

PHOT-X IS

MODEL 505

DENTAL X-RAY

Service Manual

(For USA & Canada)

 **Belmont[®]**

Index

1 . Adjustment required when parts are replaced	3
2 . Method to measure mA and kV.....	3
3 . Error Code.....	3
3.1 Error Code: E.00	3
3.2 Error Code: E.01	4
3.3 Error Code: E.02	4
3.4 Error Code: E.03	4
3.5 Error Code: E.05	5
3.6 Error Code: E.06	5
3.7 Error Code: E.07	6
3.8 Error Code: E.08	7
3.9 Error Code: E.09	8
3.10 Error Code: E.10	8
3.11 Error Code: E.11	8
3.12 Error Code: E.12	8
3.13 Error Code: E.14	9
3.14 Error Code: E.15	9
3.15 Error Code: E.16	10
3.16 Error Code: E.17	10
3.17 Error Code: E.19	11
3.18 Error Code: E.20	11
3.19 Error Code: E.22	12
3.20 Error Code: E.23	12
3.21 Others	12
4 . Setting Mode	14
4.1 Film type, digital mode and priority light	14
4.2 Tube current adjustment value	14
4.3 Tube voltage adjustment value	15
4.4 Electronic chime ON/OFF	15
4.5 Manual setting of preheating power	16
4.6 Automatic adjustment of preheating power	16
4.7 Setting the automatic lock	17
4.8 Setting the standard density value for each tooth	17
4.9 Viewing the setting	17
4.10 Error History	18
4.11 Number of Exposures	19
4.12 Estimated Air Kerma Display Setting	19

5 . Exposure time	19
5.1 Assignable exposure time	19
5.2 Exposure time in the automatic setting mode	19
5.2.1 Exposure Time Settings (60kV, 3mA, Short Cone)	20
5.2.2 Exposure Time Settings (60kV, 6mA, Short Cone)	20
5.2.3 Exposure Time Settings (70kV, 3mA, Short Cone)	21
5.2.4 Exposure Time Settings (70kV, 6mA, Short Cone)	21
5.2.5 Exposure Time Settings (60kV, 3mA, Long Cone)	22
5.2.6 Exposure Time Settings (60kV, 6mA, Long Cone)	22
5.2.7 Exposure Time Settings (70kV, 3mA, Long Cone)	23
5.2.8 Exposure Time Settings (70kV, 6mA, Long Cone)	23
5.2.9 Exposure Time Settings (60kV, 3mA, Short Cone + Rectangular Collimator)	24
5.2.10 Exposure Time Settings (60kV, 6mA, Short Cone + Rectangular Collimator)	24
5.2.11 Exposure Time Settings (70kV, 3mA, Short Cone + Rectangular Collimator)	25
5.2.12 Exposure Time Settings (70kV, 6mA, Short Cone + Rectangular Collimator)	25
5.2.13 Exposure Time Settings (60kV, 3mA, Long Cone + Rectangular Collimator)	26
5.2.14 Exposure Time Settings (60kV, 6mA, Long Cone + Rectangular Collimator)	26
5.2.15 Exposure Time Settings (70kV, 3mA, Long Cone + Rectangular Collimator)	27
5.2.16 Exposure Time Settings (70kV, 6mA, Long Cone + Rectangular Collimator)	27
6 . Parts replacement.....	28
6.1 Head	28
<i>Adjustment after exchanging the x-ray head</i>	28
6.2 Power PC board	29
<i>Adjustment after exchanging the power PC board (mA adjustment)</i>	30

1. Adjustment required when parts are replaced

Following two kinds of adjustment are necessary if the x-ray head or PC board is replaced.

Replaced part	Head	Timer PC board	Power PC board
Adjustment			
Change the CP value as indicated on the head yoke. [Refer to section 3.3.]	Necessary	Necessary	Not Necessary
Automatic adjustment of preheating power [Refer to section 3.6.]	Necessary	Necessary	Necessary

2. Method to measure mA and kV.

Actual tube current (mA) and tube potential (kV) can be checked by the following procedure.

1. Turn the main switch on and set the exposure time at 1 sec. and 60 kV, 3 mA
2. Make an exposure and keep the exposure switch depressed continuously after the exposure is over.
3. Keeping the exposure switch depressed, press kV selection switch twice. KV measured value will be displayed on the LED window. This value should be 60 ± 5 kV.
4. Keeping the exposure switch depressed, press mA selection switch twice. MA measured value will be displayed on the LED window. This value should be 3 ± 1 mA.
5. Release the exposure switch and change the setting to 70 kV, 6 mA.
6. Make an exposure and keep the exposure switch depressed continuously after the exposure is over.
7. Keeping the exposure switch depressed, press kV selection switch twice. KV measured value will be displayed on the LED window. This value should be 70 ± 5 kV.
8. Keeping the exposure switch depressed, press mA selection switch twice. MA measured value will be displayed on the LED window. This value should be 6 ± 1 mA.

3. Error Code

3.1 Error Code: E.00

Meaning

The exposure switch was released during x-radiation.

To release

Press either button for tooth selection.

Measures

Explain that the operator must continue pressing the exposure switch until the exposure light goes out (and alarm stops sounding).

If not resolved

Possible cause

Contact failure of the exposure switch or contact failure occurred due to disconnection in a curl cord of a hand switch during the exposure.

Verification

Take the exposure switch or the hand switch from the timer PC board and check continuity of the cables. (Pay special attention to the cord bush and connectors.)

Solution

Replace the exposure switch or the hand switch if any failure is found.

3.2 Error Code: E.01

Meaning

The exposure switch was pressed within three seconds after power-on.

The exposure switch was pressed within ten seconds after previous exposure.

To release

Release the exposure switch to restore the original state.

Solution

Explain that the operator must wait to press the exposure switch for three seconds after power-on (until the ready light is on) and that exposure is allowed only after an interval 30 times the length of the last exposure time.

If not resolved

Possible cause

Contact fault occurred in the exposure switch or contact failure occurred due to disconnection in a curl cord of a hand switch in the middle of exposure.

Verification

Take the exposure switch or the hand switch from the PC board and check continuity of the cables. (Pay special attention to the cord bush and connectors.)

Solution

Replace the exposure switch or the hand switch if any failure is found.

3.3 Error Code: E.02

Meaning

The exposure switch was pressed when the line voltage was less than 90% of the rated voltage.

To release

Release the exposure switch to restore the original state.

Verification

Measure the voltage between L and N of the power supply terminal block.

Solution

Increase the line voltage using a step-up transformer if the supply voltage is less than 90% of the rated voltage.

If not resolved (or if line voltage is within $\pm 10\%$ of rated voltage.)

Possible cause

The memory is out of order.

Verification

Check C.XX setting at overview mode. (Refer to section 3.9.)

Solution

If C.7F is displayed, memory is out of order and timer PC board should be replaced.

3.4 Error Code: E.03

Meaning

The exposure switch was pressed when the supply voltage was more than 110% of the rated voltage.

To release

Release the exposure switch to restore the original state.

Verification

Measure the voltage between L and N of the power supply terminal block.

Solution

Decrease the voltage using a step-down transformer if the supply voltage is more than 110% of the rated voltage.

If not resolved (or if the line voltage is within the range of $\pm 10\%$ of rated voltage.)

Possible cause

The memory is out of order.

Verification

Check C.XX setting at overview mode. (Refer to section 3.9.)

Solution

If C.7F is displayed, memory is out of order and timer PC board should be replaced.

3.5 Error Code: E.05

Meaning

Tube current before termination of exposure was less than 2 mA (when 3 mA is selected) or less than 4.5 mA (when 6 mA is selected).

To release

Turn off the main power switch and confirm all displays go off. Then turn on again.

Verification

Make an exposure for 0.05 seconds and check the tube current.

- ① After exposure, do not release the exposure switch. Press the mA button twice while holding down the exposure switch.
- ② Keep holding down the exposure switch and check that the T5 light is on and the indication of the seven-segment LED.

Solution

If seven-segment LED displays not more than 1.9 mA (when 3 mA is set) or not more than 4.2 mA (when 6 mA is set), increase the setting value for h.XX. (Refer to section 3.5.)

If not resolved

Possible cause 1

If seven segment LED displays not more than 1 mA, the power PC board or the head is out of order.

Solution

X-ray head should be changed. If the tube current is not more than 1 mA after the head is replaced, change the power PC board.

Possible cause 2

If seven segment LED displays more than 1 mA, but not more than 1.9 mA (when 3 mA is set) or not more than 4.2 mA (when 6 mA is set), tube current might be low at transient period of exposure.

Solution

X-ray head should be changed.

Possible cause 3

The tube current adjusting value is not properly adjusted.

Solution

Increase the setting value for EP.X. (Refer to section 3.2.)

3.6 Error Code: E.06

Meaning

Tube current immediately before termination of exposure was more than 4 mA (when 3 mA is selected) or

more than 7.5 mA (when 6 mA is selected).

To release

Turn off the main power switch and confirm all displays go off. Then turn on again.

Verification

Make an exposure for 0.05 seconds and check the tube current.

- ① After exposure, do not release the exposure switch. Press the mA button twice while holding down the exposure switch.
- ② Keep holding down the exposure switch and check that the T5 light is on and the indication of the seven-segment LED.

Solution

If seven-segment LED displays not less than 4.1 mA (when 3 mA is set) or not less than 7.6 mA (when 6 mA is set), decrease the setting value for h.XX. (Refer to section 3.5.)

If not resolved

Possible cause 1

The tube current adjusting value is not properly adjusted.

Solution

Decrease the setting value for EP.X. (Refer to section 3.2.)

Possible cause 2

The power PC board or the head is out of order.

Verification

Replace the head and check whether the same symptom (Error code E.06) appears again.

Solution

If the same symptom appears, the cause of the error is presumed to lie in the power PC board. In this case, replace the power PC board. If the exposure turns out to be normal, the cause is presumed to lie in the x-ray head.

3.7 Error Code: E.07

Meaning

Tube current during the exposure dropped to 1.5 mA or less (when 3 mA is set) or 3 mA or less (when 6 mA is set).

To release

Turn off the main power switch and confirm all displays go off. Then turn on again.

Verification

Make an exposure for 0.05 seconds and check the tube current.

- ① After exposure, do not release the exposure switch. Press the mA button twice while holding down the exposure switch.
- ② Keep holding down the exposure switch and check that the T5 light is on and the indication of the seven-segment LED.

Solution

If seven-segment LED displays not more than 1.4 mA (when 3 mA is set) or 2.9 mA (when 6 mA is set), increase the setting value for h.XX. (Refer to section 3.5.)

If not resolved

Possible cause 1

The arm cable (power line for filament of x-ray tube) is broken.

Verification

Disconnect the arm cable from the head (10P connector) and the power PC board (8P connector) and check continuity of the cable.

1. between #4 (head side) and #4 (power PC board side)
2. between #8 (head side) and #7 (power PC board side)
3. between #9 (head side) and #8 (power PC board side)

Solution

Replace the arm in question (horizontal or balance arm) if any failure is found.

Possible cause 2

The arm cable (tube current feedback line) is broken.

Verification

Disconnect the arm cable from the head (10P connector) and the power PC board (8P connector) and check continuity of #1 (head side) and #2 (power PC board side).

Solution

Replace the arm in question (horizontal or balance arm) if any failure is found.

Possible cause 3

If seven segment LED displays not more than 1 mA, the power PC board or the head is out of order.

Solution

X-ray head should be change. If the tube current is not more than 1 mA after the head is replaced, change the power PC board.

Possible cause 4

If seven segment LED displays more than 1 mA, but not more than 1.4 mA (when 3 mA is set) or not more than 2.9 mA (when 6 mA is set), tube current might be low at transient period of exposure.

Solution

X-ray head should be changed.

3.8 Error Code: E.08

Meaning

Tube current during exposure rose to 20 mA or above.

To release

Turn off the main power switch and confirm all displays go off. Then turn on again.

Verification

Make exposures for 0.1 seconds and check whether the same symptom appears every time.

Solution

Decrease the setting value for h.XX. (Refer to section 3.5.)

If not resolved

Possible cause

The power PC board or the head is out of order.

Verification

Replace the head and check whether the same symptom (Error code E.08) appears again.

Solution

If the same symptom appears, the cause of the error is presumed to lie in the power PC board. In this case, replace the power PC board. If the exposure turns out to be normal, the cause is presumed to lie in the head.

3.9 Error Code: E.09

Meaning

The set value for the preheating power is abnormal when the power is turned on.

To release

Turn off the main power switch and confirm all displays go off. Then turn on again.

