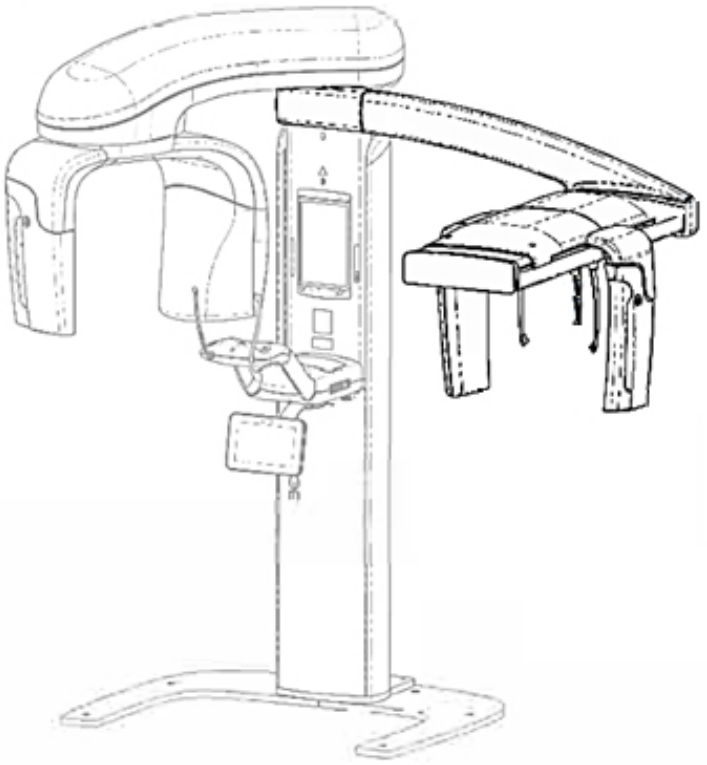
midmark™

Progeny Vantage Panoramic X-ray System with Cephalometric Option



User Guide

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Progeny Vantage Panoramic X-ray System with Cephalometric Option

User Guide

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Indications for Use

Statement of Indications for Use

The indications for use of the Progeny Vantage® Panoramic X-ray System are to provide dental radiographic examination and diagnosis of diseases of the teeth, jaw, and oral structures. When the system is equipped with the Cephalometric option, the system will also provide cephalometric radiographic examinations for the use in orthodontic treatment planning and evaluation.

Guidelines for Patient Selection

The guidelines for use of the Progeny Vantage® Panoramic Extraoral X-ray System are described in the “ADA/FDA Guide to Patient Selection for Dental Radiographs.” This device is to be operated only for the intended use as indicated by prescription of a qualified dental practitioner.

Contraindications

None known at this time.

Adverse Reactions

None known at this time.

Indications of Sterility

This production is not provided sterile. See Maintenance section of this Manual.

Warnings and Precautions

Radiation Safety

Only qualified and authorized personnel may operate this equipment observing all laws and regulations concerning radiation protection.

- It is recommended that operators of an extraoral dental X-ray device stand a minimum of 2 meters (6.6 feet) away from the focal spot and out of the path of the X-ray beam.
- Full use must be made of all radiation safety features on the equipment.
- Full use must be made of all radiation protection devices, accessories, and procedures available to protect the patient and operator from X-ray radiation.

Electrical Safety

- Only qualified and authorized service personnel should remove covers on the equipment.
- This equipment must only be used in rooms or areas that comply with all applicable laws and recommendations concerning electrical safety in rooms used for medical purposes, e.g., IEC, US National Electrical Code, or VDE standards concerning provisions of an additional protective earth (ground) terminal for power supply connection.
- Before cleaning or disinfecting, this equipment must always be turned off.
- The Progeny Vantage® X-ray System is ordinary medical equipment without protection against ingress of liquids. To protect against short-circuit and corrosion, no water or any other liquid should be allowed to leak inside the equipment.

Explosion Safety

This equipment must not be used in the presence of flammable or potentially explosive gases or vapors, which could ignite, causing personal injury and/or damage to the equipment. If flammable disinfectants are used, the vapor must be allowed to disperse before using the equipment.

Damage and Injury

Do not place permanent or non-mobile structures beneath the device. Device movement may result in damage to the device or structure, or in injury to the operator or patient.

Cleanliness

To prevent cross contamination, always clean the patient contact areas and always install a fresh protective sheath over the bite guide before positioning a patient. The sheath recommended for this application is the TIDI Products, part number 21008.

Laser Safety

CAUTION: Do not stare into the beam. Do not place eyes closer than 100 mm. This equipment contains class 2 lasers of 3 mW output at 650 nm. The beam is a 40° fan line. The lensing on the laser is not removable. Laser on time does not exceed 100 seconds.

CAUTION: Use of procedures other than those contained within this manual may result in exposure to damaging laser light.

Safe Disposal Methods

This device is electrical equipment that contains lead, therefor precautions must be taken when disposing of the device. Contact your distributor or Midmark's Authorized Representative for further direction that complies with your local laws.

Compliance with Applicable Standards

Radiation Protection

The certified components of the Progeny Vantage Panoramic Dental X-ray System comply with Radiation Performance Standards 21 CFR, Subchapter J, at the time of manufacture.

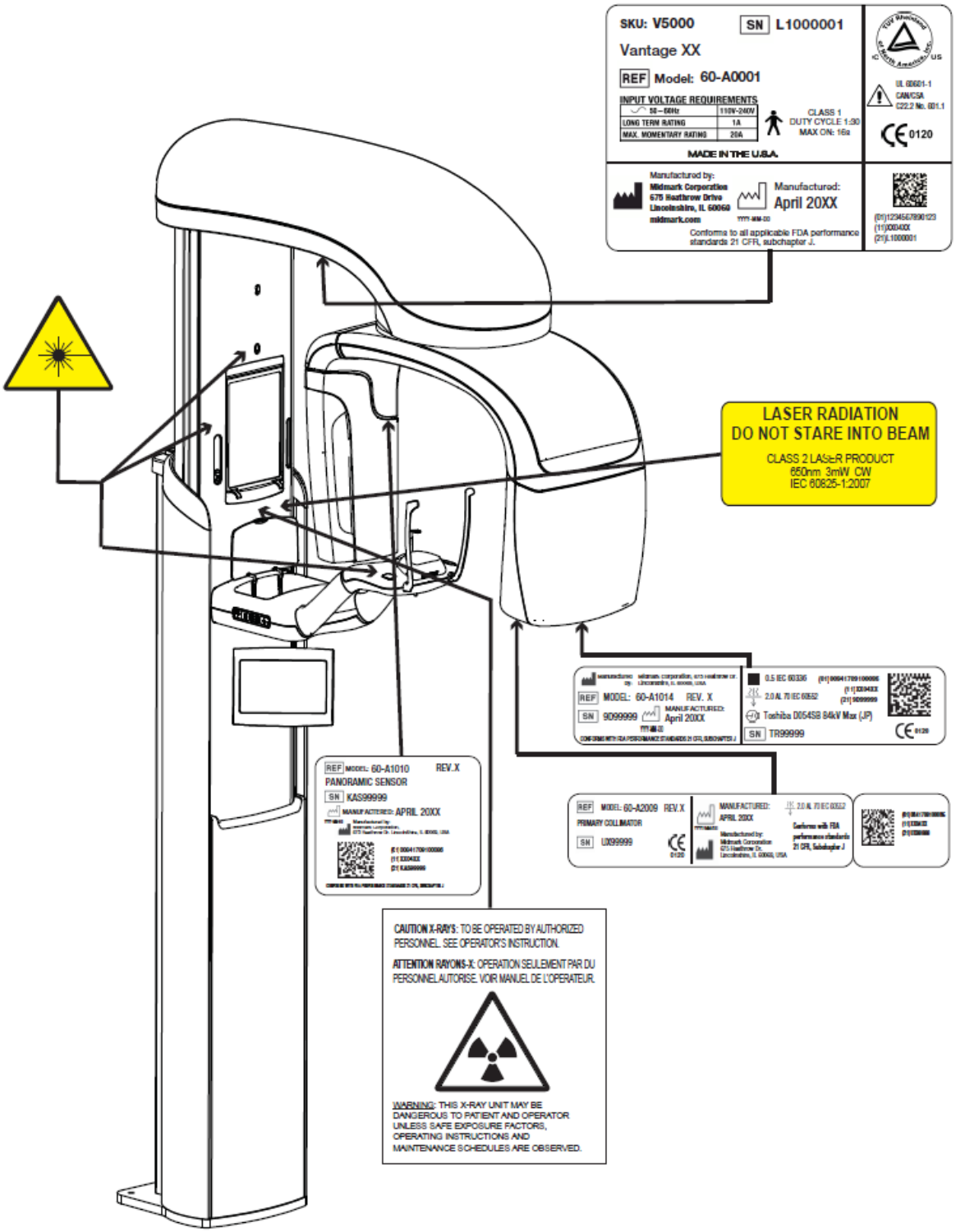
Performance Standards

Standard	Content
IEC 60825-1:2007	Safety of Laser Equipment
IEC 60601-1	Medical electrical equipment - Part 1: General requirements for basic safety and essential performance
IEC 60601-2-7	Medical electrical equipment - Part 2-7: Particular requirements for the safety of high-voltage generators of diagnostic X-ray generators
IEC 60601-2-28	Medical electrical equipment - Part 2-28: Particular requirements for the safety of X-ray source assemblies and X-ray tube assemblies for medical diagnosis
IEC 60601-1-3	Medical electrical equipment – Part 1-3: General requirements for radiation protection in diagnostic X-ray equipment
IEC 60601-1-2	EMI/RFI
CAN/CSA 22.2 No. 601.1-M90	Canadian standard for medical electrical equipment
IEC 60601-2-32: 1994	Medical electrical equipment - Part 2-32: Particular requirements for the safety of associated equipment of X-ray equipment

Certified Components

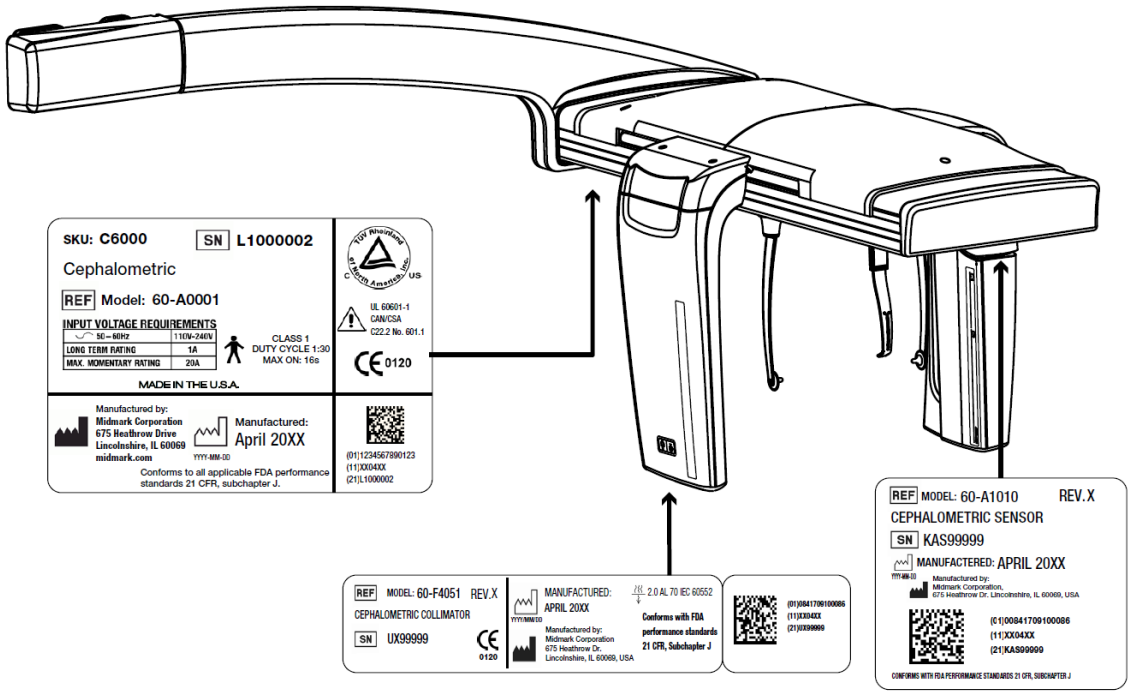
Component	Reference Number
Vantage System, Domestic	60-A0001
Sensor Assembly, Panoramic	60-A1010
Ceph Extension, with Sensors (option)	60-A1009
Pan tube head assembly	60-A1014
Primary collimator assembly	60-A2009
Pan X-ray power supply assembly	60-A2035
Sensor Assembly, Cephalometric (option)	60-A1004
(Option) Collimator, secondary, Ceph (option)	60-F4051

Device Labeling



60-L0007 Rev. D01

Optional Cephalometric Extension Labeling



EC Declaration of Conformity

Name and Description of Product

Progeny Vantage Panoramic Dental X-ray System

Catalog V5000 US Domestic Market
Model 60-A0001 system

Catalog V5100 Export Market
Model 60-A0001 system

Catalog: V5050 Progeny Vantage Panoramic with Ceph Sensor, Domestic
Model: 60-A0008

Catalog: V5150 Progeny Vantage Panoramic with Ceph Sensor, Export
Model : 60-A0008

Catalog: V5000C Progeny Vantage Panoramic with Cephalometric Extension, 2 Sensor System, Domestic
Model: V5000 + C6000

Catalog: V5100C Progeny Vantage Panoramic with Cephalometric Extension, 2 Sensor System, Export
Model: V5100 + C6000

Catalog: V5050C Progeny Vantage Panoramic with Cephalometric Extension, 1 Sensor System, Domestic
Model: V5050 + C4000

Catalog: V5150C Progeny Vantage Panoramic with Cephalometric Extension, 1 Sensor System, Export
Model: V5150 + C4000

Catalog: C6000 Cephalometric Extension with Sensor
Model: 60-A1009

Catalog: C4000 Cephalometric Extension without Sensor
Model: 60-A1019

Catalog: Ceph Sensor only
Model: 60-A1004

Catalog: Panoramic Sensor
Model: 60-A1010

Class: IIb

EC Declaration of Conformity

Reference Numbers to which Conformity is Declared	The following regulatory documents apply: UL 2601-1 IEC 60601-1-2 IEC 60601-1-3 IEC 60601-2-7 IEC 60601-2-28 IEC 60601-2-32 IEC 60825-1 Medical Device Directive ISO 13485 Machinery Directive
Declaration	This unit is manufactured by Midmark Corporation. Midmark Corporation declares that the products described herein meet all the applicable Essential Requirements of the EC Medical Device Directive 93/42/EEC in Annex I. For Class IIb products described herein, the product is manufactured, inspected, tested, and released in accordance with the approved quality assurance system established in accordance with ISO 13485 and Annex II of the EC Medical Device Directive under the Supervision of BSI, a Notified Body.
Contact	Technical Support Midmark Corporation Phone: 800-MIDMARK (1-800-643-6275)+1 847-415-9800 Fax: 847-415-9801 **imagingtechsupport@midmark.com** Hours: 8:00 a.m. – 5:00 p.m. Central Time

EMC Statement

Information regarding potential EMC interference and advice for avoidance

The Progeny Vantage Panoramic Dental X-ray System is considered as non-life-supporting equipment. While using the Progeny Vantage X-ray System adjacent to other equipment, the configuration should be carefully adjusted to ensure that electromagnetic interference (EMI) does not degrade performance. Specifically, mobile RF communications equipment can effect medical electrical equipment. Please refer to the EMC table below.

Guidance and manufacturer's declaration - electromagnetic emissions		
The Progeny Vantage Dental X-ray System is intended for use in the electromagnetic environment specified below. The customer or the user of the Progeny Vantage Dental X-ray System should assure that it is used in such an environment.		
Emission test	Compliance	Electromagnetic environment – guidance
RF emission CISPR 11	Group 1	The Progeny Vantage Dental X-ray System uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emission CISPR 11	Class B	The Progeny Vantage Dental X-ray System is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emission IEC 61000-3-2	Class A	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Complies	

Guidance and manufacturer's declaration - electromagnetic immunity			
The Progeny Vantage Dental X-ray System is intended for use in the electromagnetic environment specified below. The customer or the user of the Progeny Vantage Dental X-ray System should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment – guidance
Electrostatic discharge (ESD) IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be wood, concrete or ceramic tile. If the floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	± 2 kV for power supply lines ± 1 kV for input/output lines	± 2 kV for power supply lines ± 1 kV for input/ output lines	Mains power quality should be that of a transient/ burst supply lines typical commercial or hospital environment.
Surge IEC 61000-4-5	± 1 kV line(s) to line(s) ± 2 kV line(s) to earth	Not Applicable.	
Voltage dips, interruptions, and voltage variations on power supply input lines IEC 61000-4-11	< 5% U_T (>95% dip in U_T) for 0.5 cycle < 40% U_T (60% dip in U_T) for 5 cycles < 70% U_T (30% dip in U_T) for 25 cycles < 5% U_T (>95% dip in U_T) for 5 s	Not Applicable.	
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE: U_T is the a.c. mains voltage prior to application of the test level.			

Guidance and manufacturer's declaration - electromagnetic immunity			
The Progeny Vantage Dental X-ray System is intended for use in the electromagnetic environment specified below. The customer or the user of the Progeny Vantage Dental X-ray System should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment – guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the Progeny Vantage Dental X-ray System, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance:**
Conducted RF IEC 61000-4-6	3 V 150 kHz to 80 MHz	3 V	$d = 1.2 \times \sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	$d = 1.2 \times \sqrt{P}$ 80 MHz to 800 MHz $d = 2.3 \times \sqrt{P}$ 800 MHz to 2.5 GHz
			Where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacture and *d* is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,[a] should be less than the compliance level in each frequency range.[b] Interference may occur in the vicinity of equipment marked with the following symbol: 
NOTE 1: At 80 MHz and 800 MHz, the higher frequency range applies. NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.			
[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Progeny Vantage Dental X-ray System is used exceeds the applicable RF compliance level above, the Progeny Vantage Dental X-ray System should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the Progeny Vantage Dental X-ray System. [b] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than [V_1] V/m.			

Recommended separation distances between portable and mobile RF communications equipment and Progeny Vantage Dental X-ray System			
The Progeny Vantage Dental X-ray System is intended for use in the electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the sensor can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the sensor as recommended below, according to the maximum output power of the communications equipment.			
Rated maximum output power of transmitter, W	Separation distance according to frequency of transmitter m		
	150 kHz to 80 MHz $d = 1.2 \times \sqrt{P}$	80 MHz to 800 MHz $d = 1.2 \times \sqrt{P}$	80 MHz to 2.5 GHz $d = 2.3 \times \sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.37	0.37	0.74
1	1.17	1.17	2.34
10	3.69	3.69	7.38
100	11.67	11.67	23.34

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be determined using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer. NOTE 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies. NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.

Authorized Representatives

North America

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2 Introduction

In this Chapter

- Product Description
- Disclaimer about the Manual
- Symbols and Conventions
- Obtaining Technical Support

Product Description

The Progeny Vantage® Panoramic X-ray System is a digital panoramic X-ray system.

The panoramic X-ray provides a broad overview of the teeth, jaw, and oral structure of the entire mouth. The X-ray image supplies information about the teeth, upper and lower jawbone, sinuses, and other hard and soft tissues of the head and neck. The panoramic digital receptor is contained in a C-arm that moves around the patient's head.

The Progeny Vantage® System has many applications that include evaluation of third molars, evaluation of patients with past and present TMJ (temporomandibular joint) problems, patients who require full or partial removable dentures, dental implants, or braces, those who are at risk or suspected of having oral cancer or other tumors of the jaw, those who have impacted teeth, and those who have had any recent trauma to the face or teeth (i.e., can help identify a fractured jaw).

The optional Cephalometric Extension allows for lateral and PA views of oral structures. The ceph digital receptor is mounted on a transit rail which scans horizontally during ceph examinations. Cephalometric images are typically useful in orthodontic evaluation and treatment.

Disclaimer about the Manual

Midmark pursues a policy of continual product development. Although every effort is made to produce up-to-date product documentation, this publication should not be regarded as an infallible guide to current specifications. We reserve the right to make changes without prior notice. The original language of this manual is English.

Symbols and Conventions

Symbol	Explanation
	Type B: Protection against electric shock (IEC 60601.1-1988).
	Consult written instructions in the User Guide.
	ATTENTION RAYONS-X: OPERATION SEULEMENT PAR DU PERSONNEL AUTORISE. VOIR MANUEL DE L'OPERATEUR.
	WARNING X-RAY THIS X-RAY UNIT MAY BE DANGEROUS TO PATIENT AND OPERATOR UNLESS SAFE EXPOSURE FACTORS AND OPERATING INSTRUCTIONS ARE OBSERVED.
	*X-RAY EMISSION*
L	Power Mains, HOT WIRE
N	Power Mains, NEUTRAL WIRE
	Protective Earth (Ground)
	LASER RADIATION DO NOT STARE INTO BEAM CLASS 2 LASER PRODUCT. 650 nm, 3 mW
	Power off (circle) Power on (line)
	Waste Electrical and Electronic Equipment (WEEE). WEEE distributed in the European Economic Area (EEA) must be collected and disposed of separately from other waste, per WEEE Directive 2012/19/EU. Contact your equipment dealer for information on local compliance schemes.

Obtaining Technical Support

For Technical Support, contact:

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imagingtechsupport@midmark.com

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3 System Overview

In this Chapter

- About the Vantage System
- About the Panoramic X-ray Device
- About the Optional Cephalometric Extension

About the Vantage System

The Progeny Vantage® Panoramic X-ray System consists of the panoramic X-ray device, the exposure button, and the Progeny client software which is installed on computer system(s) within the dental office network. These computer systems are not provided by Midmark.

About the Panoramic X-ray Device

The panoramic X-ray device consists of the telescoping column, the overhead assembly, the patient positioning table, and the touch control panel.

Telescoping Column

The telescoping column has two main parts: the fixed section and the moving or telescoping section. The fixed section contains the actuator to control up and down movement of the panoramic X-ray device. The telescoping section mounts the patient positioning features. Optical sensors in the telescoping section define the maximum and minimum extension of the column.

Overhead Assembly

The overhead assembly consists of an overhead arm and C-arm. The overhead arm supports the C-arm, which rotates. The C-arm includes the tubehead and the removable sensor. The tubehead produces the X-ray beam, and the sensor is a digital image receptor.

Patient Positioning Table

The patient positioning table guides and supports the patient's head during acquisition of panoramic X-ray images by means of the chin rest, bite guide, and positioning wands. The positioning control on the side of the patient positioning table has 4 buttons for the operator to control the up/down movement of the telescoping column, to apply and release the positioning wands, and to turn on positioning lights. The patient positioning table also contains a storage compartment.

Touch Control Panel

The touch control panel is mounted on the fixed column section under the patient positioning table. It is the main user interface for taking X-ray images with the Progeny Vantage® System and is activated by touch.

Exposure Button

The exposure button is used by the operator to take the X-ray. The basic configuration consists of a hand switch connected to the panoramic X-ray device by a coil cord.

Bite Guide

A bite guide helps the patient keep his or her jaw correctly positioned. Additional bite guides may be obtained from Midmark. Always install a fresh protective sheath over the bite guide before positioning a patient. The sheath for this application is the Midmark part number 60-S0027.

Chin Rest

An easily removable chin rest fits into an opening on the patient positioning table. Additional chin rests may be obtained from Midmark.

TMJ Positioner

A TMJ positioner for TMJ X-rays fits into the patient positioning table. TMJ positioners are included with the Progeny Vantage®.

Emergency Stop Switch

The stop switch, mounted under the left side of the patient positioning table near the telescoping column, is for use by the patient. Depressing the button will immediately halt all motor movement. Touching the control panel surface will also abort any movement. The button can be released by turning the knob.

About the Optional Cephalometric Extension

The Cephalometric Extension consists of the support arm, the cephalometric scanning mechanism and the cephalometric sensor.

Support Arm

The support arm is an aluminum casting that mounts to the panoramic column's inner (mobile) component. It mounts via a support casting that allows vertical adjustment of the position of the cephalometric mechanism. The arm can be mounted either to the right, or to the left of the column.

