

# PHOT-X II

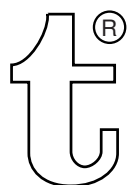
**MODEL 303**

***DENTAL X-RAY***

## **OPERATOR'S INSTRUCTIONS (for USA & Canada)**

**⚠ WARNING**

**This X-ray equipment may be dangerous to patients and operators unless safe exposure factors and operating instructions are observed.**



## INDEX

	PAGE
[ 1 ] INTRODUCTION -----	1
[ 2 ] LAYOUT OF CONTROLS -----	3
[ 3 ] FUNCTION OF CONTROLS -----	4
[ 4 ] OPERATING PROCEDURES -----	6
[ 5 ] OPTIONAL HAND EXPOSURE SWITCH -----	6
[ 6 ] DIGITAL IMAGING SYSTEM -----	7
[ 7 ] CLEANING AND DISINFECTION -----	7
[ 8 ] DISPOSAL OF USED FILM AND CCD COVERS -----	7
[ 9 ] ERROR CODES -----	8
[ 10 ] MAINTENANCE -----	9
[ 11 ] TECHNICAL DATA -----	10

### [ 1 ] INTRODUCTION

#### 1. GENERAL

PHOT-X II MODEL 303 is a extraoral source dental radiographic x-ray unit. This unit works as a diagnostic purpose x-ray source for human teeth with resultant image recorded on intraoral dental x-ray film or image receptor.

This manual provides information for the operation and maintenance procedures and technical specifications for PHOT-X II MODEL 303 dental x-ray. The instructions contained in this book should be thoroughly read and understood before operation.

**PHOT-X II MODEL 303 has no user serviceable items. Maintenance and repair should be performed by qualified dealer service personnel.**

#### 2. PARTS IDENTIFICATION OF X-RAY SYSTEM "PHOT-X II" MODEL 303

- a. Tube housing assembly : 303-H
- b. X-ray controls : 303-CM (main controller), 303-CS (sub controller)
- c. Cones : 303-R (regular), 303-L (long), 303-REC (rectangular)
- d. Balance arm : 303-A

#### 3. COMPLIANCE WITH STANDARD

BELMONT PHOT-X II MODEL 303 x-ray unit complies with the following standard.

##### a. Electrical and Mechanical Safety

IEC60601-1 : 1988, UL60601-1 : 2003, IEC60601-2-7 : 1998  
IEC60601-2-28 : 1993, IEC60601-2-32 : 1994

##### b. Radiation Safety

21 CFR 1020.30



**[ 2 ] LAYOUT OF CONTROLS**

①

**[ 3 ] FUNCTION OF CONTROLS**

**TABLE 1. Speed Setting and Exposure Time (Regular Cone)** [ unit : sec.]

Speed Setting	kV	mA	Child					Adult					Large Adult				
			T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
F.09	60	4	0.16	0.16	0.20	0.25	0.32	0.25	0.32	0.32	0.40	0.63	0.32	0.40	0.40	0.50	0.80
		7	0.08	0.10	0.13	0.13	0.20	0.13	0.16	0.20	0.25	0.32	0.16	0.20	0.25	0.32	0.40
	70	4	0.10	0.13	0.16	0.16	0.25	0.16	0.20	0.25	0.32	0.40	0.20	0.25	0.32	0.40	0.50
		7	0.06	0.08	0.08	0.10	0.16	0.10	0.13	0.16	0.16	0.25	0.13	0.16	0.20	0.20	0.32
F.05	60	4	0.06	0.08	0.08	0.10	0.16	0.10	0.13	0.16	0.16	0.25	0.13	0.16	0.20	0.20	0.32
		7	0.03	0.04	0.05	0.06	0.08	0.06	0.06	0.08	0.10	0.13	0.08	0.08	0.10	0.13	0.16
	70	4	0.04	0.05	0.06	0.08	0.10	0.08	0.08	0.10	0.13	0.16	0.10	0.10	0.13	0.16	0.20
		7	0.02	0.03	0.04	0.04	0.06	0.04	0.05	0.06	0.06	0.10	0.05	0.06	0.08	0.08	0.13
d.06	60	4	0.04	0.05	0.05	0.06	0.10	0.06	0.08	0.10	0.10	0.16	0.08	0.10	0.10	0.13	0.20
		7	0.02	0.03	0.03	0.04	0.10	0.04	0.04	0.05	0.06	0.08	0.05	0.05	0.06	0.08	0.10
	70	4	0.03	0.03	0.04	0.04	0.06	0.05	0.05	0.06	0.08	0.10	0.06	0.06	0.08	0.10	0.13
		7	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