Solution

Set the h.XX value to "h.10" at all conditions (60 kV/3 mA, 70 kV/3 mA, 60 kV/6 mA, 70 kV/6 mA). If the same symptom (E.09) does not appear when the power is turned on again, set the CP value (see 3.3) and perform automatic adjustment of preheating power (see 3.6).

If not resolved

Possible cause

The timer PC board (EEPROM) is out of order.

Verification

Replace the timer PC board and check whether the same symptom (Error code E.09) appears again.

Solution

If the error code disappears, the timer PC board is presumed to be the cause. Replace it.

3.10 Error Code: E.10

Meaning

The exposure switch is already on, when the power switch is turned on.

To release

Turn off the main power switch and confirm all displays go off. Then turn on again.

Verification

Power on after disconnecting CN2 on the timer PC board and check whether the same symptom (E.10) appears. If the hand switch is used, disconnect CN3 as well.

Solution

If the same symptom (Error code E.10) appears even after the connector is disconnected, the cause of the error is presumed to lie in the timer PC board. In this case, replace the timer PC board. If the E.10 does not appear, the cause is presumed to lie in the contact fault in the exposure switch. In this case, replace the exposure switch. If a hand switch is used, connect either of the connectors and check it.

3.11 Error Code: E.11

Meaning

Tube current of 2 mA or more is detected during preheating.

To release

Turn off the main power switch and confirm all displays go off. Then turn on again.

Solution

There is a failure in the power PC board. Replace the PC board.

3.12 Error Code: E.12

Meaning

Tube current of 1 mA or more is detected when main power switch is turned on.

To release

Turn off the main power switch and confirm all displays go off. Then turn on again.

Solution

There is a failure in the power PC board. Replace the PC board.

3.13 Error Code: E.14

Meaning

Tube voltage immediately before termination of exposure was less than 50 kV (when 60 kV is set) or less than 60 kV (when 70 kV is set).

To release

Turn off the main power switch and confirm all displays go off. Then turn on again.

Verification

Make an exposure for 0.05 seconds and check the tube voltage.

- ① After exposure, do not release the exposure switch. Press the kV button twice while holding down the exposure switch.
- ② Keep holding down the exposure switch and check that the T5 light is on and the indication of the seven-segment LED.

Solution

If seven-segment LED displays not more than 50 kV (when 60 kV is set) or not more than 60 kV (when 70 kV is set), increase the setting value for CP.X. (Refer to section 3.3.)

If not resolved

Possible cause

The power PC board or the head is out of order.

Verification

Replace the head and check whether the same symptom (Error code E.14) appears again.

Solution

If the same symptom appears, the cause of the error is presumed to lie in the power PC board and it should be replaced. If the exposure turns out to be normal, the cause is presumed to lie in the head.

3.14 Error Code: E.15

Meaning

Tube voltage immediately before termination of exposure was higher than 70 kV (when 60 kV is set) or 80 kV (when 70 kV is set).

To release

Turn off the main power switch and confirm all displays go off. Then turn on again.

Verification

Make an exposure for 0.05 seconds and check the tube voltage.

- ① After exposure, do not release the exposure switch. Press the kV button twice while holding down the exposure switch.
- ② Keep holding down the exposure switch and check that the T5 light is on and the indication of the seven-segment LED.

Solution

If seven-segment LED displays not less than 70 kV (when 60 kV is set) or not less than 80 kV (when 70 kV is set), decrease the setting value for CP.X. (Refer to section 3.3.)

If not resolved

Possible cause

The power PC board or the head is out of order.

Verification

Replace the head and check whether the same symptom (Error code E.15) appears again.

Solution

If the same symptom appears, the cause of the error is presumed to lie in the power PC board. In this case, replace the power PC board. If the exposure turns out to be normal, the cause is presumed to lie in the head.

3.15 Error Code: E.16

Meaning

Tube voltage during exposure dropped to less than 40 kV (when 60 kV is set) or less than 50 kV (when 70 kV is set).

To release

Turn off the main power switch and confirm all displays go off. Then turn on again.

Verification

The arm cable (main output line) may be broken. Disconnect the arm cable from the head (10P connector) and the power PC board (2P connector) and check continuity of the cable.

1. between #10 (head side) and #1 (power PC board side)
2. between #5 (head side) and #2 (power PC board side)

Solution

Replace the arm in question (horizontal or balance arm) if any failure is found.

If not resolved

Possible cause 1

The arm cable (tube voltage feedback line) is broken.

Verification

Disconnect the arm cable from the head (10P connector) and the power PC board (8P connector) and check continuity between #7 (head side) and #6 (power PC board side).

Solution

Replace the arm in question (horizontal or balance arm) if any failure is found.

Possible cause 2

The power PC board or the head is out of order.

Verification

Replace the head and check whether the same symptom (Error code E.16) appears again.

Solution

If the same symptom appears, the cause of the error is presumed to lie in the power PC board and it should be replaced. If the exposure turns out to be normal, the cause is presumed to lie in the head.

3.16 Error Code: E.17

Meaning

Tube voltage during exposure rose to 80 kV or above.

To release

Turn off the main power switch and confirm all displays go off. Then turn on again.

Solution

If the same symptom appears, it is more likely that the power PC board is the cause. In this case, replace the PC board.

If not resolved

Possible cause

The head is out of order.

Solution

Replace the head.

3.17 Error Code: E.19

Meaning

An over current ran the primary circuit of the high voltage transformer.

To release

Turn off the main power switch and confirm all displays go off. Then turn on again.

Solution

If the same symptom appears, it is more likely that the power PC board is the cause. In this case, replace the PC board.

If not resolved

Possible cause

The head is out of order.

Solution

Replace the head.

3.18 Error Code: E.20

Meaning

The exposure switch was pressed when the temperature inside the head was 60°C or higher.

To release

Release the exposure switch to restore the original state.

Solution

It is highly likely that exposures were conducted irrespective of the duties, and the temperature inside the head rose to 60°C or higher. Explain that the operator must wait until the temperature drops (until the ready light becomes on) before the next exposure.

If not resolved

Possible cause 1

The arm cable (temperature sensor line) is broken.

Verification

Disconnect the arm cable from the head (10P connector) and the power PC board (8P connector) and check continuity of #6 (head side) and #5 (power PC board side).

Solution

Replace the arm in question (horizontal or balance arm) if any failure is found.

Possible cause 2

The arm cable (signal common line) is broken.

Verification

Disconnect the arm cable from the head (10P connector) and the power PC board (8P connector) and check the continuity between #2 (head side) and #3 (power PC board side).

Solution

Replace the arm in question (horizontal or balance arm) if any failure is found.

Possible cause 3

The head is out of order.

Verification

Disconnect the head connector (10P) from the arm cable and check continuity between #2 and #6

terminals in the head connector.

Solution

Replace the head if no continuity between #2 and #6 terminals is confirmed.

3.19 Error Code: E.22

Meaning

Communication between the power PC board and the timer PC board was not normal.

To release

Turn off the main power switch and confirm all displays go off. Then turn on the main power switch again.

Verification

The communication line may be broken. Check continuity of the #2 wire of the communication cable.(4P)

Solution

Replace the communication cable if any failure is found.

If not resolved

Possible cause 1

Something is wrong with the communication circuit on the timer PC board.

Solution

Replace the timer PC board.

Possible cause 2

Something is wrong with the communication circuit on the power PC board.

Solution

Replace the power PC board.

3.20 Error Code: E.23

Meaning

A button other than the exposure switch is already on when the main power switch is turned on.

To release

Release the button in question to restore the original state

Verification

It is likely that the power was turned on while another button was held down. Dismount the timer PC board from the front cover of the sub controller and then turn on the main power switch.

Solution

Do not tighten screws too much when mounting the timer PC board.

If not resolved

Possible cause

The button on the timer PC board is out of order.

Solution

Replace the timer PC board.

3.21 Others

Symptom

Nothing was displayed on the display on the sub controller.

Verification

Check whether a fuse has been blown (F01[10A] on the filter PC board and F3[1A] on the power PC board).

Solution

Replace the fuse if it has been blown..

If not resolved

Possible cause 1

The communication cable (power line) is broken. * If the fuse blows again when fuse is replaced, no break exists in the communication cable.

Verification

Check continuity of the #1 and #4 wires of the communication cable.

Solution

Replace the communication cable if any failure is found.

Possible cause 2

The power supply circuit on the timer PC board is out of order.

Solution

Replace the timer PC board.

Possible cause 3

The control power supply circuit on the power PC board is out of order.

Solution

Replace the power PC board.

Symptom

Exposure can not be made although the ready light is on.

Verification

Remove the exposure switch and the hand switch from the PC board and check continuity of the cables. (Pay special attention to the cord bush and connectors.)

Solution

Replace the exposure switch or the hand switch if any failure is found.

If not resolved

Possible cause 1

The communication cable (exposure signal line) is broken.

Verification

Check continuity of the #3 wire of the communication cable.

Solution

Replace the communication cable.

Possible cause 2

The exposure switch circuit on the timer PC board is out of order.

Solution

Replace the timer PC board.

Possible cause 3

The exposure switch circuit on the power PC board is out of order.

Solution

Replace the power PC board.

4. Setting Mode

4.1 Film type, digital mode and priority light

(1) To enter this mode

Hold down both of the tube current button and the tube voltage button for approximately three seconds.

(2) The status when entering this mode

- ①The tooth and exposure lights are off. For patient, cone, film/digital mode, tube voltage, and tube current, the lights for prioritized settings are on. The ready light blinks.
- ②On the seven-segment LED, the film speed number or the sensor sensitivity number, which was set in the prioritized film type/digital mode, is displayed.

(3) Operation and display

- ①Each time you press the patient, cone, or film type button, the light of your choice is turned on. Pressing the digital mode button turns off the film light and turns on the digital light. Thus, turn on the lights for the settings you want to prioritize at the time of power-on.
- ②To change the film speed number registered in the film type, press the film type selection button to display the film type you want and the press the Δ or ∇ button to display the film number you want on the seven-segment LED. If you want to change the film number of another film type, select the film type using the film type selection button and then follow the same process as above.
- ③To change the exposure conditions (tube voltage or tube current) registered in the digital mode, press the digital mode button to select the digital mode. To change the tube voltage or tube current, press the tube voltage or tube current button and turn on the light you want. To change the sensor sensitivity number, press the Δ or ∇ button to display the sensor sensitivity number you want on the seven-segment LED.
- ④If rectangular collimator is used with short cone, press T4 button and make the short cone light to flash. If long cone with rectangular collimator is used, long cone light should flash.
- ⑤When you complete the change, turn on the lights for the film type/digital mode you want to prioritize at the time of power-on. Press the T1 button for approximately one second and then buzzer beeps twice and the settings are stored in EEPROM.
- ⑥Prioritized settings at factory are listed in table 1.

Table 1: Factory settings for priority

Film type	Patient type	Cone	Tube current	Tube voltage
a	Adult	Short	6 mA	60 kV
Film speed (film a)	Film speed (film b)	Digital Sensor speed		
F.09	F.05	d.10		

* F.09 is for D speed (Kodak Ultra-speed film) and F.05 is for F/E speed (Kodak Insight film).

4.2 Tube current adjustment value

(1) To enter this mode

Hold down the patient/cone/film buttons for approximately three seconds.

(2) The status when entering this mode

- ①The ready light blinks. The lights for tooth, patient, cone, tube voltage, exposure, film, and digital mode are off.
- ②For the tube current light, 3 mA is on.

- ③The seven-segment LED displays “EP.X”. X represents the tube current adjustment value for 3 mA held at the time. The standard setting is “EP.8”.

(3) Operation and display

- ①Press the Δ or ∇ button to increase/decrease the tube current adjustment value displayed on the seven-segment LED. Select the value you want and press the patient selection button for approximately one second. Buzzer beeps twice and the value is stored as a new tube current adjustment value for 3 mA.
- ②Press the tube current selection button and the light for 3 mA is turned off and 6 mA is turned on. Follow the same procedures as above to store a new tube current adjustment value for 6 mA.
- ③When the change of tube current adjustment value is completed, the standard digital value for tube current is automatically changed in conjunction with the adjustment value stored.

4.3 Tube voltage adjustment value

(1) To enter this mode

Hold down the patient/cone/ tube voltage buttons for approximately three seconds.

(2) The status when entering this mode

- ①The ready light blinks. The lights for tooth, patient, cone, tube current, exposure, film, and digital mode are off.
- ②For the tube voltage light, 60 kV is on.
- ③The seven-segment LED displays “CP.X”. X represents the tube voltage adjustment value for 60 kV held at the time. The standard setting is “CP.8”.