Cephalometric Scanning Mechanism

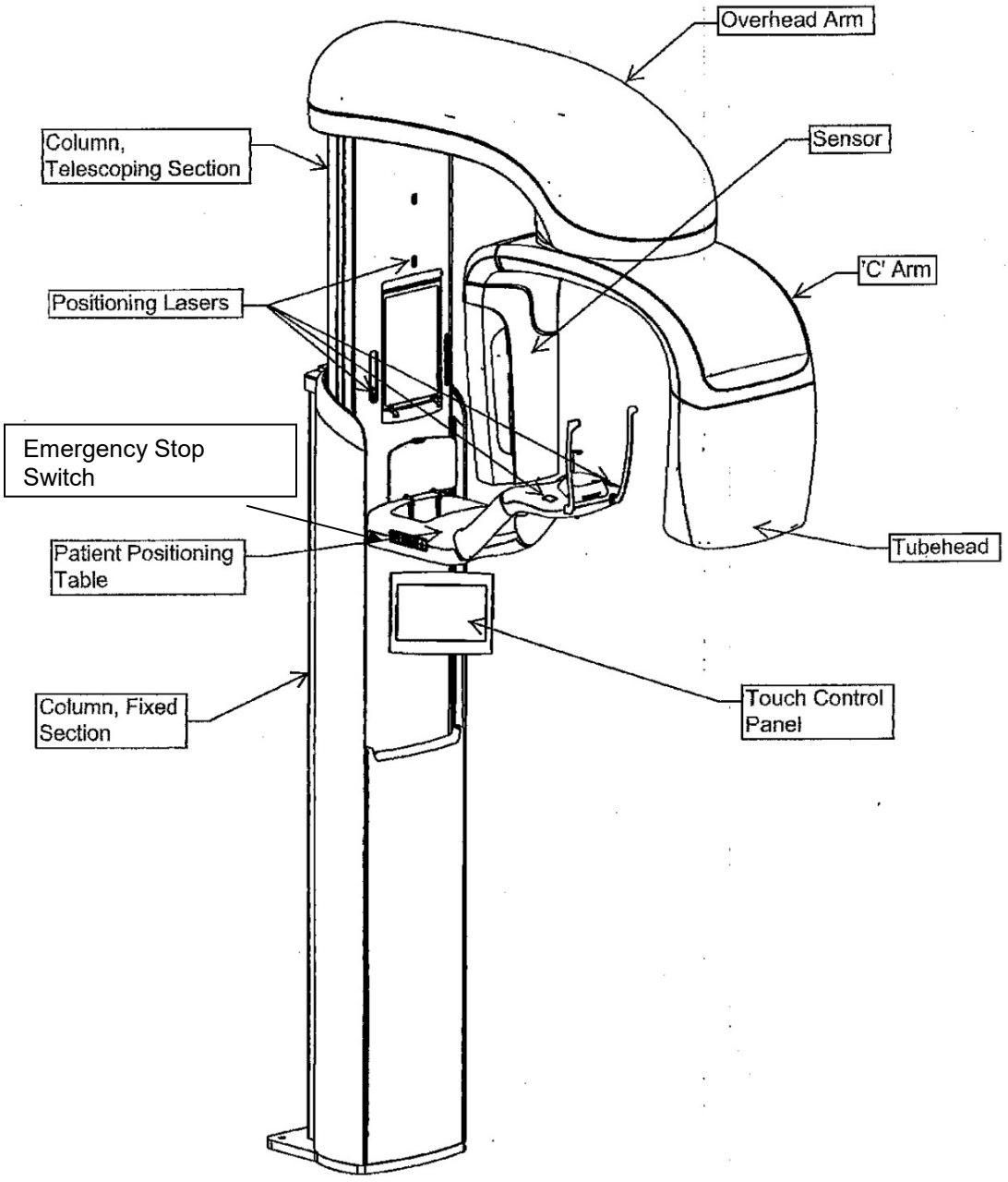
The cephalometric scanning mechanism is comprised of the rail and the transit assembly. The rail supports the transit mechanism, and houses the motor and bearings that cause the transit mechanism to move. The transit assembly mounts the cephalometric sensor and the secondary collimator, and maintains the alignment of the sensor and secondary collimator to the panoramic tube head.

The rail also supports the cephalostat, used to position the patient. The cephalostat is comprised of two earposts which adjust to conform to the width of the patient's head, and a nasion locator, which adjusts vertically and laterally to align the patient's head. The entire cephalostat rotates in 22.5° increments to support many cephalometric imaging positions.

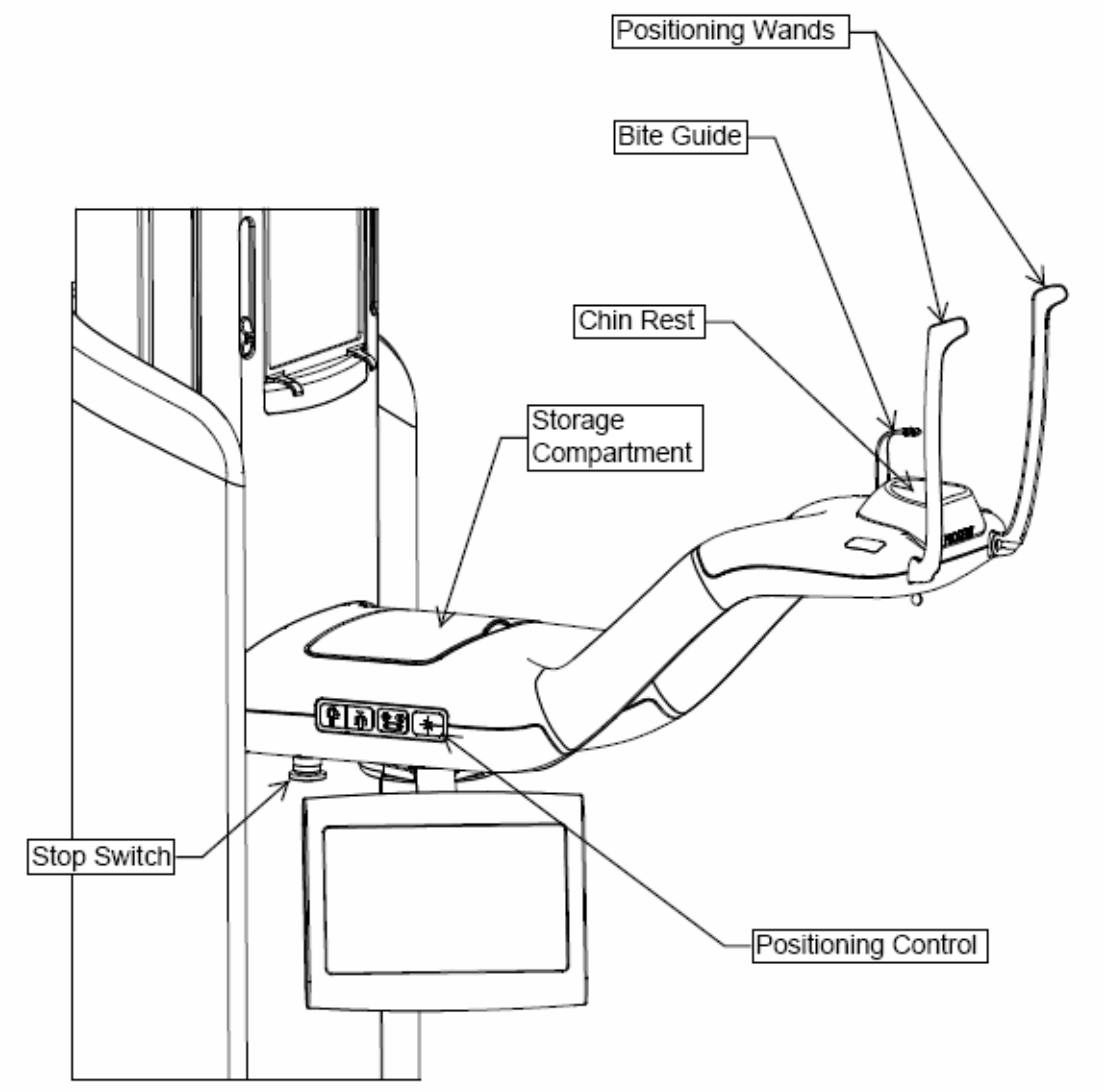
Cephalometric Sensor

The cephalometric sensor is similar in appearance to the panoramic sensor, but houses within a 21cm long digital detector instead of the 14 cm digital detector used for normal panoramic exam. The cephalometric sensor can be used in place of the panoramic sensor, but the panoramic sensor will not operate as a cephalometric sensor.

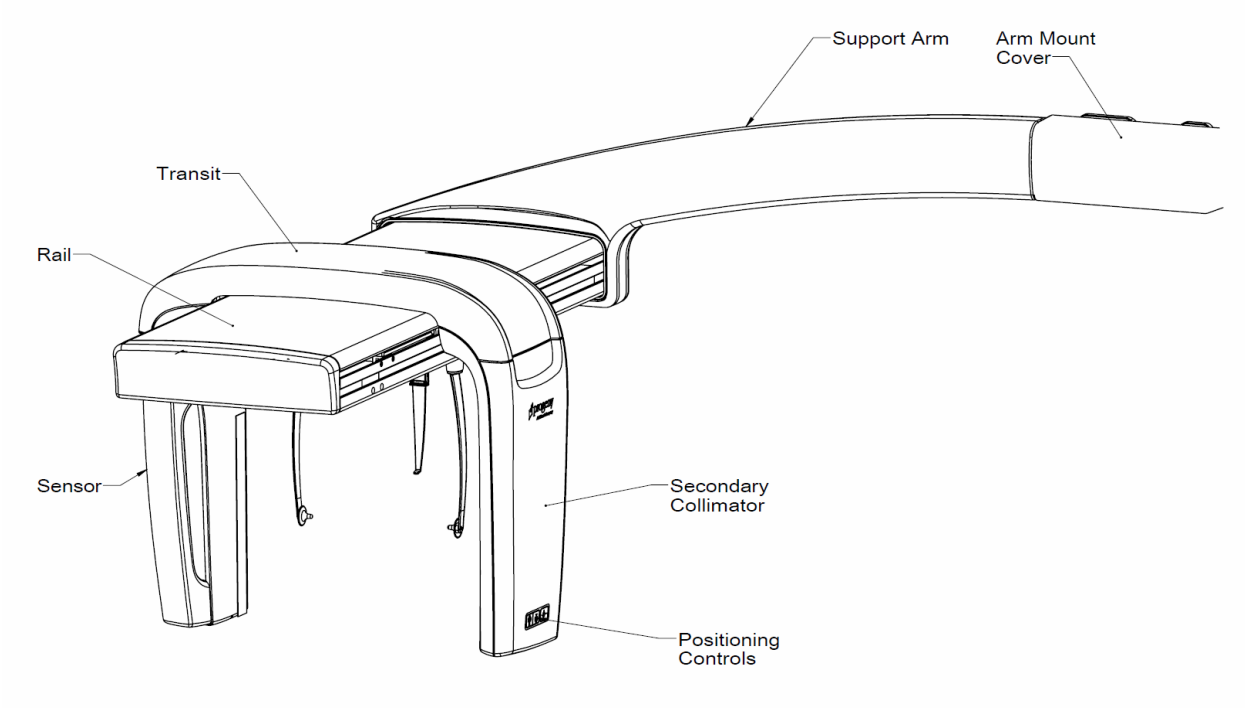
Vantage System Panoramic X-ray Device

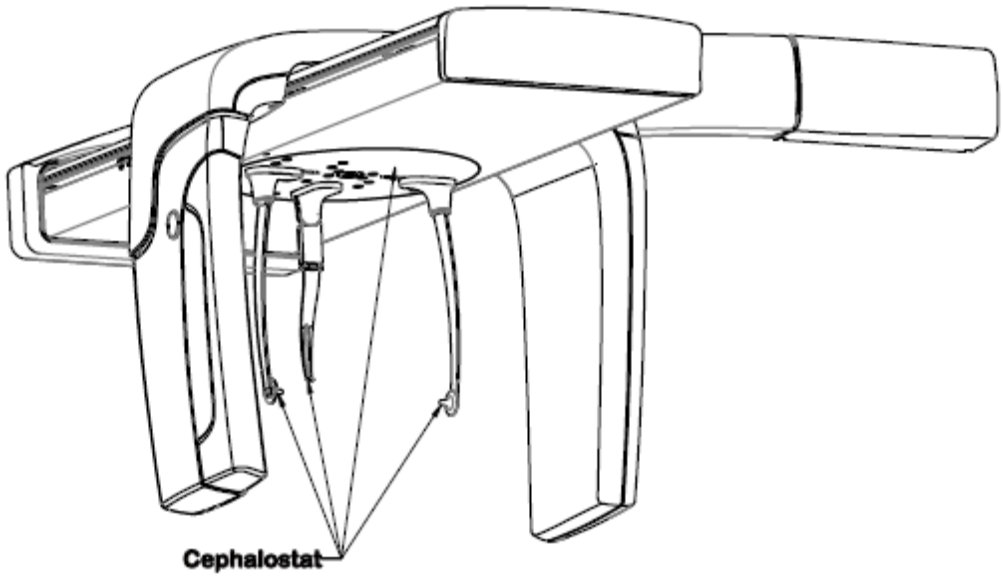


Vantage System Patient Positioning Table



Optional Cephalometric Extension





4 Projection Summary

In this Chapter

- Overview
- Panoramic Standard Projection
- Panoramic Pediatric Projection
- Panoramic Enhanced Projection
- Temporomandibular Joint (TMJ) Projection
- Bitewing Projection
- Cephalometric Projections (option)

Overview

The Progeny Vantage® Panoramic X-ray System offers multiple projections: a panoramic standard projection, panoramic pediatric (pedo) projection, panoramic enhanced projection with enhanced orthogonality, panoramic bitewing projection, and a temporomandibular joint (TMJ) image.

The Panoramic magnification is a constant 1.2 horizontal and vertical, +/- 0.05. For both panoramic and TMJ images, the basic image size is a standard 300 x 150 mm.

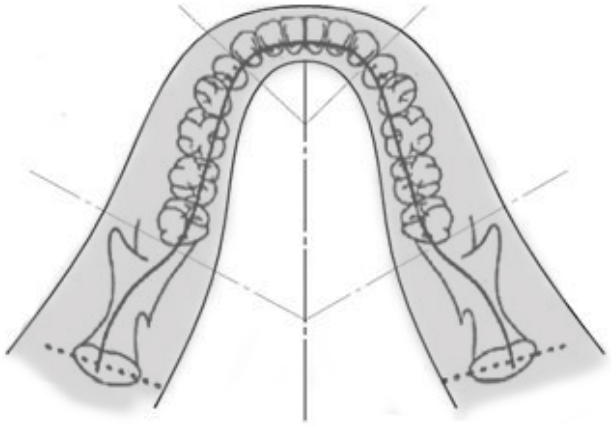
The optional Cephalometric extension offers multiple pre-programmed projections: AP/PA, and right and left Lateral projections. Other cephalometric projections can be made by orienting the cephalostat as needed.

The magnification is a constant 1.1 horizontal and vertical, +/- 0.05. For AP/PA projections, the basic image size is a 180 by 210mm. For Lateral projections, the available sizes are 240 by 210mm and 300 by 210mm

Panoramic Standard Projection

The panoramic standard projection has the traditional path and angles of the X-ray beam. If the patient is a child or very small adult, it is recommended to use the child setting for the exposure where the width of the exposed area is reduced.

Panoramic Standard Projection

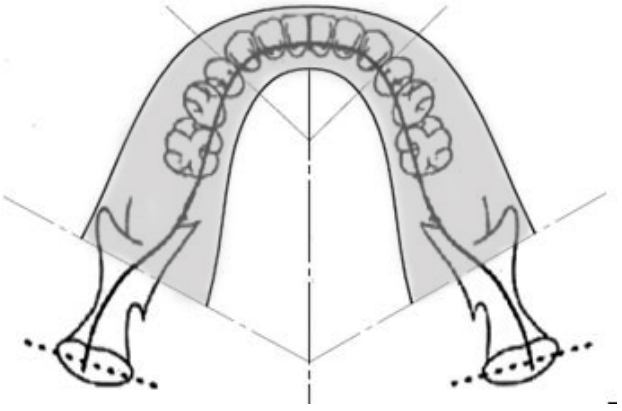


Panoramic Pediatric (Pedo) Projection

The panoramic pediatric Pedo projection is a subset of the panoramic standard projection, with a reduced field projection to limit the patient exposure to radiation.

To identify a Pedo projection, select Child as the Patient Size.

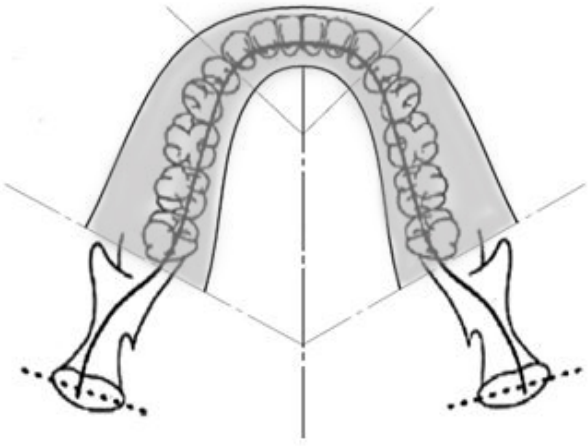
Panoramic Pedo Projection



Panoramic Enhanced Projection

In the panoramic enhanced projection, the basic imaging geometry is the same as in the panoramic standard projection except that it includes only the dentition. The panoramic enhanced projection, with the X-ray perpendicular to the jaw, is an improved orthogonal program, and is useful for implant planning.

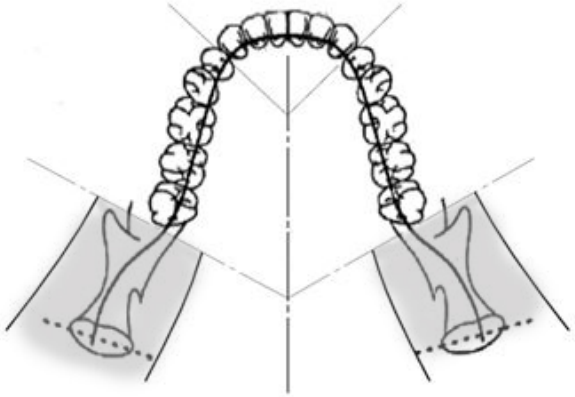
Panoramic Enhanced Projection



TMJ Projection

The TMJ projection provides exposures of patient's left and right temporomandibular joints.

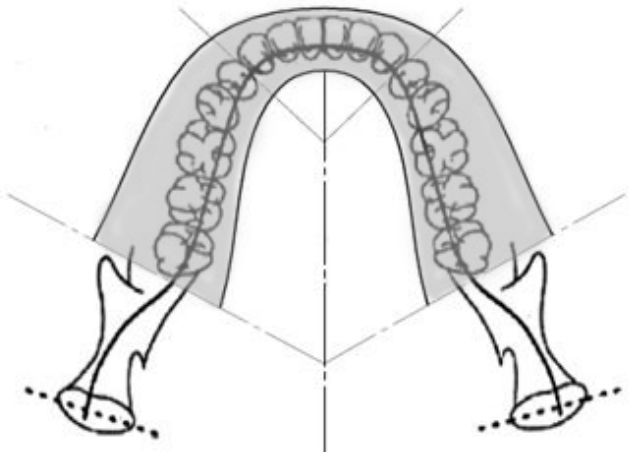
TMJ Projection



Panoramic Bitewing Projection

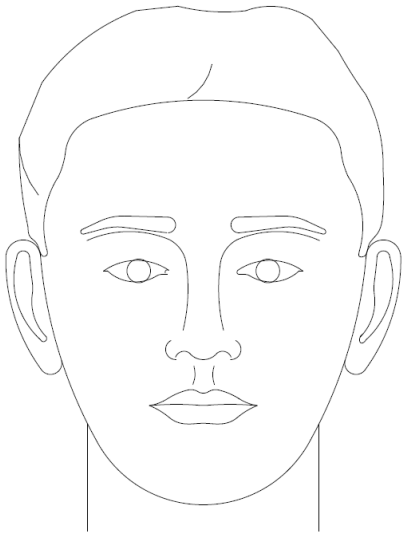
In the panoramic bitewing projection, the basic imaging geometry is the same as in the panoramic enhanced projection except that it reduces the vertical collimation to cover only the bitewing portion of the dentition. The panoramic bitewing projection, with the X-ray perpendicular to the jaw, is an improved orthogonal program, useful for bitewing analysis.

Panoramic Bitewing Projection



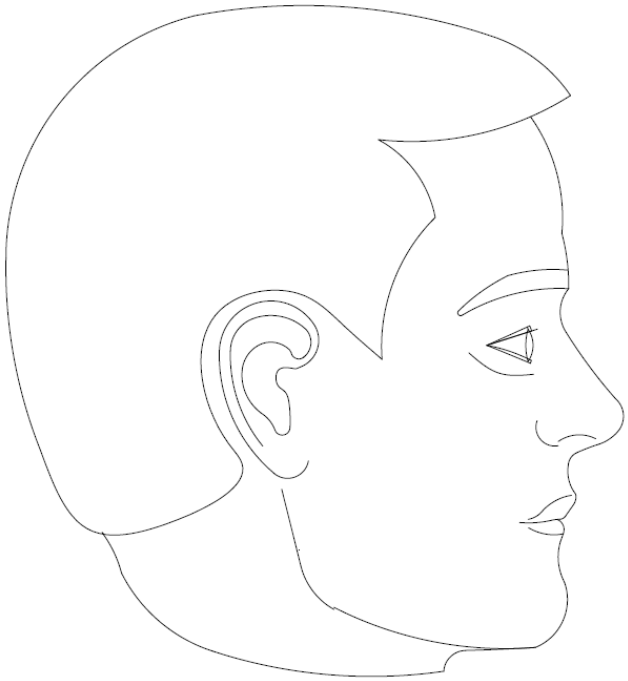
Cephalometric AP/PA Projection

The AP/PA projection is used for orthodontic evaluations. It is performed by rotating the cephalostat so that the nasion marker is toward the sensor (PA) or away from the sensor (AP.)



Cephalometric Lateral Projection

The Lateral projection is achieved with the cephalostat positioned with the ear posts in line with the X-ray tube head. The position of the nasion indicates whether a left or right lateral is produced.



5 System Walkthrough

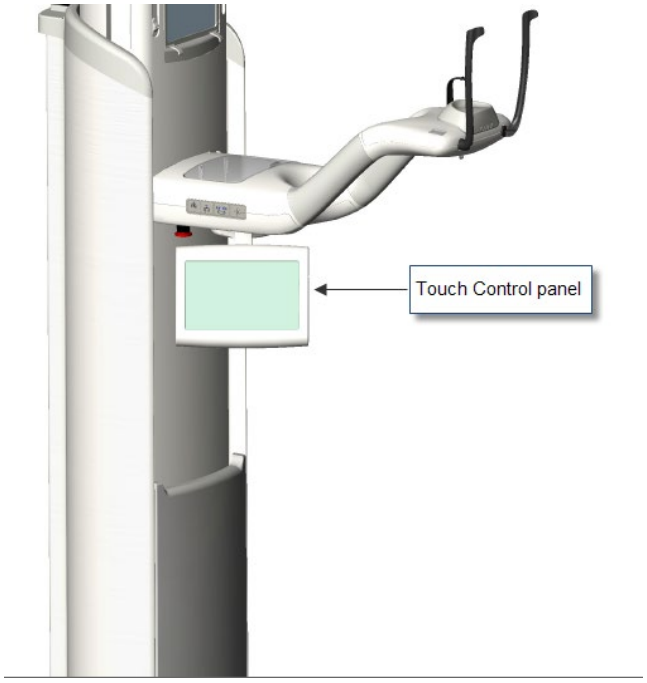
In this Chapter

- Touch Control Panel
- Tools for Patient Positioning
- Cephalometric (Option) Positioning Tools
- Entry, Exit, and Ready for Imaging Positions
- Demo Mode

Touch Control Panel

The Touch Control panel is the main operator tool for image acquisition. It is mounted on the telescopic column of the Vantage System, and can be swung to either side of the column to make it easier to use.

Touch Control Panel



Software on the Touch Control Panel

The user interface software runs on the Touch Control panel. For safety reasons, patient positioning can only be done from the Touch Control panel.

The Touch Control panel displays information pertinent to the current image being acquired. The screen is activated by touch. You tap a button to move to another screen, or you tap an icon to select a value.

The screens and features relating to image acquisition are described next:

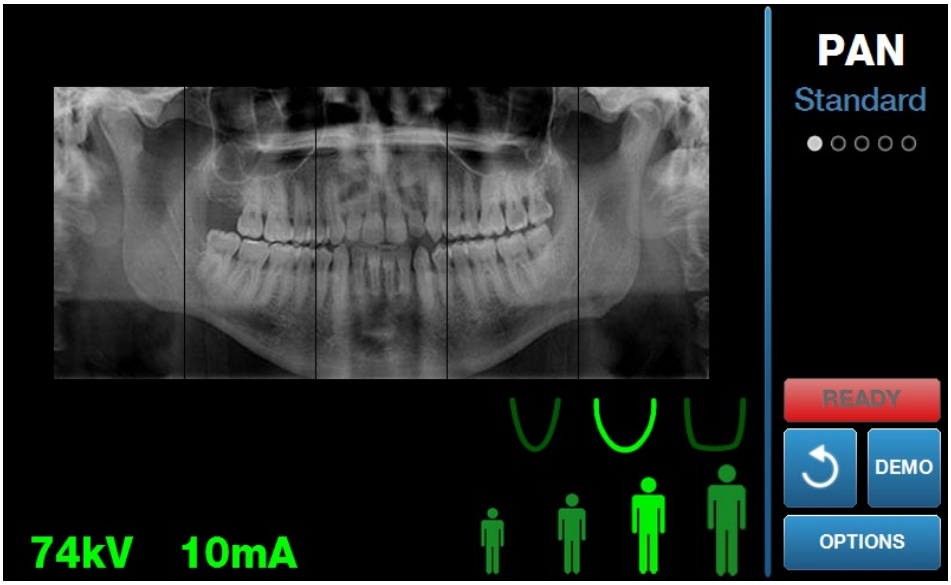
- Acquisition Setup screen
- Options screen
- Image Preview screen
- System Center screens
- kV and mA Properties screen
- Profile Properties screen
- Calibration Files screen
- Backup & Restore screen
- VantageTrust^{SM} screen
- Service screen (Password)

Acquisition Setup Screen

The Acquisition Setup screen is the principal screen used to acquire an image. At the upper left corner is the patient name and dental office. The other information on this screen - the technique factors – is the information you customize for each patient's X-ray.

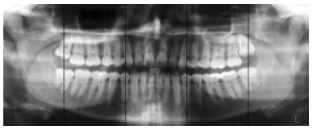
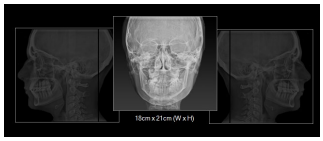
The technique factors define the intensity and duration of the X-ray. Technique factors include the settings of the projection type, segmentation, patient size, jaw size, and tube voltage as measured in kilovolt (kV) and X-ray tube current as measured in milliampere (mA) values. *For more information, see* Setting Technique Factors *in* Chapter 7.

Acquisition Setup screen



The following table describes the information and functions on the Acquisition Setup screen. The order of the options in the table is not indicative of the entry order.