**TABLE 2. Speed Setting and Exposure Time (Long Cone)** [ unit : sec.]

Speed Setting	kV	mA	Child					Adult					Large Adult				
			T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
F.09	60	4	0.40	0.50	0.63	0.63	1.00	0.63	0.80	1.00	1.00	1.60	0.80	1.00	1.25	1.25	2.00
		7	0.25	0.25	0.32	0.40	0.50	0.40	0.50	0.50	0.63	1.00	0.50	0.63	0.63	0.80	1.25
	70	4	0.32	0.32	0.40	0.50	0.63	0.50	0.63	0.63	0.80	1.25	0.63	0.80	0.80	1.00	1.60
		7	0.16	0.20	0.25	0.25	0.40	0.25	0.32	0.40	0.50	0.63	0.32	0.40	0.50	0.50	0.80
F.05	60	4	0.16	0.20	0.25	0.25	0.40	0.25	0.32	0.40	0.50	0.63	0.32	0.40	0.50	0.63	0.80
		7	0.10	0.10	0.13	0.16	0.25	0.16	0.20	0.25	0.25	0.40	0.20	0.25	0.25	0.32	0.50
	70	4	0.13	0.13	0.16	0.20	0.25	0.20	0.25	0.25	0.32	0.50	0.25	0.32	0.32	0.40	0.63
		7	0.06	0.08	0.10	0.10	0.16	0.10	0.13	0.16	0.20	0.25	0.13	0.16	0.20	0.25	0.32
d.06	60	4	0.10	0.13	0.16	0.16	0.25	0.16	0.20	0.25	0.25	0.40	0.20	0.25	0.32	0.32	0.50
		7	0.06	0.08	0.08	0.10	0.13	0.10	0.13	0.13	0.16	0.25	0.13	0.16	0.16	0.20	0.32
	70	4	0.08	0.08	0.10	0.13	0.16	0.13	0.16	0.16	0.20	0.32	0.16	0.20	0.20	0.25	0.40
		7	0.04	0.05	0.06	0.06	0.10	0.06	0.08	0.10	0.13	0.16	0.08	0.10	0.13	0.13	0.20

**⑬ kV Selection Switch**

Momentarily depressing this switch will change the tube potential to 60 or 70 kV. Since the tube potential is constant DC, a 60 kV setting the PHOT-X II is similar to a 70 kVp setting on a conventional x-ray. If either the **Film Speed Switch ⑪** or **Digital Imaging Switch ⑫** is depressed, 60kV is automatically selected.

**⑭ mA Selection Switch**

Momentarily depressing this switch will change the tube current setting (4 or 7 mA). If the **Digital Imaging Switch ⑫** is depressed, 4 mA is automatically selected and if the **Film Speed Switch ⑪** is depressed, 7 mA is automatically selected,

**⑮ Patient Size Selection Switch**

This switch alters the selection of patient type/size to be radiographed (child

## [ 4 ] OPERATING PROCEDURES

1. Turn ON the Main Power Switch ①.
2. Confirm that Ready Light ② is illuminated.

**NOTE : The ready light will not illuminate unless the incoming line voltage is correct and within the x-ray's operable range (108 ~ 132VAC).**

3. Select the appropriate tooth type (⑤ ~ ⑨), and confirm the pre-selected conditions (cone type, film or digital, kV, mA and patient size) are suitable for exposure.

