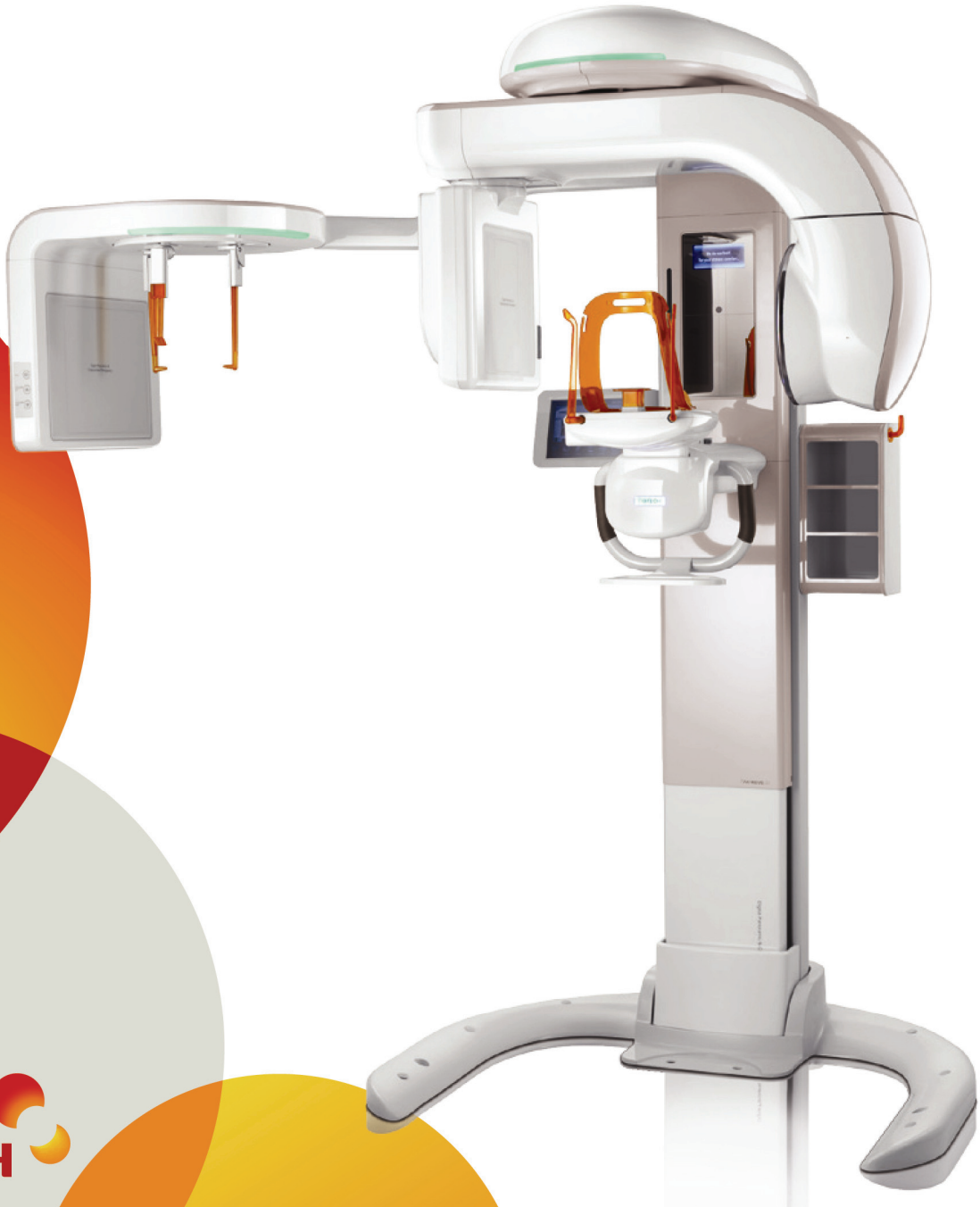
World's Best Dental Imaging Company

PaX-Reve3D

User Manual



Caring Insight

VATECH

Table of Contents

Chapter 1 Introduction

This user manual contains a unit description, imaging software installation directions, operation instructions, and other useful information for the PaX-Reve3D digital imaging system.

1.1 Conventions used in this guide

The following symbols will be used throughout this manual. Make sure that you fully understand them and obey the instructions they reference.

Symbol	Message	Meaning
	Note	This symbol indicates a *note* to help you get the ideal performance from the system. Carefully read and follow these notes to receive the best results.
	Warning	This symbol indicates a *warning* that should be obeyed with extreme care. When missed, it may cause severe damage or physical injury.
	X-Ray	The radiation symbol represents possible radiation danger. Proper procedures should be followed.
	Important	Contains important instructions. If not observed, malfunction or system damage may occur.

1.2 Note to the user

X-Ray can be harmful and dangerous if not used properly. The instructions and warnings contained in this manual must be followed carefully.

As a manufacturer of radiology equipment that conforms to stringent protection standards throughout be world, we guarantee a maximum degree of protection against radiation hazards.

1.3 Warning and safety instructions

Extreme care must be used when operating this system, due to the involvement of high voltage and multiple electrical components within the unit.
Never expose the equipment to liquids or sprays – this may lead to electrical shock or damage to the equipment.

Laser beams can cause permanent eye injuries. For maximum safety, advise the patient to never look directly at the laser beam. While positioning be sure that the beam is not directed into the patient's eyes.

Warnings

1. You are responsible for the operation and maintenance of this unit. Only legally qualified persons can operate this unit. DO NOT remove the covers of this unit.
   When necessary, have a trained authorized service technician carry out inspection and maintenance operations.
2. Install this unit in an X-Ray room that complies with current installation standards. From this location, you must be able to maintain visual or audio communication with the patient. This unit must be permanently grounded with a fixed power supply cable.
3. DO NOT place the PC and other peripheral equipment associated with the unit in the immediate vicinity of where the patient will enter the unit. Leave at least 2m of distance between the patient and the PC/peripherals.
4. To obtain maximum image quality and visual comfort, position the screen to avoid direct light reflections from internal or external lighting.
5. X-ray equipment is hazardous to patients and the operator if you do not observe the exposure safety regulations and operating instructions.
6. DO NOT place objects within the unit's field of operation.
7. The patient should wear a protective lead-lined shoulder apron.
8. Disinfect any parts of the unit that come into contact with the patient and the operator after each patient has been exposed.

9. While adjusting the height of the unit, ensure that the patient is kept clear of the Machine.
10. When the unit is not in use, ensure that the ON/OFF switch is set to OFF (O).
11. To dispose of the unit or its components, contact an authorized service technician.
12. Ask the patient to remain still until the unit has stopped moving and the reset movement has completed.
13. DO NOT use this unit in conjunction with oxygen-rich environments. This unit is not intended for use with flammable anesthetics or agents.

1.4 Cautions

Make sure to observe the following statements.

- Follow the specified process of operation for the safety of both user and patient.
- Check the system condition (power, PC, cable) prior to use.
- When capturing images, be sure to let the machine cool down in accordance with the voice announcement from the device, when needed, before capturing another image.
- Place this unit away from water, moisture, or foreign substances as this product is a precision medical electronic device.
- If this product was exposed to water or foreign substances during use that resulted in abnormal operation, turn off the power immediately and contact your agent for technical support.

1.5 Warning

Make sure to observe the following statements.

- The PaX-Reve3D is a precision electro-mechanical system. Therefore, please read this manual carefully before operating this equipment. E-WOO is not responsible for damages caused by improper installation, operation, or maintenance procedures.

1.6 Radiation protection policy

Users must comply with the rules and regulations of their country for radiation safety and protection since they differ among countries.

- User should wear lead apron or use protective walls to protect him / her from radiation during the imaging process.
- Users should provide protective clothing, such as a lead apron, to the patient during imaging.
- Children or pregnant women should consult with the doctor in charge before imaging.
- Users should be at least 2 m (6 feet) away from the equipment during imaging.
- Equipment should be located inside an X-ray shielded facility. During imaging; the operator should be able to view inside the room through a window or from another location outside the shielded facility.
- Users should continuously check the patient and equipment status during imaging.
- Users should immediately stop imaging if equipment malfunctions.

1.7 Manufacturer liability policy

The manufacturer and sellers of X-Ray equipments, such as this product, can only assume responsibility for safe and normal operation of the product when the following criteria is met.

- Product must be installed by an authorized agent.
- Product must be installed in accordance with the cautions and conditions provided in the installation manual for this device.
- A genuine product must be used, as approved by the manufacturer.
- Maintenance and repairs must be performed by an authorized agent.
- Product must be used in accordance to this user manual.
- Equipment damage or malfunctions not attributed to user inflicted damage or error.

Chapter 2 PaX-Reve3D imaging system overview

2.1 System features

The PaX-Reve3D is diagnostic equipment that incorporates Digital Dental Panoramic and Cephalometric Imaging Systems, as well as Computed Tomography with Cone Beam Technology. This equipment is based on digital and computed tomography. Specifically, its advanced digital imaging process allows for a considerably more efficient diagnosis, well-rounded management of information, and a real-time sharing of image information over a network. It is equipped with state-of-the-art CT sensor technology to capture 3-D Computed Tomogram X-Ray images.

Summary in brief:

- Digital Panoramic X-Ray Imaging System with CMOS Sensor
- Digital Cephalometric X-Ray Imaging System with FPD based on a-Si TFT
- CBCT [Cone Beam Computed Tomography] X-ray Imaging System with FPD based on CMOS
- Movement Technology — Multi-motor with digital trajectory control; Motorized carriage movement
- Patient Positioning — CT - Triple [Mid-Sagittal / Vertical / Horizontal] laser beam positioning; Pano - Triple [Mid-Sagittal / Frankfurt / Canine] laser beam positioning
- Patient Positioning Aid — Chin rest, bite block, head-rest, mirror; Ear rods for PANO & CEPH mode
- Voice Instruction — Typical – English
- Up/Down Movement — Silky up/down with one stage speed by electric-motor

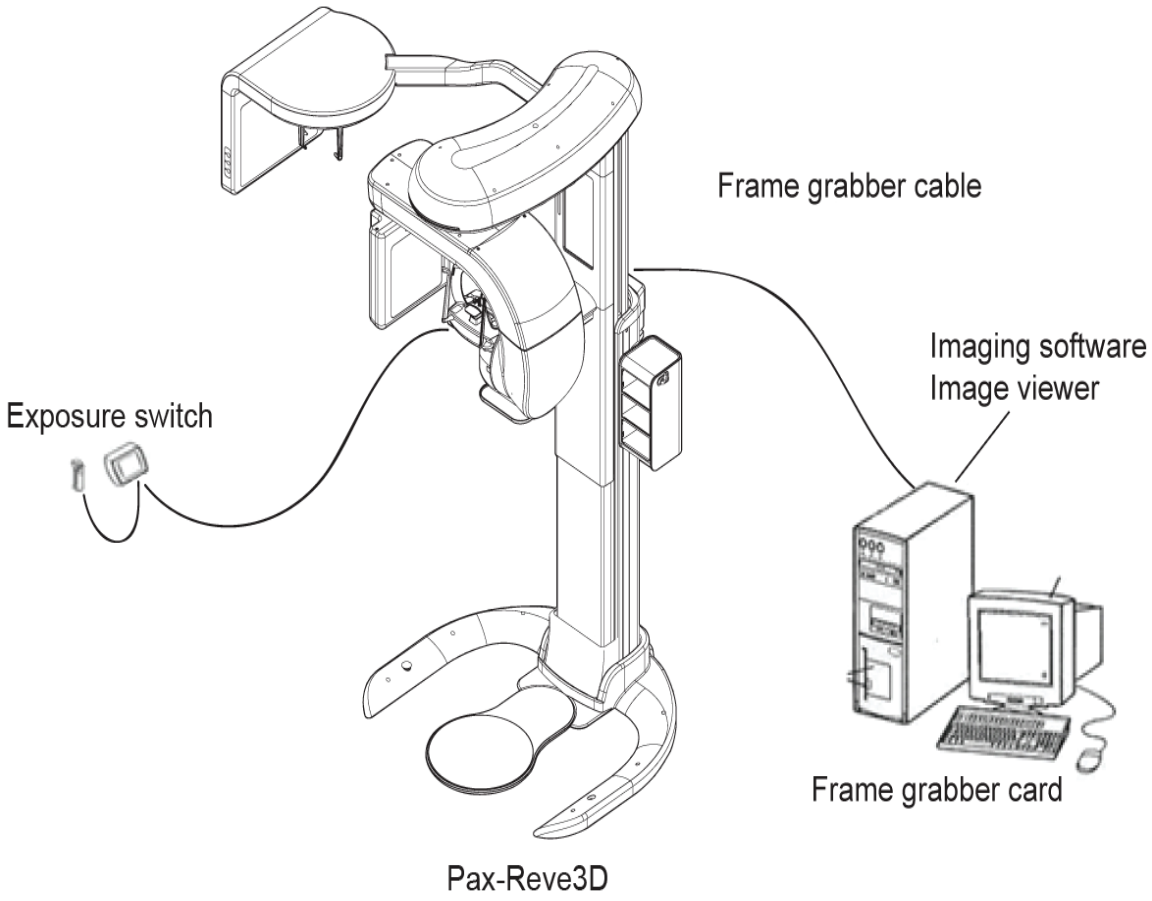
This equipment provides the following features:

1. Consolidates Panoramic, One-shot Cephalometric and CT imaging into a single system and provides the ability to acquire high quality digital images with ease
2. Easy operation using both the PC and attached Touchpad Screen.

3. Auto-focusing capability using the adaptive layer mode panoramic tomography in the panoramic mode.
4. Features a 3 in 1 system that provides all the necessary dental images for diagnosis.
5. Supports a variety of capture modes for dental diagnosis and treatment, such as implants.
6. Able to switch between modes automatically, without the mounting and removal of sensors.
7. Features a FPXD for Cephalometric one-shot capture..
8. Generate extremely clear 3D reconstructed images used to analyze areas that 2D images do not provide, making practices safer than ever before.
9. Space requirements are similar to a general panorama system.
10. Greatly reduced exposure doses compared to a general purpose CT X-Ray system.
11. Improved reliability by adopting the CAN(Controlled Area Network) protocol that is used throughout the aviation industry, leading to a great reduction in system malfunction.

2.2 Imaging system construction

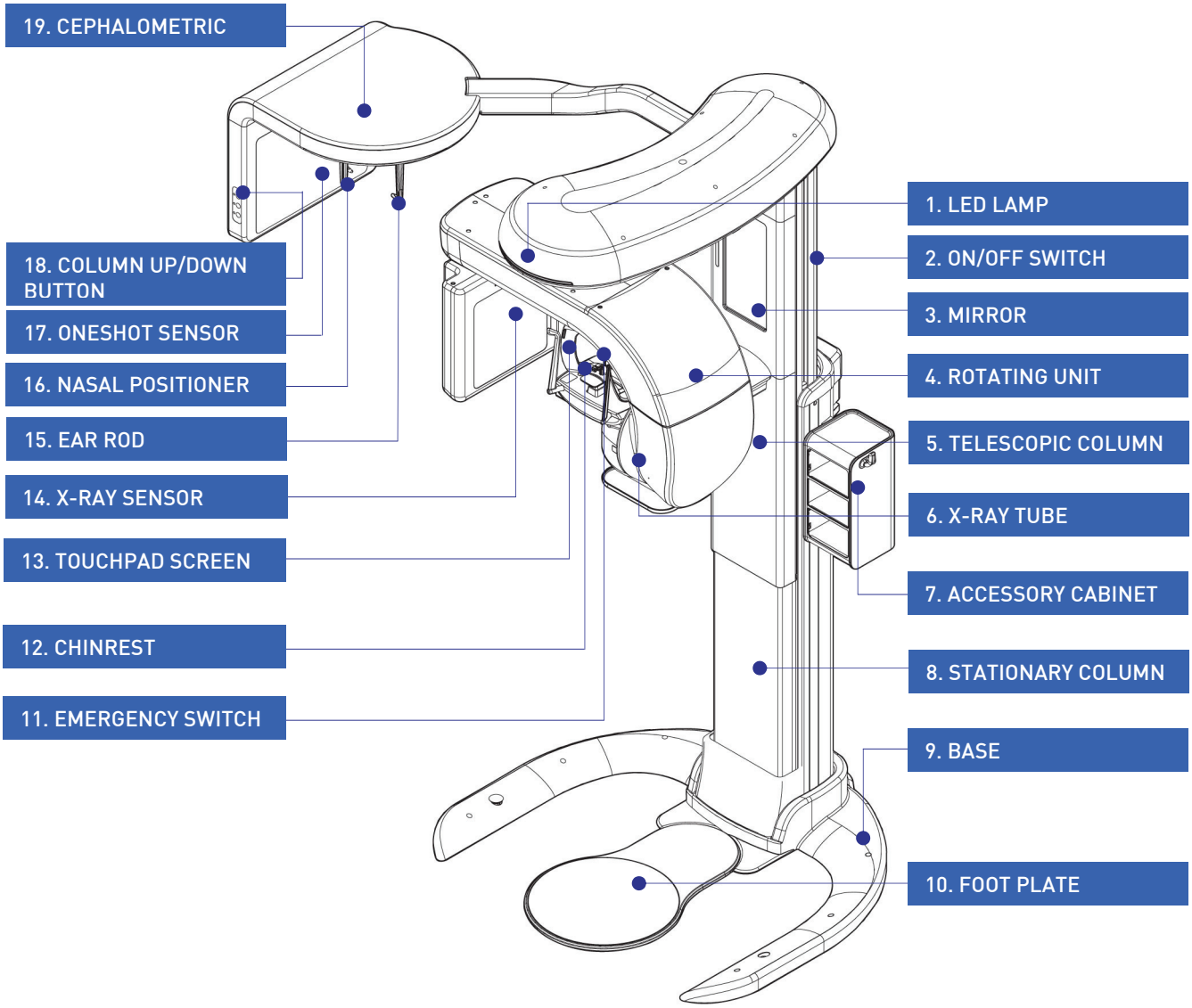
The following image depicts the general connection configuration for the PaX-Reve3D and PC workstation.



NOTE

The frame grabber cable and card are used to deliver the captured image to the PC, where the image is manipulated and processed for viewing and printing. This interface is required due to the high volume of data traffic and to ensure error-free transmission to the PC.

2.3 General view of the PaX-Reve3D

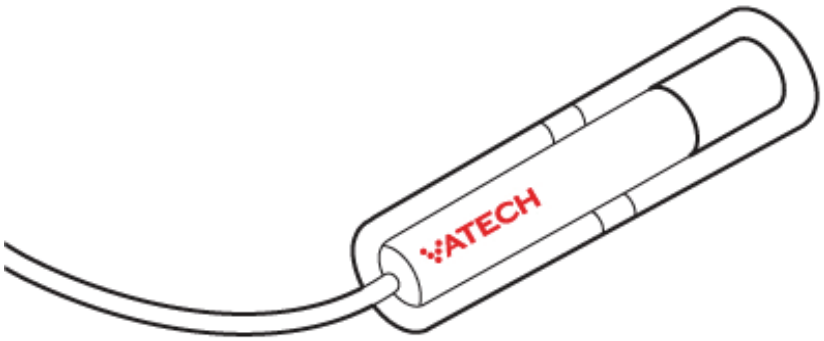


1. **LED LAMP** : Green when idle, orange during X-Ray exposure.
2. **ON/OFF SWITCH** : Turns the equipment on and off.
3. **MIRROR:** Allows the patient to correct their position using their reflection in the mirror.
4. **ROTATING UNIT** : Automatically moves to the proper position and rotates around the patient's head during exposure.
5. **TELESCOPIC COLUMN** : This part of the column moves up and down for patient positioning.
6. **X-RAY TUBE** : The source of X-Ray emission.
7. **ACCESSORY CABINET** : Used to hold accessories used in the operation of this unit.
8. **STATIONARY COLUMN** : This portion of the column is fixed to the base.

9. **BASE** : used to balance and stabilize the equipment.
10. **FOOT PLATE** : Plate on which the patient stand while imaging.
11. **EMERGENCY SWITCH** : For safety reasons, this is used to terminate power to the equipment if a severe fault occurs. Its primary use is to protect both humans and equipment from severe injuries or damage.
12. **CHIN REST** : The patient will rest their chin here during imaging.
13. **TOUCH PAD SCREEN** : Allows the operator to control certain functions of the unit by touching the screen. The LCD screen will also display operation parameters as well as helpful text messages. Users can touch the screen the activate the unit.
14. **X-RAY SENSOR** : Used to detect a dose of X-Rays emitted through a patient and convert this into an electrical signal. This module consists of two different sensors that perform different functions (CT and Panoramic).
15. **EAR ROD** : The vertical pieces holding the ear rods are usually wood or plastic.
16. **NASAL POSITIONER** : Used to help position the patient correctly in Cephalometric mode.
17. **ONE-SHOT SENSOR** : Refers to the type of sensor detecting signal used in Cephalometric mode.
18. **COLUMN UP/DOWN BUTTON** : It is a function that controls the up/down movements of the column additionally in the cephalo module.
19. **CEPHALOMETRIC UNIT** : an assembled unit used to carry out Cephalometric imaging.

2.4 Exposure switch

The exposure switch enables the user to invoke image capture via the exposure button from outside of the X-Ray room. Press and hold the exposure button until the end of acquisition. Premature release of the button will abort image capture.



2.5 Anatomical programs supported

The PaX-Reve3D has been designed to carry out the following radiological examination modes.