Options on the Acquisition Setup Screen

Option	Description
Projection 	Four projections are available: Pan Standard (for both adult and child), Pan Enhanced, Pan Bitewing, and TMJ.
Patient size 	The Progeny Vantage® System has four patient sizes, each with its own default kV and mA settings. The patient sizes are Child, Small Adult, Adult, and Large Adult. Adult is the default patient size.
Jaw Size 	The jaw size setting determines the form of the focal trough. The three sizes accommodate patients with different jaw shapes and sizes: narrow, normal, and wide.
Segmentation 	By default, the Progeny Vantage System® images the entire jaw. The segment panels can be used to restrict the image to one or more contiguous segments. The segment panel is dark when unselected, and light when selected. For a TMJ projection type, the Progeny Vantage® System automatically selects the outermost two segments and does not allow changes. For a Pan Enhanced projection type, the Progeny Vantage® System automatically selects the innermost three segments, and does not allow changes.
Ceph Image Type 	The Cephalometric projection is chosen by the position of the Cephalostat. The corresponding selection is highlighted on the acquisition screen, along with the image size. If no selection is highlighted, then the Cephalostat is in a non-standard position.
kV and mA 	The kilovolt (kV) and milliampere (mA) values that appear are the default Voltage and Current values for the selected patient size, as configured on the Profile Properties screen. The default values appear as green and change to yellow when a value is no longer the default value. You might see one value in green and the other in yellow, indicating that the yellow value is no longer the default value. This table shows the initial default values of the kV and mA settings.

Patient Size	Default Values	
	kV Value	mA Value

Option	Description
	Child 66 8 **Small adult** 72 10 **Adult** 76 10 **Large adult** 80 10
Ready for Imaging 	The Ready for Imaging button has a dual purpose. It moves the Progeny Vantage System® to either the Ready for Imaging position or the patient entry position, depending on its current position. If the Progeny Vantage® System is not already in the patient entry position, tapping the Ready for Imaging button moves it there. When you tap this button, the status indicator flashes “WAIT” to indicate a moving status while the Vantage System moves to the Ready position for image acquisition.
	If no sensor is connected and you are *not* in Demo mode the Ready for Imaging button will indicate no sensor is detected and prevent motion of the machine
Demo 	The Demo button turns on Demo mode. In this mode, all functions of the Vantage device are available, but no X-rays are emitted.
Options 	The Options button opens the Options window where you can configure the default values for the Progeny Vantage® System. *For more information, see* Options Screen *in this chapter*.
Exposure Time 	This indicator displays the patient Exposure Time, in seconds. This is not an adjustable option.

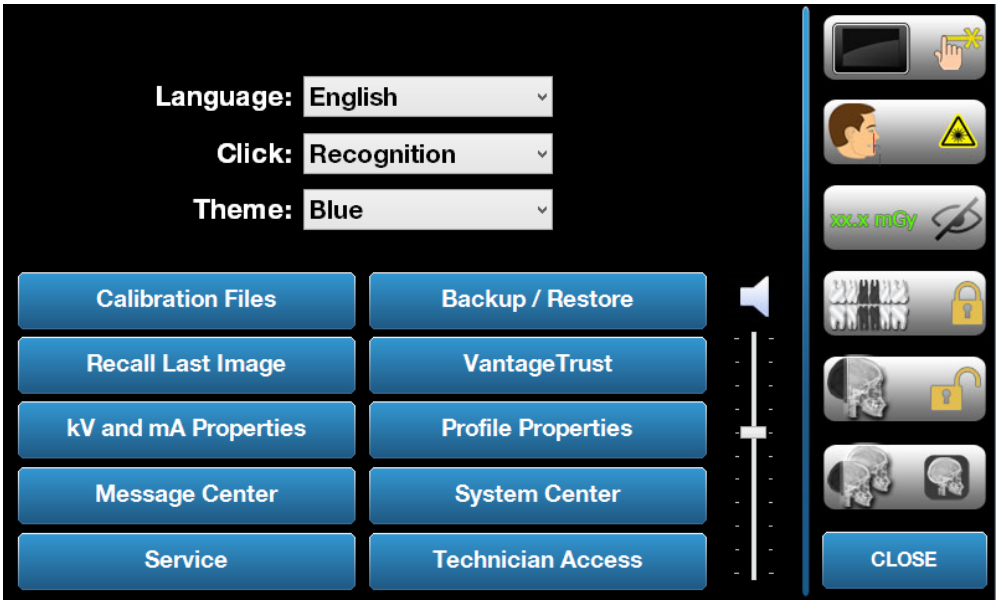
Option	Description
Cool Down Time 	When the Progeny Vantage® is in cool down mode, the Cool Down Time replaces the Exposure Time.
Est. Dose	To assist medical personnel and the patient in making informed decisions, the Progeny Vantage® System displays an estimated air kerma-area product for the selected image survey to be executed. The quantity is presented in SI units of $mGy \cdot cm^2$. The dose information is labeled DAP in the user interface to link it with locally established dose reference levels (DRL). The data provided here are equivalent to the information provided in the Dose Information section of this manual. **NOTICE:** Displayed value can differ up to 30% from measured dose quantity with calibrated equipment. Do not use the displayed value when a precise dose reading is expected. Use calibrated equipment to measure the needed dose quantity.
Status Indicator 	When the status indicator displays **Ready** in green, the Progeny Vantage® System is ready for imaging. When **Ready** is gray, the Progeny Vantage® System is in the exit position. When **Ready** is yellow, the Progeny Vantage® System is in the entry position. When **Ready** is red, the system is in an unknown position, as at initial power up, and moving to find the home position. When a flashing **Wait** appears, the Progeny Vantage® System is in motion. When **Safe** appears, the Progeny Vantage® System is busy checking components, and is in transition to another screen. This state is temporary. If it lasts more than 5 minutes, restart the Progeny Vantage® System.
Cuspid Light Reminder 	When the Progeny Vantage® moves into patient entry position a reminder is indicated on the top of the acquisition screen to remind you to use the cuspid light.

Options Screen

As delivered, the Touch Control panel comes with default settings for images and is completely ready to use. The Options screen is used to change any of the default settings or configure differently the behavior of the Touch Control panel. For example, you can use the Options screen to set the peak kiloVolt (kV) and milliAmpere (mA) values for each patient size.

The Options screen is accessed through the Options button on the Acquisition Setup screen.

Options Screen



The following table describes the information and functions of the Options screen.

Options on the Options Screen

Option	Description
Click	The dropdown menu lets you decide what type of sound is heard when you tap a button on the Touch Control panel. The options include standard Microsoft Windows™ sounds.
Language	The dropdown menu lets you select a language. English is the default language.
Audio Level 	The slider button controls the volume of the Click sound. Moving the slider to the bottom makes the sound less audible; moving it to the top makes it more audible.
Calibration Files	This button is used to install sensor calibration files on the Vantage System
Backup / Restore	This button is used to backup and restore your user settings to/from the Vantage System.
Recall Last Image	This button is used to retrieve and redisplay the most recent image acquired. The most recent image is always stored until another image is acquired, or until the Vantage System is turned off.
VantageTrust	This button is used to view your current VantageTrust settings.
kV and mA Properties	This button is used to set the minimum and maximum kiloVolt (kV) and milliAmpere (mA) values for radiation.
Message Center	This button allows you to interactively view messages for specific components of the Vantage Panoramic system.
Profile Properties	This button is used to set the default kV and mA values and the jaw size for each patient size.
System Center	This button provides access to information on the sensor type, serial number, and number of images taken since the last sensor controller reset.
Service	This button is used for maintenance or when a service technician works on the system. It is password protected.
Technician Access	This button is used to prepare the machine for a technician to access the Vantage System remotely
Slide On/Off 	This toggle button allows you to choose tap or sliding motion to select the projection and one or more segments on the segmentation panel. The button is circled in green when the slide selection is activated.

Option	Description
Segment Lock 	This toggle button allows you to lock the segments in the acquisition screen to prevent accidental segment de-selection
Cuspid Light Reminder 	This toggle button allows to enable and disable the cuspid light reminder on the acquisition screen
mGray icon 	This button is used to enable and disable the dose display.
Ceph Segmentation Lock 	This button activates or deactivates the Ceph Lateral segmentation lock
Ceph Segmentation Default 	This toggle button sets the default Ceph Lateral segmentation (image size)

Recall Last Image

After an X-ray image has been acquired, or when you tap the Recall Last Image button on the Options screen, an Image Preview appears. This Image Preview remains on the screen of the Touch Control panel until you tap the OK button. Be sure to verify that the image acquired is the one desired for the patient.

If you just powered on the Vantage System, and you tap the Recall Last Image button, a non-diagnostic image may appear. This image may not be useful for diagnostic purposes.

Image Preview

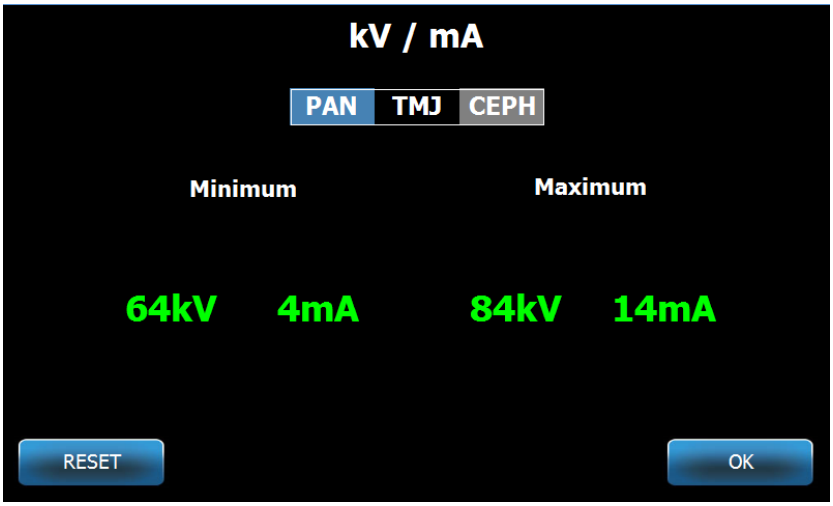
System Center

The System Center will allow access to three screens to display system information. The 3 screens are Sensor, Real Time Controller, and VantageTouch Panel. If applicable, a Ceph sensor screen is also available. The information in these screens allows the user to verify system revision information and usage information.

kV and mA Properties Screen

The kV and mA Properties screen provides the user with the ability to limit the minimum and maximum Voltage (kV) and Current (mA) that can be selected for Pan and TMJ images on the Touch Control Panel. Tapping the kV and mA Properties button on the Options screen opens the kV and mA Properties screen.

kV and mA Properties Screen



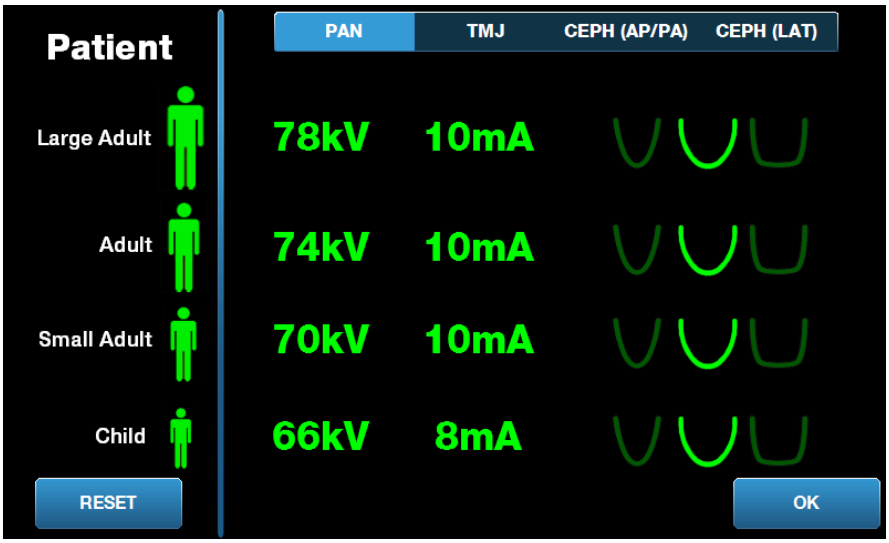
Profile Properties Screen

The Touch Control panel comes with default values for each patient size and is completely ready for use. With the Profile Properties screen, you can modify these values. The default values appear when you select PAN or TMJ and a patient size on the Acquisition Setup screen.

For Pan images, for each patient size, you can define the kV and mA peak values and the jaw size. The kV and mA values must fall within the range already defined on the kV and mA Properties screen. For TMJ images, you can define the kV and mA peak values for each patient size.

When you tap Profile Properties on the Options screen, the Profile Properties screen opens.

Profile Properties Screen



The following table describes the information on the Profile Properties screen.

Profile Properties Screen

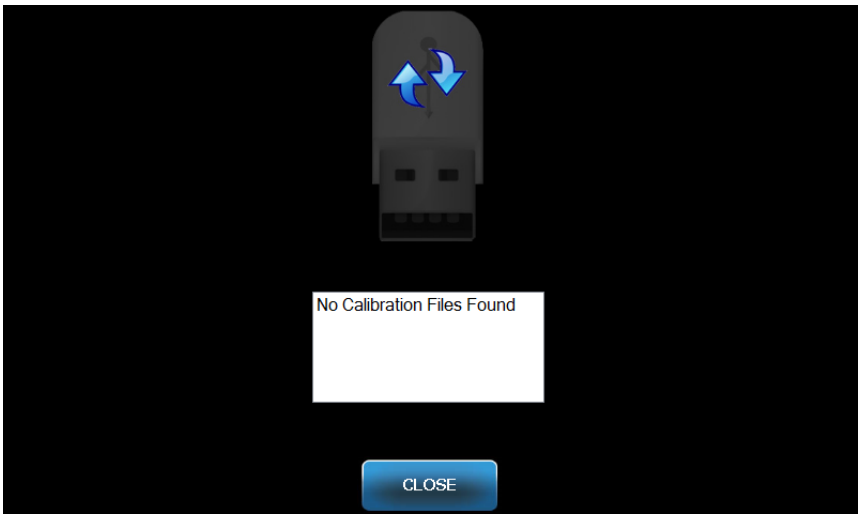
Option	Description
PAN/TMJ/CEPH AP/PA CEPH LAT	Select the type of image for which you are setting defaults.
Patient	All values are set for a specific patient size. This is where you select the patient size to edit.
kV and mA Values	Each patient size can have unique kV and mA values that will be used in image acquisition. These values can be further defined for Pan, TMJ, Ceph AP/PA and Ceph Lateral projections.
Jaw Profile	For Pan images, you can customize the patient size further by specifying a jaw size: Narrow, Normal, and Wide.

Calibration Files Screen

The Calibration Files screen is used to load calibration files for Vantage sensors. Any time a new sensor is added you will need to load the calibration files to use it. You can also remove old calibration files by using the list at the bottom of this screen.

When you tap Calibration Files on the Options screen, the Calibration Files screen opens.

Calibration Files Screen



The following table describes the information on the Profile Properties screen.

Calibration Files Screen

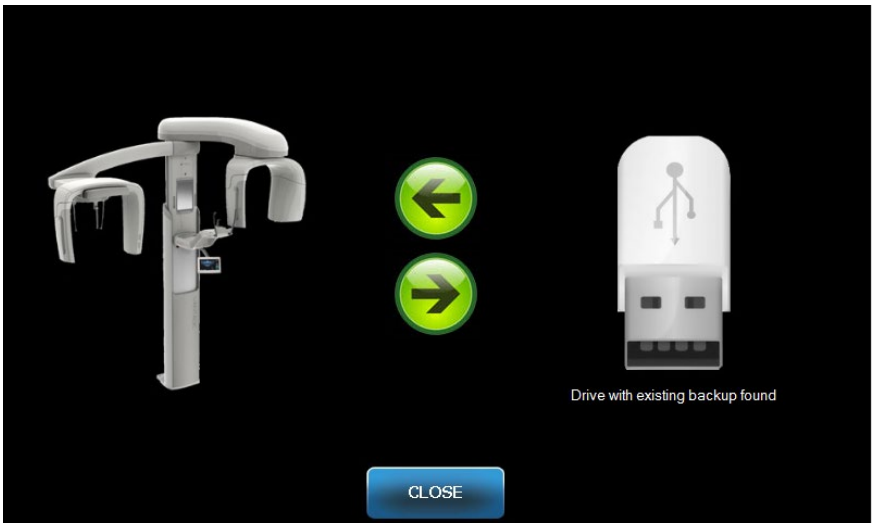
Option	Description
USB Drive	Displays the state of the USB drive plugged into the Control Panel.
Calibration File List	Lists all of the calibration files already in the Control Panel.

Backup / Restore Screen

The Backup / Restore screen is used to backup and restore technique factors, sensor calibration files, and VantageTrust information.

When you tap Backup / Restore on the Options screen, the Backup / Restore screen opens.

Backup / Restore Screen



The following table describes the information on the Backup / Restore screen.

Backup / Restore Screen

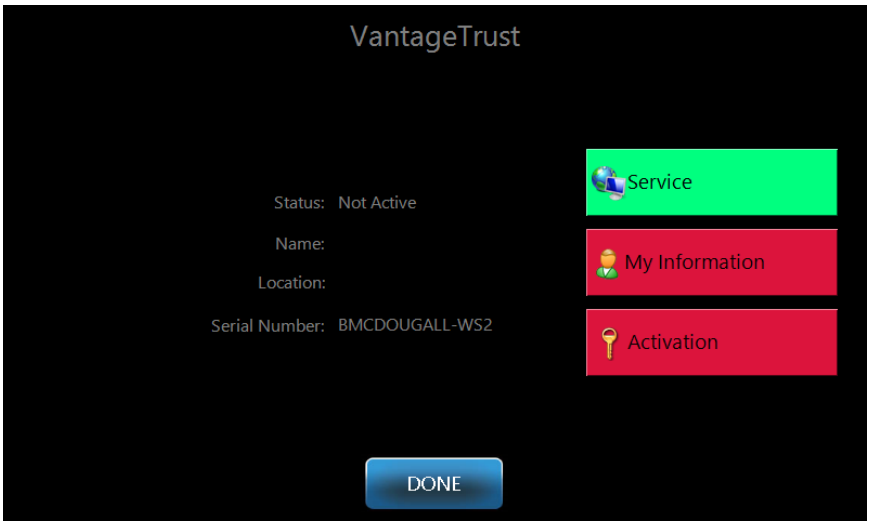
Option	Description
USB Drive	Displays the state of the USB drive plugged into the Control Panel.
Backup Arrow	Displayed going from the Vantage to the USB drive creates or overwrites a backup that already exists.
Restore Arrow	Displayed going from the USB drive to the Vantage restores an existing backup to the system.
Confirmation	Before a backup or restore occurs a confirmation appears prior to beginning the action.

VantageTrust Screen

The VantageTrust screen is used to view information about your VantageTrust account.

When you tap VantageTrust on the Options screen, the VantageTrust screen opens.

VantageTrust Screen



The following table describes the information on the VantageTrust screen.

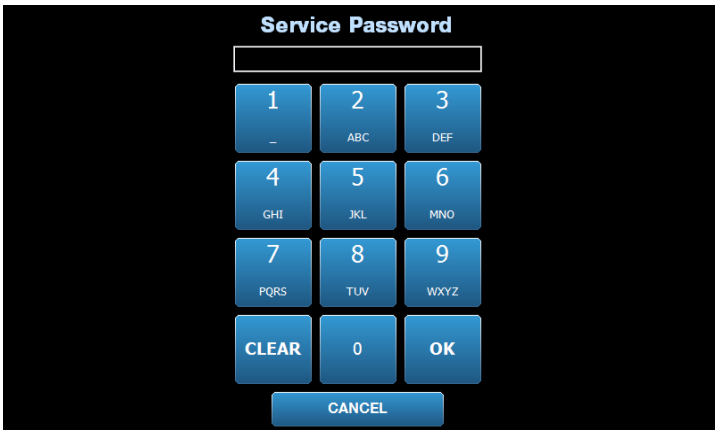
VantageTrust Screen

Option	Description
Status	The current status of the VantageTrust account.
Name	The registered practice name.
Location	The registered practice location.
Serial Number	Your Vantage serial number.
Service Light	Indicator for accessibility of the VantageTrust service online
My Information	Account information

Service Screen

The Service screen is a diagnostic and troubleshooting tool, and is used by Service technicians. The Service screen is password protected. When you tap Service on the Options screen, the Service Password screen opens.

Service Password Screen



Tools for Patient Positioning

Having the patient correctly positioned for a panoramic X-ray is extremely important for the quality of the image. The size and shape of the area most sharply defined on the image depends on the correct positioning of the patient.

The Progeny Vantage Panoramic X-ray System has built-in tools that make correct positioning quick and easy to accomplish. These tools include:

- control buttons for column height
- the patient positioning table with chin rest, bite guide, and positioning wands
- the laser positioning system with the Frankfort plane laser, mid-Sagittal laser, and Cuspid laser.

Control Buttons for Column Height

The telescoping column of the Vantage System supports the patient positioning table with the chin rest, the bite guide, and the positioning wands. The height of this column and the patient positioning table is easily adjusted from the Control Button panel located on either side of the patient positioning table. A second set of controls are available on the Ceph Extension option for easier Ceph positioning.

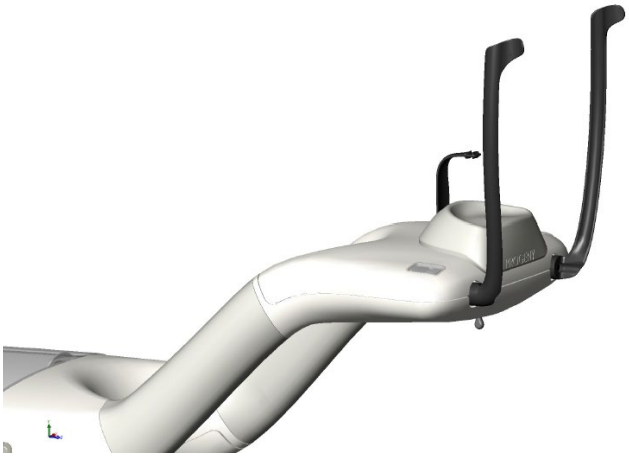
Control Button Panel Showing Up/Down Buttons

Patient Positioning Table with Chin Rest, Bite Guide, and Positioning Wands

The chin rest, bite guide, and positioning wands are crucial elements for properly positioning the patient. The chin rest attaches to the patient positioning table, and the bite guide attaches to the slot in the chin rest. The positioning wands, together with the chin rest and bite guide, help align the patient's head for the exposure, and control side to side movement.

When removing the chin rest and bite guide, the bite guide must be removed first by pulling upward. Then the chin rest may be lifted out of the Positioning Table.

Patient Positioning Table with Chin Rest, Bite Guide, and Positioning Wands



Consumable Items for Panoramic and Cephalometric Systems

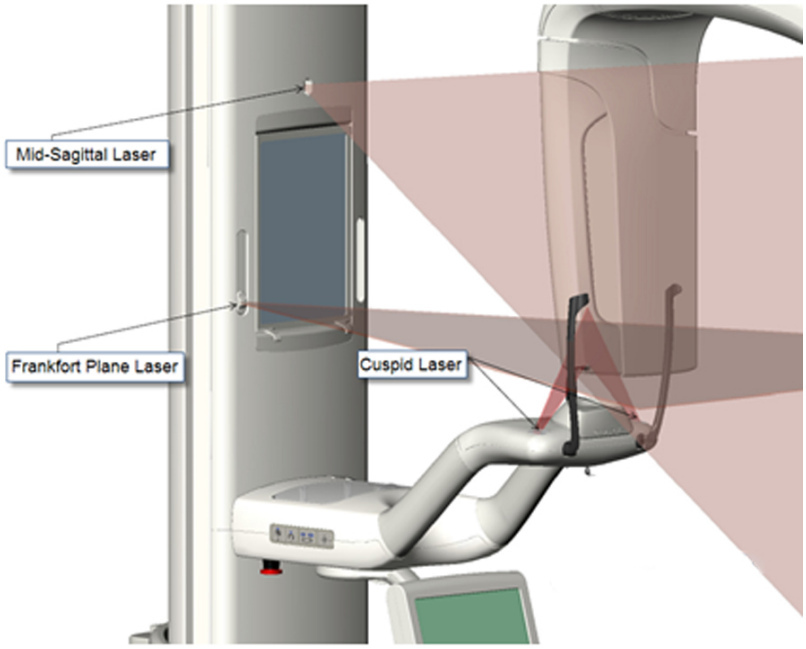
Panoramic	Cephalometric Option
Vantage Accessories Kit .....60-A2049 *(chin rest, bite piece, wands, TMJ positioner, screws, sample sheath packs)* Bite Piece .....60-P0018 Chin Rest.....60-P0017 Wand, Left Patient Positioning.....60-P0026 Wand, Right Patient Positioning .....60-P0027 Positioning Wand Screw .....H1-35-M05008-10 TMJ Positioner .....60-P0044 Sheaths, Bite Block *(500/box)*.....60-S0027 Sheaths, TMJ Block *(500/box)*.....60-S0036	Naison Post ..... 60-P0063 Ear Post..... 60-P0058 Ear Speculum *(500/box)*..... 60-P4009

Laser Positioning System

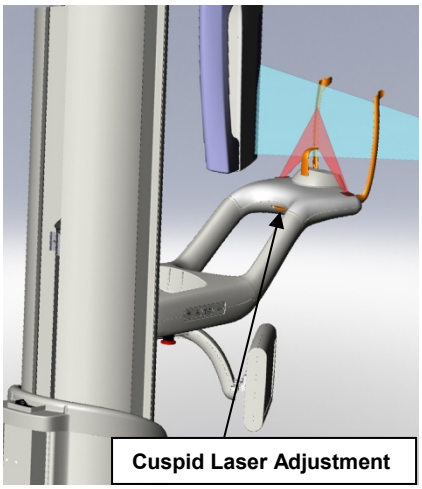
The Progeny Vantage Panoramic X-ray System uses three highly precise lasers to position the patient: Frankfort plane laser, mid-Sagittal laser, and Cuspid laser. Each laser has a very specific function in the proper alignment of the patient and the production of a high quality image.