(3) Operation and display

- ①Press the Δ or ∇ button to increase/decrease the tube voltage adjustment value displayed on the seven-segment LED. Select the value you want and press the patient selection button for approximately one second. Buzzer beeps twice and the value is stored as a new tube current adjustment value for 60 kV.
- ②Press the tube voltage selection button and the light of 60 kV is turned off and 70 kV is turned on. Follow the same procedures as above to store a new tube voltage adjustment value for 70 kV.
- ③When the change of tube voltage adjustment value is completed, the standard digital value for tube voltage is automatically changed in conjunction with the adjustment value stored.

4.4 Electronic chime ON/OFF

(1) To enter this mode

Hold down the T1 and T2 buttons for approximately three seconds.

(2) The status when entering this mode

- ①The ready light blinks. The lights for tooth, patient, cone, tube voltage, tube current, exposure, film, and digital mode are off.
- ②The seven-segment LED displays “bu.X”. X represents the chime status number held at the time.

(3) Operation and display

- ①Press the Δ or ∇ button to increase/decrease the chime status number displayed on the seven-segment LED. Select the value you want and press the patient selection button for approximately one second. Buzzer beeps twice and the value is stored as a new chime status number. “bu” represents buzzer and the following numbers have the meanings as described below:

0: An electronic chime does not sound when the selection buttons are depressed.

1: An electronic chime sounds when switches are depressed. (Δ , ∇ , tooth, patient, cone, tube voltage, tube current, exposure, film, and digital buttons) The roundness of the chime is less than bu.2 setting.

2: An electronic chime sounds when switches are depressed. ($\Delta \nabla$, tooth, patient, cone, tube voltage, tube current, exposure, film, and digital buttons) The roundness of the chime is more than bu.1 setting.

Warning: Exposure warning buzzer and alarm sound of error code can not be eliminated.

②Select the value you want and press the patient selection button for approximately one second. Buzzer beeps twice and the value is stored as a new chime setting value. Factory default is “bu.2”.

4.5 Manual setting of preheating power

(1) To enter this mode

Hold down the Film and T4 buttons for approximately three seconds.

(2) The status when entering this mode

①The ready light blinks. The lights for tooth, patient, cone, exposure, film, and digital mode are off.

②For the tube voltage light, 60 kV is on.

③The seven-segment LED displays “h.XX”. XX represents the preheating setting value for 60 kV/3 mA held at the time (00 to 3F). The standard setting is “h.20”.

(3) Operation and display

①Press the Δ or ∇ button to increase/decrease the preheating power setting value displayed on the seven-segment LED. Select the value you want and press the patient selection button for approximately one second. Buzzer beeps twice and the value is stored as a new preheating power setting value for 60 kV/3 mA.

②Pressing the tube voltage selection button switches the tube voltage light to 70 kV and the tube current selection button to 6 mA. Follow the same process as above, and the preheating power setting value for 60kV/6mA, 70kV/3mA and 70kV/6mA can be stored.

4.6 Automatic adjustment of preheating power

(1) To enter the mode

Hold down the T1, T4, and T5 buttons for approximately three seconds.

(2) The status when entering this mode

①The ready light is on. The lights for tooth, patient, cone, exposure, film, and digital mode are off.

②For the tube voltage light, 70 kV is on. For the tube current light, 3 mA blinks for approximately three seconds and then comes on.

③“h.XX” blinks on the seven-segment LED simultaneously with the ② and then “0.50” is displayed.

(3) Operation and display

①Press the exposure switch to make an x-radiation for 0.50 seconds. If the tube current at initial rise falls within the prescribed range, XX specified in (2)- ③ is stored as the preheating power setting value for 70 kV/3 mA, and you will be directed to the adjustment of 70 kV/6 mA. If it falls outside the range, a new “h” value is displayed, and exposure at 70 kV/3 mA shall be conducted again. If the exposure at “h.3C” is conducted but falls lower outside the range, same exposure will be repeated. If the exposure at “h.03” is conducted but falls higher outside the range, same exposure will be repeated. If the tube current is within the prescribed value, you will be directed to the adjustment of 70 kV/6 mA. The interval before the next exposure is 10 seconds. During this period, the ready light goes off and the “h” value for the next exposure, the tube current light, and the tube voltage light blink.

②When the adjustment of 70 kV/6 mA is completed, buzzer beeps twice and “Fin” is displayed on the seven-segment LED. At this moment, the two “h” values are written to EEPROM. Therefore, if you power

off before “Fin” is displayed or move to another setting mode, the “h” values will not be updated. (For 60 kV, same “h” values are stored as 70 kV.)

4.7 Setting the automatic lock

(1) To enter this mode

Hold down the T3 and T4 buttons for approximately three seconds.

(2) The status when entering this mode

①The ready light blinks. The lights for tooth, patient, cone, tube voltage, tube current, exposure, film, and digital mode are off.

②The seven-segment LED displays “AL.X”. X represents the automatic lock status number held at the time (0 or 1).

(3) Operation and display

①Press the Δ or ∇ button and the seven segment LED displays “AL.0” and “AL.1” in turn. “AL” represents “automatic lock,” and the following numbers have the meanings as described below:

0: If it sits idle for approximately eight minutes while the power is on, it automatically enters the energy-saving mode.

1: If it sits idle for approximately eight minutes while the power is on, it automatically enters the lock mode.

②Select the value you want and press the patient selection button for approximately one second. Buzzer beeps twice and the automatic lock setting is stored. Factory default is “AL.0”.

4.8 Setting the standard density value for each tooth

(1) To enter the mode

Hold down the T1 and T5 buttons for approximately three seconds.

(2) The status when entering this mode

①The ready light blinks. The lights for patient, cone, tube voltage, tube current, exposure, film, and digital mode are off.

②T1 of the tooth light is on.

③The seven-segment LED displays “b.XX”. XX represents the standard value for T1 density held at the time. Standard XX value is 0 and can be changed between -4 to +4.

(3) Operation and display

①Press the Δ or ∇ button to increase/decrease the standard density value displayed on the seven-segment LED. By increasing 1 step for the standard density, the exposure time increases 12%.

②Select the value you want and then press another tooth button. Then, the standard density value of the tooth is displayed on the seven-segment LED. Change the value to the one you want as well. The change will be temporarily held until step ③ is finished.

③Press the patient selection button for approximately one second after completing the change of all standard density values. Buzzer beeps twice and the values are stored.

④If all tooth need to be changed to the same steps, press “D” switch and adjust the standard density by pressing the Δ or ∇ and store it by pressing patient switch..

4.9 Viewing the setting

(1) To enter this mode

Hold down the T5 buttons and the cone button for approximately three seconds.

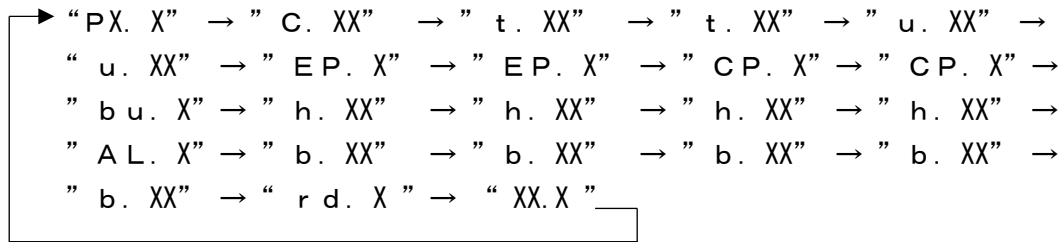
(2) The status when entering this mode

①The ready light blinks. The lights for tooth, patient, cone, tube voltage, tube current, exposure, film, and digital mode are off.

②The seven-segment LED displays “PX.X”. X.X represents the version number of the program.

(3) Operation and display

①Each time you press the Δ button, the display on the seven-segment LED will change in the order as below and allow you to check the settings. For “t.XX”, the tube current light blinks. For “d.XX” and “Pt.X”, the tube voltage light blinks. The same applies to the tooth light for “b.XX”, and both tube voltage light and the tube current light for “h.XX”



②Pressing the ∇ button reverses the direction of the display.

③This mode only allows viewing the settings and does not allow any changes.

4.10 Error History

(1)To enter the mode

Hold down the F and D buttons for approximately three seconds.

(2)The status when entering this mode

①The ready light blinks. The lights for patient, cone, tube voltage, tube current, exposure, film, and digital mode are off.

②T1 of the tooth light is on.

③The seven-segment LED displays the latest Error code that had been displayed. If no error code had been occurred in the past, “- -” will be displayed.

(3) Operation and display

①[History Display] If Δ button is depressed, T2 lamp comes on instead of T1 lamp and 7 segment LED will show the second latest error code. Each time Δ button is depressed, lit lamp moves T2 → T3 → T4 → T5 and the error code is displayed until the fifth latest error. If error code is not exist, “- -” will be displayed.

②Error code E.02, E.03, E.08, E.09, E.11, E.12, E.17, E.19, E.20 and E.22 are recorded. Even if the error code E.02, E.03 and E.20 occurred several times, one record is stored unless the power of the unit is off.

③[Occurring frequency Display] If T1 button is pressed, all tooth lamp will be off and 7 segment LED indicates the error code and the number of that error code’s occurrences. Display starts from the smallest error code and after all error codes are displayed, indication starts from beginning again. Error code not occurred is not displayed in this mode.

④Since the maximum number for occurrence is limited to 15, 15 is displayed even if that error occurred more frequently.

⑤If T1 button is pressed again, the error history mode comes back.

⑥If C button is pressed more than 1 second in the error history mode, buzzer beeps twice and all history records are cleared and all tooth lamp goes off and 7 segment LED indicates “- -”. If there is no history records, pressing T1 button can not change the mode.

4.11 Number of Exposures

(1) To enter the mode

Hold down the C and D buttons for approximately three seconds.

(2) The status when entering this mode

① The lights for ready, patient, cone, tube voltage, tube current, tooth, exposure, film, and digital mode are off.

② The seven-segment LED displays "Cnt".

(3) Operation and display

Since only three digits can be displayed at one time, we use three displays for one indication. Examples are as follows.

If number of exposures is 99, "Cnt" → "000." → "099" → blank → "Cnt" → "000." → "099" → repeat

If number of exposures is 999, "Cnt" → "000." → "999" → blank → "Cnt" → "000." → "999" → repeat

If number of exposures is 9999, "Cnt" → "009." → "999" → blank → "Cnt" → "009." → "999" → repeat

4.12 Estimated Air Kerma Display Setting

(1) To enter the mode

Hold down the T2 and T5 buttons for approximately three seconds.

(2) The status when entering this mode

① The ready light blinks. The lights for patient, cone, tube voltage, tube current, tooth, exposure, film, and digital mode are off.

② The seven-segment LED displays "rd.X". X is display mode number (0 ~ 2) for radiation indication.

(3) Operation and display

① If Δ button is depressed, display mode number is increased. If ∇ button is pressed, display mode number is decreased. The meaning of display mode number is as follows.

0 : Radiation is not indicated.

1 : Radiation can be indicated by manual operation. (=pressing P button more than 1 sec.)

2 : Radiation is automatically displayed for 10 seconds after the exposure is finished. Radiation can be displayed by manual operation (=pressing P button more than 1 sec.) also.

② Press the P switch (patient type selection switch) until the buzzer beeps twice to store this setting and turn off the main power switch.

③ Unit for radiation displayed is mGy. This radiation dose is estimated value at the distal end of cone.

④ Estimated Air Kerma indication is required by IEC60601-2-65 (203.6.4.5).

5. Exposure time

5.1 Assignable exposure time

0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.13
0.14	0.16	0.18	0.20	0.22	0.25	0.28	0.32	0.36	0.40	0.45	0.50
0.56	0.63	0.71	0.80	0.90	1.00	1.12	1.25	1.40	1.60	1.80	2.00

5.2 Exposure time in the automatic setting mode

Exposure time is calculated by the combination of selections for kV, mA, tooth, patient type, cone and film speed (or digital sensor speed). Exposure time settings for every combination are listed on the tables in the following pages. "*" in the table denotes that a tube current setting is automatically switched to the alternating setting and set at the most appropriate time.

5.2.1 Exposure Time Settings (60kV, 3mA, Short Cone)

[unit : sec.]