- Standard Panoramic mode
- Special Panoramic mode
- Cephalometric mode
- CT mode

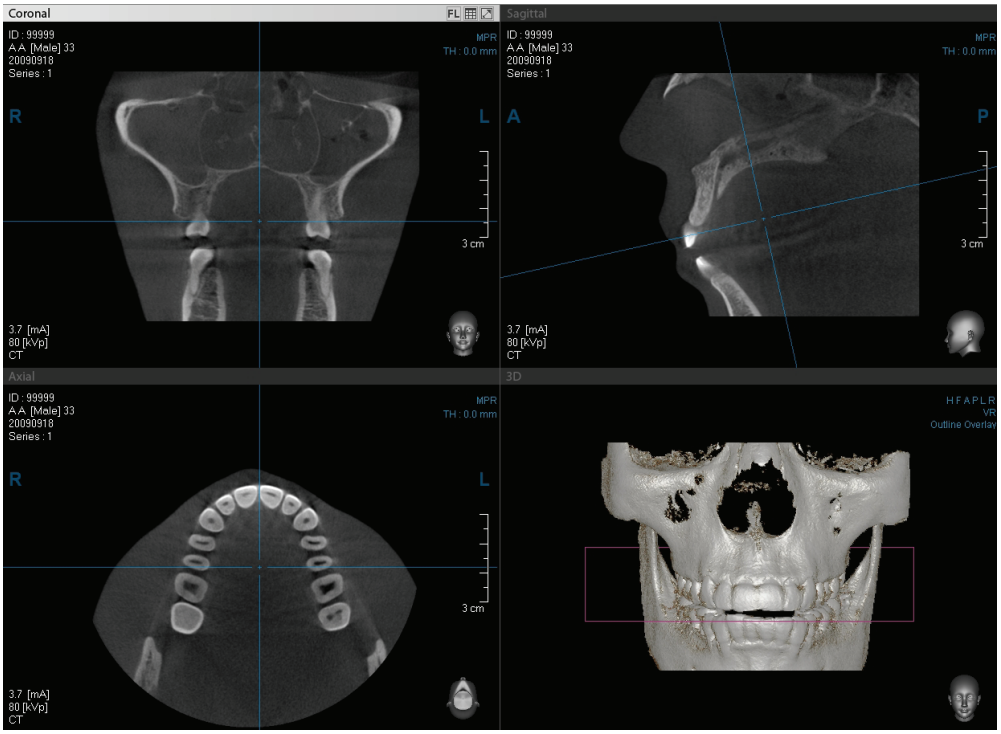
<Anatomical Programs Supported>

Standard mode	Normal Panorama Fast Panorama Right Front Left TMJ Open TMJ Close Sinus	
Special mode	Molar Clear Right Molar Clear Left Canal Clear Right Canal Clear Left Incisor Clear Orthogonal	
Arch mode	Normal Narrow Wide Child	
Setting mode	Man Woman Child	Hard Normal Soft
Cephalometric	Lateral Frontal SMV Carpus	

CT mode	P Mode (FOV 150x150) I Mode (FOV 120x80) D Mode(FOV 80x60) S Mode (FOV 50x50) F Mode Double Scan Mode

2.5.1 Computed tomography examination programs

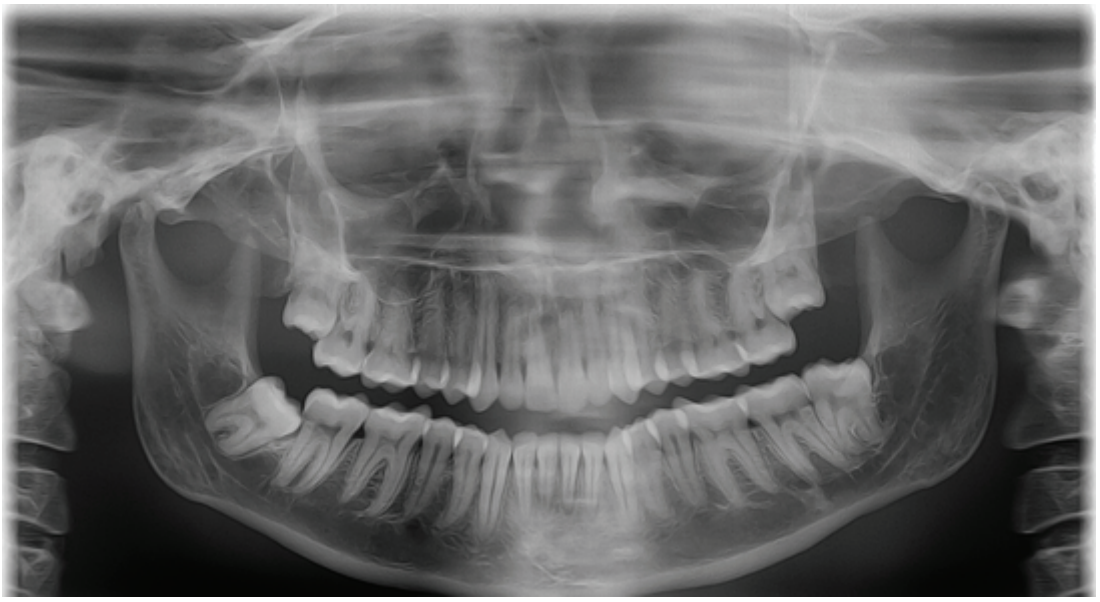
- 3-D Volume Rendering
- Axial View
- Coronal View
- Sagittal View
- Cross-Sectional View
- Panoramic View
- MPR – Multi-Planar Reconstruction
- Region of Interest [ROI] – Analysis Bone Density [Hounsfield Units]



2.5.2 Panoramic examination programs

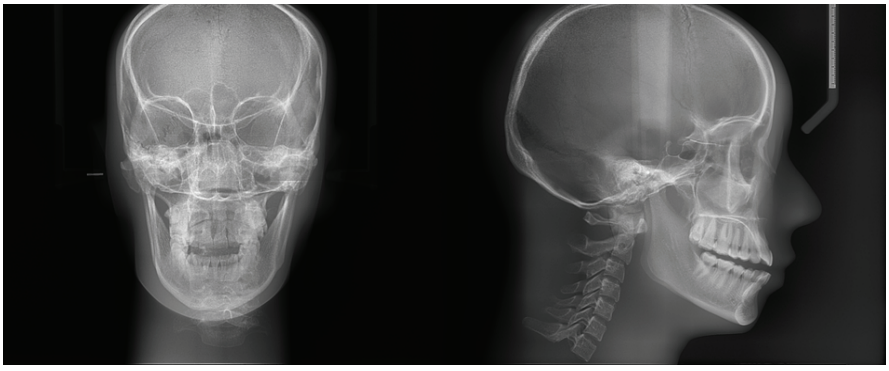
In each program the compensation for the spinal column is obtained by means of exposure parameter modulation, optimized in accordance with the selected anatomic program.

- Normal Panoramic
- Hemi-Panoramic (Left and Right)
- Frontal Dentition
- TMJ Open/Close mouth : 4 views [Right Open–Right Close–Left Close–Left Open] are captured on one image.
- Maxillary Sinuses



2.5.3 Cephalometric examination programs

- Latero-Lateral
- Posterior-Anterior
- Carpus
- SMV



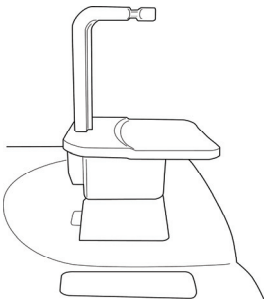
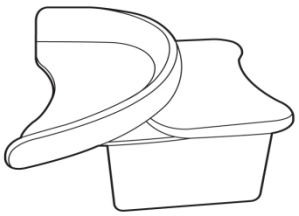
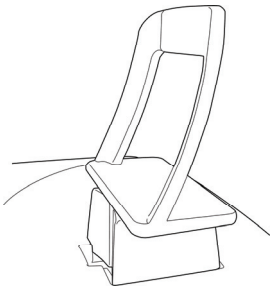
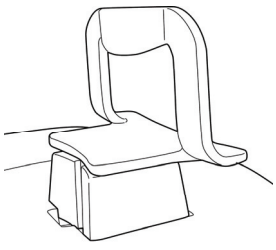
2.5.4 Anatomic programs

- Patient Type : CT - adult, weak
- Examination Region : CT(FOV, cm*cm) - 15*15, 12*8, 8*6, 5*5
  Pano – Normal, Left, Right, Center, TMJ
- Arch Shape : Pano – Normal, Narrow, Wide, Child

2.5.5 Image processing

- CBCT Examination Programs : Normal, Metal Artifact Reduction.
  *** Metal Artifact : Please select 'Metal' for patient with 2 ~ 3 crowns.**

2.6 Replacement parts and positioning accessories

Accessory	Description
	Normal bite
	Toothless support
	TMJ support
	Sinus support

Chapter 3 Imaging software overview

3.1 PC system requirements

IMPORTANT

It is mandatory to ensure that the PC system configuration is compatible with the PC system requirements for the imaging software and image viewer software. If necessary, the user must update their PC system configuration. Do not place the PC and the peripheral equipment connected to it in the immediate vicinity of the patient in the unit. Leave at least 1.5 m distance from the unit.

Item	Minimum Image Viewing Requirements	Minimum Acquisition Requirements	Comments
CPU	Intel Xeon E5420, 2.5Ghz or higher	Intel Xeon E5420, 2.5Ghz or higher	
RAM	4 GB DDR2 or above	4GB DDR2 or above	RAM has a major impact on system performance.
Hard disk drive	1.2 GB for software installation • 80 GB free space to use the software	1 TB (prefer bigger capacity. Do not use RAID)	
Graphic card	1GB (NVIDIA Geforce GTX 280)	NVIDIA Geforce GTX 280, 1GBytes	The video RAM has major impact on system performance.
Monitor	19" or larger, 1280 x 1024 minimum screen resolution	19", 1280 x 1024 minimum screen resolution	Your monitor is a vital component when displaying quality images. Low-quality screens can prevent proper diagnosis and treatment.
Operating system	Windows XP Pro edition SP2	Windows XP Pro edition SP2	
Ethernet interface	1 Ethernet interface	1 Ethernet interface (100Mbits)	

Serial Port		1 RS232 port	To communicate with the Unit
CD/DVD drive	CD-ROM drive is required to install the product.	CD-ROM drive is required to install the product.	

3.2 Software overview

The following image shows the initial view of the imaging software running *on the PC.*

When operating the PaX-Reve3D, most primary operation will be carries out on the main screen of the PC. This program runs in a passive way only displaying images that has been acquired, similar to an image viewer.

1. **Dental CT**

   Displays the window for CT mode operation. To activate, select this mode and any subsequent parameters.

2. **Special panoramic mode**

   Displays the window for Special Panoramic mode operation. To activate, select this mode and any subsequent parameters.

3. **Standard panoramic mode**

   Displays the window for Standard Panoramic mode operation. To activate, select this mode and any subsequent parameters.

4. **Cephalometric mode**

   Displays the window for Cephalometric mode operation. To activate, select this mode and any subsequent parameters.

5. **Information window**

   Shows the current status of imaging via text messages. Also includes patient name, age, and chart number.

6. **ON/OFF switch for laser beam light**

   Switches the laser beams ON and OFF for patient positioning.

7. **Serial COM port**

   Sets the COM port for serial communication used between the PC and the unit.

8. **Exit Button**

   Exits the imaging program.

9. **Instructional message display**

   Displays the current instructions for the user.

10. **Patient appearance display**

    Displays the patient's appearance during image acquisition

11. **Confirm**

    Confirm the current parameters.

12. **Ready**

    Launch the exposure and start acquiring image

3.3 Touchpad Screen overview

This picture describes each unique mode in which relevant functions are selected and its parameters are configured. To make a selection on the Touchpad Screen, simply touch the screen with your finger on a text field or any of the icons.

① **HOME :** Go back to the main (initial) screen.

② **MODE :** Displays the currently selected imaging mode among Standard Pano, Special Pano, Cephalometric, and CT.

③ **BEAM :** Used to operate the patient camera and alignment lamp to position the patient properly. Turns the laser beams on and off.

④ **CAMERA :** Used to send an image of the patient during image acquisition.

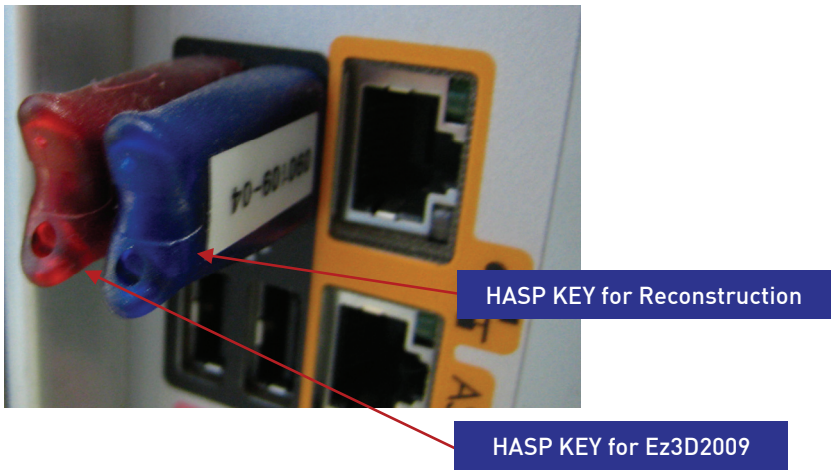
⑤ **ARCH :** Used to adjust the focal area of image acquisition based on the patients arch.

⑥ **RETURN BUTTON :** Return the rotating unit to its initial state.

Chapter 4 Getting started

4.1 HASP Key installation

To capture, view, and analyze images, the driver software for the two provided HASP keys should be installed properly.



4.2 Starting the imaging software

Ensure that:

- All the connections between the PaX-Reve3D and PC are properly connected.
- The PC is turned on.

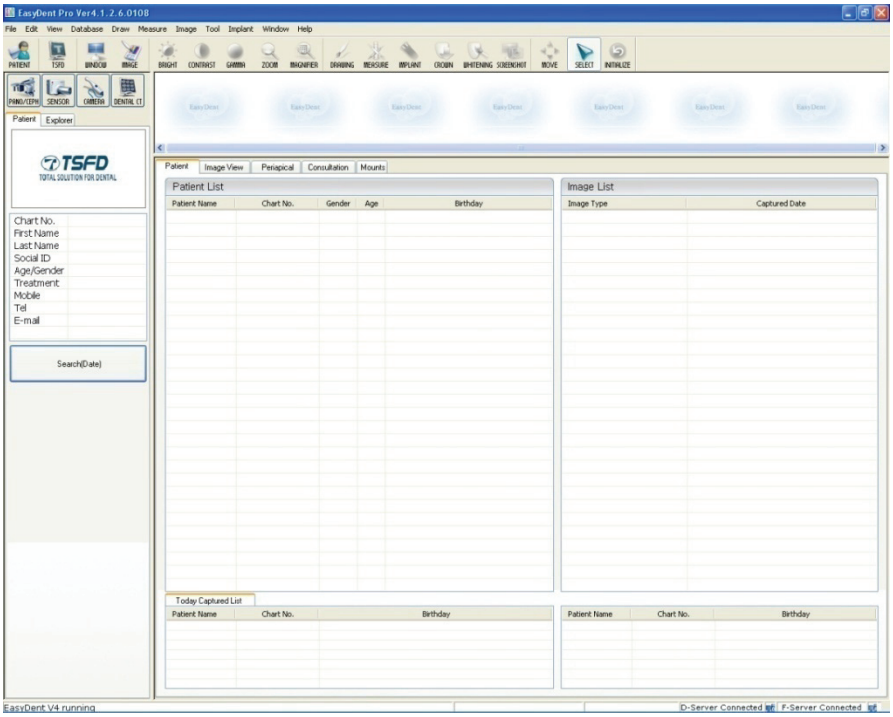
To launch the imaging software, follow these steps:

1. On your desktop, double-click **EasyDent** or **Start > All Programs > EasyDent4.**
   A blank Patient Window will be displayed.
2. Create or open an existing patient record.

4.3 Creating a new patient record

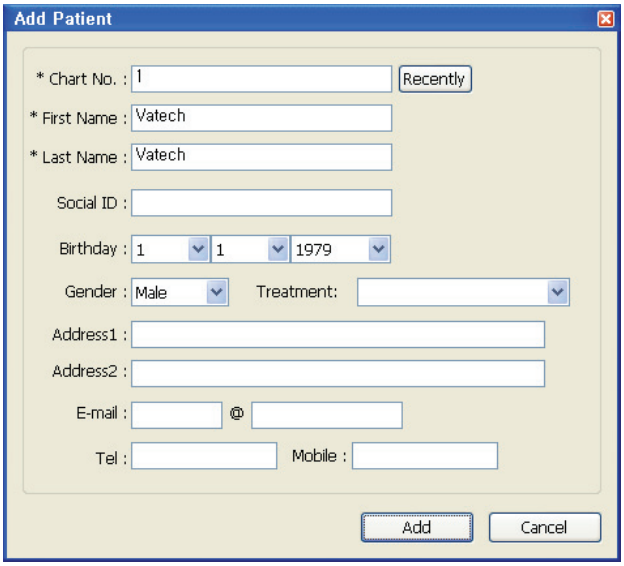
To create a new patient record, follow these procedures.

1. Launch **EasyDent** and the following main screen will appear.



From the menu bar, select **Database > New > Add.** The following dialog box will appear.

NOTE **For the detailed operation of this software, refer to the EasyDent user manual.**



2. Enter the required patient information. **Chart number, first name** and **last name** are required fields.
3. All other fields are optional, but recommended to be populated.
4. Once all of the parameters have been entered, click **Add** to save the patient record.

4.4 Turning on the PaX-Reve3D

Before switching on the equipment, check that installation of the unit is complete.
To switch on the unit, follow these steps.

1. Press the **ON/OFF** switch on the column.

IMPORTANT

To increase the operating life of the X-Ray tube, please take special care before using the equipment if it has been idle for an extended period of time.

2. Confirm that the patient's name appears on the touch pad screen.
3. The equipment is now ready for image acquisition.

4.5 Launching the image acquisition software

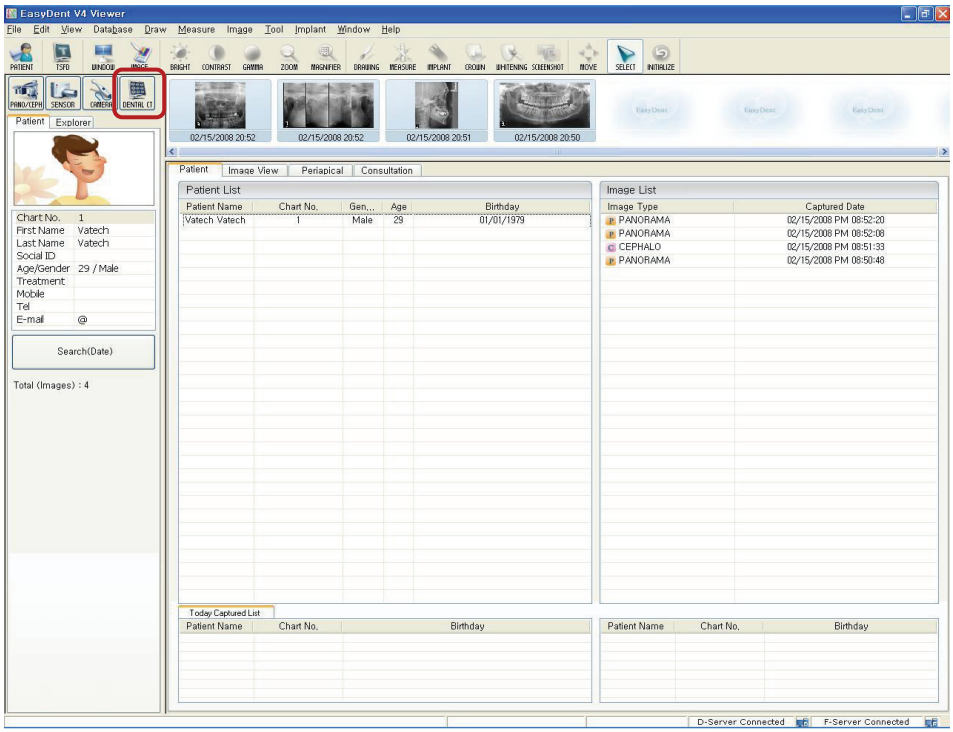
To access the image capture mode, follow the bellow procedure.

1. Run the **EasyDent** program.

NOTE

At this point, it is assumed that all relevant patient information has been entered.

2. From the main window, click the **Dental CT** icon in the upper left corner of the screen to *launch the image capture program.*



3. The following main screen will appear.

The above image shows the main window of the imaging software. Its sole purpose is to control the equipment and acquire images. By default, Standard Panoramic mode is activated.

Now it is time to launch exposure and acquire images.

The following chapter will give an overview of each specific imaging mode.

Chapter 5 Acquiring images

5.1 Acquiring standard panoramic image

Before acquiring an image, make sure that you have:

- Reset the rotating unit on the equipment to its starting position for patient entry.
- Selected the patient record you have created.
- Accessed the main program on touch pad screen to control the equipment.
- Have the imaging capture software installed on PC.

5.1.1 Unit preparation and acquisition parameters

From the PC, perform the following procedures to set the capture parameters for a specific patient and capture mode.

1. Click the **Standard** button to move to the next screen, displayed before.
2. Select **Normal** to acquire a standard normal mode panoramic image.

3. Select the patient type.
4. Select the Arch option as it relates to the patient.
5. Select his/her characteristics like bone density among **Hard, Normal and Soft**.
6. Manually adjust the **kVp and mA**, if necessary.
7. To capture an image of a patient, who has metal artifacts, select **Metal** from the Metal Processing. The **Metal** function reduces the appearance of Metal on the actual tooth image.
8. Click **Confirm** for parameters to take effect or click **Reset** to start over.

NOTE

It is sometimes necessary to adjust exposure parameters manually to accurately reflect the patient's unique bone structure and density. This is done through kVp/mA fine adjustment. Refer to the appendix for more details.

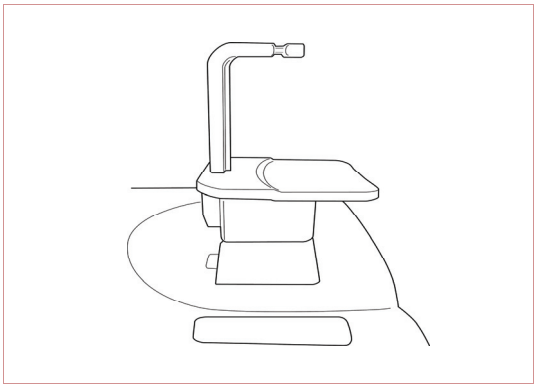
5.1.2 Patient preparation and positioning

To prepare and position the patient, follow the next steps.

IMPORTANT

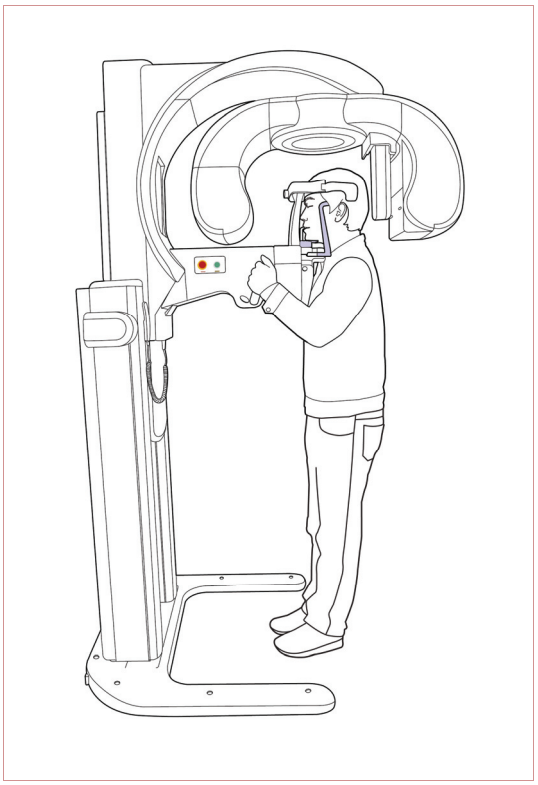
Correct posture is a very important factor for capturing the best image possible.
Good posture will reduce the appearance of the spinal column on the reconstructed image.

1. Have the patient remove all jewelry and metallic objects, such as earrings, hair pins, spectacles, dentures, and orthodontic appliances. These items can cause shadow images that may obscure diagnosis.

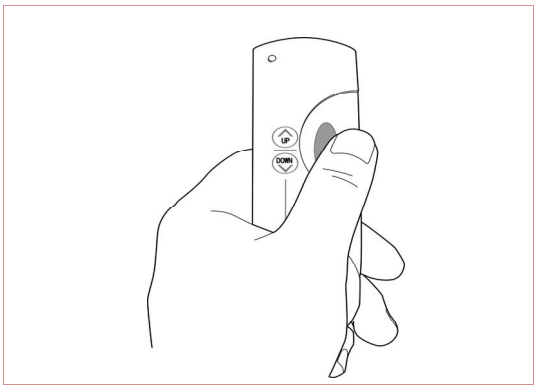


2. Insert the normal chin support and bite block in the unit's chinrest receptacle. Place a hygienic cover over the bite block.