CAUTION: Do not stare into the beam. Do not place eyes closer than 100 mm. This equipment emits Class 2 Laser radiation of 3 mW output at 650 nm.

Location of Lasers



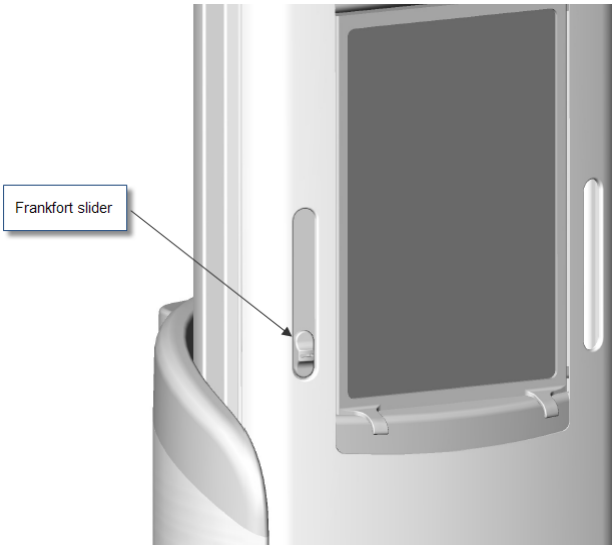
Cuspid Laser Adjustment



Frankfort Plane Laser

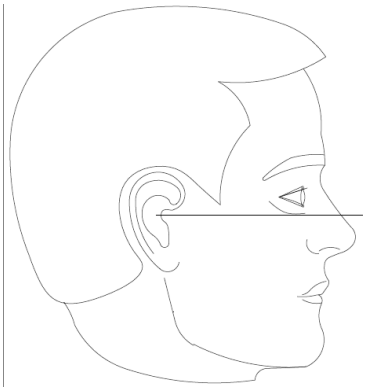
The Frankfort plane laser is used to align the horizontal tilt of the patient's head. A slider button on the front of the telescoping column moves the laser.

Frankfort Plane Laser Slider Button



The illustration, Alignment with the Frankfort Plane Laser, is an example of the positioning of the Frankfort Plane laser on the patient's head.

Alignment with the Frankfort Plane Laser

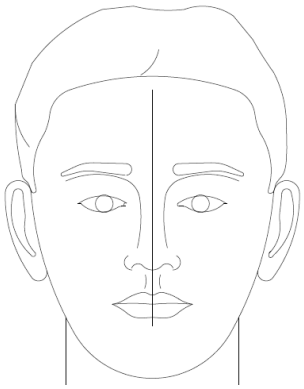


This laser is used to align the patient's head.

Mid-Sagittal Laser

The mid-Sagittal laser is used to center the patient on the patient positioning table. It is a fixed laser.

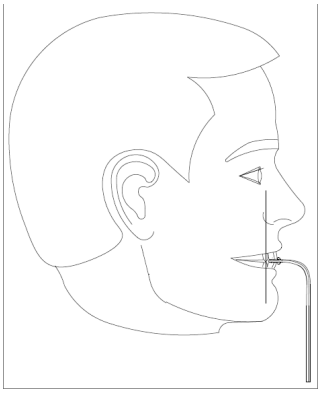
Alignment with the Mid-Sagittal Laser



Cuspid Laser

The Cuspid laser is used to align the focal trough, the area most sharply defined on the X-ray. You use the adjustment knob under the patient positioning table to move the Cuspid laser to the proper alignment.

Alignment with the Cuspid Laser



Cephalometric Positioning Tools

Having the patient correctly positioned for a Cephalometric X-ray is extremely important for the quality of the image.

The Progeny Vantage Cephalometric X-ray System has built-in tools that make correct positioning quick and easy to accomplish. These tools include:

- control buttons for column height
- Easy to use, and comfortable Cephalostat

Control Buttons for Column Height

The telescoping column of the Vantage System supports the Cephalometric assembly from which the Cephalostat depends. The height of this column and the Cephalostat is easily adjusted from the positioning controls on the Secondary Collimator, or from the Positioning Control Button panel located on the side of the patient positioning table.

Cephalostat

The cephalostat has three distinct functions. First, the cephalostat as a whole can be rotated to identify the type of cephalometric projection desired (lateral left or right, AP, and PA). Secondly, the otic posts are a gentle positioning aid to help keep the patient in the proper, stationary position during the examination. Finally, a nasion marker is provided to aid the location of this soft tissue area on resulting radiographs (a ruler is also embedded in the marker for measurement purposes).

Entry and Exit, and Ready for Imaging Positions

The overhead arm on the Vantage System has an entry, exit, and ready for imaging position.

- In the entry position, the overhead arm is nearly centered to the patient table to allow the patient to enter the Vantage System.
- In the exit position, the overhead arm is slightly off to the side of the patient positioning table to allow the patient to exit the Vantage System.
- In the Ready for Imaging position, the overhead arm is close to the patient positioning table and ready to begin image acquisition.

Status Indicator

The Status Indicator is color-coded for the position of the overhead arm. When **Ready** is yellow, the Vantage System is in the entry position. When **Ready** is gray, the Vantage System is in the exit position. When **Ready** is green, the Vantage System is ready for imaging. When **Ready** is red, the system is in an unknown position, as at initial power up, and moving to find the home position.

Demo Mode

The Demo mode allows the operator to simulate the movement of the Vantage System as it runs through an actual imaging cycle. No X-ray image is taken during the demo. Using the Demo mode helps patients see how the Vantage System moves, and what to expect during the actual acquisition of an image. This in turn may allow the patient to be more at ease during the X-ray and to move less, thereby increasing the likelihood of a good image, and a lower level of X-ray exposure.

For a patient who is fearful of the process, you might ask the patient to stand back from the Vantage System and watch as it simulates an X-ray. For most patients, you can run the Demo mode after you have positioned them for their X-ray, just before you initiate the X-ray.

6 Preparing to Receive the Image

In this Chapter

About Imaging Software

The imaging software, running on the workstation, is used to view and store the images made using the Progeny Vantage Panoramic X-ray System. The imaging software also provides the Vantage Panoramic X-ray System with patient name and practice name.

There are several types of imaging software. In this manual, Progeny Imaging software and Progeny TWAIN software are addressed. If different imaging software is used, consult the manual that came with the software to make full use of its capabilities.

Using Progeny Imaging Software

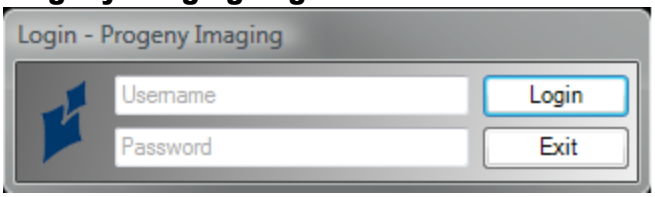
Follow the steps below to use the Progeny Imaging software.

1. Open the Progeny Imaging software.

Progeny Imaging Icon

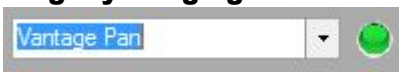
2. When the Login - Progeny Imaging screen appears, enter your username and password, and then click the Login button.

Progeny Imaging Login Screen



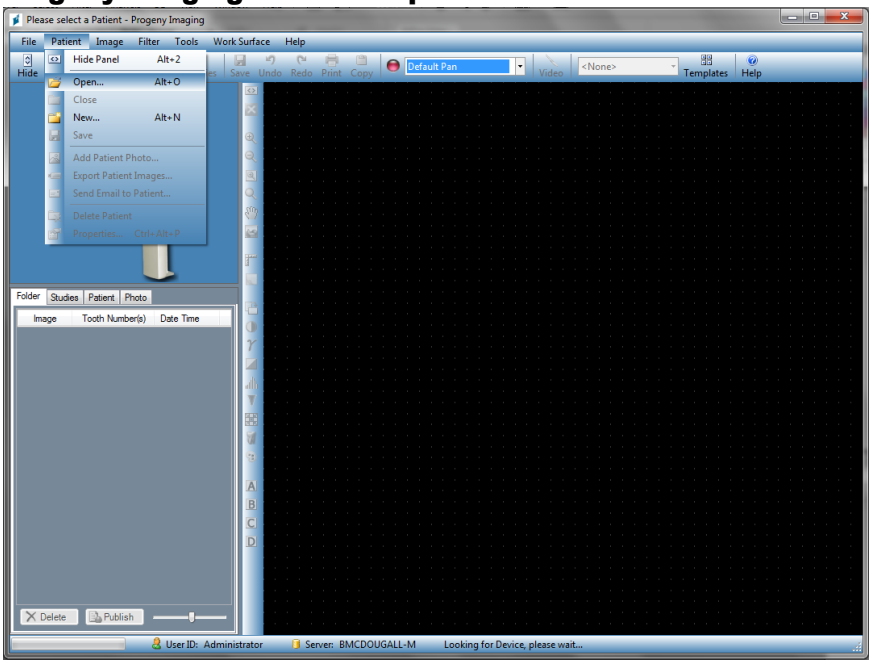
3. Select “Default Pan” in the device selection box at the top of the screen.

Progeny Imaging Screen – Device Selection



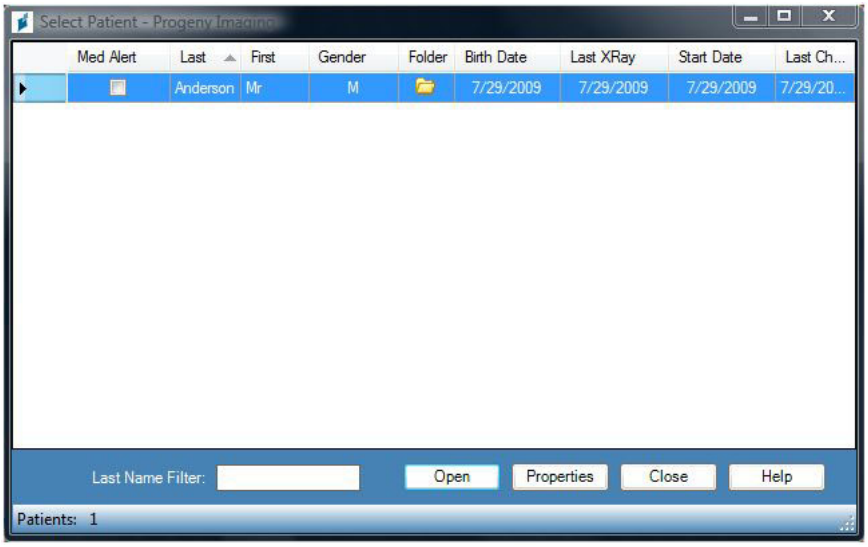
4. To display the list of patients, click Patient > Open from the menu at the top.

Progeny Imaging Screen – Open the Patient List



5. On the Select Patient screen, select the patient, and then click the Open button. The patient information appears on the workstation and the Touch Control panel.

Progeny Imaging Screen – Select a Patient



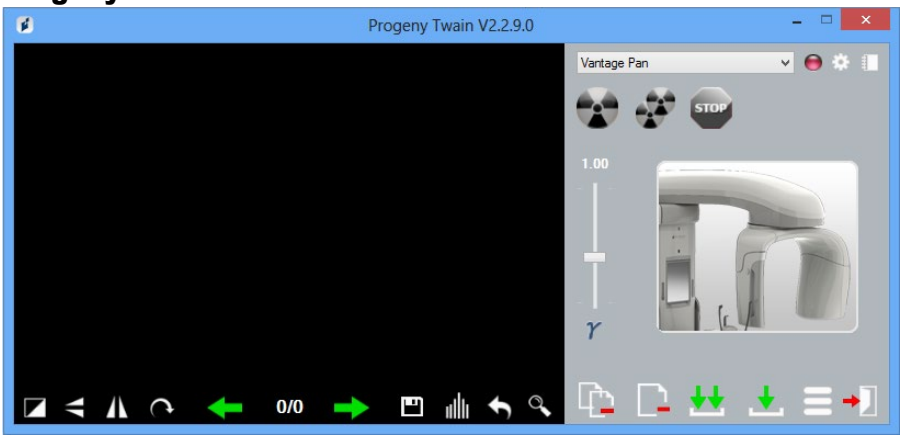
6. Follow the Vantage procedures in the chapter for Positioning the Patient and acquire an image.

Using Other Software

The Progeny Vantage Panoramic X-ray System can also interface with other imaging and practice management software using the Progeny TWAIN interface.

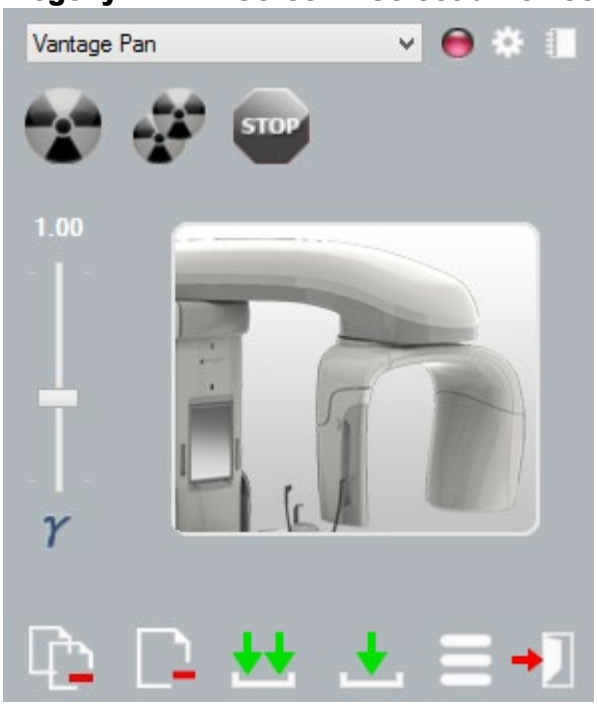
1. Open the TWAIN option in the software being used, and choose the Progeny TWAIN device. The Progeny TWAIN window appears.

Progeny TWAIN Screen



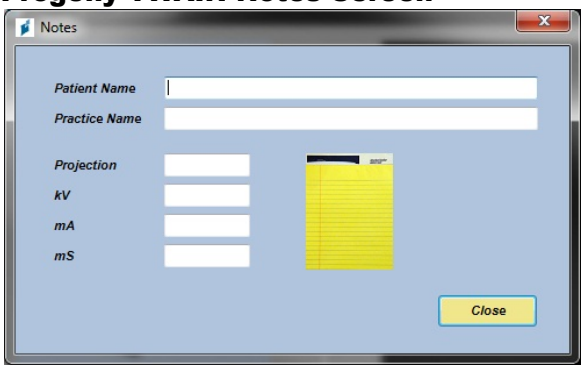
2. Select the device “Progeny Vantage Pan” from the device dropdown menu.

Progeny TWAIN Screen – Select a Device



3. To view image information, click the yellow notepad button. The Notes window appears.

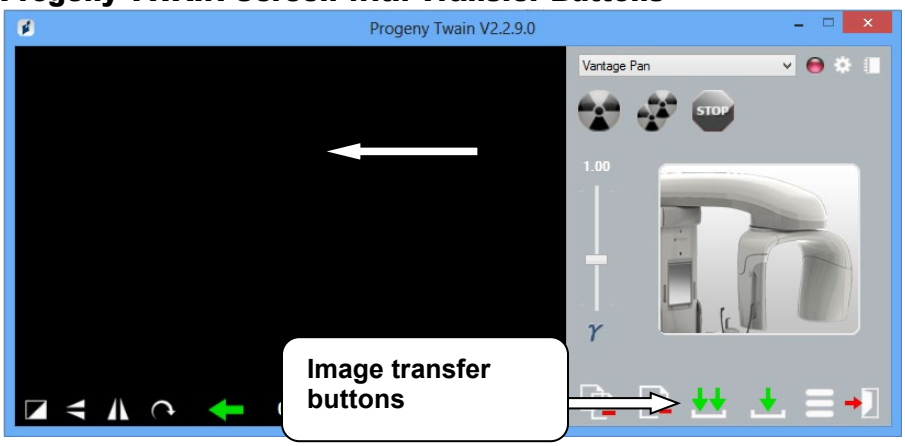
Progeny TWAIN Notes Screen



Note:
Image technique information appears in the window. The patient name can be entered for reference in the TWAIN application, but it is not passed on to the imaging application.

4. Enter image information, such as patient name, and then click the Close button when finished.
5. Follow the Vantage procedures in the chapter for Positioning the Patient and acquire an image.
6. After acquiring an image, return to the Progeny TWAIN window.

Progeny TWAIN Screen with Transfer Buttons



7. Use the Transfer buttons to download images to the 3rd party software.
   - Transfer - downloads the last acquired image.
   - Transfer All - downloads all newly acquired images.

7 Getting Started

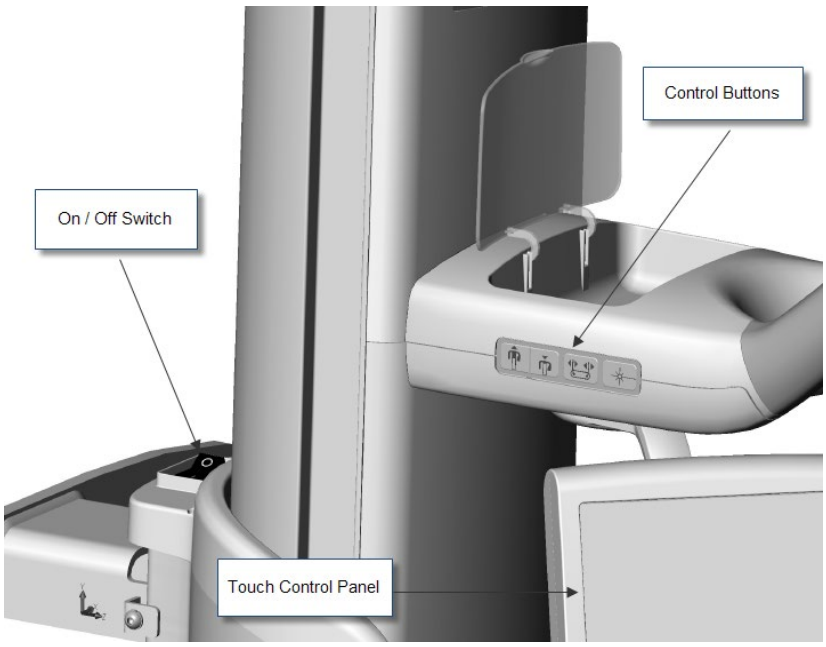
In this Chapter

- Turning the Vantage System On
- Setting the Technique Factors
- Configuring Device Options
- Configuring the Touch Control Panel

Turning the Vantage System On

1. To turn on the Vantage panoramic device, press the On/Off switch located at the back of the stationary column on top of the box of connections.

Vantage Panoramic Device with On/Off switch



When you turn on the Vantage panoramic device, the Touch Control panel displays a “Start Up” screen. The Vantage panoramic device goes through a self diagnostic procedure as part of the startup process.

Setting the Technique Factors

The technique factors are the exposure factors, defining the intensity and duration of the X-ray. The technique factors are the projection type, segmentation, patient and jaw sizes, and kiloVolt (kV) and milliAmpere (mA) values. You set the technique factors on the Acquisition Setup screen. *For more information, see the* Acquisition Setup screen *in* Chapter 5.

Projection Type

Select one of four projections: Pan Standard, Pan Enhanced, Pan Bitewing or TMJ. The method of selection (tap or slide) is set using the Slide On/Off button

on the Options screen. *For more information, see the* Options screen *in Chapter 5.*

1. Select the Projection icon until the desired projection type appears.

Pan Standard Projection Icon

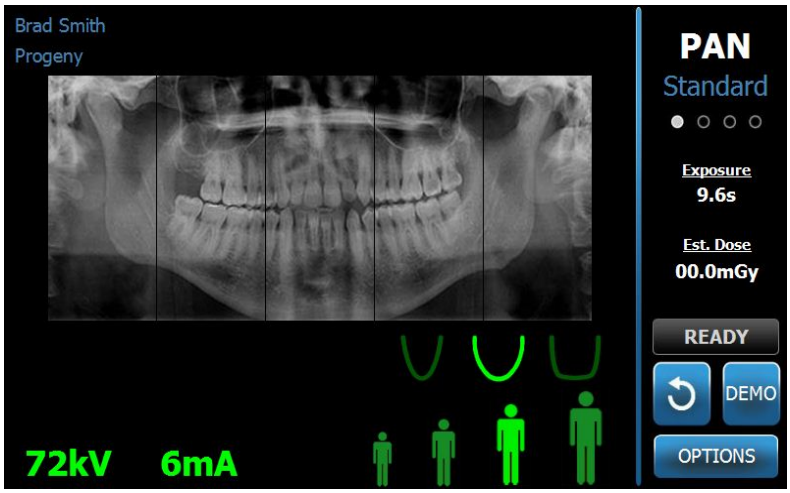
2. To view a different projection type, select the icon again.
3. For a Pan Pediatric (Pedo) projection, select Pan Standard projection and then select the Child patient size.

Segmentation

By default, the Vantage System images the entire jaw. To select specific areas to image, you use the segment panels or the projection types, which automatically select segments. The method of selection (tap or slide) is set using the Slide On/Off button on the Options screen. *For more information, see the* Options screen *in Chapter 5.*

1. To turn a segment panel off, simply select any segment. The segment turns dark to indicate it is not selected.
2. Select the segment again to turn it back on.

Segmentation Panel



Patient Size

The patient sizes are Child, Small Adult, Adult, and Large Adult. Adult is the default patient size. Changing the Patient size sets the kV and mA values to the default setting for that patient size, as defined on the Profile Properties screen. *For more information, see* Profile Properties Screen *in* Chapter 5.

1. To change from Adult, simply tap the desired icon.
2. To select the Child patient size, tap the smallest patient size.
   By default, the jaw size changes to “Narrow” to indicate that the width of the exposed area will be reduced.

Patient Size Icon

Jaw Size

The jaw size is dependent on the patient size and the settings from the Profile Properties screen. *For more information, see the* Acquisition Setup screen *and the* Profile Properties Screen*, both in* Chapter 5*.*

Jaw Size Icon

1. To select the jaw size, tap the corresponding icon for Narrow, Normal, and Wide jaw sizes.
   The selected jaw size turns bright green.
2. If you change the patient size after selecting a jaw size, the jaw size may change as well. Simply reselect the correct jaw size for the new patient size.

kV and mA Values

All kV values quoted in this manual are peak values. You can increase or decrease kV and mA values up to their maximum values as defined on the kV and mA Properties screen. A default value is green and changes to yellow to indicate the value is no longer the default value.

kV and mA Icon

1. To change a value, tap the kV value or the mA value. Up and down arrows appear above the value selected.
2. Tap the up or down arrow as often as needed to reach the desired value.

The Default kV and mA Values table identifies initial values used with the Progeny Vantage Panoramic X-ray System.

Default kV and mA Values for Pan Images

Patient Size	Default Values	
	kV Value	mA Value
Child	66	6
Small Adult	70	8
Adult	74	8
Large adult	78	10

Default kV and mA Values for TMJ Images

Patient Size	Default Values	
	kV Value	mA Value
Child	62	8
Small Adult	64	8
Adult	68	10
Large adult	70	12

Default kV and mA Values for CEPH Lateral Images

Patient Size	Default Values	
	kV Value	mA Value
Child	66	9
Small Adult	74	11
Adult	78	11
Large adult	82	12

Default kV and mA Values for CEPH AP/PA Images

Patient Size	Default Values	
	kV Value	mA Value
Child	68	11
Small Adult	74	13
Adult	78	13
Large adult	82	14

If any of the following conditions apply, you may wish to consider adjusting the kV and mA peak values:

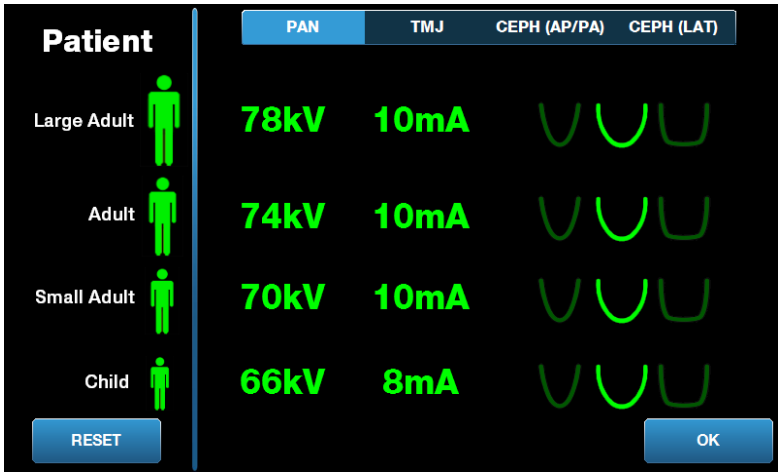
- If the patient has heavy soft tissue and/or bone structure about the face and neck, use the next higher kV and/or mA setting.
- If the patient is small and has narrow facial bone structure, use the next lower kV and/or mA setting.
- If the patient is edentulous, use the next lower kV and/or mA setting.

Configuring Device Options

The Profile Properties screen allows you to change default settings for the patient.

