



# SERVICE MANUAL



REV.002

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## GENERAL ORDERING INFORMATION

EXCALIBER and Belmont Dental Equipment is sold through authorized Dental Dealers.

Special orders are non-cancellable and non-returnable.

All Models, Specifications, and Prices are subject to change without notice.

## WARRANTY

Belmont Equipment is warranted by the manufacturer to be free from defective material and workmanship under normal use and service, for a period of two(2) years from date of shipment to the Buyer, except that any part or parts that are replaced under this Warranty within ninety (90) days of the completion of the two year period shall be warranted to be free from defective material and workmanship for a period of ninety (90) days from date of shipment of said parts to Buyer. Belmont will repair or replace any defective part under this warranty, provided the part is returned to our factory with prepaid postage, delivery or freight charges. In the event Warranty service must be performed to correct any defect, only Belmont and/or one of its authorized dealers shall provide same upon mutually agreeable arrangements made in advance

EXCEPT as otherwise provided herein, there is NO WARRANTY representation or condition of ANY KIND, express or implied (including NO WARRANTY OF MERCHANTABILITY OR FITNESS) and none shall be implied by law. THE EXPRESS WARRANTY AND THE REMEDIES CONTAINED HEREIN (1) ARE MADE SOLELY TO THE FIRST PURCHASER FOR BENEFICIAL USE (THE BUYER), (2) ARE THE SOLE WARRANTIES AND REMEDIES, (3) ARE IN LIEU OF ALL OTHER WARRANTIES, GUARANTEES, AGREEMENTS OR OTHER LIABILITIES, WHETHER EXPRESS OR IMPLIED, AND ALL OTHER REMEDIES FOR BREACH OF WARRANTY OR ANY OTHER LIABILITY OF BELMONT, IN NO EVENT SHALL BE LIABLE FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES.

No person, agent distributor or dealer is authorized to change, modify or extend the terms of this Warranty in any manner, whatsoever.

This warranty is void when failure or defect is caused by conditions beyond the manufacturer's control, such as damage resulting from mishandling, neglect, misuse, improper maintenance, accident or alteration of repair by anyone other than Belmont or an authorized Belmont dealer.

## INTRODUCTION

Certain assumptions are made in this manual as to qualifications, training and knowledge of anyone attempting to utilize this manual to repair, adjust and/or calibrate a Belmont X-CALIBER Model 1000/ X-CALIBER CM Model 2000 X-Ray.

- # 1 - That you are a state licensed or registered x-ray service technician where required by law.
- # 2 - That you are familiar with the principles of x-radiation and specifically the principles of dental panoramic x-ray.
- # 3 - That you have read the units operating and technique manual or will read the condensed version contained in chapter 2 of this manual prior to testing, calibrating, repairing or operating this machine.
- # 4 - That you have a working knowledge of electrical safety, electronics and electronic test measurements.
- # 5 - That you have the following test equipment and tools in hand :
  - 1 - #1 Phillips Screwdriver
  - 2 - #2 Phillips Screwdriver
  - 3 - Flat Blade Screwdriver
  - 4 - Set of Metric Allen Type Wrenches
  - 5 - 4" or 6" Crescent Wrench
  - 6 - Digital Multimeter (DMM) with the following ranges;
    - 0 - 1000 VDC
    - 0 - 200 VAC
  - Accuracy must meet or exceed B.R.H. guidelines for test equipment.
  - 7 - Stopwatch or Electrical Cycle Counter
  - 8 - Meter leads with clip-on circuit board style test clips.

# SECTION ONE : SPECIFICATIONS & PHYSICAL CHARACTERISTICS

## TECHNICAL DATA

### [1] ELECTRICAL AND RADIATION DATA

1. Maximum rated peak tube potential ..... 90 kVp
2. Rated peak tube potential ..... 60 - 90 kVp (5kVp in 7steps)
3. Rated tube current ..... 10 mA
4. Rated line voltage ..... 120 VAC
5. Line voltage range ..... 110 - 130 VAC
6. Range of line voltage regulation ..... 1 - 3 %
7. Maximum rated line current ..... 10 A at 90 kVp, 10 mA
8. Exposure time ..... 12 sec. at panoramic mode  
15 sec. at TMJ mode
9. Minimum filtration ..... 2.6 mmAl
10. Focal point measurement ..... 1.0 mm X 1.0 mm  
NOTE: Effective focal spot size .... 0.5 mm X 1.0 mm
11. S.I.D. .... 490 mm
12. Duty cycle ..... 1:15 (refer to NOTE below)  
NOTE: The exposure time in panoramic mode is 12 sec., therefore, 3 min. interval or "Non Use" period requires the user to wait before making another exposure. Because of the 15 sec. exposure time in TMJ mode, 3.75 min. waiting time must be allowed after each series of 2 exposures.
13. Leakage technique factor ..... 90 kVp, 0.63 mA  
NOTE: 0.63 mA is maximum rated continuous current for 10 mA with a duty cycle of 1: 15.
14. Film size ..... 6 inch X 12 inch
15. Magnification rate ..... 1.25
16. Tomographic orbit ..... Single axis, continuous rotation
17. Nominal roentgen output at the end of beam limiting device\*
  - a. Panoramic mode: 2.3 R/12 sec.  $\pm$  40% at 90 kVp, 10 mA
  - b. TMJ mode : 2.9 R/15 sec.  $\pm$  40% at 90 kVp, 10 mANOTE: at the distance of 450 mm from focal spot.

## SECTION ONE : SPECIFICATIONS & PHYSICAL CHARACTERISTICS

### TECHNICAL DATA (CONT'D)

#### [1] ELECTRICAL AND RADIATION DATA

##### 18. Half value layer\*

- a. Approx. 3.3 mmAl equiv. at 90 kVp
- b. Approx. 2.4 mmAl equiv. at 60 kVp

##### 19. Maximum deviation of tube potential and tube current\*

- a. Tube potential: the selected kVp  $\pm 15\%$
- b. Tube current : 10 mA  $\pm 10\%$

\*NOTE: APPROX. VARIATION MAY BE REALIZED TO MEASUREMENT INSTRUMENTATION, MANUFACTURING TOLERANCES, AGE, INSTALLATION VARIABLES, AND USE HISTORY.

##### 20. Timer accuracy: $\pm 5\%$

##### 21. Measurement basis of technique factors

###### a. Peak tube potential

The potential difference across the x-ray tube during the conducting half cycle and results in an accuracy tolerance of  $\pm 15\%$ , except as stated below;

From 0 - 0.3 sec., kVp may vary  $+35/-45\%$

###### b. Tube current

The average mA value during a complete power line cycle, results in an accuracy tolerance of  $\pm 10\%$ , except as stated below;

