midmark

Progeny Vantage Panoramic X-ray System

Technical Service Manual

00-02-1609
Revision G01
February 2019

CE 0086

Contents

How to Use this Manual

In this Chapter

How to Use this Manual

The Technical Service Manual is used for regular maintenance and service of the Progeny Vantage Panoramic X-ray System. The work should be performed by a technician familiar with the Progeny Vantage Panoramic X-ray System.

For information on…	Go to…
How the Vantage system works	Chapter 2, System Overview on page 10 About the Components on page 12
Error messages	Chapter 3, Message Center on page 24
PCBs and test points	Chapter 3, Printed Circuit Boards on page 36 Troubleshooting with Printed Circuit Boards on page 39
IP addresses	Chapter 3, Network Communications on page 59
Troubleshooting	Chapter 4, Troubleshooting Procedures on page 60
Improving image quality	Chapter 5, Typical Problems and their Cause on page 76
Service Screen	Chapter 6, Service Screen Overview on page 81
Maintenance procedures	Chapter 7 through Chapter 14
Readiness checklists	Chapter 15, Operational Readiness on page 102
Touch control panel screens	Appendix A, Touch Control Panel on page 104

Related Manuals

The following manuals will be helpful when servicing the Progeny Vantage Panoramic X-ray System.

Related Manuals

Title	Description
Progeny Vantage Panoramic X-ray System Installation Guide	The Installation Guide identifies requirements for installation; explains workstation setup; and describes how to install the Vantage device, how to install cables, and how to start up.
Progeny Vantage Panoramic X-ray System User Guide	The User Guide explains the components of the Vantage system and provides instructions on getting started, positioning a patient, acquiring images, and resolving image problems.

Warnings and Cautions

Radiation Safety

- Only qualified and authorized personnel may operate this equipment observing all laws and regulations concerning radiation protection.
- During exposure, the operator must remain 6 ft. (2 m) from the focal spot and the X-ray beam for operator protection.
- 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 Panoramic 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 such disinfectants are used, the vapor must be allowed to disperse before using the equipment.

Laser Safety

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.

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	Mains HOT WIRE
N	Mains NEUTRAL WIRE
	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.

Specifications

System Specifications Sheet

System Specifications

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^2	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	2.5 – 16 seconds as indicated +/- 10%
SID	Panoramic	500 mm (20”)
Magnification	Panoramic	Constant 1.2 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	6.144 mm x 146 mm (0.25” x 5.8”)
Image field	Panoramic	14 x 30 cm (5.8 x 12”)
Pixels/exposure	Panoramic	3072 x 6250 16 bits per pixel
CCD data rate	Panoramic	4 Mwords/Sec. 8 Mbytes/Sec.
MaxImage data size	Panoramic	19.2 MBytes
Attenuation Equivalent of Image Receptor	Panoramic	0.4 mm Al
Maximum Heat Dissipation into Surrounding Air	Panoramic	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.)

Obtaining Technical Support

For Technical Support, contact:

MIDMARK CORPORATION
1001 Asbury Drive
Buffalo Grove, Illinois 60089 U.S.A.
Phone: 888-924-3800 (Press 2) (U.S. and Canada)
+1 847-415-9800 (Press 2) (International)
Fax: 847-415-9810
techsupport@progenydental.com

Hours: 8:00 a.m. – 5:00 p.m. CST

2 Theory of Operations

In this Chapter

- System Overview
- About the Components
- Operational Systems

System Overview

Panoramic radiography is a branch of tomography, particularly a branch of rotational tomography. Images of internal structures are created by moving the source and receptor in such a way as to cause the foreground and background structures to blur, leaving a defined focal trough.

System Description

The Progeny Vantage Panoramic X-ray System is a computer-controlled multi-axis dental panoramic radiographic device incorporating:

- a DC X-ray source
- a CCD digital receptor
- distributed processing
- a WVGA LCD touch screen control panel

The Vantage panoramic X-ray device is adjustable to the patient's height with the motorized, 3-speed, telescoping column. Multiple lasers are used to locate the patient and configure the device to the patient's morphology. A separate computer, the workstation, is used to coordinate the various individual processors.

The outer portion of the column, the fixed column, is mounted to the wall and/or floor, and supports the inner, moving or telescoping portion of the column. This inner, telescoping column supports both the patient positioning table and the overhead arm. The overhead arm supports the C-arm, which in turn supports the X-ray source, or tubehead, and the receptor, or digital sensor.

Powering the Vantage System

The Vantage system is powered by any mains power (110/240 V), single or two-phase. The Progeny Vantage device is automatically configuring.

Network Communications

The Progeny Vantage device employs a fixed network between the workstation and the imaging device. The Progeny Vantage workstation connects to any Windows-based network.

Distributed Processing

The Vantage Panoramic device is a multi-processor system. Each system monitors itself and reports errors to the workstation.

The separate processing systems are the Real Time Controller (RTC, or system controller) and combined X-ray power and logic boards, the image sensor, the touch control panel, and the workstation. All inter-module communications are via Ethernet, with the power over Ethernet (PoE) switch being located just below the patient positioning table.

Movement profiles are stored in the RTC and initiated by communications from the workstation and by the exposure switch. The movement profiles include X-ray power and timing information, which are communicated to the power and logic boards by the RTC via a serial port.

Software Architecture

The four separate processing systems run Progeny-developed software to control all aspects of device operation. The workstation keeps track of overall system operation, communicating with all subsidiary processors. The remaining processing systems (RTC/X-ray, sensor, and touch control panel) all report status to the workstation, where the appropriate operations are initiated. Movement and X-ray control are handled by the RTC, under the parameters communicated to it by the workstation. The sensor performs all initial collection and processing of the image before delivering it to the workstation, wherein secondary image processing is applied. The touch control panel responds to input and displays messages that are mirrored on the interface on the workstation. All system user settings are maintained on the workstation. Mechanical and X-ray calibration information are maintained on the RTC and X-ray controller respectively. The sensor calibration information is maintained on the workstation and on the sensor, depending on the level of the calibration information (high vs. low.) The processing systems move together through the various states used to produce the device functions.

About the Components

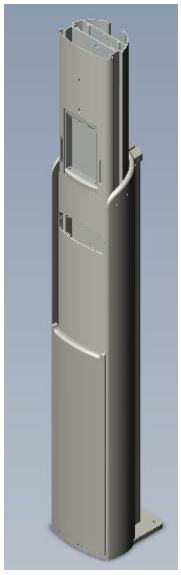
The Progeny Vantage Panoramic X-ray System includes the following components.

Vertical Column

The vertical 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 contains the positioning lasers. Optical sensors in the telescoping section define the maximum and minimum extension of the column.

The column is comprised of two extrusions, connected by bearings and a linear actuator. The bearings are adjustable to align the extrusions to each other, and to minimize slop. The linear actuator is a gear driven screw with integral brake. The column, actuated by a push button control panel located on the side of the patient positioning table, moves at three progressively faster speeds, with a smooth transition between speeds.

Vertical Column



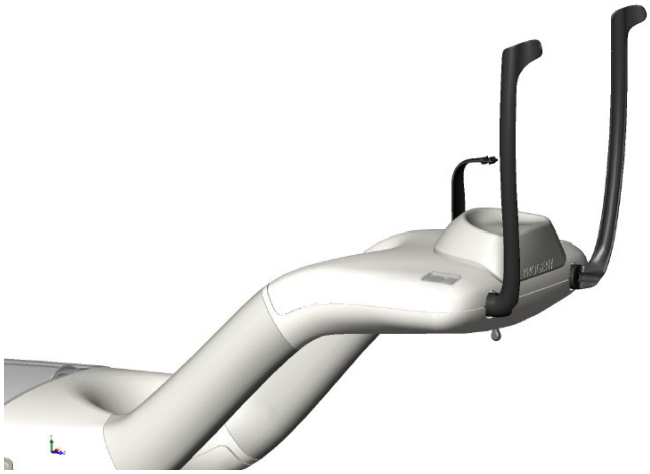
Patient Positioning Table

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.

Correct and repeatable patient positioning is essential to producing a clinical quality image. Patient positioning is accomplished by the telescoping column, the temple wands, and the reference lasers. All of these subsystems are actuated by a push button control panel located on the side of the patient positioning table.

The temple wands are located on either side of the chinrest/bite piece assembly. The wands use a spring to close against the patient's head, and a motor to open. The maximum opening is controlled by an optical sensor mounted inside the positioning platform. At any point, the wands can be manually opened further against the spring.

Patient Positioning Table



Workstation

The workstation is a PC with x86 processor and Windows operating system. An additional network interface card is installed for the fixed network used to communicate with the Vantage device. Vantage operating software comes installed on the workstation, as do the sensor calibration files.

Overhead Assembly

The overhead assembly consists of an overhead (swing) 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.

Overhead Arm – Y-axis

For the lateral Y-axis motion, the overhead arm pivots about bearings located in the mounting casting fastened at the top of the column. Its motion is produced by a ball screw drive, one end of which is connected to the mounting casting and the other end to the overhead arm itself. The step motor is at the column end. Both mechanical connections of the drive assembly are through ball bearing assemblies.

An optical sensor on the mounting casting engages a flag on the overhead arm to define a home reference for the system. Motion is monitored by a potentiometer connected to the ball bearings at the column end of the drive assembly. To define the 'zero position' for the system, a hole in the swing arm is aligned with a similar hole in the mounting casting using a precision pin.

Overhead Arm – X-axis

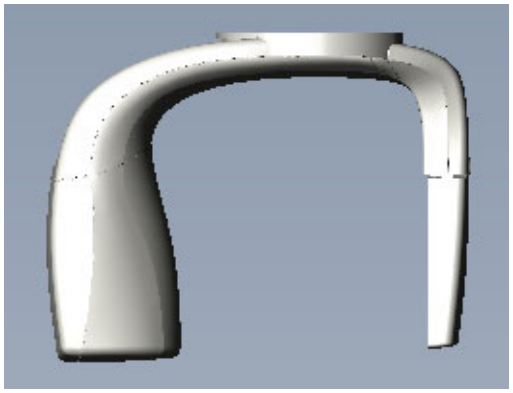
For the in-and-out X-axis motion, the translation drive of the overhead arm (X axis) is comprised of a plate mounted on linear bearings attached to the overhead arm casting. The plate is moved by a back-lashless screw drive with a step motor on the fixed end. Position feedback is via a linear potentiometer with an optical sensor and flag for home reference. A hole in the plate aligns with a hole in the overhead arm casting to define a system zero position.

Overhead Assembly

C-arm

The C-arm is suspended on a pair of bearings mounted to the underside of the X-axis translation plate. The C-arm casting incorporates an internal tooth ring gear that meshes with a pinion gear on a step motor mounted on the X-axis translation plate. The motor is spring mounted to maintain positive mesh and minimize slop.

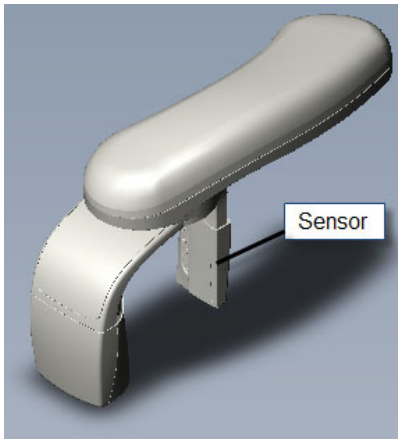
C-arm



Sensor

The image sensor detects X-rays and manipulates the detection to produce an image. It also communicates solely with the workstation via an Ethernet connection. It is a CCD device and is sensitive to impact. The device is powered through the Ethernet connection from the PoE switch located below the patient table.

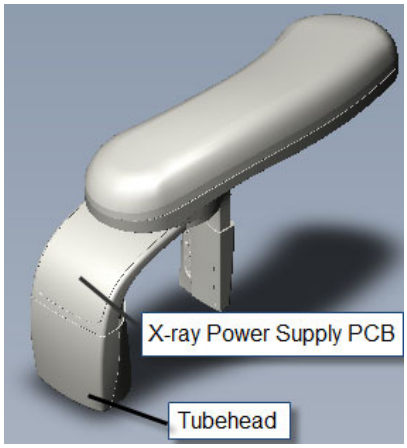
Sensor



Tubehead / Collimator

The tubehead contains a high-frequency DC X-ray source that uses a Canon (Toshiba) stationary anode X-ray tube. The X-ray control/power printed circuit board (PCB) assembly controls and monitors the operation of the tubehead. The operation of this PCB assembly is governed by the RTC. Power for the PCB assembly is derived from line current. Mounted on the output port of the X-ray tubehead is the collimator. The collimator is a 2-axis motorized beam limiter, whose operation is also governed by the RTC.

Tubehead

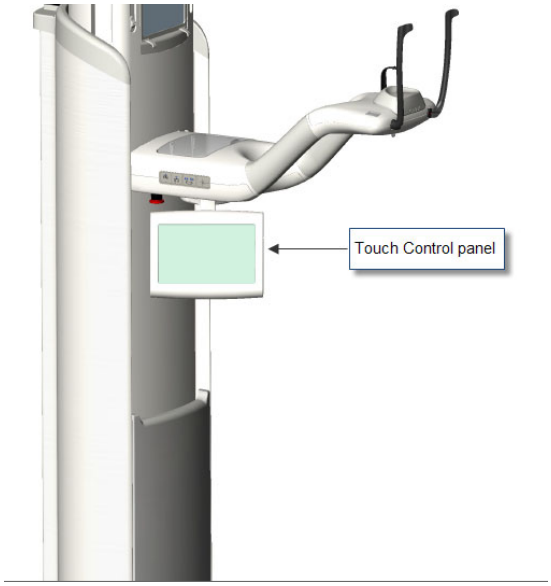


Touch Control Panel

The touch control panel, mounted on the fixed column section under the patient positioning table, acts as the user interface for the device. The touch control panel controls are mirrored on the workstation. The touch control panel communicates solely with the workstation via an Ethernet connection. The touch control panel is powered through the Ethernet connection from the PoE switch located below the patient positioning table.

The touch control panel is a stand-alone computer and does not need to be mounted on the Vantage. A second Ethernet port, located under the power cover on the back of the unit, allows for the remote mounting and connection of the touch control panel.

Touch Control Panel



Lasers

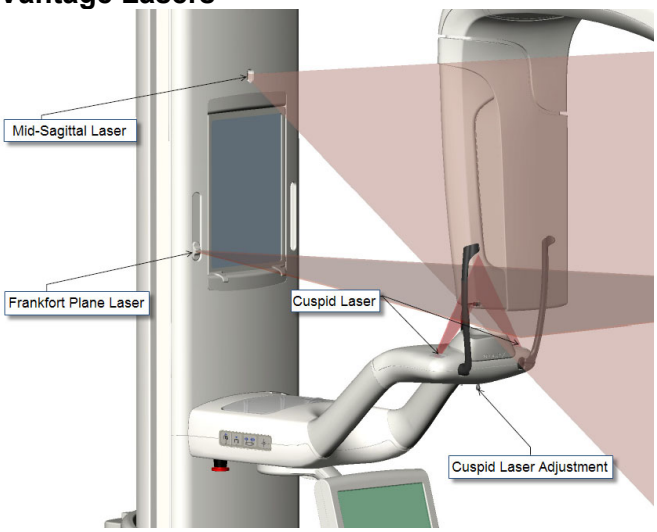
There are four reference lasers for locating the patient's head relative to the device: the mid-Sagittal, the Frankfort plane, and two Cuspid lasers.

The mid-Sagittal, a fixed laser, provides the vertical center plane reference. It is located on the inner column behind the upper cover.

The Frankfort plane provides a horizontal planar reference, and is adjustable vertically to correspond to the patient's physiognomy. It is mounted to the inside of the upper column cover, and is mountable to either the left or right side of the column upper cover.

The Cuspid lasers are mounted within the patient positioning table and are directed by mirrors up to the patient's mouth. The Cuspid lasers are carried on a transit that moves fore and aft. The transit movement is reported to the RTC by a slide potentiometer. A detented position at the center of movement of the transit is used for calibrating laser position.

Vantage Lasers



Operational Systems

The various processing systems in the Progeny Vantage Panoramic X-ray System are stand-alone modules, each with their own diagnostic procedures.

User Interface

The touch control panel user interface is a stand-alone tablet-style computer running the Vantage interface software. The touch control panel provides direct and indirect views of the Vantage system. Users use gesture controls, such as swiping and sliding, on the touch control panel to interact with the Vantage system.

X-ray Generation

For the generation of X-rays, parameters are passed from the workstation to the RTC defining the desired technique factors and exposure time. Upon actuation of the exposure switch, the RTC passes the necessary information to the X-ray controller to produce the desired exposure. The exposure switch is also connected to the X-ray controller. Upon receipt of the exposure parameters from the RTC, and the signal from the exposure switch, the X-ray controller then initiates, controls, and terminates the exposure.

Motion Control

To generate the movements necessary to produce the tomographic effect, the Vantage uses a 3-axis, computer-controlled assembly resident completely in the swing arm of the overhead assembly. The three axes are:

- the swing arm of the overhead assembly, which produces the side-to-side (Y-axis) motion
- the translation drive of the overhead assembly, which produces the in and out motion (X-axis)
- the C-arm drive which produces the rotational motion (Z-axis or R-axis)

Two additional motion systems are the patient positioning wands and the motorized column.

The positioning wands use a step motor to open the wands. Closure of the wands is produced using a spring. In any position defined by the motor, the wands are free to open against the spring. The open position of the wands is defined by an optical sensor.

The column drive is an integral 24Vdc linear actuator. Limit of motion is governed by flags, mounted on the outer column, which are sensed by two optical sensors mounted on the inner column.

All motion components are controlled by separate motor controller cards (5). The cards are linked to the main system controller (RTC) via RS232 communications. The Y-axis and X-axis cards for the overhead arm are identical except for the address jumpers and power setting jumpers.

The wand and collimator drive systems also use the motor controller cards, but they are set at lower power ratings. The column (C-arm) drive uses a motor controller card similar to the others, but designed to operate a DC motor instead of a step motor.

System Diagnostics

The Vantage incorporates an extensive diagnostic system to aid in recording and troubleshooting system errors.

Errors generated by any subsystem are reported to the workstation, which records them in a log. The errors are reported to the user via a pop-up window. Within the pop-up window is a link to the system Message Center where the detailed message can be reviewed. The Message Center can sort system error messages by date, subsystem, and content. Error messages contain a high-level error number, which identifies the subsystem, and a low-level error number to specifically identify the exact error.

Image Acquisition and Transfer

To produce an image, the profile and technique factors are selected on the Touch control panel which communicates them to the workstation. When the Touch control panel sends the command to move to the Ready for Imaging (RFI) position, the workstation passes the profile and technique factors to the RTC, and commands the RTC to move to RFI. After moving to RFI, the RTC arms itself and the X-ray power and logic board assembly. Meanwhile, the workstation has also commanded the sensor to prepare to receive X-rays.

Upon closure of the exposure switch, the RTC begins providing motion parameters to the various motor controllers and X-ray parameters to the X-ray power and logic board assembly. This continues for as long as the exposure switch remains closed, or until the profile parameters are exhausted.

When the sensor detects X-rays, it begins recording the image. The sensor continues recording for a time period equal to the profile exposure time. The sensor transfers a preview image (low resolution) and final image (high resolution) to the workstation. The preview image is immediately passed to the touch control panel. When the workstation receives the complete final image, it then processes the final image with the selected filters and passes the image to the imaging application.

If, at anytime during the creation of the image, the exposure switch is released (opened), the RTC immediately ceases transmitting parameters and instead transmits a stop command to the motor controllers and to the X-ray power and logic board assembly. It also advises the workstation of the occurrence.

Service Cautions

Please observe all warnings and cautions in the Warnings and Cautions section at the beginning of the manual.

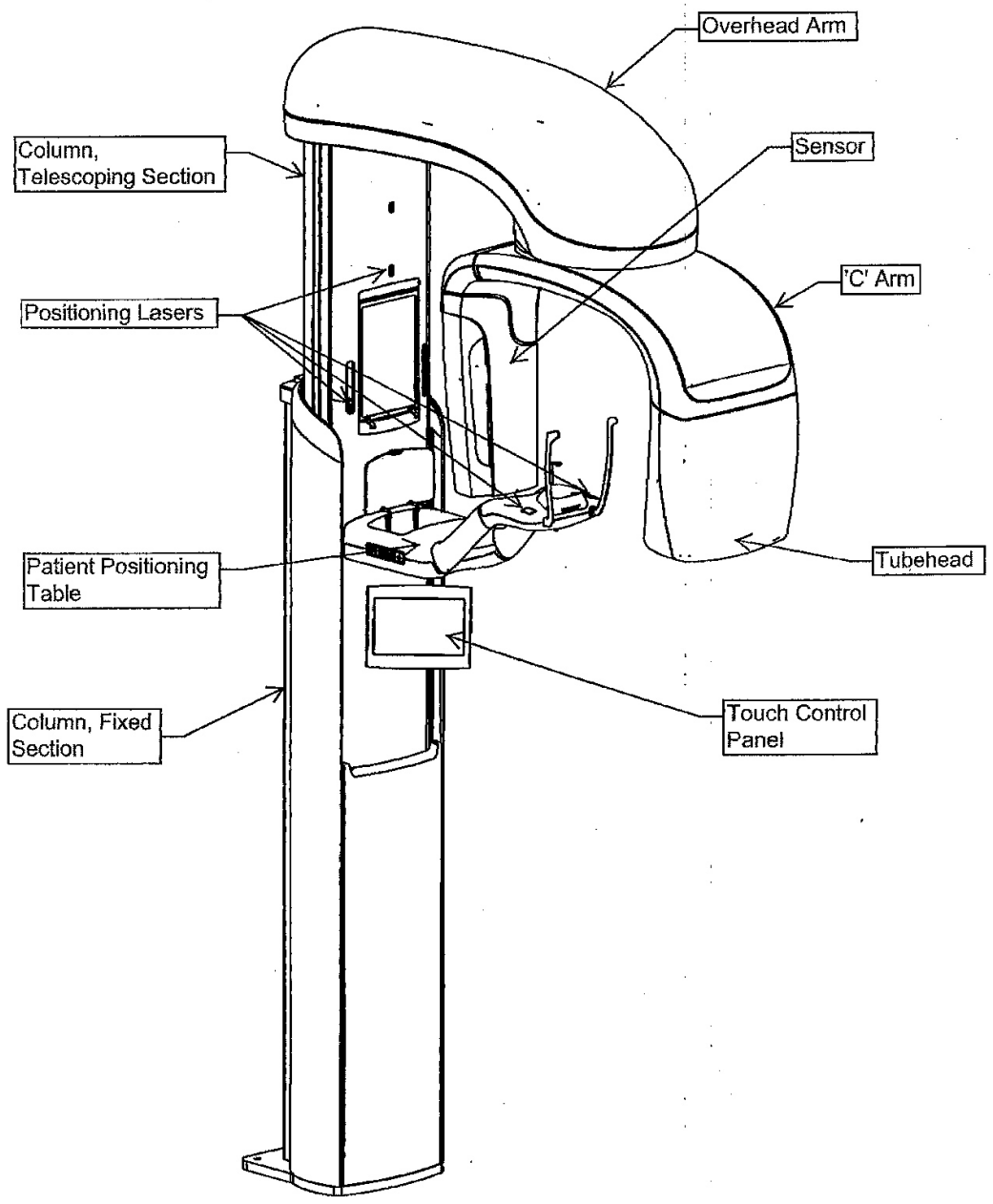
This unit operates on Line voltage and current, and as such, this voltage potential is present within the machine. It may be necessary, during troubleshooting of the device, to operate the machine with the covers removed. In this case, please be aware that Line voltage is present at various points in the machine and that some subsystems operate at 48VAC, and proceed with appropriate caution.

This unit contains subsystems that produce motion. Please make sure that no parts of your body are present in any position within the machine when initiating movement with covers removed. Pinch points are present that can cause harm or permanent damage.