3. It is recommended that the patient wear a lead apron for protection against any possible scatter radiation.



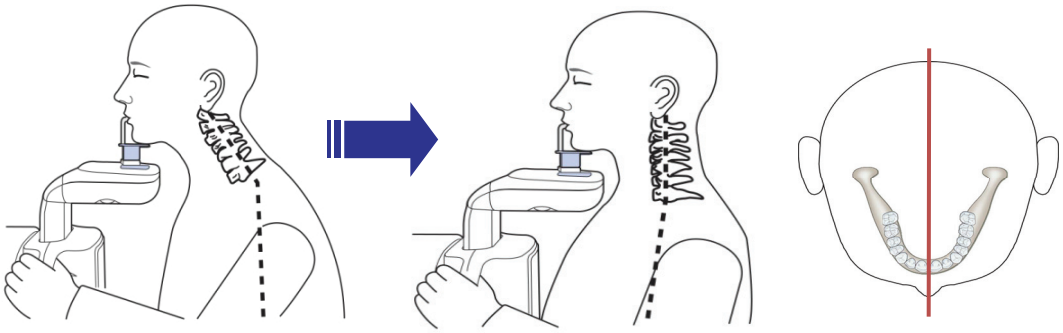
4. Have the patient stand upright at the center of the machine with their chin in line with the chinrest. Ask the patient to grip both handles on either side of the unit firmly. Ask the patient to position their feet slightly forward.



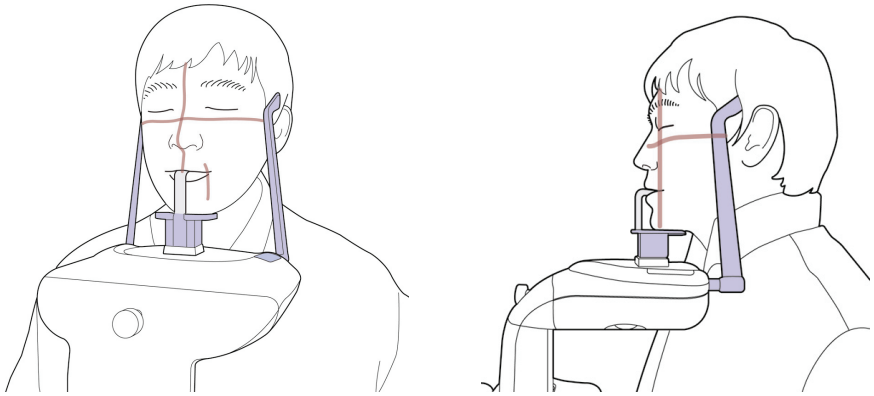
5. Adjust the height of the system using the column up/down switch until the patient's chin is resting on the chinrest. Position the patient's chin on the normal chin support.

6. The mid-sagittal positioning laser beam for the vertical alignment and the horizontal positioning laser beam for a Frankfurt plane alignment are activated by touching **Position** button on the main screen.

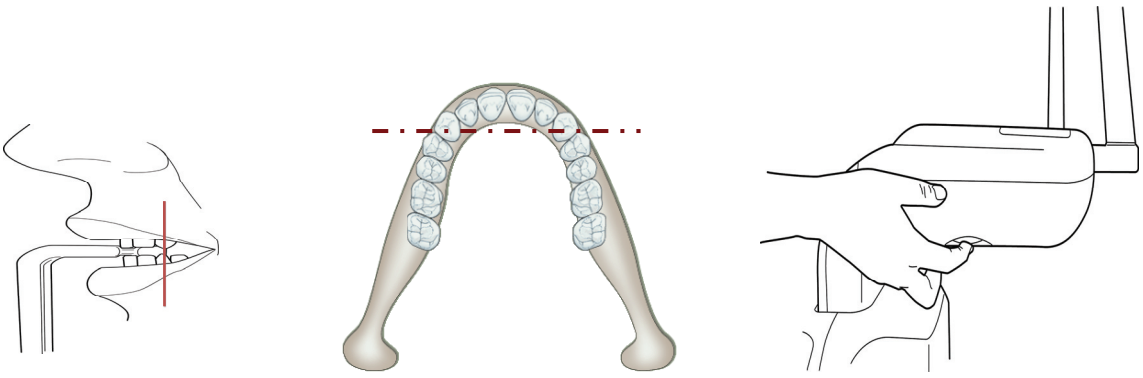
7. Ensure that the patient's shoulders remain level and their neck is relaxed. The cervical spine should be straight and upright. To prevent magnifications on the left and right sides of the final image, make sure that the vertical laser beam is positioned at the center of the occipital bone.

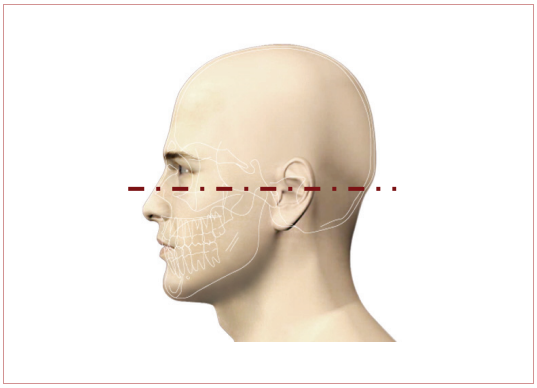


8. Have the patient bite the bite block along the grooves using their upper and lower incisors. Ensure that the chin is in good contact with the chin support.

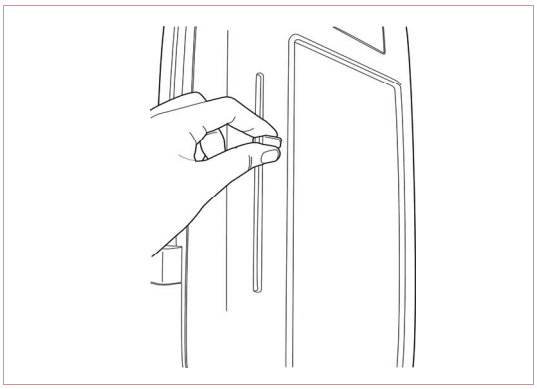


9. Have the patient smile to properly position the canine laser beam at the center of the patient's canine tooth. Rotate the thumb wheel, located under the patient support rest, forward and backward to properly align the beam.

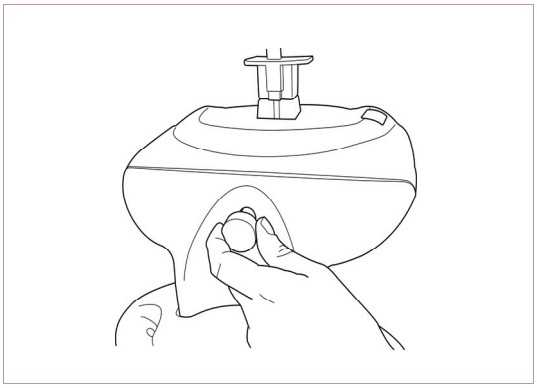




10. Position the head of the patient to properly align their Frankfort plane with the horizontal laser beam. For proper positioning, adjust in which way the patient's head is tilted by adjust the unit slightly upward or downward using the column up/down switch. The Frankfort plane is the line from the infra-orbital point to the superior edge of the External Auditory Meatus(EAM).

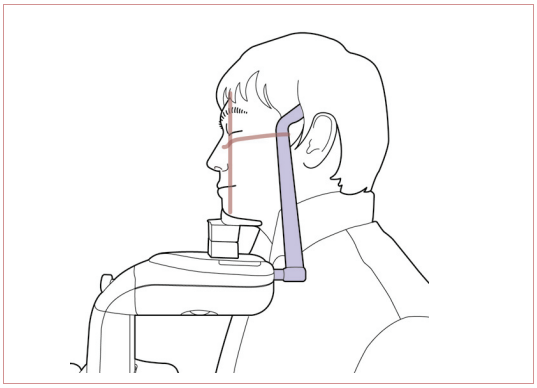


11. The horizontal laser beam, located at the side of the column, can be adjusted up or down to accommodate different head sizes. This is done by manually moving the horizontal laser beam lever up or down.

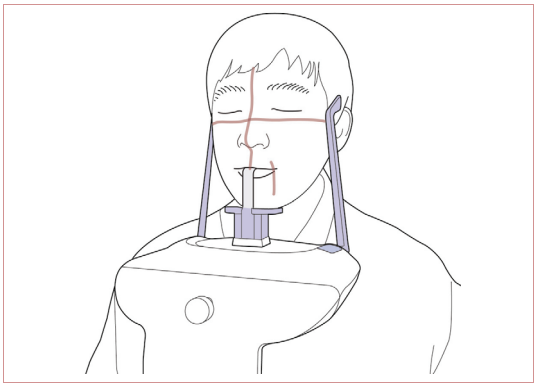


12. Using the temple support wheel button, adjust the temple supports to fit snugly on either side of the patient's head. The patient's head should be immobilized. The temple support wheel button is located at the front of the patient support rest.

13. Have the patient close their lips and keep their tongue positioned towards the palate throughout the exposure cycle.



14. For a patient with no teeth, the vertical laser beam should be positioned on the patient's mid-sagittal line. The horizontal laser beam should be aligned along the Frankfort plane. Align the canine beam on the fold on the side of the nose.



15. Ensure that the patient's eyes are closed. Ask the patient to remain still, swallow and place the tongue in contact with the palate and to breathe through the nose. Press and hold the **exposure switch** button until image acquisition is complete.

16. Press the **Ready** button after the patient has been positioned. The rotating unit will move to the panoramic imaging position.

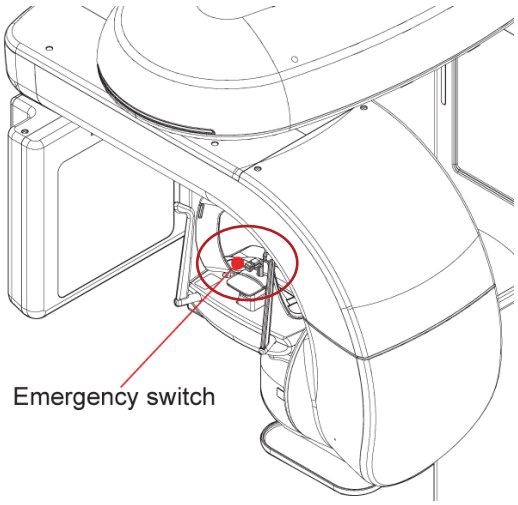
5.1.3 Launching X-ray exposure

To launch the X-ray emission, do the following.

1. Leave the X-Ray room and close the door. The operator must maintain visual contact with the patient during acquisition.

WARNING

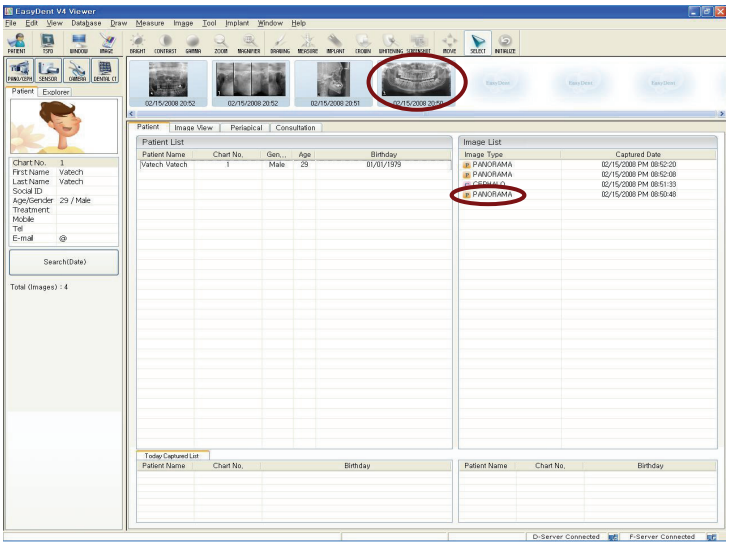
In case any problem occur during acquisition, release the exposure switch button or press the red emergency stop button on the main column. (See figure below)



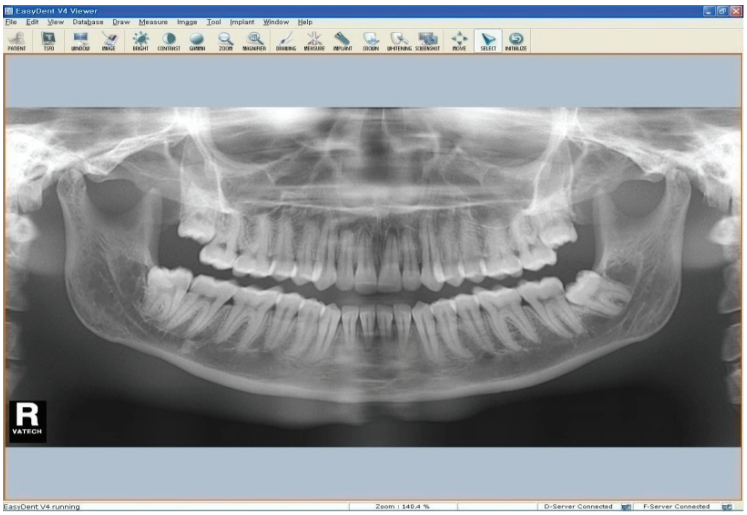
2. Begin X-Ray emission using the exposure switch. **Press and hold the button until the end of acquisition.** Observe the LED lamp on the top of the unit as it turns orange, indicating X-Ray emission. The image will appear on the capture program on the PC in real time. The following image shows the acquisition process.

After image acquisition, the image will be optimized for viewing, as shown below.

When acquisition is complete, the acquired image will be transferred to **EasyDent for viewing.**



When you press the name of the patient in the patient list after imaging, the image list for that patient is refreshed. The most recent image captured will appear on the far left, as shown in the above image. Double-click an image to enlarge it for viewing, as shown below.



3. Check image quality.
4. After image acquisition, do the following.
   - Open the temple supports and release the patient.
   - Remove the hygiene barrier from the bite block.
   - Reset the rotating unit for the next acquisition.

5.2 Acquiring TMJ (Temporomandibular Joint) image

There are two sub modes - TMJ Open and TMJ Close.

Before acquiring an image, make sure that you have;

- Reset a rotating unit on the equipment to its starting position for patient entry.
- Selected the patient record you have created.
- Accessed the main program on the touch pad screen for equipment control.
- Have the image capture software installed on the PC.

5.2.1 Unit preparation and acquisition parameters

From the PC, perform the following procedures to set the capture parameters for a specific patient and capture mode.

1. Click the **Standard** button to move to the next screen shown below.
2. Select **TMJ** mode.

3. Select the patient type.
4. Select the Arch option as it relates to the patient.
5. Select his/her characteristics like bone density among **Hard, Normal and Soft**.
6. Manually adjust the **kVp and mA**, if necessary.
7. To capture an image of a patient, who has metal artifacts, select **Metal** from the Metal Processing. The **Meta**l function reduces the appearance of Metal on the actual tooth image.
8. Click the **Confirm** for the parameters to take effect or click **Reset** to start over.

NOTE

It is sometimes necessary to adjust exposure parameters manually to accurately reflect the patient's unique bone structure and density. This is done through kVp/mA fine adjustment. Refer to the appendix for more details.

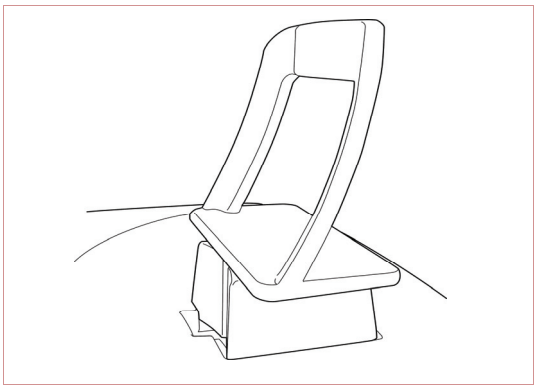
5.2.2 Patient preparation and positioning

To prepare and position the patient, follow the next steps.

IMPORTANT

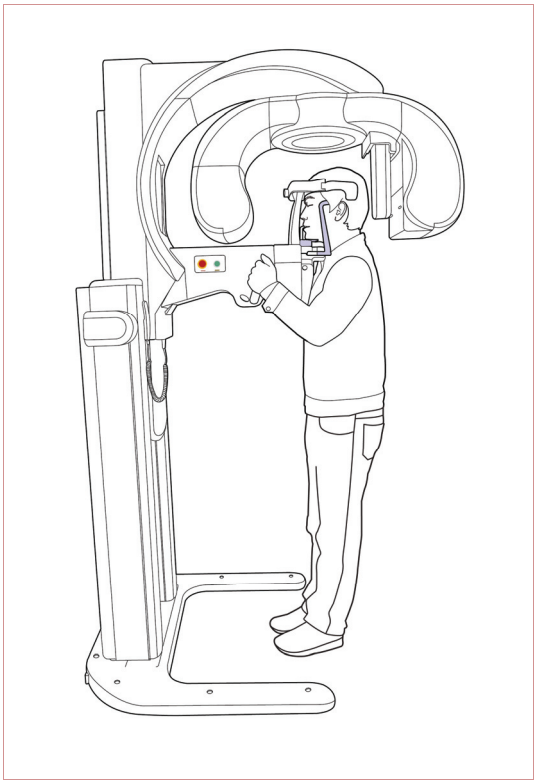
Correct posture is a very important factor for capturing the best image possible. Good posture will reduce the appearance of the spinal column on the reconstructed image.

1. Have the patient remove all jewelry and metallic objects, such as earrings, hair pins, spectacles, dentures, and orthodontic appliances. These items can cause shadow images that may obscure diagnosis.



2. Insert the chin support (TMJ).

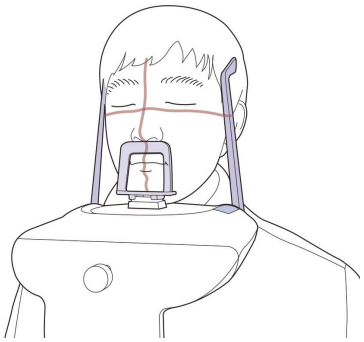
3. It is recommended that the patient wear a lead apron for protection against any possible scatter radiation.



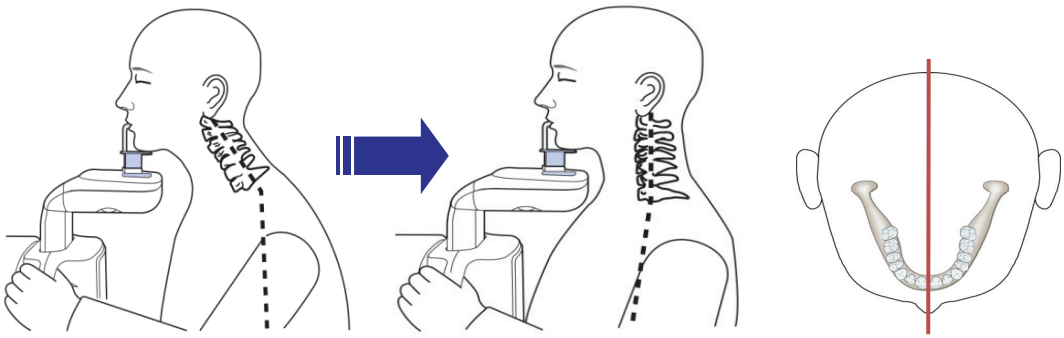
4. Have the patient stand upright at the center of the machine with their chin in line with the chinrest. Ask the patient to grip both handles on either side of the unit firmly.

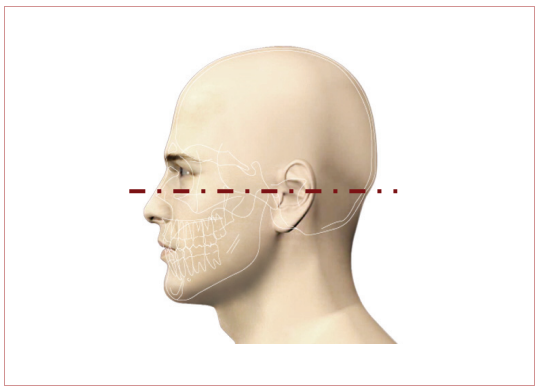
   Ask the patient to position feet slightly forward.

5. Adjust the height of the system using the column up/down switch until the patient's chin is resting on the chin rest. The top of the TMJ support should be in contact with the patient's acanthion point.

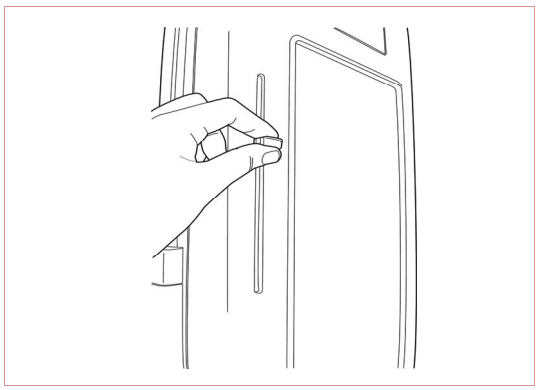


6. Ensure that the patient's shoulders remain level and their neck is relaxed. The cervical spine should be straight and upright. To prevent magnifications on the left and right sides of the final image, make sure that the vertical laser beam is positioned at the center of the occipital bone.



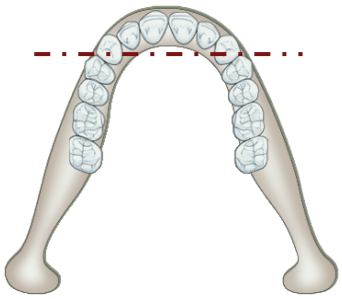


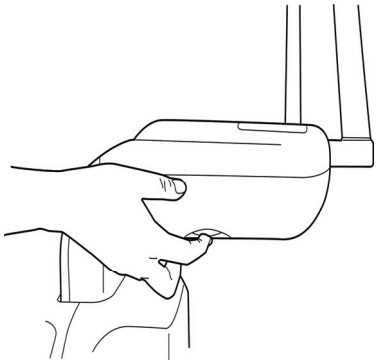
7. Position the head of the patient to properly align their Frankfort plane with the horizontal laser beam. For proper positioning, adjust in which way the patient's head is tilted by adjusting the unit slightly upward or downward using the column up/down switch. The Frankfort plane is the line from the infra-orbital point to the superior edge of the External Auditory Meatus (EAM).



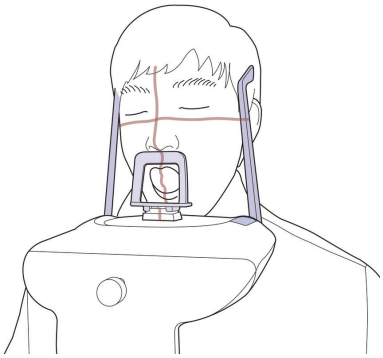
8. The horizontal laser beam, located at the side of the column, can be adjusted up or down to accommodate different head sizes. This is done by manually moving the horizontal laser beam lever up or down.

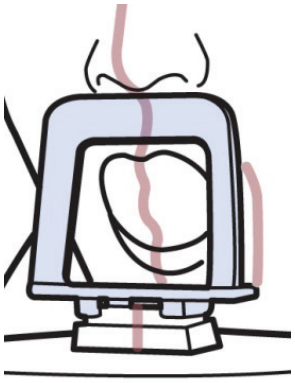
9. Have the patient smile to properly position the canine laser beam at the center of the patient's canine tooth. Rotate the thumb wheel, located under the patient support rest, forward and backward to properly align the beam.





