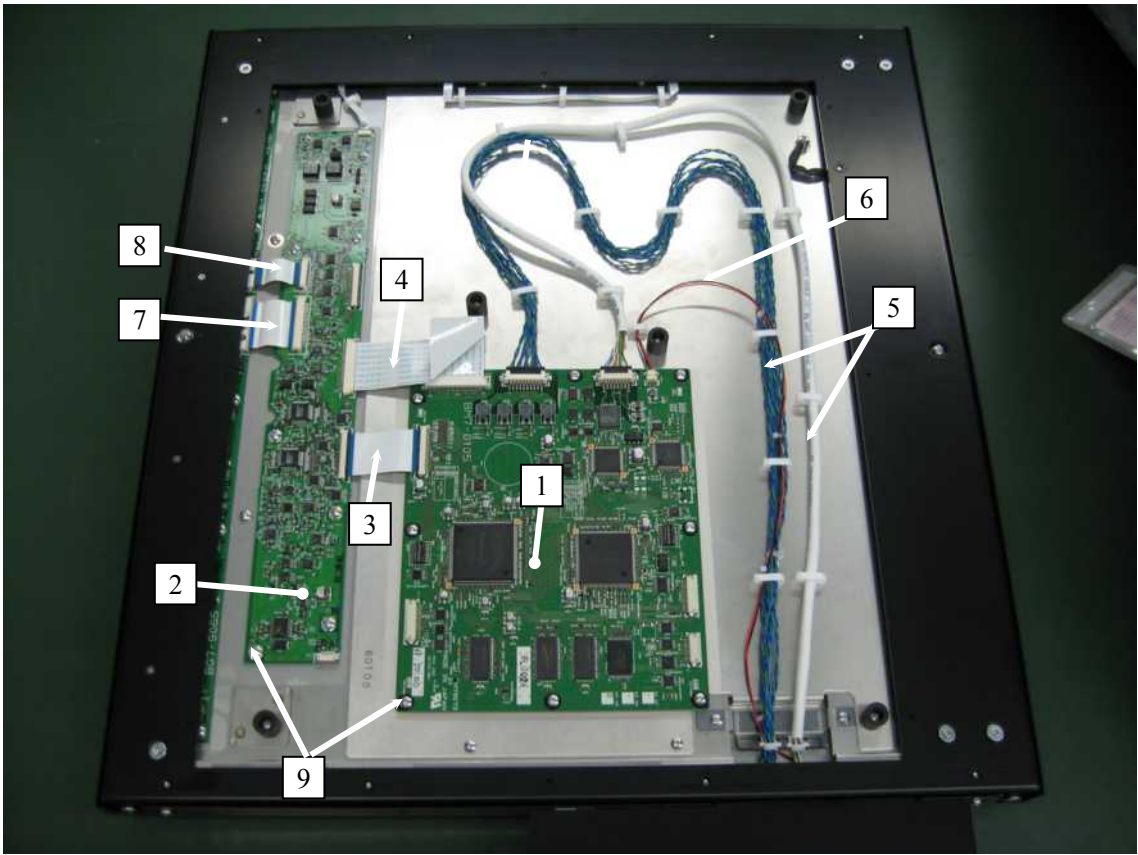
IMAGING UNIT

KEY NO.	PARTS NO.	Q'TY	DESCRIPTION	MEMO
1	BA5-0390-000	6	BOLT, SCM	
2	BG7-3068-000	1	CABLE UNIT, SENSOR	



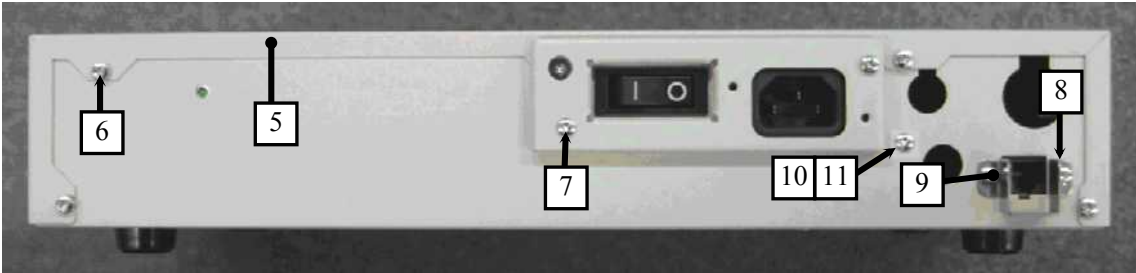
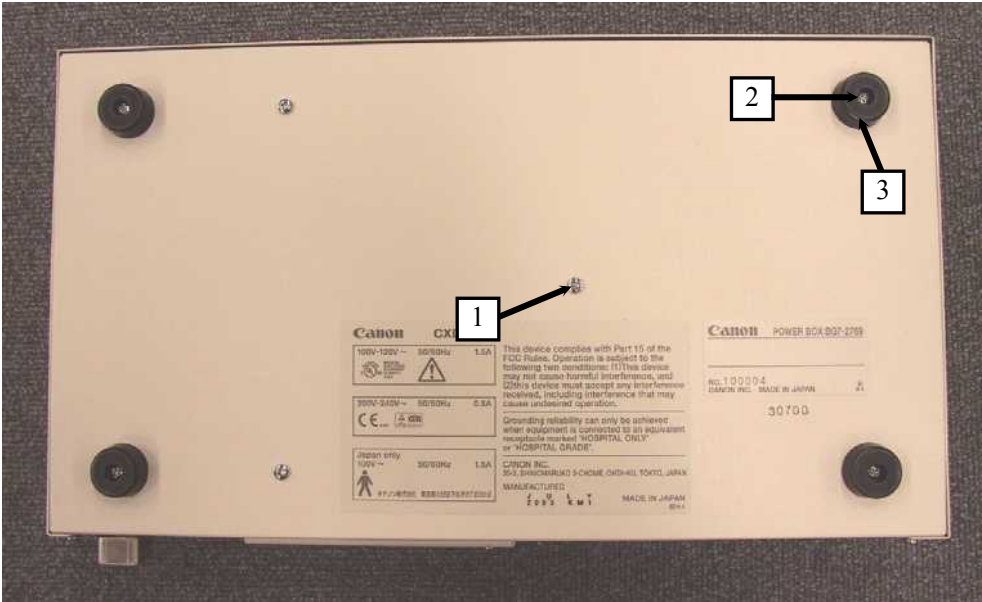
IMAGING UNIT

KEY NO.	PARTS NO.	Q'TY	DESCRIPTION	MEMO
1	BM7-0105-000	1	PCB UNIT, DIGITAL	
2	BG7-9064-040	1	PCB UNIT, A/D	
3	BH6-7582-000	1	CABLE, FLAT	
4	BH6-6481-000	1	CABLE, FLAT	
5	BH7-9071-000	1	CABLE UNIT, RELAY, SENSOR	
6	BM7-0106-000	1	CABLE UNIT, RELAY, LAMP	
7	BH6-7585-020	1	CABLE, FLAT	
8	BH6-7580-000	1	CABLE, FLAT	
9	XB1-2300-406	17	SCREW	