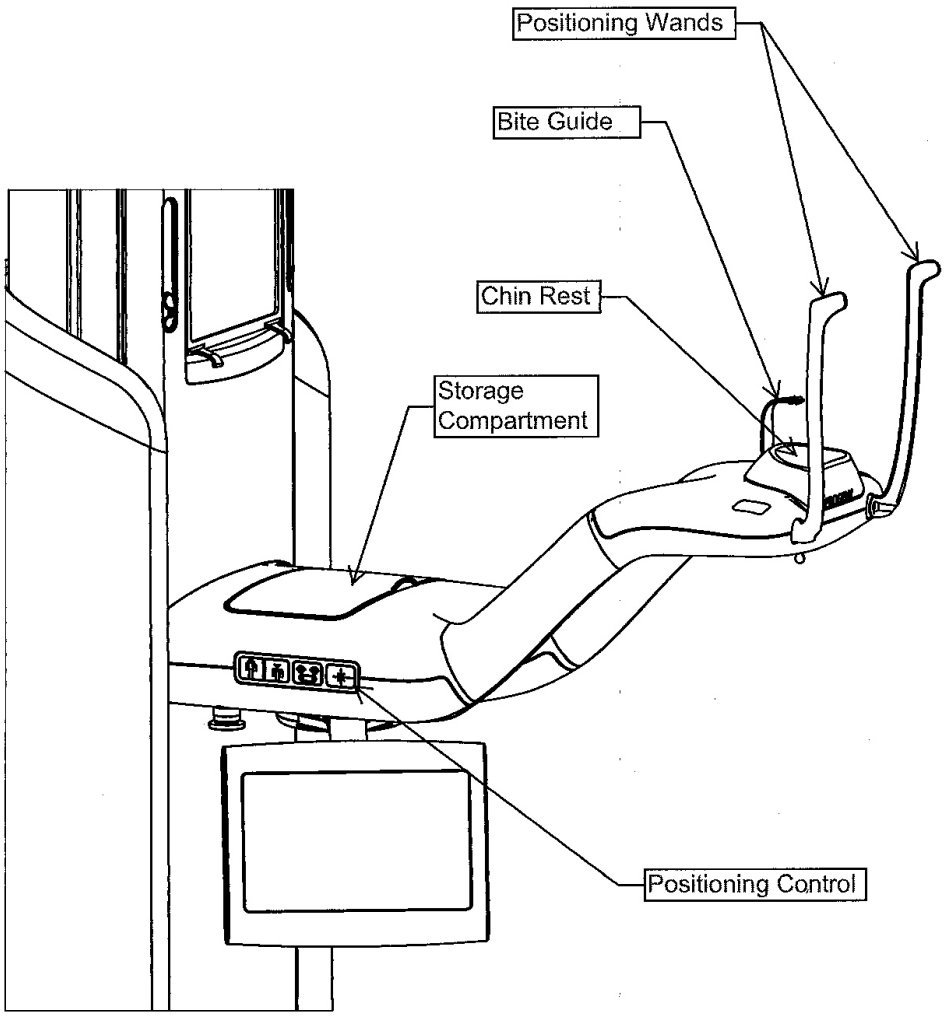
Precautions for Printed Circuit Boards

- When replacing a PCB or component, power down the Vantage device before attempting any service and wait at least 30 seconds before continuing.
- Do not touch any non-grounded metal parts with bare skin. Damage to the unit or injury could occur.
- Use caution when measuring voltages on test points.
- Make sure each test lead is touching one test point only.
- Do not short two test points together or short a test point to any other metal part.

Vantage System Panoramic X-ray Device



Vantage System Patient Positioning Table



3 Troubleshooting Resources

In this Chapter

Obtaining Assistance through Remote Access

Remote access enables Progeny Technical Support to have access to a Progeny Vantage Panoramic X-ray system while the service technician is present at the machine.

1. Permission from the user is required for access to the Vantage.
2. In order to gain access, a connection from the Vantage to the Web is necessary.
3. The service engineer must be present at the location.
4. With the active participation of Progeny tech support, the “on-site” person will use the workstation to gain access to the Internet and log on to a remote access website. Remote access will require the downloading and activation of a short application program from the website.
5. Once communications are established, Progeny Technical Support will be able to review the content of the Vantage Message Center, see images and make limited changes in the settings of the workstation and the panoramic X-ray device. Progeny Technical Support will not be able to facilitate all manner of repairs remotely. Progeny Technical Support will be able to review historical events and make recommendations as to the next course of action. The “on-site” participant must be able to perform the repairs or adjustments in order to complete the task.

Service Kit

Progeny offers a service kit for the alignment and image evaluation of the Vantage Panoramic X-ray System. The service kit contains the following fixtures and tools:

- Positioning Laser Alignment Fixture
- X-ray Source Alignment Fixture
- C-arm Calibration Setup Fixture
- Copper Shield
- Zero Position Pins Kit
- Laser Module Assembly
- Projection Head Kit
- Molteni Phantom

The service kit is available through Progeny Dental. Contact Progeny Technical Support for further information.

Message Center

The Message Center screen is an interactive screen on the touch control panel that displays up to 100 error messages for the components of the Vantage Panoramic system. The messages are sorted by time, with the most recent at the top of the list.

Tapping a column heading, such as Component, sorts the messages by that heading. Tapping a Vantage component, for example, the telescoping column, highlights all messages for the component.

Message Center Screen

Messages also appear as pop-ups on the touch control panel and workstation, as illustrated below.

Pop-up Message

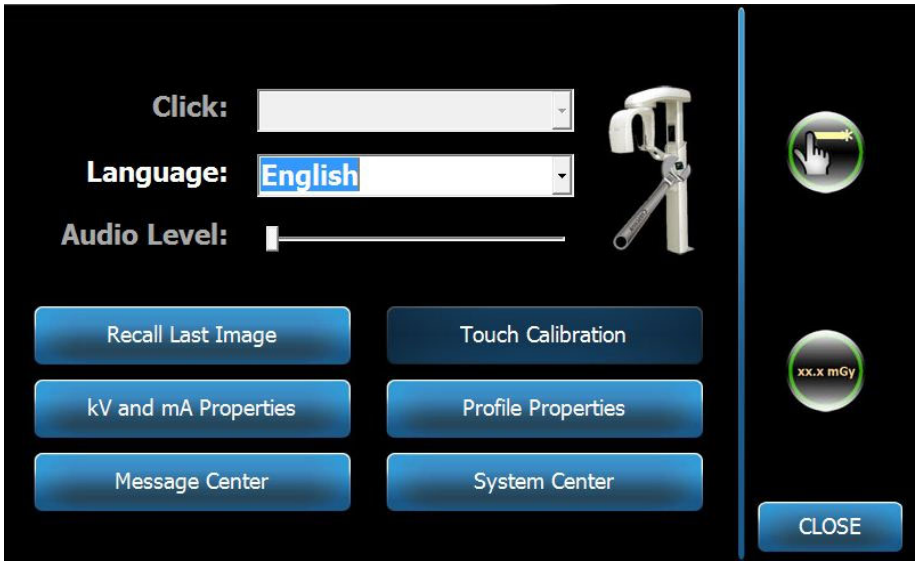
Accessing the Message Center

The Message Center is accessed from the Options screen, from the SAFE or OFFLINE screens, and from a pop-up message screen.

To Access the Message Center from the Options Screen

1. On the Acquisition Setup screen, tap Options to display the Options screen.

Options Screen



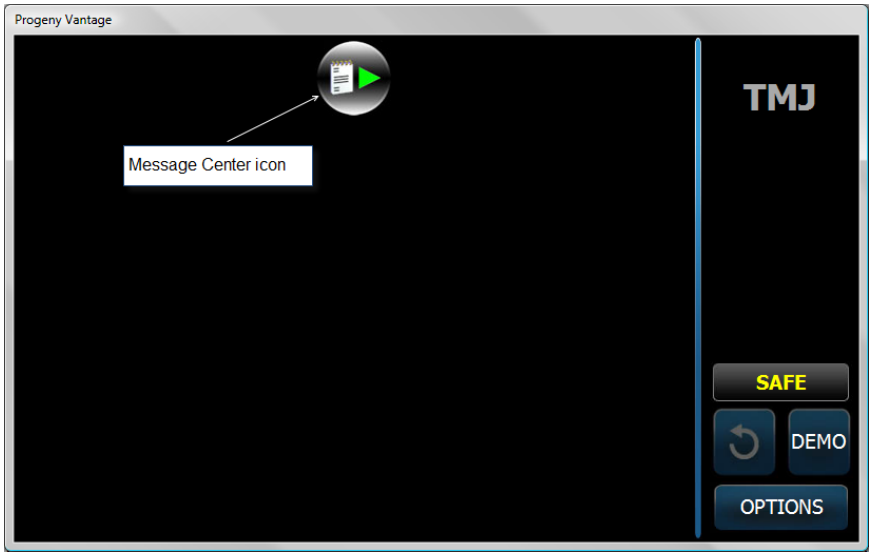
2. Tap the Message Center button.

To Access the Message Center from the SAFE or OFFLINE Screens

The SAFE and OFFLINE screens are not directly accessible. The SAFE screen is transitional and appears when the Vantage system is trying to recover. The OFFLINE screen appears when the touch control panel is disconnected from the computer workstation.

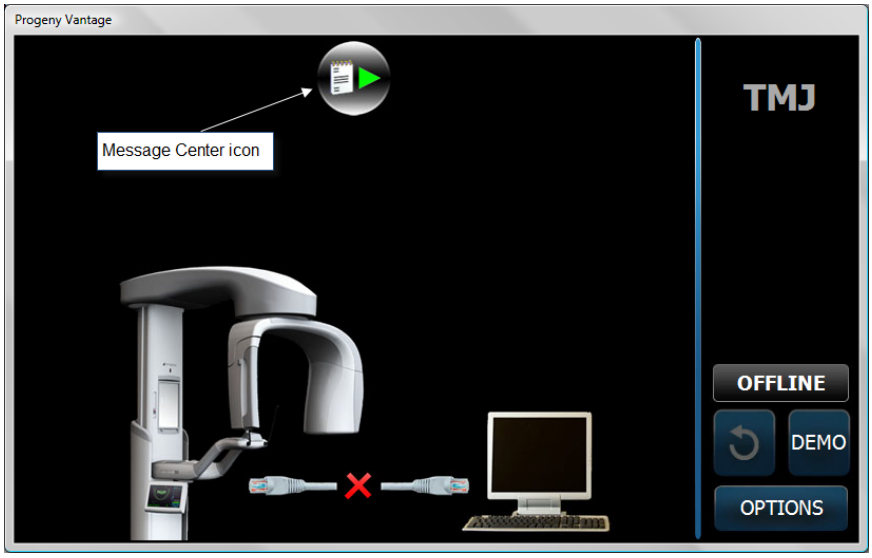
On the SAFE screen, tap the Message Center icon to display the Message Center screen.

SAFE Screen



On the OFFLINE screen, tap the Message Center icon to display the Message Center screen.

OFFLINE Screen



To Access the Message Center from a Message Screen

On the message screen, tap the Message Center icon.

Message Screen

Vantage Error Codes

This section lists all the Vantage error codes, including system and subsystem errors for the RTC. These codes help in troubleshooting when trying to pinpoint the source of a problem.

Error codes will either state a condition or offer a direction to investigate. In the case of directly stated conditions, follow the instruction. In the case of coded messages that indicate a direction to investigate, review the content of the Message Center for guidance. Error messages that make reference to a particular node are translated as:

- C-arm or issues related to the C-arm spinning are identified as “Node 0”.
- X-Axis or issues related to front to back movement are identified as “Node 1”.
- Y-Axis or issues related to side to side movement are identified as “Node 2”.
- Collimator issues are identified as “Node 3”.
- Wand issues are identified as “Node 4”.
- Cephalometric issues are identified as “Node 5”.

Error Codes and Messages

Error Code	Pop-up Message	Message Center Error Description	Refer to…
100	Connection to the device is not detected. (100)	Connection to RTC is not possible. Reported Error Code is ControllerCommunication_SocketUnrecoverable. Trying to recover...	
		Connection to RTC is not possible. Reported Error Code is ControllerCommunication_NoAdapter. Trying to recover...	
		Connection to RTC is not possible. Reported Error Code is ControllerCommunication_NoEcho. Trying to recover...	
		Connection to RTC is not possible. Reported Error Code is ControllerCommunication_SocketNotConnected. Trying to recover...	
		Connection to RTC is not possible. Reported Error Code is ControllerCommunication_SocketNotSending. Trying to recover...	

		Connection to RTC is not possible. Reported Error Code is ControllerCommunication_SocketNotReceiving. Trying to recover...
		Connection to RTC is not possible. Reported Error Code is ControllerCommunication_BadResponse. Trying to recover...
		Connection to RTC is not possible. Reported Error Code is ControllerCommunication_BadProtocolVersion. Trying to recover...
		Connection to RTC is not possible. Reported Error Code is ControllerCommunication_BadFirmwareVersion. Trying to recover...
		Connection to RTC is not possible. Reported Error Code is Unknown. Trying to recover...
101	Device Controller has encountered an error. (101)	Reported Error Code is {0}. Trying to recover...
		Reported Error Code is WorkstationCommunication_Error. Trying to recover...
		Reported Error Code is WorkstationCommunication_BadMessageLimit. Trying to recover...
		Reported Error Code is WorkstationCommunication_LinkTimeout. Trying to recover...
		Reported Error Code is MotorControllerCommunication_Error. Trying to recover...
		Reported Error Code is MotorControllerCommunication_PollTimingCollision. Trying to recover...
		Reported Error Code is MotorControllerCommunication_PeriodicTimerCollision. Trying to recover...
		Reported Error Code is MotorControllerCommunication_NoAckNode0. Trying to recover...
		Reported Error Code is MotorControllerCommunication_NoAckNode1. Trying to recover...
		Reported Error Code is MotorControllerCommunication_NoAckNode2. Trying to recover...
		Reported Error Code is MotorControllerCommunication_NoAckNode3. Trying to recover...
		Reported Error Code is MotorControllerCommunication_NoAckNode4. Trying to recover...
		Reported Error Code is MotorControllerCommunication_NoAckNode5. Trying to recover...
		Reported Error Code is MotorControllerCommunication_NoAckNode6. Trying to recover...

	Reported Error Code is MotorControllerCommunication_BadAckNode0. Trying to recover...
	Reported Error Code is MotorControllerCommunication_BadAckNode1. Trying to recover...
	Reported Error Code is MotorControllerCommunication_BadAckNode2. Trying to recover...
	Reported Error Code is MotorControllerCommunication_BadAckNode3. Trying to recover...
	Reported Error Code is MotorControllerCommunication_BadAckNode4. Trying to recover...
	Reported Error Code is MotorControllerCommunication_BadAckNode5. Trying to recover...
	Reported Error Code is MotorControllerCommunication_BadAckNode6. Trying to recover...
	Reported Error Code is MotorControllerCommunication_FlagTimeoutNode0. Trying to recover...
	Reported Error Code is MotorControllerCommunication_FlagTimeoutNode1. Trying to recover...
	Reported Error Code is MotorControllerCommunication_FlagTimeoutNode2. Trying to recover...
	Reported Error Code is MotorControllerCommunication_FlagTimeoutNode3. Trying to recover...
	Reported Error Code is MotorControllerCommunication_FlagTimeoutNode4. Trying to recover...
	Reported Error Code is MotorControllerCommunication_FlagTimeoutNode5. Trying to recover...
	Reported Error Code is MotorControllerCommunication_FlagTimeoutNode6. Trying to recover...
	Reported Error Code is XRayControllerCommunication_Error. Trying to recover...
	Reported Error Code is XRayControllerCommunication_LowKV. Trying to recover...
	Reported Error Code is XRayControllerCommunication_HighKV. Trying to recover...
	Reported Error Code is XRayControllerCommunication_LowMA. Trying to recover...

Reported Error Code is XRayControllerCommunication_HighMA. Trying to recover...
Reported Error Code is XRayControllerCommunication_ExcessiveArcing. Trying to recover...
Reported Error Code is XRayControllerCommunication_Timeout. Trying to recover...
Reported Error Code is XRayControllerCommunication_UnexpectedPreterminatio n. Trying to recover...
Reported Error Code is BadMotorControllerVersion_Node0. Trying to recover...
Reported Error Code is BadMotorControllerVersion_Node1. Trying to recover...
Reported Error Code is BadMotorControllerVersion_Node2. Trying to recover...
Reported Error Code is BadMotorControllerVersion_Node3. Trying to recover...
Reported Error Code is BadMotorControllerVersion_Node4. Trying to recover...
Reported Error Code is BadMotorControllerVersion_Node5. Trying to recover...
Reported Error Code is BadMotorControllerVersion_Node6. Trying to recover...
Reported Error Code is BadXRayControllerVersion_0 *through* _1F. Trying to recover...
Reported Error Code is BadXRayControllerVersion_1F. Trying to recover...
Reported Error Code is ExposureKey_StuckLow. Trying to recover...
Reported Error Code is ControlButton_Error. Trying to recover...
Reported Error Code is ControlButton_Lasers. Trying to recover...
Reported Error Code is ControlButton_Wands. Trying to recover...
Reported Error Code is ControlButton_Wands_Lasers. Trying to recover...
Reported Error Code is ControlButton_ColumnDown. Trying to recover...
Reported Error Code is ControlButton_ColumnDown_Lasers. Trying to recover...
Reported Error Code is ControlButton_ColumnDown_Wands. Trying to recover...
Reported Error Code is ControlButton_ColumnDown_Wands_Lasers. Trying to recover...
Reported Error Code is ControlButton_ColumnUp. Trying to recover...

		Reported Error Code is ControlButton_ColumnUp_Lasers. Trying to recover...
		Reported Error Code is ControlButton_ColumnUp_Wands. Trying to recover...
		Reported Error Code is ControlButton_ColumnUp_Wands_Lasers. Trying to recover...
		Reported Error Code is ControlButton_ColumnUp_ColumnDown. Trying to recover...
		Reported Error Code is ControlButton_ColumnUp_ColumnDown_Lasers. Trying to recover...
		Reported Error Code is ControlButton_ColumnUp_ColumnDown_Wands. Trying to recover...
		Reported Error Code is ControlButton_All. Trying to recover...
		Reported Error Code is NoCalibration_Node0. Trying to recover...
		Reported Error Code is NoCalibration_Node1. Trying to recover...
		Reported Error Code is NoCalibration_Node2. Trying to recover...
		Reported Error Code is NoCalibration_Node3. Trying to recover...
		Reported Error Code is NoAlignment_Sensor. Trying to recover...
101	Emergency Switch was activated. Please, release the switch by rotating it clockwise. (101)	Reported Error Code is MotorController_PowerError. Trying to recover...
102	Device Controller has encountered an error. (102)	RTC is out of sync with the system. Trying to recover...
120	Connection to the sensor is not detected. (120)	Connection to Sensor is not possible. Trying to recover to Demo mode...
121	Device has encountered an error. Current procedure was interrupted due to time-out. (121)	Sensor is not ready for image acquisition in the time interval allowed. The workflow was interrupted. Trying to recover...
122	Sensor has encountered a calibration error. (122)	The sensor calibration files are not available and no imaging is possible. Re-installation of the calibration files is required.
123	Sensor has encountered an error. (123)	Sensor is out of sync with the system. Trying to recover...

124	Sensor has encountered a malfunction. Please, replace the sensor. (124)	Sensor is out of sync with the system and cannot recover. Remove Sensor to continue recovering to Demo mode...
125	Device is not connected to the Imaging application. (125)	A connection to the Imaging application is not available and no imaging is possible. Re-start of the Imaging application is required.
126	Image transmission is not complete. (126)	Image was not transmitted successfully. User could re-transmit the image from Options screen.
140		Connection to Control Panel is not possible. Verify the network connection between the device and the workstation. Trying to recover...
141		The communication protocol version {0} is not supported. Replace Control Panel or the system software.
142	Device has encountered an error. Current procedure was interrupted due to time-out. (142)	User did not start an exposure in the time interval allowed. The workflow was interrupted. Trying to recover...
143	Device cannot execute selected function. Please, try again. (143)	User selected a function which is not possible to execute due to RTC or Sensor error, or because the system is transitioning to another state. User could select the function again later...
144	Device is cooling down. Please, try again after that. (144)	User selected a function which is not possible to execute due to cooling down. User could select the function again after cooling down completed...
997	Selected combination of segments is not valid. The selection should be contiguous.	Invalid segment selection. User could change the selection.
998	Procedure was interrupted before completion.	User interrupted image acquisition before its completion. The image might be received.
999	Device has to return to Patient Entry position. Please, stand back and tap Ready For Imaging button to proceed.	The device was moved out of the correct position and has to be positioned properly. Please, stand back and tap the Ready For Imaging button to proceed...

Error Logs

The Vantage error logs provide an internal view of the Vantage system. Their purpose is to track the interactions of the system, including actions by the user.

Description

The Vantage system has four Progeny error logs and one Windows error log.

- **Panoramic.Rtc** is the RTC error log created by Progeny. It contains messages related to communication with the RTC, and start up and termination routines.
- **Panoramic.Cm** is the communications log for the touch control panel created by Progeny. It contains communication errors with the touch control panel, and start up and termination routines.
- **Panoramic.Stm** is the system log created by Progeny. It is the main log and includes RTC errors, sensor errors, control module (touch control panel) errors, transitions between states, and actions. The system log also contains user actions, such as the user tapping a button on the touch control panel, as well as recording startup and termination routines.
- **Panoramic.PanDevice** is a device log file containing sensor-related messages and driver information.
- **Panoramic.Network** is the network communications log created by Microsoft Windows. It contains whatever happens with the network on the Windows level.

