SHIMADZU

M503-E058B

Mobile X-Ray System

MobileDaRt Evolution

Operation Guide

Read this manual thoroughly before you use the product.
Keep this manual for future reference.

Overview

MobileDaRt Evolution/MobileArt Evolution (with FPD upgrade option) is a mobile digital X-ray system which performs direct radiography on patient's various body parts.
This operation guide briefly describes basic operation of MobileDaRt Evolution/MobileArt Evolution (with FPD upgrade option).
For detailed operation, refer to the relevant instruction manuals.

●Instruction Manuals

This product includes the following manuals and documents.
1- Operation Manual (M503-E028)
2- Operation Guide (M503-E037)

●Symbols

The following symbols are used in this Operation Guide.

Symbols	Meaning
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor to moderate injury or equipment damage.
NOTE	Emphasizes additional information that is provided to ensure the proper use of this product.
1, **2**, **3**, ...	Indicates the operation in order.
❶, ❷, ❸, ...	Indicates further details of above operation.
►	Indicates the result of operation.
☞	Describes the points, notices and references of operation.

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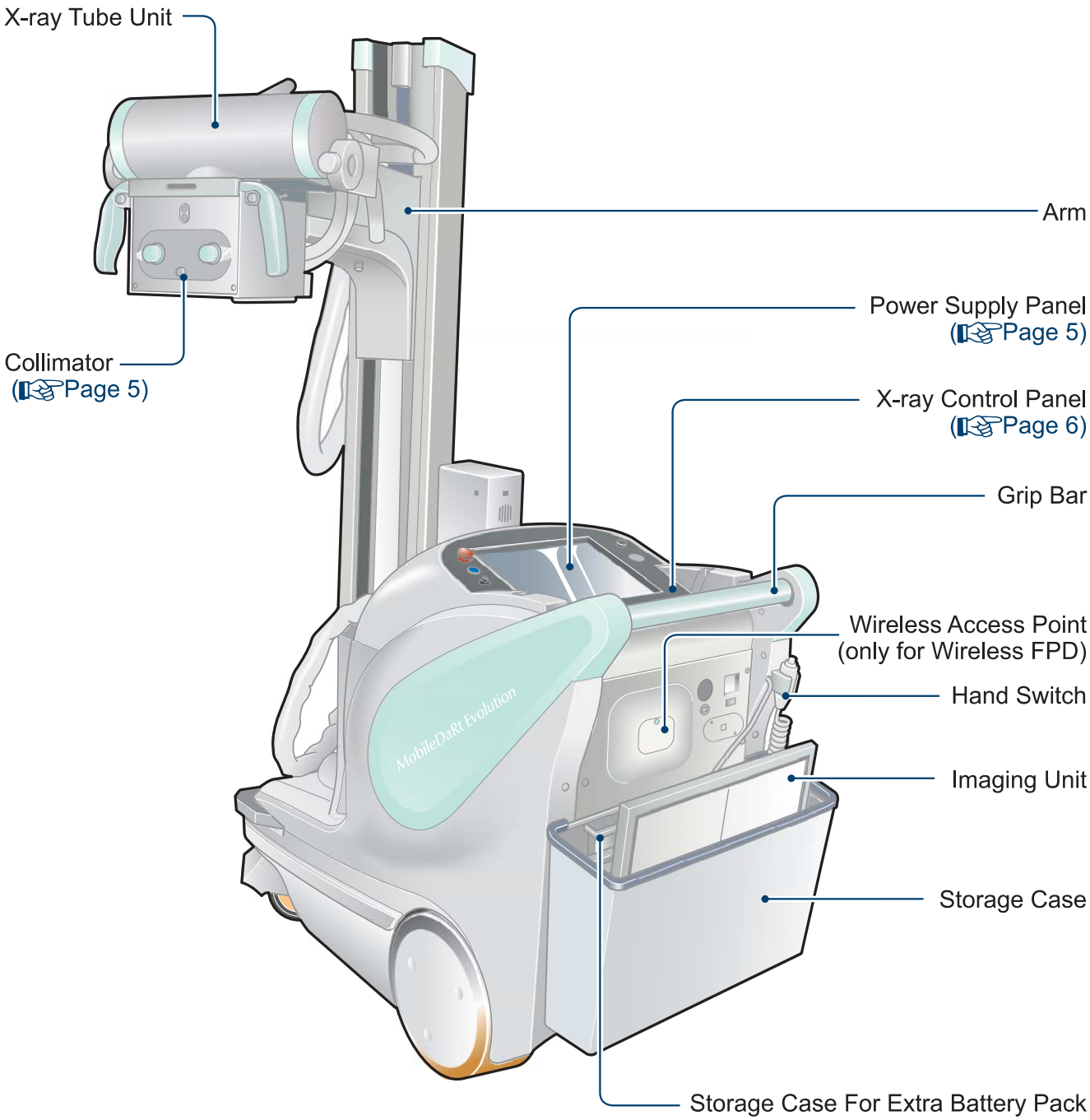
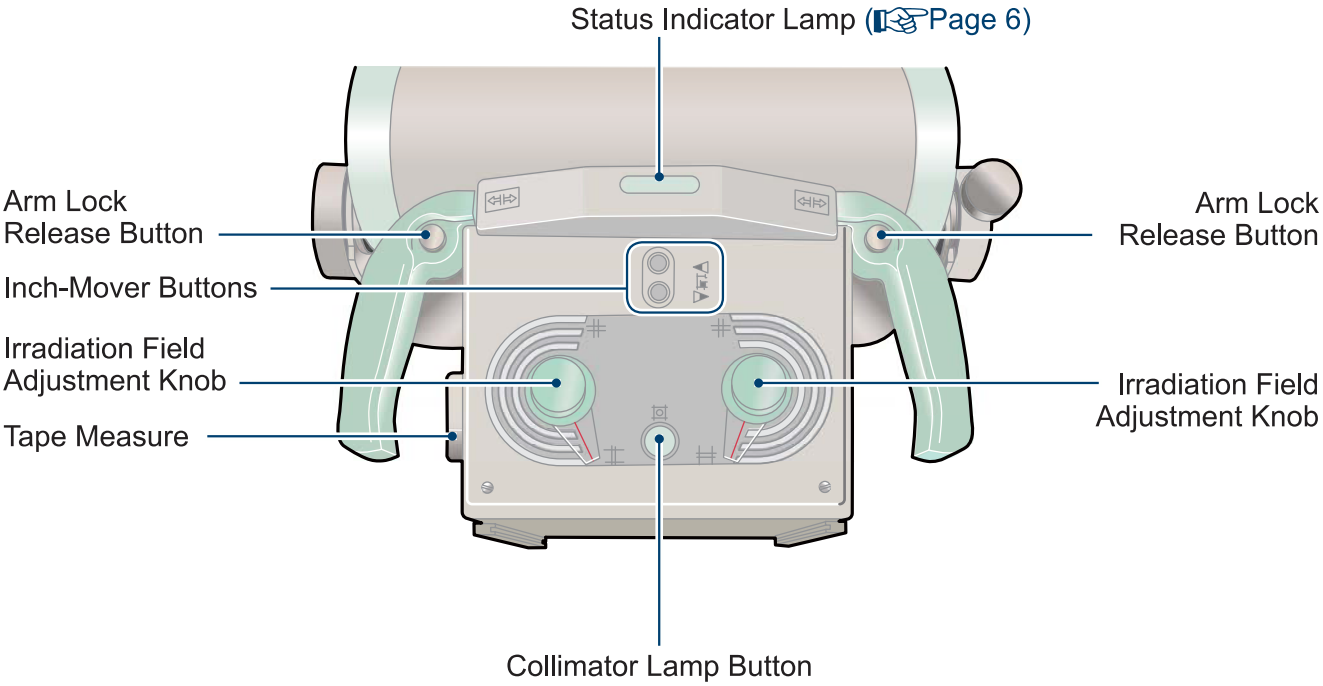
System Components