**NOTE : To manually set the exposure time, depress either of the manual Exposure Time Adjusting Switches ( ^ or v ) until the desired exposure time appears in the Exposure Time Display Window ⑩. While the unit is in manual mode, other selection switches (⑤ ~ ⑨) do not affect exposure time. (All of the tooth selection lights are off.) To return to the automatic exposure time selection mode, depress any one of Tooth Selection Switches (⑤ ~ ⑨).**

4. Depress the Exposure Switch ⑱. When the Exposure Switch is depressed, the Exposure Warning Light ⑰ illuminates and the audible warning sounds. Do not release the Exposure Switch until the Exposure Warning Light and audible warning automatically shut off. Failure to keep the switch depressed will result in exposure being terminated prematurely.
5. To continue to radiograph other teeth, just select appropriate Tooth Selection Switches (⑤ ~ ⑨).

**IMPORTANT : To protect x-ray tubehead from heat accumulation, wait for a time interval that is equal to 50 times the selected exposure time before making additional exposures. (Example : a 25 sec. wait is necessary between exposures that are 0.5 sec. in duration.)**

6. Turn OFF the Main Power Switch ① in order to prevent accidental exposures when the unit is not in use.

**NOTE : If the unit left over 8 min. without being operated and the Main Power Switch ① is kept on, figure "1" runs through the Exposure Time Display Window ⑩. This does not mean that malfunction of the unit has occurred ; this is an energy saving feature. The unit returns to ready condition by pressing any one of the switches, except the Exposure Switch ⑱.**

## [ 5 ] OPTIONAL HAND EXPOSURE SWITCH

An optional hand exposure switch can be connected to the sub controller. Since this exposure switch has a coiled cord, operators can stand in the most suitable position for operation.

As controller has separate connector for this exposure switch, both exposure switch ⑱ on the front panel of sub controller and this hand exposure switch can be used.

If local code prohibits use of both, ask installer to disconnect the connector of either switch.

## [ 6 ] DIGITAL IMAGING SYSTEM

If electrical instruments such as a digital imaging system is used with PHOT-X II MODEL 303 x-ray, the following points should be confirmed to keep electrical safety.

### CAUTION :

**The use of ACCESSORY equipment not complying with the equivalent safety requirements of PHOT-X II MODEL 303 may lead to a reduced level of safety of the resulting system.**

**Consideration relating to the choice shall include :**

- use of the accessory in the PATIENT VICINITY
- evidence that the safety certification of the ACCESSORY has been performed in accordance to the appropriate IEC60601-1 and/or IEC60601-1 harmonized national standard.

## [ 7 ] CLEANING AND DISINFECTION

In order to ensure proper hygiene and cleaning of the equipment, the following procedures must be followed :

### WARNING

**Before cleaning the unit, turn off the main power switch and breaker on the branch line. This is required because some internal parts remain connected to main voltage even when the main power switch has been turned off.**

Wipe the outside surface with a paper towel dampened with a disinfectant solution or household, non abrasive cleaner. DO NOT SPRAY SOLVENT OR LIQUID DIRECTLY ON THE X-RAY UNIT. BE CAREFUL NOT TO ALLOW SOLVENTS TO RUN OR DRIP into the PHOT-X II. This could cause damage to the PHOT-X II. Allow surfaces to air dry before turning breaker and main switch back on.

Parts in contact with skin :

To ensure proper cleaning of these parts, periodic disinfection with a non corrosive surface disinfectant is recommended.

## [ 8 ] DISPOSAL OF USED FILM AND CCD COVERS

Dispose of used film covers and CCD sensor covers appropriately, according to the procedures indicated by each manufacturer and by local codes.

