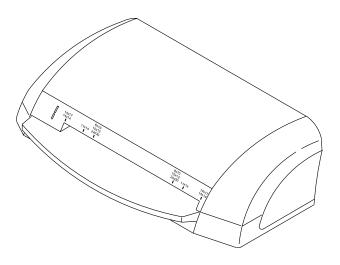
CARESTREAM DIRECTVIEW VITA CR System

Service Guide





Important

- Qualified service personnel must install this modification.
- See the Service Portal for possible updates before doing this modification.
- When doing the procedures in this document, you must use safe work practices and wear the correct personal
 protective equipment (for example, safety eyewear) according to your company's standard operating
 procedures.

CARESTREAM DIRECTVIEW VITA CR System Service Guide

Document No.: 8H8442

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Use of Manual

CARESTREAM CR Systems are designed to meet international safety and performance standards. Personnel operating the unit must have a thorough understanding of the proper operation of the system. This manual has been prepared to aid medical and technical personnel to understand and operate the system. Do not operate the system before reading this manual and gaining a clear understanding of the operation of the system. If any part of this manual is not clear, please contact your Carestream Health representative for clarification.



Authorized Representatives

LES MERCURIALES 40, rue Jean Jaures 93176 BAGNOLET CEDEX

France



Carestream Health, Inc.

Rochester, NY 14608

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Section 1: Safety and Regulatory Information

Introduction

The information contained herein is based on the experience and knowledge relating to the subject matter gained by Carestream Health prior to publication. No patent license is granted by this information.

Carestream Health reserves the right to change this information without notice, and makes no warranty, express or implied, with respect to this information. Carestream Health shall not be liable for any loss or damage, including consequential or special damages, resulting from any use of this information, even if loss or damage is caused by Carestream Health's negligence or other fault.

Document Conventions

In this document the CARESTREAM DIRECTVIEW VITA CR SYSTEM will be referred to as "Vita CR". "CR Scanner", or "System".



Notes provide additional information, such as expanded explanations, hints, or reminders.



Caution

Cautions point out procedures that you must follow precisely to avoid damage to the system or any of its components, yourself or others, loss of data or corruption of files in software applications.



Important

Important highlights critical policy information that affects how you use this manual and this product.

General Safety Guidelines

- This product is designed and manufactured to ensure maximum safety of operation. Operate and maintain it in strict compliance with the safety precautions and operating instructions contained in this manual.
- This product meets all the safety requirements applicable to medical equipment. However, anyone attempting to operate the system must be fully aware of potential safety hazards.
- · Aside from cleaning the phosphor screen and the system's rollers, there are no user serviceable parts in this system. The product must be installed, maintained, and serviced by qualified service personnel according to procedures and preventive maintenance schedules in the product service manual. If your product does not operate as expected, contact your Service Representative.
- Do not modify this product in whole or in part without prior written approval from Carestream Health.
- · Personnel operating and maintaining this system should receive training and be familiar with all aspects of operation and maintenance.
- To ensure safety, read all user manuals carefully before using the system and observe all Cautions, Importants, and Notes located throughout the manual.
- Keep this manual with the equipment.
- Reading this manual does not qualify you to operate, test, or calibrate this system.
- Unauthorized personnel are not allowed access to the system.
- If the product does not operate properly or fails to respond to the controls as described in this manual:
 - Follow the safety precautions as specified in this manual.
 - Stop using the unit and prevent any changes to it.
 - Immediately contact the service office, report the problem, and await further instructions.
- Use only legally marketed cassettes. Check periodically the quality of the cassettes, and replace them if any defects are apparent.

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- The images provided by this system are intended as tools for the trained user. They are explicitly not to be regarded as a sole incontrovertible basis for clinical diagnosis.
- Be aware of the product specifications and of system accuracy and stability limitations. Consider these limitations before making any decision based on quantitative values. If you have any doubts, consult your Sales Representative.
- This system is Class I continuous operated stationary equipment without applied parts and has one signal input/ output part.
- The appliance coupler of the flexible cord is used as a disconnecting device.
- In order to guarantee medical-grade leakage current, the computer that is connected to the system should be a medical-grade computer or connected to the mains through a medical-grade isolation transformer.
- To achieve grounding reliability in USA installations, the equipment must be connected to an equivalent receptacle marked "Hospital Only" or "Hospital Grade".