From 0 - 0.09 sec., mA may vary  $+150/-100\%$

From 0.1 - 0.19 sec., mA may vary  $+100/-75\%$

From 0.2 - 0.3 sec., mA may vary  $+35/-45\%$

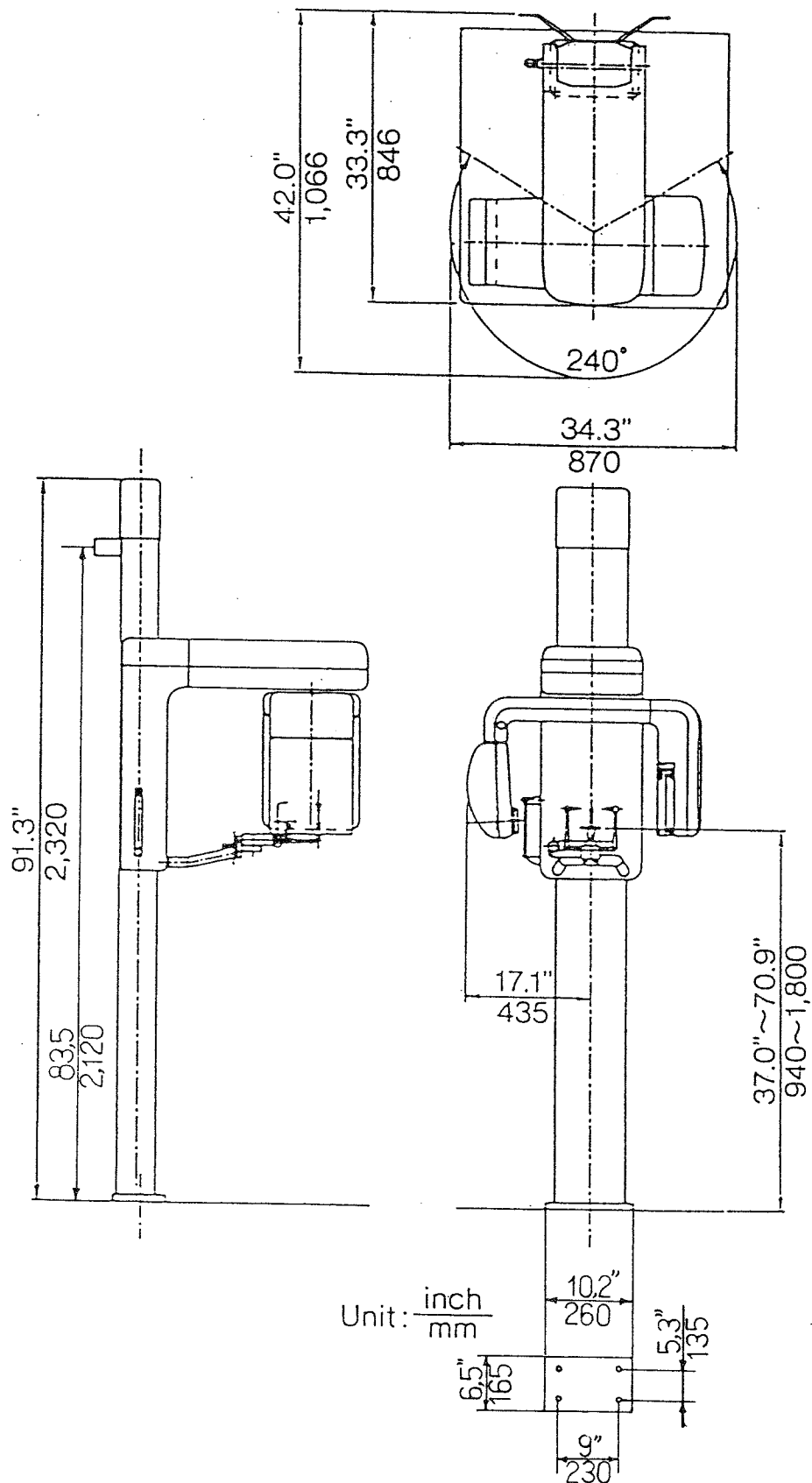
###### c. Exposure time

Impulse time is directly related to power line frequency. Exposure time applies from the beginning of first conducting line impulse to the end of last impulse, results in an accuracy tolerance of  $\pm 5\%$ .

# SECTION ONE : SPECIFICATIONS & PHYSICAL CHARACTERISTICS

## OVERALL DIMENSIONS

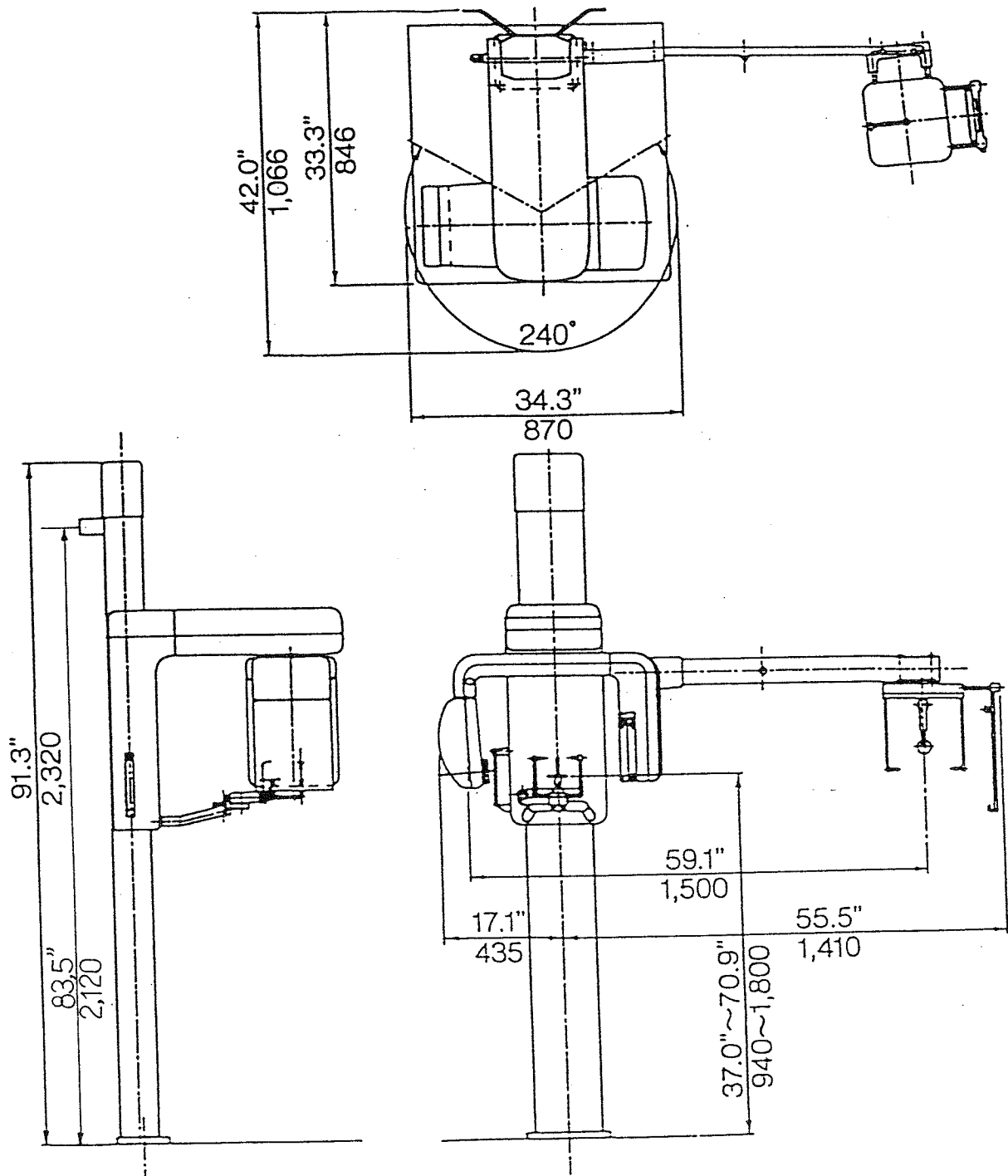
X-CALIBER, MODEL 1000



# SECTION ONE : SPECIFICATIONS & PHYSICAL CHARACTERISTICS

## OVERALL DIMENSIONS

X-CALIBER, MODEL 2000





## SECTION ONE : SPECIFICATIONS & PHYSICAL CHARACTERISTICS

### TUBE HEAD THERMAL CHARACTERISTICS

#### A. INTERVAL BETWEEN EACH EXPOSURE

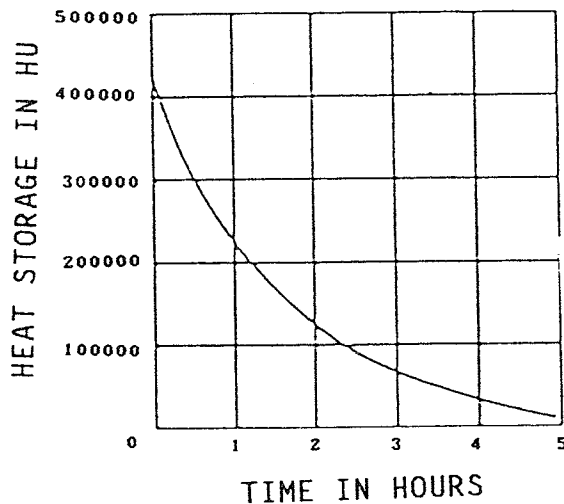
The temperature inside of the tube head rises when an exposure is made. The value of the heat generated is measured in Heat Units (HU), which is the product of tube potential, tube current and exposure time. Excessive heat will be accumulated inside of the tube head if the x-ray is used without proper cool down interval between each exposure. The excessive heat may damage the x-ray tube, high voltage generator or both.