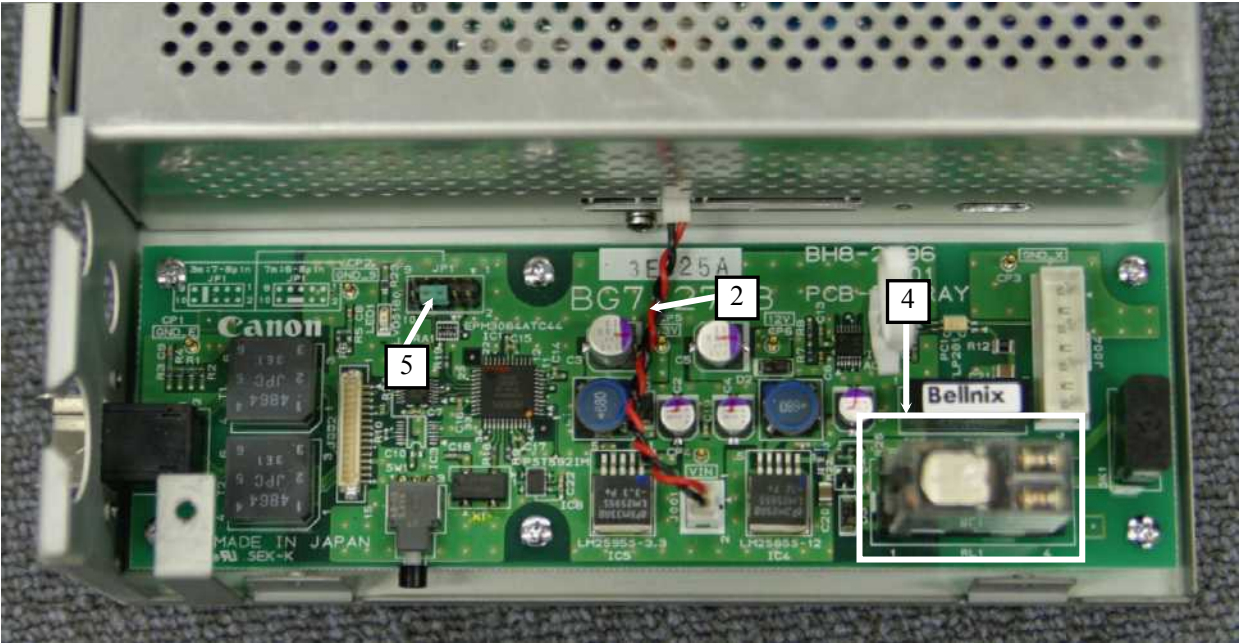
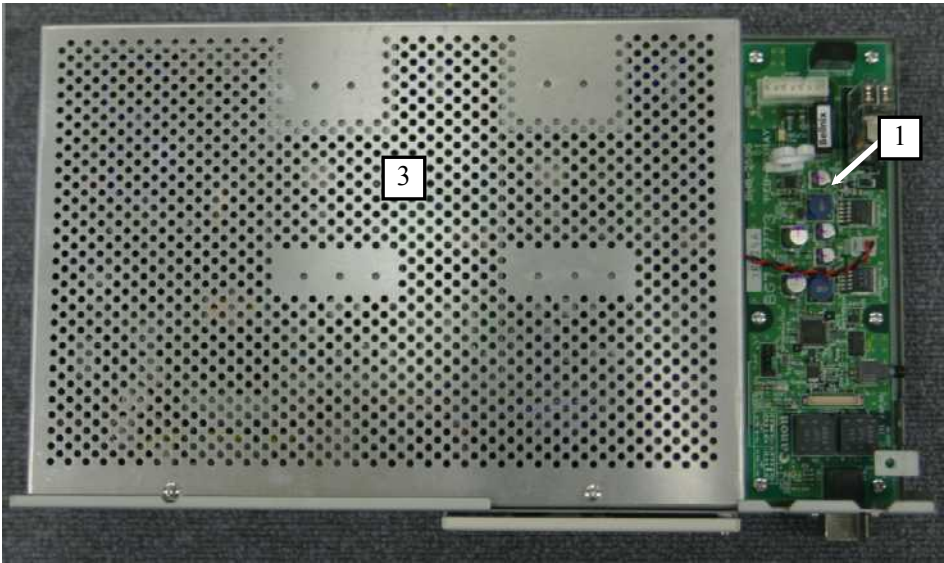
POWER BOX

KEY NO.	PARTS NO.	Q'TY	DESCRIPTION	MEMO
1	XB1-2300-406	3	SCREW	
2	XB1-2300-806	4	SCREW	
3	BA4-1803-000	4	PAD	
4	XB1-2300-406	8	SCREW	
5	BA4-1800-030	1	UPPER COVER, POWER BOX	
6	XB2-7300-606	5	SCREW, W/WASHER	
7	XB1-2300-406	2	SCREW	
8	XB1-2300-406	2	SCREW	
9	BA4-1802-000	1	COVER, CABLE	
10	XB1-1400-603	1	SCREW	
11	XD1-4200-402	1	WASHER, TOOTHED LOCK	



POWER BOX

KEY NO.	PARTS NO.	Q'TY	DESCRIPTION	MEMO
1	BG7-3069-100	1	PCB UNIT,X-RAY I/F	
2	BG7-2856-050	1	CABLE UNIT, POWER SUPPLY	
3	BG7-2857-070	1	POWER SUPPLY UNIT, 7M	
4	WB2-5019-000	1	RELAY, DC	
5	WS1-0287-000	1	PLUG, 2P	