Location of Error Logs

On a Windows Vista system, the system-level logs are located on the PC hard drive:
`<ROOT DIRECTORY>\ProgramData\Progeny`

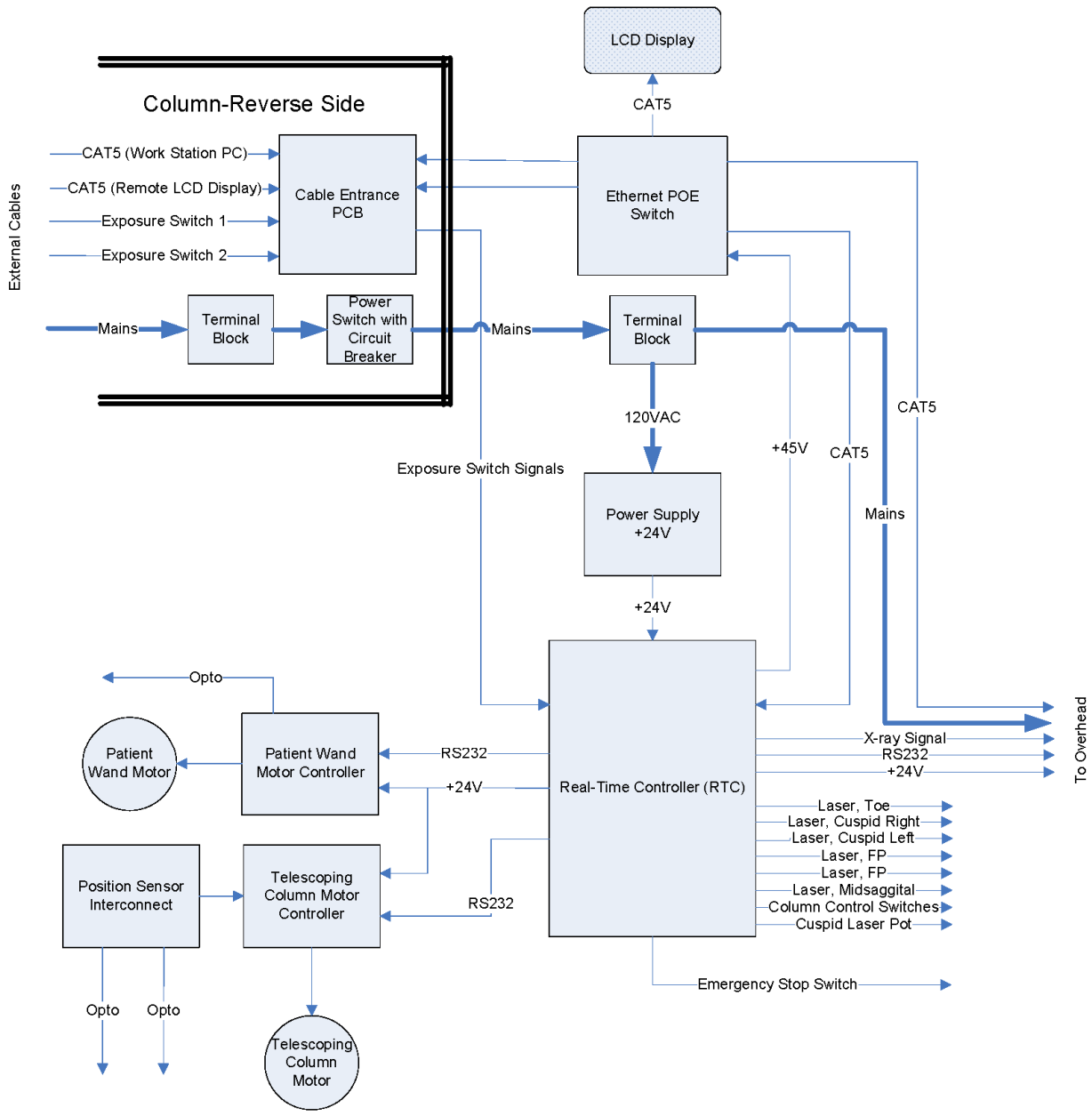
The logs for the touch control panel are in a folder in this directory:
`<ROOT DIRECTORY>\ProgramData\Progeny\Logs`

Wiring Diagrams

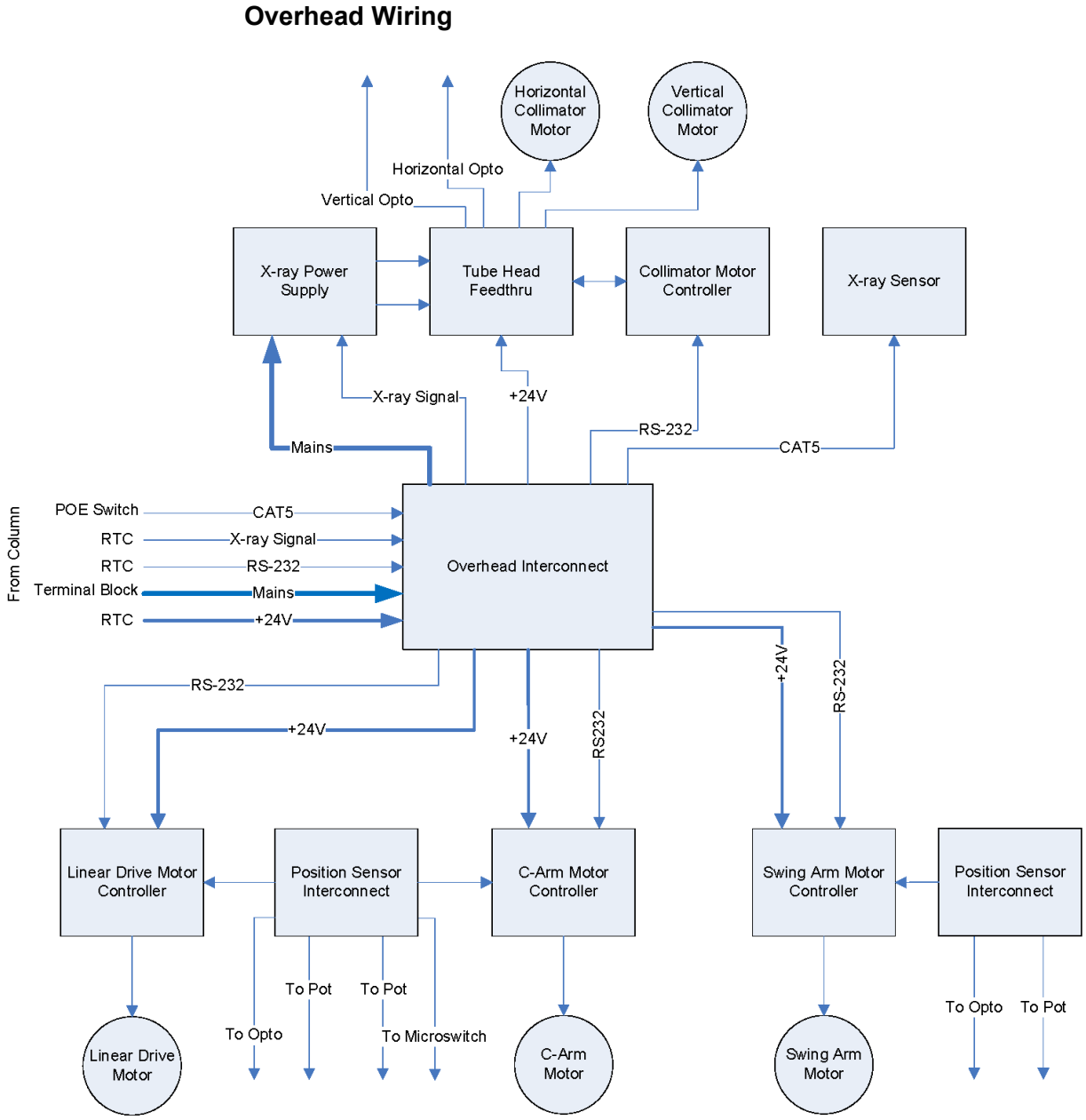
The two wiring diagrams in this section incorporate wiring for all Vantage Panoramic system components.

Column Wiring

Column Wiring



Overhead Wiring



Printed Circuit Boards

This section provides an overview of the printed circuit boards (PCBs) used in the Vantage Panoramic X-ray device. The section contains:

- A table of PCBs with information on each PCB
- A diagram of the Vantage device showing PCB locations

Table of PCBs

The PCB table lists the PCBs in the Vantage Panoramic device. Each PCB is discussed in greater detail in the next section.

Vantage Device PCBs

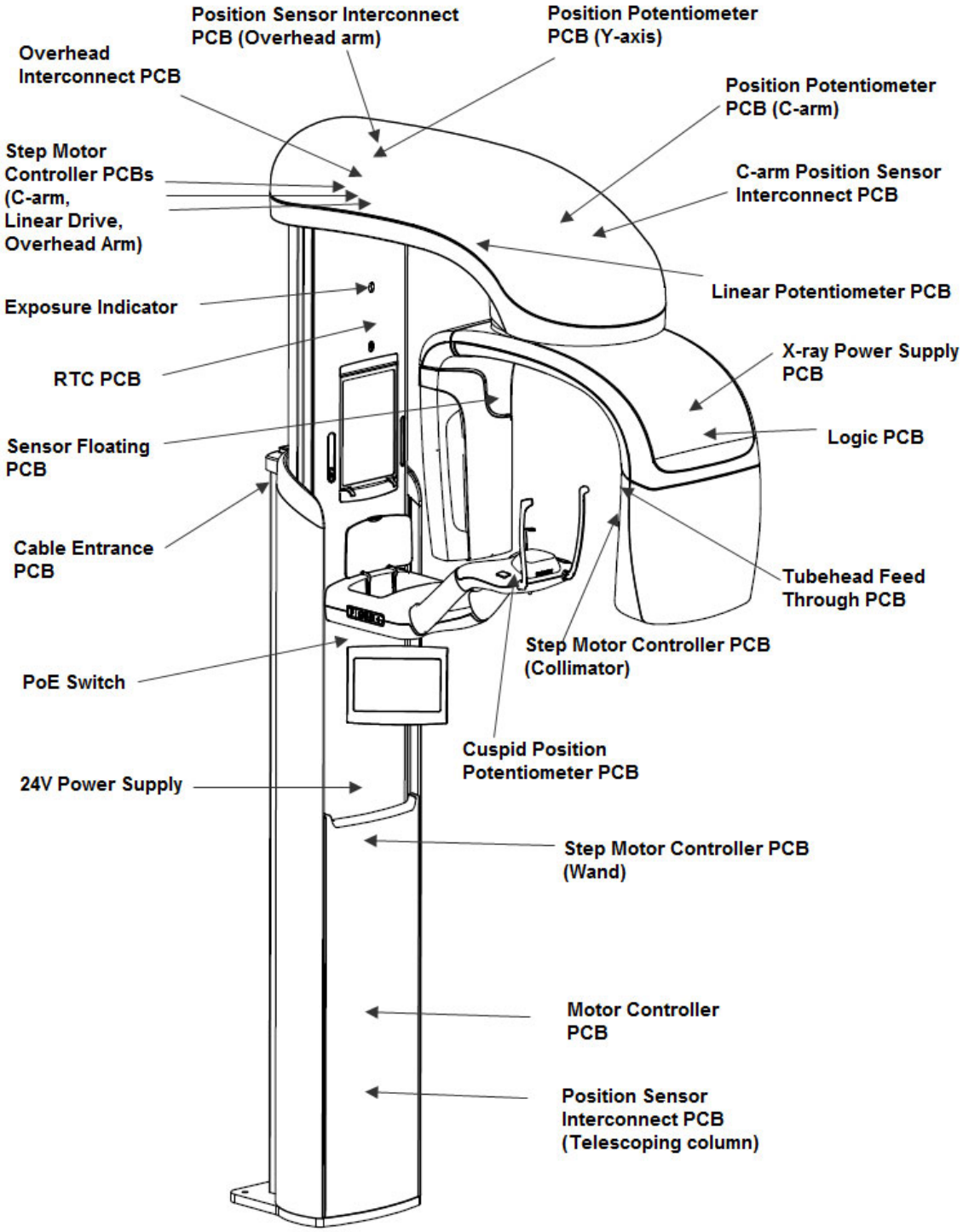
PCB	Function	Location	Part number	Testing and Troubleshooting
Overhead Interconnect PCB	This PCB holds the connection points for the overhead cables including 24V and RS232 for the Step Motor Controller PCBs, 120VAC, exposure signal, and serial communications for the X-ray Power Supply PCB, and the Ethernet connection for sensor	Overhead arm	60-08016	Test points
Position Sensor Interconnect PCB (Overhead arm)	This PCB provides the connections for the potentiometer and optical switch of the Step Motor Controller PCB.	Overhead arm	60-08061	None
Position Sensor Interconnect PCB (Telescoping column)	This PCB provides the connections for the potentiometer and optical switch of the Motor Controller PCB.	Telescoping column, lower part	60-08061	None
C-arm Position Sensor Interconnect PCB	This PCB has the potentiometer, optical switch, and micro switch connections for the Step Motor Controller PCB.	Overhead arm over C-Arm	60-08067	None
Cuspid Position Potentiometer PCB	This PCB positions the sensor for the Cuspid positioning laser.	Patient table beneath chin rest	60-08019	None
Tubehead Feed Through PCB	This PCB provides the power and signal connections for the tubehead, as well as connections for the collimator motors and optical switches	Tubehead (inside facing sensor)	60-08001	None
Sensor Floating PCB	This PCB provides the connection for sensor assembly, including a selection switch to indicate Pan or Ceph function.	where C-Arm meets sensor	60-08010	Switch
X-ray Power Supply PCB (front and back)	This PCB supplies power for tubehead.	C-arm	60-08011	Indicator light and test points
Logic PCB	This PCB controls the X-ray Power Supply PCB.	C-arm	60-08007	Test points and a switch

RTC PCB	This PCB controls exposure times, motor function, laser function, power over Ethernet (PoE) switch power, communications with the PC workstation, X-ray power supply and remote switch configuration.	Telescoping column near laser beam	60-08008	Test points, indicator lights, and jumpers
Cable Entrance PCB	This PCB provides connections for external cables, including Ethernet cable to the PC workstation, the hand switch, remote exposure switch, and external touch control panel.	On the back of the telescoping column	60-08018	None
Step Motor Controller PCB (C-arm)	This PCB is the motor controller for the C-arm.	Overhead arm	60-08115	DIP switches
Step Motor Controller PCB (Linear Drive)	This PCB is the motor controller for the linear drive.	Overhead arm	60-08115	DIP switches
Step Motor Controller PCB (Overhead arm)	This PCB is the motor controller for the overhead arm.	Overhead arm	60-08115	DIP switches
Step Motor Controller PCB (Collimator)	This PCB is the motor controller for the collimator.	On the Tubehead	60-08115	DIP switches
Step Motor Controller PCB (Wand)	This PCB is the motor controller for the wand.	Telescoping column	60-08115	DIP switches
Motor Controller PCB	This PCB is the motor controller for the telescoping column.	Telescoping column (lower part)	60-08116	DIP Switches, indicator lights
Linear Potentiometer PCB	This PCB positions the sensor for linear drive motor.	Overhead arm	60-08017	None
Position Potentiometer PCB (C-arm)	This PCB positions the sensor for the C-arm motor.	Overhead arm near C-arm	60-08081	None
Position Potentiometer PCB (Y-axis)	This PCB positions the sensor for the overhead motor.	Overhead arm near the telescoping column	60-08081	None
PoE Switch	The Power over Ethernet (PoE) switch contains all the Ethernet communications that pass through the PC workstation, the sensor, and the touch control panel.	Telescoping column	60-08063	None
24V Power Supply	It powers everything in the Vantage device except the X-ray power supply.	Telescoping column	60-08060	None

Locating a PCB

This diagram illustrates the general location of each PCB.

Location of PCBs



Precautions When Working with PCBs and Test Points

Please observe all warnings and cautions in the Warnings and Cautions section at the beginning of the manual.

This unit operates on Line voltage and current, and as such, this voltage potential is present within the machine. It may be necessary, during troubleshooting of the device, to operate the machine with the covers removed. In this case, please be aware that Line voltage is present at various points in the machine and that some subsystems operate at 48VAC, and proceed with appropriate caution.

This unit contains subsystems that produce motion. Please make sure that no parts of your body are present in any position within the machine when initiating movement with covers removed. Pinch points are present that can cause harm or permanent damage.

- Do not touch any non-grounded metal parts with bare skin. Damage to the unit or injury could occur.
- Use caution when measuring voltages on test points.
- Make sure each test lead is touching one test point only.
- Do not short two test points together or short a test point to any other metal part.
- When replacing a PCB or component, power down the Vantage device before attempting any service and wait at least 30 seconds before continuing.

Troubleshooting with Printed Circuit Boards

This troubleshooting section presents detail on each PCB. The PCBs are presented in the order used in the Vantage Device PCBs table in the preceding section.

For each PCB, the section contains:

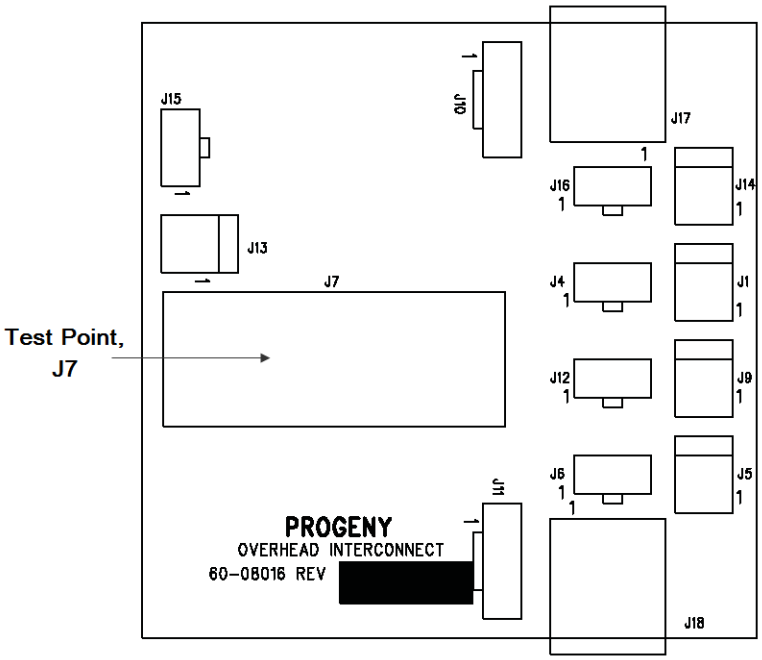
- A diagram
- Location of test points, indicator lights, jumpers, and switches used for maintenance or troubleshooting
- Test point function, measuring technique, reference, expected value, and what to do if out of range.
- Indicator light name and/or designator, color, purpose, normal status, and notes

Overhead Interconnect PCB (#60-08016)

This PCB is the point of connection for the cables in the Overhead Arm assembly. The connections include the 24V and RS232 for the Step Motor Controller PCBs in the overhead arm assembly, 120V AC, exposure signal, serial communications for the X-ray Power Supply PCB, and Ethernet connection for the sensor.

The PCB has one test point, J7, housing terminals with wires for testing Line and Neutral.

Overhead Interconnect PCB



Test Points on the Overhead Interconnect PCB

Test Point Label	Function	Measuring Technique	Reference	Expected Value	If out of range, do this:
J7	Line	Measure the black wire with the green/ yellow wire.	Ground	120/240V, +/- 10%	With power off and unit unplugged, check connections to end of line cord.
J7	Neutral	Measure the white wire with the green/ yellow wire.	Ground	0V	With power off and unit unplugged, check connections to end of line cord.

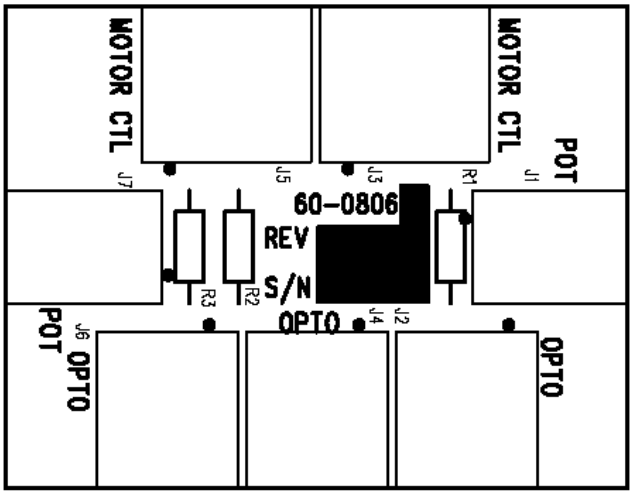
Position Sensor Interconnect PCB (#60-08061)

This PCB provides the connections for the potentiometer and the optical switch. It is used in two different locations.

The PCB located in the overhead arm assembly has connections for the Step Motor Controller PCB. The PCB located in the lower part of the telescoping column has connections for the Motor Controller PCB.

There are no test points, indicators, switches, or jumpers on this PCB.

Position Sensor Interconnect PCB

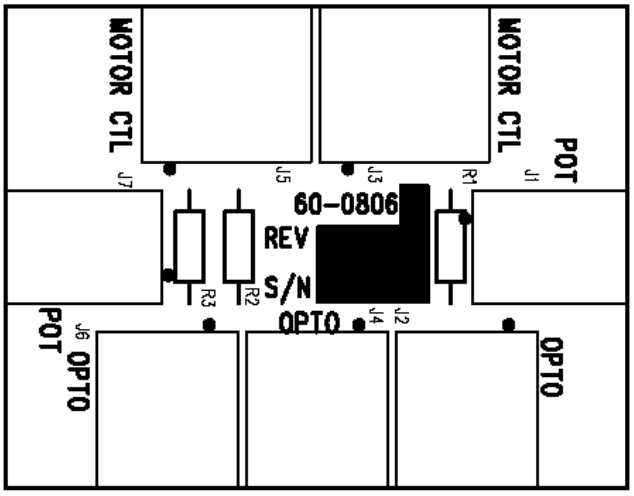


C-arm Position Sensor Interconnect PCB (#60-08067)

This PCB has the potentiometer, optical switch, and micro switch connections used by the Step Motor Controller PCB in the C-arm.

There are no test points, indicators, switches, or jumpers on this PCB.

C-arm Position Sensor Interconnect PCB



Cuspid Position Sensor Potentiometer PCB (#60-08019)

This PCB positions the sensor for the Cuspid positioning laser.

There are no test points, indicators, switches, or jumpers on this PCB.

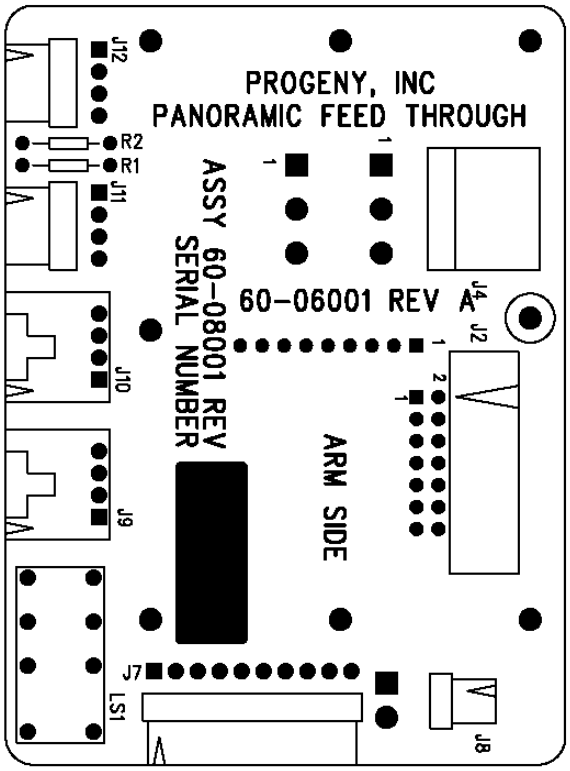
Cuspid Position Sensor Potentiometer PCB

Tubehead Feed Through PCB (#60-08001)

This PCB provides the power and signal connections for the tubehead, as well as connections for the collimator motors and optical switches.

There are no test points, indicators, switches, or jumpers on this PCB.

Tubehead Feed Through PCB

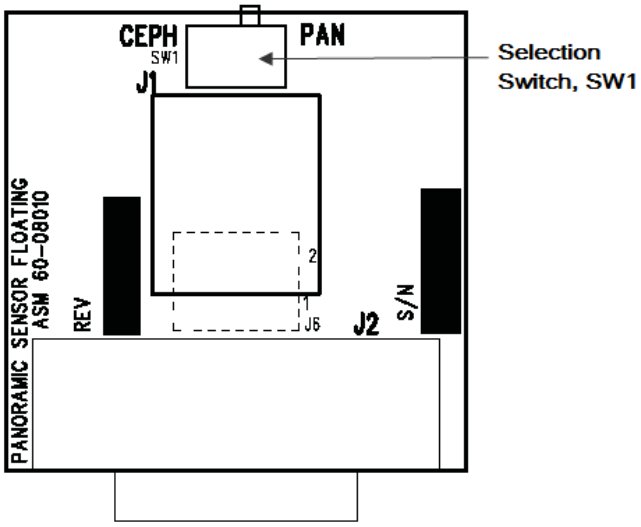


Sensor Floating PCB (#60-08010)

This PCB provides the connection for the sensor assembly, including a selection switch to indicate PAN or CEPH function. For normal operation, the selection switch must be in the PAN position.

Besides the selection switch, there are no other test points, indicators, switches, or jumpers on this PCB.