#### B. DUDTY CYCLE

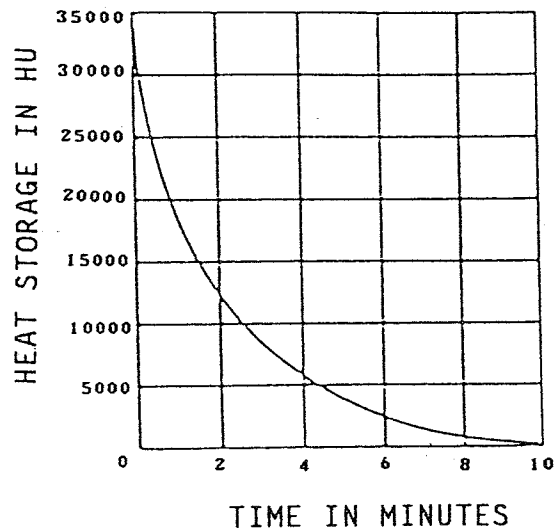
To avoid the accumulation of excessive heat in an effort to prolong the tube head life, a cool down interval of 3 min. at panoramic mode or 3.75 min. at TMJ mode must be allowed between each exposure.

#### C. TUBE HEAD COOLING CURVE

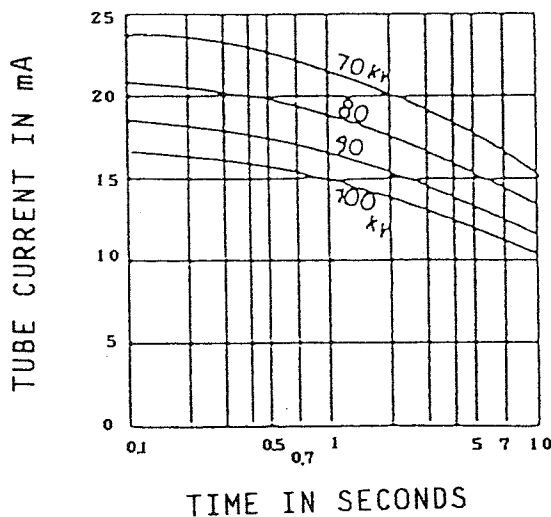
1. Tube housing cooling curve



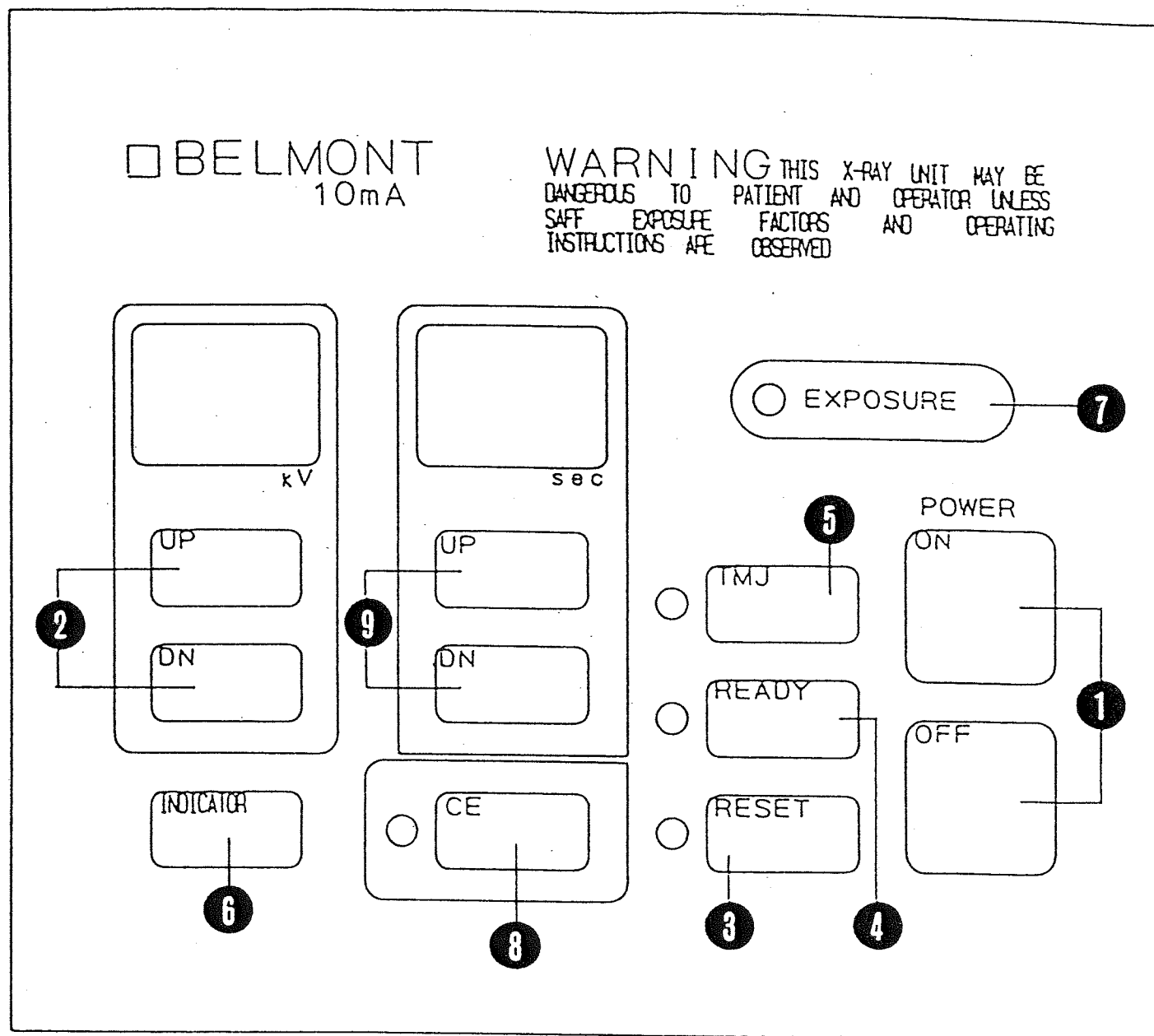
2. Anode thermal characteristics



3. Maximum rating chart



# LAYOUT OF CONTROLS



## SECTION TWO : OPERATING INSTRUCTIONS (GENERAL)

### FUNCTION OF CONTROLS

#### ① MAIN POWER "ON" & "OFF" SWITCHES

- Depressing POWER "ON" switch will turn the main power ON.

NOTE: Indicators show standard conditions of 75 kVp and 12 sec. when the main power is turned ON.

#### ② kVp "UP" & "DN" SWITCHES

- Tube potential can be adjusted by depressing "UP" or "DN(Down)" switch between 60 - 90 kVp by 5 kVp increment or decrement.

#### ③ RESET SWITCH

- Depressing this switch moves X-ray Head assembly and Cassette Holder to the starting position for panoramic or TMJ radiography.

NOTE: The switch located on the Rotation Arm has the same function. Refer to page 2, I.D. No.11.

#### ④ READY SWITCH

- Depress this switch after all the radiographing conditions are set, film cassette is mounted and patient is properly positioned.
- An exposure can be made after the indicator lamp flashes three times and stays lit.
- READY switch should be activated again after first exposure of TMJ radiography.

NOTE 1: READY switch turns ON only when the x-ray head assembly and the cassette holder are at Starting Position.

NOTE 2: READY status will be cancelled unless an exposure starts within 15 seconds. (If you are making an exposure after 15 seconds, depress the READY switch again.)

NOTE 3: READY switch will not function for 15 seconds after the main power switch is turned ON.

#### ⑤ TMJ SWITCH

- TMJ radiography can be made by depressing this switch.

#### ⑥ INDICATOR SWITCH

- By depressing INDICATOR switch, following three beam lines are available for 50 seconds.

1. Median Line
2. Frankfort Line
3. Focal Trough Line

#### ⑦ EXPOSURE INDICATOR

- This lamp will remain illuminated while x-ray is being generated.