INDEX OF PARTS NUMBERS

PARTS NO.	PAGE	REVISION NO. - REPORT NO.				
BA4-1800-030	3-1	-	-	-	-	-
BA4-1802-000	3-1	-	-	-	-	-
BA4-1803-000	3-1	-	-	-	-	-
BA5-0390-000	2-1,2-2	-	-	-	-	-
BA5-0392-000	1-1	-	-	-	-	-
BG7-2145-030	1-1	-	-	-	-	-
BG7-2172-110	1-1	-	-	-	-	-
BG7-2856-050	3-2	-	-	-	-	-
BG7-2857-070	3-2	-	-	-	-	-
BG7-3068-000	2-2	-	-	-	-	-
BG7-3069-100	3-2	-	-	-	-	-
BG7-9064-040	2-3	-	-	-	-	-
BH4-1063-000	1-1	-	-	-	-	-
BH4-2385-100	1-1	-	-	-	-	-
BH4-6217-030	1-1	-	-	-	-	-
BH6-6481-000	2-3	-	-	-	-	-
BH6-5728-040	1-1	-	-	-	-	-
BH6-7580-000	2-3	-	-	-	-	-
BH6-7582-000	2-3	-	-	-	-	-
BH6-7585-020	2-3	-	-	-	-	-
BH7-9071-000	2-3	-	-	-	-	-
BM7-0104-000	2-1	-	-	-	-	-
BM7-0105-000	2-3	-	-	-	-	-
BM7-0106-000	2-3	-	-	-	-	-
WB2-5019-000	3-2	-	-	-	-	-
WS1-0287-000	3-2	-	-	-	-	-
WT2-5859-020	1-1	-	-	-	-	-
XA9-0828-000	2-1	-	-	-	-	-
XB1-1400-603	1-1,3-1	-	-	-	-	-
XB1-2300-406	2-3,3-1	-	-	-	-	-
XB1-2300-806	3-1	-	-	-	-	-
XB2-7300-606	3-1	-	-	-	-	-
XD1-4200-402	3-1	-	-	-	-	-

CXDI-40G COMPACT

6. Troubleshooting

6.Troubleshooting

Contents

1	Gathering Information about Problems	1
1.1	Outline.....	1
1.2	Probable problems.....	1
1.3	Required Information	1
1.3.1	When Dr. Watson Error Occurs	1
1.3.2	When Error Occurs.....	2
1.3.3	When Image is Bad	4
1.3.4	Trouble AnalysisTools	4
2	How to Back up and Recover the System	5
2.1	Objective	5
2.2	Technical Description	5
2.3	Backup Method	5
2.4	Recovery Method	6
2.4.1	When Problems Occur in a Ccr Software ini File	6
2.4.2	When Problems Occur in Ccr Software	6
2.4.3	When the Hard Drive Crashes.....	7
2.4.4	When Problems Occur in Driver Software.....	7
	-Reference-	8

5.Troubleshooting

1 Gathering Information about Problems

1.1 Outline

When trouble has occurred on the market, it is recommended that the entire board or unit (Imaging unit, OPU, Power box, Control PC) be replaced on-site to restore the user's operations with the minimum downtime.

It is desirable to have the bad unit brought back and repaired. (Although it depends on the kind of the problem.)

This section explains about the information (log file) required to know what has occurred and what to be done.

1.2 Probable problems

- System connection failure and condition setting failure during installation
- Electrical and mechanical system failure, malfunctioning, bad image, noise, and communication error
- Software and specifications problem

1.3 Required Information

1.3.1 When Dr. Watson Error Occurs

Gather information when:

- Communication error related to Dr. Watson occurred between the OPU and the CXDI, resulting in CXDI application failure
- Display on the OPU freezes and cannot be recovered

* Required Log files

- 1) Environmental information (CXDI.HOST version, hardware configuration, optional software versions, external equipment configuration)

- 2) Dr. Watson log

C:\Documents and Settings\All Users\Application Data\Microsoft\Drwatson\drwts32.log

- 3) Event viewer system log

C:\WINDOWS\system32\config\SysEvent.Evt

- 4) The whole D:\Ccr folder

Depending on the timing the error has occurred, images may be saved in a folder before dtstore. In this case, copy dttmp and dtque folder.

5.Troubleshooting

1.3.2 When Error Occurs

Information required differs according to whether optional module (such as DMW, generator communication module, etc.) is used or not.

(1) Log files and information required no matter optional module is used or not

1) How the system is used at the customer's site (System composition)

2) Version of CXDI host program

3) Error message and code

4) All the INI files directly under CCR folder

5) All the BodyParts folders

All of the above five items are necessary to see how the CXDI is set. If the problem has occurred in the CXDI, the information is required to have the problem occur again.