Sensor Floating PCB



Switch Settings on the Sensor Floating PCB

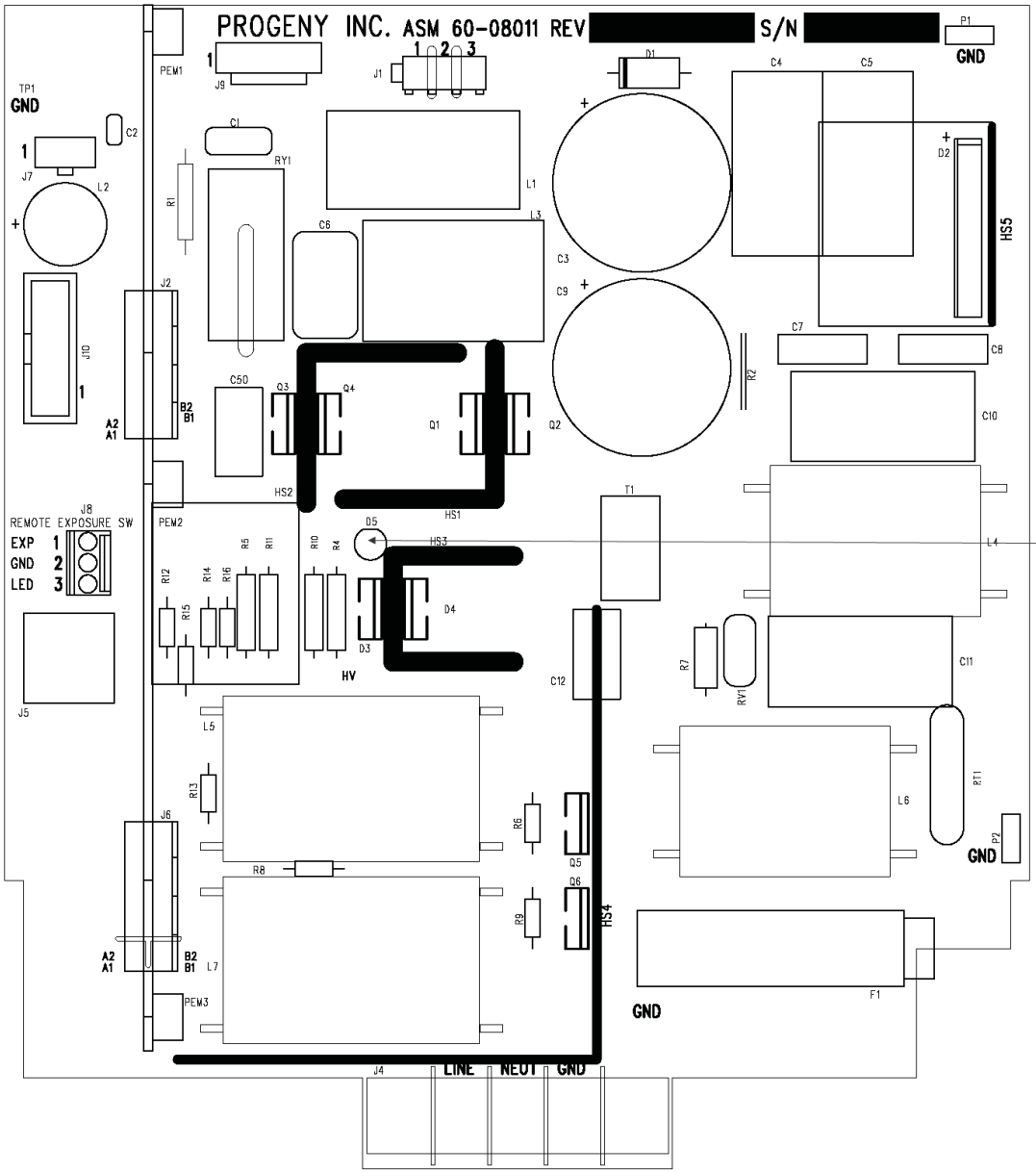
Function	PAN / CEPH Switch
Default, normal operation	PAN
Not currently used	CEPH

X-ray Power Supply PCB (#60-08011)

This PCB supplies power for the tubehead. Both the front and back of this PCB are represented below. The front of the PCB has an indicator light which turns on when X-rays are being emitted even though the light is not visible from the outside of the machine.

The back of the X-ray Power Supply PCB has the test points used for troubleshooting. The test points are accessed through the openings in the metal plate covering the back of the PCB. If no X-ray is generated, as evidenced by no image, make measurements on the back of the X-ray Power Supply PCB using the test point values in the table.

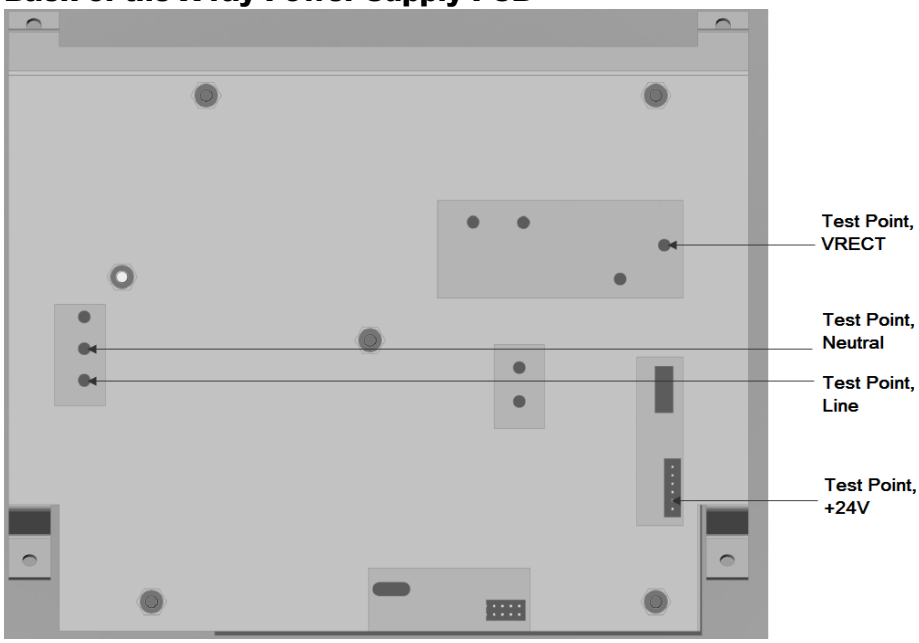
Front of the X-ray Power Supply PCB



Indicator Light on the Front of the X-ray Power Supply PCB

Name	Designator	Color	Purpose	Normal Status	Notes
	D5	green	Indicates presence of 390V	off	The light is on during exposure.

Back of the X-ray Power Supply PCB



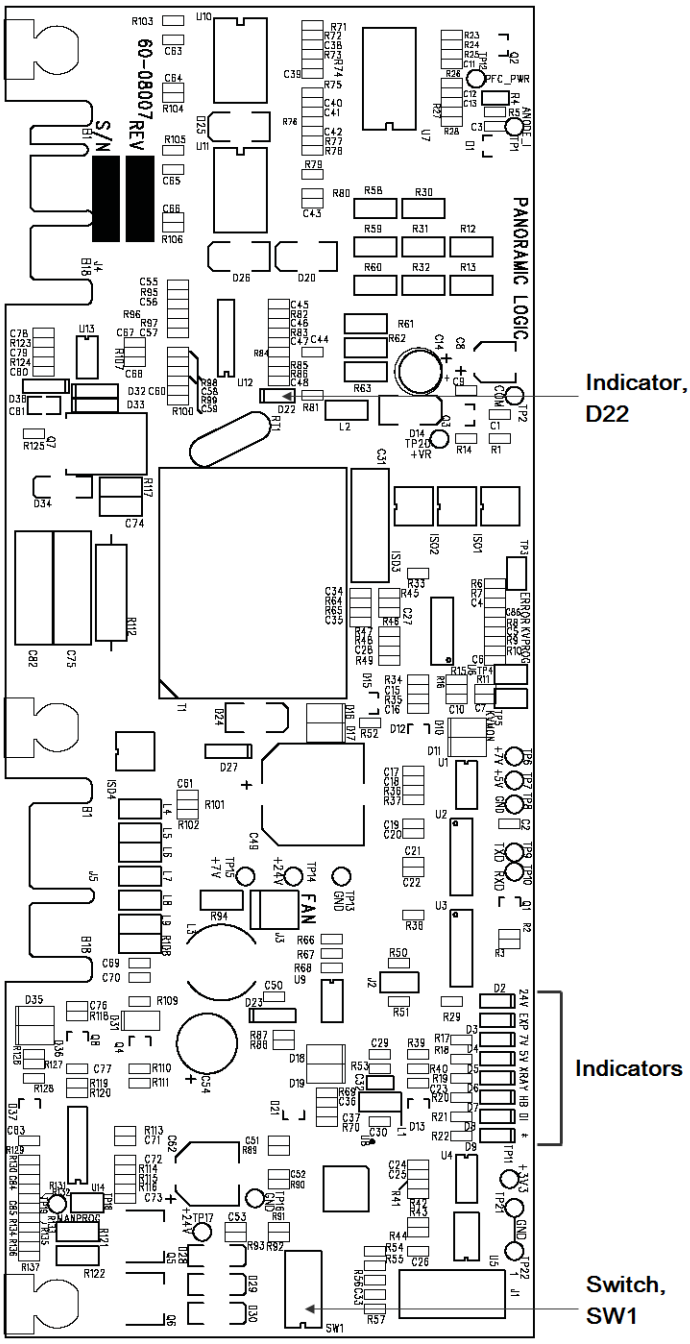
Test Points on the Back of the X-ray Power Supply PCB

Test Point Label	Function	Measuring Technique	Reference	Expected Value	If out of range, do this:
Line	Line	AC voltage	Ground	120/240V, +/- 10%	With power off and unit unplugged, check connections to end of line cord.
Neutral	Neutral	AC voltage	Ground	0V	With power off and unit unplugged, check connections to end of line cord.
VRECT	Rectified Line Voltage	DC Voltage	PGND	130V-265V	Check fuse, F1
+24V	24V power supply	DC Voltage	Ground	28V, +/- 1.0	Check connection between X-ray power supply and Logic PCB.

Logic PCB (#60-08007)

This PCB controls the X-ray Power Supply PCB. The Logic PCB has multiple indicator lights and a switch.

Logic PCB



Indicator Lights on the Logic PCB

Name	Designator	Color	Purpose	Normal Status	Notes
+VR	D22	green	Indicates boost circuit is on	off	On during exposure
*	D9	green	Indicates tube current level	off	
				flicker during x-ray exposure	Tube current correct
				on during exposure	Tube current too high
				off during exposure	Tube current too low
EXP	D3	green	Indicates exposure switch is pressed	off	On when exposure switch is pressed
+5V	D5	green	Indicates presence of 5V power supply	on	
DI	D8	green	Indicates absence of tubehead calibration	off	On indicates tubehead has not been calibrated
+24V	D2	green	Indicates presence of 24V power supply	on	
X-RAY	D6	green	X-ray Indicator	Off when unit is idle, on when unit is emitting x-ray	
H.B.	D7	green	Indicates communication with RTC	flashing	
+7V	D4	green	Indicates presence of 7V power supply	on	

Switch Settings on the Logic PCB

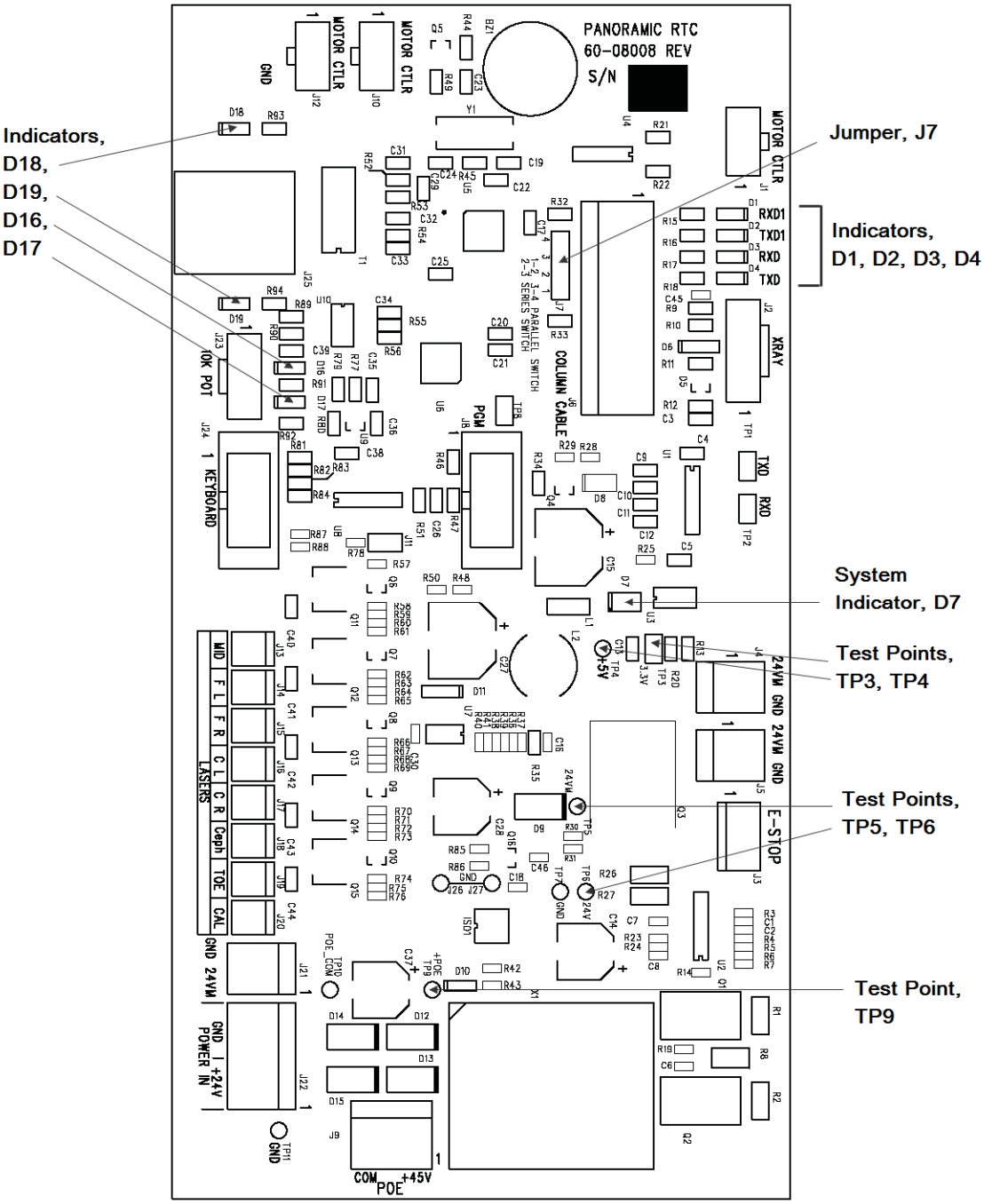
Designator	Purpose	Normal Status	Position
Sw1-1	Calibrate tubehead (On)	Off	ON position is toward the D30 terminal, and the Power Supply PCB.
Sw1-2	Calibrate tubehead (On)	Off	ON position is toward the D30 terminal, and the Power Supply PCB.
Sw1-3	Calibrate tubehead (On)	Off	ON position is toward the D30 terminal, and the Power Supply PCB.
Sw1-4	Calibrate tubehead (On)	Off	ON position is toward the D30 terminal, and the Power Supply PCB.

RTC PCB (#60-08008)

The Real Time Controller (RTC) PCB controls exposure times, motor function, laser function, power over the Ethernet (PoE) switch, communications with the PC workstation, X-ray power supply, and remote switch configuration.

The RTC PCB has test points, indicator lights, and jumpers. When a motor does not move or a display does not turn on, take measurements on the RTC PCB.

RTC PCB



Test Points on the RTC PCB

Test Point (TP) Label	TP #	Function	Measuring Technique	Reference	Expected value	If out of range, do this:
24V	TP6	24V power supply	DC voltage	GND, TP7	24V, +/- 1.0	Disconnect cable at J22. Measure 24V at 24V Power Supply (60-08060), TB2 (designator for 24V power supply output connector.)
24VM	TP5	Motor Controller power supply	DC voltage	GND, TP7	24V, +/- 1.0	Power to the motor controller and step motor controllers is software controlled and may be off when the machine is idle. Verify Emergency stop switch is released. Enter Maintenance mode from the touch control panel. Disconnect cables to J4, J5, J21. Test voltage. If 24V is still not present at TP5, replace RTC PCB.
+5V	TP4	5V Power Supply	DC voltage	GND, TP7	5V, +/-0.25	Disconnect all lasers at J13-J20. If +5V is still not present at TP4, replace RTC PCB.
3.3V	TP3	3.3V Power Supply	DC voltage	GND, TP7	3.3V, +/-0.1	Replace RTC PCB.
+PoE	TP9	Power Supply for PoE Switch	DC voltage	POE_COM	45V, +/-1.0	Disconnect cable at J9. If 45V is still not present at J9, replace RTC PCB.

Indicator Lights on the RTC PCB

Name	Designator	Color	Purpose	Normal Status	Notes
RXD1	D1	green	indicates communication with motor controllers	off	Flashes when communicating with motor controllers (when motors are moving)
TXD1	D2	green	indicates communication with motor controllers	off	Flashes when communicating with motor controllers (when motors are moving)
RXD	D3	green	indicates communication with x-ray power supply	flashing	
TXD	D4	green	indicates communication with x-ray power supply	flashing	
System Indicator Light	D7	amber	X-ray indicator that is visible externally.	Off when unit is idle. On when unit is emitting x-rays.	Located in the telescoping column, upper section
LINK	D18	green	indicates network connection	on	
ACT	D19	green	indicates network connection	flashing	
SDA	D16	green	not used	off	
HB	D17	green	indicates network connection	flashing	
				on	no network connection
				slow flashing (2 sec)	searching for network connection

Jumpers on the RTC PCB

The jumpers configure the remote exposure switches on the Vantage. To operate either remote switch 1 or remote switch 2, configure the jumpers as shown below. If the requirement is for both exposure switches to be pressed simultaneously, configure the jumpers 2 & 3.

Jumpers on the RTC PCB

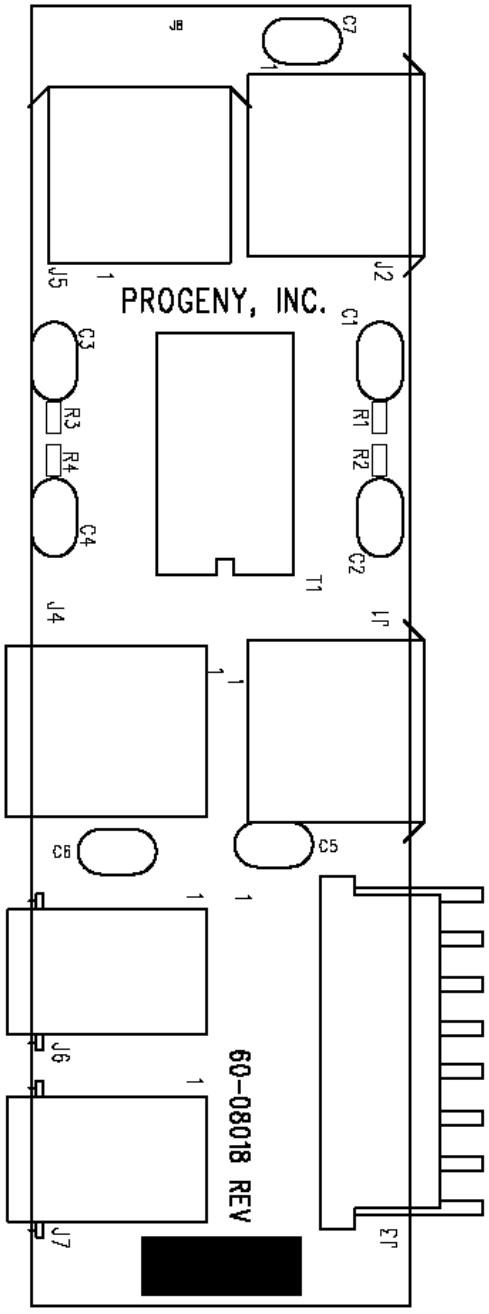
Remote Switch Configuration	Jumper #
Enable remote switch 1	1 & 2
Enable remote switch 2	3 & 4
Enable remote switches 1 and 2 simultaneously	2 & 3

Cable Entrance PCB (#60-08018)

This PCB provides the connections for external cables, including Ethernet cable to the PC workstation, the hand switch, remote exposure switch, and external touch control panel.

There are no test points, indicators, switches, or jumpers on this PCB.

Cable Entrance PCB

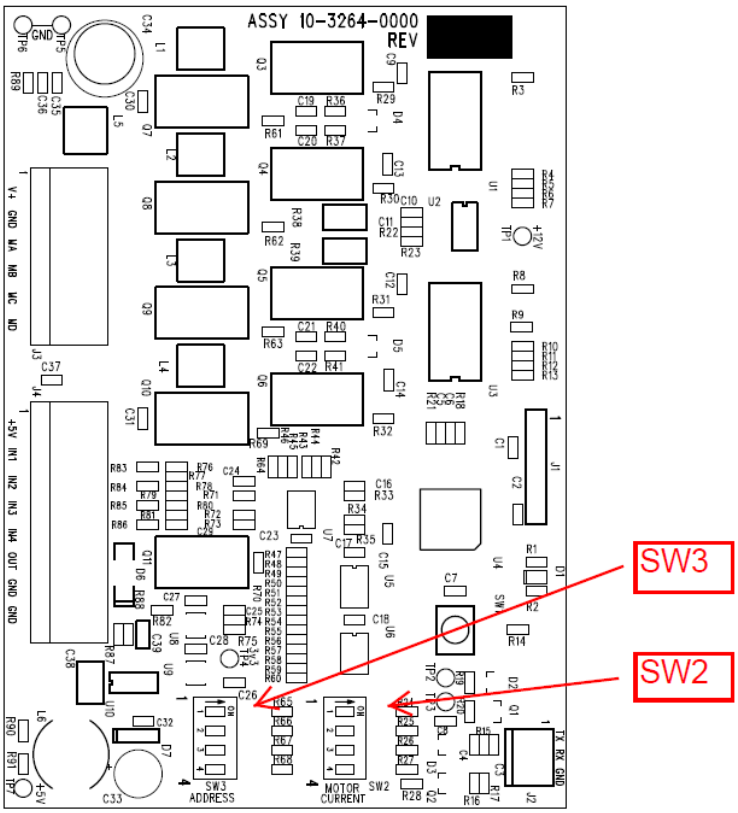


Step Motor Controller PCB (#60-08115)

There are five Step Motor Controller PCBs, each one acting as the motor controller for a different component. The PCBs for the C-arm, linear drive, and overhead arm are located in the overhead assembly. The PCB for the collimator is located inside the tubehead, and the PCB for the wands is located in the telescoping column.

All five PCBs have jumpers.

Step Motor Controller PCB



DIP Switch Settings on the Step Motor Controller PCB

Jumpers on the Step Motor Controller PCB

Motor Controller Name	Motor Controller #	SW3-1	SW3-2	SW3-3	SW3-4	SW2-1	SW2-2
C-Arm	0	On	On	On	On	On	Off
Linear Drive	1	Off	On	On	On	Off	On
Overhead Arm	2	On	Off	On	On	On	On
Collimator	3	Off	Off	On	On	Off	Off
Wand	4	On	On	Off	On	Off	Off

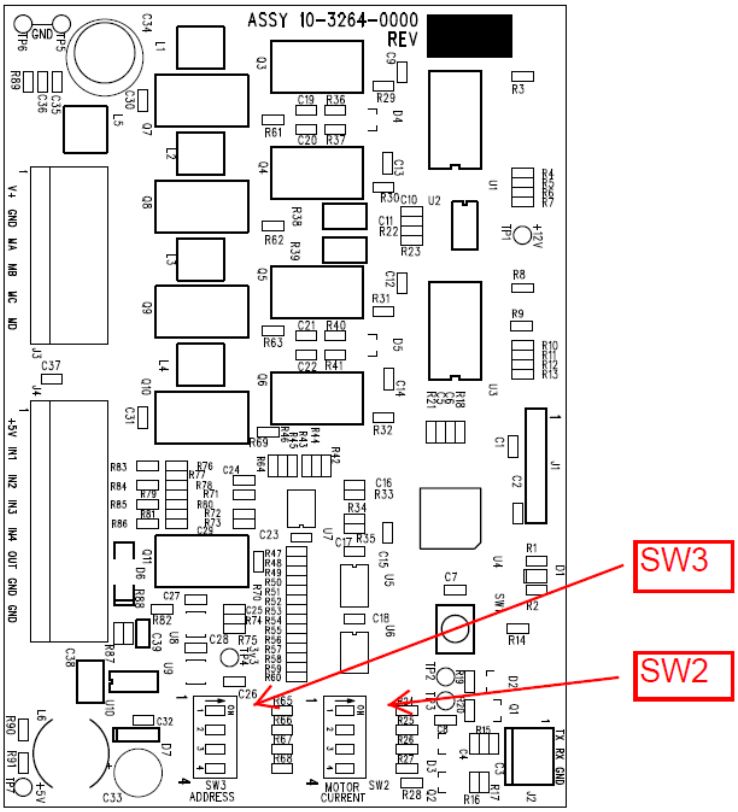
Note: SW2, positions 3 and 4 are not used.

Motor Controller PCB (#60-08116)

This PCB is the motor controller for the telescoping column.

This PCB has three jumpers and an indicator light.

Motor Controller PCB



DIP Switches on the Motor Controller PCB

A jumper is considered “On” when the jumper is in place, and “Off” when there is no jumper.