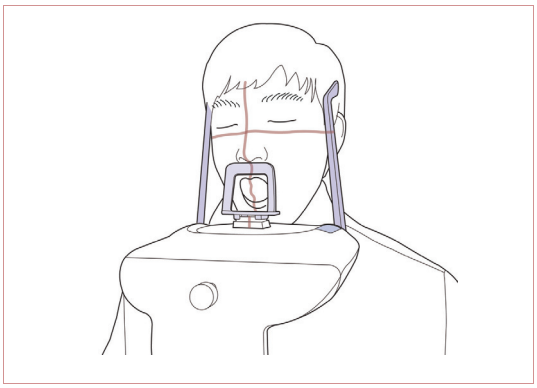
10. For TMJ – Open imaging, the patient's mouth should be opened as wide as possible. The top of the TMJ support and the patient's acanthion point must remain in contact.



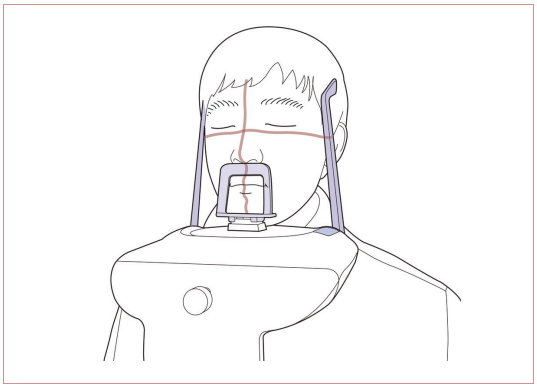


11. Have the patient close their eyes and rest their tongue at the bottom of their mouth throughout the exposure cycle.

12. Using the temple support wheel button, adjust the temple supports to fit snugly on either side of the patient's head. The patient's head should be immobilized. The temple support wheel button is located at the front of the patient support rest.

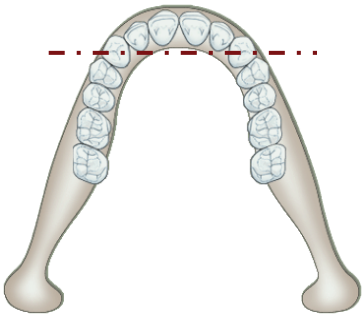


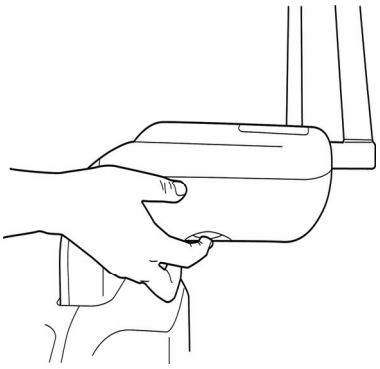
13. Ensure that the patient does not move during image acquisition. To expose, press and hold the exposure switch until TMJ – Open image acquisition is completed.



14. To subsequently take the TMJ–Closed image, the patient's mouth will now remain closed. The upper lip must make contact with the TMJ support.

15. Have the patient smile to properly position the canine laser beam at the center of the patient's canine tooth. Rotate the thumb wheel, located under the patient support rest, forward and backward to properly align the beam.





16. Have the patients close their lips and rest their tongue at the bottom of their mouth throughout the exposure cycle.

17. Ensure that the patient's eyes are closed. Ask the patient to remain still, swallow and place the tongue in contact with the palate and to breathe through the nose. Press and hold the exposure switch button until image acquisition is complete.
18. Press the **Ready** button after the patient has been positioned.

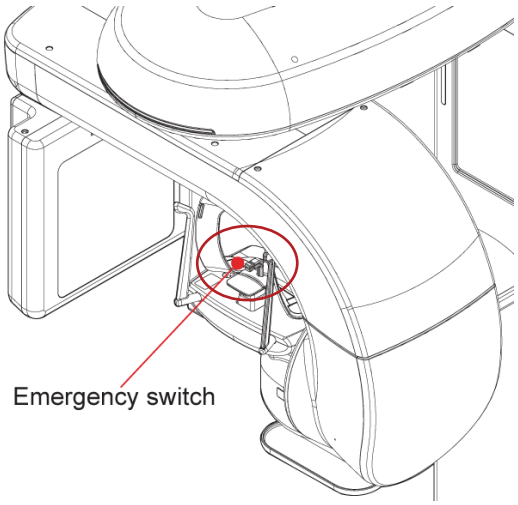
5.2.3 Launching X-ray exposure

To launch X-ray emission, do the following.

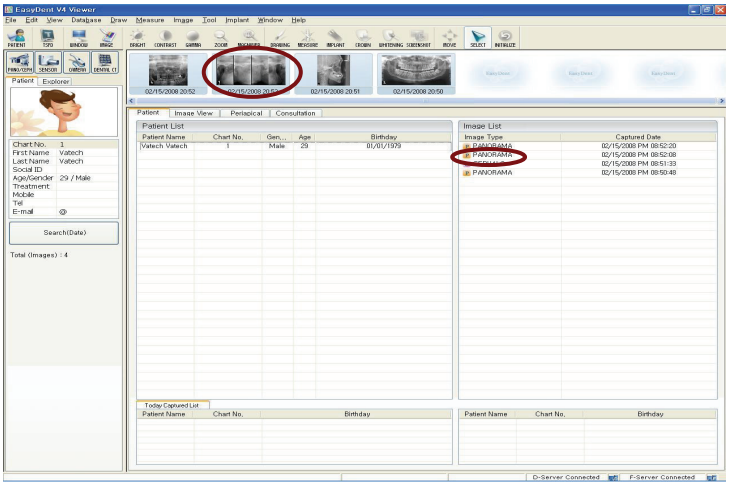
1. Leave the X-Ray room and close the door. The operator must maintain visual contact with the patient during acquisition.

WARNING

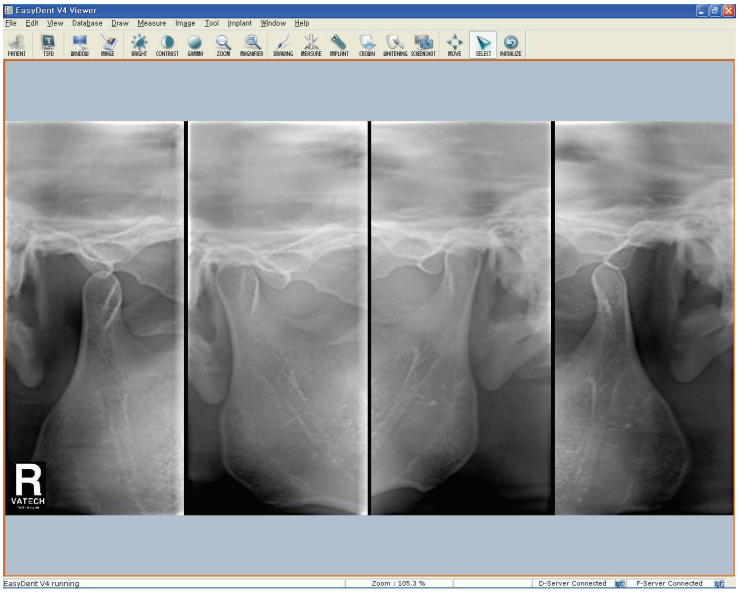
In case any problem occur during acquisition, release the exposure switch button or press the red emergency stop button on the main column. (See figure below)



2. Begin X-Ray emission using the exposure switch. Press and hold the button until the end of acquisition. Observe the LED lamp on the top of the unit as it turns orange, indicating X-Ray emission. The image will appear on the capture program on the PC in real time. The following image shows the acquisition process.



When you highlight the name of the patient in the patient list after imaging, the image list for that patient is refreshed. The most recent image captured will appear on the far left, as shown in the above image. Double-click an image to enlarge it for viewing, as shown below.



3. Check image quality.
4. After image acquisition, do the following.
   - Open the temple supports and release the patient.
   - Remove the hygiene barrier from the bite block.
   - Reset the rotating unit for the next acquisition.

5.3 Acquiring sinus image

Before acquiring an image, make sure that you have ;

- Reset the rotating unit on the equipment to its starting position for patient entry.
- Selected the patient record you have created.
- Accessed the main program on the touch pad screen for equipment control.
- Have the image capture software installed on the PC.

5.3.1 Unit preparation and acquisition parameters

From the PC, perform the following procedures to set the capture parameters for a specific patient and capture mode.

1. Click the **Standard** button to move to the next screen shown below.
2. Select **Sinus** mode.

3. Select **Sinus** mode.
4. Select the patient type.
5. Select the Arch option as it relates to the patient.

6. Select his/her characteristics like bone density among **Hard, Normal and Soft**.
7. Manually adjust the **kVp and mA**, if necessary.
8. To capture an image of a patient, who has metal artifacts, select **Metal** from the Metal Processing. The **Meta**l function reduces the appearance of Metal on the actual tooth image.
9. Click **Confirm** for the parameters to take effect or click **Reset** to start over.

NOTE

It is sometimes necessary to adjust exposure parameters manually to accurately reflect the patient's unique bone structure and density. This is done through kVp/mA fine adjustment. Refer to the appendix for more details.

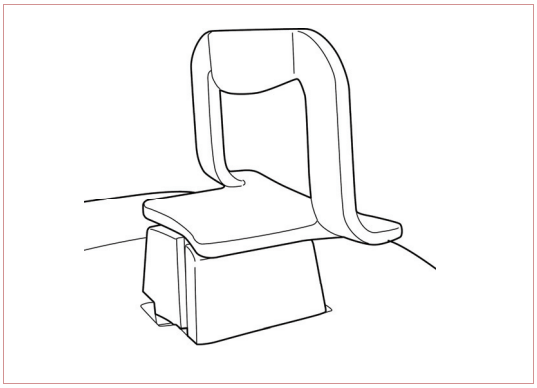
5.3.2 Patient Preparation and Positioning

To prepare and position the patient, follow these steps.

IMPORTANT

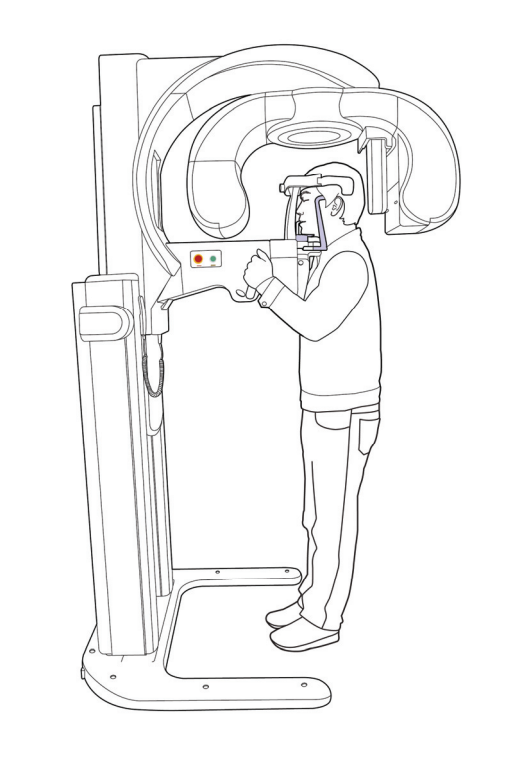
Correct posture is a very important factor for capturing the best image possible. Good posture will reduce the appearance of the spinal column on the reconstructed image.

1. Have the patient remove all jewelry and metallic objects, such as earrings, hair pins, spectacles, dentures, and orthodontic appliances. These items can cause shadow images that may obscure diagnosis.



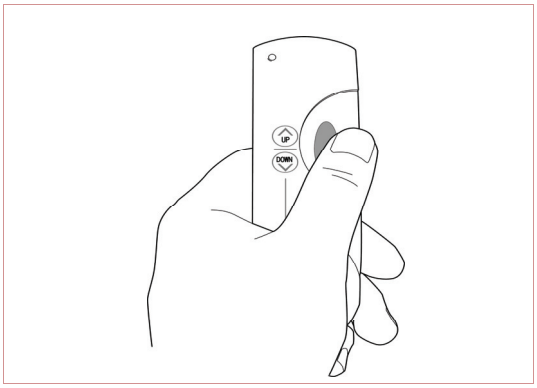
2. Insert the Chin support (Sinus).

3. It is recommended that the patient wear a lead apron for protection against any possible scatter radiation.



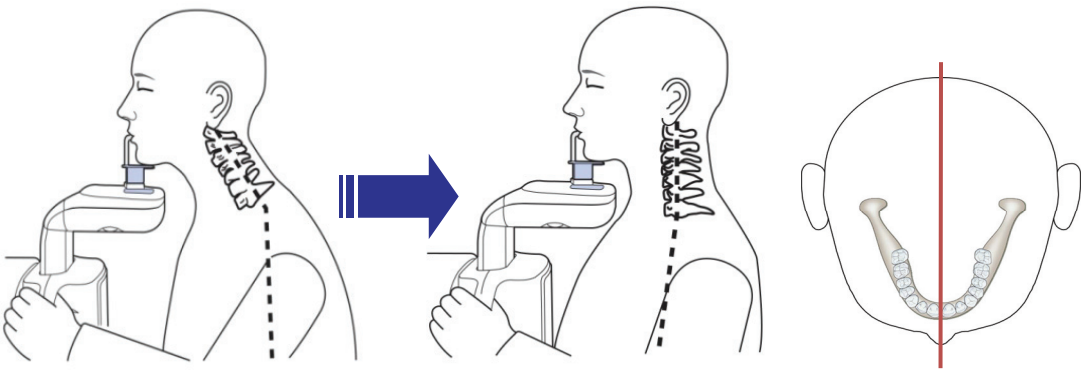
4. Have the patient stand upright at the center of the machine with their chin in line with the chinrest. Ask the patient to grip both handles on either side of the unit firmly.

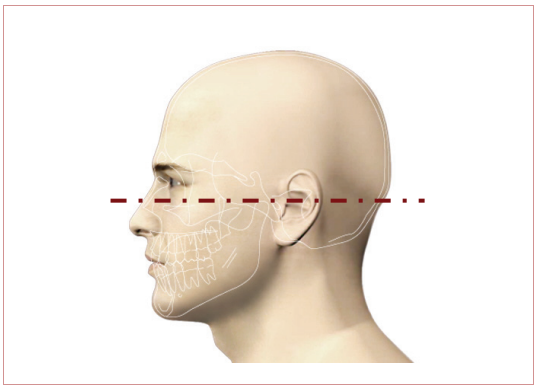
   Ask the patient to position feet slightly forward.



5. Adjust the height of the system using the column up/down switch until the patient's chin is resting on the sinus chin support.

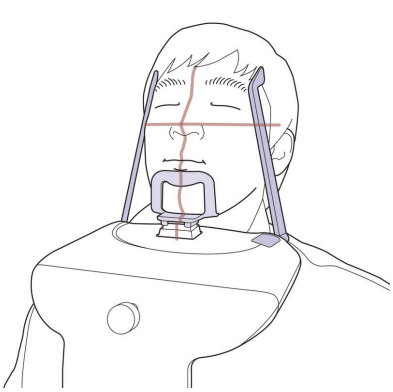
6. Ensure that the patient's shoulders remain level and their neck is relaxed. The cervical spine should be straight and upright. To prevent magnifications on the left and right sides of the final image, make sure that the vertical laser beam is positioned at the center of the occipital bone.

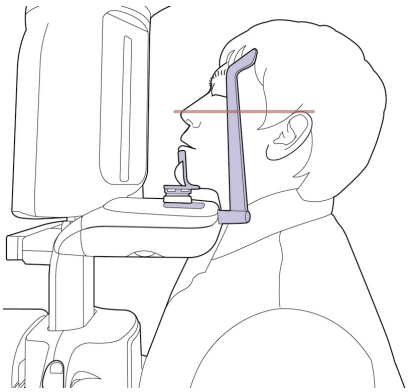




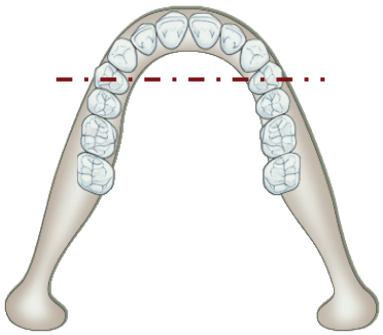
7. Position the head of the patient to properly align their Frankfort plane with the horizontal laser beam. For proper positioning, adjust in which way the patient's head is tilted by adjust the unit slightly upward or downward using the column up/down switch. The Frankfort plane is the line from the infra-orbital point to the superior edge of the External Auditory Meatus (EAM).

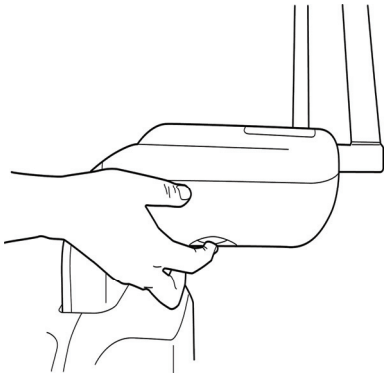
8. The horizontal light should fall on the tip of patient's nose. Therefore, you have to tilt the patient's head 10~15 degrees upward.

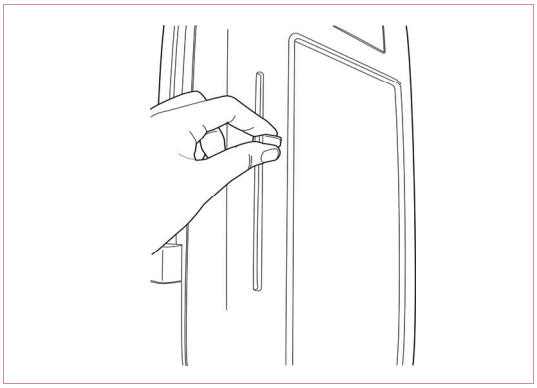




9. Have the patient smile to properly position the canine laser beam at the center of the patient's premolars tooth. Rotate the thumb wheel, located under the patient support rest, forward and backward to properly align the beam.







10. Adjust the horizontal laser beam along the patient's Inferior Orbital Fissure. The horizontal laser beam, located at the side of the column, can be adjusted up or down to accommodate different head sizes. This is done by manually moving the horizontal laser beam lever up or down.

11. Using the temple support wheel button, adjust the temple supports to fit snugly on either side of the patient's head. The patient's head should be immobilized. The temple support wheel button is located at the front of the patient support rest.

12. Have the patient close their lips and keep their tongue positioned towards the palate throughout the exposure cycle.

13. Ensure that the patient's eyes are closed. Ask the patient to remain still, swallow and place the tongue in contact with the palate and to breathe through the nose. Press and hold the exposure switch button until image acquisition is complete.

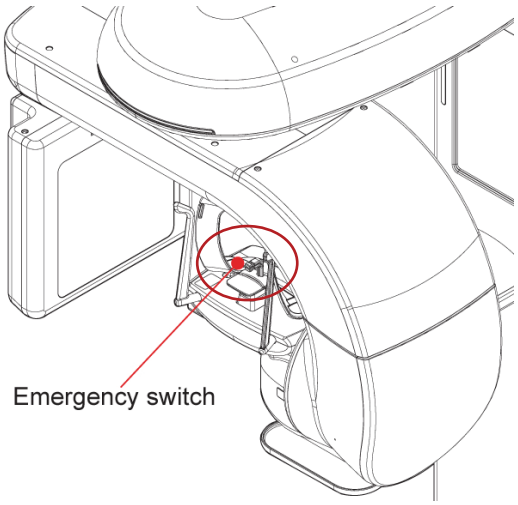
5.3.3 Launching X-ray exposure

To launch X-ray emission, do the following.

1. Leave the X-Ray room and close the door. The operator must maintain visual contact with the patient during acquisition.

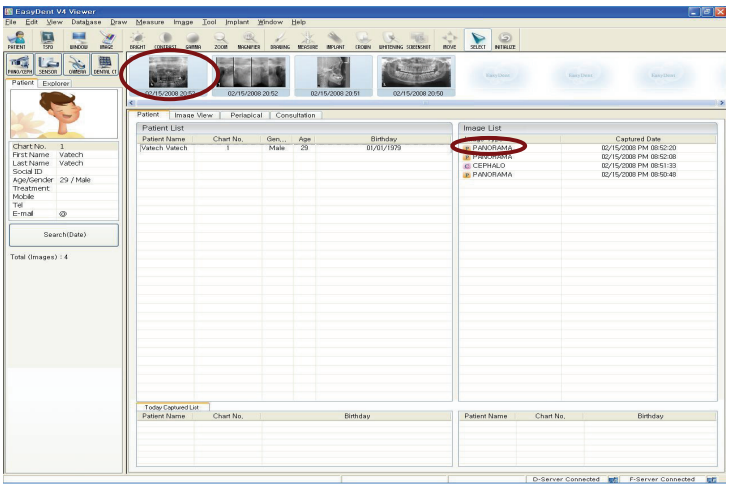
WARNING

In case any problem occur during acquisition, release the exposure switch button or press the red emergency stop button on the main column. (See figure below)

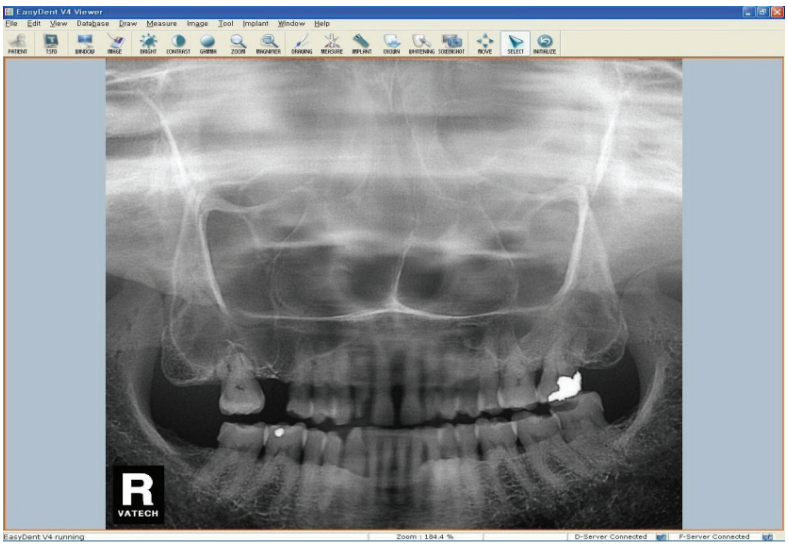


2. Begin X-Ray emission using the exposure switch. Press and hold the button until the end of acquisition. Observe the LED lamp on the top of the unit as it turns orange, indicating X-Ray emission. The image will appear on the capture program on the PC in real time. The following image shows the acquisition process.

When acquisition is completed, the acquired image will be transferred to EasyDent.



When you press the name of the patient in the patient list after imaging, the image list for that patient is refreshed. The most recent image captured will appear on the far left, as shown in the above image. Double-click an image to enlarge it for viewing, as shown below.



3. Check image quality.
4. After image acquisition, do the following.
   - Open the temple supports and release the patient.
   - Remove the hygiene barrier from the bite block.
   - Reset the rotating unit for the next acquisition.

5.4 Acquiring special panoramic image

Before acquiring an image, make sure that you have ;

- Reset the rotating unit on the equipment to its starting position for patient entry.
- Selected the patient record you have created.
- Accessed the main program on the touch pad screen for equipment control.
- Have the image capture software installed on the PC.