Patient	Child					Adult					Large Adult				
Tooth	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
F.00	0.03	0.03	0.04	0.04	0.06	0.04	0.05	0.06	0.07	0.11	0.06	0.07	0.08	0.09	0.13
F.01	0.03	0.04	0.05	0.06	0.08	0.06	0.07	0.08	0.09	0.14	0.07	0.08	0.10	0.11	0.16
F.02	0.04	0.05	0.06	0.07	0.10	0.07	0.08	0.10	0.11	0.16	0.09	0.10	0.13	0.14	0.20
F.03	0.05	0.06	0.07	0.08	0.13	0.08	0.10	0.13	0.14	0.20	0.11	0.13	0.16	0.18	0.25
F.04	0.07	0.08	0.09	0.11	0.16	0.11	0.13	0.16	0.18	0.25	0.14	0.16	0.20	0.22	0.32
F.05	0.08	0.10	0.11	0.14	0.20	0.14	0.16	0.20	0.22	0.32	0.18	0.20	0.25	0.28	0.40
F.06	0.10	0.13	0.14	0.16	0.25	0.16	0.20	0.25	0.28	0.40	0.22	0.25	0.32	0.36	0.50
F.07	0.13	0.16	0.18	0.20	0.32	0.20	0.25	0.32	0.36	0.50	0.25	0.32	0.36	0.45	0.63
F.08	0.16	0.20	0.22	0.25	0.40	0.28	0.32	0.40	0.45	0.63	0.32	0.40	0.50	0.56	0.80
F.09	0.20	0.25	0.28	0.32	0.50	0.32	0.40	0.50	0.56	0.80	0.40	0.50	0.63	0.71	1.00
F.10	0.25	0.28	0.36	0.40	0.56	0.40	0.50	0.56	0.71	1.00	0.50	0.63	0.71	0.80	1.25
F.11	0.32	0.36	0.45	0.50	0.71	0.50	0.63	0.71	0.90	1.25	0.63	0.80	0.90	1.12	1.60
F.12	0.40	0.45	0.56	0.63	0.90	0.63	0.80	0.90	1.12	1.60	0.80	1.00	1.12	1.40	2.00
F.13	0.50	0.56	0.71	0.80	1.12	0.80	1.00	1.12	1.40	2.00	1.00	1.25	1.40	1.60	*
F.14	0.63	0.71	0.90	1.00	1.40	1.00	1.25	1.40	1.60	*	1.25	1.60	1.80	2.00	*
F.15	0.71	0.90	1.12	1.25	1.80	1.25	1.60	1.80	2.00	*	1.60	1.80	*	*	*
d.00	0.01	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.04	0.05	0.03	0.03	0.04	0.05	0.07
d.01	0.02	0.02	0.02	0.03	0.04	0.03	0.03	0.04	0.05	0.07	0.04	0.04	0.05	0.06	0.08
d.02	0.02	0.02	0.03	0.03	0.05	0.03	0.04	0.05	0.06	0.08	0.04	0.05	0.06	0.07	0.10
d.03	0.03	0.03	0.04	0.04	0.06	0.04	0.05	0.06	0.07	0.10	0.05	0.06	0.08	0.09	0.13
d.04	0.03	0.04	0.05	0.05	0.08	0.05	0.07	0.08	0.09	0.13	0.07	0.08	0.10	0.11	0.16
d.05	0.04	0.05	0.06	0.07	0.10	0.07	0.08	0.10	0.11	0.16	0.09	0.10	0.13	0.14	0.20
d.06	0.05	0.06	0.07	0.08	0.13	0.08	0.10	0.13	0.14	0.20	0.11	0.13	0.16	0.18	0.25
d.07	0.06	0.08	0.09	0.10	0.16	0.10	0.13	0.16	0.18	0.25	0.13	0.16	0.18	0.22	0.32
d.08	0.08	0.10	0.11	0.13	0.20	0.13	0.16	0.20	0.22	0.32	0.16	0.20	0.25	0.28	0.40
d.09	0.10	0.11	0.14	0.16	0.25	0.16	0.20	0.25	0.28	0.40	0.20	0.25	0.28	0.36	0.50
d.10	0.13	0.14	0.18	0.20	0.28	0.20	0.25	0.28	0.32	0.50	0.25	0.32	0.36	0.40	0.63
d.11	0.16	0.18	0.22	0.25	0.36	0.25	0.32	0.36	0.45	0.63	0.32	0.40	0.45	0.56	0.80
d.12	0.20	0.22	0.28	0.32	0.45	0.32	0.40	0.45	0.56	0.80	0.40	0.50	0.56	0.63	1.00
d.13	0.25	0.28	0.36	0.40	0.56	0.40	0.50	0.56	0.63	1.00	0.50	0.63	0.71	0.80	1.25
d.14	0.32	0.36	0.45	0.50	0.71	0.50	0.63	0.71	0.80	1.25	0.63	0.80	0.90	1.00	1.60
d.15	0.36	0.45	0.56	0.63	0.90	0.63	0.80	0.90	1.00	1.60	0.80	0.90	1.12	1.25	1.80

5.2.2 Exposure Time Settings (60kV, 6mA, Short Cone)

[unit : sec.]

Patient	Child					Adult					Large Adult				
Tooth	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
F.00	0.01	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.04	0.05	0.03	0.03	0.04	0.05	0.07
F.01	0.02	0.02	0.02	0.03	0.04	0.03	0.03	0.04	0.05	0.07	0.04	0.04	0.05	0.06	0.08
F.02	0.02	0.02	0.03	0.03	0.05	0.03	0.04	0.05	0.06	0.08	0.04	0.05	0.06	0.07	0.10
F.03	0.03	0.03	0.04	0.04	0.06	0.04	0.05	0.06	0.07	0.10	0.05	0.06	0.08	0.09	0.13
F.04	0.03	0.04	0.05	0.05	0.08	0.05	0.07	0.08	0.09	0.13	0.07	0.08	0.10	0.11	0.16
F.05	0.04	0.05	0.06	0.07	0.10	0.07	0.08	0.10	0.11	0.16	0.09	0.10	0.13	0.14	0.20
F.06	0.05	0.06	0.07	0.08	0.13	0.08	0.10	0.13	0.14	0.20	0.11	0.13	0.16	0.18	0.25
F.07	0.06	0.08	0.09	0.10	0.16	0.10	0.13	0.16	0.18	0.25	0.13	0.16	0.18	0.22	0.32
F.08	0.08	0.10	0.11	0.13	0.20	0.13	0.16	0.20	0.22	0.32	0.16	0.20	0.25	0.28	0.40
F.09	0.10	0.11	0.14	0.16	0.25	0.16	0.20	0.25	0.28	0.40	0.20	0.25	0.28	0.36	0.50
F.10	0.13	0.14	0.18	0.20	0.28	0.20	0.25	0.28	0.32	0.50	0.25	0.32	0.36	0.40	0.63
F.11	0.16	0.18	0.22	0.25	0.36	0.25	0.32	0.36	0.45	0.63	0.32	0.40	0.45	0.56	0.80
F.12	0.20	0.22	0.28	0.32	0.45	0.32	0.40	0.45	0.56	0.80	0.40	0.50	0.56	0.63	1.00
F.13	0.25	0.28	0.36	0.40	0.56	0.40	0.50	0.56	0.63	1.00	0.50	0.63	0.71	0.80	1.25
F.14	0.32	0.36	0.45	0.50	0.71	0.50	0.63	0.71	0.80	1.25	0.63	0.80	0.90	1.00	1.60
F.15	0.36	0.45	0.56	0.63	0.90	0.63	0.80	0.90	1.00	1.60	0.80	0.90	1.12	1.25	1.80
d.00	*	*	0.01	0.01	0.02	0.01	0.01	0.02	0.02	0.03	0.01	0.02	0.02	0.02	0.03
d.01	*	0.01	0.01	0.01	0.02	0.01	0.02	0.02	0.02	0.03	0.02	0.02	0.03	0.03	0.04
d.02	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.02	0.03	0.03	0.04	0.05
d.03	0.01	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.03	0.05	0.03	0.03	0.04	0.04	0.06
d.04	0.02	0.02	0.02	0.03	0.04	0.03	0.03	0.04	0.04	0.07	0.03	0.04	0.05	0.06	0.08
d.05	0.02	0.02	0.03	0.03	0.05	0.03	0.04	0.05	0.06	0.08	0.04	0.05	0.06	0.07	0.10
d.06	0.03	0.03	0.04	0.04	0.06	0.04	0.05	0.06	0.07	0.10	0.05	0.06	0.08	0.09	0.13
d.07	0.03	0.04	0.05	0.05	0.08	0.05	0.06	0.08	0.09	0.13	0.07	0.08	0.09	0.11	0.16
d.08	0.04	0.05	0.06	0.07	0.10	0.07	0.08	0.10	0.11	0.16	0.08	0.10	0.11	0.14	0.20
d.09	0.05	0.06	0.07	0.08	0.11	0.08	0.10	0.11	0.14	0.20	0.10	0.13	0.14	0.18	0.25
d.10	0.06	0.07	0.09	0.10	0.14	0.10	0.13	0.14	0.16	0.25	0.13	0.16	0.18	0.22	0.32
d.11	0.08	0.09	0.11	0.13	0.18	0.13	0.16	0.18	0.22	0.32	0.16	0.20	0.22	0.28	0.40
d.12	0.10	0.11	0.14	0.16	0.22	0.16	0.20	0.22	0.28	0.40	0.20	0.25	0.28	0.32	0.50
d.13	0.13	0.14	0.18	0.20	0.28	0.20	0.25	0.28	0.32	0.50	0.25	0.32	0.36	0.40	0.63
d.14	0.16	0.18	0.22	0.25	0.36	0.25	0.32	0.36	0.40	0.63	0.32	0.36	0.45	0.50	0.80
d.15	0.18	0.22	0.28	0.32	0.45	0.32	0.36	0.45	0.50	0.80	0.40	0.45	0.56	0.63	0.90

5.2.3 Exposure Time Settings (70kV, 3mA, Short Cone)

[unit : sec.]

Patient	Child					Adult					Large Adult				
Tooth	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
F.00	0.02	0.02	0.03	0.03	0.05	0.03	0.04	0.05	0.05	0.08	0.04	0.05	0.06	0.07	0.10
F.01	0.02	0.03	0.03	0.04	0.06	0.04	0.05	0.06	0.07	0.10	0.05	0.06	0.07	0.08	0.13
F.02	0.03	0.04	0.04	0.05	0.07	0.05	0.06	0.07	0.08	0.11	0.06	0.07	0.09	0.10	0.14
F.03	0.04	0.04	0.05	0.06	0.09	0.06	0.07	0.09	0.10	0.14	0.08	0.09	0.11	0.13	0.18
F.04	0.05	0.06	0.07	0.08	0.11	0.08	0.09	0.11	0.13	0.18	0.10	0.11	0.14	0.16	0.22
F.05	0.06	0.07	0.08	0.10	0.14	0.10	0.11	0.14	0.16	0.25	0.13	0.14	0.18	0.20	0.28
F.06	0.07	0.09	0.10	0.11	0.18	0.13	0.14	0.18	0.20	0.28	0.16	0.18	0.22	0.25	0.36
F.07	0.09	0.11	0.13	0.14	0.22	0.14	0.18	0.22	0.25	0.36	0.18	0.22	0.28	0.32	0.45
F.08	0.11	0.14	0.16	0.18	0.28	0.18	0.22	0.28	0.32	0.45	0.25	0.28	0.36	0.40	0.56
F.09	0.14	0.16	0.20	0.22	0.36	0.25	0.28	0.36	0.40	0.56	0.28	0.36	0.45	0.50	0.71
F.10	0.18	0.22	0.25	0.28	0.40	0.28	0.36	0.40	0.50	0.71	0.36	0.45	0.50	0.63	0.90
F.11	0.22	0.28	0.32	0.36	0.56	0.36	0.45	0.56	0.63	0.90	0.45	0.56	0.63	0.80	1.12
F.12	0.28	0.32	0.40	0.45	0.63	0.45	0.56	0.63	0.80	1.12	0.56	0.71	0.80	1.00	1.40
F.13	0.36	0.40	0.50	0.56	0.80	0.56	0.71	0.80	1.00	1.40	0.71	0.90	1.00	1.25	1.80
F.14	0.45	0.50	0.63	0.71	1.00	0.71	0.90	1.00	1.25	1.80	0.90	1.12	1.25	1.40	*
F.15	0.56	0.63	0.80	0.90	1.25	0.90	1.12	1.25	1.40	*	1.12	1.40	1.60	1.80	*
d.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.02	0.02	0.03	0.03	0.05
d.01	0.01	0.01	0.02	0.02	0.03	0.02	0.02	0.03	0.03	0.05	0.03	0.03	0.04	0.04	0.06
d.02	0.01	0.02	0.02	0.02	0.04	0.02	0.03	0.04	0.04	0.06	0.03	0.04	0.04	0.05	0.07
d.03	0.02	0.02	0.03	0.03	0.04	0.03	0.04	0.04	0.05	0.07	0.04	0.05	0.05	0.06	0.09
d.04	0.02	0.03	0.03	0.04	0.06	0.04	0.05	0.06	0.06	0.09	0.05	0.06	0.07	0.08	0.11
d.05	0.03	0.04	0.04	0.05	0.07	0.05	0.06	0.07	0.08	0.11	0.06	0.07	0.09	0.10	0.14
d.06	0.04	0.04	0.05	0.06	0.09	0.06	0.07	0.09	0.10	0.14	0.08	0.09	0.11	0.13	0.18
d.07	0.04	0.05	0.06	0.07	0.11	0.07	0.09	0.11	0.13	0.18	0.09	0.11	0.13	0.16	0.22
d.08	0.06	0.07	0.08	0.09	0.14	0.09	0.11	0.14	0.16	0.22	0.11	0.14	0.18	0.20	0.28
d.09	0.07	0.08	0.10	0.11	0.18	0.11	0.14	0.18	0.20	0.28	0.14	0.18	0.22	0.25	0.36
d.10	0.09	0.11	0.13	0.14	0.22	0.14	0.18	0.22	0.25	0.36	0.18	0.22	0.25	0.32	0.45
d.11	0.11	0.13	0.16	0.18	0.28	0.18	0.22	0.28	0.32	0.45	0.22	0.28	0.32	0.40	0.56
d.12	0.14	0.16	0.20	0.22	0.32	0.22	0.28	0.32	0.40	0.56	0.28	0.36	0.40	0.50	0.71
d.13	0.18	0.20	0.25	0.28	0.40	0.28	0.36	0.40	0.50	0.71	0.36	0.45	0.50	0.63	0.90
d.14	0.22	0.25	0.32	0.36	0.50	0.36	0.45	0.50	0.63	0.90	0.45	0.56	0.63	0.71	1.12
d.15	0.28	0.32	0.40	0.45	0.63	0.45	0.56	0.63	0.71	1.12	0.56	0.71	0.80	0.90	1.40

5.2.4 Exposure Time Settings (70kV, 6mA, Short Cone)

[unit : sec.]