DIP Switches on the Motor Controller PCB

Motor Controller Name	Motor Controller #	SW3-1	SW3-2	SW3-3	SW3-4	SW2-1	SW2-2
Telescoping Arm	6	On	Off	Off	On	Off	Off

Note: SW2, positions 3 and 4 are not used.

Indicator Lights on the Motor Controller PCB

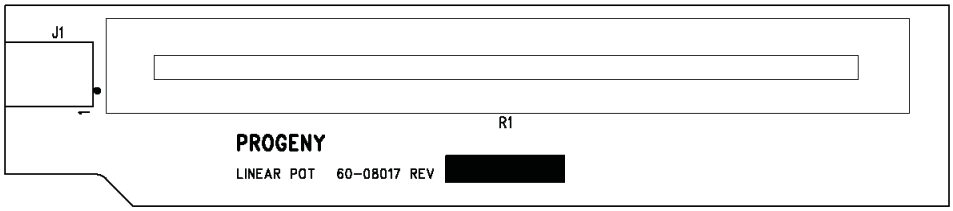
Name	Designator	Color	Purpose	Normal Status
	D1	Green, Amber	Indicates power is on and micro controller is running.	Green ON Amber Flashing

Linear Potentiometer PCB (#60-08017)

This PCB positions the sensor for the linear drive motor.

There are no test points, indicators, switches, or jumpers on this PCB.

Linear Potentiometer PCB

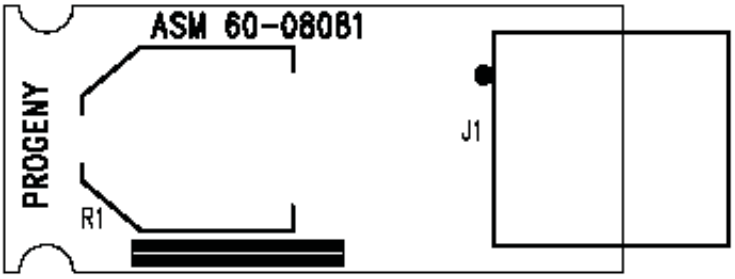


Position Potentiometer PCB (#60-08081)

There are two Position Potentiometer PCBs, each positioning its respective motor sensor. The Position Potentiometer PCB in the overhead arm near the C-arm positions the sensor for the C-arm motor. The Position Potentiometer PCB in the overhead arm near the telescoping column positions the sensor for the overhead motor.

There are no test points, indicators, switches, or jumpers on this PCB.

C-arm Position Potentiometer PCB

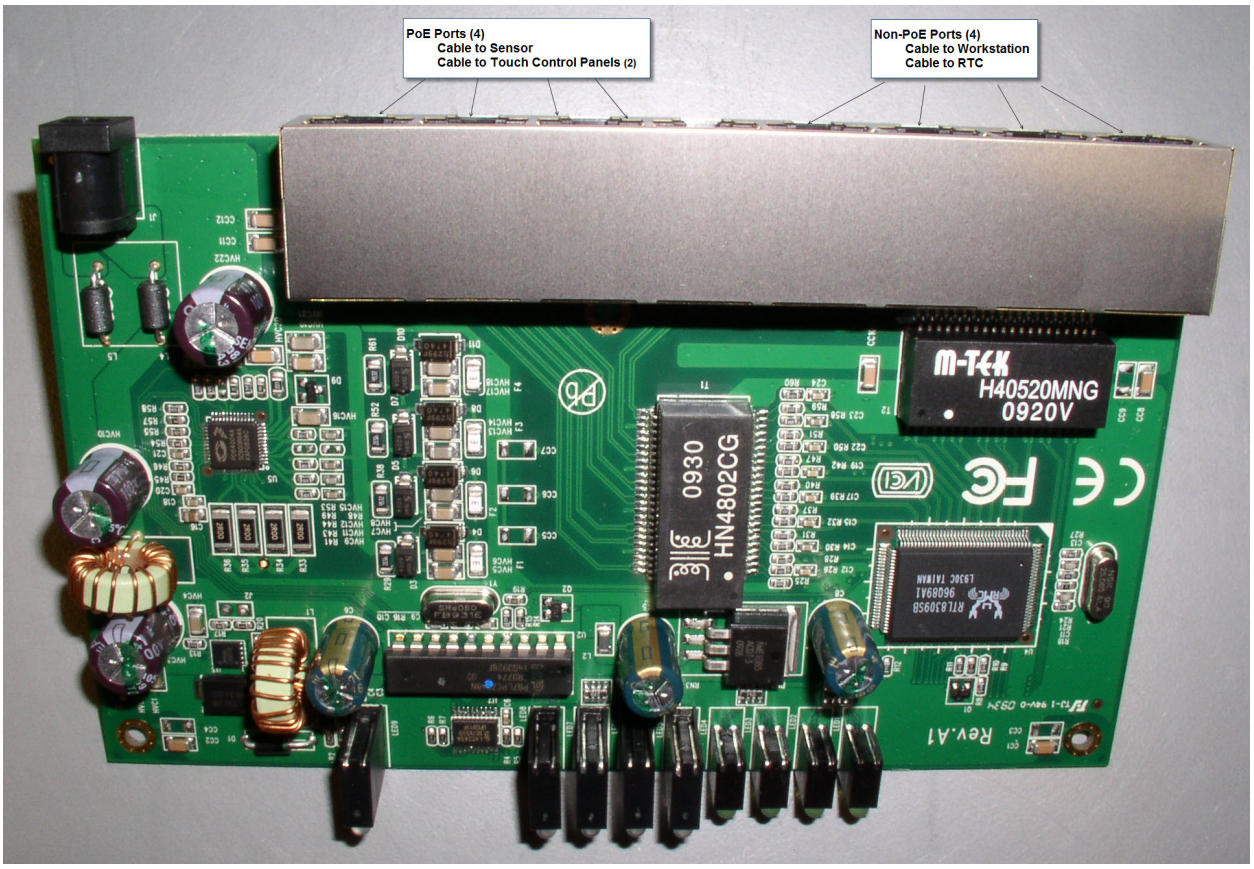


Power over Ethernet (PoE) Switch (#60-08063)

The Power over Ethernet (PoE) switch contains all the Ethernet communications that pass through the PC workstation, the sensor, and the touch control panel.

There are no test points, indicators, switches, or jumpers on this switch.

PoE Switch

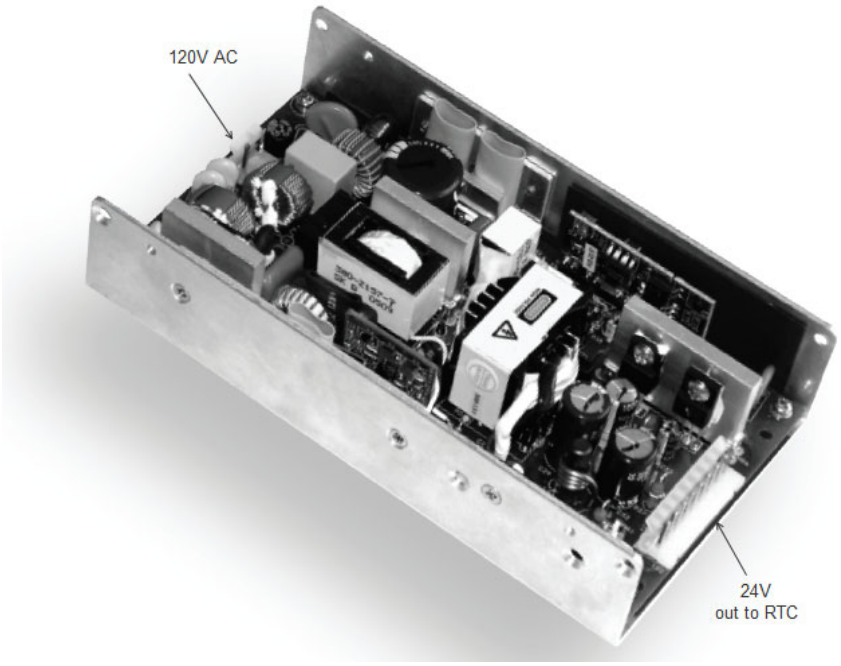


24V Power Supply (#60-08060)

The 24V Power Supply powers everything in the Vantage device except the X-ray power supply.

There are no test points, indicators, switches, or jumpers on this power supply.

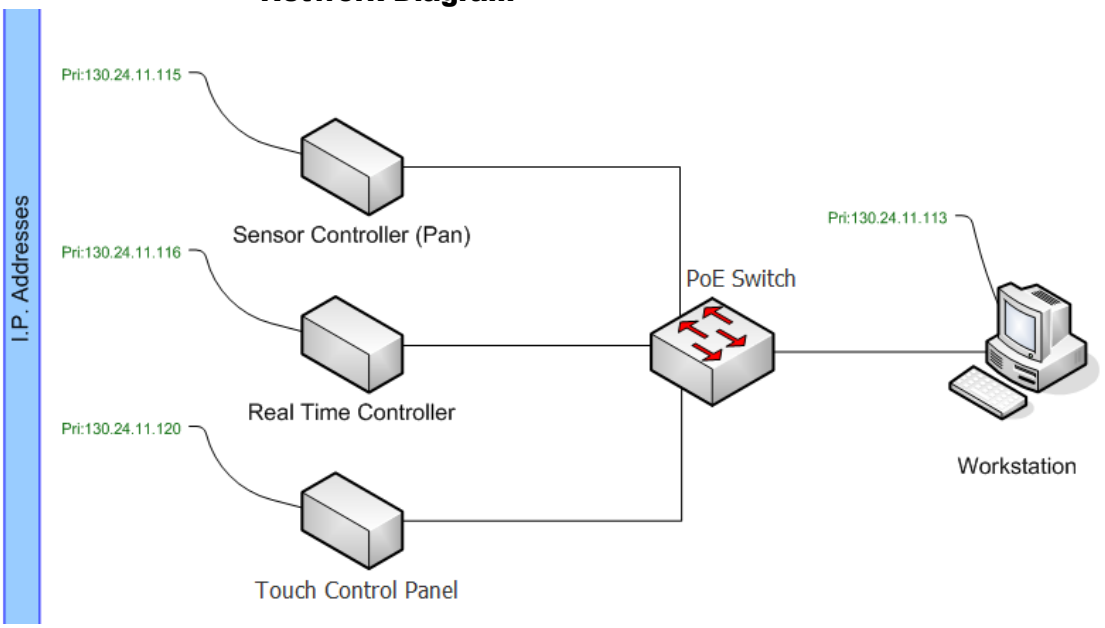
24V Power Supply



Network Communications

The Progeny Vantage Panoramic X-ray System uses an Ethernet-based network with a hardware network switch to connect the PC Workstation, sensor, RTC, and touch control panel.

Network Diagram



IP Addresses

A Class B static IP addressing scheme is used for both the primary and secondary addresses. Both schemes use a 28-bit networking mask (255.255.255.240) and both allow for a total of 14 available hosts in the network. Using a subnet in conjunction with an uncommon network scheme provides minimal risk of collision and/or improper transmission of packets.

IP Addresses

Primary Address Scheme	
Wire address	130.24.11.112
Broadcast address	130.24.11.127
Range	130.24.11.113 to 130.24.11.126
NIC (PC workstation)	130.24.11.113
Sensor	130.24.11.115
RTC	130.24.11.116
Touch control panel	130.24.11.120

4 Troubleshooting Procedures

In this Chapter

Communications Fail

Panoramic X-ray Device does not Synchronize with the Workstation

This section assumes that the workstation and the panoramic X-ray device are fully connected and fully energized. This will be apparent from the illuminated touch control panel and the active workstation.

1. Verify the “Pan Server” application program is selected and active on the workstation.
2. Initial start up of the panoramic X-ray device and the workstation requires about one minute to synchronize. A red “X” on the workstation Pan Server screen and on the touch control panel demonstrates this condition. If, after this waiting period, the synchronization has not occurred, proceed to the next step.
3. Verify the condition of the CAT 5 cable connected between the Electrical Box located at the top of the vertical column fixed section and the workstation CPU.
4. The CAT 5 cable must be connected from either Ethernet connector on the column to the bottom network card of the workstation CPU. This particular network card is necessary and dedicated for this purpose. The other network card is for network applications only and will not interface with the panoramic X-ray device.
5. Proper network communication within the workstation may be realized by observing the green and amber LEDs on the panoramic X-ray device network card. Illumination indicates functionality.
6. Communication transmits from the workstation to the PoE Switch (60-08063). This board contains several LEDs. Illumination and flashing LEDs indicate functionality. If all LEDs are extinguished, follow the steps outlined in

the section of this chapter entitled *Workstation Energizes but the Panoramic X-ray Device does not*.

7. Successful communication is also impacted by the workstation operating system settings. For example, the CPU must never go to the “hibernate” state. Make sure that the firewall has not shut off communications. Also confirm the settings for the second NIC (DNS, etc.).

TWAIN Drive does not Collect Image

1. The RTC will not allow an exposure to begin, nor will the panoramic X-ray device drive to the “ready” position if the image management software is not open, functioning, and a patient is selected. Follow the indicated error codes to investigate the cause.
2. Once the TWAIN interface is open and active, verify that the green ready indicator on the window is illuminated.
3. If the indicator is red, choose the pull down menu to the left of the red indicator and labeled “default pan”. From the pull down selections, select another choice such as “Vision DX USB”. Then, return to the pull down menu and select “default pan”. This process performs a reset of the X-ray sensor and TWAIN interface.
4. If the indicator continues to be red, the sensor is not communicating with the workstation and the image management software. Verify that the image management software program is open only once. If the image management program is open twice, the sensor may be connected to the “hidden”, second window.
5. Check to see that the panoramic X-ray device is not in Demo mode. If the panoramic X-ray device will not exit demo mode, then the sensor is not communicating.
6. Finally, review the steps outlined in the section of this chapter entitled *X-ray Sensor not Detected*.

Image does not Transfer from TWAIN to Image Management Program Patient File

Verify that the image management software program is open only once. If the image management program is open twice, the sensor may be connected to the “hidden”, second window.

Workstation does not Communicate with the Facility Network

1. Identify the network server IP address.
2. Ping that address.
3. If no response is apparent, inspect or replace the network card of the Vantage Workstation and verify the NIC drivers are present and current. Observe the activity of the Ethernet LED indicators on the connector to verify connectivity and communication.
4. If the condition persists, inspect or replace the Ethernet cable leading to the network port of the server.

Workstation Energizes but the Panoramic X-ray Device does not

1. The panoramic X-ray device will require up to 60 seconds to activate. During this time the touch control panel may be blank. After a short waiting period, the Touch control panel will illuminate. If not, continue with the following tests.
2. Make sure that the emergency power switch is not actuated.
3. Verify that the panoramic X-ray device is connected to a reliable power source. Vantage will operate equally on 120 or 230V, 50 or 60 hertz.
4. Power arrives on the 24V power supply (60-08060) at TB1, via the front column terminal strip. The front column terminal strip and TB1 of the 24V power supply will contain line voltage (and so, caution must be applied to the measurement). The front column terminal strip is supplied by the rear power connection, located under the electrical box cover.
5. Output power may be measured on the 24V power supply (60-08060) at TB 2. The red and white conductors carry +24 vdc while the return will be found on black and green.
6. 24 vdc is carried to the RTC (60-08008) and arrives at J22 of that board. The RTC steps up the voltage to 48 vdc where it is placed on the output connector designated as “PoE”. 48 vdc may be measured on the copper and silver wires.
7. 48 vdc arrives on the PoE Switch (60-08063) at J1. Power to this board will be apparent from the series of illuminated LEDs on the board.
8. The PoE Switch provides the touch control panel (60-A2017) and sensor with power and signals. The CAT 5 cables from the touch control panel and sensor must be connected to any of the four “left hand” Ethernet ports. Power demonstrated at the PoE switch but not arriving at the touch control panel would necessitate substitution with a Cat 5 cable or the touch control panel. The touch control panel has no field serviceable parts.

Workstation Fails

Panoramic X-ray Device Energizes the Workstation does not

1. Verify that the monitor and the CPU are connected to a reliable power source.
2. Check the power indicators on the monitor and CPU which will illuminate when the respective components are activated.
3. When the monitor is energized, an “indicator” will show on the screen. If not, replace the monitor.
4. If the CPU power indicator is active but no further activity is noted from the CPU, the internal power supply has failed and the unit must be replaced.
5. If the CPU has noticeable activity, such as indicator lights and hard drive movement, but the monitor will not produce the “desktop”, inspect the condition of the monitor cable and replace this cable if necessary.
6. If the problem persists, replace the CPU.
7. If the computer system produces a “desktop,” but will not respond to keyboard commands, check keyboard connection and, if necessary, replace the keyboard.

8. If the computer system produces a “desktop” and responds to keyboard commands but will not respond to mouse commands, check mouse connection and, if necessary, replace the mouse.

Touch Control Panel Fails

Touch Control Panel does not Energize

Follow the steps outlined in the section of this chapter entitled *Workstation Energizes but the Panoramic X-ray Device does not*.

Touch Control Panel does not Respond to Selections

1. The following tests assume that the touch control panel (60-A2017) is illuminated and portraying the acquisition setup screen. If this is not the case, review the steps outlined in the section of this chapter entitled *Workstation Energizes but the Panoramic X-ray Device does not*.
2. The touch control panel signals and power originate from the PoE Switch (60-08063). Verify that the CAT 5 cable from the touch control panel is connected to any of the four “left hand” Ethernet ports on the PoE switch.
3. Power demonstrated at the PoE switch, by illuminated LEDs, but not arriving at the touch control panel would necessitate the substitution of the Cat 5 cable or the touch control panel. The touch control panel has no field-serviceable parts.

Movement Operations Fail

Telescoping Column does not Drive Up

Normal vertical drive operation is a sequence of events. Once the appropriate drive switch is pressed, the column movement will begin after a short delay period. Movement begins very slowly and then the speed gradually increases.

1. If, instead of normal operation after the switch is pressed, three short beeps are enunciated, the RTC will not be able to command column movement. This indicates a possible short in one of the positioning controls or in the exposure switch.
2. Column movement has boundaries. An optical limit switch, once interrupted, will no longer allow movement in the selected direction. Verify that the limit of movement has not been reached by selecting the positioning control for the opposite direction.
3. Inspect the condition of the optical limit switch, cable, and connector which lead to the Position Sensor Interconnect board (60-08061). Signals from the Upper Limit Switch (60-08073) arrive at J4 of the Position Sensor Interconnect.
4. On a temporary basis, it is permissible to swap the limit switch inputs to the Position Sensor Interconnect PCB (60-08061) in an effort to demonstrate the cause of the problem to be sensor related. If the cables are swapped, return

the input cables to the original locations after the test in order to prevent mechanical damage.

5. Actual monitoring of the optical limit switch occurs on the Motor Controller PCB (60-08116). The board requires 24 vdc originating from the RTC (60-08008). The voltage arrives on the Motor Controller PCB at J4, pins 1 and 2, and begins at J5 of the RTC.
6. The operating signal and supply to operate the limit switches originates at J5 of the Motor Controller PCB and continues on to the Position Sensor Interconnect. The circuit can be tested by observing the presence of 5 vdc across pins 1 and 5 of J5 and observing a logic state change across pins 3 and 5, while actuating the optical sensor.
7. Actual motor drive ability may be tested from the touch control panel Service screen. On the Service screen, select the column and perform the Service Column task. This test directly signals the Motor Controller PCB and, subsequently, the motor.
8. Failure at this stage requires the verification of the output voltage from the Motor Controller PCB to the motor. This will be found at connector J5 at pins 5 and 6 and is 24 vdc.

   NOTE: Two connectors are present on J5. The connector involved here is a four pin connector with two wires present in the "3" and "4" position.
9. Switchable voltage at this point indicates a problem directly with the motor. No voltage presence requires the replacement of the Motor Controller PCB.
10. In one particular case, both opto switches may be blocked and motion will not occur. This will happen when the column is in the full down position. In this case, on the touch control panel Service screen, select the column and select the Service Column task. Then use the positioning controls to move the column up.
11. It is also possible that debris may have blocked one or both sensors. Make sure that the sensors are not blocked by debris or damaged.

Telescoping Column does not Drive Down

Normal vertical drive operation is a sequence of events. Once the appropriate drive switch is pressed, the column movement will begin after a short delay period. Movement begins very slowly and then the speed gradually increases.

1. Instead of normal operation after the switch is pressed, three short beeps are enunciated, the RTC will not be able to command column movement. This indicates a possible short in one of the positioning controls or in the exposure switch.
2. Column movement has boundaries. An optical limit switch, once interrupted, will no longer allow movement in the selected direction. Verify the limit of movement has not been reached by selecting the movement switch for the opposite direction.
3. Inspect the condition of the optical limit switch, cable, and connector which leads to the Position Sensor Interconnect board (60-08061). Signals from the Lower Limit Switch (60-08073) arrive at J6 of the Position Sensor Interconnect.
4. On a temporary basis, it is permissible to swap the limit switch inputs to the Position Sensor Interconnect board in an effort to demonstrate the cause of

the problem to be sensor related. If so, the input cables must be returned to the original locations after the test in order to prevent mechanical damage.

5. Actual monitoring of the optical limit switch occurs on the Motor Controller PCB (60-08116). The board requires 24 vdc originating from the RTC (60-08008). The voltage arrives on the Motor Controller PCB at J4, pins 1 and 2 and, begins at J5 of the RTC.
6. The operating signal and supply to operate the limit switches originates at J5 of the Motor Controller PCB and continues on to the Position Sensor Interconnect. The circuit can be tested by observing the presence of 5 vdc across pins 1 and 5 of J5 and, observing a logic state change across pins 3 and 5, while actuating the optical sensor.
7. Actual motor drive ability may be tested from the touch control panel Service screen. On the Service screen, select the column and perform the Service Column task. This test directly signals the Motor Controller PCB and, subsequently, the motor.
8. Failure at this stage requires the verification of the output voltage from the Motor Controller PCB to the motor. This will be found at connector J5 at pins 5 and 6 and is 24 vdc.

   NOTE: Two connectors are present on J5. The connector involved here is a four pin connector with two wires present in the "3" and "4" position.
9. Switchable voltage at this point indicates a problem directly with the motor. No voltage presence requires the replacement of the Motor Controller PCB.
10. In one particular case, both opto switches may be blocked and motion will not occur. This will happen when the column is in the full down position. In this case, on the touch control panel Service screen, select the column and select the Service Column task. Then use the positioning controls to move the column up.
11. It is also possible that debris may have blocked one or both sensors. Make sure that the sensors are not blocked by debris or damaged.

Unrequested Telescoping Column Movement (Up or Down)

1. Column movement is commanded by the Patient Table Membrane Switch (60-08068). The signal is conducted through the Membrane Switch Cable (60-08077) to the RTC (60-08008). Isolating each component will reveal if the switch or cable is shorted.
2. The RTC will provide 24 vdc, motor direction signals, and motor enable signals to the Motor Controller PCB (60-08116) with the request of movement.
3. Presence of these signals before a movement request is made indicates a problem within the RTC.
4. If one of the column control circuits is shorted, pressing the wand button will cause the RTC to emit three short beeps.

Telescoping Column Drive Noisy

1. Inspect the condition of the Column Actuator (H7-00013), column bearing tracks, and the column bearing blocks. Any foreign materials must be cleared away. Excessive wear must be reported to Progeny Technical Support.

2. If it is determined that the Column Actuator must be replaced, contact Progeny Technical Support for assistance.

Wands do not Close or Open

1. Wand movement is activated by the Patient Table Membrane Switch (60-08068). The signal is conducted through the Membrane Switch Cable (60-08077) to the RTC (60-08008).
2. The activation signal arrives from the Patient Table Membrane Switch on connector J24. The signal is processed by the RTC and provides two outputs. The first is an RS-232 signal to the Step Motor Controller (Wand) (60-08020) conducted from J12 of the RTC to J3 of the Step Motor Controller (Wand). The second output is 24 vdc from J21 of the RTC to J4 of the Step Motor Controller (Wand).
3. The 24 vdc supply voltage for the Step Motor Controller (Wand) arrives at pins 1 and 2 of J4. Bi-directional motor drive is also a part of J4. Output signals are presented at pins 3, 4, 5 and 6.
4. The Wand Optical Sensor (60-08024) will stop movement in the open direction if interrupted. To remove this input, disconnect the cable arriving at J5 of the Step Motor Controller (Wand). Briefly activate the wand switch. If the wand motor drives, inspect the condition of the sensor and replace if necessary. If the motor does not drive, replace the Step Motor Controller (Wand).