## [ 9 ] ERROR CODES

If an abnormal condition exists in the unit, or a malfunction occurs, an error code is displayed in the Exposure Time Display Window ⑯. Please refer to the Table below.

Error Code	Condition	Step to be Taken	Possible Solution
E.00	Exposure switch was released before exposure termination.	All the tooth selection lights blink. Depress one of the tooth switches.	Release the exposure switch after the exposure lamp turns off.
E.01	Exposure switch was depressed within 10 sec. of previous exposure.	A 10 sec. delay is built in between each exposure.  Release the exposure switch.	There should be a "wait" interval of 50 times the exposure time between successive exposure.
	Exposure time was set and exposure switch was depressed within 3 sec. of the power switch being turned on.		Wait a minimum 3 sec. after the main power switch is turned on before pressing the exposure switch.
E.02	Line voltage was less than 90% of rated voltage.		Confirm that ready lamp is on before exposure. Ask service personnel to check the line voltage.
E.03	Line voltage was more than 110% of rated voltage.		
E.05	Tube current at last portion of exposure was less than 3 mA at 4 mA setting or less than 5.25 mA at 7 mA setting	Turn off the main power switch and wait for approximately 2 min. Turn on the main power switch again.	If same error code is displayed, call service personnel.
E.06	Tube current at last portion of exposure was more than 5 mA at 4 mA setting or more than 8.75 mA at 7 mA setting		
E.07	During the exposure, tube current becomes less than 2 mA at 4mA setting or less than 3.5 mA at 7 mA setting.		
E.08	During the exposure, tube current becomes more than 6 mA at 4mA setting or less than 10.5 mA at 7 mA setting.		
E.09	Setting for pre-heating time is out of range.		
E.10	Exposure switch or exposure circuit had been ON, when main power switch is turned on.		
E.11	Tube current is detected during pre-heating period.		
E.12	Tube current is detected when main power switch is turned on.		
E.14	Tube potential at last portion of exposure was less than 50 kV at 60 kV setting or less than 60 kV at 70 kV setting.		

Error Code	Condition	Step to be Taken	Possible Solution
E.15	Tube Potential at last portion of exposure was more than 70 kV at 60 kV setting.	Turn off the main power switch and wait for approximately 2 min. Turn on the main power switch again.	If same error code is displayed, call service personnel.
E.16	During the exposure, tube potential becomes less than 40 kV at 60 kV setting or less than 50 kV at 70 kV setting.		
E.17	During the exposure, tube potential becomes more than 80 kV.		
E.18	Excess current was detected in primary circuit of filament transformer.		
E.19	Excess current was detected in primary circuit of high voltage transformer.		
E.20	Exposure switch was depressed when tube head temperature was over 60°C.	Release the exposure switch,	
E.22	Failure of electrical communication between the power PCB and timer PCB.	Turn off the main power switch and turn on again.	
E.23	Some switch had been on, when the main power switch is turned on. (Except the exposure switch.)		

## [ 10 ] MAINTENANCE

PHOT-X II MODEL 303 x-ray unit requires post installation confirmation and periodic maintenance checks to be performed by dealer service personnel. These procedures ensure that the x-ray unit is functioning within the manufacture's specifications and remains in compliance with the Standard.

It is responsibility of the owner of the unit to see that these maintenance checks are done **once every 6 months** and that they are performed by a trained, certified service technician.

The specific instructions to perform these checks are located within the PHOT-X II MODEL 303 Installation Manual.

- A. Line voltage confirmation
- B. Tube potential and Tube current confirmation
- C. Inspection of arm and head movement
- D. Mechanical safety
  1. The wall plate should be checked to confirm that it is securely attached to the wall.
  2. The arm mounting bracket should be checked to confirm that it is securely attached to the wall mounting plate. The arm mounting bracket must be level horizontally and vertically.
  3. Check and verify that the horizontal arm is not raising up and out of the arm mounting bracket.  
This should be verified routinely by treatment room personnel.