1. On the Options screen, tap the Profile Properties button. The Profile Properties screen appears.

Profile Properties Screen



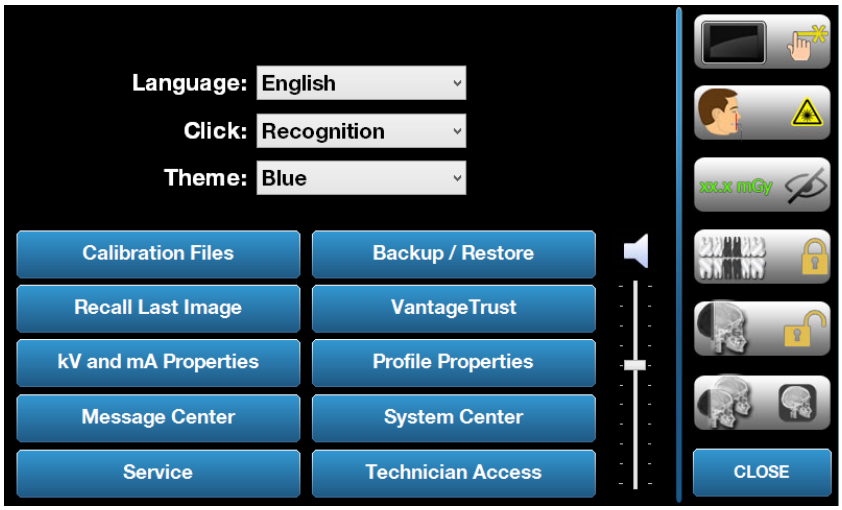
2. Tap Pan, TMJ CEPH (AP/PA) or CEPH (LAT).
3. For each patient size to be changed, tap the appropriate patient icon.
4. To modify a default kV and/or mA value, tap the value and adjust it using the up/down arrows.
5. When setting Pan defaults, tap a different jaw profile for the patient.
6. When finished, tap the OK button to save the changes, or tap Reset to return to the previous default values.

Configuring the Touch Control Panel

The Touch Control panel is configured and calibrated, and ready to use upon arrival. You may want to refine the configuration for the following options: Click sound, Language, Audio Level, Touch Calibration, and Slide on/off.

1. Tap the Options button on the Acquisition Setup screen, and the Options screen appears.

Options Screen



2. To change the sound, tap anywhere on the Click field and select a sound from the dropdown menu.
3. To change the language, tap anywhere on the Language field and select a language other than English, the default.
4. To adjust the volume, drag the Audio Level slider button left or right to the proper volume.
5. To calibrate the Touch Control panel, tap the Touch Calibration and follow the on-screen instructions.
6. To toggle the Slide on/off, click the circle icon with a hand in it.
7. Click the Close button to return to the Acquisition Setup screen.

8 Positioning the Patient

In this Chapter

About Patient Positioning and Image Quality

Having the patient correctly positioned for a panoramic X-ray is extremely important for the quality of the image. The patient's positioning relative to the focal trough (the area of sharpest definition) determines the quality of the resulting image.

The Vantage System enables you to position patients quickly and easily with its up/down buttons, chin rest, positioning wands, and precision positioning lasers.

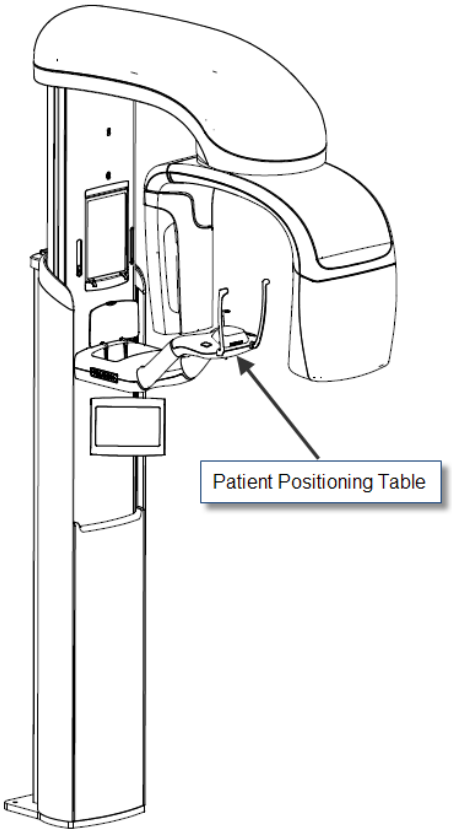
Preparing the Patient

1. Describe to the patient what needs to occur to acquire a successful image. Include an overview of the imaging process, and what you will be asking the patient to do.
2. Ask the patient if they would like you to run the Demo, a simulation of the imaging process.
3. Request that the patient remove earrings, eye glasses, and mouth or facial piercings, as well as a jacket or bulky sweater while you prepare the Vantage System and set technique factors.

Setting the Height of the Vantage System

You adjust the height of the patient positioning table so that the chin rest is approximately the same height as the patient's chin.

Patient Positioning Table



1. Visually compare the height of the patient's chin with the chin rest on the patient positioning table.
2. Using the up/down control buttons on the side of the patient positioning table, adjust the height of the Vantage System until the cup of the chin rest is approximately level with the patient's mouth.

Tip **The vertical column moves slowly at first, and then faster.**

Up/Down Control Buttons

Inserting the Chin Rest and Bite Guide

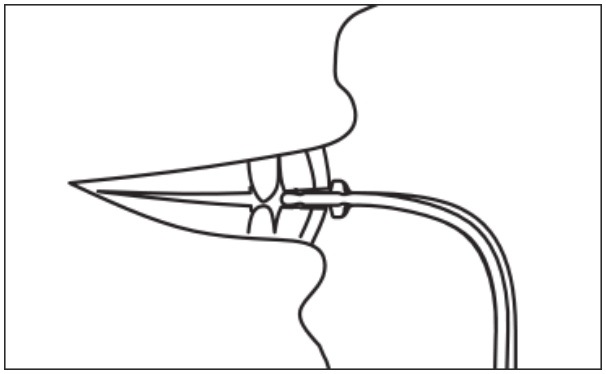
The chin rest and bite guide are used to position a patient for all Pan Standard, Pan Enhanced, and Pan Pedo projections.

1. Mount the chin rest on the patient positioning table.
2. Insert the bite guide into the slot at the back of the chin rest. The bite guide aligns the jaws front to rear.
3. Install a sheath on the bite guide prior to patient positioning.
4. Slowly, using the up/down control buttons, raise the Vantage System until the cup of the chin rest is approximately level with the patient's mouth.
5. Ask the patient to step forward to the Vantage System, grasp the handles and put their chin in the chin rest.

Chin Rest and Bite Guide Positioning

6. Ask the patient to gently bite down on the protective sheath covering the bite guide. Make sure the teeth are located between the ridges of the bite guide.

Teeth Positioning on the Bite Guide



Removing the Chin Rest and Bite Guide

When removing the chin rest and bite guide, the bite guide must be removed first by pulling upward. Then the chin rest may be lifted out of the Positioning Table.

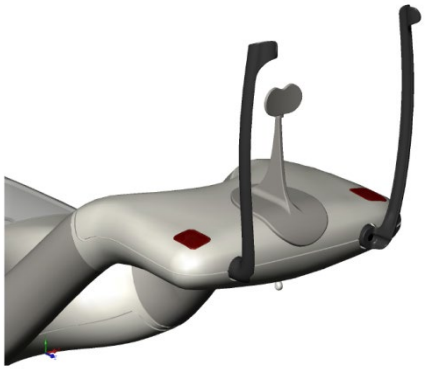
Inserting the TMJ Positioner

The TMJ positioner is used to position a patient for TMJ projections. All other steps for positioning the patient are the same as for other projections.

1. Replace the chin rest and bite guide on the patient positioning table with the TMJ positioner.

TMJ Positioner

TMJ Positioner Mounted on the Patient Positioning Table

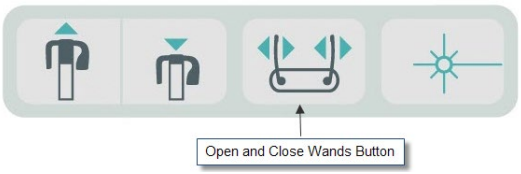


2. Slowly, using the up/down control buttons, raise the Vantage System until the TMJ positioner is approximately level with the patient's mouth.
3. Install a sheath on the TMJ positioner prior to patient positioning.
4. Ask the patient to step forward to the Vantage System and grasp the handles.
5. Position the patient so the TMJ positioner presses against the upper lip at the base of the nose.

Adjusting the Positioning Wands

1. Press the open and close wand button to move the wands in and out from the patient's head. The button is on the Button Control panel, shown here.

Open and Close Wands Button

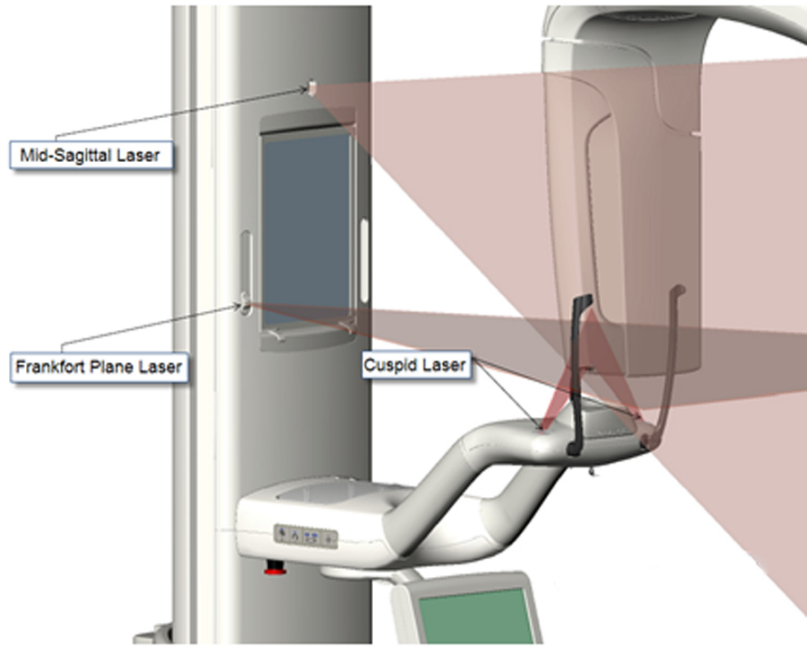


2. Press the button until the wands rest firmly on the patient's head in the temple area.

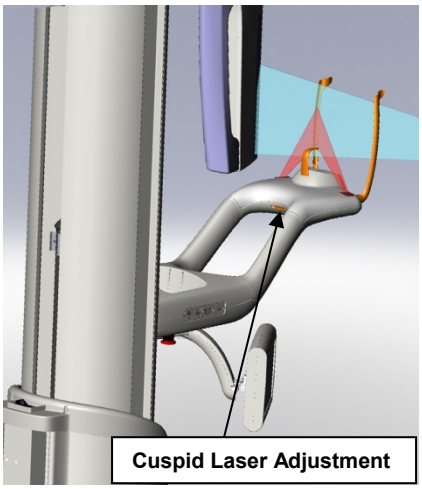
Using the Positioning Lasers

The Progeny Vantage Panoramic X-ray System has three lasers to help position the patient: Frankfort laser, mid-Sagittal laser, and Cuspid laser.

Positioning Lasers



Cuspid Laser Adjustment



1. Turn on the positioning lasers using the laser on/off button on the patient positioning table.

Positioning Laser On/Off Button

CAUTION: Do not stare into the beam. Do not place eyes closer than 100 mm. This equipment emits Class 2 Laser radiation of 3 mW output at 650 nm.

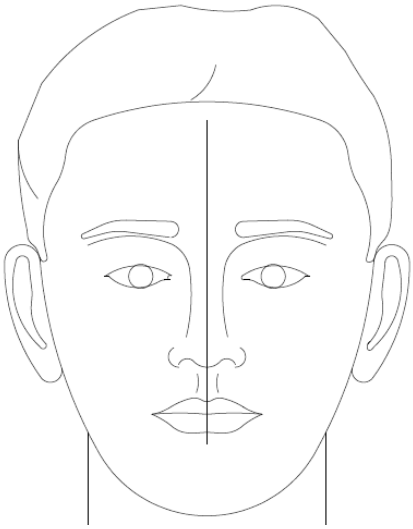
2. Have the patient grasp the handles on the patient positioning table and step forward.

Mid-Sagittal Laser

To properly center the patient, use the fixed mid-Sagittal laser to check the lateral positioning of the patient.

1. Make sure the teeth are located between the ridges of the bite guide to ensure the jaws are aligned front to rear and side to side.
2. Center the laser beam on the bridge of the nose so it passes through the center of the upper lip.
3. If the laser is not centered, gently move the patient's head until it is centered.

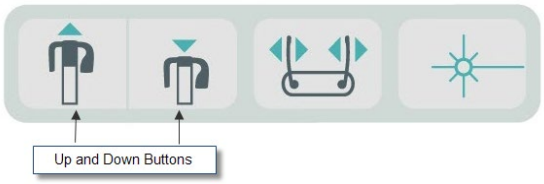
Mid-Sagittal Laser



Frankfort Plane Laser

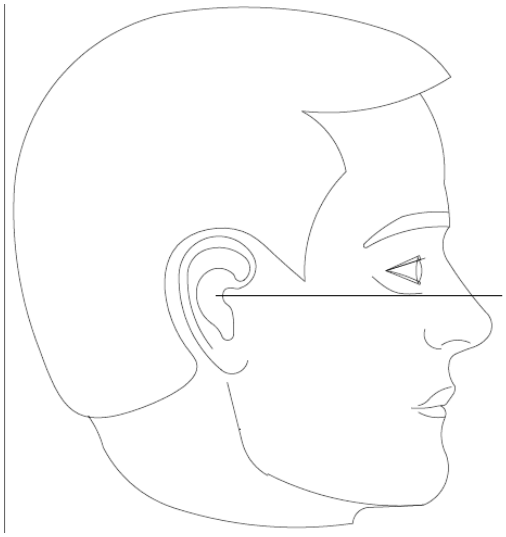
To properly align the tilt of the patient's head, two types of adjustments are needed.

- The Frankfort slider button moves the laser up and down on the patient's head to align with the external auditory meatus.
- The up and down control buttons raise and lower the patient positioning table and adjust the tilt of the patient's head and align with the bottom of the optical orbit.



1. Align the laser with the external auditory meatus by moving the Frankfort Plane slider button up and down on the vertical column.
2. Use the up and down control buttons to align the lower part of the optical orbit with the Frankfort Plane laser. See the Frankfort Plane Laser illustration that follows.

Frankfort Plane Laser

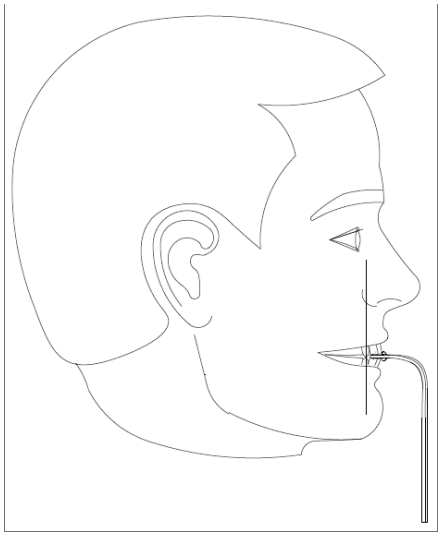


Cuspid Laser

The Cuspid laser helps to align the focal trough.

1. Make sure the teeth are located between the ridges of the bite guide to ensure the jaws are aligned front to rear and side to side.
2. Move the adjustment knob under the patient positioning table until the laser beam aligns with the anterior edge of the Cuspid teeth.
3. Have the patient smile. See the Cuspid Laser illustration that follows.

Cuspid Laser



Positioning an Edentulous Patient

1. Use TMJ positioner to locate the patient.
2. Place cotton rolls between the anterior gums to space the jaws.
3. Line the Cuspid laser up slightly to the rear of the upper anterior gum line.

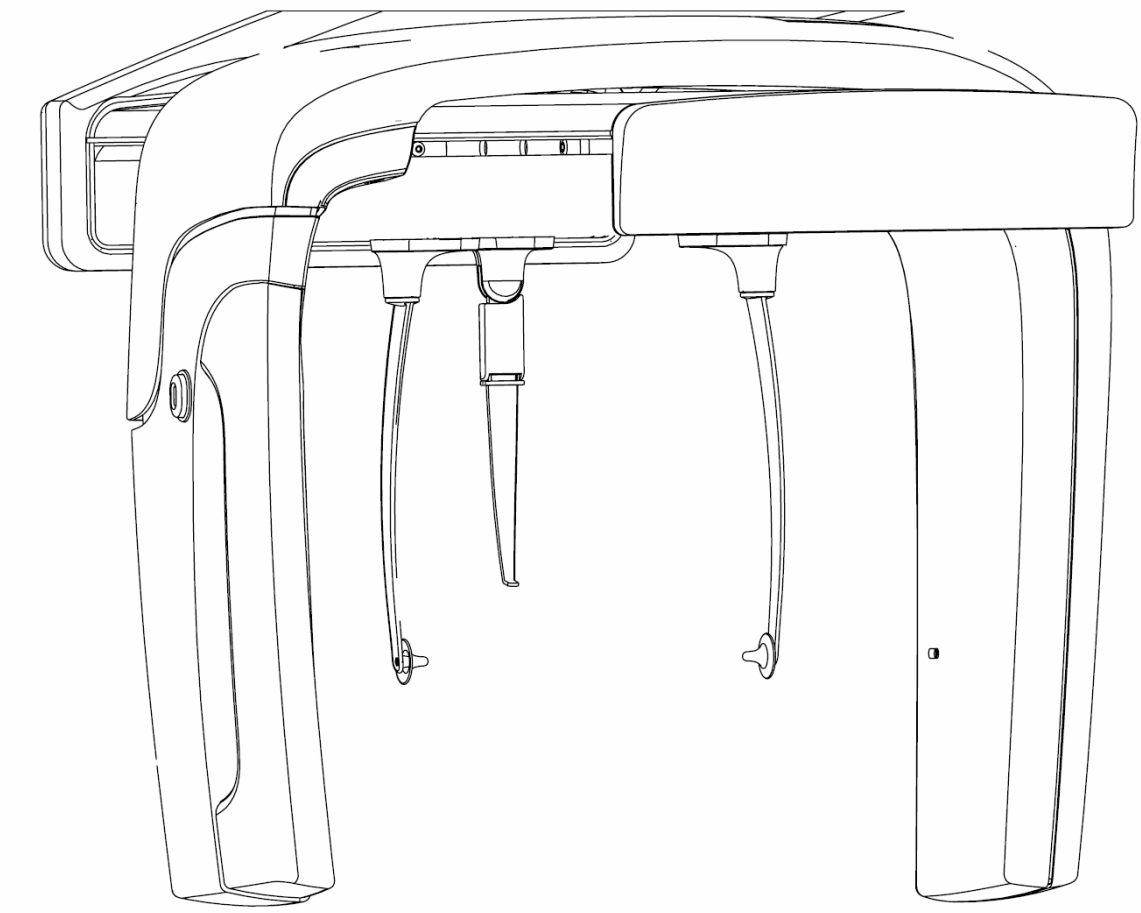
Cephalometric Positioning (Option)

The same general instructions at the beginning of this Chapter apply to cephalometric positioning. The patient should be placed in a comfortable standing position close to the cephalostat device.

Setting the Height of the Vantage System

Adjust the height of the cephalostat until the ear posts are approximately the height of the patient's otic canal.

Cephalostat



1. Visually compare the height of the patient's otic canal with the cephalostat ear posts.

2. Using the up/down control buttons on the secondary collimator, or on the side of the patient positioning table, adjust the height of the Vantage System until the ear posts are approximately level with the patient's otic canal.

Tip **The vertical column moves slowly at first, and then faster.**

Up/Down Control Buttons

Adjusting the Otic Posts and Nasion

3. Grasp one of the Otic Posts at the top and move it in or out as needed to position or release the patient. Both posts will move together. The posts are designed so that they will not move except when grasped at the top.
4. Grasp the Nasion and slide it vertically until it aligns with the bridge of the patients nose. Slide the Nasion toward the patients nose until the tip contacts the bridge of the nose. For projections where the Nasion is not needed it will rotate about the base out of projection area.

Review Patient Head Orientation

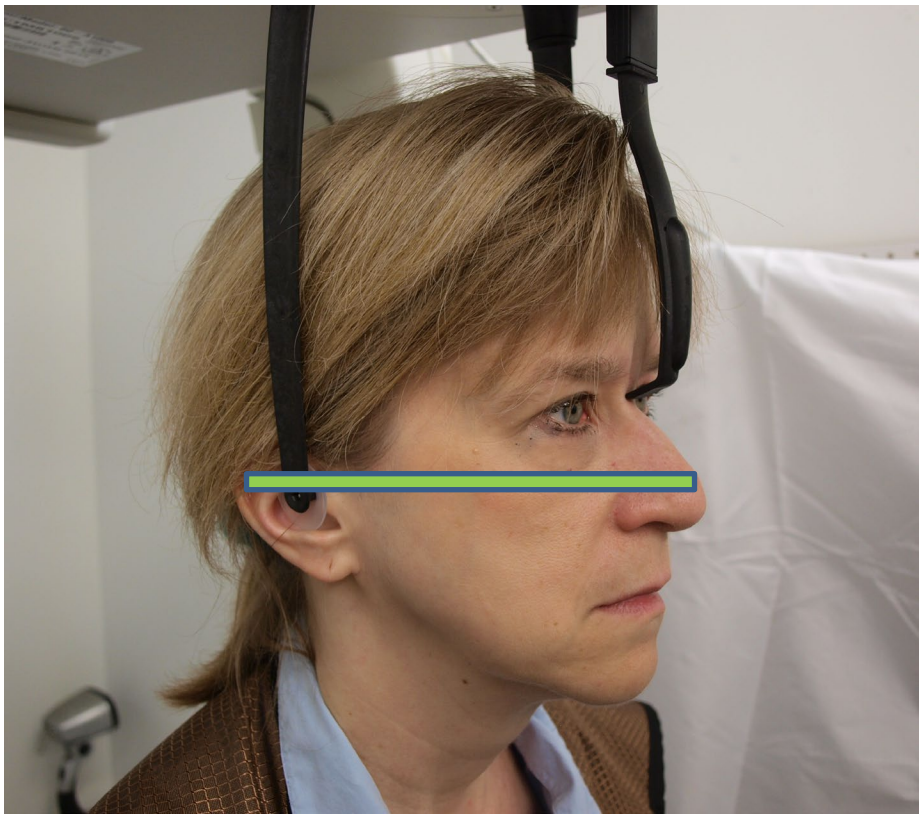
5. The patient's head position should be reviewed to make sure it is correct along 3 axes:

   a. From a side lateral view, the Frankfort plane (bottom of orbit to Otic Posts) should be level horizontally.
   b. From a frontal view, the patient's face should be straight forward, without any twisting.
   c. Also from the front, ensure the patient's head is not tilted, but vertically straight.

AP/PA Projection

The AP/PA projection is achieved with the cephalostat positioned with the nasion toward the tubehead (AP), or opposite the tubehead (PA).

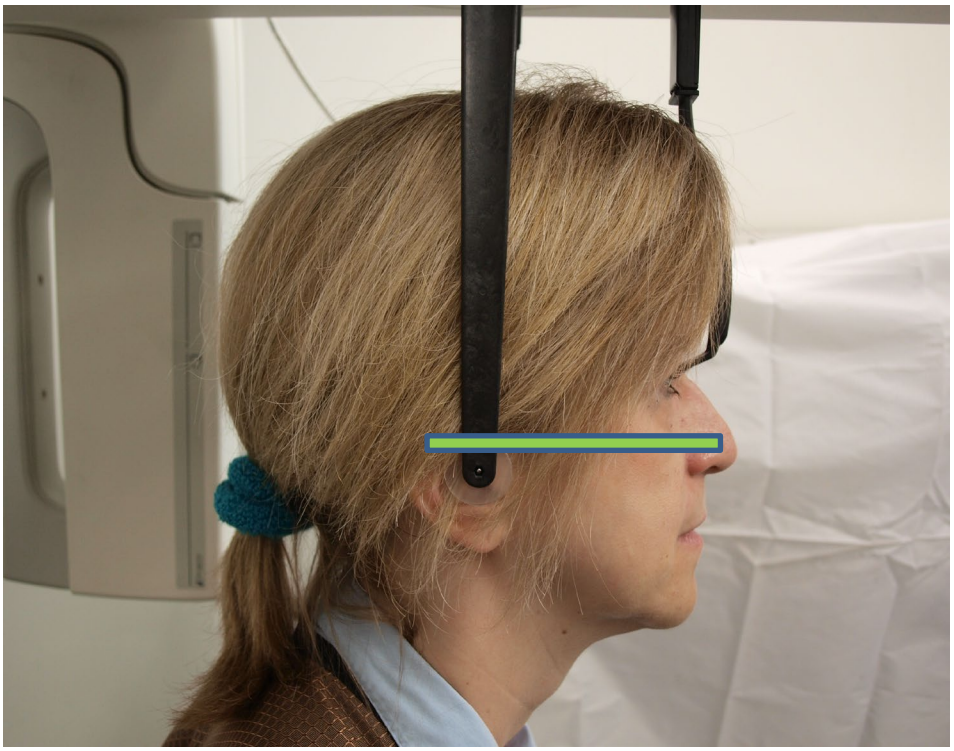
- Rotate the Nasion marker up
- Rotate the cephalostat into the PA position
- Place the patient within the cephalostat
- Make sure the Frankfort Plane is level
- Ask the patient to close the mouth



Lateral Projection

The Lateral projection is achieved with the cephalostat positioned with the Otic posts in line with the x-ray tube head.