Patient	Child					Adult					Large Adult				
Tooth	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
F.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.02	0.02	0.03	0.03	0.05
F.01	0.01	0.01	0.02	0.02	0.03	0.02	0.02	0.03	0.03	0.05	0.03	0.03	0.04	0.04	0.06
F.02	0.01	0.02	0.02	0.02	0.04	0.02	0.03	0.04	0.04	0.06	0.03	0.04	0.04	0.05	0.07
F.03	0.02	0.02	0.03	0.03	0.04	0.03	0.04	0.04	0.05	0.07	0.04	0.05	0.05	0.06	0.09
F.04	0.02	0.03	0.03	0.04	0.06	0.04	0.05	0.06	0.06	0.09	0.05	0.06	0.07	0.08	0.11
F.05	0.03	0.04	0.04	0.05	0.07	0.05	0.06	0.07	0.08	0.11	0.06	0.07	0.09	0.10	0.14
F.06	0.04	0.04	0.05	0.06	0.09	0.06	0.07	0.09	0.10	0.14	0.08	0.09	0.11	0.13	0.18
F.07	0.04	0.05	0.06	0.07	0.11	0.07	0.09	0.11	0.13	0.18	0.09	0.11	0.13	0.16	0.22
F.08	0.06	0.07	0.08	0.09	0.14	0.09	0.11	0.14	0.16	0.22	0.11	0.14	0.18	0.20	0.28
F.09	0.07	0.08	0.10	0.11	0.18	0.11	0.14	0.18	0.20	0.28	0.14	0.18	0.22	0.25	0.36
F.10	0.09	0.11	0.13	0.14	0.22	0.14	0.18	0.22	0.25	0.36	0.18	0.22	0.25	0.32	0.45
F.11	0.11	0.13	0.16	0.18	0.28	0.18	0.22	0.28	0.32	0.45	0.22	0.28	0.32	0.40	0.56
F.12	0.14	0.16	0.20	0.22	0.32	0.22	0.28	0.32	0.40	0.56	0.28	0.36	0.40	0.50	0.71
F.13	0.18	0.20	0.25	0.28	0.40	0.28	0.36	0.40	0.50	0.71	0.36	0.45	0.50	0.63	0.90
F.14	0.22	0.25	0.32	0.36	0.50	0.36	0.45	0.50	0.63	0.90	0.45	0.56	0.63	0.71	1.12
F.15	0.28	0.32	0.40	0.45	0.63	0.45	0.56	0.63	0.71	1.12	0.56	0.71	0.80	0.90	1.40
d.00	*	*	*	*	0.01	*	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.02	0.02
d.01	*	*	*	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.02	0.03
d.02	*	*	0.01	0.01	0.02	0.01	0.01	0.02	0.02	0.03	0.02	0.02	0.02	0.03	0.04
d.03	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.04	0.02	0.02	0.03	0.03	0.05
d.04	0.01	0.01	0.02	0.02	0.03	0.02	0.02	0.03	0.03	0.05	0.02	0.03	0.04	0.04	0.06
d.05	0.01	0.02	0.02	0.02	0.04	0.02	0.03	0.04	0.04	0.06	0.03	0.04	0.04	0.05	0.07
d.06	0.02	0.02	0.03	0.03	0.04	0.03	0.04	0.04	0.05	0.07	0.04	0.05	0.05	0.06	0.09
d.07	0.02	0.03	0.03	0.04	0.05	0.04	0.04	0.05	0.06	0.09	0.05	0.06	0.07	0.08	0.11
d.08	0.03	0.03	0.04	0.05	0.07	0.05	0.06	0.07	0.08	0.11	0.06	0.07	0.09	0.10	0.14
d.09	0.04	0.04	0.05	0.06	0.09	0.06	0.07	0.09	0.10	0.14	0.07	0.09	0.11	0.13	0.18
d.10	0.04	0.05	0.06	0.07	0.11	0.07	0.09	0.11	0.13	0.18	0.09	0.11	0.13	0.16	0.22
d.11	0.06	0.07	0.08	0.09	0.13	0.09	0.11	0.13	0.16	0.22	0.11	0.14	0.16	0.20	0.28
d.12	0.07	0.08	0.10	0.11	0.16	0.11	0.14	0.16	0.20	0.28	0.14	0.18	0.20	0.25	0.36
d.13	0.09	0.10	0.13	0.14	0.20	0.14	0.18	0.20	0.25	0.36	0.18	0.22	0.25	0.28	0.45
d.14	0.11	0.13	0.16	0.18	0.25	0.18	0.22	0.25	0.28	0.45	0.22	0.28	0.32	0.36	0.56
d.15	0.13	0.16	0.20	0.22	0.32	0.22	0.28	0.32	0.36	0.56	0.28	0.32	0.40	0.45	0.71

5.2.5 Exposure Time Settings (60kV, 3mA, Long Cone)

[unit : sec.]

Patient	Child					Adult					Large Adult				
Tooth	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
F.00	0.06	0.07	0.08	0.09	0.13	0.09	0.11	0.13	0.16	0.22	0.11	0.14	0.16	0.20	0.28
F.01	0.07	0.08	0.10	0.11	0.18	0.11	0.14	0.18	0.20	0.28	0.14	0.18	0.22	0.25	0.36
F.02	0.09	0.10	0.13	0.14	0.20	0.14	0.18	0.20	0.25	0.36	0.18	0.22	0.25	0.28	0.45
F.03	0.11	0.13	0.16	0.18	0.25	0.18	0.22	0.25	0.28	0.45	0.22	0.28	0.32	0.36	0.56
F.04	0.14	0.16	0.20	0.22	0.32	0.22	0.28	0.32	0.36	0.56	0.28	0.36	0.40	0.45	0.71
F.05	0.18	0.20	0.25	0.28	0.40	0.28	0.36	0.40	0.45	0.71	0.36	0.45	0.50	0.56	0.90
F.06	0.22	0.25	0.32	0.36	0.50	0.36	0.40	0.50	0.56	0.90	0.45	0.56	0.63	0.71	1.12
F.07	0.25	0.32	0.36	0.45	0.63	0.45	0.50	0.63	0.71	1.00	0.56	0.63	0.80	0.90	1.25
F.08	0.32	0.40	0.50	0.56	0.80	0.56	0.63	0.80	0.90	1.40	0.71	0.80	1.00	1.12	1.60
F.09	0.40	0.50	0.63	0.71	1.00	0.71	0.80	1.00	1.12	1.60	0.90	1.00	1.25	1.40	2.00
F.10	0.50	0.63	0.71	0.90	1.25	0.90	1.00	1.25	1.40	2.00	1.12	1.25	1.60	1.80	*
F.11	0.63	0.80	0.90	1.12	1.60	1.12	1.25	1.60	1.80	*	1.40	1.60	2.00	*	*
F.12	0.80	1.00	1.12	1.40	2.00	1.40	1.60	2.00	*	*	1.60	2.00	*	*	*
F.13	1.00	1.25	1.40	1.60	*	1.60	2.00	*	*	*	2.00	*	*	*	*
F.14	1.25	1.60	1.80	2.00	*	2.00	*	*	*	*	*	*	*	*	*
F.15	1.60	1.80	*	*	*	*	*	*	*	*	*	*	*	*	*
d.00	0.03	0.03	0.04	0.05	0.07	0.05	0.06	0.07	0.08	0.11	0.06	0.07	0.08	0.10	0.14
d.01	0.04	0.04	0.05	0.06	0.09	0.06	0.07	0.09	0.10	0.14	0.07	0.09	0.11	0.13	0.18
d.02	0.04	0.05	0.06	0.07	0.10	0.07	0.09	0.10	0.11	0.18	0.09	0.11	0.13	0.14	0.22
d.03	0.05	0.06	0.08	0.09	0.13	0.09	0.11	0.13	0.14	0.22	0.11	0.13	0.16	0.18	0.28
d.04	0.07	0.08	0.10	0.11	0.16	0.11	0.14	0.16	0.18	0.28	0.14	0.18	0.20	0.25	0.36
d.05	0.09	0.10	0.13	0.14	0.20	0.14	0.18	0.20	0.25	0.36	0.18	0.22	0.25	0.28	0.45
d.06	0.11	0.13	0.16	0.18	0.25	0.18	0.22	0.25	0.28	0.45	0.22	0.28	0.32	0.36	0.56
d.07	0.13	0.16	0.18	0.22	0.32	0.22	0.25	0.32	0.36	0.50	0.28	0.32	0.40	0.45	0.63
d.08	0.16	0.20	0.25	0.28	0.40	0.28	0.32	0.40	0.45	0.63	0.36	0.40	0.50	0.56	0.80
d.09	0.20	0.25	0.28	0.36	0.50	0.36	0.40	0.50	0.56	0.80	0.45	0.50	0.63	0.71	1.00
d.10	0.25	0.32	0.36	0.45	0.63	0.45	0.50	0.63	0.71	1.00	0.56	0.63	0.80	0.90	1.25
d.11	0.32	0.40	0.45	0.56	0.80	0.56	0.63	0.80	0.90	1.25	0.71	0.80	1.00	1.12	1.60
d.12	0.40	0.50	0.56	0.63	1.00	0.71	0.80	1.00	1.12	1.60	0.80	1.00	1.25	1.40	2.00
d.13	0.50	0.63	0.71	0.80	1.25	0.80	1.00	1.25	1.40	2.00	1.00	1.25	1.60	1.80	*
d.14	0.63	0.80	0.90	1.00	1.60	1.00	1.25	1.60	1.80	*	1.25	1.60	1.80	*	*
d.15	0.80	0.90	1.12	1.25	2.00	1.25	1.60	2.00	*	*	1.60	2.00	*	*	*

5.2.6 Exposure Time Settings (60kV, 6mA, Long Cone)

[unit : sec.]