5.4.1 Unit preparation and acquisition parameters

From the PC, perform the following procedures to set the capture parameters for a specific patient and capture mode.

1. Click the **Special** button to proceed to the next screen shown below.

2. Select **Orthogonal** mode.
3. Select the patient type.
4. Select the Arch option as it relates to the patient.

5. Select his/her characteristics like bone density among **Hard, Normal and Soft**.
6. Manually adjust the **kVp and mA**, if necessary.
7. To capture an image of a patient, who has metal artifacts, select **Metal** from the Metal Processing. The **Meta**l function reduces the appearance of Metal on the actual tooth image.
8. Click **Confirm** for the parameters to take effect or click **Reset** to start over.

It is sometimes necessary to adjust exposure parameters manually to accurately reflect the patient's unique bone structure and density. This is done through kVp/mA fine adjustment. Refer to the appendix for more details.

There are 6 sub modes for the special panoramic imaging mode, as stated below. The patient will be positioned the same way for all of these modes. The Orthogonal mode is used as an example.

● *Orthogonal*

Choose Orthogonal to capture an image that minimizes the overlapping of teeth.

● *Incisor clear*

Choose Incisor Clear to capture an image that optimizes the incisors of the patient.

● *Canal clear Right*

Choose Incisor Clear to capture an image that optimizes the incisors of the patient.

● *Canal clear Left*

Choose Canal Clear L to capture an image that optimizes the mandibular canal on the patient's left side.

● *Maxillary clear Right*

Choose Maxillary Clear R to capture an image that optimizes the maxillary sinus on the patient's right side.

● *Maxillary clear Left*

Choose Maxillary Clear L to capture an image that optimizes the maxillary sinus on the patient's left side.

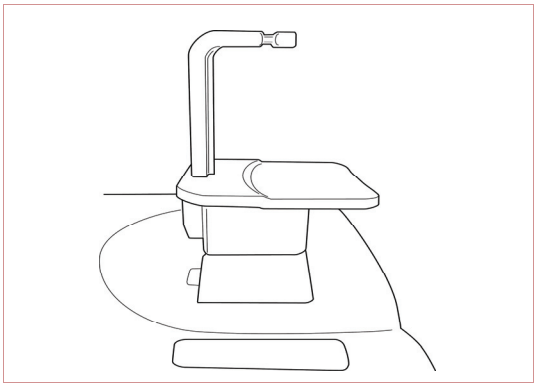
5.4.2 Patient preparation and positioning

To prepare and position the patient, follow these steps.

IMPORTANT

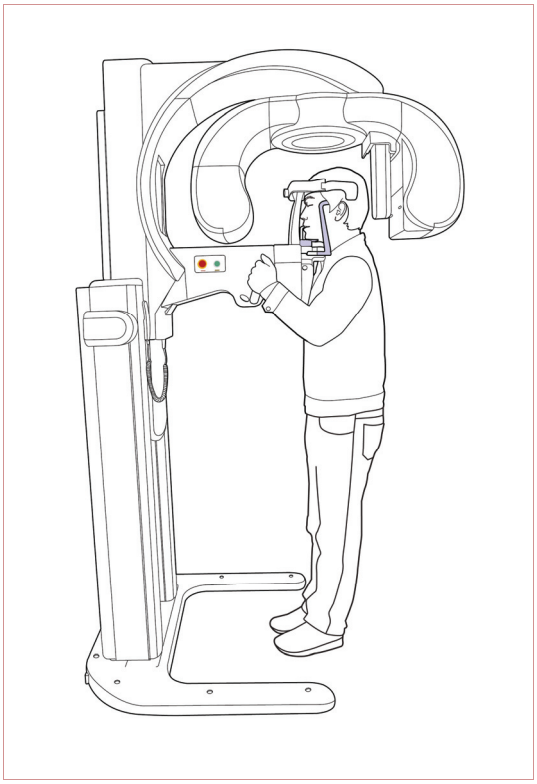
Correct posture is a very important factor for capturing the best image possible. Good posture will reduce the appearance of the spinal column on the reconstructed image.

1. Have the patient remove all jewelry and metallic objects, such as earrings, hair pins, spectacles, dentures, and orthodontic appliances. These items can cause shadow images that may obscure diagnosis.

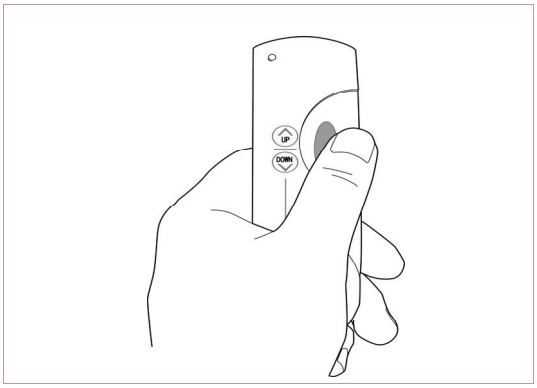


2. Insert the normal chin support and bite rod in the unit's chinrest receptacle. Place a hygienic cover over the bite rod.

3. It is recommended that the patient wear a lead apron for protection against any possible scatter radiation.

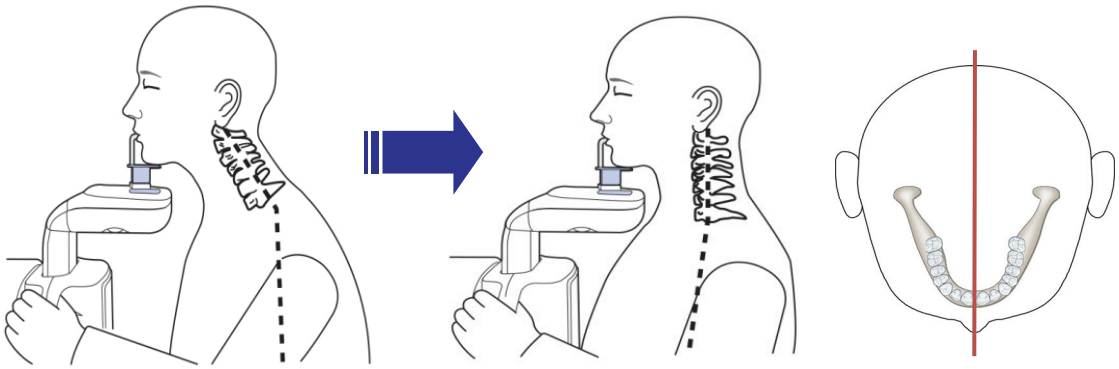


4. Have the patient stand upright at the center of the machine with their chin in line with the chinrest. Ask the patient to grip both handles on either side of the unit firmly.



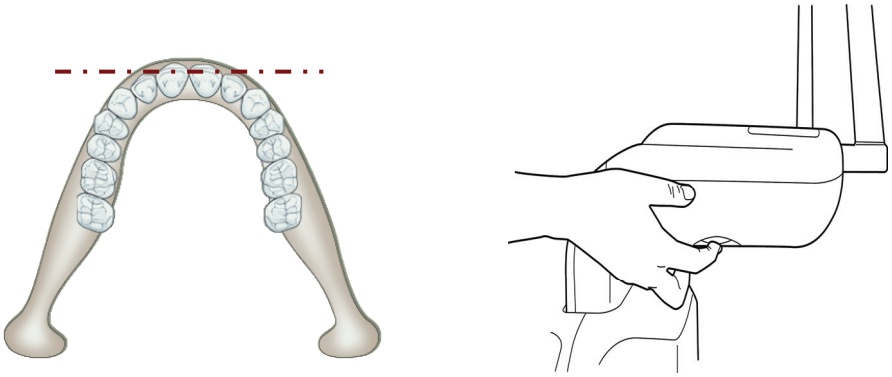
5. Adjust the height of the system using the column up/down switch until the patient's chin is resting on the chinrest.

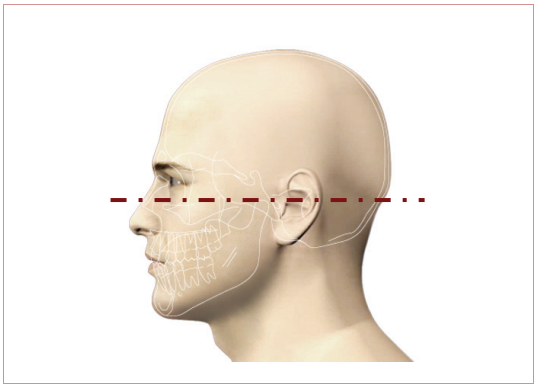
6. Ensure that the patient's shoulders remain level and their neck is relaxed. The cervical spine should be straight and upright. To prevent magnifications on the left and right sides of the final image, make sure that the vertical laser beam is positioned at the center of the occipital bone.



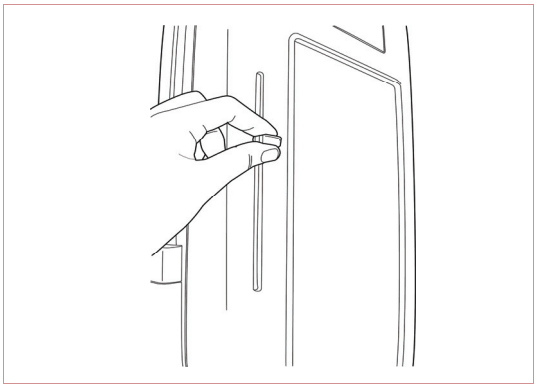
7. Instruct the patient to bite the bite rod along the grooves using their upper and lower incisors. Ensure that the chin is in good contact with the chin support.

8. Have the patient smile to properly position the canine laser beam at the center of the patient's canine tooth. Rotate the thumb wheel, located under the patient support rest, forward and backward to properly align the beam.





9. Position the head of the patient to properly align their Frankfurt plane with the horizontal laser beam. For proper positioning, adjust in which way the patient's head is tilted by adjust the unit slightly upward or downward using the column up/down switch. The Frankfurt plane is the line from the infra-orbital point to the superior edge of the External Auditory Meatus (EAM).



10. The horizontal laser beam, located at the side of the column, can be adjusted up or down to accommodate different head sizes. This is done by manually moving the horizontal laser beam lever up or down.

11. Using the temple support wheel button, adjust the temple supports to fit snugly on either side of the patient's head. The patient's head should be immobilized. The temple support wheel button is located at the front of the patient support rest.

12. Instruct the patient to close their lips and keep their tongue positioned towards the palate throughout the exposure cycle.

13. For a patient with no teeth, the vertical laser beam should be positioned on the patient's mid-sagittal line. The horizontal laser beam should be aligned along the Frankfurt plane. Align the canine beam on the fold on the side of the nose.

14. Ensure that the patient's eyes are closed. Press and hold the exposure switch button until image acquisition is complete.

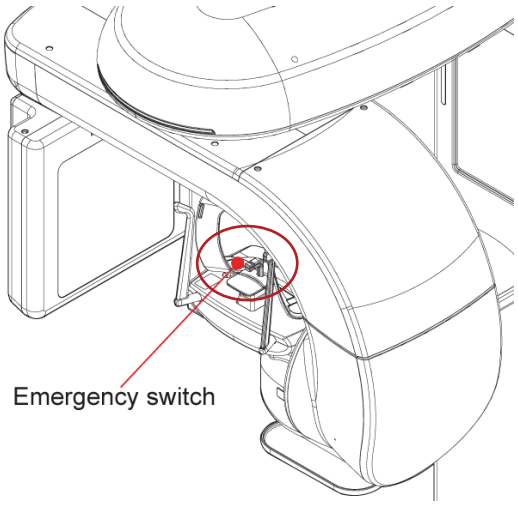
5.4.3 Launching X-Ray exposure

To launch the X-Ray emission, do the following.

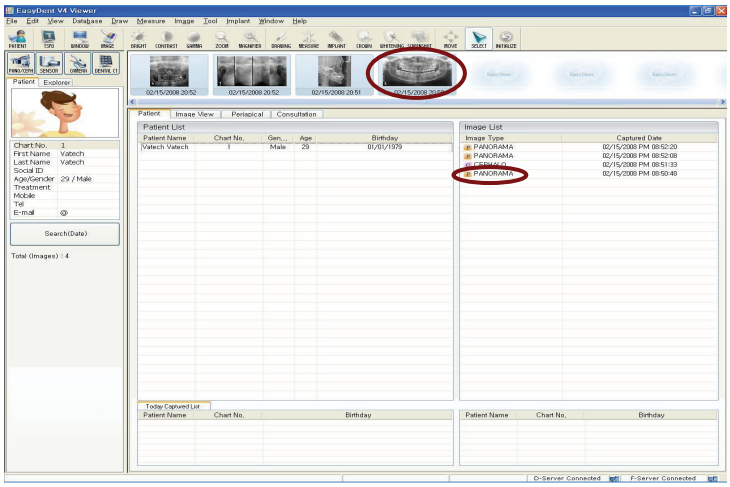
1. Leave the X-Ray room and close the door. The operator must maintain visual contact with the patient during acquisition.

WARNING

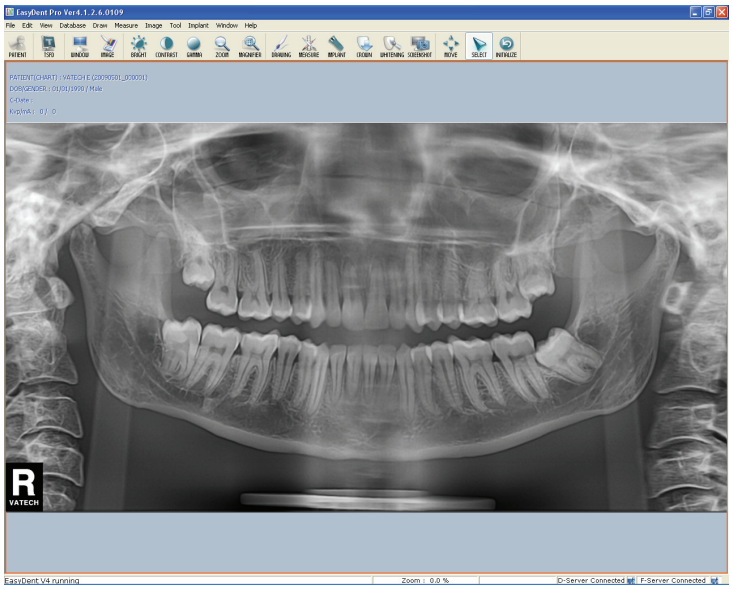
In case any problem occur during acquisition, release the exposure switch button or press the red emergency stop button on the main column. (See figure below)



2. Begin X-Ray emission using the exposure switch. Press and hold the button until the end of acquisition. Observe the LED lamp on the top of the unit as it turns orange, indicating X-Ray emission.
   The image will appear on the capture program on the PC in real time. When acquisition is completed, the image will be transferred to EasyDent.



When you press the name of the patient in the patient list after imaging, the image list for that patient is refreshed. The most recent image captured will appear on the far left, as shown in the above image. Double-click an image to enlarge it for viewing, as shown below.



3. Check image quality.
4. After image acquisition, do the following.
   - Open the temple supports and release the patient.
   - Remove the hygiene barrier from the bite block.
   - Reset the rotating unit for the next acquisition.

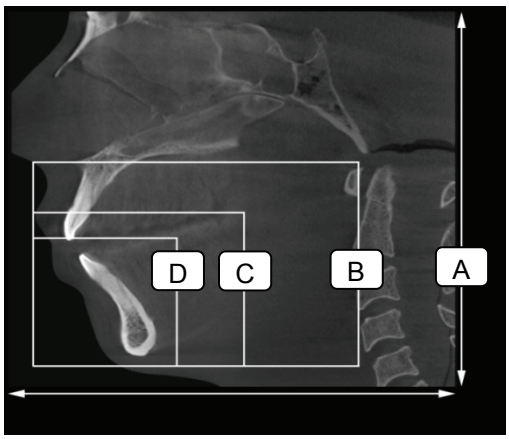
5.5 Acquiring CT images

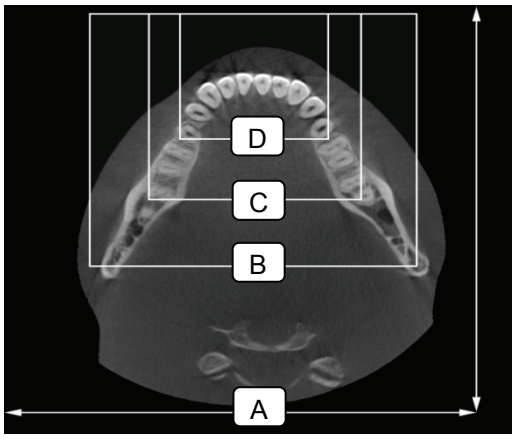
Before acquiring an image, make sure that you have;

- Reset the rotating unit on the equipment to its starting position for patient entry.
- Selected the patient record you have created.
- Accessed the main program on the touch pad screen for equipment control.
- Have the image capture software installed on the PC.

NOTE

The following image shows the FOV coverage area.(





A: 15X15 (P mode) **B:** 12X8 (I mode) **C**: 8X6 (D mode) **D:** 5X5 (S mode)

5.5.1 Unit preparaion and acquisition parameters

From the PC, perform the following procedures to set the capture parameters for a specific patient and capture mode. The following example walks the user through taking an image with the FOV size of 15x15. These procedures are applicable to any FOV size chosen.

1. Click the **Dental CT** button to move to the next screen shown below.

2. Select the FOV.
3. Specify the Voxel size.
4. Select the image quality with which acquisition is to be performed.
5. Select the **MAR**(Metal Artifact) mode, if needed. The **MAR** function reduces the appearance of Metal on the actual tooth image.
6. Select the **Arch** type.
7. Adjust the **kVp** and **mA** fitting the current patient.
8. Click the **Confirm** button for the parameters to take effect.

5.5.2 Touchpad Screen display for CT mode

1. Click **HOME** to go to the main screen.
2. Check the current settings like Gender, Arch, kVp and so forth.
3. Operate the camera and alignment lamp to position the patient.
4. Turn on the camera to display the patient during imaging.
5. Adjust the heights of the chinrest manually.(only for CT mode)
6. Return rotating unit to the initial position.

5.5.3 Patient preparation and positioning

To prepare and position the patient, follow the next steps.

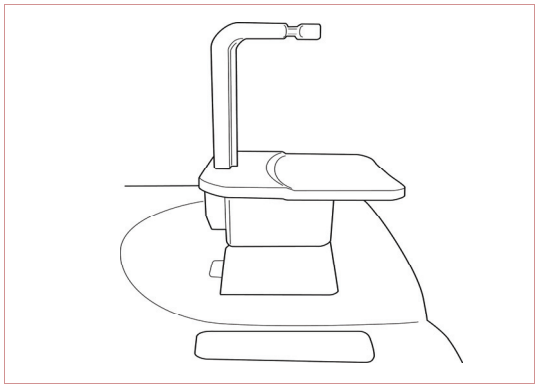
IMPORTANT

Correct posture is a very important factor for capturing the best image possible. Good posture will reduce the appearance of the spinal column on the reconstructed image.

NOTE

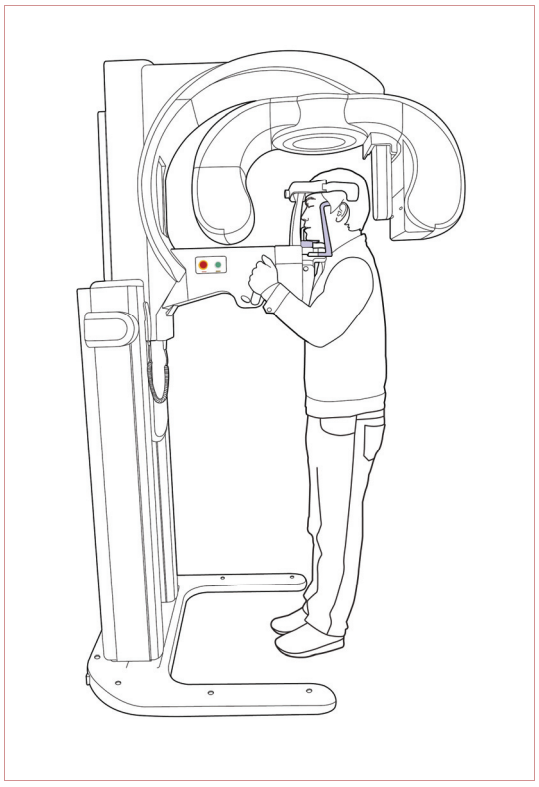
Taking a CT image is virtually the same as that of a standard panoramic.

1. Have the patient remove all jewelry and metallic objects, such as earrings, hair pins, spectacles, dentures, and orthodontic appliances. These items can cause shadow images that may obscure diagnosis.

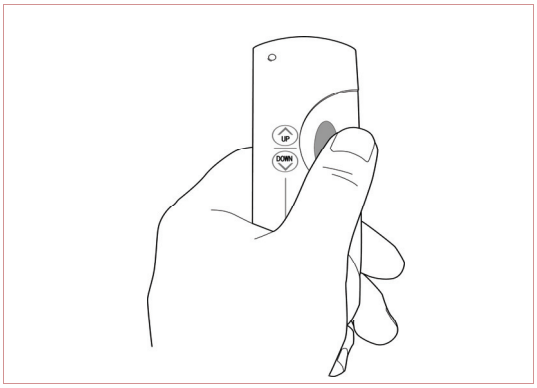


2. Insert the normal chin support and bite block in the unit's chinrest receptacle. Place a hygienic cover over the bite block.

3. It is recommended that the patient wear a lead apron for protection against any possible scatter radiation.

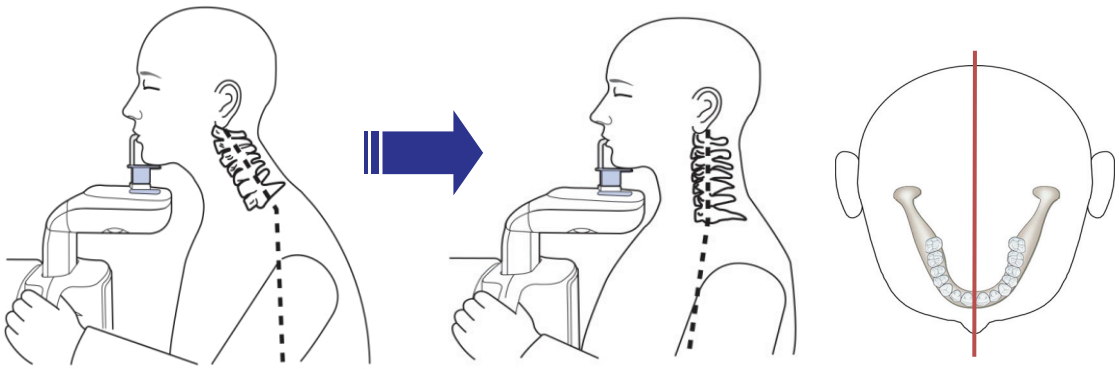


4. Have the patient stand upright at the center of the machine with their chin in line with the chinrest. Ask the patient to grip both handles on either side of the unit firmly.



5. Adjust the height of the system using the column up/down switch until the patient's chin is resting on the chinrest. Position the patient's chin on the normal chin support

6. Ensure that the patient's shoulders remain level and their neck is relaxed. The cervical spine should be straight and upright. To prevent magnifications on the left and right sides of the final image, make sure that the vertical laser beam is positioned at the center of the occipital bone.