Important

When the System is not in use, disconnect the power cable from the electrical outlet.

Electrical Hazards



Caution

- Do not remove or open system covers or plugs. Internal circuits use high voltage capable of causing serious injury.
- Fuses blown within 36 hours of being replaced by a qualified technician may indicate malfunctioning electrical
 circuits within the system. Have the system checked by qualified service personnel. Do not attempt to replace
 any fuse.
- Fluids that seep into the active circuit components of the system may cause short circuits that can result in electrical fires. Therefore, do not place any liquid or food on any part of the system.

Electromagnetic Emissions/Immunity

- Electromagnetic Compatibility Precautions
 - Medical electrical equipment requires special precautions regarding electromagnetic compatibility (EMC).
 Medical equipment must be installed and put into service according to the EMC information provided in the following documentation.
- · Communications Equipment
 - Portable and mobile radio frequency (RF) communications equipment can affect medical electrical equipment EMC performance.
- Replacement of Cables, Accessories or Transducers
 - The use of cables, accessories or transducers other than those specified below with the exception of transducers or cables sold by the manufacturer of the equipment as replacement parts for internal components, may result in increased emissions or decreased immunity of the medical equipment.
- · Other Equipment
 - The Vita CR should not be used adjacent to or stacked on other equipment. If adjacent or stacked use is necessary, verify normal operation in the configuration in which the scanner will be used.
- Cable, Accessory and Transducer Information for the Vita CR.

Port Type	Port Description	From	То	Cable Type	Cable Length
Power	AC Power	Vita CR	AC Mains	Unshielded	3 m (9.84 ft.)
Signal	USB	Vita CR	PC	Shielded	3 m (9.84 ft.)

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Guidance and manufacturer's declaration - electromagnetic emissions

The Vita CR is intended for use in the electromagnetic environment specified below. The customer or the user of the Vita CR should assure that it is used in such an environment.

Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions	Group 1	The Vita CR uses RF energy only for its internal
CISPR 11		function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions	Class B	The Vita CR is suitable for use in all establishments,
CISPR 11		including domestic establishments and those directly
Harmonics emissions	Class A	connected to the public low-voltage power supply network that supplies buildings for domestic purpos
IEC 61000-3-2		notwork that dapphed ballange for domocile purposes.
Voltage fluctuations/ flicker emissions	Complies	
IEC 61000-3-3		

Guidance and manufacturer's declaration - electromagnetic immunity

The Vita CR is intended for use in the electromagnetic environment specified below. The customer or the user of the Scanner should assure that it is used in such an environment.

			Electromagnetic environment -
Immunity test	IEC 60601 test level	Compliance level	guidance
Electrostatic	±6 kV contact	±6 kV contact	Floors should be wood, concrete or
discharge (ESD)	±8 kV air	±8 kV air	ceramic tile. If floors are covered
IEC 61000-4-2			with synthetic material, the relative
FI 41 16 4	01)//	011//	humidity should be at least 30%.
Electrical fast transient/burst	±2 kV for power supply lines	±2 kV for power	Mains power quality should be that
		supply lines	of a typical commercial or hospital environment.
IEC 61000-4-4	±1 kV for input/output	±1 kV for input/output	environment.
	lines	lines	
Surge	±1 kV line to line	±1 kV line to line	Mains power quality should be that
IEC 61000-4-5	±2 kV line to earth	±2 kV line to earth	of a typical commercial or hospital environment.
Valtage dine	.F0/ Ll= /, OF0/ alia in	.F0/ LL= /: OF0/ dia in	
Voltage dips, short	<5% U⊤ (>95% dip in U⊤) for 0.5 cycle	<5% Uτ (>95% dip in Uτ) for 0.5 cycle	Mains power quality should be that of a typical commercial or hospital
interruptions	,	,	environment. If the user of the Vita
and voltage	40% UT (60% dip in	40% U⊤ (60% dip in	CR requires continued operation
variations on	Uτ) for 5 cycles	U⊤) for 5 cycles	during power mains interruptions, it
power supply	70% U⊤ (30% dip in	70% U⊤ (30% dip in	is recommended that the Vita CR be
lines	Uτ) for 25 cycles	U⊤) for 25 cycles	powered from an uninterruptible
IEC 61000-4-11	<5% U⊤ (>95% dip in	<5% U⊤ (>95% dip in	power supply.
	Uт) for 5 sec.	Uт) for 5 sec.	
Power	3 A/m	3 A/m	Power frequency magnetic fields
frequency (50/			should be at levels characteristic of
60 Hz) magnetic			a typical location in a typical
field			commercial or hospital environment.
IEC 61000-4-8			
Note: U⊤ is the AC m	ains voltage prior to applicat	ion of the test level.	