Patient	Child					Adult					Large Adult				
Tooth	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
F.00	0.03	0.03	0.04	0.05	0.07	0.05	0.06	0.07	0.08	0.11	0.06	0.07	0.08	0.10	0.14
F.01	0.04	0.04	0.05	0.06	0.09	0.06	0.07	0.09	0.10	0.14	0.07	0.09	0.11	0.13	0.18
F.02	0.04	0.05	0.06	0.07	0.10	0.07	0.09	0.10	0.11	0.18	0.09	0.11	0.13	0.14	0.22
F.03	0.05	0.06	0.08	0.09	0.13	0.09	0.11	0.13	0.14	0.22	0.11	0.13	0.16	0.18	0.28
F.04	0.07	0.08	0.10	0.11	0.16	0.11	0.14	0.16	0.18	0.28	0.14	0.18	0.20	0.25	0.36
F.05	0.09	0.10	0.13	0.14	0.20	0.14	0.18	0.20	0.25	0.36	0.18	0.22	0.25	0.28	0.45
F.06	0.11	0.13	0.16	0.18	0.25	0.18	0.22	0.25	0.28	0.45	0.22	0.28	0.32	0.36	0.56
F.07	0.13	0.16	0.18	0.22	0.32	0.22	0.25	0.32	0.36	0.50	0.28	0.32	0.40	0.45	0.63
F.08	0.16	0.20	0.25	0.28	0.40	0.28	0.32	0.40	0.45	0.63	0.36	0.40	0.50	0.56	0.80
F.09	0.20	0.25	0.28	0.36	0.50	0.36	0.40	0.50	0.56	0.80	0.45	0.50	0.63	0.71	1.00
F.10	0.25	0.32	0.36	0.45	0.63	0.45	0.50	0.63	0.71	1.00	0.56	0.63	0.80	0.90	1.25
F.11	0.32	0.40	0.45	0.56	0.80	0.56	0.63	0.80	0.90	1.25	0.71	0.80	1.00	1.12	1.60
F.12	0.40	0.50	0.56	0.63	1.00	0.71	0.80	1.00	1.12	1.60	0.80	1.00	1.25	1.40	2.00
F.13	0.50	0.63	0.71	0.80	1.25	0.80	1.00	1.25	1.40	2.00	1.00	1.25	1.60	1.80	2.00
F.14	0.63	0.80	0.90	1.00	1.60	1.00	1.25	1.60	1.80	2.00	1.25	1.60	1.80	2.00	2.00
F.15	0.80	0.90	1.12	1.25	2.00	1.25	1.60	2.00	2.00	2.00	1.60	2.00	2.00	2.00	2.00
d.00	0.01	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.04	0.06	0.03	0.03	0.04	0.05	0.07
d.01	0.02	0.02	0.03	0.03	0.04	0.03	0.04	0.04	0.05	0.07	0.04	0.04	0.05	0.06	0.09
d.02	0.02	0.03	0.03	0.04	0.05	0.04	0.04	0.05	0.06	0.09	0.04	0.05	0.06	0.07	0.11
d.03	0.03	0.03	0.04	0.04	0.06	0.04	0.05	0.06	0.07	0.11	0.06	0.07	0.08	0.09	0.13
d.04	0.03	0.04	0.05	0.06	0.08	0.06	0.07	0.08	0.09	0.14	0.07	0.09	0.10	0.11	0.18
d.05	0.04	0.05	0.06	0.07	0.10	0.07	0.09	0.10	0.11	0.18	0.09	0.11	0.13	0.14	0.22
d.06	0.05	0.06	0.08	0.09	0.13	0.09	0.11	0.13	0.14	0.22	0.11	0.13	0.16	0.18	0.28
d.07	0.07	0.08	0.09	0.11	0.16	0.11	0.13	0.16	0.18	0.25	0.14	0.16	0.20	0.22	0.32
d.08	0.08	0.10	0.13	0.14	0.20	0.14	0.16	0.20	0.22	0.32	0.18	0.20	0.25	0.28	0.40
d.09	0.10	0.13	0.14	0.18	0.25	0.18	0.20	0.25	0.28	0.40	0.22	0.25	0.32	0.36	0.50
d.10	0.13	0.16	0.18	0.22	0.32	0.22	0.25	0.32	0.36	0.50	0.28	0.32	0.40	0.45	0.63
d.11	0.16	0.20	0.22	0.28	0.40	0.28	0.32	0.40	0.45	0.63	0.32	0.40	0.50	0.56	0.80
d.12	0.20	0.25	0.28	0.32	0.50	0.32	0.40	0.50	0.56	0.80	0.40	0.50	0.63	0.71	1.00
d.13	0.25	0.32	0.36	0.40	0.63	0.40	0.50	0.63	0.71	1.00	0.50	0.63	0.80	0.90	1.25
d.14	0.32	0.36	0.45	0.50	0.80	0.50	0.63	0.80	0.90	1.25	0.63	0.80	0.90	1.12	1.60
d.15	0.40	0.45	0.56	0.63	1.00	0.63	0.80	1.00	1.12	1.60	0.80	1.00	1.25	1.40	2.00

5.2.7 Exposure Time Settings (70kV, 3mA, Long Cone)

[unit : sec.]

Patient	Child					Adult					Large Adult				
Tooth	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
F.00	0.04	0.05	0.06	0.07	0.10	0.07	0.08	0.10	0.11	0.16	0.08	0.10	0.11	0.14	0.20
F.01	0.05	0.06	0.07	0.08	0.13	0.08	0.10	0.13	0.14	0.20	0.10	0.13	0.16	0.18	0.25
F.02	0.06	0.07	0.09	0.10	0.14	0.10	0.13	0.14	0.16	0.25	0.13	0.16	0.18	0.22	0.32
F.03	0.08	0.09	0.11	0.13	0.18	0.13	0.16	0.18	0.20	0.32	0.16	0.18	0.22	0.25	0.40
F.04	0.10	0.11	0.14	0.16	0.22	0.16	0.20	0.22	0.28	0.40	0.20	0.25	0.28	0.32	0.50
F.05	0.13	0.14	0.18	0.20	0.28	0.20	0.25	0.28	0.32	0.50	0.25	0.32	0.36	0.40	0.63
F.06	0.16	0.18	0.22	0.25	0.36	0.25	0.32	0.36	0.40	0.63	0.32	0.36	0.45	0.50	0.80
F.07	0.18	0.22	0.28	0.32	0.45	0.32	0.36	0.45	0.50	0.71	0.40	0.45	0.56	0.63	0.90
F.08	0.25	0.28	0.36	0.40	0.56	0.40	0.50	0.56	0.63	1.00	0.50	0.63	0.71	0.80	1.25
F.09	0.28	0.36	0.45	0.50	0.71	0.50	0.56	0.71	0.80	1.25	0.63	0.71	0.90	1.00	1.40
F.10	0.36	0.45	0.56	0.63	0.90	0.63	0.71	0.90	1.00	1.40	0.80	0.90	1.12	1.25	1.80
F.11	0.45	0.56	0.63	0.80	1.12	0.80	0.90	1.12	1.25	1.80	1.00	1.12	1.40	1.60	*
F.12	0.56	0.71	0.80	1.00	1.40	1.00	1.12	1.40	1.60	*	1.25	1.40	1.80	2.00	*
F.13	0.71	0.90	1.00	1.25	1.80	1.25	1.40	1.80	2.00	*	1.40	1.80	*	*	*
F.14	0.90	1.12	1.25	1.40	*	1.40	1.80	*	*	*	1.80	*	*	*	*
F.15	1.12	1.40	1.60	1.80	*	1.80	*	*	*	*	*	*	*	*	*
d.00	0.02	0.02	0.03	0.03	0.05	0.03	0.04	0.05	0.05	0.08	0.04	0.05	0.06	0.07	0.10
d.01	0.03	0.03	0.04	0.04	0.06	0.04	0.05	0.06	0.07	0.10	0.05	0.06	0.08	0.09	0.13
d.02	0.03	0.04	0.04	0.05	0.07	0.05	0.06	0.07	0.08	0.13	0.06	0.08	0.09	0.11	0.16
d.03	0.04	0.05	0.05	0.06	0.09	0.06	0.08	0.09	0.10	0.16	0.08	0.09	0.11	0.13	0.20
d.04	0.05	0.06	0.07	0.08	0.11	0.08	0.10	0.11	0.13	0.20	0.10	0.13	0.14	0.16	0.25
d.05	0.06	0.07	0.09	0.10	0.14	0.10	0.13	0.14	0.16	0.25	0.13	0.16	0.18	0.22	0.32
d.06	0.08	0.09	0.11	0.13	0.18	0.13	0.16	0.18	0.20	0.32	0.16	0.18	0.22	0.25	0.40
d.07	0.09	0.11	0.14	0.16	0.22	0.16	0.18	0.22	0.25	0.36	0.20	0.22	0.28	0.32	0.45
d.08	0.11	0.14	0.18	0.20	0.28	0.20	0.25	0.28	0.32	0.50	0.25	0.28	0.36	0.40	0.63
d.09	0.14	0.18	0.22	0.25	0.36	0.25	0.28	0.36	0.40	0.56	0.32	0.36	0.45	0.50	0.71
d.10	0.18	0.22	0.28	0.32	0.45	0.32	0.36	0.45	0.50	0.71	0.40	0.45	0.56	0.63	0.90
d.11	0.22	0.28	0.32	0.40	0.56	0.40	0.45	0.56	0.63	0.90	0.50	0.56	0.71	0.80	1.12
d.12	0.28	0.36	0.40	0.50	0.71	0.50	0.56	0.71	0.80	1.12	0.63	0.71	0.90	1.00	1.40
d.13	0.36	0.45	0.50	0.63	0.90	0.63	0.71	0.90	1.00	1.40	0.71	0.90	1.12	1.25	1.80
d.14	0.45	0.56	0.63	0.71	1.12	0.71	0.90	1.12	1.25	1.80	0.90	1.12	1.40	1.60	*
d.15	0.56	0.71	0.80	0.90	1.40	0.90	1.12	1.40	1.60	*	1.12	1.40	1.60	2.00	*

5.2.8 Exposure Time Settings (70kV, 6mA, Long Cone)

[unit : sec.]

Patient	Child					Adult					Large Adult				
Tooth	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
F.00	0.02	0.02	0.03	0.03	0.05	0.03	0.04	0.05	0.05	0.08	0.04	0.05	0.06	0.07	0.10
F.01	0.03	0.03	0.04	0.04	0.06	0.04	0.05	0.06	0.07	0.10	0.05	0.06	0.08	0.09	0.13
F.02	0.03	0.04	0.04	0.05	0.07	0.05	0.06	0.07	0.08	0.13	0.06	0.08	0.09	0.11	0.16
F.03	0.04	0.05	0.05	0.06	0.09	0.06	0.08	0.09	0.10	0.16	0.08	0.09	0.11	0.13	0.20
F.04	0.05	0.06	0.07	0.08	0.11	0.08	0.10	0.11	0.13	0.20	0.10	0.13	0.14	0.16	0.25
F.05	0.06	0.07	0.09	0.10	0.14	0.10	0.13	0.14	0.16	0.25	0.13	0.16	0.18	0.22	0.32
F.06	0.08	0.09	0.11	0.13	0.18	0.13	0.16	0.18	0.20	0.32	0.16	0.18	0.22	0.25	0.40
F.07	0.09	0.11	0.14	0.16	0.22	0.16	0.18	0.22	0.25	0.36	0.20	0.22	0.28	0.32	0.45
F.08	0.11	0.14	0.18	0.20	0.28	0.20	0.25	0.28	0.32	0.50	0.25	0.28	0.36	0.40	0.63
F.09	0.14	0.18	0.22	0.25	0.36	0.25	0.28	0.36	0.40	0.56	0.32	0.36	0.45	0.50	0.71
F.10	0.18	0.22	0.28	0.32	0.45	0.32	0.36	0.45	0.50	0.71	0.40	0.45	0.56	0.63	0.90
F.11	0.22	0.28	0.32	0.40	0.56	0.40	0.45	0.56	0.63	0.90	0.50	0.56	0.71	0.80	1.12
F.12	0.28	0.36	0.40	0.50	0.71	0.50	0.56	0.71	0.80	1.12	0.63	0.71	0.90	1.00	1.40
F.13	0.36	0.45	0.50	0.63	0.90	0.63	0.71	0.90	1.00	1.40	0.71	0.90	1.12	1.25	1.80
F.14	0.45	0.56	0.63	0.71	1.12	0.71	0.90	1.12	1.25	1.80	0.90	1.12	1.40	1.60	2.00
F.15	0.56	0.71	0.80	0.90	1.40	0.90	1.12	1.40	1.60	2.00	1.12	1.40	1.60	2.00	2.00
d.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.02	0.02	0.03	0.03	0.05
d.01	0.01	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.03	0.05	0.03	0.03	0.04	0.04	0.06
d.02	0.02	0.02	0.02	0.03	0.04	0.03	0.03	0.04	0.04	0.06	0.03	0.04	0.05	0.05	0.08
d.03	0.02	0.02	0.03	0.03	0.05	0.03	0.04	0.05	0.05	0.08	0.04	0.05	0.06	0.07	0.10
d.04	0.02	0.03	0.04	0.04	0.06	0.04	0.05	0.06	0.07	0.10	0.05	0.06	0.07	0.08	0.13
d.05	0.03	0.04	0.04	0.05	0.07	0.05	0.06	0.07	0.08	0.13	0.06	0.08	0.09	0.11	0.16
d.06	0.04	0.05	0.05	0.06	0.09	0.06	0.08	0.09	0.10	0.16	0.08	0.09	0.11	0.13	0.20
d.07	0.05	0.06	0.07	0.08	0.11	0.08	0.09	0.11	0.13	0.18	0.10	0.11	0.14	0.16	0.25
d.08	0.06	0.07	0.09	0.10	0.14	0.10	0.11	0.14	0.16	0.25	0.13	0.14	0.18	0.20	0.28
d.09	0.07	0.09	0.11	0.13	0.18	0.13	0.14	0.18	0.20	0.28	0.16	0.18	0.22	0.25	0.36
d.10	0.09	0.11	0.13	0.16	0.22	0.16	0.18	0.22	0.25	0.36	0.20	0.22	0.28	0.32	0.45
d.11	0.11	0.14	0.16	0.20	0.28	0.20	0.22	0.28	0.32	0.45	0.25	0.28	0.36	0.40	0.56
d.12	0.14	0.18	0.20	0.25	0.36	0.25	0.28	0.36	0.40	0.56	0.28	0.36	0.45	0.50	0.71
d.13	0.18	0.22	0.25	0.28	0.45	0.28	0.36	0.45	0.50	0.71	0.36	0.45	0.56	0.63	0.90
d.14	0.22	0.28	0.32	0.36	0.56	0.36	0.45	0.56	0.63	0.90	0.45	0.56	0.71	0.80	1.12
d.15	0.28	0.32	0.40	0.45	0.71	0.45	0.56	0.71	0.80	1.12	0.56	0.71	0.80	1.00	1.40

5.2.13 Exposure Time Settings (60kV, 3mA, Long Cone + Rectangular Collimator)

[unit : sec.]