#### ⑧ CEPHALOMETRIC SWITCH (MODEL X-CALIBER CM ONLY)

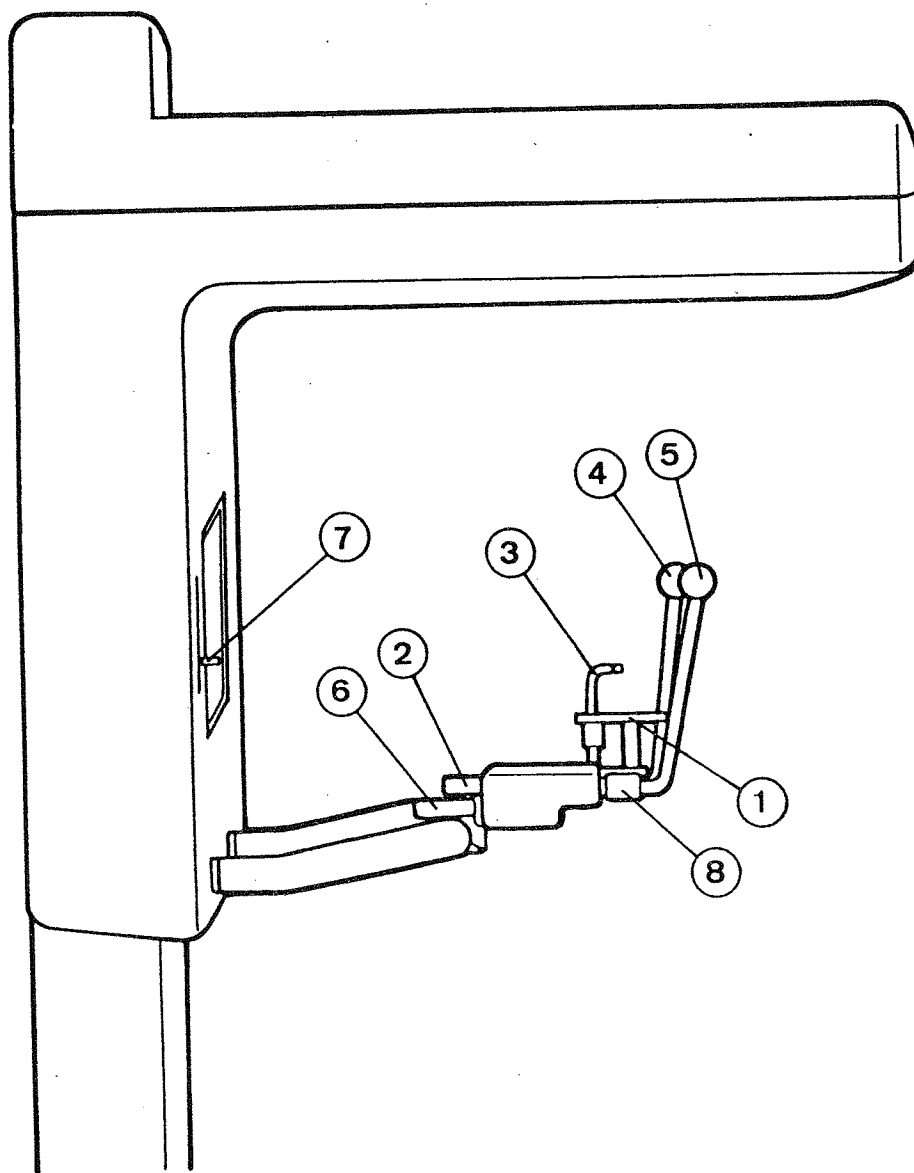
- By depressing this switch, cephalometric mode can be selected.

#### ⑨ SEC. "UP" & "DN" SWITCHES

- Exposure time can be adjusted by depressing "UP" or "DN" switches.

## SECTION TWO : OPERATING INSTRUCTIONS FOR PANORAMIC

### PATIENT CONTROLS - LAYOUT



## SECTION TWO : OPERATING INSTRUCTIONS FOR PANORAMIC

### FUNCTION OF PATIENT POSITIONING CONTROLS

#### 1) CHINREST ASSEMBLY

- ① CHINREST  
Plastic piece for patient to rest chin on during procedure.
- ② CHINREST ADJUSTER KNOB  
Turning this knob clockwise or counter-clockwise moves the whole chinrest assembly forward or backward through the focal trough.  
It is suggested to set the chinrest assembly at 0 (zero) position on scale before the patient positioning.
- ③ BITE PIECE  
Plastic piece with a small groove on the top and bottom that the patient fits upper and lower anterior teeth into and bites down.

#### 2) HEAD SUPPORTING ASSEMBLY

- ④ HEAD HOLDING RODS (for PANORAMIC)  
Two plastic pieces to hold the sides of the patient's head.
- ⑤ EAR HOLDING RODS (for TMJ)  
Two plastic pieces with ear piece to hold the patient's head.
- ⑥ HOLDING RODS ADJUSTER  
To open or close Head Holding Rods or Ear Holding Rods.

#### 3) INDICATING BEAMS ADJUSTERS

- ⑦ FRANKFORT PLANE INDICATOR BEAM ADJUSTING LEVER  
Located on Sliding Unit front, besides the mirror.  
By sliding this lever, Frankfort Plane Indicator Beam moves up/down.
- ⑧ FOCAL TROUGH INDICATOR BEAM ADJUSTING KNOB  
Located on Chinrest Assembly (opposite side of Chinrest Adjuster Knob).  
By rotating this knob, Focal Trough Indicator Beam moves up/down.

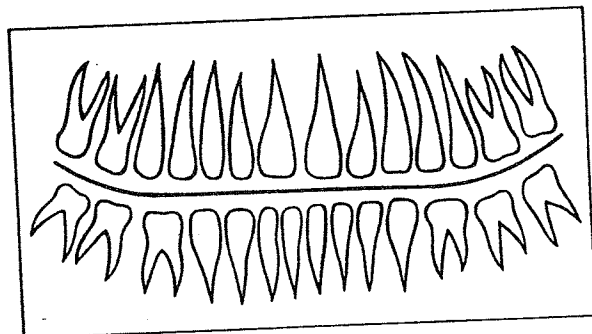
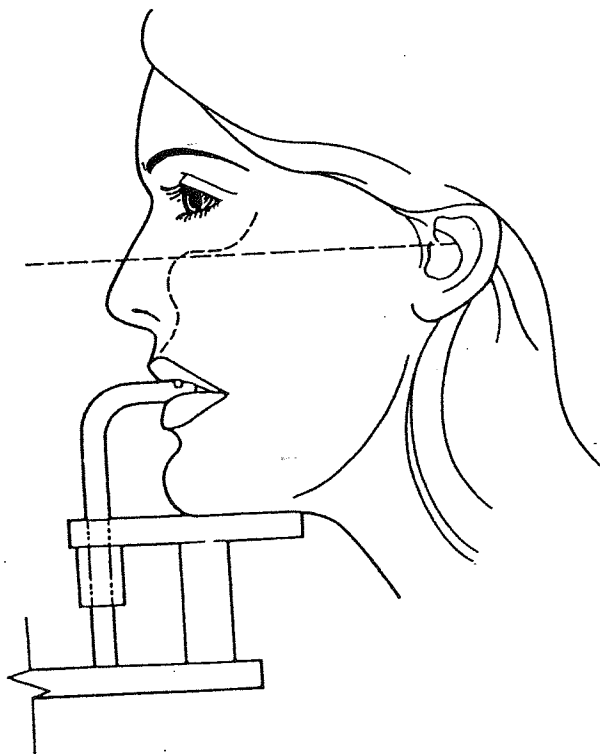
- 4) ⑨ ELECTRO-MAGNETIC LOCK SWITCH (OVERHEAD CARRIAGE RELEASE SWITCH)  
Located on upper portion of Grip of Sliding Unit.  
While the main power switch is ON, the entire Overhead Carriage and Cephalostat Assembly are electro-magnetically locked at the position.  
By depressing this switch, Overhead Carriage and cephalostat assembly can be free and moved up/down. They can be locked at the place where the switch is released.