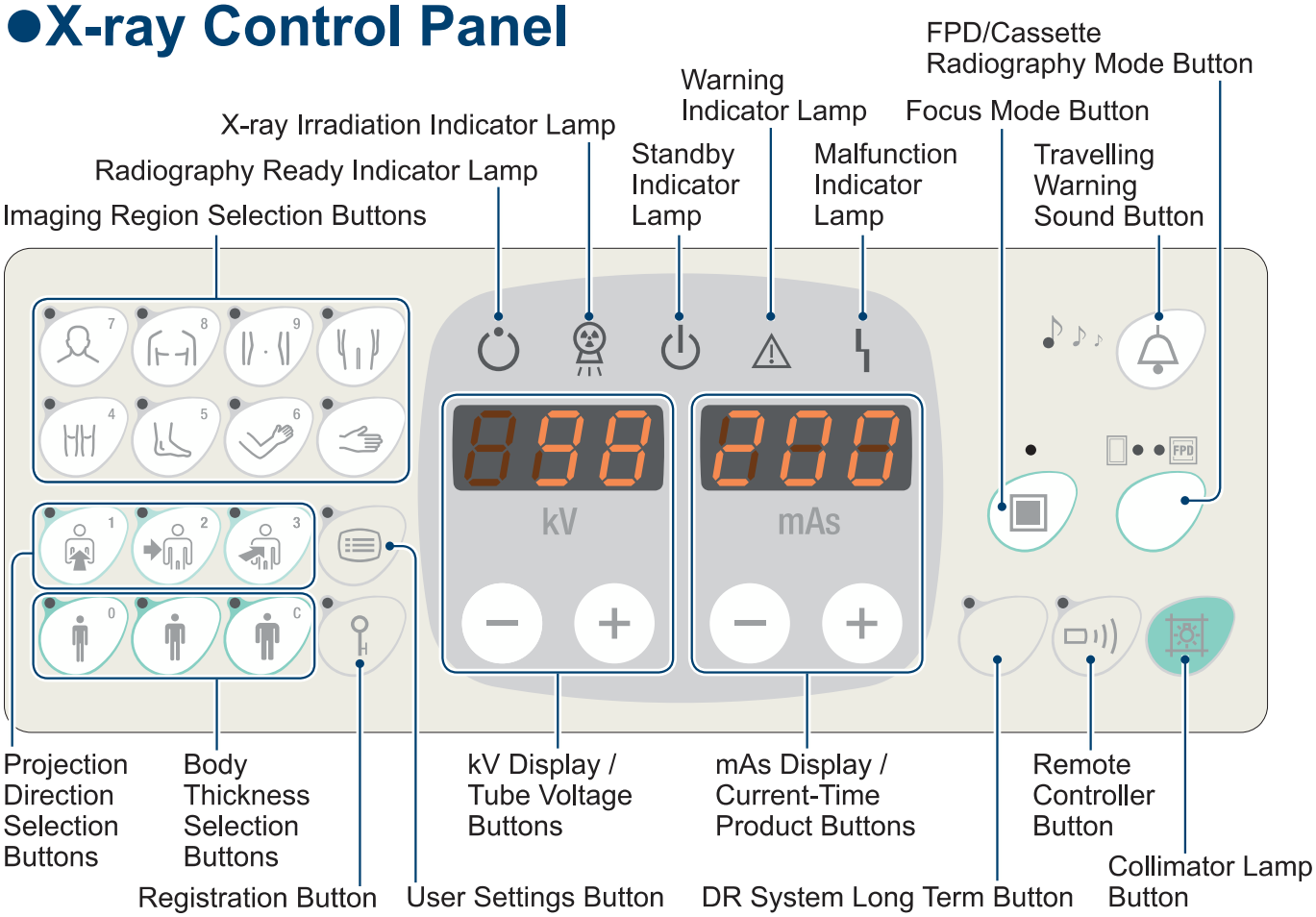


●Collimator



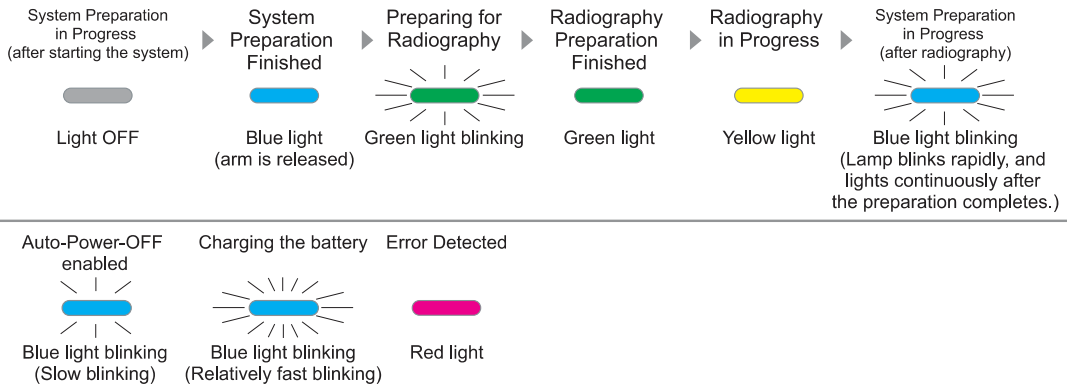
●Power Supply Panel

●X-ray Control Panel



●Status Indicator Lamp

The status of the status indicator lamp changes according to the instrument status as follows.



⚠ CAUTION

If the status indicator lamp is red, the code is displayed on the mAs display on the X-ray control panel. If the status indicator is red, carefully read "6 Troubleshooting" in the Operation Manual and take the appropriate measures.

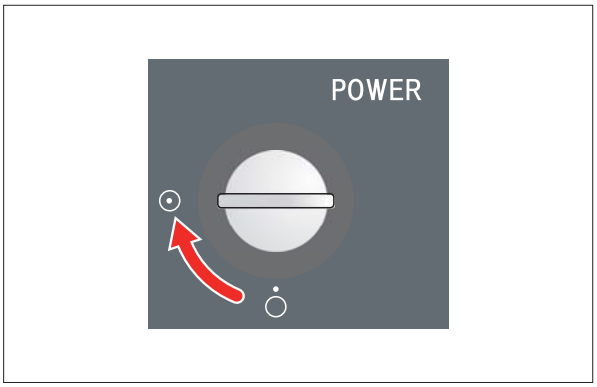
Preparation

●Turning the Power ON

1 **Insert the key, and turn the key switch to ⊙ position.**

Status Indicator

Blue light is turned ON.

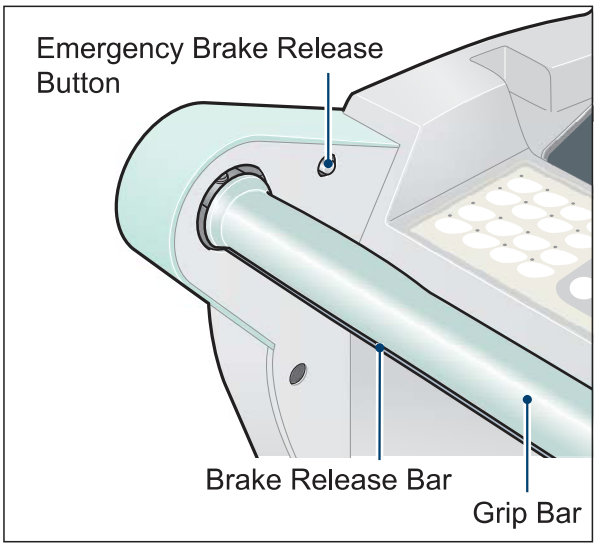


⚠ CAUTION

Always perform warm-up (running-in operation of the X-ray tube unit) before starting radiography.

●Driving the Instrument

1 **Move the instrument to the required place, holding the driving handle and brake bar.**



⚠ CAUTION

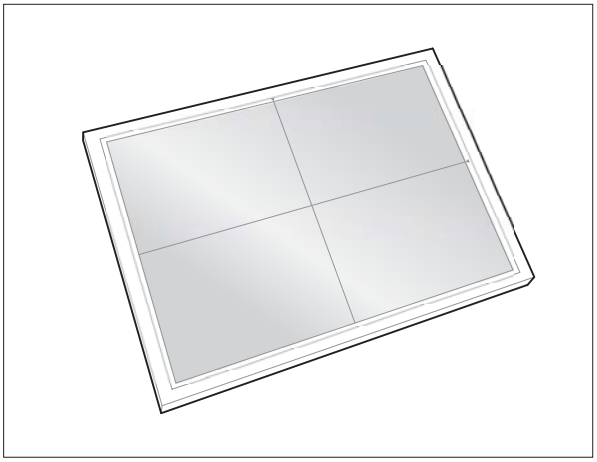
If electric travel is disabled due to an instrument malfunction, press the emergency brake release button and manually move the instrument to a safe location.
For detailed operation, See "●If Unable to Travel Electrically" (☞ Page 23).