## [11] TECHNICAL DATA

1. X-ray tube -----	Toshiba D-0711 (Stationary Anode)			
a. Focal spot -----	0.7 mm			
b. Target Material -----	Tungsten			
c. Target angle -----	16°			
d. Maximum anode heat content -----	7kJ (10kHU)			
2. Maximum x-ray tube assembly heat content -----	120kJ (170kHU)			
3. Rated peak tube potential -----	60 kV / 70 kV selectable			
4. Rated tube current -----	4 mA / 7 mA selectable			
5. Maximum rated peak tube potential -----	70 kV			
6. Rated line voltage -----	120 VAC, 60Hz, Single phase, 1.3 kVA			
7. Line voltage range -----	108 VAC ~ 132 VAC			
8. Range of line voltage regulation -----	2 ~ 5 %			
9. Rated line current -----	10.8 A at 70 kV, 7 mA			
10. Maximum line current -----	12 A at 70 kV, 7 mA			
11. Exposure time -----	0.01 ~ 3.2 sec.			
12. Inherent filtration -----	1.7 mm Al Equivalent			
13. Added filtration -----	0.3 mm Al			
14. Minimum filtration permanently in useful beam -----	2.0 mm Al Equivalent at 70 kV			
15. Nominal roentgen output	60 kV		70 kV	
	4 mA	7 mA	4 mA	7mA
a. Distal end of regular cone -----	5.4	9.4	7.1	12.4 mGy/sec. ± 40%
b. Distal end of long cone -----	2.4	4.2	3.1	5.5 mGy/sec. ± 40%
	(Data obtained by direct measurement in the useful beam)			
16. Nominal electrical output of H.V. generator -----	0.49 kW at 70 kV, 7 mA			
17. Cone	Source to skin distance		Field size	
a. Regular cone -----	8 inches (203 mm)		58 mm dia., circular	
b. Long cone (option) -----	12 inches (305 mm)		58 mm dia., circular	
c. Rectangular cone (option) -----	8 inches (203 mm)		36 x 47 mm, rectangular	
18. Maximum symmetrical radiation field -----	60 mm dia. at distal end of cone			
19. Leaking technique factor -----	70 kV / 0.14 mA			
	(0.14 mA is maximum rated continuous current for 7 mA with a duty cycle 1 : 50)			
20. Duty cycle -----	1 : 50 (0.5 sec. exposure with 25 sec. interval)			
21. Maximum deviation of tube potential, tube current and exposure time				
a. Below 0.1 sec. setting -----	±10 kV, ±2 mA, ±5 msec.			
b. 0.1 sec. setting & up -----	±5 kV, ±1 mA, ±10 msec.			
22. Measurement base of technique factors				
a. peak tube potential -----	Average of peak tube potentials during one exposure			
b. tube current -----	Average of tube current during one exposure			
c. exposure time -----	Time period during x-ray is emitted			
23. Half value layer -----	1.5 mm Al over			
24. Source to the base of cone distance -----	94 mm			
25. Environmental condition for storage -----	-20 ~ 70°C, 10 ~ 100%, 500 ~ 1060hPa			
26. Environmental condition for operation -----	10 ~ 40°C, 30 ~ 70%, 700 ~ 1060hPa			



**BELMONT EQUIPMENT, Division of Takara Belmont, USA, Inc.**

101 Belmont Drive Somerset, New Jersey 08873 U.S.A. TEL.:(732) 469-5000 / (800) 223-1192 Fax.:(732)526-6322 / (800) 280-7504  
[www.belmonteqip.com](http://www.belmonteqip.com)

**TAKARA CO, CANADA LTD.**

2076 S. Sheridan Way, Mississauga, Ont., L5J2M4, Can. TEL.:(905) 822-2755 Fax.:(905)822-6203  
[www.takarabelmont.ca](http://www.takarabelmont.ca)