6) opu3.log and opu3_YYYYMMDDHHMMSS.log

When file size exceeds 1 MB, opu3.log makes a new "opu3.log" with a different name in "opu3_YYYYMMDDHHMMSS.log" when the system is restarted.

Ten history files in the past will be saved.

Because a new log is made when the file size is large, log at the time the error occurred may be in a file other than "opu3.log".

Since location of the log cannot be checked at the customer's site, please be sure to collect not only the opu3.log but all the history files.

7) syslog

8) Dr. Watson log

9) Event viewer system log

10) Sensor log

Other: User information, 5W1H, frequency of occurrence, reproducibility, special characteristics

(2) Required log files and information according to the used optional module

Please also gather the following files and information other than those indicated in (1).

(2-1) DMW

1) chmwm.ini

2) ccMax_ws.ini

chmwm.ini/ccMax_ws.ini will be collected automatically when all the INI files directly under CCR folder are collected.

3) chmwm.log

4) DICOM conformance statement of RIS

5.Troubleshooting

(2-2) Generator communication module

1) cgbig3.ini

2) StrTable.ini

StrTable.ini will be collected automatically when all the INI files directly under CCR folder are collected.

3) Character string (such as error code) that is displayed in the error dialog box

(2-3) STUDIX

1) chstudix.ini

* When using the multi-action function

2) cc_multi_st.ini

* If all the INI files immediately under the CCR folder are recovered, it will also be possible to recover chstudix.ini/cc_multi_st.ini automatically.

3) Study history files (if they are left)

4) All folders shared by STUDIX

(2-4) RISFIX

1) chrisfix.ini

If all the INI files immediately under the CCR folder are recovered, it will also be possible to recover chrisfix.ini automatically.

2) ccrhis.log

If all the risfix communication folders are recovered, it will also be possible to recover ccrhis.log automatically.

3) FTP communication log files (CXDI side)

These are used to analyze the communication files sent from RIS.

WINDOWS\System32\LogFiles folder

If not all the files can be recovered, recover the files with the dates on or around the day on which the problem occurred.

4) FTP communication log files (RIS side)

If the communication files sent from RIS to CXDI or vice versa fail to arrive, if the file contents are wrong or if some other problem in communication has occurred, ask the individual in charge to provide the log showing the times and contents of the FTP communications at the RIS and RIG sides.

5.Troubleshooting

1.3.3 When Image is Bad

*** Required Log files**

- 1) How the system is used at the customer's site (System composition)
- 2) Version of CXDI host program
- 3) D:\ccr folder set
- 4) Trouble image together with the images before and after it, all Bin files and logs folder if ccr folder set cannot be obtained
- 5) Extracting sensor log files by "logread.exe"

Refer to SIDR-08-003 for file collection procedure in case of image errors.

1.3.4 Trouble Analysis Tools

This section describes the analysis tools used to remedy trouble or ascertain the status quo. The tools are useful in analysis applications on-site or at the office.

- 1) trnsfrm3.exe
 - * Viewer software for image analysis
 - * "Technical document for image analysis methods" given in SIDR-03-009 (software must be purchased separately)
- 2) Dcap.exe
 - * Image transfer software
 - * "Dcap Image Transfer Software User's Manual" given in SIDR-03-021
- 3) Pingtest.exe
 - * Software for evaluating reliability of network communications
 - * "Operation Verification Results for General-Purpose LAN Card" given in CXDI-50G, SMR04-009

2 How to Back up and Recover the System

2.1 Objective

This document describes how to back up and recover the system.

2.2 Technical Description

There are two system backup methods as follow:

The recovery method required depends on the way the system crashes.

Backup method

A) Backup using floppy disks

B) Backup using a hard drive

2.3 Backup Method

A) Backup method using floppy disks

The network settings configured in each installation site and the customized body part settings are stored in each ini file.

All the ini files are stored on a floppy disk when starting up the control PC.

The system has a feature that stores the latest ini files on the floppy disk at the system startup by updating the ini files with modifications users made while using the system.

B) Backup method using a hard drive

The control PC has no feature that mirrors all the files including the OS to other hard drives. Therefore, to be ready for hard drive crashes, we recommend that you add another hard drive when installing the system, in order to copy the software between the hard drives using Ghost or Drive Copy, which are available on the market.

This should be conducted at the final installation stage (just before delivery to users).