NOTE

•When the arm is locked, you can drive the instrument at the normal speed (maximum 5 km/hour).
•When the lock is released, the driving speed becomes about half of the normal speed.

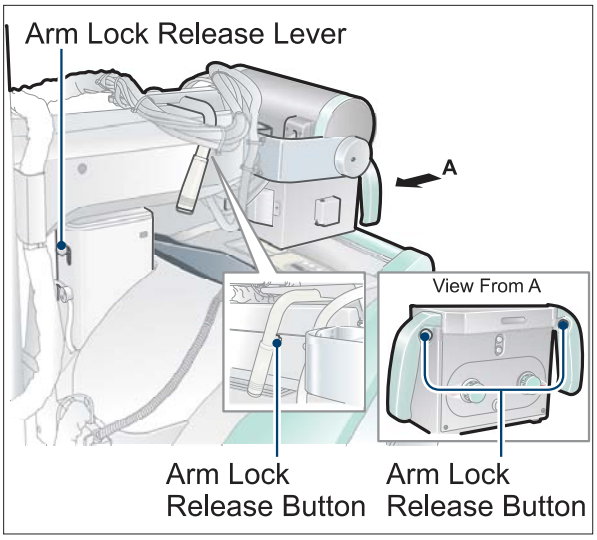
Positioning

1 Place the imaging unit under the body part to be radiographed.



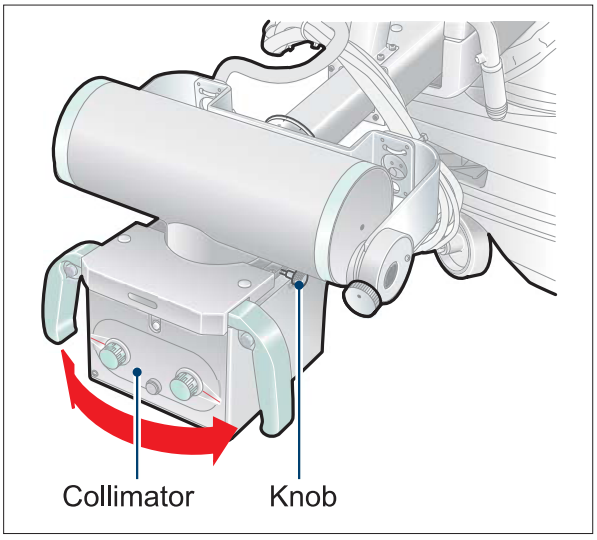
2 Release the arm lock, and bring the X-ray tube unit close to the radiography position.

► Press the arm lock release lever or button to simultaneously enable column rotation, arm extension/contraction, and vertical movement of the X-ray tube unit.

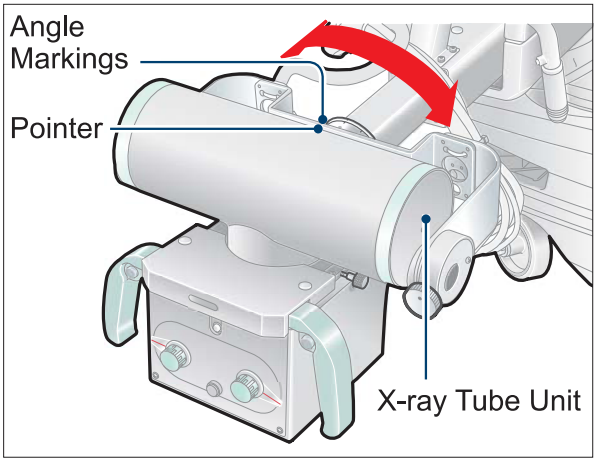


3 Adjust the position of the X-ray tube unit.

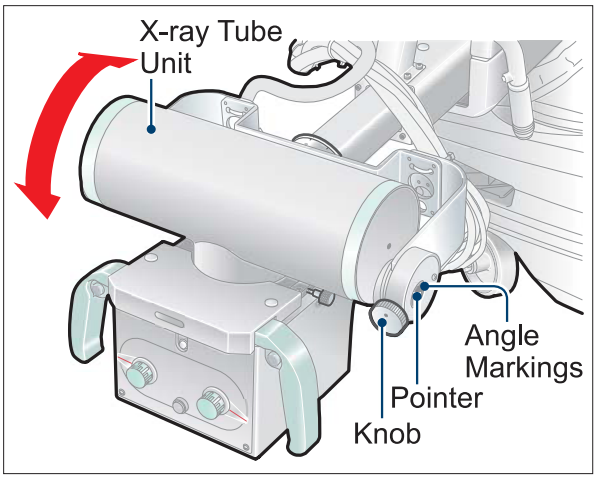
❶ Loosen the knob, and change the collimator orientation.



❷ Rotate the X-ray tube unit laterally.



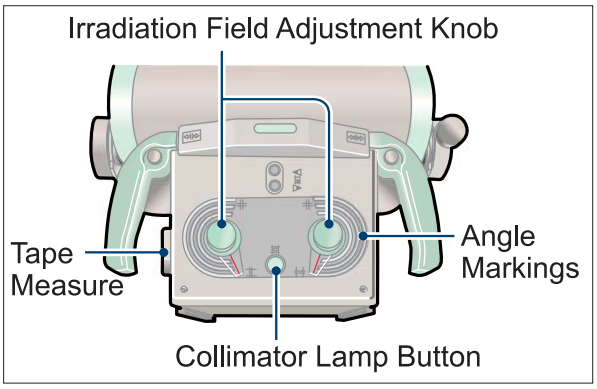
❸ Loosen the knob, and rotate the X-ray tube unit forward and backward.



4 Adjust the irradiation field.

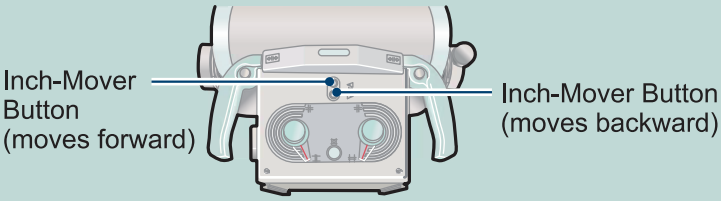
❶ Press the collimator lamp button and check the irradiation field.

❷ Use the irradiation field adjustment knob to adjust the irradiation field size.



NOTE

Use the collimator inch-mover button to move the system slowly forward and backward.
Use this to make fine positioning adjustments.

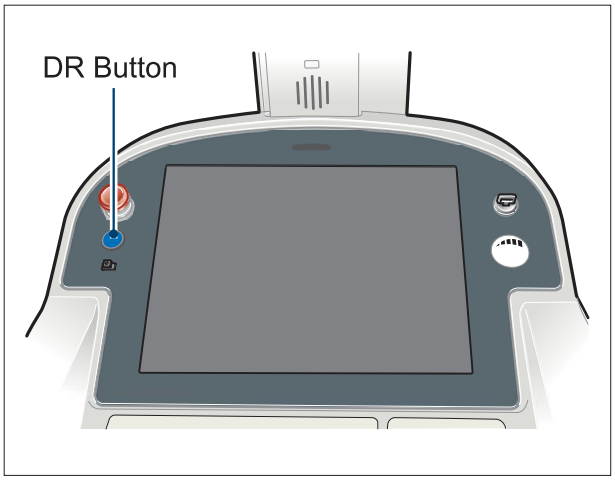


DR Radiography

●Starting up the DR System

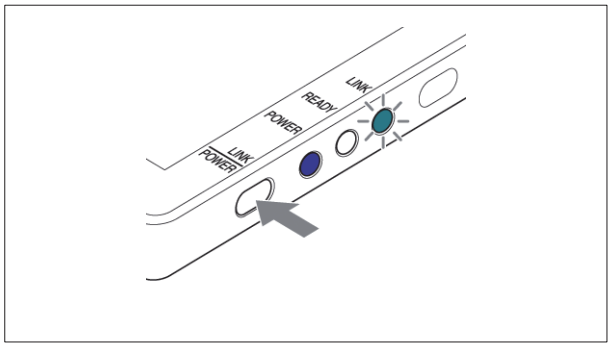
1 **Press DR Switch.**

► The DR system will start up.