- Rotate the Nasion marker up
- Rotate the cephalostat in the Lateral position
- Place the patient within the cephalostat
- Make sure the Frankfort Plane is level
- Move the Nasion marker tip to the patients nasion
- Ask the patient to close the mouth

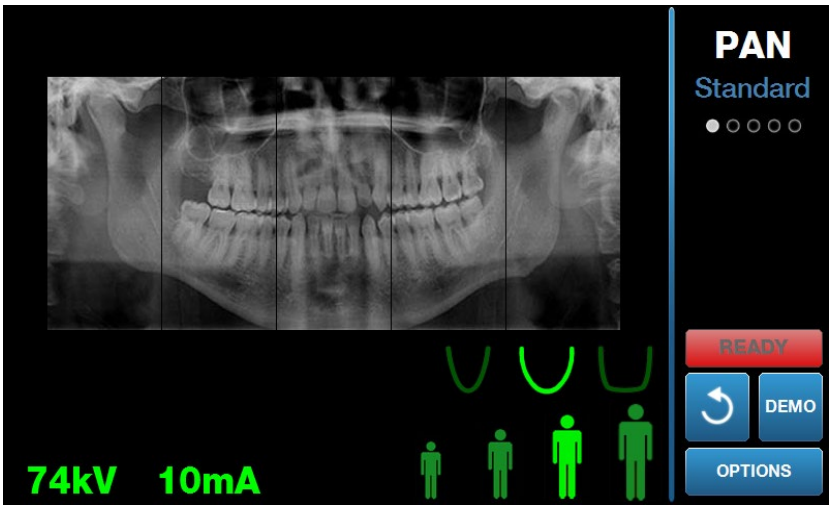


Using the Demo Mode

The Demo mode allows demonstration of device function without emission of radiation. Demo mode is activated using the Demo button on the Acquisition Setup screen on the Touch Control panel. When the sensor is not connected, the system automatically enters Demo mode.

1. On the Acquisition Setup screen of the Touch Control panel, tap the Demo button.

Acquisition Setup screen showing Demo Button



2. Tap the Demo button again to return to the image acquisition mode.

9 Acquiring a Panoramic Image

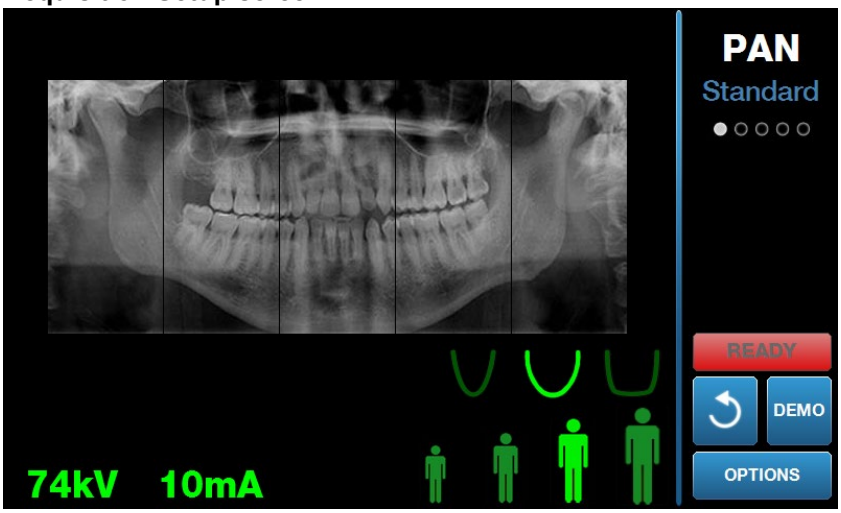
In this Chapter

- Acquiring an Image

Acquiring an Image

1. Make sure the Vantage System is in the Patient Entry position. If not, tap the Ready for Imaging button on the Touch Control Panel Acquisition Setup screen.
2. Verify the correct patient name appears at the top left of the Acquisition Setup screen.

Acquisition Setup screen



3. Adjust the height of the Vantage System to the approximate height for the patient using the up/down control buttons on the side of the patient control table.
4. Select the technique factors. *For more information, see* Setting the Technique Factors *in* Chapter 6.
5. Follow the Vantage procedures in the chapter for Positioning the Patient and acquire an image.
6. If the patient requested an X-ray simulation, tap the Demo button on the Acquisition Setup screen. When Demo mode is active, position the patient (if desired), and proceed as if an actual image is being taken. When done, tap Demo again to turn off the Demo mode.
7. After the patient is properly positioned, request that the patient swallow, place their tongue on the roof of their mouth, and remain as motionless as possible until the device stops moving and the audio signal sounds.
8. To begin image acquisition, tap the Ready for Imaging button on the Touch Control panel.
   The status indicator flashes “WAIT” to indicate a moving status while the Vantage System moves to the ready position.

Ready for Imaging Button

9. **Prepare to take an X-ray.** It is recommended that operators of an extraoral dental X-ray device stand a minimum of 2 meters (6.6 feet) away from the focal spot and out of the path of the X-ray beam.
10. **Take an X-ray.** Press and hold the exposure button until the Vantage System stops moving.

Exposure Control Button

11. When the Image Preview appears on the Touch Control panel, verify the image acquired is the one desired for the patient.

Image Preview Screen

12. Tap OK to close the image window.
13. Help the patient exit the Vantage System.

Early Release of the Exposure Button

If the exposure button is released before the Vantage System stops moving, this message appears: “Procedure was interrupted before completion.”

1. Click OK on the Message window and wait for Vantage System to recover and to determine if the Image Preview appears.
2. If it does, verify the accuracy of the image.
3. If there is no image or the displayed one is inaccurate, retake the image.

10 Acquiring a TMJ Image

In this Chapter

- About the TMJ Image
- Acquiring a TMJ Image

About the TMJ Image

The temporomandibular joint (TMJ) image is actually a compilation of two images. One image is acquired with the mouth closed, and one with the mouth open. The order is not important. Either the open mouth or closed mouth image can be done first, but both must be done.

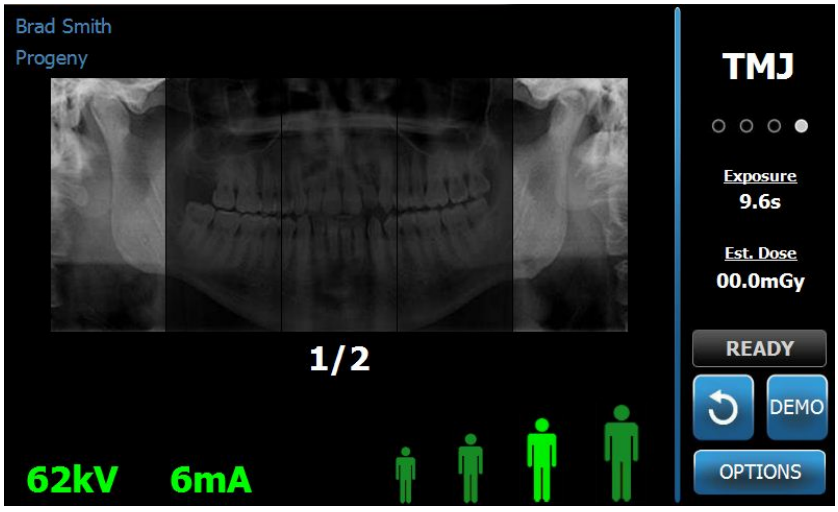
The resulting image, appearing after the second TMJ image is acquired, depicts four image segments, two outer segments and two inner segments. The outer two segments are from the first TMJ image acquired, and the inner two segments are from the second TMJ image acquired.

Acquiring a TMJ Image

Acquiring a TMJ image is very similar to acquiring a pan image, with two differences: the TMJ positioner is used instead of the chin rest, and the actual image acquisition is longer because two images are acquired.

1. Attach the TMJ positioner to the patient positioning table.
2. Make sure the Vantage System is in the Patient Entry position. If not, tap the Ready for Imaging button on the Touch Control Panel Acquisition Setup screen.
3. Verify the correct patient name appears at the top left of the Acquisition Setup screen.

Acquisition Setup Screen



4. Adjust the height of the Vantage System to the approximate height for the patient using the up/down control buttons on the side of the patient control table.

5. When you select the technique factors, be sure to select the TMJ projection. *For more information, see* Setting the Technique Factors *in* Chapter 6.
6. Follow the Vantage procedures in the chapter for Positioning the Patient and acquire an image.
7. If the patient requested an X-ray simulation, tap Demo on the Acquisition Setup screen. When Demo mode is active, position the patient (if desired), and proceed as if an actual image is being taken. When done, tap Demo again to turn off the Demo mode.
8. After the patient is properly positioned, request that the patient remain as motionless as possible until the device stops moving and the audio signal sounds.
9. Remind the patient that two exposures are needed for a TMJ image.
10. To begin image acquisition, tap the Ready for Imaging button on the Touch Control panel.
    The status indicator flashes “WAIT” to indicate a moving status while the Vantage System moves to the ready position.

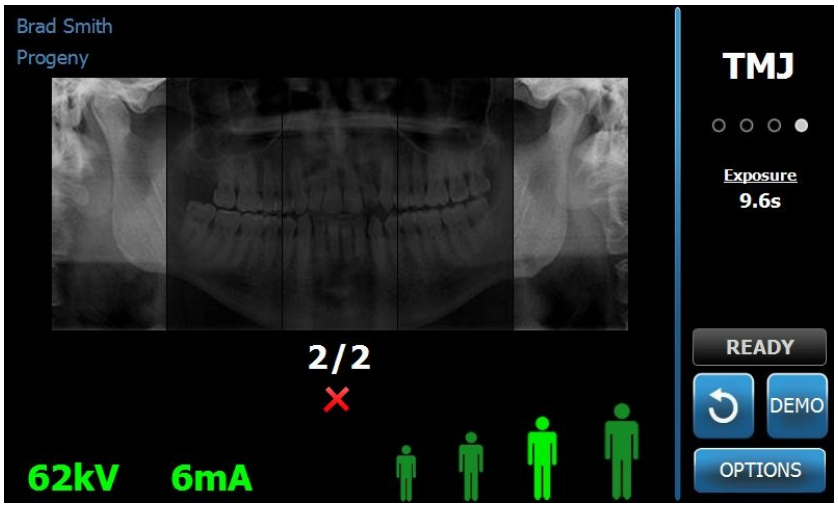
Ready for Imaging Button

11. **Prepare to take an X-ray.** It is recommended that operators of an extraoral dental X-ray device stand a minimum of 2 meters (6.6 feet) away from the focal spot and out of the path of the X-ray beam.
12. **Take an X-ray.** Press and hold the exposure button until the Vantage System stops moving.

Exposure Control Button

13. Tap OK to close the image window.
14. Alert the patient that you are taking the second TMJ image. (Note: If you need to cancel the TMJ sequence, press the red “X” on the screen.)
15. Tap the Ready for Imaging button.
16. **Prepare to take an X-ray.** It is recommended that operators of an extraoral dental X-ray device stand a minimum of 2 meters (6.6 feet) away from the focal spot and out of the path of the X-ray beam.
17. **Take an X-ray.** Press and hold the exposure button until the Vantage System stops moving.
18. When the Image Preview appears on the Touch Control panel, verify the image acquired is the one desired for the patient.
19. Tap OK to close the image window. The Cool Down time appears on the Acquisition Setup screen.

Cool Down Time on Acquisition Setup Screen



20. Help the patient exit the Vantage System.

Early Release of the Exposure Button

If the exposure button is released before the Vantage System stops moving, this message appears: “Procedure was interrupted before completion.”

1. Click OK on the Message window and wait for Vantage System to recover and to determine if the Image Preview appears.
2. If it does, verify the accuracy of the image.
3. If there is no image or the displayed one is inaccurate, retake both TMJ images.

11 Acquiring a Cephalometric Image

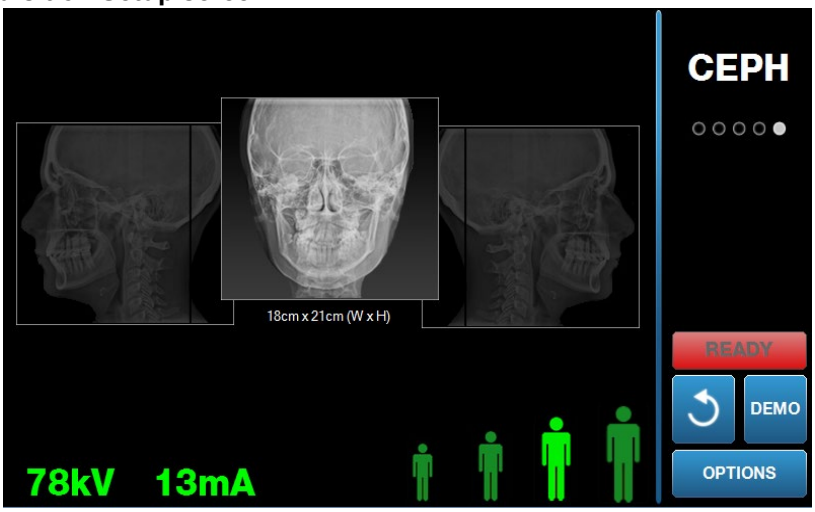
In this Chapter

- Acquiring a Cephalometric Image

Acquiring an Image

1. Make sure the Vantage System is in the Patient Entry position. If not, tap the Ready for Imaging button on the Touch Control Panel Acquisition Setup screen.
2. Verify the correct patient name appears at the top left of the Acquisition Setup screen.

Acquisition Setup screen



3. Adjust the height of the Vantage System to the approximate height for the patient using the up/down control buttons on the secondary collimator, or on the side of the patient control table.
4. Select the technique factors. *For more information, see* Setting the Technique Factors *in* Chapter 6.
5. Follow the Vantage procedures in the chapter for Positioning the Patient and acquire an image.
6. If the patient requested an X-ray simulation, tap the Demo button on the Acquisition Setup screen. When Demo mode is active, position the patient (if desired), and proceed as if an actual image is being taken. When done, tap Demo again to turn off the Demo mode.
7. After the patient is properly positioned, request that the patient swallow, place their tongue on the roof of their mouth, and remain as motionless as possible until the device stops moving and the audio signal sounds.
8. To begin image acquisition, tap the Ready for Imaging button on the Touch Control panel.
   The status indicator flashes “WAIT” to indicate a moving status while the Vantage System moves to the ready position.

Ready for Imaging Button

9. **Prepare to take an X-ray.** It is recommended that operators of an extraoral dental X-ray device stand a minimum of 2 meters (6.6 feet) away from the focal spot and out of the path of the X-ray beam.
10. **Take an X-ray.** Press and hold the exposure button until the Vantage System stops moving.

Exposure Control Button

11. When the Image Preview appears on the Touch Control panel, verify the image acquired is the one desired for the patient.

Image Preview Screen

12. Tap OK to close the image window.
13. Help the patient exit the Vantage System.

Early Release of the Exposure Button

If the exposure button is released before the Vantage System stops moving, this message appears: “Procedure was interrupted before completion.”

14. Click OK on the Message window and wait for Vantage System to recover and to determine if the Image Preview appears.
15. If it does, verify the accuracy of the image.
16. If there is no image or the displayed one is inaccurate, retake the image.

12 Recalling the Last Image

In this Chapter

- About Image Preview
- Recalling the Last Image

About Image Preview

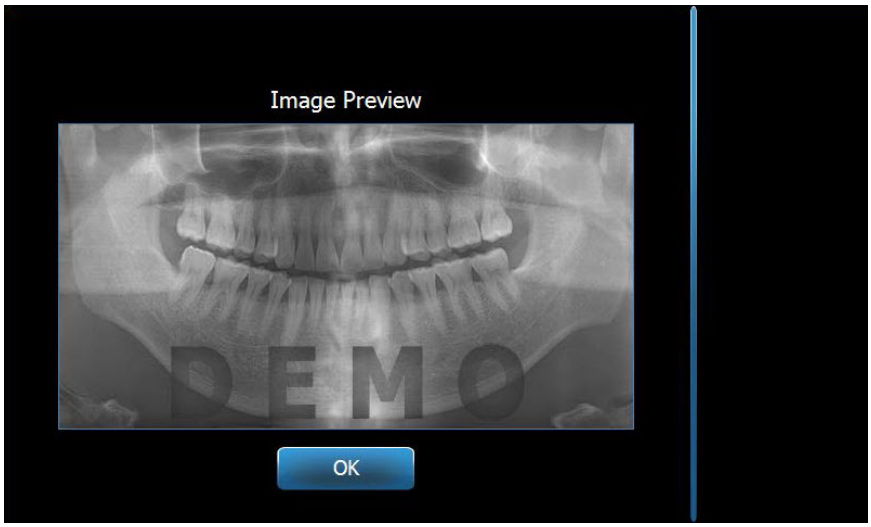
The Vantage System retains the most recent image acquired in memory until the Vantage System is shut down, or until another image is acquired. Then that image becomes the image in memory. This image can be recalled at any time.

Recalling the Last Image

When you need to retransmit the most recently acquired image, the Recall Last Image button on the Options screen allows you to do this.

1. Tap the Options button on the Acquisition Setup screen, and the Options screen appears.
2. Tap the Recall Last Image button. The Image Preview screen appears.

Recall Image



3. When you are finished previewing the image, tap the OK button.

Note
If you just powered on the Vantage System, and you tap the Recall Last Image button, a non-diagnostic image may appear. This image may not be useful for diagnostic purposes.

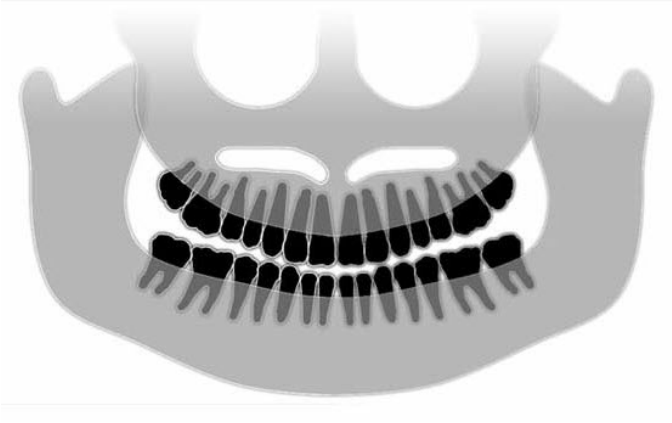
13 Troubleshooting

In this Chapter

- Characteristics of a Quality Image
- Characteristics of a Quality Cephalometric Image
- Resolving Image Problems

Characteristics of a Quality Panoramic Image

A quality panoramic image will look like the following image, and have the following characteristics:



- Symmetry of structures about the midline.
- Slight downward tip of the occusal plane or smiling appearance.
- Good density, visibility, and sharpness of all structures.
- Spine and ramus ghost artifacts should be minimal.

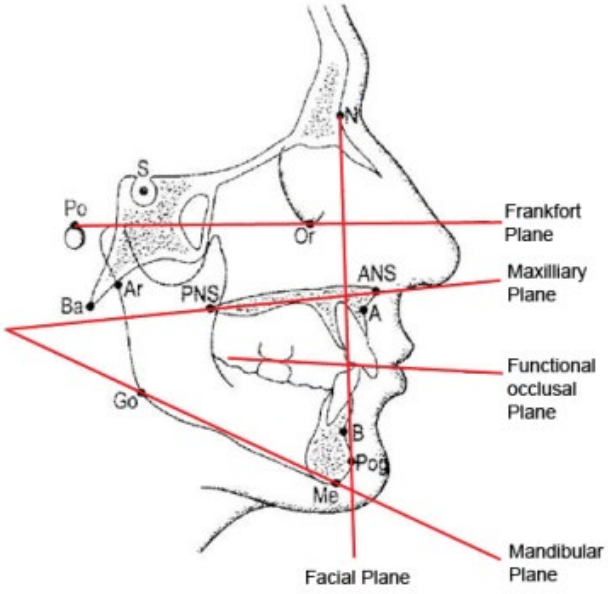
Characteristics of a Quality Cephalometric Image

The Cephalometric x-ray examination is employed to measure the relationships between intracranial landmarks. These anatomical structures, identified within the radiograph, become one of the components necessary in developing a treatment plan. In order to maximize visibility, the practitioner must verify placement of the Otic Posts and Nasion Locator. During patient positioning, the Midsaggital Line and, Frankfort Plane must be preserved.

Among the landmarks to be visualized, we have:

- Sella (S) – midpoint of the sella turcica
- Nasion (N) – most anterior point of the frontonasal suture
- “A” Point (A) – deepest point on the maxillary profile, between the anterior nasal spine and the alveolar crest
- “B” Point (B) – deepest point on the concavity of the mandibular profile, between the alveolar crest and the point on the chin
- Posterior Nasal Spine (PNS) – the tip of the posterior nasal spine
- Anterior Nasal Spine (ANS) – anterior point of the bony nasal spine

- Gonion (G) – the most posterior, inferior point on the angle of the mandible
- Menton (M) – lowermost point of the mandibular symphysis
- Pogonion (Pog) – most anterior point on the bony chin
- Porion (Po) – the highest point on the bony external acoustic meatus
- Orbitale (Or) – most inferior point of the orbit
- Articulare (Ar) – the point of intersection of the projection of the surface of the condylar neck and the inferior surface of the basi-occiput
- Basion (Ba) – the most posterior inferior point of the midline on the basi- occiput



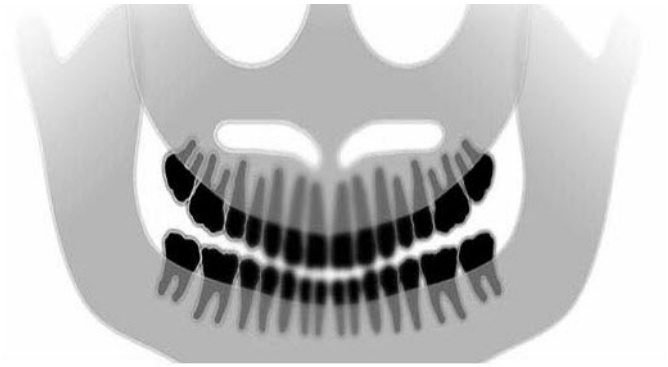
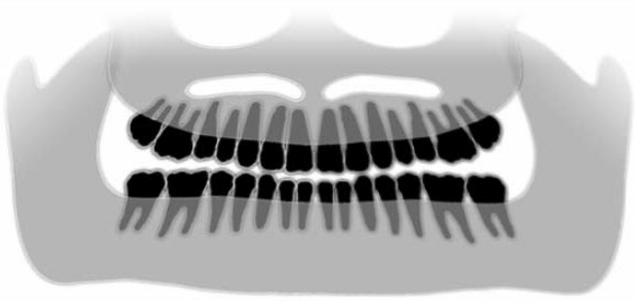
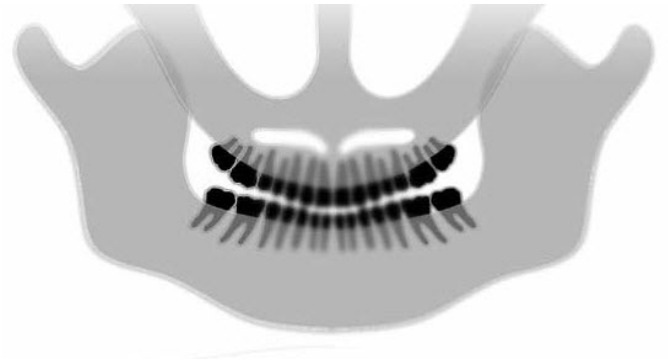
These landmarks are used to develop a visualization of key “Planes” of interest. The planes are identified as:

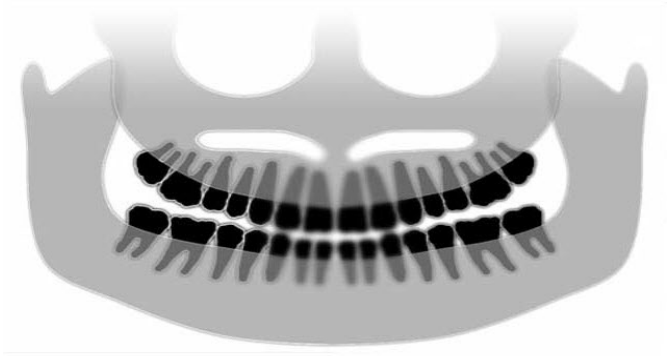
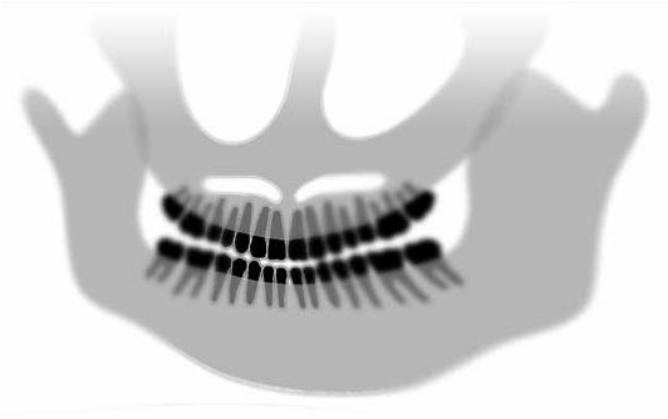
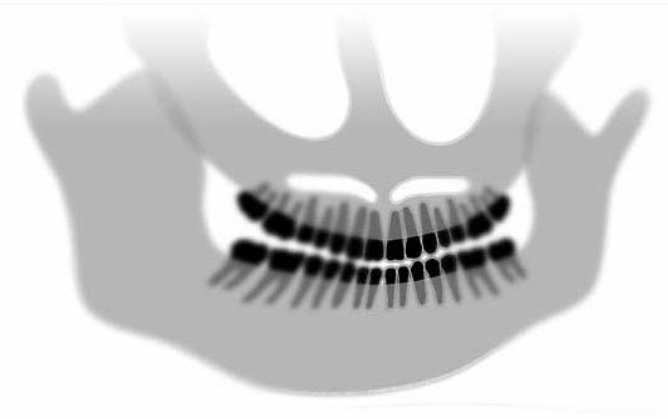
- The ***Frankfort Plane***, which is a line drawn from the Porion to the Orbitale
- The ***Facial Plane***, the line between the nasion and the pogonion
- The ***Maxillary Plane*** – a line from the anterior nasal spine to the posterior nasal spine
- The ***Mandibular Plane*** - the line between the gonion and the menton
- The ***Occlusal Plane*** – dental contact surfaces

Several commercially available application programs have been developed to assist the clinician through the process of marking these planes. It is suggested that the clinician become familiar with these and, other anatomical landmarks as the treatment plan and, the anatomy included with the treatment plan, are beyond the scope of this manual.

Resolving Image Problems

The table that follows offers examples of problem images, their characteristics, and steps to take to resolve the problem.