7. Instruct the patient to bite the bite rod along the grooves using their upper and lower incisors. Ensure that the chin is in good contact with the chin support.

8. Using the temple support wheel button, adjust the temple supports to fit snugly on either side of the patient's head. The patient's head should be immobilized. The temple support wheel button is located at the front of the patient support rest.

9. For CT Imaging, the horizontal positioning laser should be aligned to the patient's Occlusal line. This beam cannot be adjusted. To properly align the patient's Occlusal line with the horizontal laser beam, adjust the height of the chin rest using the up/down control buttons on the Touchpad Screen.

NOTE

If you would like to ensure a clear image of a particular area, adjust the chin rest using the Up/Down buttons on the Touchpad Screen to use the positioning lasers to focus on a specific area.

1. To focus on the maxillary area, the horizontal laser beam should be aligned 1.5cm above the patient's Occlusal line.
2. To focus on the mandible area, the horizontal laser beam should be aligned 1.5cm below the patient's Occlusal line.

10. Instruct the patient to close their lips and keep their tongue positioned towards the palate throughout the exposure cycle.

11. Ensure that the patient's eyes are closed. Press and hold the exposure switch button until image acquisition is complete.

12. Press the **Ready** button after the patient has been positioned. The rotating unit will automatically move to the CT position.

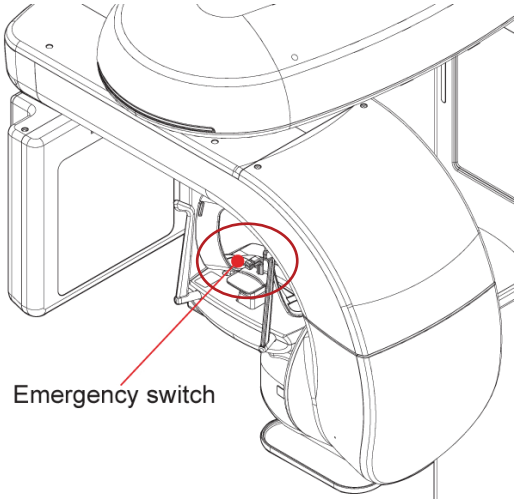
5.5.4 Launching X-ray exposure

To launch X-ray emission, do the following.

1. Leave X-Ray room and close the door. The operator must maintain visual contact with the patient during acquisition.

WARNING

In case any problem occur during acquisition, release the exposure switch button or press the red emergency stop button on the main column. (See figure below)

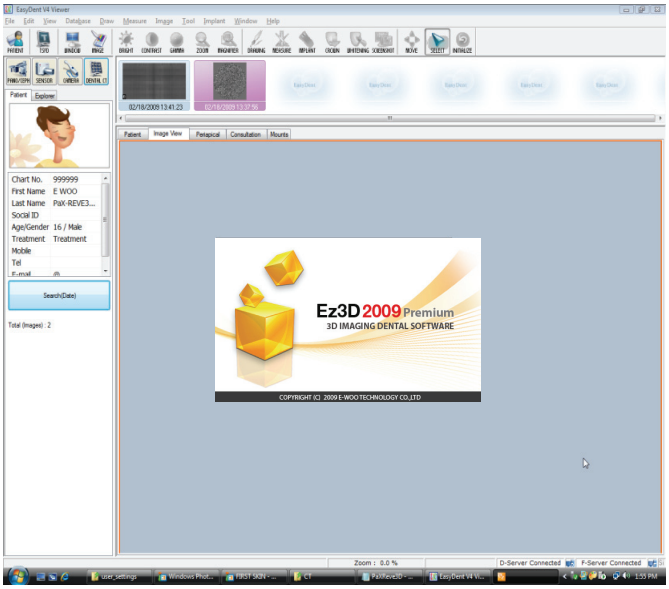


2. Begin X-Ray emission using the exposure switch. Press and hold the button until the end of acquisition. Observe the LED lamp on the top of the unit as it turns orange, indicating X-Ray emission. The image will appear on the capture program on the PC in real time. The following image shows the acquisition process.

Upon release of the exposure switch, image reconstruction will begin as shown below.

Converting to DICOM format file.

After completing reconstruction, **Ez3D2009** will run automatically.



5.6 Acquiring Images at Cephalometric mode

Before acquiring an image, make sure that you have;

- Reset the rotating unit on the equipment to its starting position for patient entry.
- Selected the patient record you have created.
- Accessed the main program on the touch pad screen for equipment control.
- Have the image capture software installed on PC.

5.6.1 Unit preparation and acquisition parameters for frontal mode

From the PC, perform the following procedures to set the capture parameters for a specific patient and capture mode.

1. Click the **Cephalometric** button to move to the next screen shown below.

2. Select **Frontal** mode.(4 modes available)
3. Select the patient type among **man, woman** and **Child**.
4. Select the patient's characteristics like bone density among **Hard, Normal** and **Soft**.
5. Manually adjust the **kVp** and **mA**, if necessary.

6. Specify the exposure time.
7. Click **Confirm** for the parameters to take effect or click **Reset** to start over.

NOTE

It is sometimes necessary to adjust exposure parameters manually to accurately reflect the patient's unique bone structure and density. This is done through kVp/mA fine adjustment. Refer to the appendix for more details.

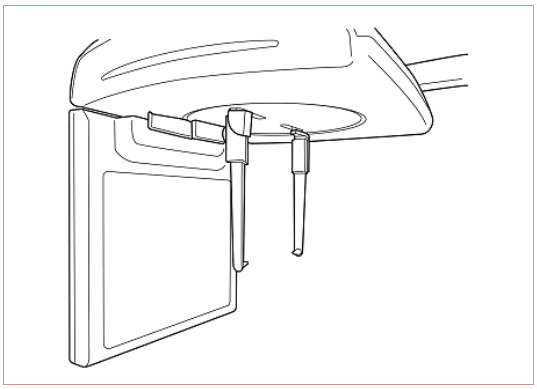
< Patient Preparation and positioning >

To prepare and position the patient, follow the next steps.

IMPORTANT

Correct posture is a very important factor for capturing the best image possible. Good posture will reduce the appearance of the spinal column on the reconstructed image.

1. The nasal positioner should be flipped to the side and upward to prevent image obstruction.

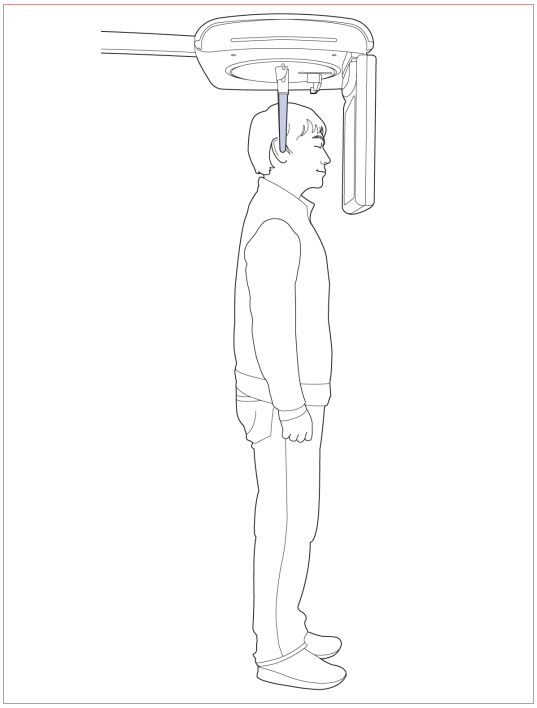


2. Adjust the distance of the ear rods, as shown in the illustration.

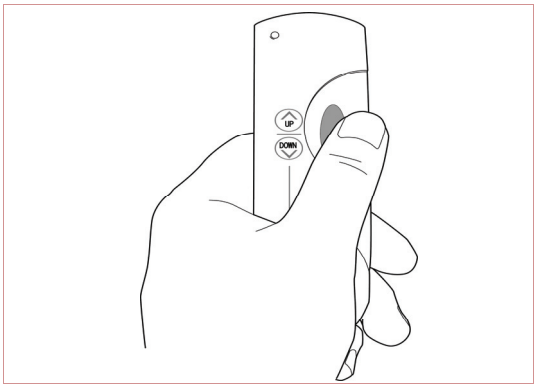
3. Have the patient remove all jewelry and metallic objects, such as earrings, hair pins, spectacles, dentures, and orthodontic appliances. These items can cause shadow images that may obscure diagnosis.

4. It is recommended that the patient wear a lead apron for protection against any possible scatter radiation.

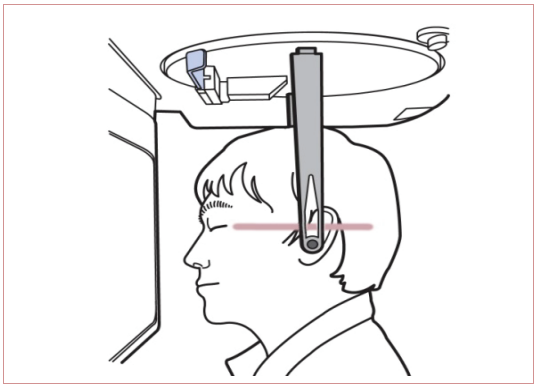
5. Guide the patient to the Cephalometric Unit.



6. Ask the patient to stand upright. Make sure that the patient's shoulders are level and the neck is relaxed.



7. Adjust the height of the unit to fit the patient. Press the **Up & Down button** of the Column switch to adjust the carriage until the ear rods are properly positioned adjacent to the patient's ears.



8. As a gauge for proper positioning, the Frankfort Plane should be parallel to the floor.

9. Please click **Ready** for the next stage.

5.6.2 Unit preparation and acquisition parameters for lateral mode

From the PC, perform the following procedures to set the capture parameters for a specific patient and capture mode.

1. Click the **Cephalometric** button to move to the next screen shown below.

2. Select **Lateral** mode.
3. Select the patient type among **man, woman** and **Child**.
4. Select the patient's characteristics like bone density among **Hard, Normal** and **Soft**.
5. Manually adjust the **kVp and mA**, if necessary.
6. Specify the exposure time.
7. Click **Confirm** for the parameters to take effect or click **Reset** to start over.

NOTE

It is sometimes necessary to adjust exposure parameters manually to accurately reflect the patient's unique bone structure and density. This is done through kVp/mA fine adjustment. Refer to the appendix for more details.

< Patient preparation and positioning >

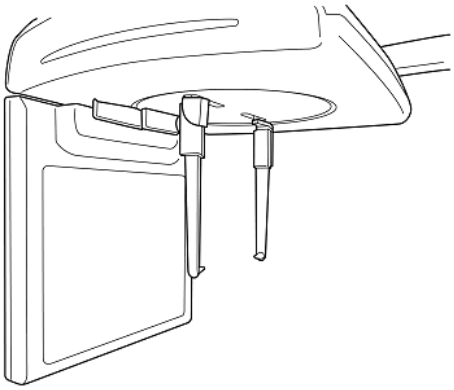
To prepare and position the patient, follow these steps.

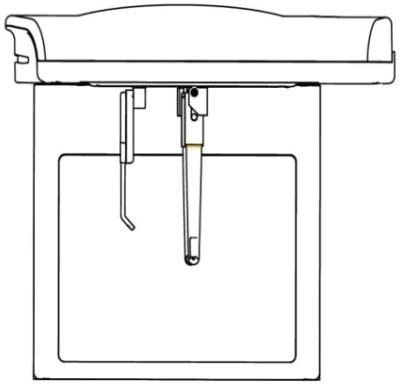
IMPORTANT

Correct posture is a very important factor for capturing the best image possible. Good posture will reduce the appearance of the spinal column on the reconstructed image.

1. Have the patient remove all jewelry and metallic objects, such as earrings, hair pins, spectacles, dentures, and orthodontic appliances. These items can cause shadow images that may obscure diagnosis.

2. Flip the nasal positioner downwards, then Rotate and place the ear rods along the patient's ears. Adjust the distance of the ear rods, as shown in the illustration.

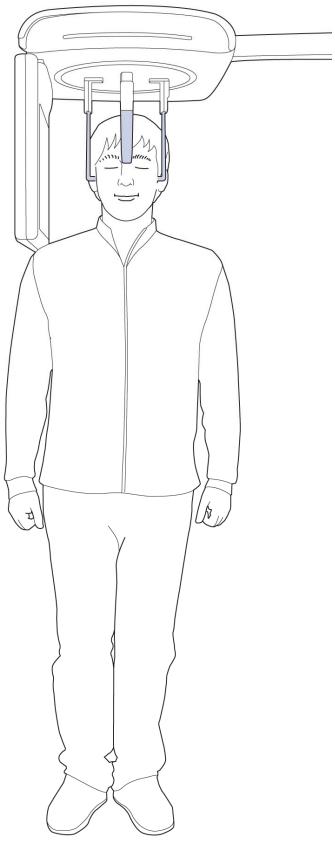


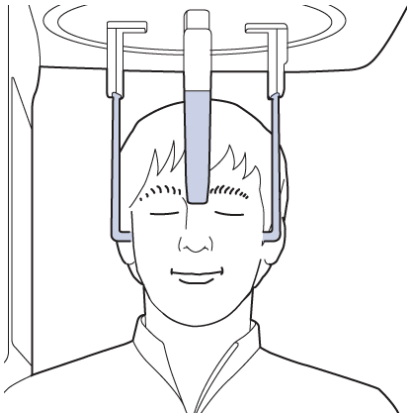


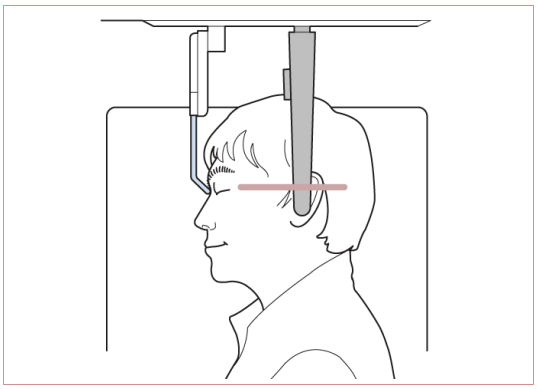
3. It is recommended that the patient wear a lead apron for protection against any possible scatter radiation.

4. Guide the patient to the Cephalometric Unit.

5. Rotate and place the ear rods along the patient's ears. Make sure that the rods are comfortably yet firmly in place.







6. For proper positioning, the patient's OML(Orbitomeatal Line) should be parallel to the floor. Adjust the nasal positioner to the nasion point.

7. Ask the patient to stand upright. Make sure that the patient's shoulders are level and the neck is relaxed.

8. Please click **Ready** for the next stage.
   Proceed to Section 5.6.4 Launching X-Ray Exposure.

5.6.3 Unit preparation and acquisition parameters for SMV mode

From the touch pad panel, perform the following procedures to set the capture parameters for a specific patient and capture mode.

NOTE

SMV is an abbreviation for Cephalometric Submento-vertical.

1. Click the **Cephalometric** button to move to the next screen shown below.

2. Select **SMV** mode.
3. Select the patient type among **man, woman** and **Child**.
4. Select the patient's characteristics like bone density among **Hard, Normal** and **Soft**.
5. Manually adjust the **kVp and mA**, if necessary.
6. Specify the exposure time.
7. Click **Confirm** for the parameters to take effect or click **Reset** to start over.

NOTE

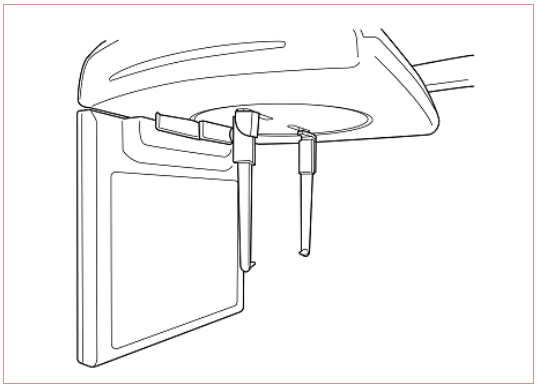
It is sometimes necessary to adjust exposure parameters manually to accurately reflect the patient's unique bone structure and density. This is done through kVp/mA fine adjustment. Refer to the appendix for more details.

< Patient preparation and positioning >

To prepare and position the patient, follow these steps.

IMPORTANT

Correct posture is a very important factor for capturing the best image possible. Good posture will reduce the appearance of the spinal column on the reconstructed image.



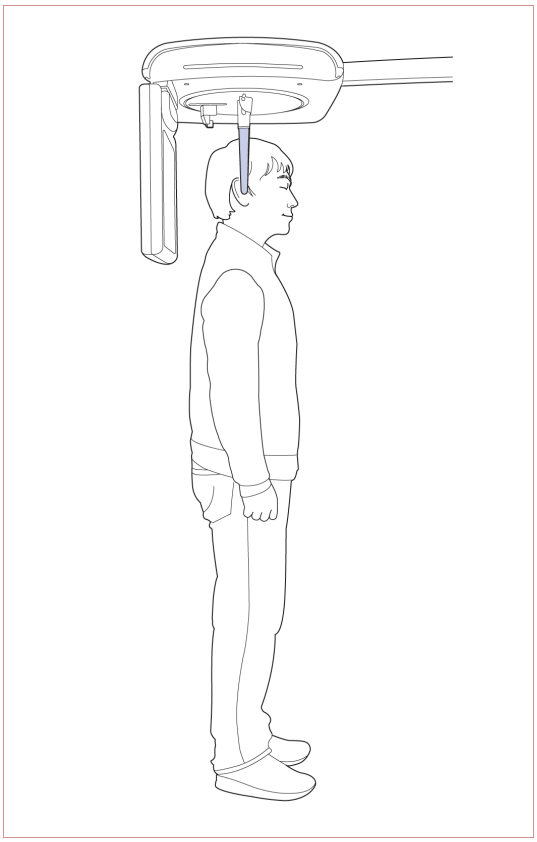
1. The nasal positioned should be flipped to the side and upward to prevent image obstruction.

2. For head positioning, adjust the distance of the ear rods.

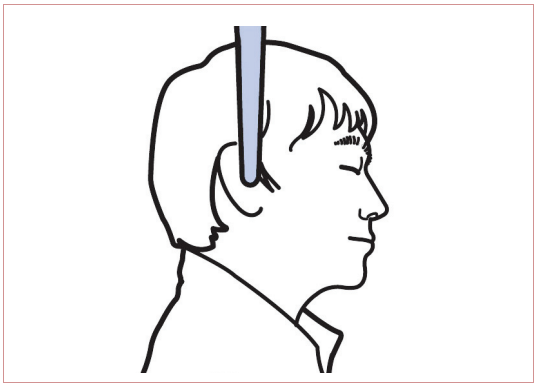
3. Have the patient remove all jewelry and metallic objects, such as earrings, hair pins, spectacles, dentures, and orthodontic appliances. These items can cause shadow images that may obscure diagnosis.

4. It is recommended that the patient wear a lead apron for protection against any possible scatter radiation.

5. Guide the patient to the Cephalometric Unit.

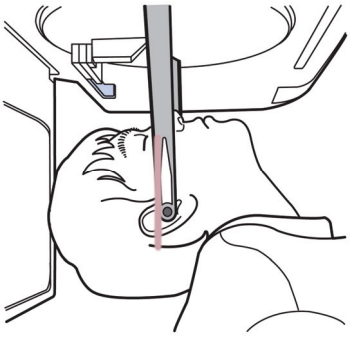


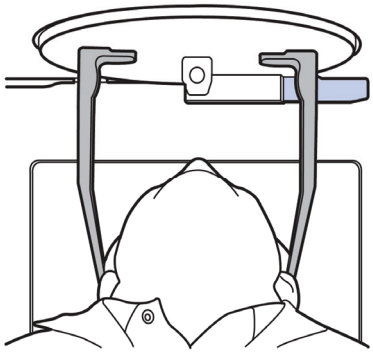
6. Ask the patient to stand upright and to face the x-ray tube.



7. Place the ear rods along the patient's ears. Make sure that the rods are comfortably, yet firmly in place.

8. For proper positioning, the patient's Frankfort plane should be perpendicular to the floor.





9. Please click **Ready** for the next stage.
   Please go to the **clause 5.6.4. Launching x-ray exposure**

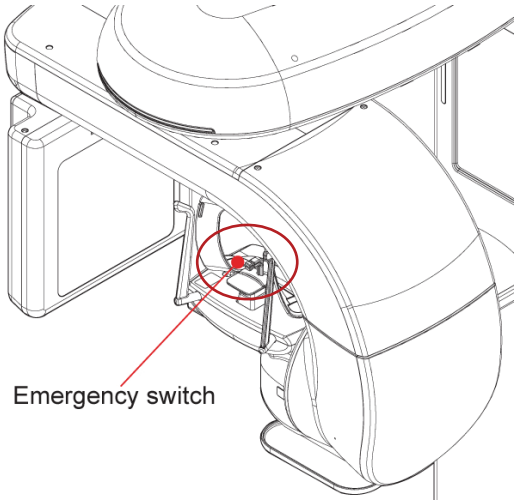
5.6.4 Launching X-Ray exposure

To launch the X-ray emission, do the following.

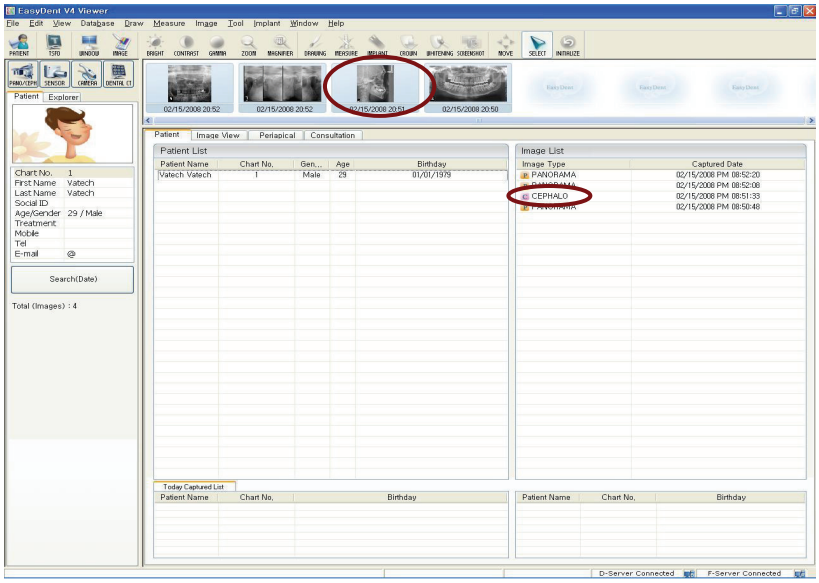
1. Leave the X-Ray room and close the door. The operator must maintain visual contact with the patient during acquisition.