As an alternative, you can also provide a hard drive that contains the OS (before activation) and drivers in case of hard drive crashes.

5.Troubleshooting

2.4 Recovery Method

2.4.1 When Problems Occur in a Ccr Software ini File

The system can be recovered to the last environment status just before the system was used by users when problems^{*1} occur in d:\Ccr software other than the OS.

^{*1} When the setting data or files are damaged

In this case,

In this case, restoration is possible by copying the Bodyparts folder and all ini files stored on the floppy disk into d:\ccr, thus overwriting the existing data in it.

2.4.2 When Problems Occur in Ccr Software

When problems occur in files other than ini files for d: \Ccr software other than the OS, recovery can be accomplished by adding or replacing the relevant files if you can identify the defective files. Recover Ccr with the following procedure if you cannot identify the defective files:

- 1) Copy d: \ccr to a different directory or laptop computer.
- 2) Delete d: \ccr, and then newly install the CXDI software. (Note)
(Note) The same version of the software must be installed.
- 3) Copy the following files in Ccr that were copied in Step 1) to d: \ccr
 - \dtstore (captured images)
 - \Logs
 - \White.dcm
 - \defpix#.dat
 - \xxxxxx.dp
- 4) Newly install the optional software (DMW/Gen.communication) if you are using it.
- 5) To restore the user operating environment, copy the Body parts folder and all ini files stored on the floppy disk into d:\ccr, thus overwriting the existing data in it.
- 6) Perform the settings again that are described in the “Control PC serial number” and “Setting the imaging unit identification and the number of connecting units” in this manual “Setting Procedures”.

5.Troubleshooting

2.4.3 When the Hard Drive Crashes

Recover the system using the following method when the hard drive crashes.

- 1) Replace the crashed hard drive with the hard drive provided in item B above, “Backup method using a hard drive”.

* Copy \Ccr from the original hard drive to the new hard drive when the D drive in the crashed hard drive is in a normal state (a problem case caused by the OS).

Note: Perform Step 2 after upgrading if the CXDI version you are using is newer than that in the hard drive provided by copying from hard drive to hard drive during system installation.

(Files such as Str.ini are not compatible when the CXDI version is different.)

* When the hard drive has crashed mechanically, proceed to Step 2 and subsequent steps.

- 2) Upon completion of the replacement, to restore the user operating environment, copy the Bodyparts folder and all ini files stored on the floppy disk into d:\ccr, thus overwriting the existing data in it.

That images captured by users cannot be inherited in this case.

Note: Calibration is required when the system has been used for over one year.

Note: Perform Step 2 after upgrade if the CXDI version you are using is newer than that in the hard drive provided by copying from hard drive to hard drive during system installation.

(Files such as StrTable.ini are not compatible when the CXDI version is different.)

2.4.4 When Problems Occur in Driver Software

When drivers such as the touch panel driver are damaged, reinstall the appropriate drivers by referring to “C3S Service Manual”.

5.Troubleshooting

-Reference-

The following describes Windows XP activation for your reference.

(Note that this information is based on a test and information posted on Web bulletin boards because Microsoft does not provide an official document for this.)

1. With or without reactivation required

Modification	1. With or without reactivation required	Description
Reinstalling OS without hard drive formatting required	Not required	
Reinstalling OS with hard drive formatting required	Required	Because an install ID stored in the hard drive is cleared.
Replacing a mother board	Probably required	Depends on the number of on-board devices.
Move a hard drive to a different machine	Required	Due to being regarded as anything other than the hard drive being modified.
Changing external devices	Not required	Due to recognizing the PC's internal configuration only.
Adding hardware components	Not required	Only replacement of components that existed at the time of first activation is detected. Adding components is a different category.

2. Hardware components related to activation

- Display adapter (video board)
- SCSI adapter
- IDE adapter
- Network adapter (MAC address)
- Within the amount of mounted physical memory
- Processor type
- Processor serial number
- Hard disk interface
- Hard disk volume serial number
- CD-ROM/CD-RW/DVD-ROM

3. The number of changed components that require no reactivation

- Without network interface: Changes up to four elements
- With network interface: Changes up to six elements