Problem Images	Characteristics and Solutions
	**Identifying Problem Characteristics:** Occlusal plane “smile” opens upward **Resolving the Problem:** Patient’s head is tilted down Use the Frankfort plane laser to properly align the horizontal tilt of the patient’s head.
	**Identifying Problem Characteristics:** Occlusal plane “smile” opens down. Anterior teeth are above posterior. **Resolving the Problem:** Patient’s head is tilted upward. Use the Frankfort plane laser to properly align the horizontal tilt of the patient’s head.
	**Identifying Problem Characteristics:** Anterior teeth are narrow and blurred. Significant spinal image **Resolving the Problem:** Patient is positioned too far forward. To ensure correct positioning, position the patient with the anterior teeth placed firmly between the ridges of the bite guide.

Problem Images	Characteristics and Solutions
	**Identifying Problem Characteristics:** Anterior teeth are overly large and blurred. Condyles may be cut off. **Resolving the Problem:** Patient is positioned too far to the rear. To ensure correct positioning, position the patient with the anterior teeth placed firmly between the ridges of the bite guide.
	**Identifying Problem Characteristics:** Unequal magnification from right to left side. Patient's right side is too large. **Resolving the Problem:** Patient's head is rotated to the right. Make sure bite guide is centered on incisors and bite wands are in contact with patient's head. Confirm with mid-Saggital laser.
	**Identifying Problem Characteristics:** Unequal magnification from left to right side. Patient's left side is too large. **Resolving the Problem:** Patient's head is rotated to the left. Make sure bite guide is centered on incisors and bite wands are in contact with patient's head. Confirm with mid-Saggital laser.
	Play, looseness in the system
	Poor Contrast, Lack of Detail, Fuzzy

General Image Troubleshooting

The diagnostic image must allow the clinician to recognize the required objects of interest. Visualization is accomplished by attention to several factors. Among the significant tools we have are sharpness, brightness (optical density), contrast, and angulation (shape distortion).

Sharpness – Most causes of image unsharpness have been eliminated by the design of the Vantage. The focal spot size has been reduced to the minimum obtainable, the rigid structure dampens vibrations and, the distance between the patient and, the digital sensor has been held to a minimum. In order to reach maximum obtainable sharpness, the patient must remain stationary during the examination and, if possible, suspend respiration.

Brightness (optical density) – Collected images which appear too dark may require an adjustment to the image management program filter settings or, a reduction in the milliampere setting on the x-ray generator. Images which appear too light may require an adjustment to the image management program filter settings or, an increase in the milliampere setting on the x-ray generator.

Contrast - Collected images which present with lower than desired contrast may require an adjustment to the image management program filter settings or, a decrease in the kilovoltage setting on the x-ray generator. Images which present with higher than desired contrast may require an adjustment to the image management program filter settings or, an increase in the kilovoltage setting on the x-ray generator.

Angulation (shape distortion) – As the information collected within the image will appear in a two dimensional format, anatomical landmarks may become superimposed due to poor positioning. In the case of the lateral Cephalometric examination, it will be necessary to verify the concentric alignment of the patient's ear canals. During the review of the PA projection, lateral symmetrical alignment is required. In either case, the Midsaggital Line and, Frankfort Plane must be preserved.

14 Maintenance

In this Chapter

- Regular Maintenance
- Cleaning and Disinfecting

Regular Maintenance

In the interest of equipment safety, a regular maintenance program must be established. This maintenance program should consist of cleaning and disinfecting as well as annual system function checking. It is the owner's responsibility to arrange for this service and to assure that the personnel performing this are fully qualified to service Progeny Dental X-ray equipment.

Cleaning and Disinfecting

The Progeny Vantage Panoramic X-ray System requires disinfection. The cleaning and disinfecting methods described here protect operators and patients in a manner that is safe for the equipment.

Cleaning Compounds

Progeny Dental recommends the use of a broad spectrum surface disinfectant/cleaning product, such as Cavicide™, or chemical equivalent.

Cleaning Methods

Between each patient, perform the following cleaning and disinfecting steps.

1. Remove gross bio-burden from the chin rest, bite guide, handles and structure with a disposable towel moistened with water.
2. Dry the chin rest, bite guide, handles and structure with disposable towels.
3. Wipe the chin rest, bite guide, handles and structure with the disinfectant/cleaning product following the manufacturer's instructions.
4. Clean any remaining disinfectant/cleaning product from the component with water. This additional step prevents possible product discoloration or corrosion.
5. Dry the patient contact areas with disposable towels.

   CAUTION: The Progeny Vantage Panoramic X-ray System is not waterproof. Use only moistened, not saturated, towels.

15 Error Messages

In this Chapter

- Message Overview
- Messages and Actions
- Message Center Interactive Screen

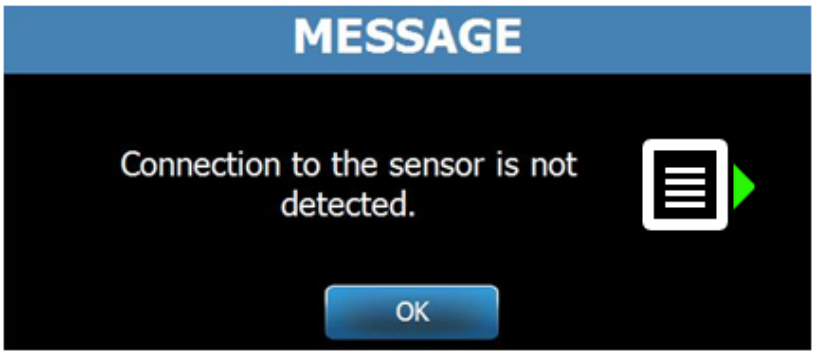
Message Overview

The Vantage Panoramic system displays informational messages and system messages. When the system encounters a problem, the message window appears on the Touch Control Panel. The message window includes a description of the problem, the OK button, and the Message Center icon.

Informational Message

This message is distinguished from the System Message by its blue header, and the wording, “MESSAGE”. The Informational Message indicates that the Vantage system can still be used, although all functions may not be available.

Example of an Informational Message



System Message

This message is distinguished from the Informational Message by its green header, and the wording, “SYSTEM”. The System Message identifies a system-wide error. The Vantage system cannot be used until the problem is resolved.

Example of a System Message

Exiting a Message Window

When a message window pops up, you have two options:

- Tapping the Message Center icon  takes you to the Message Center window. *For more information, see* Working with the Message Center *in* this chapter.
- Clicking **OK** closes the message window.

Messages and Actions

Before following the actions of a specific message, some general steps are very helpful:

- Verify the Vantage device is powered up, and the Progeny client software is running on a computer system running on the same network as the Vantage..
- If appropriate, use the Recall Last Image to retransmit the last image. *For more information, see* Recalling the Last Image *in* chapter 11.
- Cycle the power on the device off and on once.

The following table identifies the text of each message and specific actions you can take for that message.

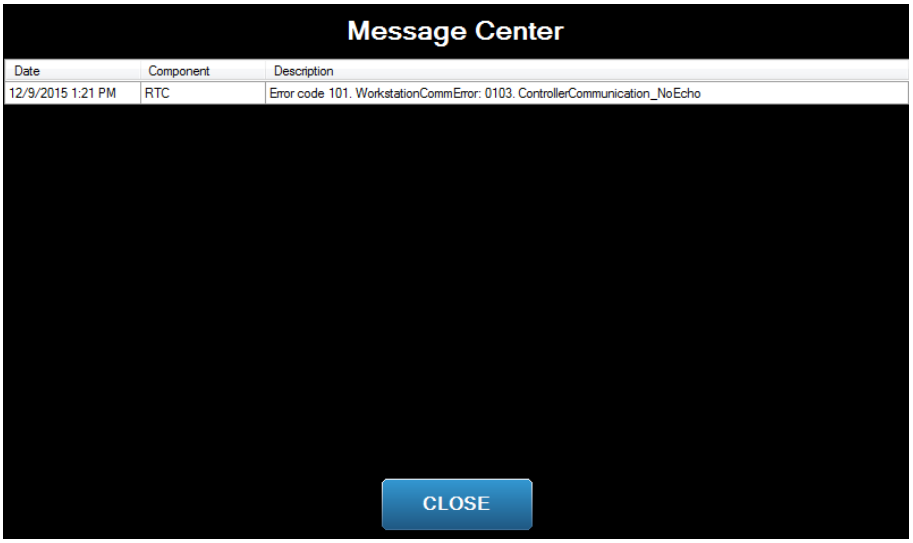
Message Text	Action
Connection to the device is not detected.	1. Call Technical Service.
Connection to the sensor is not detected.	1. Click OK. 2. Wait for Vantage System to recover. 3. Detach and re-attach the sensor. 4. Wait for the sensor to get ready, approximately one minute. 5. If message persists, call Technical Service. 6. If desired, run the Vantage System in Demo mode with no radiation emitted. *For more information, see* Using the Demo Mode *in* chapter 8.
Control Panel has encountered a protocol error.	1. Call Technical Service.
Device Controller has encountered an error.	1. Press OK on Message screen. 2. Wait for Vantage System to recover. 3. If message re-appears, restart the Vantage system. 4. If message persists, call Technical Service.
Image transmission is incorrect.	1. Click OK. 2. Wait for Vantage System to recover, and to determine if Image Preview appears. 3. If it does, verify the accuracy of the image. 4. If there is no image or the displayed one is inaccurate, retake the image.
Procedure was interrupted before completion.	Message appears when the exposure button is released before the device stops moving. 1. Click OK. 2. Wait for Vantage System to recover, and to determine if Image Preview appears. 3. If it does, verify the accuracy of the image. 4. If there is no image or the displayed one is inaccurate, retake the image.

Message Text	Action
Sensor has encountered a calibration error.	1. Call Technical Service. 2. If desired, run the Vantage System in Demo mode with no radiation emitted. *For more information, see* Using the Demo Mode *in* chapter 8.
Sensor has encountered a malfunction. Please replace the sensor.	1. Click OK. 2. Wait for Vantage System to recover. 3. Detach and re-attach the sensor. 4. Wait for the sensor to get ready, approximately one minute. 5. If message persists, call Technical Service. 6. If desired, run the Vantage System in Demo mode with no radiation emitted. *For more information, see* Using the Demo Mode *in* chapter 8.
Sensor has encountered an error.	1. Click OK. 2. Wait for Vantage System to recover. 3. Detach and re-attach the sensor. 4. Wait for the sensor to get ready, approximately one minute. 5. If message persists, call Technical Service. 6. If desired, run the Vantage System in Demo mode with no radiation emitted. *For more information, see* Using the Demo Mode *in* chapter 8
System cannot execute selected function. Please try again.	1. Click OK. 2. Wait for Vantage System to recover. 3. Repeat the action taken. 4. If the message recurs, restart the Vantage System. 5. If the message persists, call Technical Service.
System has encountered an error. Current procedure was interrupted due to time-out.	1. Click OK. 2. Wait for Vantage System to recover from the condition.

Message Center Interactive Screen

The Message Center screen is an interactive Touch Control Panel screen that displays messages for various components of the Vantage Panoramic system. Touching a component on the screen highlights the messages for that component.

Interactive Message Center Screen



To access the Message Center:

- On the Acquisition Setup screen, tap the Options button, then tap the Message Center button.
- On a Safe or Offline screen, tap the Message Center icon.

Message Center Icon

16 Technical Data Sheet

Vantage System Function Checklist

Perform the tasks on this checklist to verify electrical, mechanical, and software readiness of the Vantage Panoramic X-ray System.

System Readiness Checklist

☑	Task Area	Description
	Floor and Wall	Ensure that the wall support is adequate and that the system is securely attached to the wall and floor. For freestanding units, the structure must be firmly attached to the floor.
	Mechanical Safety	Inspect the structure for mechanical integrity of the telescoping column. Inspect the condition of the main drive lead screw, bearings, overhead attachment and pivot points, C-arm attachment and pivot points, and the patient table attachment.
	Electrical Safety	Verify integrity of the power line and its connections, and the connection to earth ground.
	Labels	Ensure that all certified components bear labels that include the model and serial number, date of manufacture, and a statement of certification.
	Consumable Items	Inspect and make sure the following are present and in working order. **Panoramic System:** chin rest, bite piece, TMJ positioner, sheaths, wands **Cephalometric System:** naison post, ear post, ear speculum If replacement needed, see the.Consumable Items for Panoramic and Cephalometric Systems section of this manual.
	Diagnostic Source Assembly	Under the tubehead cover, evaluate the condition of the following items: collimator attachment, collimator blade mechanism, electrical connections, and mechanical attachment of the tubehead and collimator to the structure. Check for oil leaks.
	Power Switch	Verify that the switch is working and that the operator panel illuminates when the power switch is in the ON position.
	Operator Panel / Touch Control Panel	A few seconds after power up, the splash screen should appear. The screen should display the status when the Vantage Client software is started. The panel must switch to the main screen when the VantageTouch software and all related devices are up and running. The panel functions must respond to interrogation.
	Movement Control Switches	Verify wand positioning and column vertical drive.

☑	Task Area	Description
	Laser Operation and alignment	The mid-Sagittal, Frankfort plane, and Cuspid lasers operate on demand by way of the activation switches on the patient table. Verify alignment through the use of the laser test fixtures.
	Exposure Switch	Verify that the exposure switch is functioning properly. To make an exposure, follow the procedures outlined in this manual.
	Exposure Indicators	Make several exposures. Verify that the visual radiation indicator illuminates and that the audible radiation indicator generates a tone.
	Premature Exposure Termination.	During an exposure, release the exposure switch before the normal end of the panoramic sweep. All movement must cease, the x-ray output must stop, and the visual and audible indicators must end.
	Error Messages	During normal operation, the appearance of any error message must be investigated and corrected. Error messages may occur due to operator error or machine malfunction. Contact Progeny Technical Support with any questions.
	X-ray Generator Inspections	Perform complete panoramic trial exposures. Absence of error messages demonstrates proper generator operation.
	Beam alignment Verification	Verify alignment between x-ray source and image receptor.
	Sensor Operation	Perform a trial examination on the test phantom. Evaluate the outcome of this trial exam. Sufficient contrast, sharpness and penetration must be evident in the image.
	Focal Trough Verification	Perform a trial examination on the test phantom. Evaluate the outcome of this trial exam. The focal trough must be located in the predicted position.
	User Information	The User manual should remain in the possession of the primary system operator. Replacement copies are available through Progeny Technical Support.
	Imaging Software	Make sure the imaging software is running and available.

System Specifications Sheet

X-ray Generator	Constant Potential	Microprocessor controlled voltage and current.
X-ray Tube	Canon (Toshiba)	D-054SB 1750W max. DC.
Focal spot size	0.5 mm	Conforms to IEC 60336/2005
Total Filtration	Min. 3.2 mm Al	
Anode Voltage	Panoramic	54-84 kVp +/- 10%
Anode Current	Panoramic	4-14mA +/- 20% 14 mA max. 1140 watts max.
Scan Time	Panoramic Cephalometric	2.5 – 16 seconds as indicated +/- 10% 9-15.6 seconds +/- 10%
SID	Panoramic Cephalometric	500 mm (20”) Left 1,680 mm (66.1”), Right 1,707 mm (67.2”)
Magnification	Panoramic Cephalometric	Constant 1.2 horizontal and vertical +/- 0.05 Constant 1.1 horizontal and vertical +/- 0.05
Image pixel size	96 by 96 μm	2 by 2 binning for 96 μm by 96 μm output pixel size.
CCD active area	Panoramic Cephalometric	6.144 mm x 146 mm (0.25” x 5.8”) 6.144mm x 221 mm (0.25” x 8.7”)
Image field	Panoramic Cephalometric	14 x 30 cm (5.8 x 12”) 21 x 30 cm (8.2 x 12”)
Pixels/exposure	Panoramic Cephalometric	3072 x 6250 16 bits per pixel 4608 x 6250 16 bits per pixel
Dose Information	Panoramic Cephalometric	See Dose Information section of this manual.
CCD data rate		4 Mwords/Sec. 8 Mbytes/Sec.
MaxImage data size	Panoramic Cephalometric	19.2 MBytes 28.8 MBytes
Attenuation Equivalent of Image Receptor		0.4 mm Al
Maximum Heat Dissipation into Surrounding Air		0.3 BTU
Line Voltage		110-240 VAC +/- 10% 50/60 Hz
Duty Cycle		1:30
Operating Temperature		+10° C/+35° C (+50° F/+95° F)
Storage Temperature		-35° C/+66° C (-31° F/+150° F)
Maximum Altitude		3650 m (12,000 ft.)

Appendix A: X-Ray Tube Information

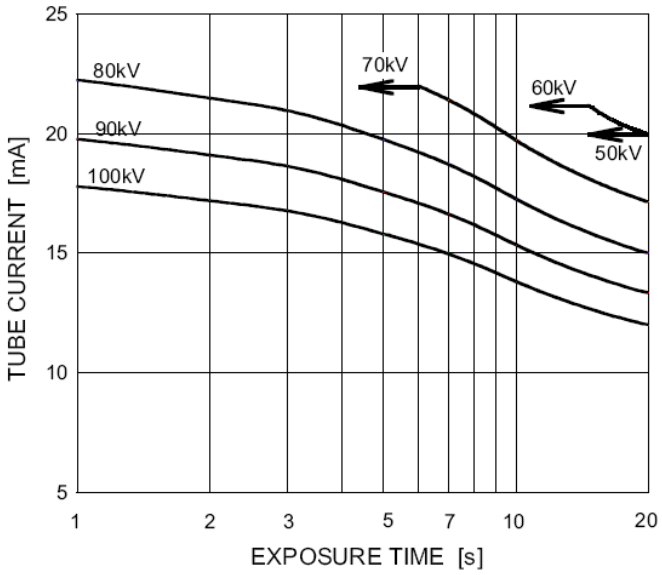
Maximum Rating Chart

Tube can be either Canon (Toshiba) D-054SB or Kailong KL29SB (rating charts are the same).

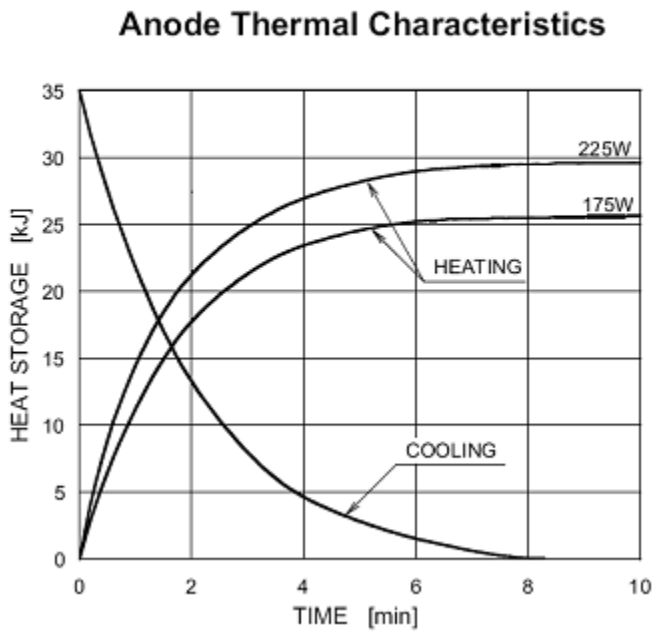
Maximum Rating Charts
(Absolute maximum rating charts)

Constant potential high-voltage generator

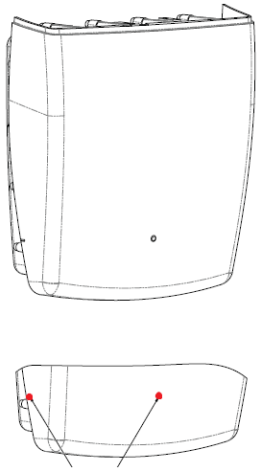
Nominal Focal Spot Value: 0.5



Anode Thermal Characteristics Chart



Appendix B Statements and Information According to Canadian Radiation Emitting Devices Regulations, Part II of Schedule II

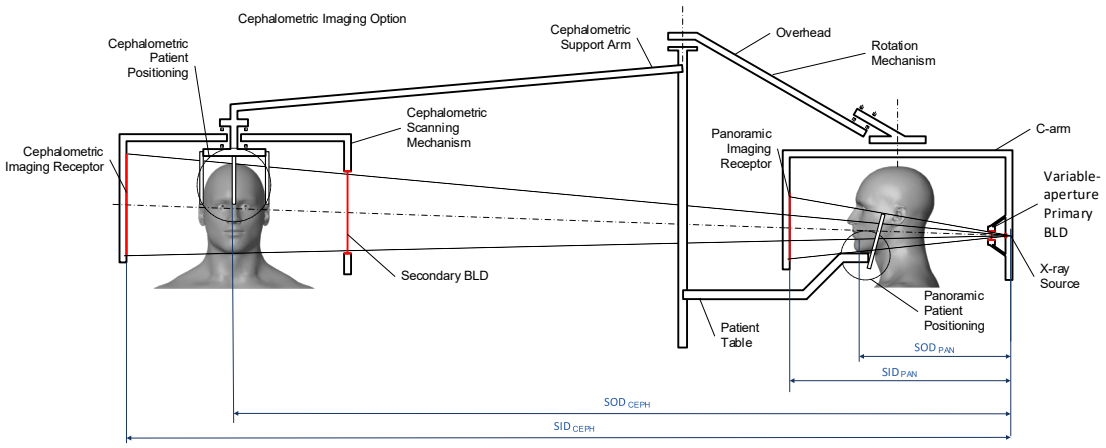
2(h)(i)-(iv)	For each X-ray tube assembly: • Nominal focal spot size: 0.5 mm • Cooling curve for the anode: refer to Anode Thermal Characteristics in the **X-Ray Tube Information** section of this manual. • X-ray tube rating charts: refer to Maximum Rating Charts in the **X-Ray Tube Information** section of this manual. • Focal spot position: The following images show the focal spot indicators on the Vantage tube head. **Tube head**  **Focal spot indicators**
2(i)	Duty cycles: Variable, automatically enforced; Max = 1:30 Rectification type: Constant potential, high frequency Generator rating: 54 kV-84 kV
2(j)	To operate the equipment at the maximum line current, the following are necessary: • Nominal line voltage: 110-240 V • Maximum line current: 20 A • Line voltage regulation: 10% of the nominal line voltage
2(k)	Loading factors that constitute the maximum line current condition for the X-ray generator: 84 kV, 14 mA, 16 s

2(l) Recommended loading factors for each patient size: refer to the **Setting the Technique Factors** section of this user manual.

2(o) The operating range and the maximum deviation for any setting within the operating range for each loading factor are summarized below:

Factor	Nominal Value	Deviation
Peak Tube Potential	54 kV-84 kV Note: User selectable, 60 kV-84 kV	Regulated to ±10% of the indicated value
Tube Current	4 mA-14 mA Note: Limited by total tube power of 1140 W.	Regulated to ±20% of the indicated value and limited by total tube power of 1140 W.
Exposure Duration	Panoramic: 2.5 s-16 s Cephalometric: 9 s- 15.6 s	50 ms plus ±20% of the indicated value

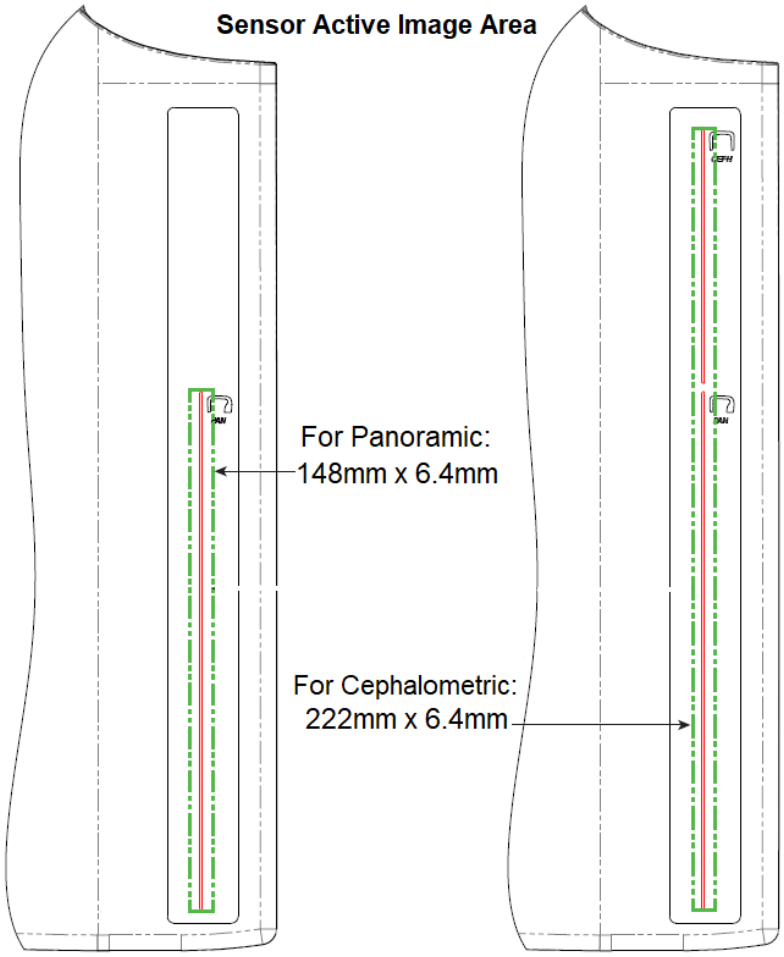
4(a) Description of the geometric relationship between the focal spot, X-ray beam dimensions, patient position and image reception area: refer to the diagram below.



4(c)(i) -(ii) Air Kerma-Area Product (KAP) information is shown the **Dose Information** section of this manual. The KAP, provided in mGy·cm^2, is a commonly used quantity associated with the amount of X-ray utilized in dental panoramic radiography.

4(d) The maximum deviation of the Air Kerma-Area Product (KAP): refer to the **Dose Information** section of this manual.

4(e) The location and dimensions of the effective (active) image reception area: See the following illustration for information about the sensor active image area.