2 **Press and hold the POWER button (approx. 1 second).**
(Only for Wireless FPD)

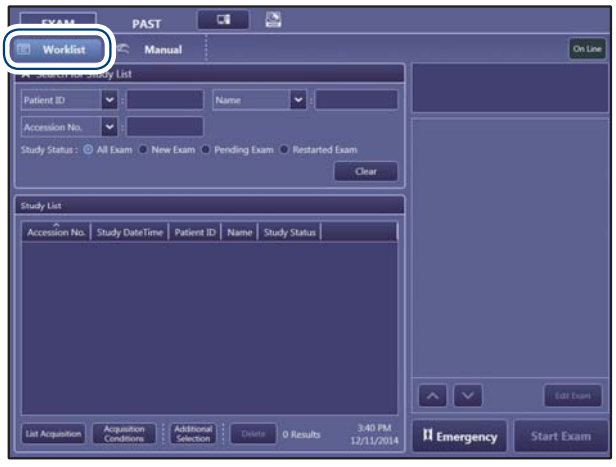
► Power lamp lights up and the detector is ON.



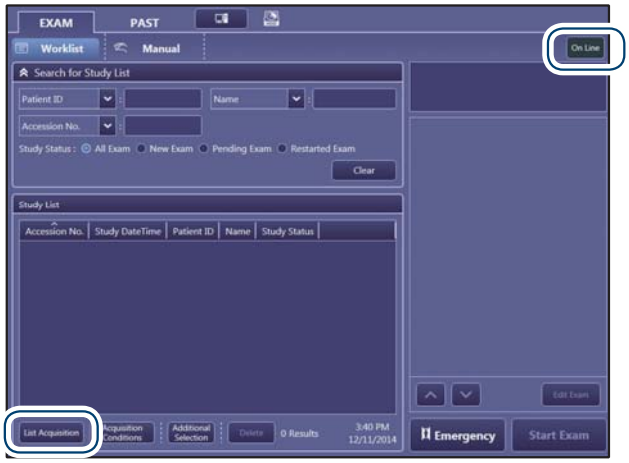
●Selecting/Creating Study Order

■To select a study order ([EXAM>Worklist])

1 **Press [EXAM>Worklist].**



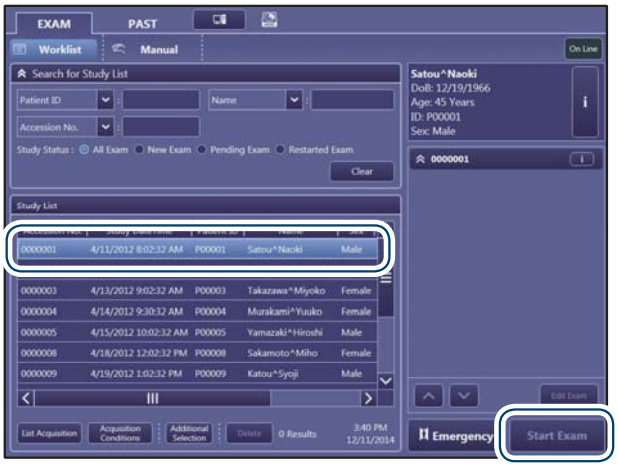
2 Make sure that the system status bar displays "On Line", and press Refresh.



NOTE

When the wireless LAN option is not installed, be sure to connect the LAN cable to the LAN connector for external connection.

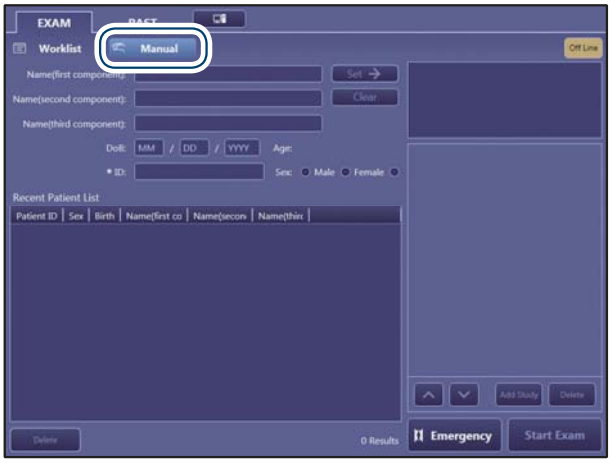
3 Click the desired study order, and press Start Exam.



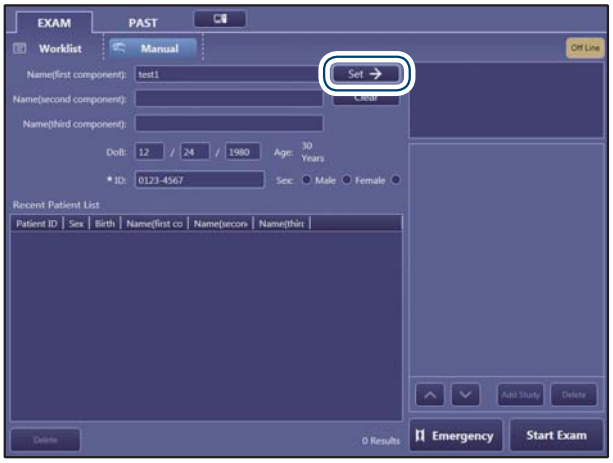
► [EXAM>Examination] is displayed, and the “Ready” indicator appears in the system status bar.

■To create a study order ([EXAM>Manual])

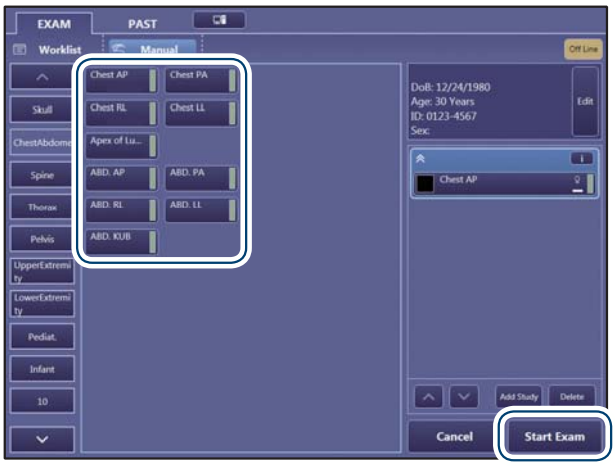
1 **Press [EXAM>Manual].**



2 **Enter patient information, and press** Set → .



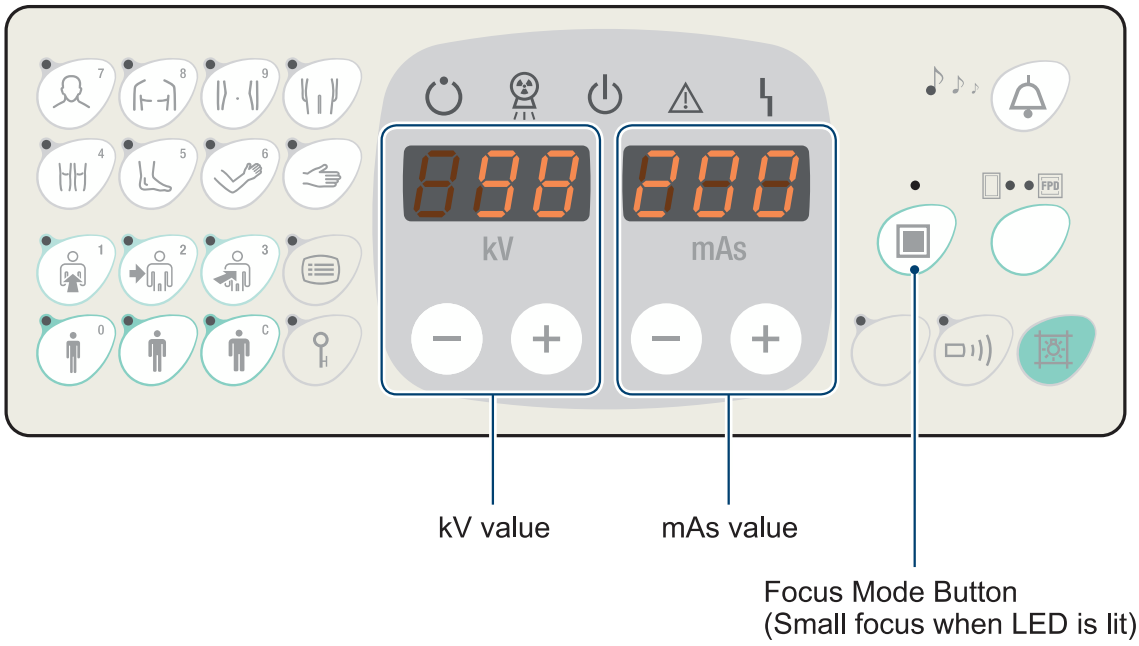
3 **Select the protocol, and press** Start Exam .