## SECTION TWO : OPERATING INSTRUCTIONS FOR PANORAMIC

### Summary Of Positioning Criteria

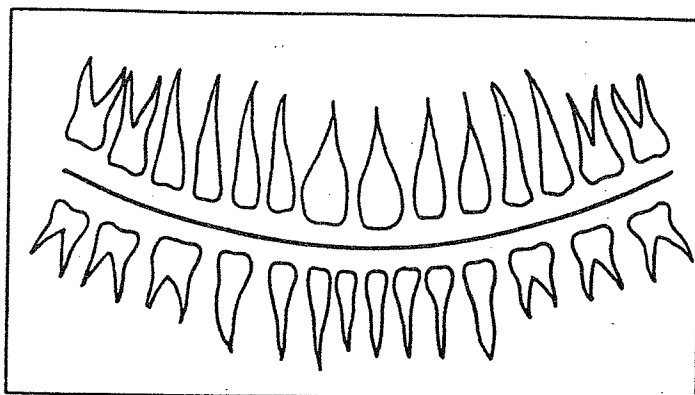
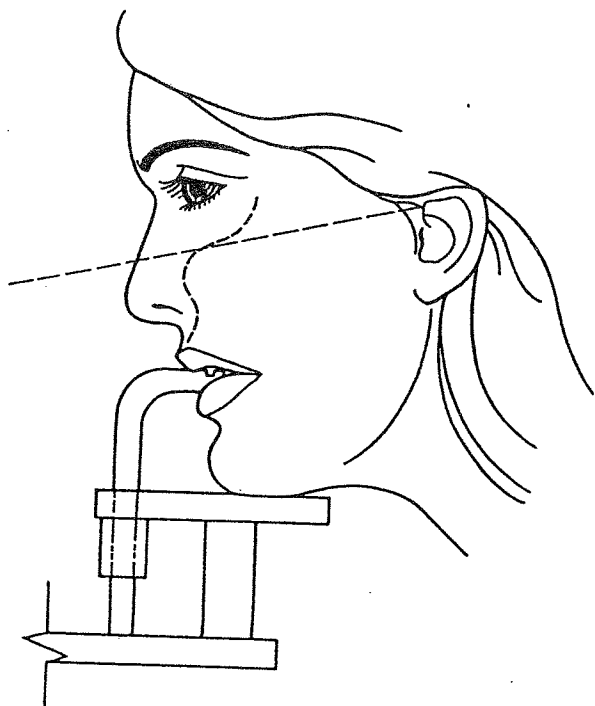
There are basically three positioning planes or criteria associated with the X-CALIBER :

1. The first is the Frankfort Plane, and is set as a patient first enters the machine and places their chin on the chinrest. The operator loosens the electro-magnetic lock switch and moves the carriage up or down the column as necessary so the patient can place the chin on the chinrest. Then the operator has the patient bite into the notches of the Bite Piece and observe whether or not the Frankfort Plane Indicator Beam falls on patient's Frankfort Plane. Frankfort Plane is a line drawn between the miniscule of the ear (hole) and the bottom of the eye orbit (top of cheekbone beneath eye). The beam height can be adjusted by moving Adjusting Knob.

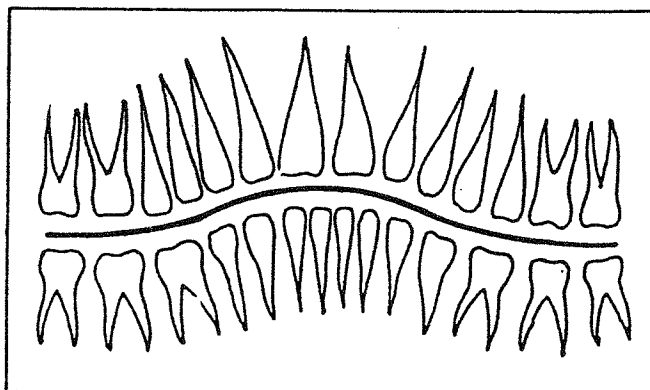
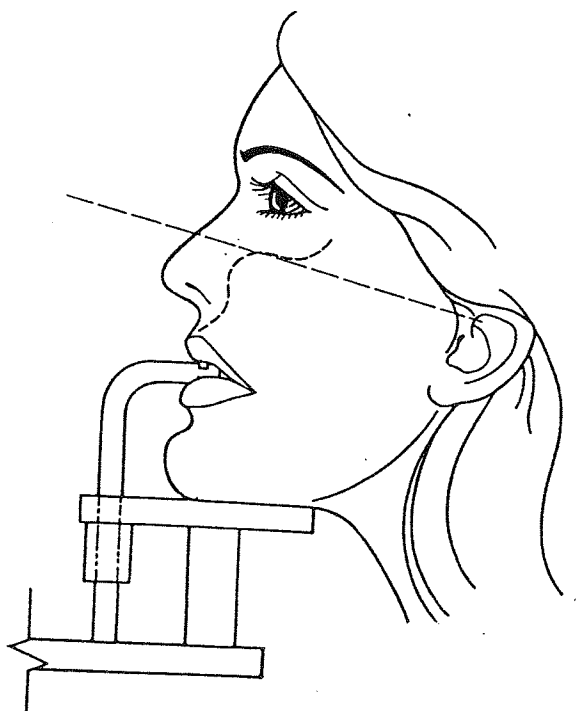


## SECTION TWO : OPERATING INSTRUCTIONS FOR PANORAMIC

If the chin is left too low, the x-ray of the dental arch will look something like below, a "smiling line relationship."

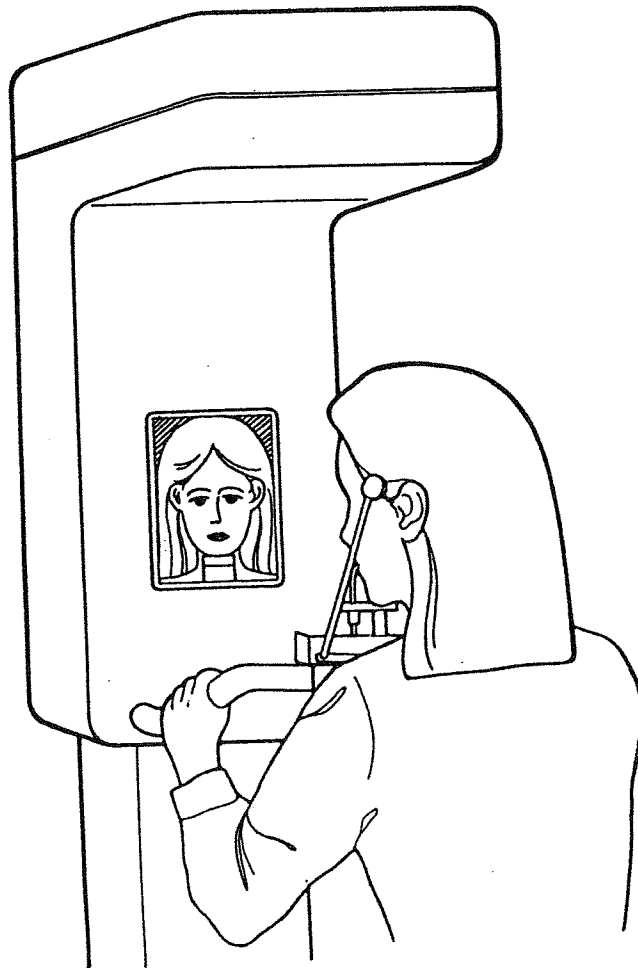


If the chin is left too high, the x-ray of the dental arch will show a "frowning" line relationship between the upper and lower teeth.



## SECTION TWO : OPERATING INSTRUCTIONS FOR PANORAMIC

2. The second is the center line of the patient and is set by looking over the patient's shoulder into the mirror built into the front of the carriage. The operator should see if the Median Line Beam falls on the center of the patient's face. The operator should instruct the patient to lift the chin from the chinrest, move it first left then right if necessary and set it on the chinrest until the face image in the mirror is bisected by the Median Line Beam. When this is achieved, close the Head Holding Rods to assist the patient in maintaining the position. The patient should also be allowed to grasp the frame bars to steady during this position and the actual x-ray.

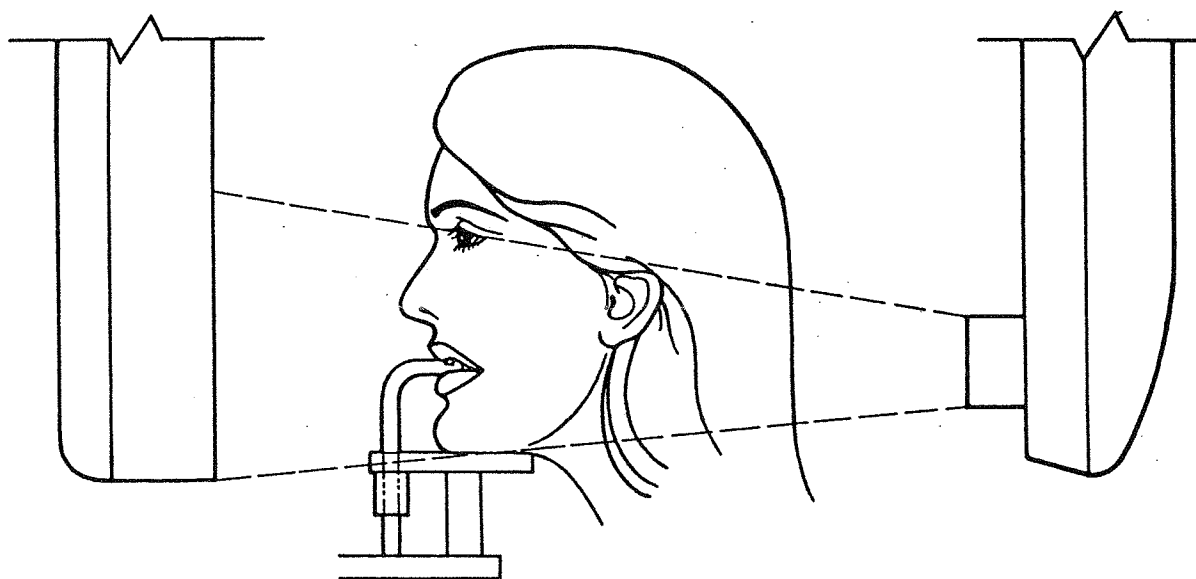


This adjustment is not critical to the success or failure of the x-ray, but causes distortion in the image if incorrect. The image appearing on the film will be to the left or right of center.