WARNING

In case any problem occur during acquisition, release the exposure switch button or press the red emergency stop button on the main column. (See figure below)

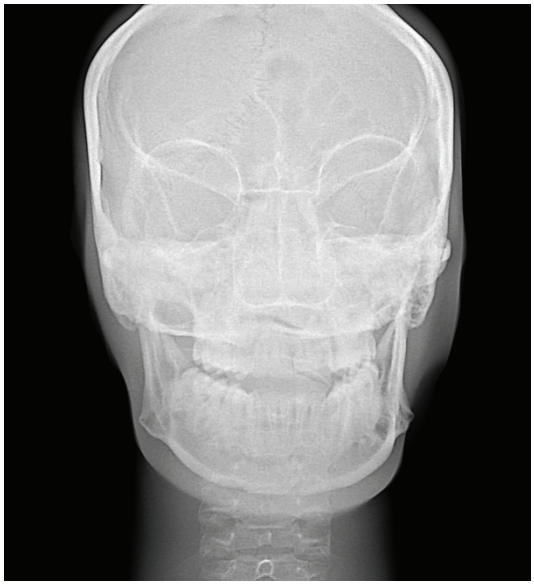


2. Begin X-Ray emission using the exposure switch. Press and hold the button until the end of acquisition. Observe the LED lamp on the top of the unit as it turns orange, indicating X-Ray emission. The image will appear on the capture program on the PC in real time.



When you press the name of the patient in the patient list after imaging, the image list for that patient is refreshed. The most recent image captured will appear on the far left, as shown in the above image. Double-click an image to enlarge it for viewing, as shown below.

Lateral mode



Posterior-Anterior (PA mode)

3. Check image quality.
4. After image acquisition, do the following.
   - Open the ear rod supports and release the patient.
   - Reset the rotating unit for the next acquisition.

Chapter 6 The imaging system with auto-focusing Capability

The **PaX-Reve3D** incorporates the capability of auto-focusing the objects(patients), thus leading to the acquisition of much improved image free from the patient's faulty position and arch shape. This is made possible by the E-WOO's proprietary adaptive layer mode panoramic tomography algorithm.

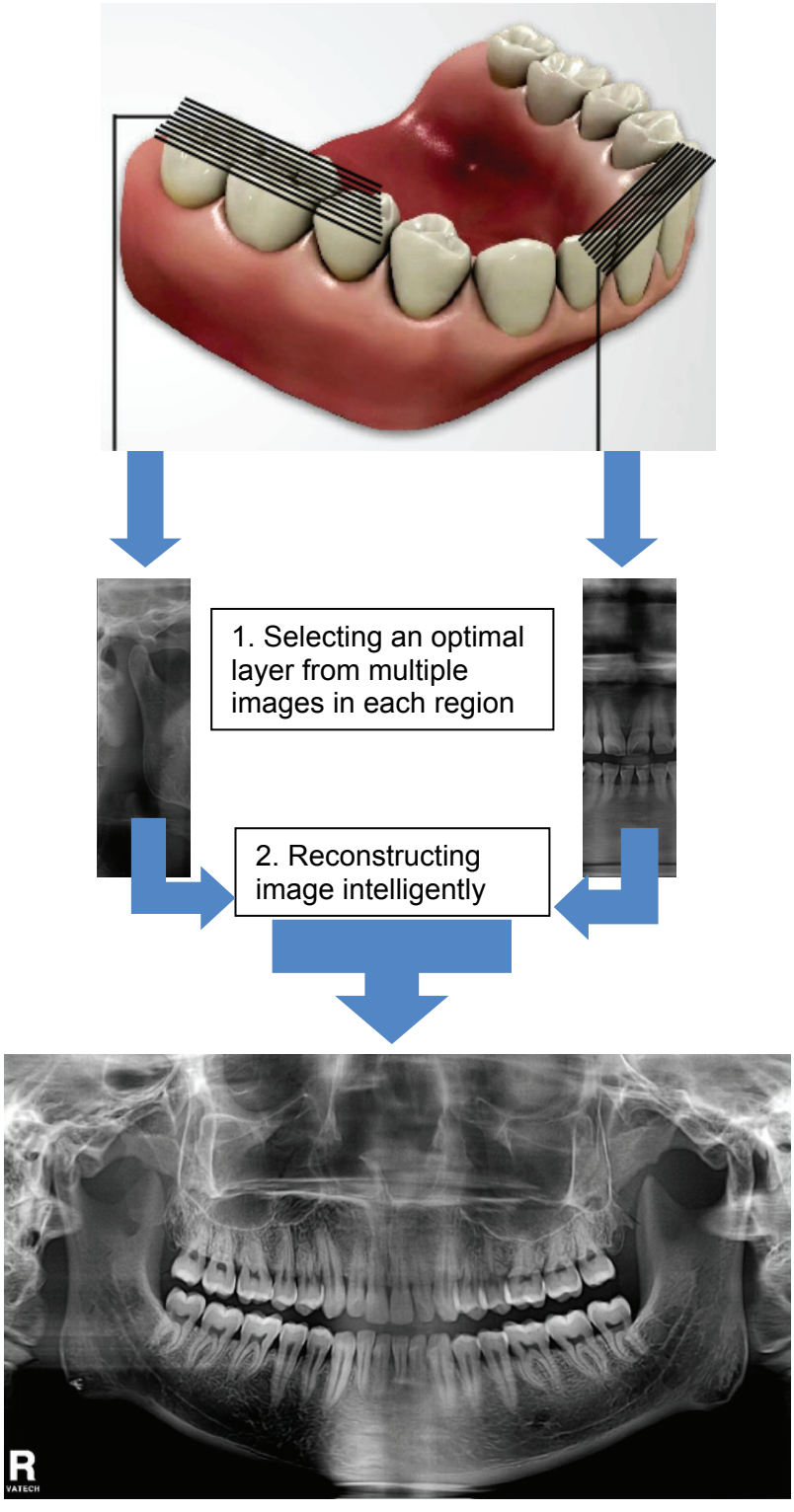
6.1 The imaging modes with the auto focusing supported

Mode		Arch Selection
Standard Panorama	Normal	Normal
		Wide
		Narrow
		Child
	Fast	Normal
		Wide
		Narrow
		Child
Special Panorama	Orthogonal	

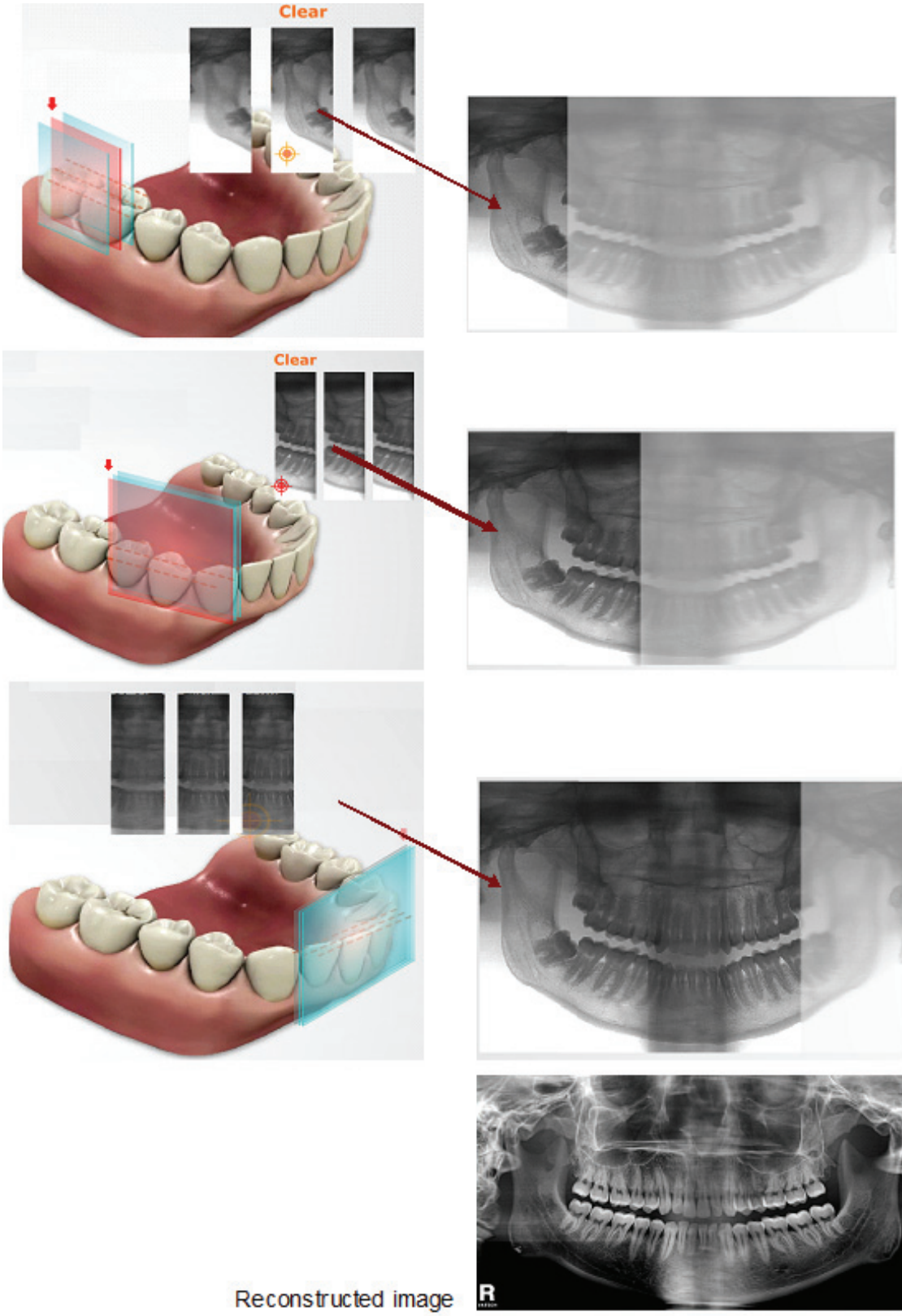
6.2 Reconstructing procedures(Algorithms)

1. Acquire the multiple layers of the images in a region.
2. Select the best single layer closest to center of the patient teeth among them.
3. Place the optimal image layer on the appropriate region of interest.
4. Repeat 1 trough 3 until the entire region of the arch is scanned and imaged.
5. After internal manipulation for the further processing, the final reconstructed image is acquired.

6.3 Graphical explanation



< Typical example >

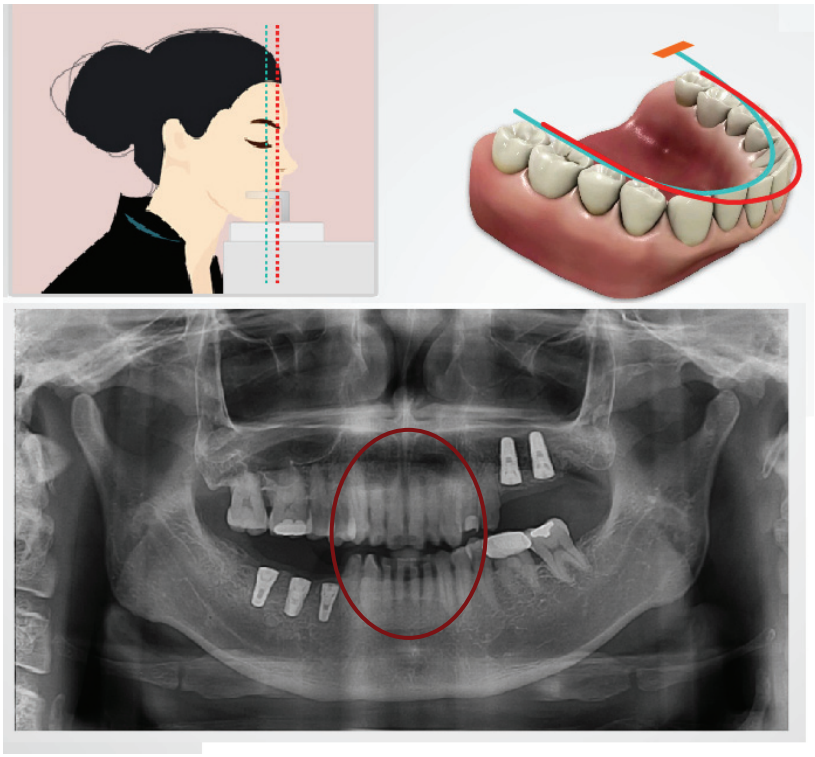


6.4 Comparisons between Standard and Auto Focusing imaging

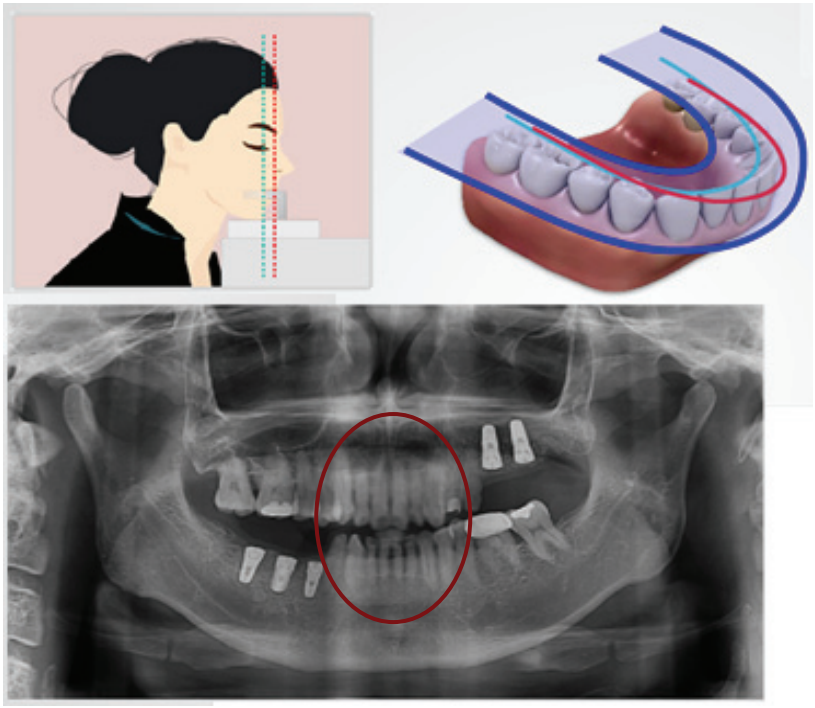
Case 1: Front teeth view is contracted

Circumstance: The bite block was inserted too deep into the mouth

< Standard (with the auto focusing disabled) >



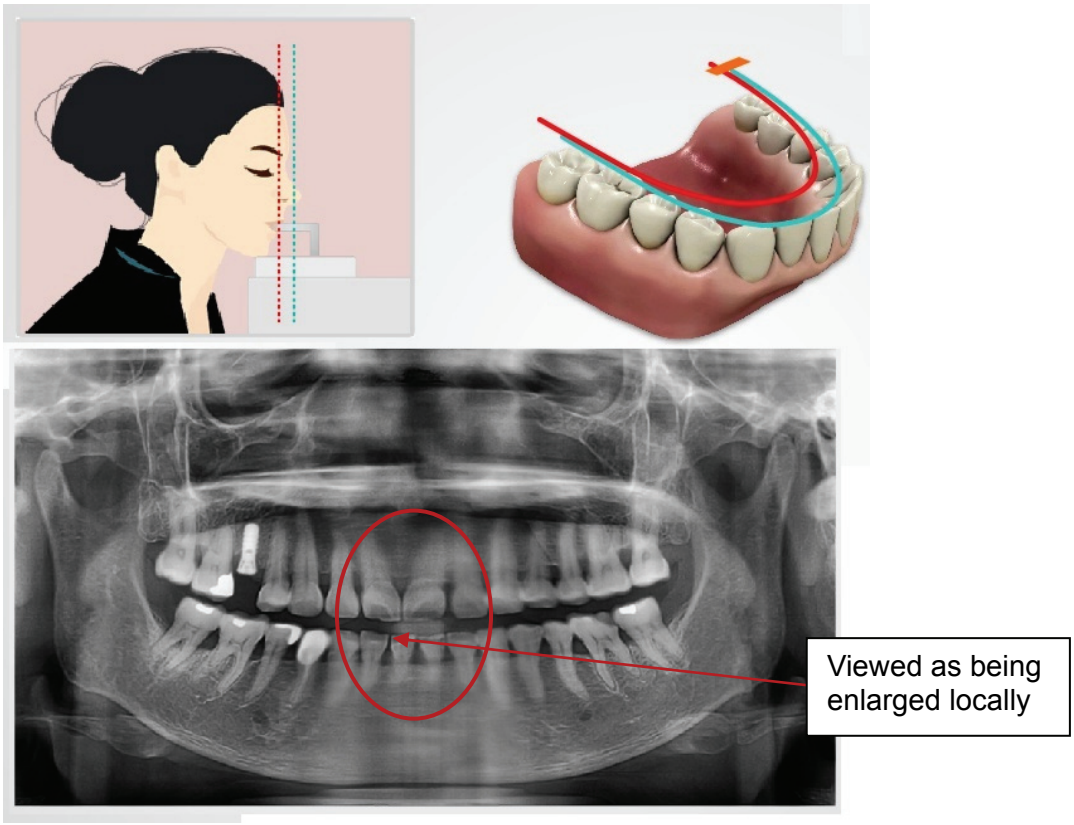
< Auto focusing enabled >



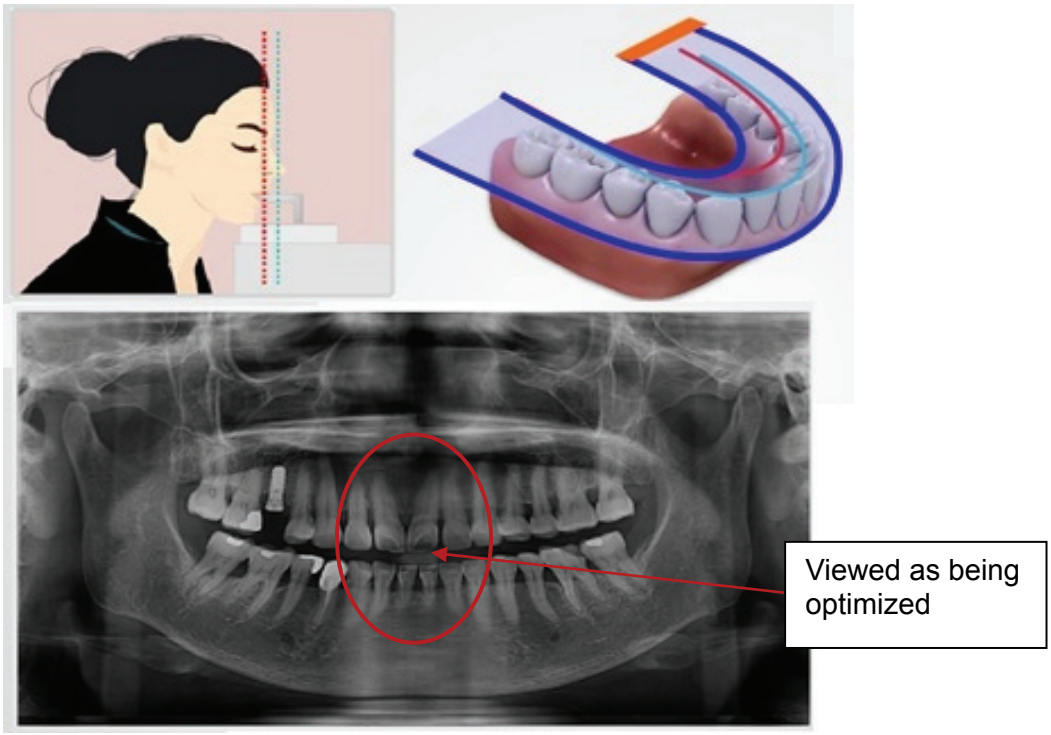
Case 2: Front teeth view is enlarged locally

Circumstance: the patient is positioned off the correct position

<Standard (with the auto focusing disabled) >



< Auto focusing enabled >



Chapter 7 Maintenance

7.1 Storage and transportation

- Ambient temperature : -**20**℃ **~ 50**℃
- Relative humidity : 10%~ 90%
- Ambient, atmospheric pressure : 500~1060 hPa
- Although allowances have been made for the machine to be functional at up to a 10 degree slope, it is recommended that the equipment is used and stored on a flat, even surface.

7.2 Sterilization and disinfection

- Sterilization and disinfection should be performed thoroughly for items like the handle frame, chinrest, and bite block, as well as anything else the patients frequently contact.
- Disinfect the affected area with 2% ammonia solution. Used bite blocks should be sterilized for more than 15 minutes at 121.
- Ultrasonic cleansing, if necessary, should be carried out.

7.3 Regular maintenance and treatment

- Don’t forcefully unplug any cables.
- Don’t keep equipments or items susceptible to water or humidity.
- Unit should be in an area unaffected by temperature, ventilation, sunlight, dust, salt, etc.
- Avoid areas vulnerable to a great degree of slope, vibration, or shock
- Keep unit away from chemical or gas-filled storage.
- Keep miscellaneous materials well organized for subsequent use.
- IWhen cleaning the equipment, wipe gently and evenly with a soft, dry tissue.
- In an extreme case of water or other forms of liquid being spilled inside the equipment, turn off the unit immediately and contact your agent or source of technical support.

7.4 Regular check up

- Equipment and components should be maintained on regular basis.
- When trying to use the equipment after it has been idle for an extended period of time, ensure that the equipment is running without any issue prior to putting it into operation.
- This equipment can only be accessed by those qualified to do so, as dictated by the manufacturer.

- Confirm that both voltage frequency and power consumption meet the requirements specified on the equipment.
- Make sure that the equipment is well grounded.

7.5 General notes

7.5.1 Preoperational stage

1. Check for basic environmental issues like switch contact and that polarity and cable conditions are met.
2. Equipment ground condition is satisfactory.

7.5.2 In-use stage

1. Always keep visual contact with the patient and the equipment during operation to ensure there have been no errors or malfunctions. If so, stop operation immediately and care must be taken to correct problems.
2. In case of equipment malfunction, always contact your agent or manufacturer for support.
3. Never try to replace equipment, including wires and cable. You may cause problems beyond repair.

7.6 X-Ray generation and warning

1. Use the extended exposure cable while taking an image to make operators less susceptible to X-Ray emissions.
2. This dental equipment generates X-Rays in a safe manner. Inappropriate handling may cause harm to the patient and operator. Unauthorized persons are to never try to operate or repair this equipment.
3. The operators have the responsibility to check the condition of the equipment regularly. This is well defined in this manual as well as education sessions.
4. Warning signals should be employed to alert the patient and operator if something unexpected happens.
5. Pregnant and special needs patients must consult with the physician prior to X-Ray exposure.
6. All requirements and conditions specified in internal law pertaining to X-Ray equipment should be observed and applied.

7.7 Daily maintenance tasks

Accessories	Maintenance Tasks
Panoramic bite block	Sterilize with cold sterilization or autoclave up to134 degrees before patient use.
Temple support	Sterilize the head support and chin rest with medical-grade 76% alcohol disinfectant before patient use.
Chin rest(panoramic, sinus and TMJ)	Sterilize the head support and chin rest with medical-grade 76% alcohol disinfectant before patient use.
All components that come into contact with patient and operator	Sterilize components with medical-grade 76% alcohol disinfectant before patient use.
Outer covers of Unit	Wipe the unit down with a dry cloth at the end of each day.  **Do not use detergents or solvents to clean outer covers of the unit.**

Chapter 8 Emergency measures

If a problem occurs while operating this unit, take the following basic troubleshooting measures.

If device is not moving	
Cause	**Resolution**
Power failure	Check the power supply to the device.
Initialization status	Wait until the device has initialized and then try again.
Control PC connection failure	Check the connection status of Serial Port (RS232) connecting PC and device.

If exposure switch is not working	
Cause	**Resolution**
Ready status	Check whether it is ready for capturing at the imaging program.

If imaging cannot be performed	
Cause	**Resolution**
Initialization status	Wait until the device has initialized and then try again. If the same problem persists, turn it off and start again.