Wand Closure Uneven

1. Activate the mid-Sagittal laser. Place a ruler from one wand to the other. Measure the distance between the laser indicator and each wand tip. This distance should be equal.
2. If not, remove the bite guide and chin rest, then open the top of the patient positioning table by removing the two screws on the underside of the patient positioning table and the one screw under the chinrest.
3. Identify the Wand Link (60-F1002) within the patient positioning table. Identify the Wand Return Spring (60-F3003).
4. Disconnect the wand return spring from its right hand attachment.
5. Disconnect the wand link from its right hand attachment.
6. Bend, or straighten, the wand link as required.
7. Replace the wand link and wand return spring.
8. Repeat steps as necessary.

C-arm does not Drive

1. The C-arm structure is powered from the RTC (60-08008) by way of the Column to Overhead Cable (60-08040), which provides 24 vdc to the Overhead Interconnect board (60-08016) at the connector J13. This same voltage should also appear at J1, J5, J9, and J14.
2. If 24 vdc is not measured on the Overhead Interconnect J13, begin by proving the panoramic X-ray device is connected to a reliable power source. Vantage will operate equally on 120 or 230 volts, 50 or 60 hertz.
3. Incoming power arrives on the 24 volt Power Supply (60-08060) at TB 1, via the front column terminal strip. The front column terminal strip and TB 1 of the 24 volt power supply will contain line voltage (and so, caution must be

applied to the measurement). The front column terminal strip is supplied by the rear power connection, located under the electrical box cover.

4. Output power may be measured on the 24 volt Power Supply (60-08060) at TB 2. The red and white conductors carry +24 vdc, while the return will be found on black and green.
5. 24 vdc is carried to the RTC (60-08008) and arrives at J22 of the board.
6. Returning to the Overhead Interconnect board, if 24 vdc is present at J5, the power will be transferred to the Step Motor Controller (C-Arm) board (60-08020) by way of the C-Arm Drive Cable (60-08035).
7. 24 vdc is measured at J4 of the Step Motor Controller (C-Arm) board on pins 1 and 2. Bi-directional motor drive is also a part of J4. Output signals are presented to the motor from pins 3, 4, 5 and 6.
8. Position sensing and limits are provided to the Step Motor Controller (C-Arm) board through J5. These values arrive at J5 by way of the Motor Controller Cable (60-08071). 5 vdc may be measured across pins 1 and 8. An analog dc value representing the position of the overhead structure may be observed across pins 1 and 5. A Logic state change may be observed as the overhead movement reaches the optical limit sensor. These signals originate on the Position Sensor Interconnect (Overhead Arm) board (60-08061) located at the top rear of the overhead assembly.
9. On the Service screen, select the overhead arm and perform the Axis Service and Diagnostics task. Select the R axis. Use the positioning controls to induce motion. On the touch control panel, select Move to Home and Move to Zero. If there are any errors given, they will help to identify the non-functioning component.

C-arm Movement is Noisy

1. Inspect the condition of the C-Arm Drive Assembly (60-2030) and fasteners. Replace if necessary.
2. Perform C-arm Alignment as described *in Chapter 7 on page 88*.

Overhead Arm does not Drive

1. The overhead arm is powered from the RTC (60-08008) by way of the Column to Overhead Cable (60-08040) which provides 24 vdc to the Overhead Interconnect board (60-08016) at the connector J13. This same voltage should also appear at J1, J5, J9 and J14.
2. If 24 vdc is not measured on the Overhead Interconnect J13, begin by proving the panoramic X-ray device is connected to a reliable power source. Vantage will operate equally on 120 or 230 volts, 50 or 60 hertz.
3. Incoming power arrives on the 24 volt Power Supply (60-08060) at TB1, via the front column terminal strip. The front column terminal strip and TB1 of the 24 volt power supply will contain line voltage (and so, caution must be applied to the measurement). The front column terminal strip is supplied by the rear power connection, located under the electrical box cover.
4. Output power may be measured on the 24 volt Power Supply (60-08060) at TB 2. The red and white conductors carry +24 vdc while the return will be found on black and green.
5. 24 vdc is carried to the RTC (60-08008) and arrives at J22 of the board.

6. Returning to the Overhead Interconnect board, if 24 vdc is present at J5, the power will be transferred to the Step Motor Controller (Overhead Arm) board (60-08020) by way of the Swing Drive Cable (60-08036).
7. 24 vdc is measured at J4 of the Step Motor Controller (Overhead Arm) board on pins 1 and 2. Bi-directional motor drive is also a part of J4. Output signals are presented to the motor from pins 3, 4, 5 and 6.
8. Position sensing and limits are provided to the Step Motor Controller (Overhead Arm) board through J5. These values arrive at J5 by way of the Motor Controller Cable (60-08071). 5 vdc may be measured across pins 1 and 8. An analog dc value representing the position of the overhead structure may be observed across pins 1 and 5. A Logic state change may be observed as the overhead movement reaches the optical limit sensor. These signals originate on the Position Sensor Interconnect board (60-08061) located at the top rear of the overhead assembly.
9. On the Service screen, select the overhead arm and perform the Axis Service and Diagnostics task. Select the Y axis. Use the positioning controls to induce motion. On the touch control panel, select Move to Home and Move to Zero. If there are any errors given, they will help to identify the non-functioning component.

Overhead Arm is Noisy

1. Inspect the condition of the Y-Axis Drive Assembly (60-A2023), the Ball Screw Assembly (H7-00004), and fasteners. Replace if necessary.
2. Perform C-arm Alignment as described *in Chapter 7 on page 88*.

Linear Drive does not Operate

1. The Linear Drive is powered from the RTC (60-08008) by way of the Column to Overhead Cable (60-08040) which provides 24 vdc to the Overhead Interconnect board (60-08016) at the connector J13. This same voltage should also appear at J1, J5, J9 and J14.
2. If 24 vdc is not measured on the Overhead Interconnect J13, begin by proving the panoramic X-ray device is connected to a reliable power source. Vantage will operate equally on 120 or 230 volts, 50 or 60 hertz.
3. Incoming power arrives on the 24 volt Power Supply (60-08060) at TB1, via the front column terminal strip. The front column terminal strip and TB1 of the 24 volt power supply will contain line voltage (and so, caution must be applied to the measurement). The front column terminal strip is supplied by the rear power connection, located under the Electrical Box Cover.
4. Output power may be measured on the 24 volt Power Supply (60-08060) at TB 2. The red and white conductors carry +24 vdc while the return will be found on black and green.
5. 24 vdc is carried to the RTC (60-08008) and arrives at J22 of the board.
6. Returning to the Overhead Interconnect board, if 24 vdc is present at J5, the power will be transferred to the Step Motor Controller (Linear Drive) board (60-08020) by way of the Linear Drive Cable (60-08037).
7. 24 vdc is measured at J4 of the Step Motor Controller (Linear Drive) board on pins 1 and 2. Bi-directional motor drive is also a part of J4. Output signals are presented to the motor from pins 3, 4, 5 and 6.

8. Position sensing and limits are provided to the Step Motor Controller (Linear Drive) board through J5. These values arrive at J5 by way of the Motor Controller Cable (60-08071). 5 vdc may be measured across pins 1 and 8. An analog dc value representing the position of the C-Arm structure may be observed across pins 1 and 5. A Logic state change may be observed as the C-Arm movement reaches the optical limit sensor. These signals originate on the Position Sensor Interconnect board (60-08061) located at the top front of the overhead assembly.

Linear Drive is Noisy

1. Inspect the condition of the X-Axis Drive Assembly (60-A2028) and fasteners. Replace if necessary.
2. Perform C-arm Alignment as described *in Chapter 7 on page 88*.

Cannot Move the Panoramic X-ray Device to the Patient Entry Position

1. Verify proper operation of the touch control panel by following the steps outlined in the section of this chapter entitled *Touch Control Panel does not Respond to Selections*.
2. This condition is monitored by the workstation. Error codes related to movement are classified as “Device Controller Errors / 101”. The complete error message can be viewed by accessing the Message Center on the workstation. Based on this information, the specific cause of malfunction may be traced.
3. Contact Progeny Technical Support for guidance once the complete error message is known.

Cannot Move the Panoramic X-ray Device to the Ready for Imaging Position

1. Verify proper operation of the touch control panel by following the steps outlined in the section of this chapter entitled *Touch Control Panel does not Respond to Selections*.
2. This condition is monitored by the workstation. Error codes related to movement are classified as “Device Controller Errors / 101”. The complete error message can be viewed by accessing the Message Center on the workstation. Based on this information, the specific cause of malfunction may be traced.
3. Contact Progeny Technical Support for guidance once the complete error message is known.

Overhead and C-arm do not Drive to Repeatable Location

1. This condition is monitored by the workstation. Error codes related to movement are classified as “Device Controller Errors / 101”. The complete error message can be viewed by accessing the Message Center on the workstation. Based on this information, the specific cause of malfunction may be traced.
2. Contact Progeny Technical Support for guidance once the complete error message is known.

Overhead and C-arm Collide with Patient Positioning Table

1. Place the system in the “off” condition so that the position sensing circuits can be reset. Before energizing the system, move the X-ray sensor towards the back wall and the tubehead assembly away from the back wall. The C-arm should then be perpendicular to the back wall. Next, push the overhead arm to the extreme right, making sure to keep the sensor and tubehead perpendicular to the back wall.
2. Reenergize the system.
3. This condition is monitored by the workstation. Error codes related to movement are classified as “Device Controller Errors / 101”. The complete error message can be viewed by accessing the Message Center on the workstation. Based on this information, the specific cause of malfunction may be traced.
4. Contact Progeny Technical Support for guidance once the complete error message is known.

X-ray Output Fails or is Incorrect

System does not Initiate an Exposure, with Motion

1. The X-ray Generator is powered from the incoming power line. The pathway is from the rear power connection, located under the Electrical Box Cover through the front column terminal block and then to the J7 terminal block on the Overhead Interconnect board (60-08016). Each connection will contain line voltage (and so, caution must be applied to the measurement).
2. Line voltage arrives on the X-Ray Power Supply board (60-08011) at the J4 terminal block.
3. Once incoming power is verified, observe the status of D5 of the X-Ray Power Supply board. This indicator should be “on” for proper operation.
4. Next, observe the status of the following Logic board (60-08007) LEDs in the standby condition: D2=on, D3=off, D4=on, D5=on, D6=off, D7=flashing, D8=off, D9=off, D22=off. A failure of this combination, with the exceptions of D7, D8, and D22, indicates a failure of the low voltage power section of the X-Ray Power Supply board and will necessitate the replacement of this board.
5. The significance of D7 in the flashing state indicates that the Logic PCB processor is running normally. Should the D7 indicator fail to flash, switch power off on the unit and wait for all LEDs on the Logic PCB to fade. Resume power and see if D7 resumes flashing. If not, replace the Logic PCB.
6. Communications between the Logic PCB and RTC PCB (60-08008) are indicated by the flashing of D3 and D4 on the left side of the upper edge of the RTC. If D3 is not flashing, then begin by inspecting the condition of the connections at J5 of the X-Ray Power Supply board, J11 of the Overhead Interconnect board, J10 of the Overhead Interconnect board, and the Ethernet connections on the RTC. It may be advisable to bypass the entire set of connections by placing a substitute CAT 5 cable directly from the RTC to the X-Ray Power Supply board.
7. If D4 on the RTC PCB is not flashing then the RTC has locked up.

8. If this series of steps does not restore communication, it will be necessary to replace either the RTC or the X-Ray Power Supply board and the Logic board.
9. If D8 on the Logic PCB is illuminated, the X-ray Generator has not been calibrated. Refer to the X-ray Generator calibration instruction in this manual.
10. If D22 is illuminated at this stage, it indicates a request from the x-ray generator microprocessor to generate voltage to the High Tension Primary Transformer. Since the x-ray generator microprocessor is interlocked by commands from the RTC, an active D22 circuit in the standby condition requires replacement of the Logic board.
11. If the correct set of indicators is present (as outlined in this procedure), attempt to initiate an exposure. To do so, it is assumed that the system begins from the Ready for Imaging position and that the touch control panel portrays a green Ready indication. From this state, begin the examination, scan motion is initiated.
12. During the exposure, observe the following indicators on the Logic board: D2=on, D3=on, D4=on, D5=on, D6=on, D7=flashing, D8=off, D9=on, D22=on. As identified earlier, D2, D4, D5 and D7 are for power supplies and communication.
13. D3 indicates that an exposure has been initiated. For this to occur, a specific serial transmission must arrive from the RTC and the workstation. In order to operate the above functions, the RTC and Workstation are presumed to be functioning properly. Therefore, it will be necessary to repeat the evaluation of “no X-ray output” by the use of a fluorescent screen placed in the X-ray field.
14. D6 indicates that the x-ray generator circuit is active and proper feedbacks are present. In this case, repeat the evaluation of “no X-ray output” by the use of a fluorescent screen placed in the X-ray field.
15. If D8 is illuminated, the X-ray Generator has not been calibrated. Refer to the X-ray Generator calibration instruction in this manual.
16. D9 indicates the X-ray tube current is correct and stabilized. In this case, repeat the evaluation of “no X-ray output” by the use of a fluorescent screen placed in the X-ray field. Tube current will not be possible without accurate, controlled kilovoltage.

System does not Initiate an Exposure, without Motion

This evaluation presumes that the panoramic X-ray device is in the Ready for Imaging position and the Ready indicator on the touch control panel is green.

1. Panoramic scans are initiated by the Exposure Switch (30-A2040) or the Remote Exposure Station (30-A2044). The system has two identical input connectors for exposure release on the back of the vertical column. It is permissible to connect the exposure switch into the “other” column connector and repeat the test. It is also advisable to perform an electrical continuity test on the switch to eliminate the presence of open circuits.
2. If the exposure switch is determined to be in working order, inspect the condition of the rear column exposure switch connector and cable, which ultimately lead to the J6 connector on the RTC (60-08008).
3. Further system operation can be further determined from this point by inspecting the contents of the service file.

4. Check to confirm the presence of jumpers on positions 1-2 and 3-4 of J7 on the RTC PCB (or 2-3, if two exposure switches are required).

Exposure Possible, without Motion

1. This condition is monitored by the workstation. Error codes related to movement are classified as “Device Controller Errors / 101”. The complete error message can be viewed by accessing the Message Center on the workstation. Based on this information, the specific cause of malfunction may be traced.
2. Contact Progeny Technical Support for guidance once the complete error message is known.

Images too Light

1. Underexposed images can occur for several different reasons. Before detailed troubleshooting begins, it would be expedient to verify the selected radiographic techniques and image management program filter settings.
2. If the problem persists, review the system for error messages pertaining to the X-ray generator, such as kV or mA too high or too low. In such cases, it will be necessary to replace the X-ray Generator Power Supply Assembly (60-A2035) or the Tubehead Assembly (60-A1014).
3. If no error messages related to the X-ray generator are present, use the touch control panel Service screen functions to verify collimator alignment. This process will demonstrate placement of the X-ray tube central ray, the collimator shutters, and the position of the X-ray sensor.
4. If the collimator verification is successful, it will be necessary to replace the X-ray Sensor (60-A1010).

Images too Dark

1. Overexposed images can occur for several different reasons. Before detailed troubleshooting begins, it would be expedient to verify the selected radiographic techniques and image management program filter settings.
2. If the problem persists, review the system for error messages pertaining to the X-ray generator, such as kV or mA too high or too low. In such cases it will be necessary to replace the X-ray Generator Power Supply Assembly (60-A2035) or the X-ray Tubehead Assembly (60-A1014).
3. If no error messages related to the X-ray generator are present, it will be necessary to replace the X-ray Sensor (60-A1010).

Poor Image Sharpness

1. Image sharpness is generally a function of image manipulation software. Verify the image management software filter settings and radiographic techniques to verify proper operation.
2. Secondarily, sharpness will be compromised with patient movement. During examination, remind the patient to remain motionless and, if possible, suspend respiration.
3. In rare cases, the condition of the X-ray tube target may contribute to poor image sharpness. In this case it will be necessary to replace the X-ray Tubehead Assembly (60-A1014).

Poor Image Contrast

1. Image contrast is generally a function of image manipulation software. Verify the image management software filter settings.
2. The selected kilovoltage in the radiographic technique will also control image contrast. Lower kV settings will produce images with more black and white with less shades of grey; higher kV will produce images with less black and white and more shades of grey.
3. If the problem persists, review the system for error messages pertaining to the X-ray generator, such as kV too high or too low. In such cases, it will be necessary to replace the X-ray Generator Power Supply Assembly (60-A2035) or the X-ray Tubehead Assembly (60-A1014).

Poor Image Brightness

1. Image brightness is generally a function of image manipulation software. Verify the image management software filter settings.
2. The selected milliamperes in the radiographic technique will also control image brightness. Lower mA settings will produce images with less black and more white; higher mA will produce images with more black and grey.
3. If the problem persists, review the system for error messages pertaining to the X-ray generator, such as kV too high or too low. In such cases, it will be necessary to replace the X-ray Generator Power Supply Assembly (60-A2035) or the X-ray Tubehead Assembly (60-A1014).

Loss of Image Quality in Area of the Spine

1. Image informational quantity and quality is generally a function of image manipulation software. Verify the image management software filter settings.
2. Insufficient dosage in the spine area will contribute to loss of details in that area of the image. Check the selected mA and kV settings for appropriateness.
3. If the problem persists, review the system for error messages pertaining to the X-ray generator, such as kV too high or too low. In such cases, it will be necessary to replace the X-ray Generator Power Supply Assembly (60-A2035) or the X-ray Tubehead Assembly (60-A1014).

Phantom Image Unacceptable or Patient Consistently Misaligned in the Image

This condition is caused by mechanical misalignment of the X-ray tube, collimator X-ray sensor, patient positioning table, and overhead/c-arm rotation. Perform mechanical alignments as outlined in the Adjustment and Calibrations section of this manual.

Sensor Fails

X-ray Sensor not Detected

1. With the system in the “on” condition, disconnect and then reconnect the X-ray Sensor (60-A1010) on the panoramic X-ray device. It will take approximately 60 seconds for the sensor to restart and be recognized.

2. If the condition persists, inspect the condition of the X-ray sensor connection at J17 of the Overhead Interconnect Board (60-08016). The X-ray sensor signals exit this board at J18 and are conducted through a CAT 5 cable to the PoE Switch (60-08063). The signals arrive at one of the four left hand Ethernet ports on the board.
3. X-ray sensor signals exit the PoE Switch at one of the four right hand Ethernet ports through the panoramic column flex cable and on to the Cable Entrance Board (60-08018) at the rear of the column.
4. From this point the X-ray sensor signals pass through the CAT 5 cable to the workstation.
5. Continued lack of communication will necessitate the replacement of the X-ray Sensor.

Indicators Fail

Lasers do not Turn on or do not turn Off

1. All four positioning lasers are activated by the Patient Table Membrane Switch (60-08068). The signal is conducted through the Membrane Switch Cable (60-08077) to the RTC (60-08008).
2. The activation signal arrives from the Patient Table Membrane Switch on connector J24. The signal is processed by the RTC and provides parallel 5 vdc outputs on J13 (for the mid-Sagittal Line), J14 (for the Frankfort Plane), J16 (for the left Cuspid) and J17 (for the right Cuspid).
3. Verification of the 24 vdc supply voltage arriving at J22, places the source problem on the RTC, and replacement should be performed.

Inoperative Audible X-ray Indicator

Replace the X-ray Power Supply (60-08011) and reload the data on the Logic board (60-08007) as outlined in the Service Manual.

Inoperative Audible Motion Indicator

Replace the RTC (60-08008) and reload the data on the RTC as outlined in the Service Manual.

Inoperative Visual Indicator

Replace the RTC (60-08008) and reload the data on the RTC as outlined in the Service Manual.

5 Troubleshooting Image Quality

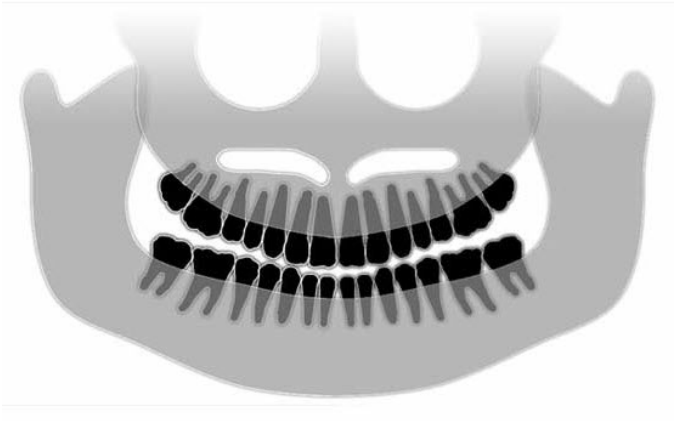
In this Chapter

- Characteristics of a Quality Image
- Typical Problems and their Causes
- Checking Image Quality

Characteristics of a Quality Image

A quality panoramic image will look like the following image.

Correct Image

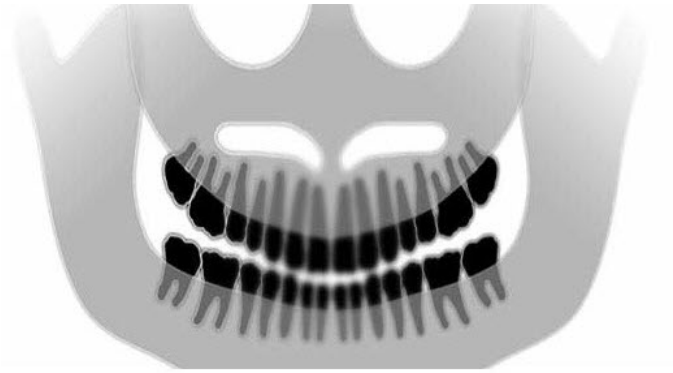
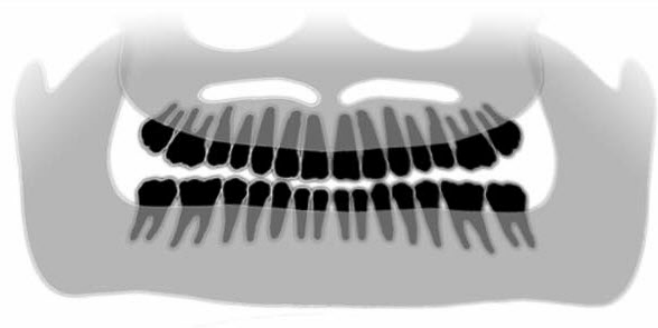
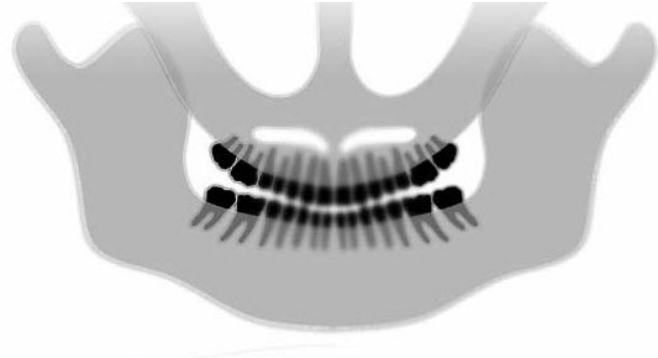


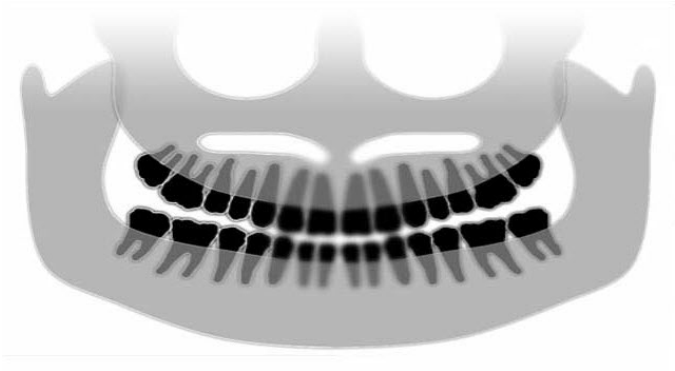
A quality image has the following characteristics:

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

Typical Problems and their Causes

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.