## SECTION TWO : OPERATING INSTRUCTIONS FOR PANORAMIC

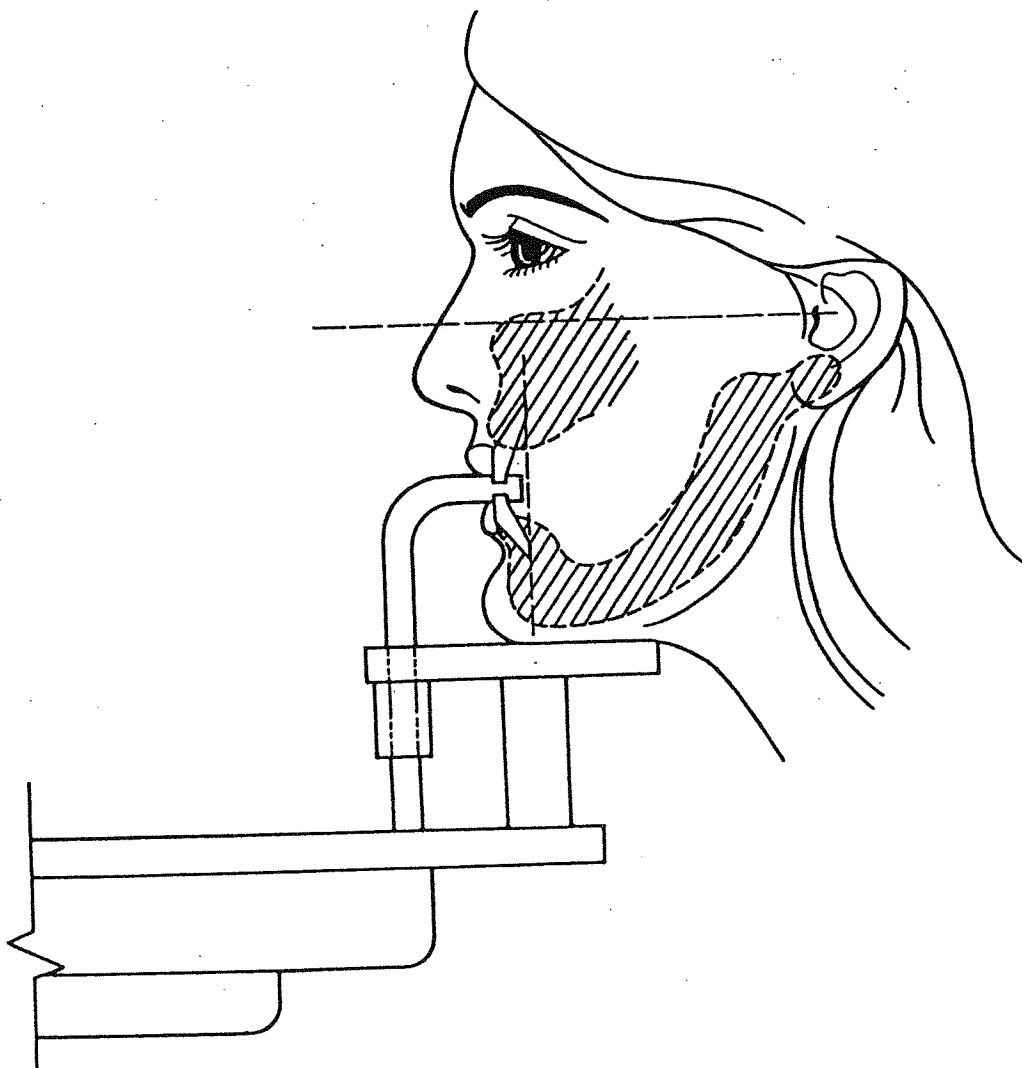
3. The third is the Focal Plane or Trough as it is usually called. The x-ray has a particular plane which will be in focus on the film. If the patient is not accurately positioned within this plane, the teeth will not appear or not appear clearly on the film. Obviously then, this is the one critical adjustment to succeed or fail with any panoramic x-ray. Since this plane is narrowest or most critical in the anterior region of the dental arch, we strive to position it correctly and the posterior teeth will automatically be in focus. To make this plane adjustment, we must move the patient in/forward or out/backwards from the overhead carriage.



This distance relationship is fixed as it is mechanically unchangeable. If the part of the patient we want to be in focus on the x-ray is in the focal trough plane, then it will be in focus on the film.

There is a knob on the opposite side of the patient's face, which moves the whole Chinrest assembly, and, therefore, the patient forward or backward in relationship to the illuminating beam which indicates the Focal Trough. We are going to ask you, the operator, for a subjective judgement. You must observe the angulation of the patients central anterior teeth and estimate the location of the apex of their roots. The Focal Trough Indicator Beam should fall approximately on this imaginary line. See example.

## SECTION TWO : OPERATING INSTRUCTIONS FOR PANORAMIC



Some people use the leading edge of the patient's cuspid as a rule of thumb and much of the time this will work, but since all humans are different, you should observe it as well. On the top side of the chinrest support assembly, is an indicator scale. As a starting place used 6 small divisions "back" from the center mark. Practice is the only way to perfect your judgement on this plane.

Remember tips on getting the best x-rays, such as swallowing air in mouth prior to exposure, breathing through nose and placing tongue on the roof of the mouth.

## SECTION TWO : OPEERATING INSTRUCTIONS FOR PANORAMIC

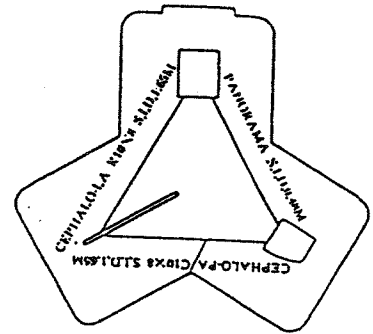
### Cassette Loading Instructions

1. NOTE : The film type and the intensifying screen type must be properly matched to achieve good radiographs.  
The cassette provided contains KODAK LANEX REGULAR SCREENS, and recommended combination film is KODAK T-MAT G.
2. In the dark room, carefully open the film box and remove one sheet of film, immediately reclosing the box.  
NOTE : Be certain that the darkroom is properly prepared per notes in the section concerning "Darkroom and Film Processing Requirements" on page 25 of this manual.
3. Carefully place the film on the side of the cassette that will be facing towards the tubehead, being sure that the edges are completely within the light seals at the cassette edges.
4. Close the cassette securely before leaving the darkroom.

## SECTION TWO : OPERATING INSTRUCTIONS PANORAMIC

### EXPOSURE INSTRUCTIONS FOR PANORAMIC RADIOGRAPHY

1. In case of EX-2000:  
Select the proper Beam Limiting Device for a panoramic exposure and insert it into the Housing of Beam Limiting Device.
  2. Mount a loaded cassette on the cassette holder.
  3. Turn the unit ON.
  4. Depress the Reset Switch on the control panel and wait for the Reset light to go out. The unit is now at starting position.
  5. Position patient as described on page 12, "patient positioning".
  6. Select the technique factors with regard to the Technique Factor Table on page 19 considering the patient size.
- NOTE : When the unit is turned ON, each technique factor is automatically set at standard conditions of 75 kVp, 15 sec. in TMJ mode.
7. Depress the Ready Switch on the control panel and wait for the Ready light to stay ON.
  8. Take the Exposure Switch on coiled cord to a safe operator's position (as defined by your State's X-ray Protection Statutes).
  9. Instruct the patient to do the following:
    - (1) Relax, this takes only 12 seconds.
    - (2) Swallow the air in your mouth and breath through your nose.
    - (3) Place your tongue on the roof of your mouth.
    - (4) Here we go.
  10. Depress the Exposure Switch. When the switch is depressed, the Exposure Warning Lamp will illuminate and the audible warning will sound. Do not release the Exposure Switch until the audible warning and the warning lamp terminate. Failure to keep the Exposure Switch depressed will result in the exposure being terminated prematurely.