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Guidance and manufacturer's declaration - electromagnetic immunity

The CR System is intended for use in the electromagnetic environment specified below. The customer or the user should assure that it is used in such an environment.

		Compliance	
Immunity test	IEC 60601 test level	level	Electromagnetic environment - guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the Vita CR, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.
			Recommended separation distance
Conducted RF IEC	3 Vrms	3 Vrms	d = 1.17 ÷P
61000-4-6	15 kHz to 80 MHz		
Radiated RF IEC	3 Vrms	3 v/m	d = 1.17 ÷P 80 MHz to 800 MHz
61000-4-3	80 MHz to 2.5 GHz		
			d = 2.33 ÷P 800 M Hz to 2.5 GHz
			where P is the maximum output rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m).
			Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey ^a , should be less than the compliance level in each frequency range ^b .
			Interference may occur in the vicinity of equipment marked with the following symbol:
			((·•))

Note 1: At 80 MHz and 800 MHz, the higher frequency range applies.

Note 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

a. Field from fixed transmitters, such as base station for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the scanner is used exceeds the applicable RF compliance level above, the scanner should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the scanner. b. Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 v/m.

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Recommended separation distance between portable and mobile RF communications equipment and the Vita CR

The Vita CR is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Vita CR can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communication equipment (transmitters) and the Vita CR as recommended below, according to the maximum output of the communications equipment.

W Rated maximum output power of transmitter	m Separation distance according to frequency of transmitter		
	150 kHz to 80 MHz	80 MHz to 800 MHz	800 MHz to 2.5 GHz
	d = 1.17÷P	d = 1.17÷P	d = 2.33÷P
0.01	0.117	0.117	0.233
0.1	0.37	0.37	0.737
1	1.17	1.17	2.33
10	3.7	3.7	7.36
100	11.7	11.7	23.3

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer. Note 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

Note 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

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Explosion and Implosion Hazards



Caution

- Do not operate the equipment in the presence of explosive liquids, vapors, or gases.
- Do not plug in or turn on the system if hazardous substances are detected in the environment. If these
 substances are detected after the system has been turned on, do not attempt to turn off the unit or unplug it.
 Evacuate and ventilate the area before turning off the system.

Overheating



Caution

Do not block the air circulation around the unit. Always maintain at least 15 cm (6 in.) clearance around the unit to prevent overheating and damage to the system.

Vita CR Laser Safety Instructions

The Vita CR is classified as a Class 1 Laser Product (with the outer cover in place).



Laser Warning

- The Vita CR contains a Class 3 laser. During normal operation, always keep the unit enclosed in its protective cover.
- Do not attempt to remove the cover. Only a qualified technician may remove the cover to service this product.

Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007.

Class 1 Laser Product, and IEC/EN 60825-1.

Class 1 Equipment.

Intended for continuous operation.

Product is provided with ordinary protection against the harmful ingress of water.

Not suitable for use in the presence of a flammable anesthetics mixture with air or with oxygen or with nitrous oxide.

The use of accessory equipment not complying with the equivalent safety requirements of this equipment may lead to a reduced level of safety of the resulting system. Consideration relating to the choice shall include:

- Use of the accessory in the patient vicinity.
- Evidence that the safety certification of the accessory has been performed in accordance with IEC 60601-1 or the system to IEC 60601-1-1 or local equivalent.