4(f) To measure the maximum deviation of the technique factors, operate the device in TMJ mode. Compare the measured result with the technique factor specification.

Appendix C: Dose Information

The following tables show the estimated Air Kerma-Area Product (KAP) for the various imaging profiles in the Progeny Vantage X-ray System. The estimated KAP is an uncalibrated value that varies from device to device. The KAP values are averaged models for the dose output of the device. These values might differ up to 30% from the KAP measured with calibrated dose measurement equipment.

Table 1: KAP - Panoramic, Standard, Adult

(all units in mGy·cm²)

	4 mA	5 mA	6 mA	7 mA	8 mA	9 mA	10 mA	11 mA	12 mA	13 mA	14 mA
60 kV	33.622	42.559	51.496	60.432	69.369	78.306	87.243	96.180	105.116	114.053	122.990
61 kV	34.421	43.715	53.010	62.305	71.600	80.895	90.190	99.485	108.780	118.075	127.370
62 kV	35.453	45.191	54.930	64.669	74.408	84.147	93.886	103.625	113.364	123.103	132.842
63 kV	36.331	46.432	56.533	66.634	76.735	86.835	96.936	107.037	117.138	127.239	137.340
64 kV	37.443	47.986	58.529	69.073	79.616	90.159	100.703	111.246	121.790	132.333	142.876
65 kV	38.618	49.611	60.604	71.596	82.589	93.582	104.575	115.567	126.560	137.553	148.545
66 kV	39.841	51.282	62.724	74.166	85.608	97.050	108.492	119.934	131.376	142.818	154.260
67 kV	40.881	52.691	64.501	76.311	88.121	99.931	111.741	123.552	135.362	147.172	158.982
68 kV	41.967	54.150	66.333	78.517	90.700	102.883	115.066	127.250	139.433	151.616	163.799
69 kV	43.322	55.958	68.593	81.228	93.863	106.498	119.133	131.768	144.403	157.038	169.673
70 kV	44.696	57.773	70.850	83.928	97.005	110.082	123.160	136.237	149.314	162.392	175.469
71 kV	45.571	58.921	72.271	85.622	98.972	112.322	125.672	139.023	152.373	165.723	179.074
72 kV	47.013	60.803	74.594	88.384	102.174	115.964	129.754	143.544	157.334	171.124	184.914
73 kV	48.487	62.712	76.937	91.162	105.387	119.612	133.837	148.062	162.287	176.512	190.737
74 kV	50.001	64.659	79.318	93.976	108.634	123.292	137.951	152.609	167.267	181.926	196.584
75 kV	51.577	66.673	81.769	96.864	111.960	127.056	142.152	157.248	172.343	187.439	202.535
76 kV	52.631	68.010	83.389	98.768	114.147	129.526	144.905	160.284	175.663	191.042	206.421
77 kV	53.701	69.362	85.024	100.686	116.348	132.009	147.671	163.333	178.994	194.656	210.318
78 kV	55.397	71.500	87.602	103.704	119.807	135.909	152.012	168.114	184.216	200.319	216.421
79 kV	57.155	73.702	90.248	106.795	123.341	139.888	156.435	172.981	189.528	206.074	222.621
80 kV	58.959	75.949	92.939	109.929	126.919	143.908	160.898	177.888	194.878	211.868	228.858
81 kV	59.758	76.938	94.118	111.299	128.479	145.659	162.839	180.019	197.199	214.379	231.560
82 kV	61.595	79.210	96.824	114.438	132.053	149.667	167.282	184.896	202.511	220.125	237.740
83 kV	63.146	81.117	99.088	117.059	135.030	153.002	170.973	188.944	206.915	224.886	242.857
84 kV	77.653	98.684	119.715	140.747	161.778	182.809	203.841	224.872	245.903	266.935	287.966

Table 2: KAP - Panoramic, Standard, Child

(all units in mGy·cm²)

	4 mA	5 mA	6 mA	7 mA	8 mA	9 mA	10 mA	11 mA	12 mA	13 mA	14 mA
60 kV	29.876	37.802	45.728	53.653	61.579	69.505	77.430	85.356	93.282	101.207	109.133
61 kV	30.586	38.831	47.077	55.322	63.567	71.812	80.057	88.303	96.548	104.793	113.038
62 kV	31.503	40.144	48.785	57.426	66.067	74.708	83.349	91.990	100.632	109.273	117.914
63 kV	32.286	41.250	50.215	59.180	68.144	77.109	86.073	95.038	104.002	112.967	121.931
64 kV	33.273	42.631	51.990	61.349	70.708	80.066	89.425	98.784	108.142	117.501	126.860
65 kV	34.315	44.073	53.831	63.589	73.347	83.105	92.863	102.621	112.380	122.138	131.896
66 kV	35.398	45.555	55.713	65.870	76.028	86.185	96.343	106.500	116.658	126.815	136.973
67 kV	36.323	46.809	57.295	67.781	78.267	88.753	99.239	109.725	120.211	130.697	141.183
68 kV	37.292	48.111	58.930	69.750	80.569	91.388	102.208	113.027	123.847	134.666	145.485
69 kV	38.495	49.717	60.938	72.160	83.382	94.603	105.825	117.047	128.268	139.490	150.712
70 kV	39.717	51.334	62.950	74.567	86.183	97.800	109.416	121.033	132.649	144.265	155.882
71 kV	40.500	52.361	64.222	76.083	87.944	99.805	111.666	123.526	135.387	147.248	159.109
72 kV	41.784	54.038	66.291	78.544	90.798	103.051	115.305	127.558	139.812	152.065	164.318
73 kV	43.095	55.736	68.377	81.018	93.659	106.300	118.941	131.582	144.223	156.864	169.505
74 kV	44.441	57.468	70.496	83.523	96.550	109.577	122.604	135.632	148.659	161.686	174.713
75 kV	45.841	59.257	72.673	86.090	99.506	112.923	126.339	139.756	153.172	166.589	180.005
76 kV	46.784	60.454	74.125	87.795	101.465	115.136	128.806	142.476	156.147	169.817	183.487
77 kV	47.742	61.666	75.589	89.513	103.437	117.360	131.284	145.208	159.131	173.055	186.979
78 kV	49.248	63.563	77.879	92.194	106.510	120.825	135.141	149.457	163.772	178.088	192.403
79 kV	50.810	65.521	80.232	94.943	109.654	124.365	139.076	153.787	168.498	183.209	197.920
80 kV	52.413	67.519	82.624	97.730	112.836	127.941	143.047	158.153	173.258	188.364	203.470
81 kV	53.134	68.411	83.688	98.965	114.243	129.520	144.797	160.075	175.352	190.629	205.907
82 kV	54.771	70.436	86.101	101.766	117.431	133.096	148.761	164.426	180.091	195.757	211.422
83 kV	56.159	72.143	88.128	104.112	120.097	136.082	152.066	168.051	184.036	200.020	216.005
84 kV	69.159	87.890	106.621	125.352	144.084	162.815	181.546	200.277	219.008	237.739	256.470

Table 3: KAP - Panoramic, Enhanced

(all units in mGy·cm²)

	4 mA	5 mA	6 mA	7 mA	8 mA	9 mA	10 mA	11 mA	12 mA	13 mA	14 mA
60 kV	18.155	23.313	28.472	33.631	38.790	43.949	49.107	54.266	59.425	64.584	69.743
61 kV	18.601	23.971	29.340	34.709	40.079	45.448	50.817	56.187	61.556	66.925	72.294
62 kV	19.079	24.663	30.248	35.832	41.416	47.000	52.585	58.169	63.753	69.338	74.922
63 kV	19.480	25.236	30.992	36.748	42.504	48.260	54.016	59.772	65.528	71.285	77.041
64 kV	20.088	26.101	32.113	38.126	44.138	50.150	56.163	62.175	68.187	74.200	80.212
65 kV	20.626	26.854	33.082	39.311	45.539	51.767	57.996	64.224	70.452	76.681	82.909
66 kV	21.188	27.634	34.081	40.528	46.975	53.422	59.868	66.315	72.762	79.209	85.655
67 kV	21.867	28.570	35.273	41.976	48.679	55.383	62.086	68.789	75.492	82.195	88.898
68 kV	22.458	29.374	36.291	43.208	50.125	57.041	63.958	70.875	77.792	84.708	91.625
69 kV	23.196	30.374	37.551	44.728	51.905	59.082	66.260	73.437	80.614	87.791	94.968
70 kV	23.828	31.219	38.611	46.002	53.393	60.785	68.176	75.567	82.959	90.350	97.741
71 kV	24.458	32.058	39.658	47.258	54.858	62.458	70.058	77.657	85.257	92.857	100.457
72 kV	25.267	33.127	40.986	48.845	56.704	64.563	72.422	80.281	88.140	95.999	103.858
73 kV	26.099	34.216	42.332	50.449	58.566	66.682	74.799	82.915	91.032	99.149	107.265
74 kV	26.672	34.958	43.244	51.530	59.817	68.103	76.389	84.675	92.961	101.248	109.534
75 kV	27.530	36.068	44.606	53.143	61.681	70.219	78.757	87.294	95.832	104.370	112.908
76 kV	28.410	37.198	45.986	54.774	63.562	72.350	81.138	89.926	98.714	107.502	116.289
77 kV	29.318	38.357	47.396	56.435	65.474	74.513	83.551	92.590	101.629	110.668	119.707
78 kV	30.255	39.545	48.835	58.126	67.416	76.706	85.996	95.286	104.576	113.866	123.157
79 kV	31.074	40.577	50.080	59.583	69.085	78.588	88.091	97.594	107.097	116.599	126.102
80 kV	31.407	40.990	50.573	60.157	69.740	79.323	88.906	98.489	108.072	117.655	127.239
81 kV	32.220	42.008	51.797	61.586	71.375	81.164	90.952	100.741	110.530	120.319	130.108
82 kV	33.260	43.306	53.351	63.397	73.442	83.488	93.533	103.579	113.625	123.670	133.716
83 kV	34.323	44.623	54.924	65.225	75.525	85.826	96.127	106.427	116.728	127.029	137.330
84 kV	44.169	56.593	69.018	81.443	93.868	106.293	118.718	131.142	143.567	155.992	168.417

Table 4: KAP - Bitewings

(all units in mGy·cm²)

	4 mA	5 mA	6 mA	7 mA	8 mA	9 mA	10 mA	11 mA	12 mA	13 mA	14 mA
60 kV	9.590	12.308	15.027	17.746	20.464	23.183	25.901	28.620	31.339	34.057	36.776
61 kV	9.885	12.714	15.544	18.373	21.203	24.032	26.862	29.691	32.521	35.350	38.180
62 kV	10.190	13.130	16.071	19.011	21.951	24.891	27.831	30.772	33.712	36.652	39.592
63 kV	10.507	13.557	16.608	19.659	22.709	25.760	28.811	31.861	34.912	37.963	41.014
64 kV	10.834	13.995	17.156	20.317	23.478	26.639	29.800	32.961	36.122	39.283	42.444
65 kV	11.172	14.443	17.714	20.985	24.256	27.527	30.798	34.069	37.340	40.612	43.883
66 kV	11.521	14.902	18.283	21.664	25.045	28.426	31.807	35.188	38.568	41.949	45.330
67 kV	11.881	15.371	18.862	22.353	25.843	29.334	32.824	36.315	39.806	43.296	46.787
68 kV	12.252	15.852	19.452	23.052	26.652	30.252	33.852	37.452	41.052	44.652	48.252
69 kV	12.633	16.342	20.052	23.761	27.470	31.180	34.889	38.598	42.307	46.017	49.726
70 kV	13.025	16.844	20.662	24.480	28.299	32.117	35.936	39.754	43.572	47.391	51.209
71 kV	13.429	17.356	21.283	25.210	29.137	33.065	36.992	40.919	44.846	48.773	52.701
72 kV	13.843	17.878	21.914	25.950	29.986	34.022	38.058	42.093	46.129	50.165	54.201
73 kV	14.267	18.412	22.556	26.700	30.845	34.989	39.133	43.277	47.422	51.566	55.710
74 kV	14.703	18.956	23.208	27.461	31.713	35.966	40.218	44.471	48.723	52.976	57.228
75 kV	15.150	19.510	23.871	28.231	32.592	36.952	41.313	45.673	50.034	54.394	58.755
76 kV	15.607	20.075	24.544	29.012	33.480	37.949	42.417	46.885	51.354	55.822	60.291
77 kV	16.075	20.651	25.227	29.803	34.379	38.955	43.531	48.107	52.683	57.259	61.835
78 kV	16.554	21.238	25.921	30.604	35.288	39.971	44.654	49.338	54.021	58.705	63.388
79 kV	17.044	21.835	26.625	31.416	36.206	40.997	45.788	50.578	55.369	60.159	64.950
80 kV	17.545	22.442	27.340	32.237	37.135	42.033	46.930	51.828	56.725	61.623	66.521
81 kV	18.056	23.061	28.065	33.069	38.074	43.078	48.083	53.087	58.091	63.096	68.100
82 kV	18.579	23.690	28.801	33.912	39.023	44.134	49.245	54.356	59.466	64.577	69.688
83 kV	19.112	24.329	29.547	34.764	39.981	45.199	50.416	55.633	60.851	66.068	71.286
84 kV	19.656	24.979	30.303	35.626	40.950	46.274	51.597	56.921	62.244	67.568	72.891

Table 5: KAP - TMJ

(all units in mGy·cm²)

	4 mA	5 mA	6 mA	7 mA	8 mA	9 mA	10 mA	11 mA	12 mA	13 mA	14 mA
60 kV	36.701	47.106	57.511	67.915	78.320	88.724	99.129	109.534	119.938	130.343	140.747
61 kV	37.830	48.659	59.488	70.317	81.146	91.975	102.804	113.633	124.462	135.291	146.120
62 kV	38.999	50.252	61.505	72.757	84.010	95.263	106.515	117.768	129.020	140.273	151.526
63 kV	40.211	51.886	63.562	75.237	86.913	98.588	110.264	121.939	133.614	145.290	156.965
64 kV	41.463	53.561	65.658	77.756	89.853	101.951	114.049	126.146	138.244	150.341	162.439
65 kV	42.757	55.276	67.795	80.314	92.833	105.352	117.870	130.389	142.908	155.427	167.946
66 kV	44.093	57.032	69.972	82.911	95.850	108.790	121.729	134.668	147.608	160.547	173.486
67 kV	45.470	58.829	72.188	85.547	98.906	112.265	125.624	138.983	152.342	165.701	179.060
68 kV	46.889	60.667	74.445	88.223	102.001	115.778	129.556	143.334	157.112	170.890	184.668
69 kV	48.349	62.545	76.741	90.937	105.133	119.329	133.525	147.721	161.917	176.114	190.310
70 kV	49.850	64.464	79.077	93.691	108.304	122.917	137.531	152.144	166.758	181.371	195.985
71 kV	51.393	66.423	81.453	96.483	111.513	126.543	141.573	156.603	171.633	186.663	201.693
72 kV	52.978	68.423	83.869	99.315	114.761	130.207	145.653	161.098	176.544	191.990	207.436
73 kV	54.604	70.464	86.325	102.186	118.047	133.908	149.769	165.629	181.490	197.351	213.212
74 kV	56.271	72.546	88.821	105.096	121.371	137.646	153.921	170.196	186.471	202.746	219.021
75 kV	57.980	74.668	91.357	108.045	124.734	141.422	158.111	174.799	191.488	208.176	224.865
76 kV	59.730	76.831	93.932	111.034	128.135	145.236	162.337	179.438	196.539	213.640	230.742
77 kV	61.522	79.035	96.548	114.061	131.574	149.087	166.600	184.113	201.626	219.139	236.652
78 kV	63.355	81.279	99.203	117.128	135.052	152.976	170.900	188.824	206.748	224.672	242.596
79 kV	65.230	83.564	101.899	120.233	138.568	156.902	175.236	193.571	211.905	230.240	248.574
80 kV	67.146	85.890	104.634	123.378	142.122	160.866	179.610	198.354	217.098	235.841	254.585
81 kV	69.104	88.257	107.409	126.562	145.715	164.867	184.020	203.172	222.325	241.478	260.630
82 kV	71.103	90.664	110.224	129.785	149.345	168.906	188.467	208.027	227.588	247.148	266.709
83 kV	73.144	93.112	113.079	133.047	153.015	172.983	192.950	212.918	232.886	252.854	272.821
84 kV	75.226	95.600	115.974	136.348	156.722	177.097	197.471	217.845	238.219	258.593	278.967

Table 6: KAP - Cephalometric, Lateral

(all units in mGy·cm²)

	4 mA	5 mA	6 mA	7 mA	8 mA	9 mA	10 mA	11 mA	12 mA	13 mA	14 mA
60 kV	4.394	5.548	6.701	7.855	9.008	10.162	11.315	12.469	13.622	14.776	15.929
61 kV	4.468	5.650	6.832	8.015	9.197	10.379	11.561	12.743	13.925	15.107	16.289
62 kV	4.572	5.793	7.015	8.236	9.458	10.679	11.901	13.122	14.344	15.565	16.787
63 kV	4.675	5.933	7.192	8.451	9.709	10.968	12.227	13.486	14.744	16.003	17.262
64 kV	4.795	6.098	7.401	8.705	10.008	11.312	12.615	13.919	15.222	16.525	17.829
65 kV	4.943	6.305	7.667	9.030	10.392	11.754	13.117	14.479	15.841	17.204	18.566
66 kV	5.093	6.513	7.933	9.353	10.773	12.193	13.613	15.032	16.452	17.872	19.292
67 kV	5.221	6.685	8.148	9.612	11.075	12.538	14.002	15.465	16.929	18.392	19.856
68 kV	5.381	6.902	8.423	9.943	11.464	12.985	14.505	16.026	17.547	19.067	20.588
69 kV	5.527	7.095	8.664	10.232	11.801	13.369	14.938	16.506	18.075	19.643	21.212
70 kV	5.696	7.322	8.947	10.572	12.197	13.823	15.448	17.073	18.699	20.324	21.949
71 kV	5.809	7.466	9.124	10.782	12.440	14.098	15.755	17.413	19.071	20.729	22.387
72 kV	5.991	7.706	9.421	11.136	12.851	14.567	16.282	17.997	19.712	21.427	23.142
73 kV	6.179	7.951	9.724	11.496	13.269	15.041	16.814	18.586	20.358	22.131	23.903
74 kV	6.373	8.203	10.033	11.862	13.692	15.522	17.351	19.181	21.011	22.840	24.670
75 kV	6.573	8.460	10.347	12.234	14.121	16.008	17.894	19.781	21.668	23.555	25.442
76 kV	6.738	8.667	10.597	12.526	14.455	16.385	18.314	20.243	22.173	24.102	26.032
77 kV	6.945	8.931	10.917	12.902	14.888	16.874	18.860	20.846	22.832	24.817	26.803
78 kV	7.131	9.164	11.197	13.230	15.263	17.296	19.329	21.362	23.395	25.428	27.461
79 kV	7.348	9.437	11.526	13.615	15.705	17.794	19.883	21.972	24.061	26.151	28.240
80 kV	7.570	9.716	11.861	14.006	16.151	18.297	20.442	22.587	24.732	26.878	29.023
81 kV	7.644	9.799	11.953	14.108	16.263	18.417	20.572	22.726	24.881	27.036	29.190
82 kV	7.879	10.091	12.303	14.515	16.727	18.939	21.150	23.362	25.574	27.786	29.998
83 kV	8.121	10.389	12.658	14.927	17.196	19.465	21.733	24.002	26.271	28.540	30.809
84 kV	9.762	12.424	15.086	17.748	20.410	23.072	25.734	28.396	31.059	33.721	36.383

Table 7: KAP - Cephalometric, AP/PA, Adult

(all units in mGy·cm²)

	4 mA	5 mA	6 mA	7 mA	8 mA	9 mA	10 mA	11 mA	12 mA	13 mA	14 mA
60 kV	2.985	3.819	4.653	5.487	6.321	7.155	7.989	8.824	9.658	10.492	11.326
61 kV	3.055	3.916	4.777	5.638	6.500	7.361	8.222	9.083	9.944	10.805	11.666
62 kV	3.151	4.048	4.945	5.842	6.738	7.635	8.532	9.429	10.326	11.223	12.120
63 kV	3.248	4.180	5.111	6.043	6.974	7.906	8.837	9.769	10.700	11.632	12.564
64 kV	3.353	4.321	5.289	6.257	7.225	8.193	9.161	10.129	11.098	12.066	13.034
65 kV	3.461	4.465	5.470	6.475	7.479	8.484	9.489	10.493	11.498	12.503	13.507
66 kV	3.569	4.609	5.649	6.688	7.728	8.768	9.808	10.848	11.888	12.928	13.968
67 kV	3.676	4.750	5.823	6.897	7.970	9.043	10.117	11.190	12.264	13.337	14.411
68 kV	3.791	4.899	6.008	7.116	8.225	9.333	10.441	11.550	12.658	13.767	14.875
69 kV	3.906	5.048	6.191	7.333	8.475	9.617	10.760	11.902	13.044	14.187	15.329
70 kV	4.027	5.205	6.382	7.559	8.736	9.913	11.090	12.268	13.445	14.622	15.799
71 kV	4.126	5.331	6.535	7.739	8.944	10.148	11.352	12.557	13.761	14.966	16.170
72 kV	4.259	5.499	6.739	7.980	9.220	10.460	11.701	12.941	14.181	15.422	16.662
73 kV	4.395	5.671	6.947	8.224	9.500	10.776	12.052	13.329	14.605	15.881	17.158
74 kV	4.534	5.847	7.159	8.471	9.783	11.095	12.408	13.720	15.032	16.344	17.656
75 kV	4.678	6.026	7.374	8.722	10.070	11.418	12.766	14.114	15.462	16.811	18.159
76 kV	4.815	6.196	7.577	8.958	10.339	11.720	13.102	14.483	15.864	17.245	18.626
77 kV	4.961	6.376	7.792	9.207	10.623	12.038	13.454	14.869	16.285	17.700	19.116
78 kV	5.106	6.555	8.004	9.453	10.901	12.350	13.799	15.248	16.697	18.146	19.594
79 kV	5.258	6.741	8.224	9.708	11.191	12.674	14.157	15.640	17.123	18.607	20.090
80 kV	5.414	6.931	8.448	9.966	11.483	13.001	14.518	16.035	17.553	19.070	20.588
81 kV	5.529	7.070	8.612	10.153	11.694	13.235	14.777	16.318	17.859	19.400	20.942
82 kV	5.697	7.273	8.850	10.427	12.003	13.580	15.156	16.733	18.310	19.886	21.463
83 kV	5.868	7.480	9.092	10.703	12.315	13.927	15.539	17.151	18.763	20.375	21.987
84 kV	6.252	7.946	9.640	11.334	13.028	14.722	16.416	18.110	19.804	21.498	23.192

Table 8: KAP - Cephalometric, AP/PA, Child

(all units in mGy·cm²)

	4 mA	5 mA	6 mA	7 mA	8 mA	9 mA	10 mA	11 mA	12 mA	13 mA	14 mA
60 kV	2.360	3.019	3.679	4.339	4.998	5.658	6.317	6.977	7.636	8.296	8.955
61 kV	2.416	3.097	3.777	4.458	5.139	5.820	6.501	7.182	7.863	8.544	9.224
62 kV	2.491	3.201	3.910	4.619	5.328	6.037	6.746	7.456	8.165	8.874	9.583
63 kV	2.568	3.305	4.041	4.778	5.515	6.251	6.988	7.724	8.461	9.197	9.934
64 kV	2.651	3.416	4.182	4.947	5.713	6.478	7.244	8.009	8.775	9.540	10.306
65 kV	2.736	3.531	4.325	5.120	5.914	6.708	7.503	8.297	9.091	9.886	10.680
66 kV	2.822	3.644	4.466	5.289	6.111	6.933	7.755	8.578	9.400	10.222	11.044
67 kV	2.907	3.756	4.604	5.453	6.302	7.151	7.999	8.848	9.697	10.546	11.394
68 kV	2.997	3.874	4.750	5.627	6.503	7.380	8.256	9.132	10.009	10.885	11.762
69 kV	3.089	3.992	4.895	5.798	6.701	7.605	8.508	9.411	10.314	11.217	12.121
70 kV	3.184	4.115	5.046	5.977	6.908	7.838	8.769	9.700	10.631	11.561	12.492
71 kV	3.263	4.215	5.167	6.120	7.072	8.024	8.976	9.929	10.881	11.833	12.785
72 kV	3.367	4.348	5.329	6.310	7.290	8.271	9.252	10.232	11.213	12.194	13.175
73 kV	3.475	4.484	5.493	6.502	7.511	8.521	9.530	10.539	11.548	12.557	13.566
74 kV	3.585	4.623	5.660	6.698	7.736	8.773	9.811	10.848	11.886	12.923	13.961
75 kV	3.699	4.765	5.831	6.897	7.963	9.028	10.094	11.160	12.226	13.292	14.358
76 kV	3.808	4.900	5.991	7.083	8.175	9.267	10.359	11.451	12.543	13.635	14.727
77 kV	3.923	5.042	6.161	7.280	8.399	9.519	10.638	11.757	12.876	13.996	15.115
78 kV	4.037	5.183	6.329	7.474	8.620	9.765	10.911	12.056	13.202	14.348	15.493
79 kV	4.158	5.330	6.503	7.676	8.848	10.021	11.194	12.367	13.539	14.712	15.885
80 kV	4.280	5.480	6.680	7.880	9.080	10.279	11.479	12.679	13.879	15.079	16.279
81 kV	4.372	5.591	6.809	8.028	9.247	10.465	11.684	12.903	14.121	15.340	16.559
82 kV	4.504	5.751	6.998	8.244	9.491	10.738	11.984	13.231	14.477	15.724	16.971
83 kV	4.640	5.914	7.189	8.463	9.738	11.012	12.287	13.561	14.836	16.110	17.385
84 kV	4.944	6.283	7.623	8.962	10.301	11.641	12.980	14.320	15.659	16.999	18.338

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