If laser beam is turned off by itself and patient alignment cannot be performed	
Cause	**Resolution**
Time assigned for alignment expired	Press LAMP Button and carry out patient alignment.

Moisture may cause extensive damage to the electric components of the system. Do not to any liquids to be in the vicinity of the machine.

Chapter 9 Technical specifications

9.1 General information

- X-ray beam : Cone Beam
- Reconstruction Algorithm : Real Time Reconstruction Algorithm
- CT reconstruction algorithm : Fast Reconstruction Algorithm (GPU based)
  New MAR Algorithm
- Dynamic Range : 14 bit
- Multi-FOV : (cm)
  - Special Mode 15X15
  - Standard Mode 12X8
  - Dental Mode 8X6
  - Implant Mode 5X5
- Slice Thickness (mm) : Min 0.1/ Max 0.4
- Exposure Time :

  <Panoramic examination programs>

  Standard Panoramic Adult/Child 13.5 sec / 12.0 sec
  Hemi-Panoramic (Left and Right) 6.8 sec
  Frontal Dentition 10.6 sec
  TMJ Open/Close mouth 11.2 sec (4 * 2.8 sec)
  Maxillary Sinus 11.0 sec

  <Cephalometric examination programs (One Shot Type)> 0.4 sec ~ 1.0 sec

- Number of Views : 450 ~ 720
- Number of Sliced Images : Min 160/ Max 608
- Voxel Size : Default 0.2X0.2X0.3 mm (160X160X160 pixel)
- X-ray type : Pulsed X-ray exposure system
- Scan Time (sec) at normal : 15-24 sec
- Rotating Unit Scan Angle (degree) : 360 or 185
- X-ray Exposure Angle (degree) : 140
- Collimator

  Primary collimator Adjustable according to FOV Size
  Motorized positioning for PANO& CEPH Mode
- Patient Position : Standing
- Patient Alignment : 3 Laser Guide Beams

- Reconstruction Time: FOV Dependent (40 sec ~120sec)
- Image Magnification
  - CT Examination Programs 1.60:1
  - Panoramic Examination Programs 1.30:1
  - Cephalometric Examination Programs 1.13:1
- Focal spot size: 0.5 X0.5 mm
- Data acquisition speed: 1 Gigabit
- Weight: 270 kg

9.2 Image acquisition system

9.2.1 Computed tomography detector

- Technology CMOS photodiode array (Active Pixel Sensor: APS)
- Pixel size 200 ㎛
- Voxel size

FOV Mode (mm)	Voxel Size(mm)	Scan time (sec)	Data Size (MB)	Voxel Number
P (150X150)	0.2*0.2*0.2	High (24 sec)	798	748*748*748
		Normal (15 sec)		
	0.3*0.3*0.3	High (24 sec)	238	500*500*500
		Normal (15 sec)		
I (120X80)	0.2*0.2*0.2	High (24 sec)	274	600*600*400
		Normal (15 sec)		
	0.3*0.3*0.3	High (24 sec)	82	400*400*268
		Normal (15 sec)		
D (80X60)	0.12*0.12*0.12	High (24 sec)	425	668*668*500
		Normal (15 sec)		
	0.2*0.2*0.2	High (24 sec)	92	400*400*300
		Normal (15 sec)		
S (50X50)	0.08*0.08*0.08	High (24 sec)	463	624*624*624
		Normal (15 sec)		
	0.12*0.12*0.12	High (24 sec)	137	416*416*416
		Normal (15 sec)		

- Frame rate 30 fps
- Gray scale 14 bit
- Active area 144 mm * 241.6 mm
- Limiting Resolution 2.5 lp/mm in detector space

9.2.2 Panoramic image detector

- Technology CMOS sensor with Cesium Iodie (CsI) scintillator screen.
- Pixel size 100 ㎛
- Active area 6 mm * 150.4 mm
- Limiting Resolution 5 lp/mm
- Gray scale 14 bit

9.2.3 Cephalometric image detector

- Technology FPD based on a-Si TFT
- Pixel size 127㎛
- Active area 325.1 mm * 264.2 mm
- Pixel resolution 3.94 lp/mm
- Gray scale 14 bit

9.2.4 3D Image viewer (Ez3D2009 Standard)

EZ3D 2009 Standard is a three dimensional dental image viewer used for prompt and accurate diagnosis with many useful MPR functions, two dimensional analysis, and three dimensional reconstruction.

- Easy conversion through various rendering methods (Volume Rendering, MIP, miniIP, and X-Ray).
- Accurate diagnosis using MPR rotation, curve, and 3-D zoom rendering modes.
- Cross-Sectional views for fast analysis.
- Convenient color management system using objects, color-map, opacity graph, presets and more.

9.2.5 3D Image viewer (Ez3D2009 Professional)

Ez3D2009 Professional supports the following value-added functionality in addition to the features of the Standard edition.

- Dynamic Detail View
- CD Export-2D, 3D(Pro)
- Volume Measure

9.2.6 3D Image viewer (Ez3D2009 Premium)

Ez3D2009 Premium supports the following value-added functionality in addition to the features of the Professional edition.

- Auto Canal Drawing
- Knowledge Info
- Auto Cross-Sectional
- Tooth Detachment

9.2.7 2D image viewer (EasyDent)

- One click operation
- User friendly interface
- Various image format support
- Various image process modes & accurate measure tool

9.3 Recommended X-Ray exposure table

9.3.1 Pano Standard

Gender/Figure	Hard	Normal	Soft
Man	72 kVp, 8 mA	70 kVp, 8 mA	68 kVp, 8 mA
Woman	70 kVp, 8 mA	68 kVp, 8 mA	66 kVp, 8 mA
Child	66 kVp, 7 mA	66 kVp, 7 mA	66 kVp, 7 mA

9.3.2 Pano Special

Gender/Figure	Hard	Normal	Soft
Man	72 kVp, 8 mA	70 kVp, 8 mA	68 kVp, 8 mA
Woman	70 kVp, 8 mA	68 kVp, 8 mA	66 kVp, 8 mA
Child	66 kVp, 7 mA	66 kVp, 7 mA	66 kVp, 7 mA

9.3.3 Normal Ceph

Gender/Figure	Hard	Normal	Soft
Man	78 kVp, 9 mA	78 kVp, 9 mA	78 kVp, 9 mA
Woman	76 kVp, 9 mA	76 kVp, 9 mA	76 kVp, 9 mA
Child	74 kVp, 8 mA	74 kVp, 8 mA	74 kVp, 8 mA

9.3.4 Quick Ceph

Gender/Figure	Hard	Normal	Soft
Man	85 kVp, 9 mA	85 kVp, 9 mA	85 kVp, 9 mA
Woman	83 kVp, 9 mA	83 kVp, 9 mA	83 kVp, 9 mA
Child	80 kVp, 9 mA	80 kVp, 9 mA	80 kVp, 9 mA

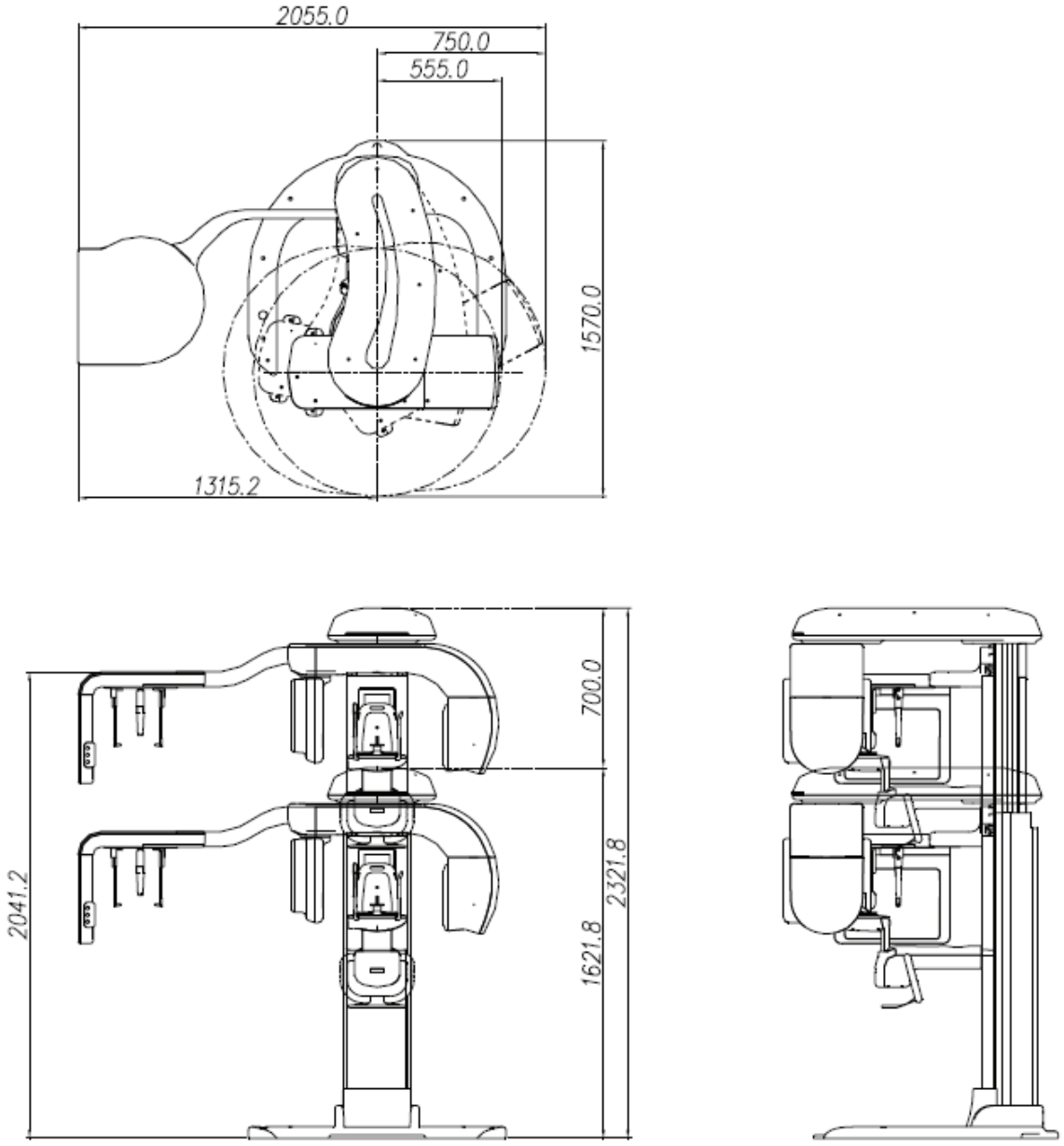
9.4 Image reconstruction time

FOV Mode	Voxel Size	Scan time	Recon time (sec)	Reconstruction time (Metal function)
P (150X150)	0.2*0.2*0.2	High (24 sec)	105	It takes twice the time compared to reconstruction without metal function.
		Normal (15sec)	94	
	0.3*0.3*0.3	High (24 sec)	60	
		Normal (15sec)	52	
I (120X80)	0.2*0.2*0.2	High (24 sec)	47	
		Normal (15sec)	39	
	0.3*0.3*0.3	High (24 sec)	28	
		Normal (15sec)	21	
D (80X60)	0.12*0.12*0.12	High (24 sec)	53	
		Normal (15sec)	46	
	0.2*0.2*0.2	High (24 sec)	21	
		Normal (15sec)	16	
S (50X50)	0.08*0.08*0.08	High (24 sec)	57	
		Normal (15sec)	50	
	0.12*0.12*0.12	High (24 sec)	27	
		Normal (15sec)	19	

* Image reconstruction time can vary depending on the computer specifications and/or its working condition.

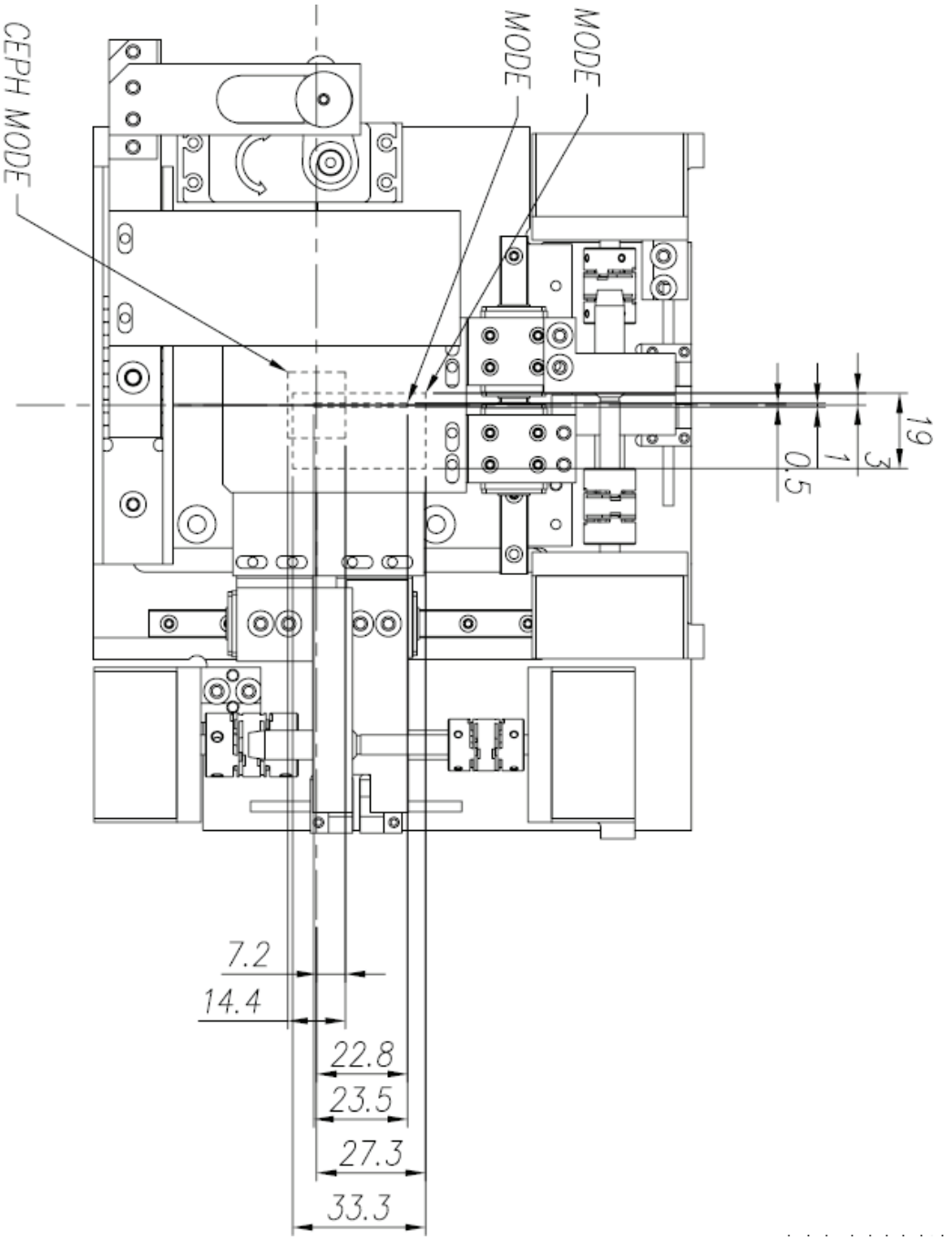
* The above data was obtained using a computer system based on the HP Workstation XW 8600, Microsoft XP Professional, 4GB RAM, GTX 280 (1G) RAM

9.5 Dimension of the unit

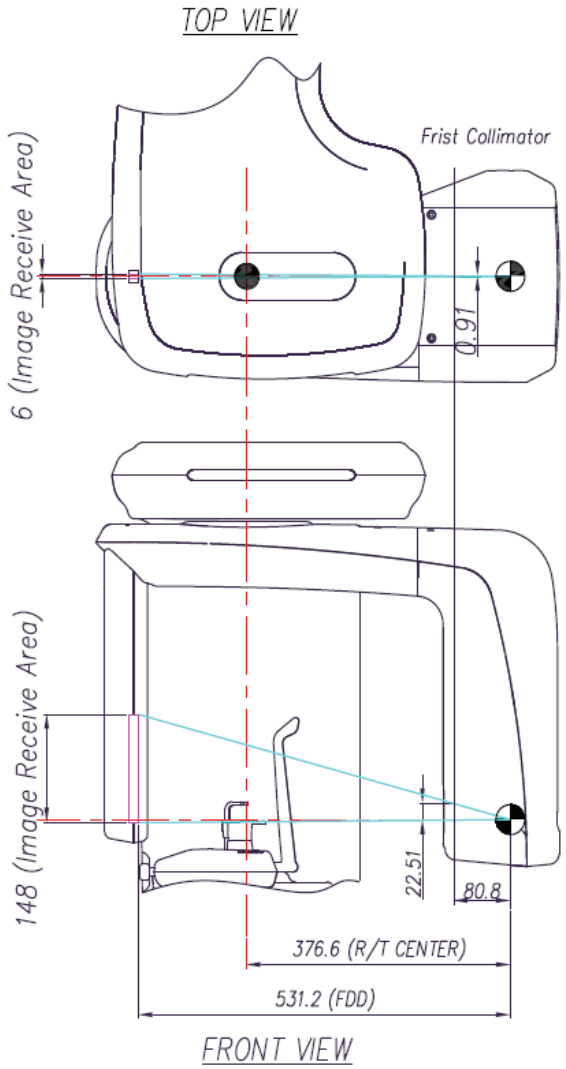


(Unit: mm)

9.6 Dimension of beam limiting device



9.7 Focal spot distance



FOD, ODD, FDD (mm)

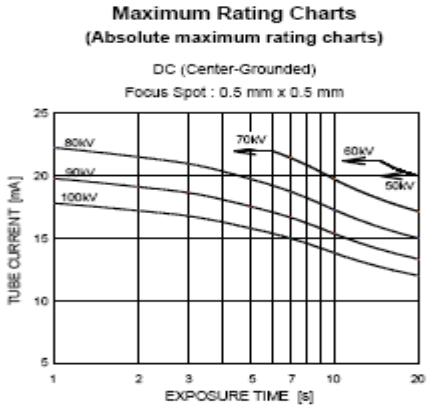
Mode	FOD (Focal Spot to Object Distance)	ODD (Object to Detector Distance)	FDD (Focal Spot to Detector Distance)
CT	424.3	254.5	678.8
PANO	456.6	149.2	605.8
CEPH	1539.4	204.5	1743.9

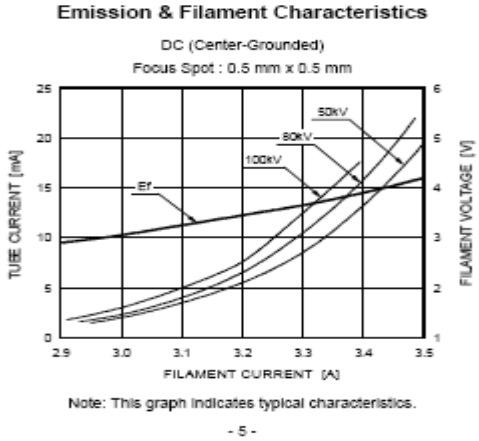
9.8 X-Ray generator specifications

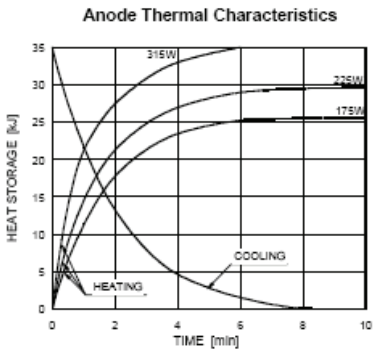
9.8.1 X-Ray Tube Specification

(D-051)

- Tube voltage: 50 ~ 100 kV
- Tube current: 1 ~ 22 mA
- Focal spot: 0.5 mm
- Inherent filtration: 0.8 mm Al
- Added filtration: 2.0 mm Al
- Total filtration: 2.8 mm Al
- Filament characteristics: 3.5~4.9V 3.5A(max. filament current)
- Anode angle: 5°
- Anode Hu: 28000J
- Anode cooling rate: 265W
- Input energy at 1 sec: 1750W
- Tube target material: Tungsten







- 5 -

9.8.2 High voltage generator

- Tube voltage: 50 to 80kV constant potential
- Tube current: 2 to 10mA direct current

9.8.3 X-Ray generation controller

- Focal spot length to Sensor: 678 mm
- Cooling: 1 min. cooling time
- X-Ray generation limit: 50 to 90kV and 2 to 10mA
- High frequency generator, constant potential, micro processor controlled
- Ripple < 5.5%
- Inverter frequency 36 kHz push-pull
- Nominal power less than 1.3 KW
- High voltage DC

9.9 Electrical characteristics

- Power supply voltage AC 110/230V ± 10%
- Frequency 50/60 Hz
- Power rating 2.0KVA

9.10 Environmental characteristics

- Operating temperature 10 ~ 30℃
- Operating relative humidity 30 ~ 75%
- Operating atmospheric pressure 700 ~ 1060 hPa
- Transport and storage temperature 20 ~ 70℃
- Transport and storage relative humidity < 90% non-condensing
- Transport and storage atmospheric pressure 500 ~ 1060 hPa

9.11 Standards

This product is designed and produced to meet the following standards:

EN 60601-1, EN 60601-1-3, EN 60601-2-7, EN 60601-2-28, EN 60601-2-32,
EN 60601-1-2, EN 61000-3-2, EN 61000-3-3
EN ISO 9001, EN ISO 13485

9.12 Marks & Graphic symbols

TYPE B Equipment

Radiation hazard

Chapter 10 Disposal of the unit

In order to reduce the environmental contamination, this unit is basically designed to be as safe as possible to use and dispose. Many parts inside and outside the unit except for some like X-ray tube are environment-friendly and can be recycled for the next uses.

All parts and components containing hazardous materials must be disposed of according to the regulation governing these issues.

Part	Main materials to be disposed	Recyclable materials	Waste disposal site	Hazardous waste Needs separate collection
Frame and covers	Aluminum and plastics	●		
Motors		●		
Boards		●		
Cables and transformer	Copper	●		
	Steel	●		
	Oil		●	
Packing	Wood	●		
	Cardboard	●		
	Paper	●		
X-Ray tube				●
Sensor head	Return sensor head to E-WOO			
Other parts			●	

E-WOO
Tel ▸ +82-31-379-9635
Fax ▸ +82-31-377-9198
Email ▸ gcs@vatech.co.kr
Head Quarters ▸ 473-4, Yun-Min Bldg., Bora-dong,
Giheung-gu, Yongin-si, Gyeonggi-do, Korea
Factory ▸ 23-4, Seokwoo-Dong, Hwaseong-si, Gyeonggi-do, Korea

CE 0499

CE symbol grants the product compliance to the European Directive for Medical Devices 93/42 as a class IIB device. Authorized by **Grand-Duche De Luxemburg**.

EC Representative; DentalHolding Sp.Zo.o
ul. Chalubinskiego 8
00-6 Warszawa Poland
Tel: +48-22-313-08-08
Fax: +48-22-313-08-90

Release Version 1.0.1
Dated Oct. 26th, 2009

E-WOO Technology
473-4, Bora-Dong, Giheung-Gu, Yongin-Si
Gyeonggi-Do, Korea 446-904
Tel 82.31.899.7979 Fax 82.31.8005.7816
www.e-wootech.com