Device-Specific Safety Information



LIFTING HAZARD

The Vita CR weighs <36 kg (79 lb). Do not try to lift the unit by yourself. Always seek assistance from another person. Lifting equipment that is too heavy may result in serious injury and/or damage to equipment.

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Health and Safety Compliance

Regulatory Information

The Vita CR was examined for compliance and has classifications and licenses as follows:

Safety

USA	UL 60601-1: 2003 Medical Electrical Equipment
Canada	CAN/CSA 22.2 No. 601.1-M90 - Medical Electrical Equipment (R2001)
	CAN/CSA 22.2 No. 601.1S1-94 - Supplement No. 1-94 to Medical Electrical Equipment (R1999)
	CAN/CSA 22.2 No. 601.1B-90 - Amendment 2 to Medical Electrical Equipment (R2002)
International	IEC 60601-1: 1988, +A1 (1991), +A2 (1995) Medical Electrical Equipment
	IEC 60825-1: 1993 +A1:1997 + A2:2001 Safety of Laser Products
European	EN 60601-1-1: 2001 - Medical Electrical Equipment
Union	EN 60601-1: 1990 +A1: 1993, +A2: 1995, +A13: 1996 - Medical Electrical Equipment
	EN 60825-1: 1994 +A1: 1997 + A2: 2001 Safety of Laser Products

EMC

IEC 60601-1-2: 2005 Medical Electrical Equipment - Electro-Magnetic Compatibility Requirements & Tests.

IEC 60825-1-2: 2001 Safety of Laser Products - Part 1: Equipment Classification, Requirements and User's Guide.

CE Conformity

This product conforms to the requirements of Council Directive 93/42/EEC. The Vita CR is a Class I medical device. The Vita CR bears the following mark of conformity.



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IEC Symbols Used

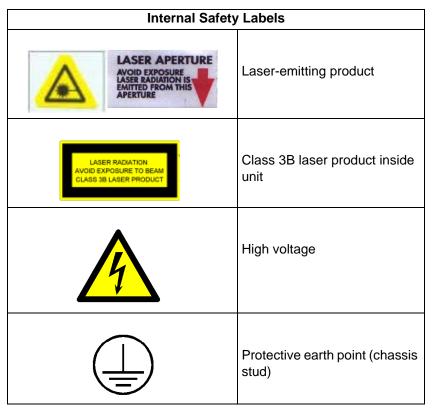
The system may have labels with one or more of the following symbols. These symbols indicate the IEC standards to which the system conforms.

À	Caution – consult accompanying documents
	Protective earth points
	Power On
	Power Off
	Caution – Electrical shock hazard

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Labelling Summary





Recycling the Scanner



In the European Union, this symbol indicates that when the last user wishes to discard this product, it must be sent to appropriate facilities for recovery and recycling. Contact your local representative for additional information on the collection and recovery programs available for this product.

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Section 2: Vita CR System Introduction

Introduction



Throughout this manual the CARESTREAM DIRECTVIEW VITA CR System will be referred to as "Vita CR" or "System."

The System is designed for the reading of phosphor X-ray screens (CR) by medical professionals.

The System consists of the Vita CR Scanner and a software package that includes:

- CARESTREAM VITA CR Systems Software that operates the scanner.
- An image viewing and archiving software package that supports the DICOM 3.1 standard and was approved by Carestream Health.
- The system features 8 x 10 in., 10 x 12 in., 14 x 17 in., 11 x 14 in., 14 x 14 in., 14 x 33 in., 24 x 30 cm, 15 x 30 cm digital image reading and viewing archive.

Features/Function	Description
Power Source	110–250 V, 4 A input source
Image Capture	40 images/hour
Image Storing	Stores 500 (configurable).
Operating System	MICROSOFT WINDOWS XP Professional with Service Pack 3, WINDOWS VISTA Business SP1, WINDOWS 7
Service Interface	Scanner: PC
Electrical Service	50–60 Hz



Throughout this manual, the *Front* of the unit refers to the side where the cassettes are inserted. *Right* and *Left* are as viewed when facing the front of the unit.

Operational Principles

The VITA CR System is a digital imaging system used for image acquisition and processing of static projection radiography images. The System utilizes a phosphor screen with energy storage capability as an X-ray image receptor.