► [EXAM>Examination] is displayed, and the “Ready” indicator appears in the system status bar.

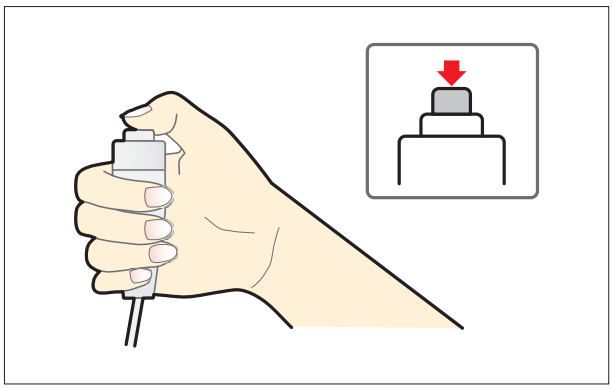
●Confirming Radiography Mode

1 Use the X-ray control panel buttons as necessary to set kV and mAs values, and switch the focus mode.



●Performing X-ray Exposure

1 Press the hand switch button to the first level.



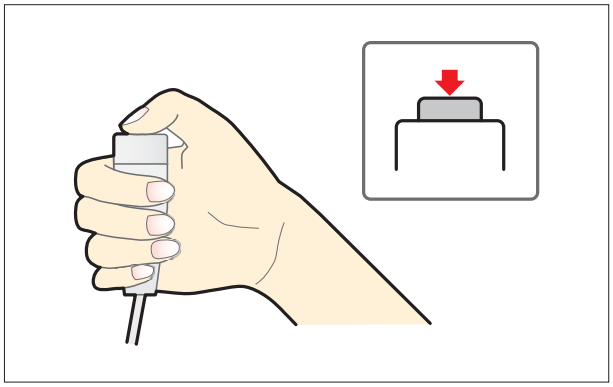
X-ray Control Panel

When the system completes the exposure preparation, ○ (Ready indicator lamp) is turned ON.

Status Indicator

Green light is turned ON.

2 Press the hand switch button to the second level.



► The X-ray starts being radiated.
Keep pressing the hand switch until the exposure is completed.

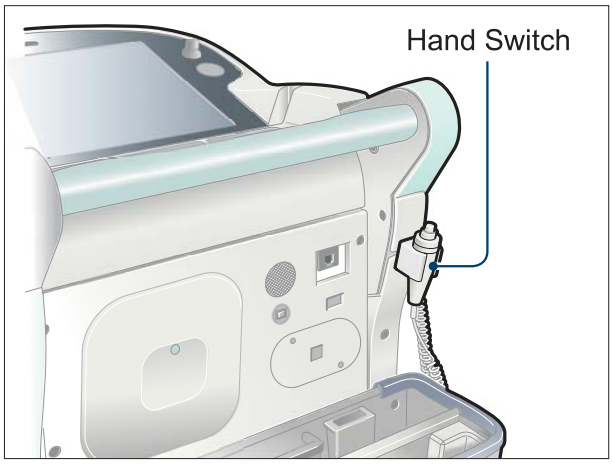
X-ray Control Panel

During the X-ray exposure, ☢ (X-ray exposure lamp) illuminates and a buzzer sounds.

Status Indicator

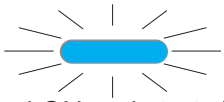
Indicates yellow while X-ray exposure is being performed.

3 Put the hand switch back into the hand switch holder.



X-ray Control Panel

The display of kV value and mAs value starts blinking.

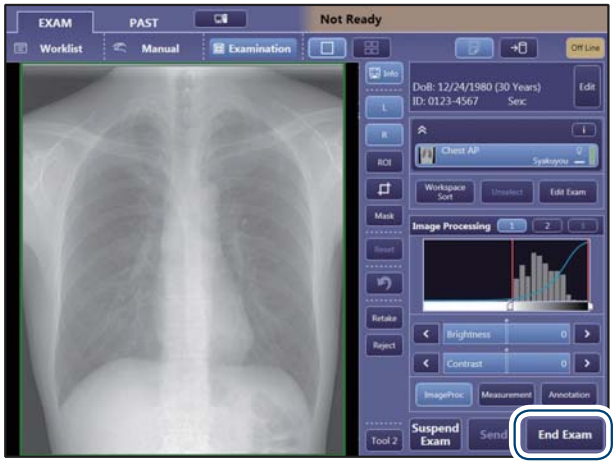
Status Indicator 

Blue light is turned ON and starts blinking.

NOTE

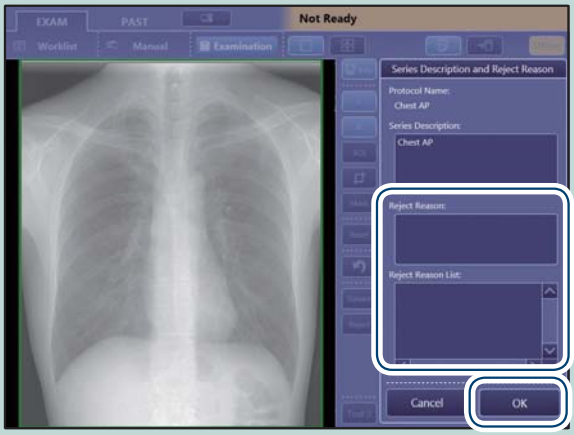
To perform radiography consecutively, wait until the blue status indicator lamp changes from blinking to solid.

4 The radiography image acquired is displayed. If it is appropriate, and press End Exam .



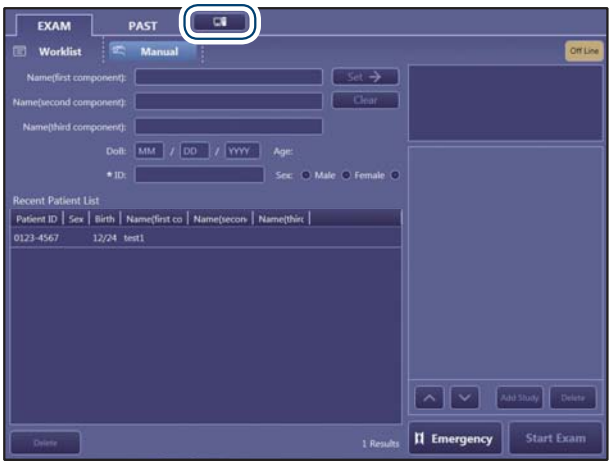
NOTE

- Press Retake to re-perform the exposure.
  Fill out he Reject Reason text box, and press OK .
  You will go back to the [EXAM>Examination] screen in step 3. (☞ Page 12).
- See "Image Output" (☞ Page 19) for image output.