## SECTION TWO : OPERATING INSTRUCTIONS FOR TMJ

### EXPOSURE INSTRUCTIONS FOR TMJ RADIOGRAPHY

Same procedures as described in 1 ~ 6 of "Exposure Instructions for Panoramic Radiography".

7. Depress TMJ Switch on the control panel.
8. Depress the Ready Switch on the control panel and wait for the Ready light to stay ON.
9. Take the Exposure Switch on coiled cord to a safe operator's position (as defined by your State's X-ray Protection Statutes).
10. Instruct the patient that RMJ Radiography consists of two consecutive exposures and the following cooperation is needed;
  - (1) Relax, this takes approx. 15 seconds for each exposure.
  - (2) During the excursion, breath through your nose.
  - (3) During the first excursion, close your mouth.
  - (4) During the second excursion, open your mouth.
  - (5) Here we go.
11. Depress the Exposure Switch. While the x-ray is generated, the Exposure Warning lamp will illuminate and the audible warning will sound. Do not release the Exposure Switch until the first excursion ends and the unit starts to return. Failure to keep the Exposure Switch depressed will result in the exposure being terminated prematurely.
12. Depress the Ready Switch on the control panel again and wait for the Ready light to stay ON. Then depress the Exposure Switch again for the 2nd exposure and keep it depressed until the excursion is completed.

### STANDARD TECHNIQUE FACTOR TABLE

AGE	SEX	KvP	mA
4 - 10	-	60 - 65	10
11 - 15	-	65 - 70	10
ADULT	FEMALE	70 - 75	10
ADULT	MALE	75 - 80	10

FILM: KODAK T-MAT G (TMG)

INTENSIFYING SCREENS:  
KODAK LANEX REGULAR

DEVELOPING:  
20° C (68° F) 4 MIN. IN TANK

27° C (81° F) 5 MIN. WITH  
AUTOMATED PROCESSOR

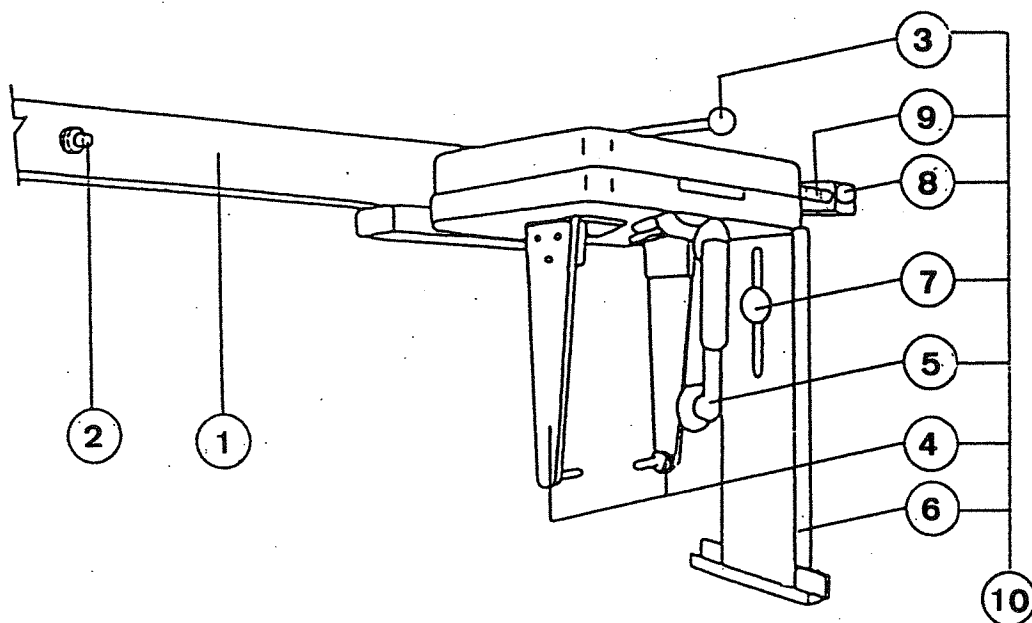
## SECTION TWO : OPERATING INSTRUCTIONS FOR TMJ

### PATIENT POSITIONING FOR TMJ RADIOGRAPHY

1. Remove the Chinrest and replace Head Holding Rods with Ear Holding Rods. Open the Ear Holding Rods fully. Then enter the patient into the machine.
2. Move the Ear Holding Rods forwardd so that the scale shows 20 mm forward from the center mark.
3. Adjust the height of Ear Holding Rods by moving Overhead Carriage up/down, so that the patient can stand upright.
4. Depress Indicator Switch on control panel. Indicator Beams come ON. For Frankfort Plane and Median Line, refer to "Patient Positioning of Panoramic radiography".
5. Carefully close the Ear Holding Rods to support the patient's head.
- ~~6. Patient is now positioned for TMJ radiography.~~

## SECTION TWO : OPERATING INSTRUCTIONS FOR CEPHALOMETRIC

### MAJOR PARTS IDENTIFICATION



### PATIENT POSITIONING CONTROLS & FUNCTIONS

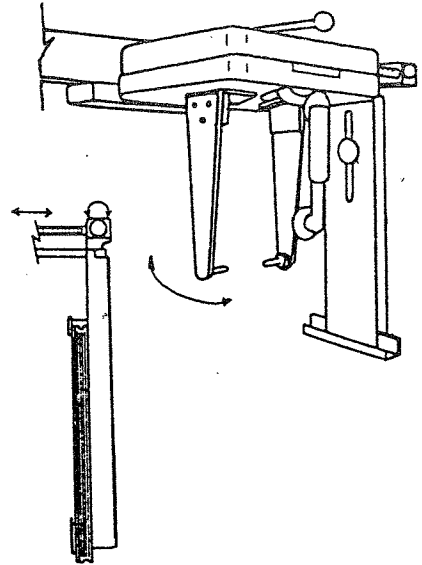
- ① CEPHALO. ARM ASSEMBLY
- ② LOCK SWITCH - Push this switch for adjusting the height of cephalostat assembly to patient's height.
- ③ EAR HOLDING ROD ADJUSTER KNOB - This knob adjustss symmetrical spacing of ear holdidng rods for accurate positioning of patient within cephalostat.
- ④ EAR HOLDING ROD
- ⑤ FOREHEAD REST
- ⑥ CASSETTE HOLDER
- ⑦ CASSETTE HOLDER KNOB
- ⑧ CASSETTE POSITION LOCK
- ⑨ CASSETTE POSITION SCALE - Indicates distance from patient center line to film plane(in cm.). Since this distance affects the magnification ratio, careful records must be kept when patients are periodically x-rayed over a period of time.
- ⑩ CEPHALOSTAT ASSEMBLY

# PATIENT POSITIONING

## CEPHALOMETRIC RADIOGRAPHY

Select the Ear Holding Rods direction.

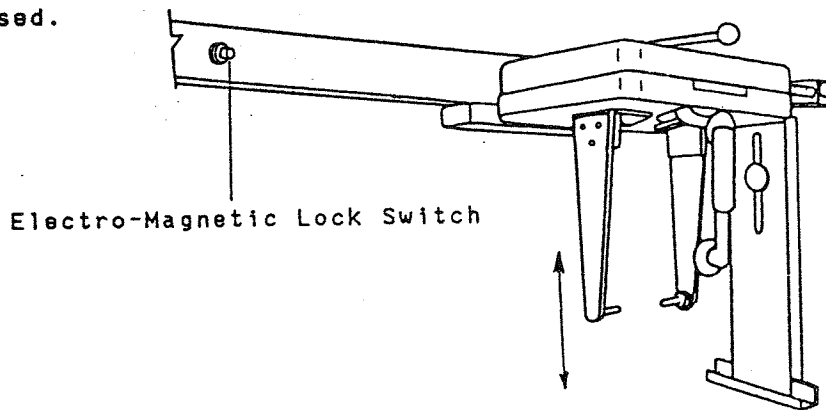
- (1) Turn the Rods toward the desired direction until they come to the proper position for lateral, postero-anterior or oblique views.
- (2) The Rods direction can be selected through every 45 degrees.



b) Adjust the position of the Cassette Holder.