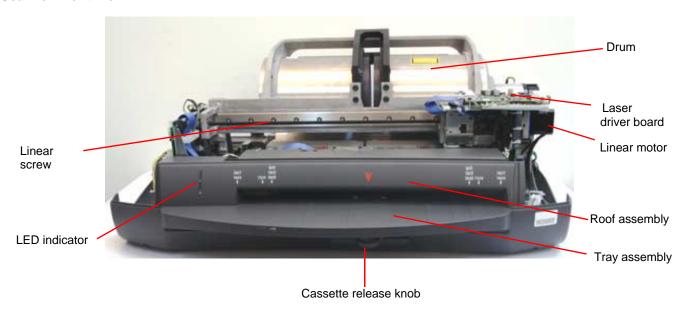
After exposure, a laser beam stimulates the phosphor screen, creating luminescence ("blue light") proportional to the local X-ray exposure. The luminescence signal is captured by a Photo Multiplier Tube (PMT), digitized, and processed for review.

The System enables you to read a storage phosphor screen quickly and erase it for the next exposure.

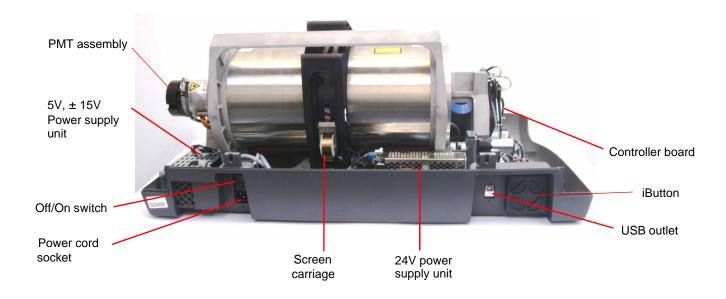
Section 3: Vita CR System Overview and Component Descriptions