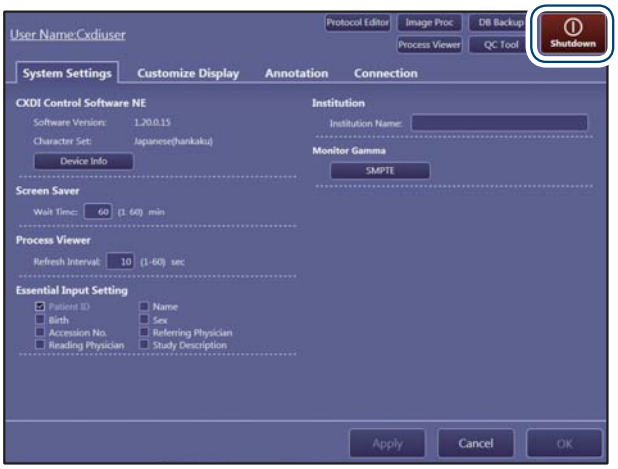
●Shutting Down the DR System

1 Press .



2 Press

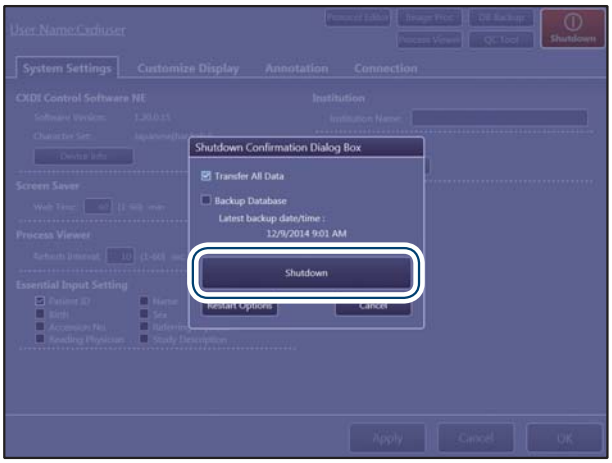
.



3 Press

on Dialog box.

► The DR system will be shut down.



4 Press and hold the POWER button (approx. 5 seconds) to turn off the detector.

► Power of the detector are turned off if all the LED lamps are off.

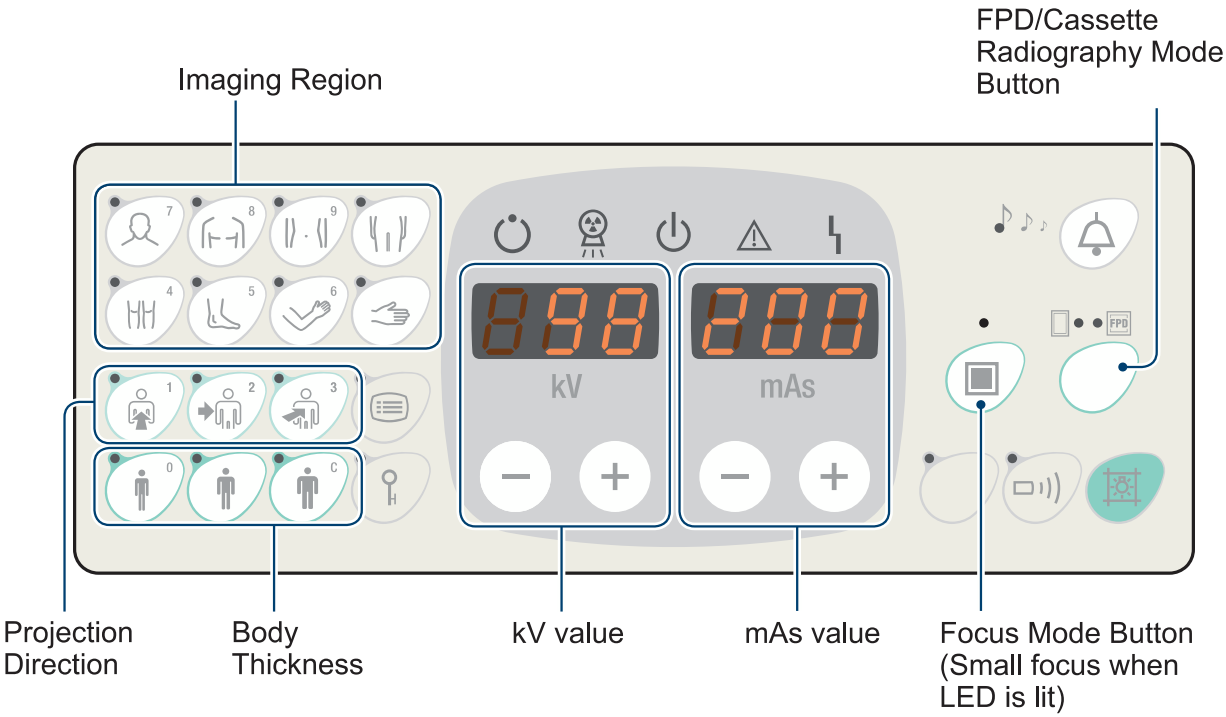
Cassette Radiography

●Selecting Radiograph Method

1 **Press and hold (FPD/Cassette Radiography Mode Button) for about 2 seconds to select cassette radiography.**

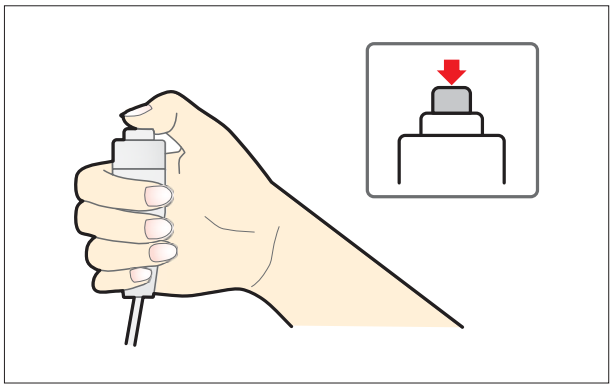
► is turned ON.

2 **Select radiograph method.**



●Performing X-ray Exposure

1 Press the hand switch button to the first level.



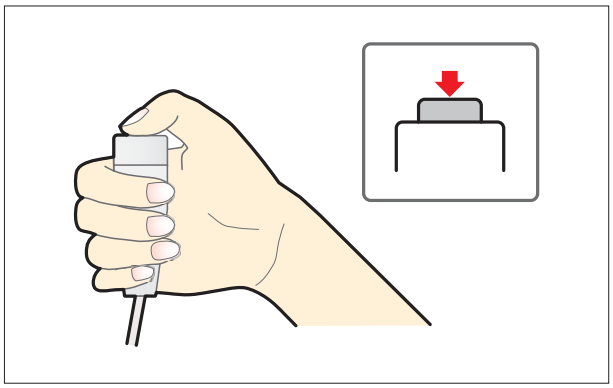
X-ray Control Panel

When the system completes the exposure preparation, ◯ (Ready indicator lamp) is turned ON.

Status Indicator

Green light is turned ON.

2 Press the hand switch button to the second level.



► The X-ray starts being radiated.
Keep pressing the hand switch until the exposure is completed.

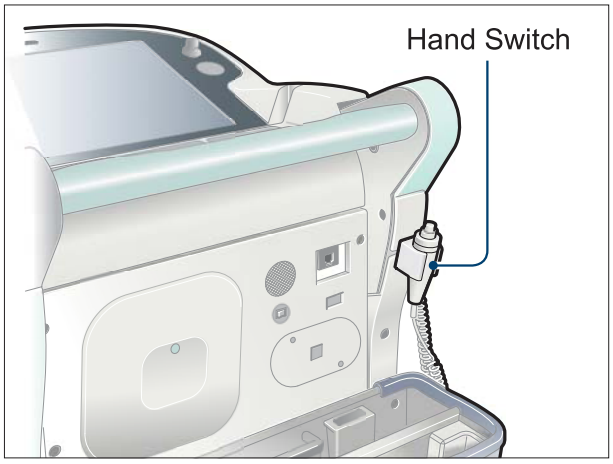
X-ray Control Panel

During the X-ray exposure, (X-ray exposure lamp) illuminates and a buzzer sounds.

Status Indicator

Indicates yellow while X-ray exposure is being performed.

3 Put the hand switch back into the hand switch holder.



X-ray Control Panel

The display of kV value and mAs value starts blinking.