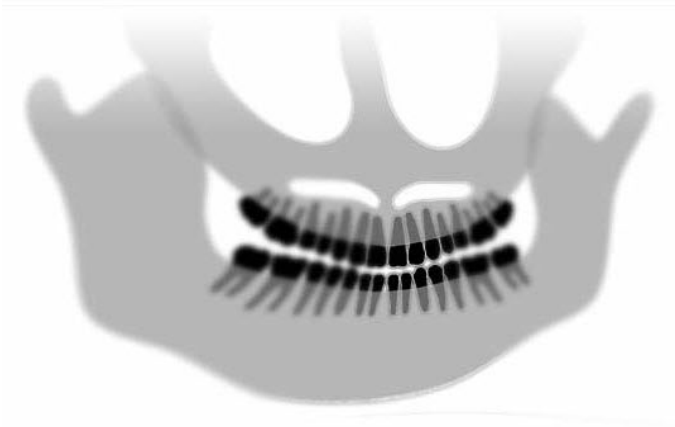
Identifying Problem Characteristics:

- 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.



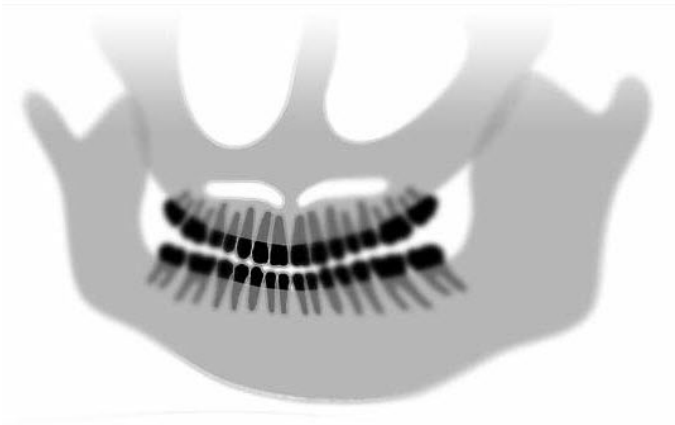
Identifying Problem Characteristics:

- 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-Sagittal 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-Sagittal laser.

Play, looseness in the system

Poor Contrast, Lack of Detail, Fuzzy

Checking Image Quality

An image quality phantom is available from Progeny. The phantom simulates the position of average human teeth roots, and markers allow you to check the position of the focal trough. To check for image quality, you need to take an X-ray exposure with the image phantom and then view the image, checking it according to some specific tests.

Install the Image Phantom

The Vantage panoramic device is designed so that the chin rest accessory can easily be switched with the image phantom.

1. To install the image phantom, lift the chin rest from the chin rest hole on the patient positioning table.
2. Set the image phantom in the chin rest hole.

Image Verification Procedure

1. Connect the Panoramic X-ray device to power and to the workstation.
2. Start the Panoramic X-ray device and wait for the image acquisition screen to appear.
3. Open Image J on the workstation.
4. Open Pan TWAIN Import.
5. Mount the Test Phantom with adaptor on the patient positioning table.
6. Mount the copper filter on the sensor along the right hand edge, approximately 5mm from the lower edge.
7. Set the kV to 68 and the mA to 8 with the aluminum plate.
8. Click on the Ready for Imaging button.
9. When the status indicator turns green, close the lead room door and hold down the exposure key until the X-ray indicators finish and the device returns to the patient entry position.
10. Click on ‘OK’ on the image preview screen.
11. Click on the diskette on the Pan TWAIN screen and save to a directory named specifically for the machine being tested.
12. Open the image in Image J.
13. Click on Image, Properties, and make sure the units are set to mm, and the pixel size is set to .096 width and height. Click OK.
14. Using the line tool, draw a line between the following features in the image. **After each line, hit ctrl-m:**

- Using the straight line selections command, measure the width of the image from the vertical line adjacent to the R to the vertical line adjacent to the L. Distance should be 160mm +/-6mm.
- Using the straight line selections command, measure the width of the image from the vertical line adjacent to the R to the center line. Distance should be 80 +/-3mm

- Using the straight line selections command, measure the width of the image from the vertical line adjacent to the L to the center line. Distance should be within 3mm of the distance obtained in step ii.
- Using points selections command, click on the lowest point of the center line then, shift + left click on the highest pint of the horizontal center line on the L or R. Distance should not be more than 6mm.
- Using the straight line selections command, measure the angle of vertical line adjacent to the R. Angle should be vertical within 6°.
- Using the straight line selections command, measure the angle of the central vertical line. Angle should be vertical within 4°.
- Using the straight line selections command, measure the angle of the vertical line adjacent to the L. Angle should be vertical within 6°.
- Using the straight line selections command, measure the distance from the left edge of the image to the central line. Distance should be 150mm+/-3mm

15. When all measurements have been taken, save the results file under the device serial number.
16. Examine the solid circles adjacent to the central line:

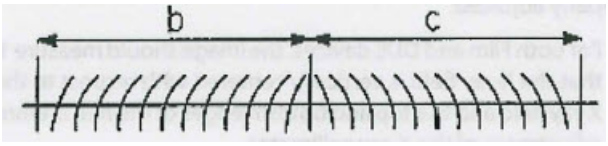
- Circles on, and on either side of the horizontal center line should be round.
- Circles at the highest extent of the vertical center line should be stretched sideways.
- Circles at the lowest extent of the vertical center line should be narrowed sideways.

17. If any of the above conditions are not met, recheck steps 1 through 5.

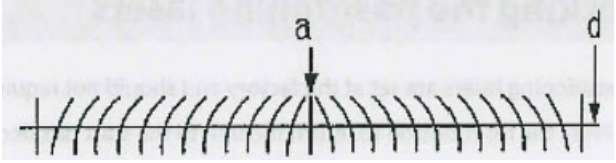
Image Checks

The following checks for image quality are performed on the image after exposing the phantom. In general, each individual line should be sharp where the lines cross the center of the image, and they should blur out above the center line.

1. Verify that the semi-projections b = c +/- 3 mm (nominal value with the central vertical line well focused) = 80 mm.

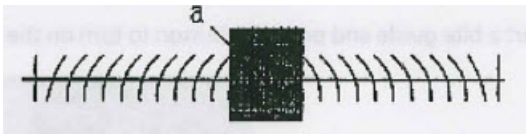


2. Verify that line “a” is vertical +/-4 degrees with respect to the horizontal line “d”.

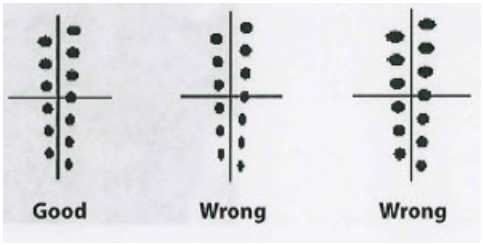


3. Verify that line “d” is horizontal and flat within a band of 6 mm.

4. Verify that the darkened area is centered in respect to the central vertical line “a” with a tolerance of +/- 4 mm.



5. Verify that the central vertical line is well focused and adjacent balls are round.



6 Overview of Service Tasks

In this Chapter

Service Screen Overview

The Service screen is home to the troubleshooting options for the Vantage Panoramic X-ray System. From the Service screen, you can access, test, and calibrate the various Vantage system components.

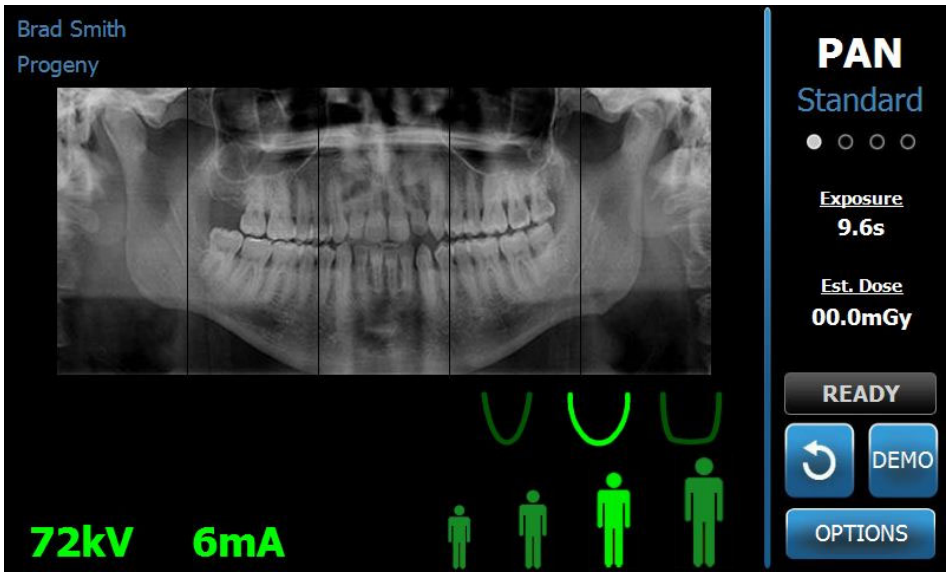
This section explains how to open the Service screen and identifies the maintenance functions and Vantage components that can be accessed from the Service screen.

The Service screen is password protected. Only the service technician and support personnel should access it.

Opening and Using the Service Screen

The home screen on the touch control panel is the Acquisition Setup screen. The Acquisition Setup screen provides access to the Service screen. The procedure below explains how to access the Service screen from the Acquisition Setup screen.

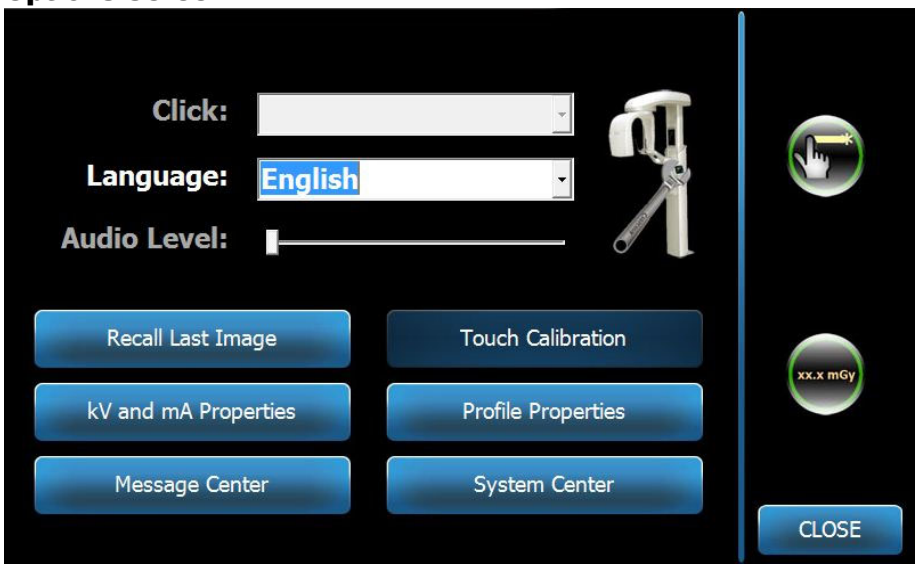
Acquisition Setup Screen



Opening the Service Screen

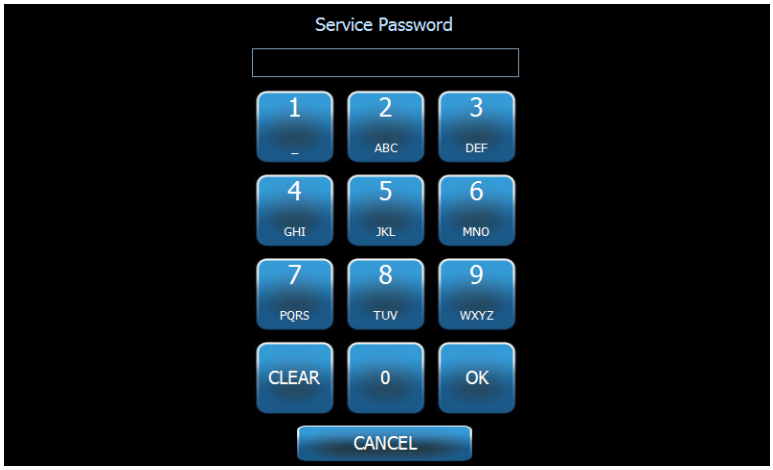
1. On the Acquisition Setup screen, tap the Options button.

Options Screen



2. On the Options screen, tap the Service icon (image of panoramic X-ray device with wrench).

Service Password Screen



3. On the Service Password screen, enter the password (77469) and tap the OK button. The Service screen appears if the correct password was entered.

Service Screen

Using the Service Screen

The Service screen provides maintenance and troubleshooting functions for the panoramic X-ray device. The Service screen is interactive. Tapping an icon initiates a specific task, as described in the Icon Tasks table below.

Icon Tasks

Function	Description
Shipping 	Select the Shipping function to return the Vantage device to its original, full down shipping position.
Network Settings 	Select the Network Settings function to view information about the IP address, TCP/UDP, and Port number for the sensor, RTC, and touch control panel.
Update 	Select the Update function to update the Vantage Panoramic software.
Life Test 	Select the Life Test function to run a short or open-ended life cycle test.
Information 	Select the Information function to display the error logs, System Center, or Message Center.
Left or Right 	Select the Left or Right function to set the direction for approaching and exiting the panoramic X-ray device.

Tapping a Vantage component displays a list of tasks, as illustrated below for the Tubehead. Each task may lead to additional tasks.

Component Task – Tubehead

Component Tasks

Component	Description
Telescoping Column	Tap the telescoping column to: • Check the column motor functionality. • Move the column motor to full down position. • Move the column motor to full up position.
Touch Control Panel	Tap the touch control panel to identify areas on the screen that are insensitive to touch.
Patient Table	Tap the patient table to: • Align the Cuspid laser. • Test the operation of the positioning controls (column up/down, open/close wands, laser lights on/off). • Check the functioning of the wands and motor.
Sensor	Tap the sensor to initiate a calibration or alignment. Calibration requires the acquisition of an exposure.
Tubehead	Tap the tubehead to: • Calibrate the height and width of the X-ray beam. • Adjust the screw for the angle of the beam. • Check the collimator X-motor functionality. • Check the collimator Y-motor functionality. • Verify the collimator calibration.
Overhead Arm	Tap the overhead arm to: • Set the Y-motor zero position to manually align the zero position of the overhead arm. • Check the Y-motor functionality. • Set the X-motor zero position to manually align the zero position of the overhead arm. • Check the X-motor functionality. • Set the R-motor zero position to manually align the zero position of the overhead arm. • Check the R-motor functionality.

Life Test

Life Test moves the panoramic X-ray device through all mechanical motions performed while taking an image. After service, run the Life Test to verify all panoramic X-ray device motions.

1. Start the panoramic X-ray device and wait for the Image Acquisition screen to appear
2. Tap Options button.
3. Tap the Service icon.
4. Tap the Life Test icon.
5. Make sure the Normal indicator is lit.

6. Select Short
7. During testing, monitor the device for unusual noises or other behavior.
8. After 100 cycles have finished the device will stop.

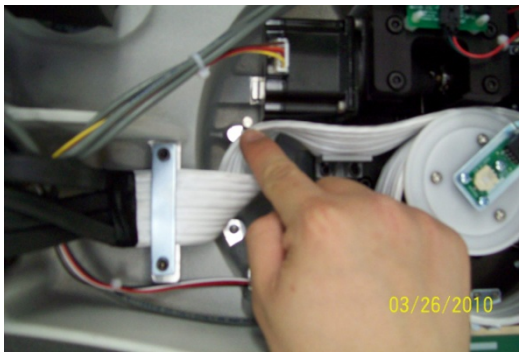
7 C-Arm

In this Chapter

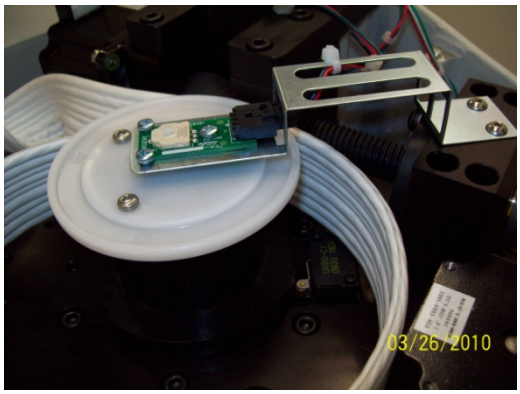
C-arm Alignment

Note: This can only be done when the X-axis is in zero position.

1. On the Service screen, select the overhead arm and perform the Axis Service and Diagnostics task.
2. Select the R axis.
3. Manually move the overhead arm until the medium alignment pin (Part # 60-T0029) fits in the zero position hole, as shown in the picture below.



4. Remove the pin.
5. On the touch control panel, tap Set Alignment.
6. Wait for the panoramic X-ray device to stop moving.
7. On the touch control panel, tap Move to Home and wait for the movement to stop.
8. Confirm that the switch lever is at the high position, as shown in the picture below.



9. On the touch control panel, tap Move to Zero and wait for movement to stop.
10. When movement has stopped, insert the pin in the zero position hole, confirming that it inserts fully. If it doesn't insert fully, go back to step 3.
11. On the touch control panel, tap Finish twice to return to the Service screen.

8 Collimator and X-ray Generator

In this Chapter

Collimator Calibration

1. In the Service screen, tap on the tubehead and select the Calibrate Collimator task.
2. Calibrate axis.
3. Wait until the status line asks you to make an exposure.
4. Wait until the 'Moving' status indicator goes back to grey.
5. Hold down the exposure switch until the cooling indicator lights or the audible X-ray indicator finishes.
6. The status line will indicate the necessary angular adjustments to the collimator. Using a hex key, loosen the two screws holding the collimator in place and tighten them until they just contact the collimator body.
7. Turn the angle adjustment screw the amount indicated in the status line.
8. Tighten the two screws holding the collimator in place.
9. Click on 'Continue'.
10. When the cooling indicator clears, the status line will ask for an exposure.
11. Wait until the 'Moving' status indicator goes back to grey.
12. Hold down the exposure switch until the cooling indicator lights or the audible X-ray indicator finishes.
13. If the angular adjustment was sufficient, the procedure will move to the next step. If not, the status line will indicate the necessary adjustment. Repeat steps 2 through 13 until this happens.
14. Wait until the status line asks you to make an exposure.
15. Wait until the 'Moving' status indicator goes back to grey.
16. Hold down the exposure switch until the cooling indicator lights or the audible X-ray indicator finishes.
17. If the calibration is successful, the status line will indicate this. If not, repeat steps 2 through 17. You will need to make one final exposure to verify the calibration. If not, repeat steps 2 through 17. The angle needs to be under 0.25.
18. Wait until the status line asks you to make an exposure.
19. Wait until the 'Moving' status indicator goes back to grey.

20. Hold down the exposure switch until the cooling indicator lights or the audible X-ray indicator finishes.
21. The status line will indicate successful verification.
22. Click on ‘Finish’ 2 times to end.

Beam Alignment

1. Mount the tubehead alignment laser from the service kit on the tubehead in place of the collimator, as shown in the picture below.

2. Mount the beam alignment fixture to the underside of the ‘C’ arm, as shown in the picture below.

3. Connect the laser power.

CAUTION! Class 2 Laser radiation. Do not stare into the beam. 650 nm, 3 mW

4. Loosen the 4 bolts supporting the tubehead.
5. Adjust the tubehead by rotating/sliding the tubehead until the laser beam passes through the slit in the beam alignment fixture.
6. Tighten the 4 bolts supporting the tubehead making sure the laser line stays in position.
7. Remove the beam alignment fixture from the Vantage and disconnect the laser power.

9 Telescoping Column

In this Chapter

Column Opto Function

1. On the Service screen, select the column and perform the Service Column task.
2. Use the positioning controls on the panoramic X-ray device to move the telescoping column away from end stop.
3. On the touch control panel, tap Return to Up Flag.
4. Use the positioning controls on the panoramic X-ray device to move the telescoping column down approximately 2 inches.
5. On the touch control panel, tap Return to Down Flag.
6. Click Finish.
7. Click Exit.

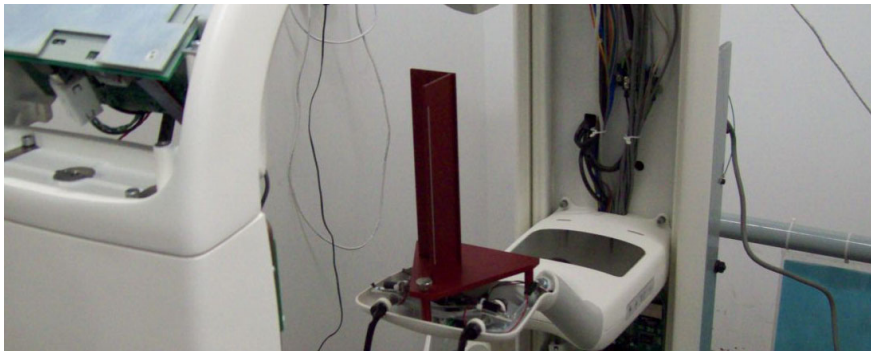
10 Lasers

In this Chapter

Align Lasers

Initial Procedure (All Lasers)

1. Remove the cover from the patient positioning platform, if it has been installed.
2. Assemble the upper cover to the column, connecting the Frankfort Plane laser to the appropriate terminals on the RTC.
3. Place the laser alignment fixture on the positioning platform with the two pins in the screw holes close to the grips, and the thumbscrew at the outermost end, as shown in the picture below.



4. Press the laser button to illuminate the lasers.

CAUTION! Class 2 Laser radiation. Do not stare into the beam. 650 nm, 3 mW

Frankfort Plane Laser

1. Move the Frankfort Plan slider until the laser contacts the horizontal line.
2. If the laser does not align with the mark on the fixture, remove the cover and loosen the screw on the side of the Frankfort Plane transit that retains the laser.
3. Rotate the laser and replace the cover onto the column.
4. Repeat from step 2 until laser aligns.
5. Remove cover and tighten screw.
6. Check alignment one final time.

Mid-Sagittal Laser

1. If the laser does not align with the mark on the fixture, loosen the screws mounting the bracket to the column and slide the bracket from side to side.
2. If necessary, loosen the screw clamping the laser to the bracket and move the laser into alignment.

Cuspid Lasers

1. Move the Cuspid laser transit until the detent in the sensing pot is felt (center of movement).
2. If the lasers do not align with the mark on the fixture, loosen the screw holding the laser/mirror assembly to the transit and pivot the laser into alignment. Repeat with the other Cuspid laser.

Final Procedure (All Lasers)

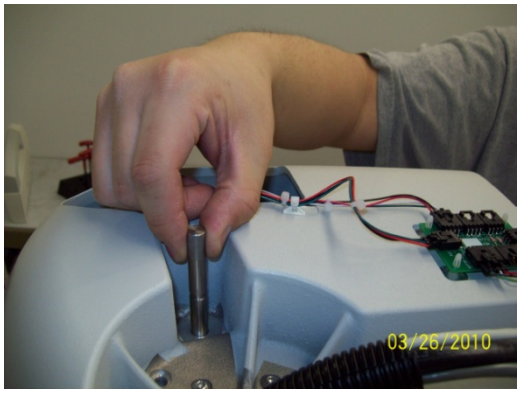
Remove the alignment fixture and reassemble the patient positioning table

11 Overhead Arm

In this Chapter

Y-axis Alignment

1. On the Service screen, select the overhead arm and perform the Axis Service and Diagnostics task.
2. Select the Y axis.
3. Manually move the overhead arm until the large alignment pin (Part # 60-T0028) fits in the zero position hole, as shown in the picture below.

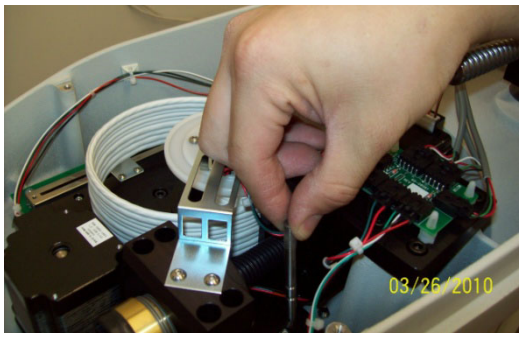


4. Remove the pin.
5. On the touch control panel, tap Set Alignment.
6. Wait for the panoramic X-ray device to stop moving.
7. On the touch control panel, tap Move to Home and wait for the movement to stop.
8. Confirm that the flag is centered in the optical sensor, as shown in the picture below.