Patient	Child					Adult					Large Adult				
Tooth	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
F.00	0.07	0.08	0.10	0.11	0.16	0.11	0.14	0.16	0.20	0.28	0.14	0.18	0.22	0.25	0.36
F.01	0.09	0.11	0.13	0.14	0.22	0.14	0.18	0.22	0.25	0.36	0.18	0.22	0.28	0.32	0.45
F.02	0.11	0.13	0.16	0.18	0.25	0.18	0.22	0.25	0.28	0.45	0.22	0.28	0.32	0.36	0.56
F.03	0.13	0.16	0.20	0.22	0.32	0.22	0.28	0.32	0.36	0.56	0.28	0.32	0.40	0.45	0.63
F.04	0.18	0.20	0.25	0.28	0.40	0.28	0.36	0.40	0.45	0.71	0.36	0.45	0.50	0.56	0.90
F.05	0.22	0.25	0.32	0.36	0.50	0.36	0.45	0.50	0.63	0.90	0.45	0.56	0.63	0.71	1.12
F.06	0.28	0.32	0.40	0.45	0.63	0.45	0.56	0.63	0.71	1.12	0.56	0.63	0.80	0.90	1.40
F.07	0.32	0.40	0.50	0.56	0.80	0.56	0.63	0.80	0.90	1.40	0.71	0.80	1.00	1.12	1.60
F.08	0.40	0.50	0.63	0.71	1.00	0.71	0.80	1.00	1.12	1.60	0.90	1.00	1.25	1.40	*
F.09	0.50	0.63	0.71	0.90	1.25	0.90	1.00	1.25	1.40	2.00	1.12	1.25	1.60	1.80	*
F.10	0.63	0.80	0.90	1.12	1.60	1.12	1.25	1.60	1.80	*	1.40	1.60	2.00	*	*
F.11	0.80	1.00	1.12	1.40	2.00	1.40	1.60	2.00	*	*	1.60	2.00	*	*	*
F.12	1.00	1.25	1.40	1.60	*	1.60	2.00	*	*	*	*	*	*	*	*
F.13	1.25	1.60	1.80	*	*	*	*	*	*	*	*	*	*	*	*
F.14	1.60	2.00	*	*	*	*	*	*	*	*	*	*	*	*	*
F.15	2.00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
d.00	0.03	0.04	0.05	0.06	0.08	0.06	0.07	0.08	0.10	0.14	0.07	0.09	0.11	0.13	0.18
d.01	0.04	0.05	0.06	0.07	0.11	0.07	0.09	0.11	0.13	0.18	0.09	0.11	0.13	0.16	0.22
d.02	0.05	0.06	0.08	0.09	0.13	0.09	0.11	0.13	0.14	0.22	0.11	0.14	0.16	0.18	0.28
d.03	0.07	0.08	0.10	0.11	0.16	0.11	0.13	0.16	0.18	0.28	0.14	0.16	0.20	0.22	0.32
d.04	0.09	0.10	0.13	0.14	0.20	0.14	0.18	0.20	0.25	0.36	0.18	0.22	0.25	0.28	0.45
d.05	0.11	0.13	0.16	0.18	0.25	0.18	0.22	0.25	0.28	0.45	0.22	0.28	0.32	0.36	0.56
d.06	0.13	0.16	0.20	0.22	0.32	0.22	0.28	0.32	0.36	0.56	0.28	0.32	0.40	0.45	0.63
d.07	0.16	0.20	0.25	0.28	0.40	0.28	0.32	0.40	0.45	0.63	0.36	0.40	0.50	0.56	0.80
d.08	0.20	0.25	0.32	0.36	0.50	0.36	0.40	0.50	0.56	0.80	0.45	0.50	0.63	0.71	1.00
d.09	0.25	0.32	0.36	0.45	0.63	0.45	0.50	0.63	0.71	1.00	0.56	0.63	0.80	0.90	1.25
d.10	0.32	0.40	0.45	0.56	0.80	0.56	0.63	0.80	0.90	1.25	0.71	0.80	1.00	1.12	1.60
d.11	0.40	0.50	0.56	0.71	1.00	0.71	0.80	1.00	1.12	1.60	0.80	1.00	1.25	1.40	2.00
d.12	0.50	0.63	0.71	0.80	1.25	0.80	1.00	1.25	1.40	2.00	1.00	1.25	1.60	1.80	*
d.13	0.63	0.80	0.90	1.00	1.60	1.00	1.25	1.60	1.80	*	1.25	1.60	2.00	*	*
d.14	0.80	1.00	1.12	1.25	2.00	1.25	1.60	2.00	*	*	1.60	2.00	*	*	*
d.15	1.00	1.25	1.40	1.60	*	1.60	2.00	*	*	*	2.00	*	*	*	*

5.2.14 Exposure Time Settings (60kV, 6mA, Long Cone + Rectangular Collimator)

[unit : sec.]

Patient	Child					Adult					Large Adult				
Tooth	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
F.00	0.07	0.08	0.10	0.11	0.16	0.11	0.14	0.16	0.20	0.28	0.14	0.18	0.22	0.25	0.36
F.01	0.09	0.11	0.13	0.14	0.22	0.14	0.18	0.22	0.25	0.36	0.18	0.22	0.28	0.32	0.45
F.02	0.11	0.13	0.16	0.18	0.25	0.18	0.22	0.25	0.28	0.45	0.22	0.28	0.32	0.36	0.56
F.03	0.13	0.16	0.20	0.22	0.32	0.22	0.28	0.32	0.36	0.56	0.28	0.32	0.40	0.45	0.63
F.04	0.18	0.20	0.25	0.28	0.40	0.28	0.36	0.40	0.45	0.71	0.36	0.45	0.50	0.56	0.90
F.05	0.22	0.25	0.32	0.36	0.50	0.36	0.45	0.50	0.63	0.90	0.45	0.56	0.63	0.71	1.12
F.06	0.28	0.32	0.40	0.45	0.63	0.45	0.56	0.63	0.71	1.12	0.56	0.63	0.80	0.90	1.40
F.07	0.32	0.40	0.50	0.56	0.80	0.56	0.63	0.80	0.90	1.40	0.71	0.80	1.00	1.12	1.60
F.08	0.40	0.50	0.63	0.71	1.00	0.71	0.80	1.00	1.12	1.60	0.90	1.00	1.25	1.40	*
F.09	0.50	0.63	0.71	0.90	1.25	0.90	1.00	1.25	1.40	2.00	1.12	1.25	1.60	1.80	*
F.10	0.63	0.80	0.90	1.12	1.60	1.12	1.25	1.60	1.80	*	1.40	1.60	2.00	*	*
F.11	0.80	1.00	1.12	1.40	2.00	1.40	1.60	2.00	*	*	1.60	2.00	*	*	*
F.12	1.00	1.25	1.40	1.60	*	1.60	2.00	*	*	*	*	*	*	*	*
F.13	1.25	1.60	1.80	*	*	*	*	*	*	*	*	*	*	*	*
F.14	1.60	2.00	*	*	*	*	*	*	*	*	*	*	*	*	*
F.15	2.00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
d.00	0.03	0.04	0.05	0.06	0.08	0.06	0.07	0.08	0.10	0.14	0.07	0.09	0.11	0.13	0.18
d.01	0.04	0.05	0.06	0.07	0.11	0.07	0.09	0.11	0.13	0.18	0.09	0.11	0.13	0.16	0.22
d.02	0.05	0.06	0.08	0.09	0.13	0.09	0.11	0.13	0.14	0.22	0.11	0.14	0.16	0.18	0.28
d.03	0.07	0.08	0.10	0.11	0.16	0.11	0.13	0.16	0.18	0.28	0.14	0.16	0.20	0.22	0.32
d.04	0.09	0.10	0.13	0.14	0.20	0.14	0.18	0.20	0.25	0.36	0.18	0.22	0.25	0.28	0.45
d.05	0.11	0.13	0.16	0.18	0.25	0.18	0.22	0.25	0.28	0.45	0.22	0.28	0.32	0.36	0.56
d.06	0.13	0.16	0.20	0.22	0.32	0.22	0.28	0.32	0.36	0.56	0.28	0.32	0.40	0.45	0.63
d.07	0.16	0.20	0.25	0.28	0.40	0.28	0.32	0.40	0.45	0.63	0.36	0.40	0.50	0.56	0.80
d.08	0.20	0.25	0.32	0.36	0.50	0.36	0.40	0.50	0.56	0.80	0.45	0.50	0.63	0.71	1.00
d.09	0.25	0.32	0.36	0.45	0.63	0.45	0.50	0.63	0.71	1.00	0.56	0.63	0.80	0.90	1.25
d.10	0.32	0.40	0.45	0.56	0.80	0.56	0.63	0.80	0.90	1.25	0.71	0.80	1.00	1.12	1.60
d.11	0.40	0.50	0.56	0.71	1.00	0.71	0.80	1.00	1.12	1.60	0.80	1.00	1.25	1.40	2.00
d.12	0.50	0.63	0.71	0.80	1.25	0.80	1.00	1.25	1.40	2.00	1.00	1.25	1.60	1.80	*
d.13	0.63	0.80	0.90	1.00	1.60	1.00	1.25	1.60	1.80	*	1.25	1.60	2.00	*	*
d.14	0.80	1.00	1.12	1.25	2.00	1.25	1.60	2.00	*	*	1.60	2.00	*	*	*
d.15	1.00	1.25	1.40	1.60	*	1.60	2.00	*	*	*	2.00	*	*	*	*

6. Parts replacement

6.1 Head

1. Turn off the main power switch on the front panel of PHOT-X IIs 505.
2. Close the balance arm and secure it with a stout cord. The balance arm is spring loaded and it can pop out and cause injury when the x-ray head is removed. (Fig. 1)
3. Remove the screw and yoke cover. (Fig. 2)
4. Remove a M5 screw which secure the nylon clamp. Disconnect the 10P connector in the yoke. (Fig. 3)

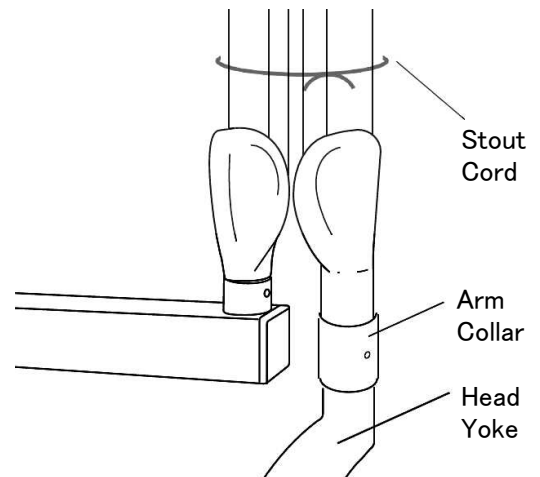
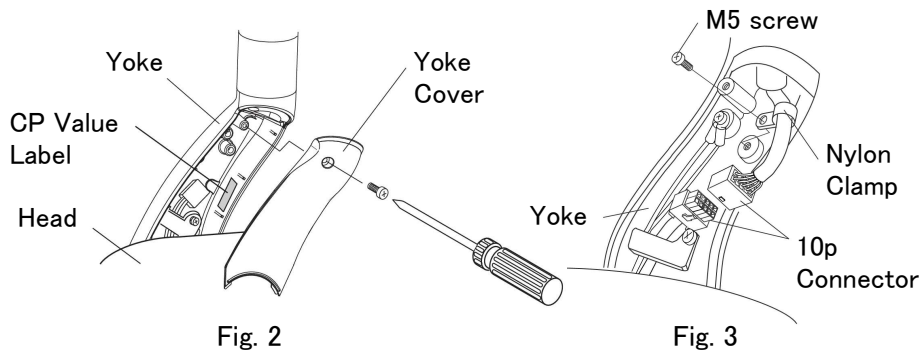


Fig. 1

5. Remove the screw which secures the arm collar. Slide the arm collar upward and temporarily hold it in position with adhesive tape. (Fig. 4)
6. Take out the head key (U shaped key) and remove the x-ray head from the arm. (Fig. 4)
7. Remove the yoke cover from the new x-ray head and insert the shaft of the balance arm into the yoke of the new head. Do not forget to insert the stopper ring. (Fig. 4)
8. Insert the head key into the retaining groove while holding the head in position.
9. Remove the adhesive tape and slide the arm collar downward. Secure it with the arm collar screw.
10. Connect the 10P connector and secure the arm cable with the nylon clamp in the yoke.
11. Remove the cord which holds the arm closed.