Status Indicator

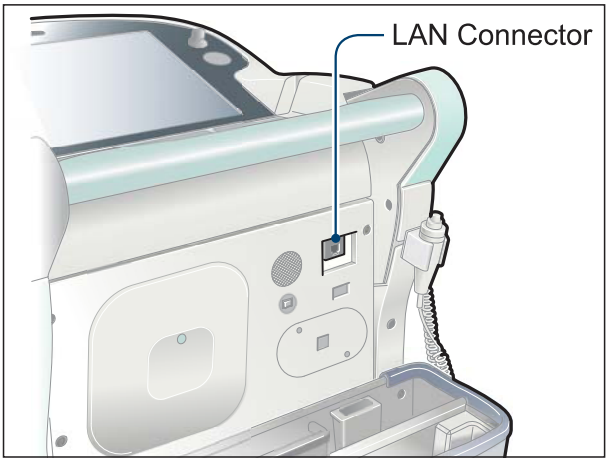
Blue light is turned ON and starts blinking.

NOTE

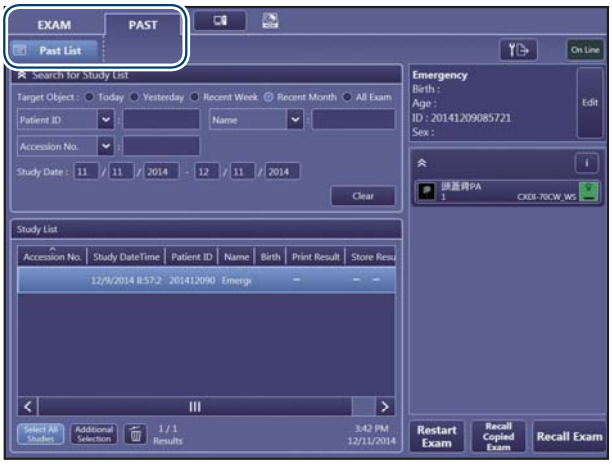
To perform radiography consecutively, wait until the blue status indicator lamp changes from blinking to solid.

Image Output

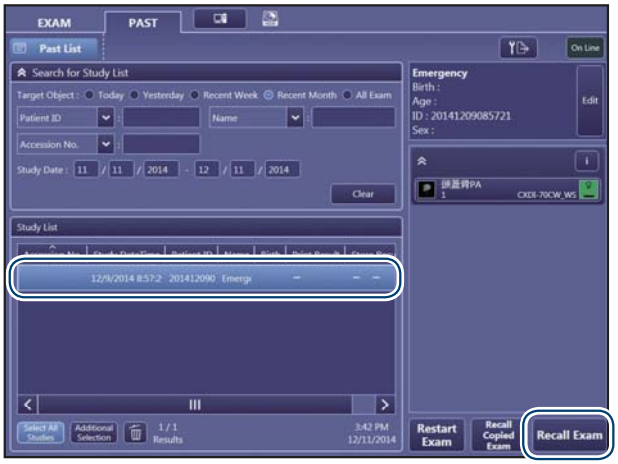
1 Insert the cable into LAN connector.



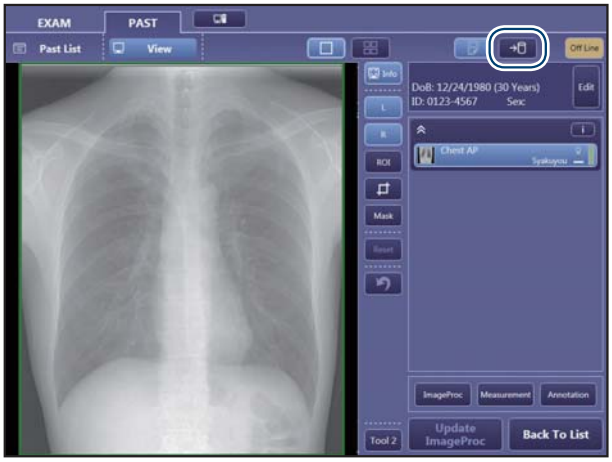
2 Press [PAST>Past List].



3 Select study orders, and press **Recall Exam** .

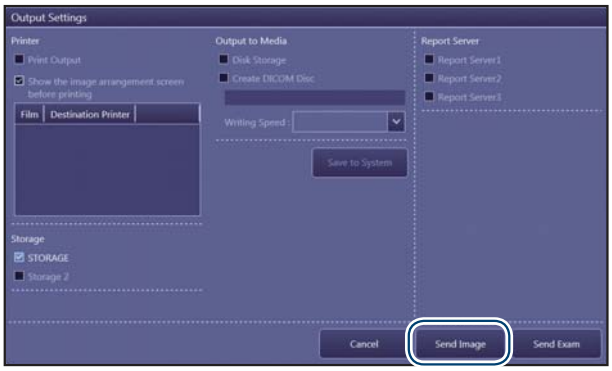


4 Display radiograph image to be output and press .



5 Select the output device, and press Send Image .

► The selected radiograph image is output to the device.

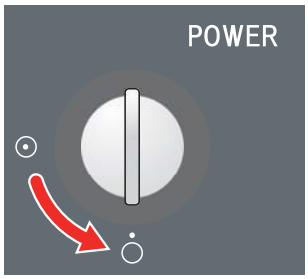


Shutting OFF and Charging

☞ For procedures to shut down DR system, see Page 16.

●Turning the Power OFF

1 **Turn the key switch to ○ position, and pull out the key.**



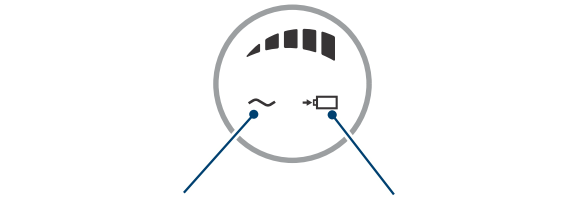
●Charging Battery

1 **Verify that the position of key switch is on ○.**

2 **Verify that the DR system has been shut down.**

3 **Take out the power plug stored in MobileDaRt Evolution and connect it to the outlet.**

► ~(Power line connection indicator lamp) will be turned ON.



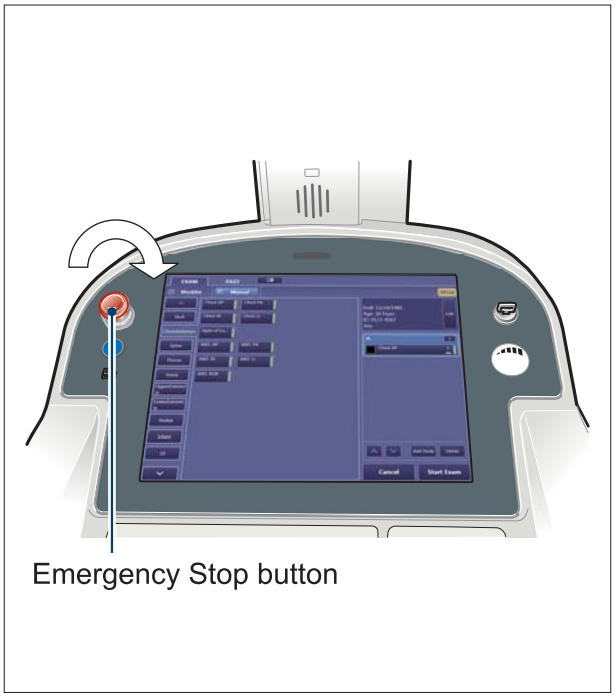
NOTE

(The charging lamp) illuminates during charge. It will be turned OFF after the battery is completely charged.

Troubleshooting

●Emergency Stop

1 **Press the emergency stop button.**



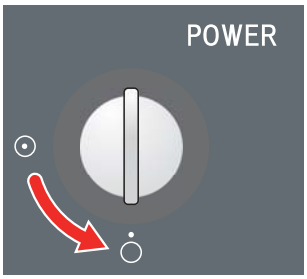
●Releasing Emergency Stop

1 **Turn the emergency stop button in the direction of the arrow.**

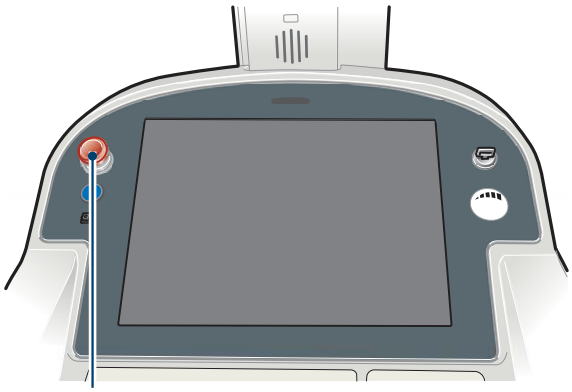
●If Unable to Travel Electrically

If the brake release function is used, the brake is released to allow moving the unit by hand.