9. On the touch control panel, tap Move to Zero and wait for movement to stop.
10. When movement has stopped, insert the pin in the zero position hole, confirming that it inserts fully. If it doesn't insert fully, go back to step 3.
11. On the touch control panel, tap Finish twice to return to the Service screen.

X-axis Alignment

1. On the Service screen, select the overhead arm and perform the Axis Service and Diagnostics task.
2. Select the X axis.
3. Manually move the overhead arm until the medium alignment pin (part # 60-T0029) fits in the zero position hole, as shown in the picture below. The overhead arm can be moved using the column keys or by turning the screw manually.



4. Remove the pin.
5. On the touch control panel, tap Set Alignment.
6. Wait for the panoramic X-ray device to stop moving.
7. On the touch control panel, tap Move to Home and wait for the movement to stop.
8. Confirm that the flag is centered in the optical sensor, as shown in the picture below

9. On the touch control panel, tap Move to Zero and wait for movement to stop.
10. When movement has stopped, insert the pin in the zero position hole, confirming that it inserts fully. If it doesn't insert fully, go back to step 3.
11. On the touch control panel, tap Finish twice to return to the Service screen.

12 Sensor

In this Chapter

Align the Sensor

Part 1

1. Mount the tubehead alignment laser from the service kit on the tubehead in place of the collimator, as shown in the picture below.

2. Mount the beam alignment fixture to the underside of the ‘C’ arm, as shown in the picture below.

3. Connect the laser power.

CAUTION! Class 2 Laser radiation. Do not stare into the beam. 650 nm, 3 mW

4. Loosen the two bolts supporting the sensor mount casting.
5. Align the vertical graphic line on the sensor to the center of the beam by rotating the adjustment screw.
6. Tighten the 2 sensor mount screws, making sure the laser line stays in position.
7. Remove the beam alignment fixture from the Vantage and disconnect the laser power.

Part 2

After the collimator has been calibrated, perform this procedure for fine sensor alignment.

1. Connect the panoramic X-ray device to the workstation.
2. Plug-in and power-up the panoramic X-ray device.
3. Make sure the panoramic X-ray device shows connected in the interface screen.
4. On the touch control panel, enter open the Service screen.
5. Open the Progeny TWAIN application.
6. Tape copper strip over the sensor, as shown in the picture below.

7. Mount the beam alignment fixture to the underside of the C-arm.
8. Put in calibration CD.
9. Copy Calibration file to C:\\Program Files\Progeny\Sensors\Pan.
10. Put the sensor on the unit.
11. On the Service screen, tap the sensor and perform the Perform Alignment task.
12. Select adjust sensor.
13. When the collimator stops moving, or when prompted on the message box, make an exposure.
14. If failure occurs, the beam image is not centered in the sensor. Loosen the 2 sensor mounting screws and turn the adjusting screw as instructed by the software. Then tighten mounting screws and select continue.
15. When successful, select continue, and then the program will automatically go to verify alignment.
16. Make an exposure when message box says to.
17. When successful select finish.
18. Remove the beam alignment fixture.

13 Wands

In this Chapter

Set Wand Open Position

1. Install wands on positioning platform shafts, making sure the keying features align.
2. Press the positioning control until the wands are at their furthermost apart position.
3. Measure the distance between the wand tips.
4. If the distance is not equal to 150mm (6in), loosen the screws holding the opto sensor. Slide the opto sensor in the appropriate direction.
5. Tighten the opto sensor screws and press the positioning control until the wands are at their furthermost apart position.
6. Repeat from step 3 until the wand tip distance is 150mm (6in).
7. Turn on the lasers. Place a ruler across the tops of the wands. The mid-Sagittal laser should be equidistant from each wand within 1mm.
8. If the mid-Sagittal laser is not equidistant, then bend the link wand down to adjust the table position.
9. Reassemble the patient positioning table cover.

14 Patient Positioning Table

In this Chapter

- Patient Positioning Table Alignment

Patient Positioning Table Alignment

1. Mount the tubehead alignment laser from the service kit on the tubehead in place of the collimator, as shown in the picture below.

1. On the Service screen, select the overhead arm and perform the Axis Service and Diagnostics task.
2. Select the Y axis.
3. Tap Move to Table.
4. Connect the laser power.

CAUTION! Class 2 Laser radiation. Do not stare into the beam. 650 nm, 3 mW

5. Remove the patient positioning table platform cover assembly.
6. Mount the laser alignment fixture on the patient positioning table platform.
7. The tubehead laser should fall on the back edge of the Cuspid laser alignment plate.
8. Loosen the 4 bolts holding the table in place and shift the table left or right as needed.
9. If the shifting of the table is unable to align the laser with the fixture, use the positioning controls to move the overhead until the laser is aligned.
10. On the touch control panel, tap Calibrate Table.

11. Tighten up the 4 bolts holding the table in place.
12. Remove tubehead alignment laser and replace collimator.
13. Repeat for X-axis, omitting the loosening of bolts etc.

15 Operational Readiness

In this Chapter

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.
	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 Offline status until the workstation software is started. The panel must switch to the main screen when the workstation software is up and running. The panel functions must respond to interrogation.
	Movement Control Switches	Verify wand positioning and column vertical drive.

	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.
	Workstation Operation	After power up, verify the Panoramic server icon is present in the system tray. Icon menu should be functional. Perform a trial examination on the test phantom. Evaluate the outcome of this trial exam.
	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.

Appendix A
Touch Control Panel Non-Service Menus

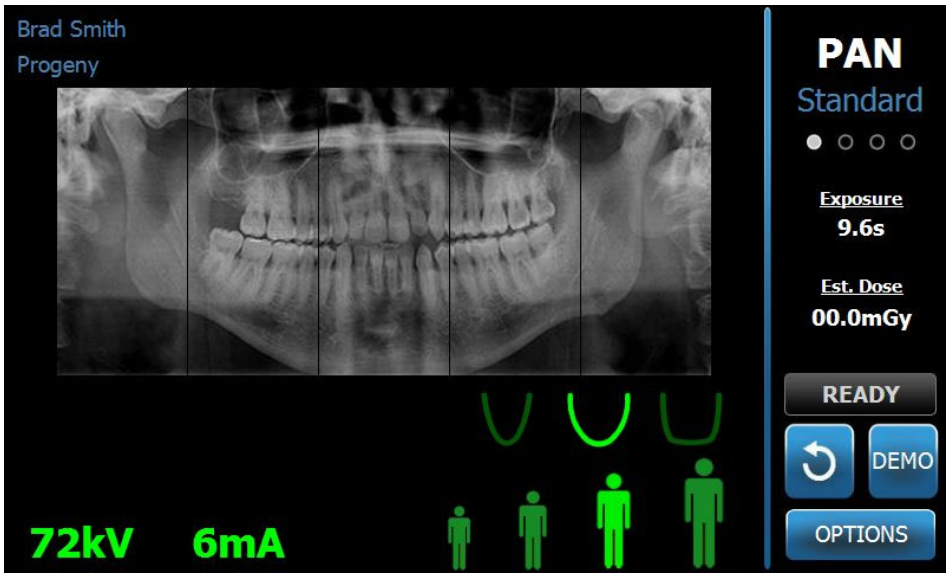
In this Chapter

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.

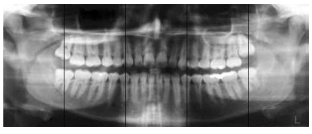
The technique factors define the intensity and duration of the X-ray. Technique factors include the settings of the projection type, segmentation, patient size, jaw size, and kiloVolt (kV) and milliAmpere (mA) values.

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 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 - narrow, normal, and wide -accommodate patients with different jaw shapes and sizes.
Segmentation 	By default, the Vantage System images the entire jaw. You can use the segment panels 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 Vantage System automatically selects the outermost two segments and does not allow changes. For a Pan Enhanced projection type, the Vantage System automatically selects the innermost three segments, and does not allow changes.

<table>
<tr><th>Option</th><th>Description</th></tr>
<tr><td>kV and mA
 
</td><td>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.
<table>
<tr><th rowspan="2">Patient Size</th><th colspan="2">Default Values</th></tr>
<tr><th>kV Value</th><th>mA Value</th></tr>
<tr><td>Child</td><td>66</td><td>8</td></tr>
<tr><td>Small adult</td><td>72</td><td>10</td></tr>
<tr><td>Adult</td><td>76</td><td>10</td></tr>
<tr><td>Large adult</td><td>80</td><td>10</td></tr>
</table></td></tr>
<tr><td>Ready for Imaging
  </td><td>The Ready for Imaging button has a dual purpose. It moves the Vantage System to either the Ready for Imaging position or the patient entry position, depending on its current position. If the 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.</td></tr>
<tr><td>Demo
 
</td><td>The Demo button turns on Demo mode. In this mode, all functions of the Vantage device are available, but no X-rays are emitted.</td></tr>
<tr><td>Options
 
</td><td>The Options button opens the Options window where you can configure the default values for the Vantage System. For more information, see Options Screen in this chapter.</td></tr>
<tr><td>Exposure Time
 

Cool Down Time
 
</td><td>This indicator displays the patient Exposure Time, in seconds.
When the Vantage device is in cool down mode, the Cool Down Time replaces the Exposure Time.</td></tr>
</table>

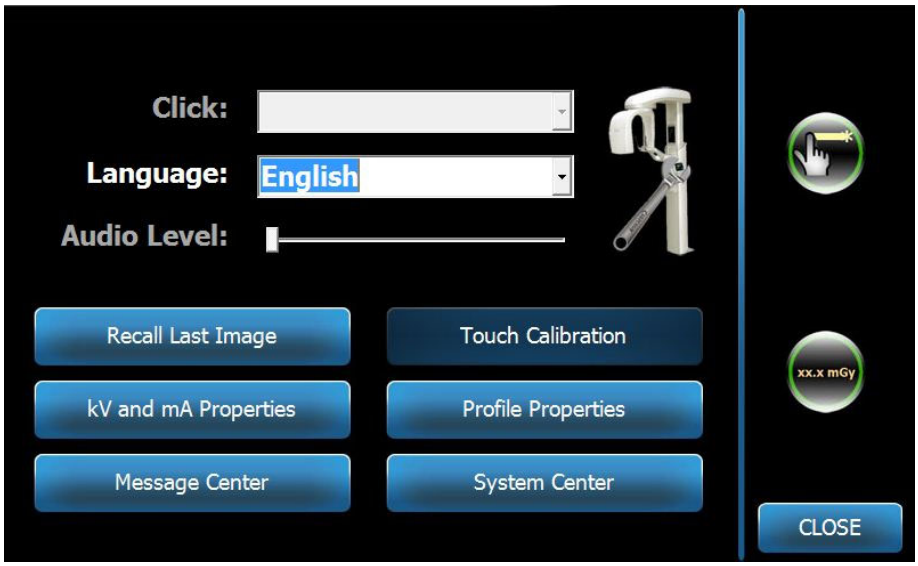
Option	Description
Est. Dose	To assist medical personnel and the patient to make informed decisions, the Vantage System displays an estimated dose for the selected image survey to be executed. The estimated dose is shown as *Dose-Area Product (DAP)* in SI units of mGy·cm^2. The displayed value is calculated based on a model for the Vantage performance and is not calibrated. **WARNING:** Use the displayed *estimated DAP* values only as guidance to the level of X-ray exposure before the actual irradiation. Do not use the displayed *estimated DAP* value when a precise dose reading is expected. Instead, use calibrated equipment to measure the actual dose of interest during the X-Ray irradiation.
Status Indicator 	When the status indicator displays **Ready** in green, the Vantage System is ready for imaging. When **Ready** is gray, the Vantage System is in the exit position. When **Ready** is yellow, the 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 Vantage System is in motion. When **Safe** appears, the 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 Vantage System. When **Offline** appears, the Vantage System is not connected to the workstation.

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 left makes the sound less audible; moving it to the right makes it more audible.
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.
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.
Touch Calibration	This button allows you to refine the sensitivity of the touch screen to your touch.
Profile Properties	This button is used to set the default kV and mA values and the jaw size for each patient size.

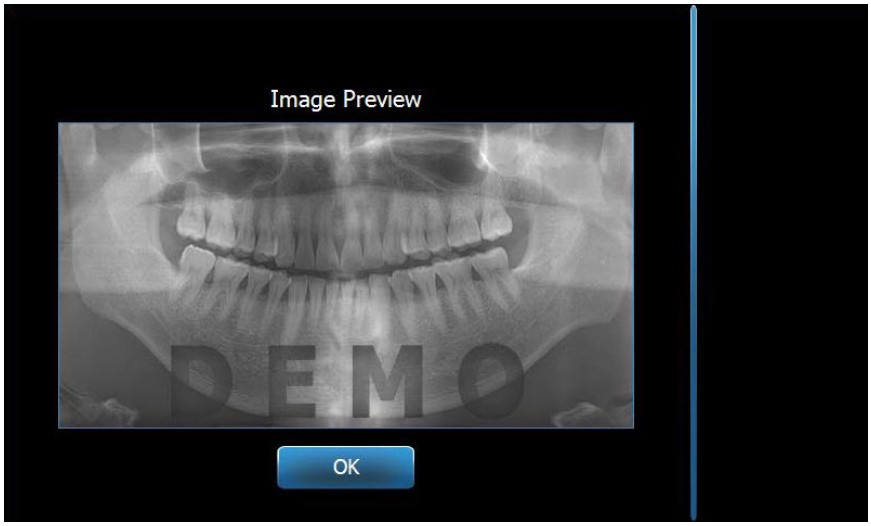
Option	Description
System Center	This button provides access to information on the sensor type, serial number, and number of images taken since the last sensor controller reset.
Service icon 	This button is used for maintenance or when a service technician works on the system. It is password protected.
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.
mGray icon 	This button is used to enable and disable the dose display.

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.

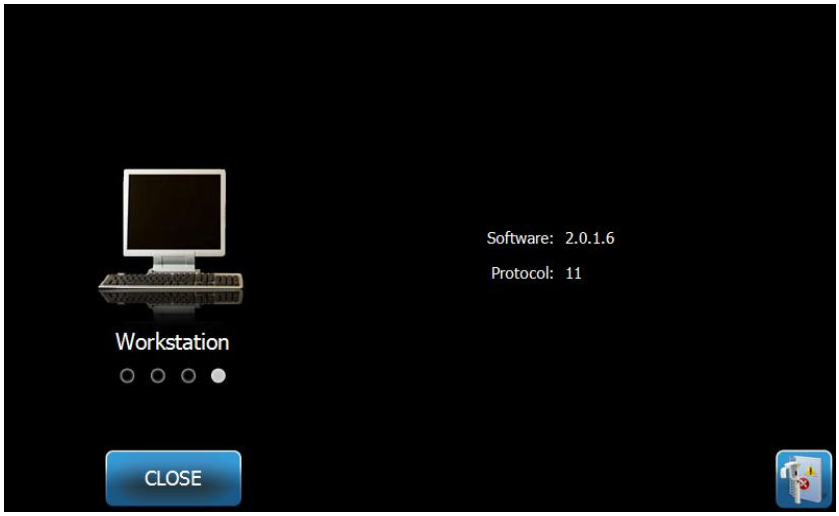
Recall Last Image Screen



System Center

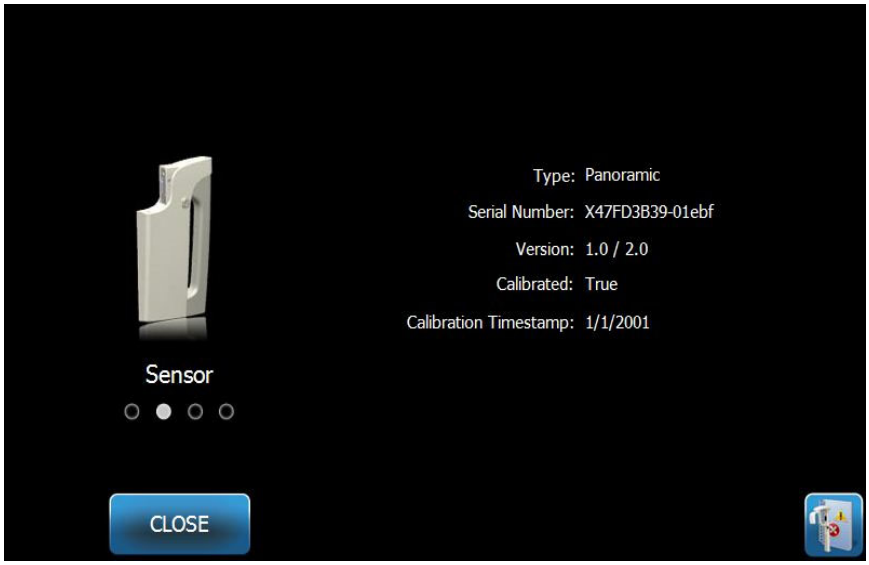
The System Center will allow access to four screens to display system information. The 4 screens are Workstation, Sensor, Real Time Controller, and VantageTouch Panel. The information in these screens allows the user to verify system revision information and usage information. The information provided is shown in the following screen displays:

Workstation Screen

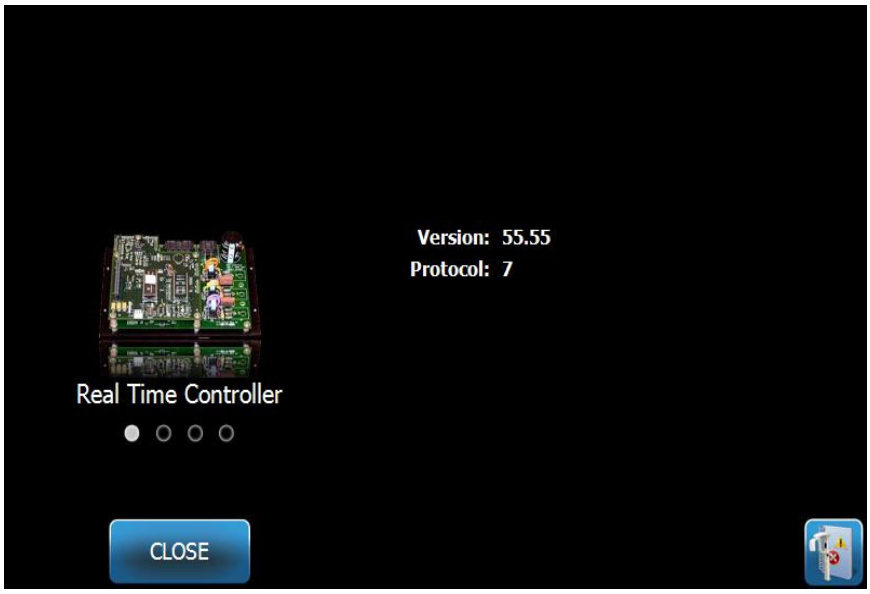


Sensor Screen

This screen is informational, and displays the type, serial number, and other information about the currently connected sensor.



Real Time Controller Screen

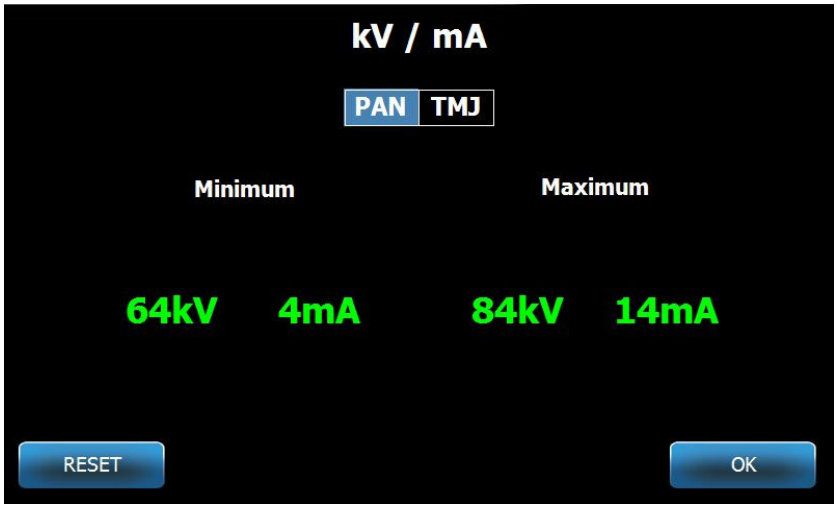


VantageTouch Panel Screen

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

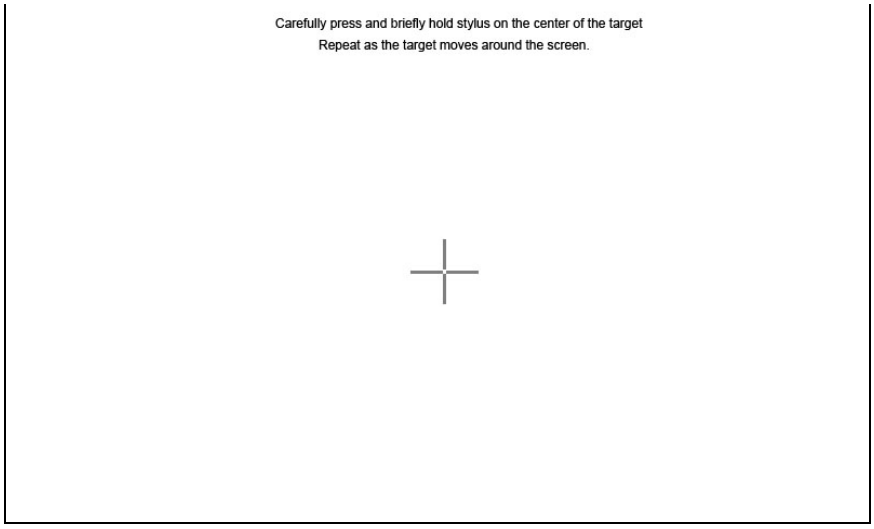


Touch Calibration Screen

The Touch Calibration screen provides a set of steps to align the physical tapping on the screen with the expected action. The touch control panel comes already calibrated from the factory and no further calibration should be needed.

When you tap Touch Calibration on the Options screen, a pop-up window appears, confirming that you wish to calibrate.

Touch Calibration Screen



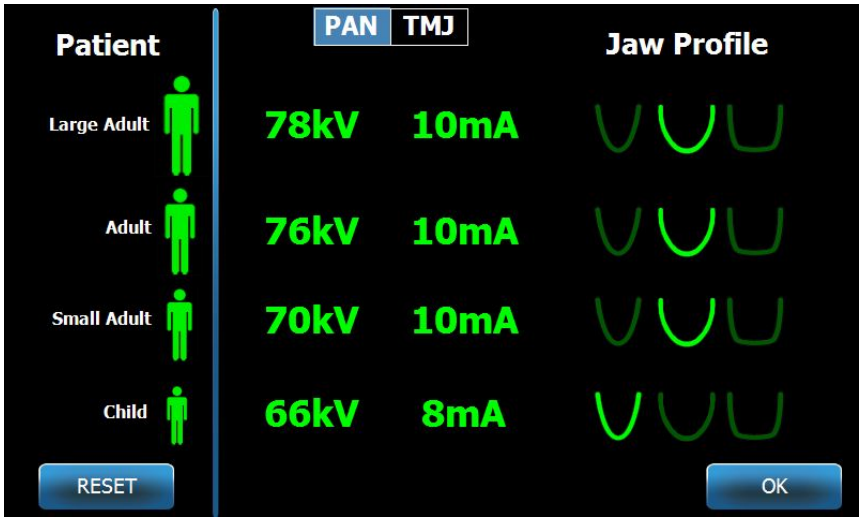
Profile Properties Screen

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.

Options on the Profile Properties Screen

Option	Description
PAN/TMJ	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 and TMJ projections.
Jaw Profile	For Pan images, you can customize the patient size further by specifying a jaw size: Narrow, Normal, and Wide.

Midmark
1001 Asbury Drive
Buffalo Grove, Illinois 60089
USA
(847) 415-9800
Fax: (847) 415-9801
www.midmark.com

Technical Library
www.midmark.com/technical-library

Technical Support
(800) 643-6275
www.midmark.com/service-support
imagingtechsupport@midmark.com