- (1) Loosen the Cassette Position Lock and move the Cassette Holder to its proper position.
- (2) The Cassette Position Scale indicates the distance from the median line to the film cassette. Normally it is set to 15 cm. (Magnification is 1.1 times at this position.)

c) Adjust the height of the Cephalostat Assembly by moving the Cephalostat Arm up/down with the Electro-Magnetic Lock Switch depressed.



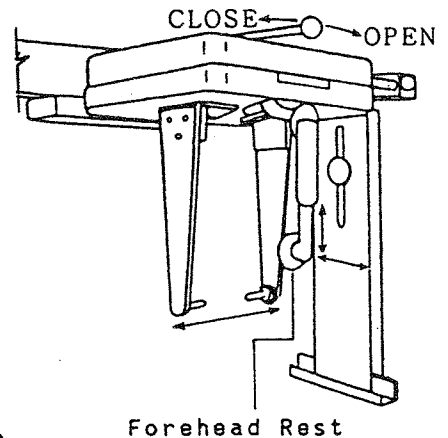
d) Open the Ear Holding Rods fully. Then enter the patient into the Cephalostat Assembly.

e) Tune the height of the Ear Holding Rods so that the patient can stand upright.

f) Carefully close the Ear Holding Rods to support the patient head and to retain correct alignment.

g) Slide the Forehead Rest up/down and back/forth so that the patient can rest gently against it with their line of sight approximately parallel to the floor.

h) Patient is now positioned for a cephalometric exposure.

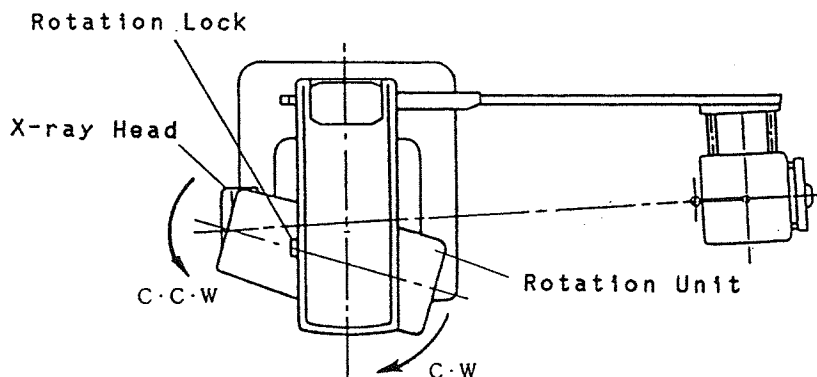
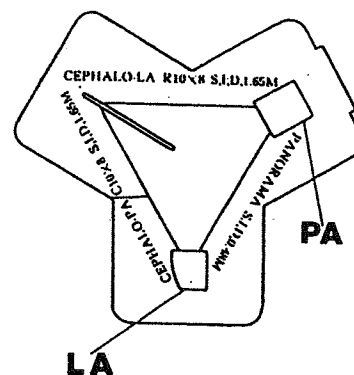




# OPERATING PROCEDURE

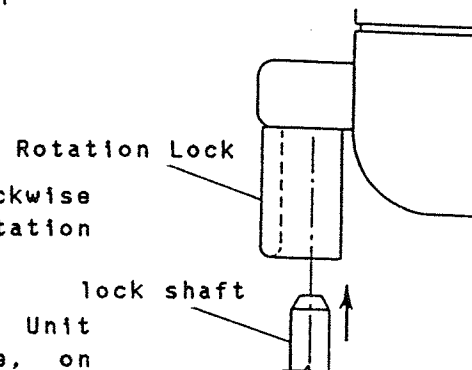
## CEPHALOMETRIC RADIOGRAPHY

- a) Select the proper Beam Limiting Device for a cephalometric exposure, either Lateral aperture or Postero-Anterior aperture, and insert it into the slot on the cone of x-ray head.
- b) Bring the Rotating Unit clockwise to Cephalometric Position.



- c) Twist the X-ray Head Assembly counter-clockwise and engage the lock to secure the Rotation Unit in Cephalometric Position.

NOTE: The Rotation Lock on the Driving Unit frame shall be aligned with the hole, on the Rotation Unit plastic cover, where the lock shaft comes out of.



- d) Lift the Cassette Holder Knob and set a loaded cassette on the Cassette Holder.
- e) Turn the unit ON.
- f) Position patient as described on page 8, "PATIENT POSITIONING".
- g) Depress the Cephalometric Switch and select the technique factors with regard to the Technique Factor Table on page 12, considering the patient size.

NOTE: When the Cephalometric mode is selected, each technique factor is automatically set at standard conditions of 80 kVp, 1.2 seconds.

- h) Depress the Ready Switch on the control panel and wait for the Ready light to stay ON.
- i) Take the Exposure Switch on the coiled cord to a safe operator's position (as defined by your state's x-ray protection statutes).

# O P E R A T I N G   P R O C E D U R E

## C E P H A L O M E T R I C   R A D I O G R A P H Y

- j) Depress the Exposure Switch. When the switch is depressed, the Exposure Warning Lamp will illuminate and the audible warning will sound. Do not release the Exposure Switch until the audible warning and the warning lamp terminates. Failure to keep the Exposure Switch depressed will result in the exposure being terminated prematurely.
- k) After use, turn the Main Power Switch OFF to prevent accidental exposures.
- l) Carefully help patient out of the unit.
- m) Remove cassette and develop film.

### STANDARD TECHNIQUE FACTOR FOR CEPHALOMETRIC MODE

A G E	V I E W	K V	M A	EXP. TIME
4 - 5	P A	75	10	0.7
	L A			0.3
6 - 10	P A	75	10	1.0
	L A			0.4
11 - 15	P A	80	10	1.2
	L A			0.5
16 - 18	P A	80	10	1.2
	L A			0.5
ADULT (Female)	P A	80	10	1.2
	L A			0.5
ADULT (Male)	P A	85	10	1.2
	L A			0.7

NOTE 1: FILM.....KODAK T-MAT G FILM (TMG 8"X 10")

SCREENS.....KODAK LANEX REGULAR

DEVELOPING...32° C(90° F), 3.5 MINUTES BY AUTOMATIC DEVELOPER

NOTE 2: EXPOSURE TIME MAY VARY  $\pm 20\%$ , DEPENDING ON THE INDIVIDUAL PATIENT SIZE.

EXPOSURE TIME RANGE IS FROM 0.3 SEC. TO 3.2 SEC. IN 15 STEPS.  
(0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.4, 2.8 AND 3.2 SEC.)

## SECTION TWO : OPERATING INSTRUCTIONS (GENERAL)

### BASIC DARKROOM PROCEDURES

#### Automatic Processors with Daylight Hoods

Following the individual manufacturer's instructions for the particular unit, that you are using, is essential.

1. Insure proper chemistry and film dating freshness.
2. Visually confirm once per day that the tank agitators are stirring the developer and fixer solutions.
3. If so equipped, confirm that the replenishment system is working when the film is fed.
4. Always allow adequate warm up time before processing any radiographs.
5. Panoramic and Cephalometric film will show up poor chemistry, improper processing time, and improper processing that might pass unnoticed in intraoral films.
6. Panoramic and Cephalometric films are much more sensitive to light than intraoral films and will show up light leaks in the processor or it's hood when intraoral film does not.

#### Automatic Processors in Darkrooms

Same comments apply, except now you must insure there are absolutely no light leaks in your darkroom because of the film's sensitivity and the length of time it is exposed in the darkroom prior to being completely fed inside the processor. Turn your safe light off, wait until your eyes have adapted to the dark and look up along the ceiling time margin around the door, especially at the bottom. If you see any light - IT IS TOO MUCH. Seal it up.

#### Manual Processing in Darkrooms

Observe the light leak tests for automatic processors in the darkroom. With manual processing several things become critical :

1. Proper temperature of developer and wash - See your film box for this temperature.
2. Precise timing of developing, fixing and washing - Again see your film box instructions.
3. Agitation of the developer and fixer prior to developing and their freshness is also critical.
4. Constant replacement of wash water.
5. Agitation of film hangers in developer and fixer during the developing process.
6. Use only a safelight with KODAK GBX-2 filter element when processing panoramic film or turn your safelight off. General purpose photographic safelight (which are designed for photographic printing paper) ARE NOT SUITABLE.