CXDI-40G COMPACT

7. Service Manual Report

CXDI-40G COMPACT

8. Tool

8. TOOL

ISSUED ON: February 2009

SPECIAL TOOL LIST

MODEL: CANON DIGITAL RADIOGRAPHY CXDI-40G COMPACT

BINDER: SERVIC MANUAL FOR CXDI-40G COMPACT

FILE NO. 1/1

TOOL NO.	TOOL NAME	Q'TY	REMARKS
-	audit_grid.exe ----- Grid Angle Measurement Tool	1	Download from the CDXI Web Site
-	Dcap.exe ----- Image Transfer Software	1	Download from the CDXI Web Site
-	Pingtest.exe ----- Network Communication Evaluation Testing Tool	1	Download from the CDXI Web Site
BY9-6538-XXX	CD-ROM, Check Software VER.XXX ----- Service maintenance software	1	
BY9-6539-000	DONGLE,SOFT. PROTEC. USB PROG ----- Protecting key	1	
BY9-6486-000	WIRE NET UNIT, METAL,OPT CHECK ----- Chart	N	(If necessary)
BY9-7007-000	CHART, RESOLUTION ----- Resolution chart	1	(If necessary)

- : Not service tools.

CXDI-40G COMPACT

9. Appendix

< I n s p e c t i o n I t e m s >

ITEM	Category	NO	Item	Characteristics values	Test means	Record
1	Imaging unit	1	Sensor cable	The cable must not be flattened or twisted and its covering must not be damaged.	Visual check	
		2	Sensor cable connector	The connector must be connected securely, and there must be no play.	Visual check, touch	
		3	Ready Lamp	The ready lamp must not be flattened or twisted and its covering must not be damaged.	Visual check	
		4	Ready Lamp Connector	The connector must be connected securely.	Visual check, touch	
		5	Firmware version	-	Visual check	Ver
		6	PLD code version	-	Visual check	Ver
		7	Imaging unit IP address	-	Visual check	
2	Power box	1	Connector	The connector must be connected securely.	Visual check, touch	
		2	Power switch	It must be possible to set this switch to its ON and OFF positions properly.	Visual check, touch	
3	Control PC	1	Connector	The connector must be connected securely.	Visual check	
4	System connections	1	Startup	The system power must come on when the power of the control PC is turned on..	Visual check	
		2	CCR startup	The system must start up with no errors.		
		3	Status lamps	The lamps must provide the correct indication that corresponds to the sensor statuses.		
		4	Shutdown	The system power must go off when the power of the control PC is turned off.		
5	Calibration	1	X-ray generator settings	The conditions under which calibration is implemented must be noted..	Visual check	
		2	Preparation for exposure	Phototimer must be installed. Grid must not be installed.	Visual check	
		3	Calibration processing	"Calibration completed successfully."	Visual check	
6	Grid installation	1	Grid installation angle check	Within ± 1.0 degree	Audit_grid.exe	
7	Self-diagnosis	1	X-ray generator	The conditions under	Visual check	kV

< I n s p e c t i o n I t e m s >

ITEM	Category	NO	Item	Characteristics values	Test means	Record
	Image quality		settings	which calibration is implemented must be noted		mA
						msec
		2	Self-diagnosis pass/fail	Tests 1 to 5 must be passed.	Visual check	TEST1 TEST2 TEST3 TEST4 TEST5
8	Image Quality	1	Phantom exposure	There must be no artifacts, shading, grid stripes, etc.	Visual check	
9	Transmission test	1	Dcap, 200 times	Transmission must be successful.	Dcap.exe	
10	Ping test	1	Ping, 100,000 times	Communication must be successful.	Pingtest.exe	
11	PC-related items	1	Dirt, dust inside PC	There must be no dirt or dust	Visual check	
		2	Event logs Application logs Watson logs	There must be no errors (excluding errors which have been dealt with).	Visual check	
		3	System logs OPU3 logs	There must be no errors (excluding errors which have been dealt with).	Visual check	
		4	Touch panel	There must be no deviation or other problems.	Visual check	
		5	Date, time	The date and time must be correct.	Visual check	
		6	CCR application version	-	Visual check	Ver.
		7	CCR folder backup	-	External media, etc.	
12	System exterior	1	Dirt	There must be no dirt.	Visual check	
13	Final checks	1	Hookup with RIS, patient data terminals	It must be possible to transmit and receive the data correctly.	Visual check	
		2	Exposure information, patient data in film server	There must be no errors in the information or data.	Visual check	
		3	X-ray generator, RIS and other equipment	The equipment must be the same as before the inspection work.	Visual check	