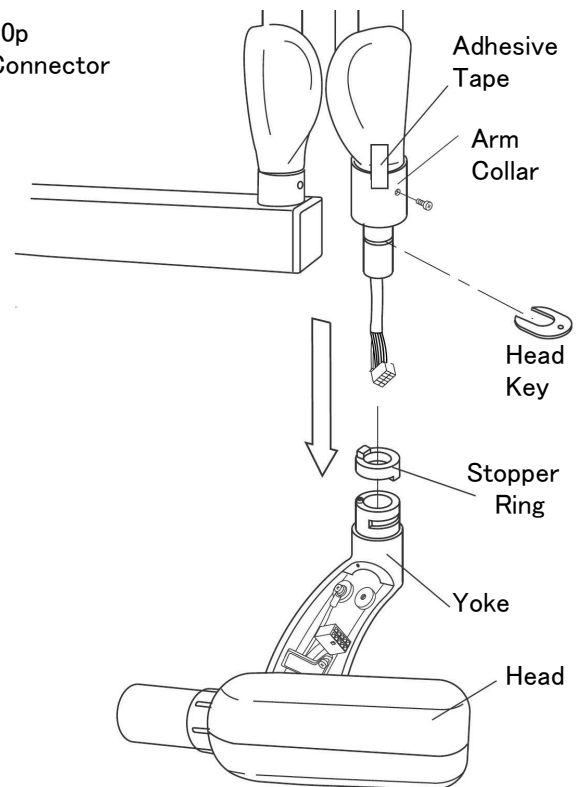


Fig. 4

Adjustment after exchanging the x-ray head

A. CP value setting

1. Turn on the main power switch on the front panel of PHOT-X IIs 505.
2. Hold down the P (Patient), C (Cone), and kV switches together until “CP-XX” is displayed in the exposure time window. Press the exposure time adjusting switches (▲or▼) and adjust the CP number so that it is the same value as 60kV, which is written on the label inside the head yoke. (Fig. 2) Press the P (Patient) switch to save its value. Be sure to hold down the P (Patient) switch until you hear two (2) beeps.
3. Press the kV switch, and the LED will show 70 kV. Press the exposure time adjusting switches (▲or▼) and adjust the CP number so that it is the same value as 70kV, which is written on the label inside the head yoke. (Fig. 2) Press the P (Patient) switch to save its value. Be sure to hold down the P (Patient) switch

until you hear two (2) beeps.

4. Turn off the main power switch and wait until the LEDs on the subcontroller turn off. Turn on the main power switch again.

B. Tube current adjustment

1. Hold down the tooth selection switches together (T1, T4, and T5) until “h.xx” appears in the exposure time display window.
2. Wait until the display changes to “0.50.” Make an x-ray exposure by depressing the exposure switch.
3. Repeat step 2 until “Fin” is displayed in the exposure time display window (you will make approximately eight (8) to ten (10) x-ray exposures until “Fin” is displayed.
4. Turn off the main power switch on the front panel of PHOT-X II s 505.

6.2 Power PC board

Turn off the main power at the circuit breaker panel.

1. Slide the side covers to right and left. (Fig. 5)
2. Remove the top two screws and open the front cover. (Fig. 5)
3. Disconnect the four connectors (2P, 3P, 4P and 8P) from the power PC board. (Fig. 6)
4. Remove the four screws which secure the power PC board. Then remove the PC board.

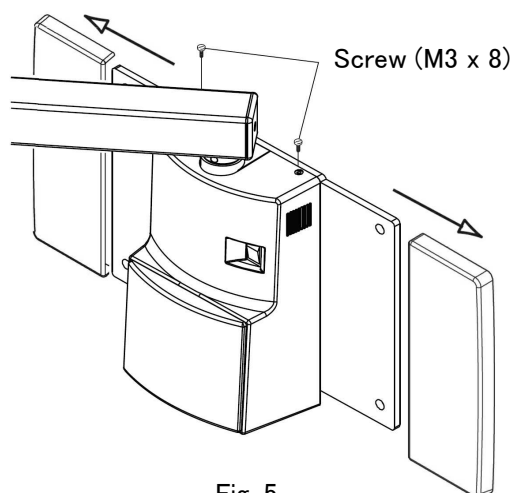


Fig. 5

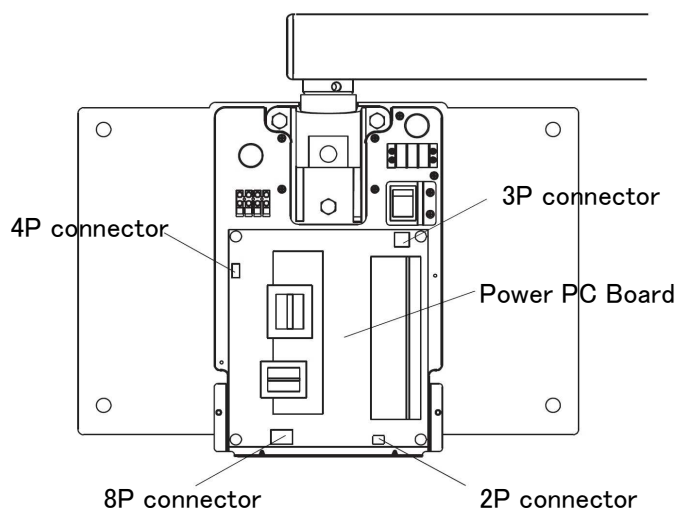


Fig. 6

4. Place the new power PC board in position and secure it with four screws. One of the four screws has no flat washer, and it should be placed in the bottom right corner.
5. Attach the four connectors to the power PC board again, being careful not to bend the PC board.
6. Attach the front cover and secure with the two screws which were removed in step 2. (Fig.7)
7. Slide in the side covers from right and left side of the wall pate.

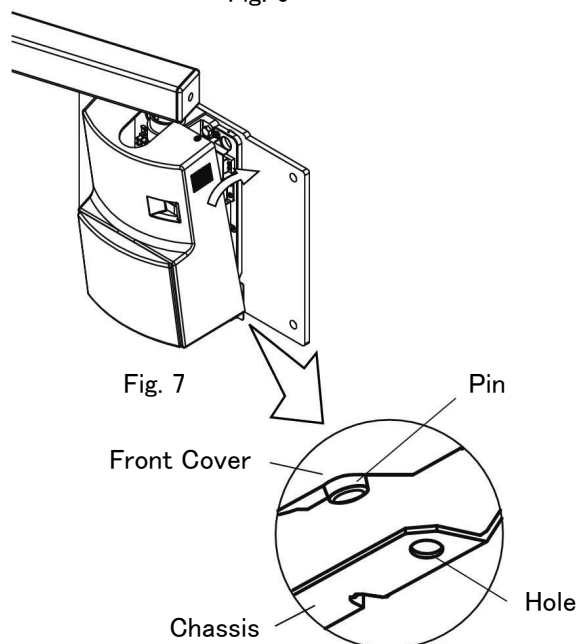
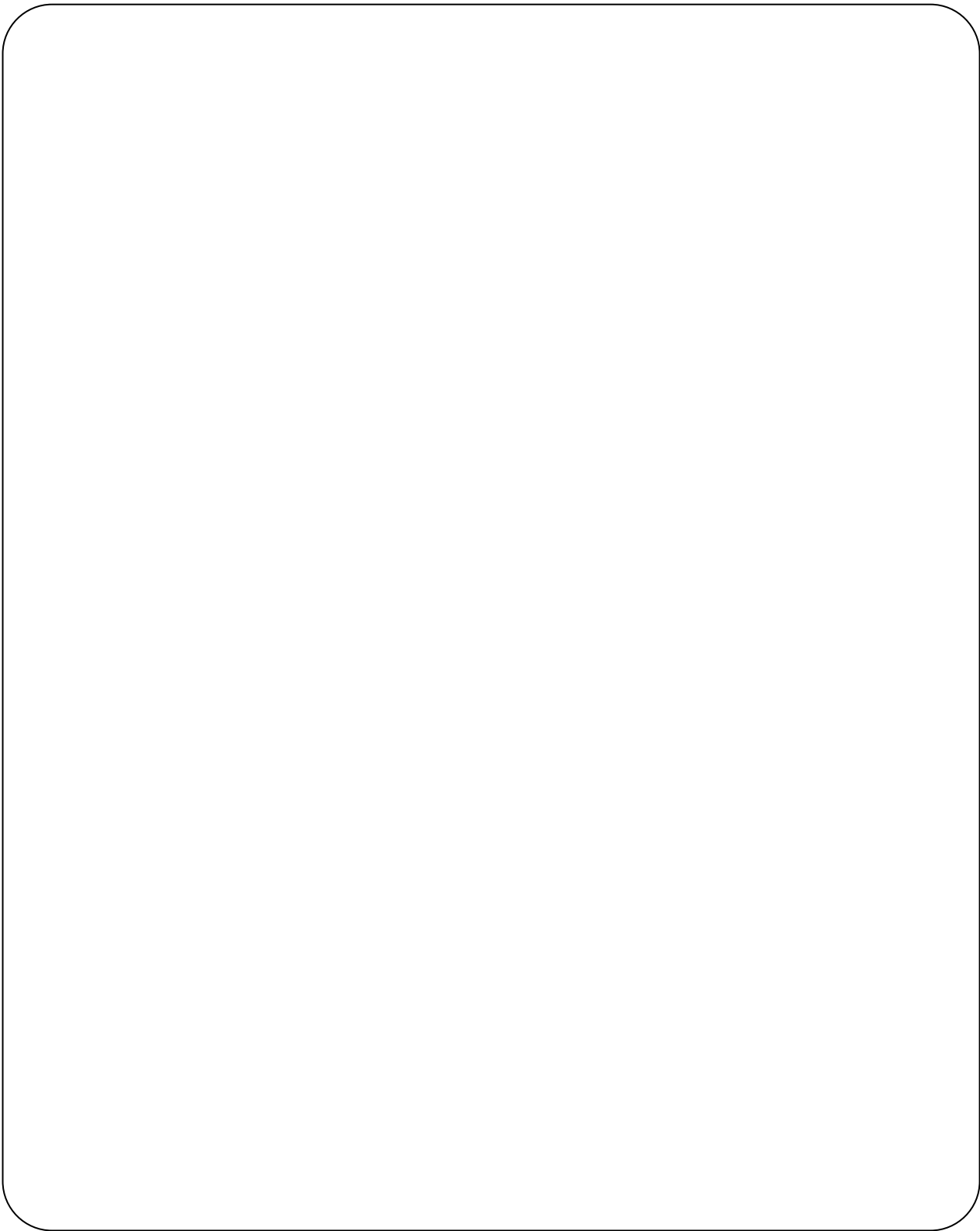


Fig. 7

Adjustment after exchanging the power PC board (mA adjustment)

1. Turn on the main switch at the circuit breaker panel and the main switch on the x-ray front panel.
2. Hold down the tooth selection switches together (T1, T4, and T5) until “h.xx” appears in the exposure time display window.
3. Wait until the display changes to “0.50.” Make an x-ray exposure by depressing the exposure switch.
4. Repeat step 3 until “Fin” is displayed in the exposure time display window (you will make approximately eight (8) to ten (10) x-ray exposures until “Fin” is displayed.)
5. Turn off the main power switch on the front panel of PHOT-X IIs 505.



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