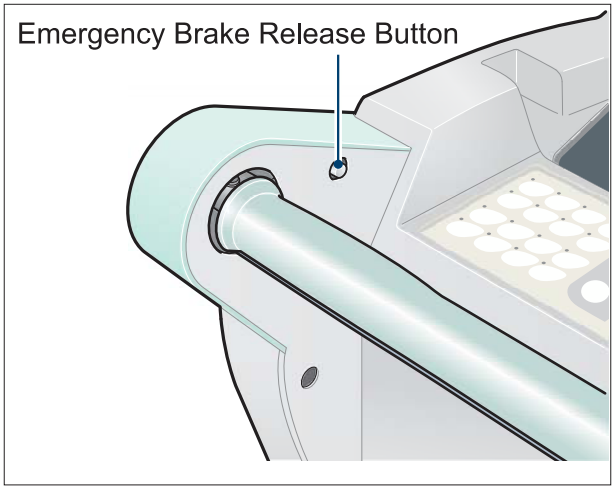
1 **Turn the Power OFF.**



2 **Press emergency stop button.**

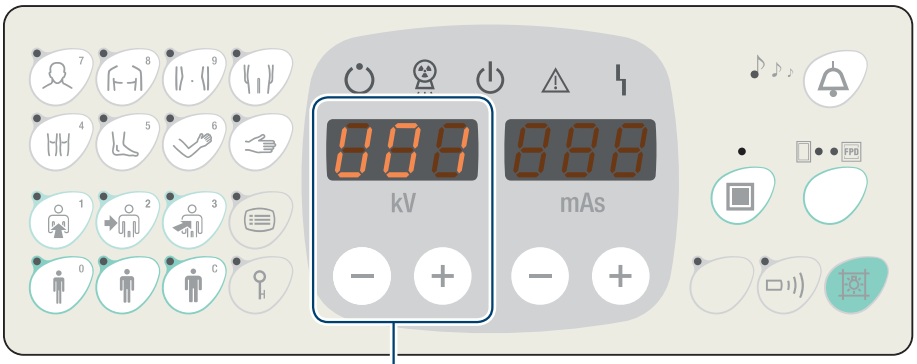


3 **Move the instrument, pressing the emergency brake release button.**



●Replacement Time Display

The system is equipped with a function to notify you of the replacement time for some parts.



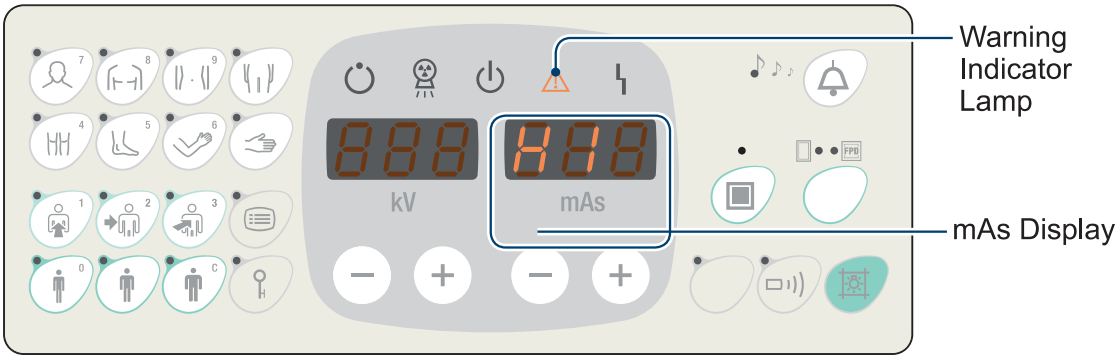
kV Display

When any one of the following codes is indicated, replace the relevant part.
☞ For detailed operation, refer to the instruction manual.

Code	Part	Remarks
U01	Battery	After 2 years from installation
U02	CPU Backup Battery	After 2 years from installation
U03	Emergency Brake Release Battery	After 2 years from installation
U04	X-Ray Tube Unit	After 30,000 exposures from installation
U05	Motor	After the system travels 7,500 km from installation.

●Warning Indicator Lamp

If the warning indicator lamp illuminates, the warning code appears on the mAs display.

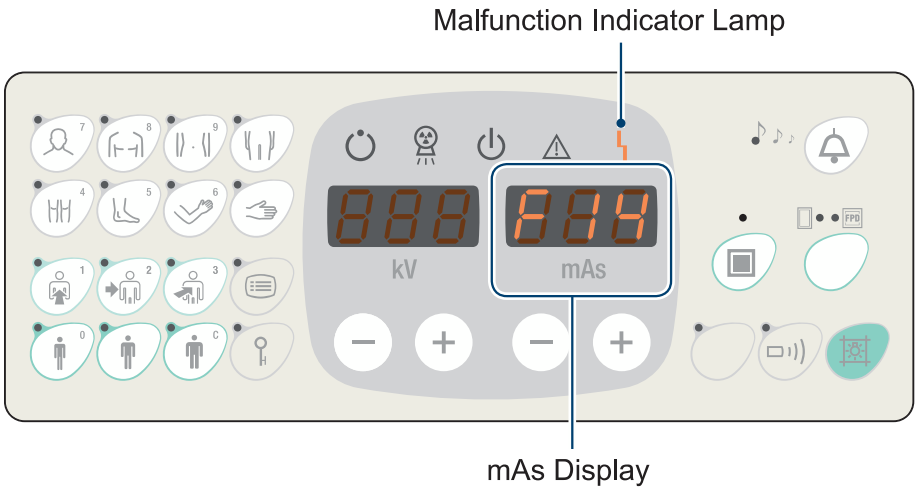


When any one of the following codes is indicated, take the prescribed action.
☞ For detailed operation, refer to the instruction manual.

Code	Description	Corrective Action
H1	Under specified radiography parameters exceeds maximum anode heat content.	Reduce radiography parameters, or stop radiography until the warning indicator lamp turns OFF. Disappear when X-ray tube unit cools sufficiently.
H2	Maximum anode heat content has reached.	Stop radiography until the warning indicator lamp turns OFF. Disappear when X-ray tube unit cools sufficiently.
H4	X-ray tube unit temperature is too high.	Stop radiography until the warning indicator lamp turns OFF. Disappear when X-ray tube unit cools sufficiently.
F68	X-ray exposure was attempted before DR system radiography preparation was finished.	Wait until DR system radiography preparation is finished before starting radiography. Disappears when the FPD radiography mode button is pressed.
F6d	Emergency stop button was pressed.	Resolve error. Disappears when the emergency stop button is turned in the direction of the arrow and reset.
bbb	Radiography not possible due to low battery voltage.	Charge the battery.
b1	The specified radiography conditions set an exposure duration exceeding the upper limit for the current image accumulation time setting, since the system is currently set in low battery mode.	Change the system settings to the DR long-term exposure mode by operating the digital radiography console.
d0~d3, d13~d15	Travel system or motor system error.	Contact your Shimadzu service representative.
d4~d11	There was an input from some switch or lever during startup.	Release the button or the lever.
d12	Increased temperature was detected in control circuit.	Stop traveling. Disappears after the control circuit cools and the temperature falls.
E,EEE	Indicates the replacement period for the CPU memory backup battery.	Although normal travel and radiography are possible, the CPU memory backup battery must be replaced.
E5	Indicates the replacement period for the emergency brake release battery.	Although normal travel and radiography are possible, the break cannot be released in an emergency. The emergency brake release battery must be replaced.

●Malfunction Indicator Lamp

If the self-diagnostic function detects any malfunction in the system, malfunction indicator lamp illuminates, and radiography is disabled.
The malfunction code appears on the mAs display.
If the malfunction indicator lamp illuminates, contact your Shimadzu service representative.



However, when the following codes appear, take an appropriate action. Then the normal operation may be restored.
☞ For detailed operation, refer to the instruction manual.

Code	Description	Corrective Action
F14	X-ray tube unit discharge	The error may be reset by warm-up the X-ray tube unit.
F5C	The plug might be connected to the outlet with the main breaker OFF.	Check the status of the main breaker.

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