System Overview

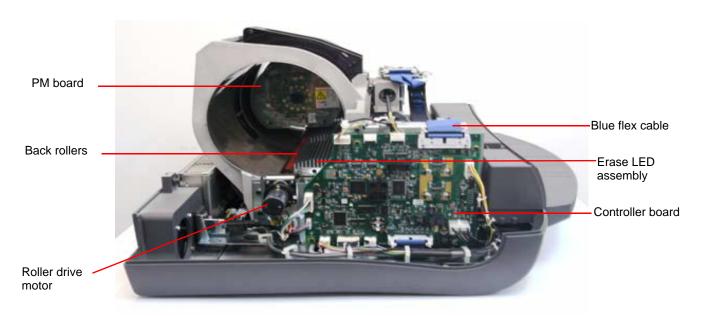
Scanner Front View



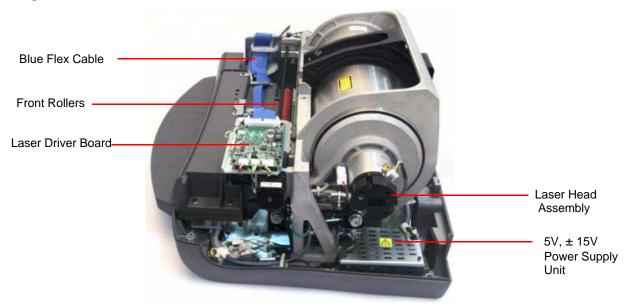
Scanner Rear View



Scanner Left View



Scanner Right View

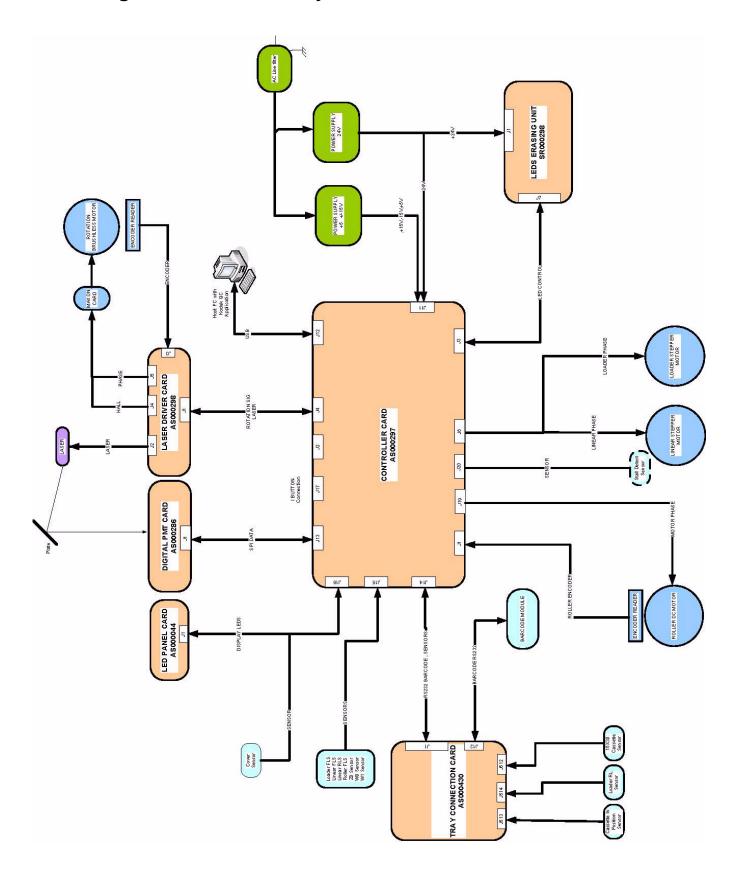


Part and System Descriptions

Part Name	Description
Controller Board	The controller board receives operational commands from the host computer workstation via the USB cable, and transforms the commands to the appropriate scanner hardware commands. The controller board builds the scanned images and sends them via the same USB cable to the computer workstation. The controller board controls and drives the four motors: • Loader motor
	Linear motor
	Rotational motor
	Roller drive motor
	The controller board receives feedback from the encoders and sensors. The controller board monitors the erasing LED current and temperature.
Laser	The laser beam stimulates the phosphor screen.
Laser Driver Board	The laser driver board receives rotation motor phases, laser power, and enables laser signals. It transfers the rotation motor encoder signals to the controller board.
Laser Head Assembly	The laser head assembly includes the laser module and the rotational motor that rotates a mirror during scanning. The laser beam emitted from the laser module is reflected by the revolving mirror to different points on the phosphor screen inside of the drum. Simultaneously, the laser head assembly travels along a linear axis, therefore the laser beam covers the full area of the screen on one line at a time (fast scan). Another mirror collects and reflects the light returned from the screen to the PM assembly window.
Photo Multiplier (PM) Assembly	The photo multiplier (PM) tube collects the light (photons) emitted from the screen and transforms the light into a current which is then converted to voltage and digitized by an Analog to Digital Converter (ADC) to pixel value.
Linear Slide Assembly	The linear slide assembly moves the laser head and PM assembly along the x-axis (slow scan) during the scan.
Barcode Reader	The barcode reader reads the screen size after the cassette is inserted into the scanner and locked into place.
LED Indicator	The LED indicator indicates the scanner's main status such as ready for scan , erasing and so on.
Power Supply	The power supply provides Vdc power to the scanner components.
Loader Stepper Assembly	The loader assembly operates during the extraction of the phosphor screen from the cassette before insertion into the drum and during the insertion of the screen back into the cassette after ejection from the drum. It is powered by the loader motor which works in an open loop (no encoder).
Roller Drive Motor Sub- System	The roller drive motor pulls the screen when loading the screen into the drum and pulls the screen back into the cassette after a scan. The roller motor has a closed loop control, which enables you to change the motor speed and, thus, control the erase time.
Erasing LED Assembly	The erasing LED assembly illuminates the phosphor screen to erase the image, which makes the screen ready to be used again.
Roof Assembly and Tray Assembly	These complementary assemblies guide the cassette into the scanner and secure the guide in position for the duration of the scanning process.

Sensor Name	Description
Z0 Sensor	The Z0 sensor detects the presence of the carriage screen in home position.
Loader Back Position Sensor (L1)	The back limit sensor stops the loader motor when moving in a backwards direction.
Loader Front Position (home) (L0)	The reverse limit sensor stops the loader motor upon reaching the end of travel position in a forward direction.
Cover Safety Interlock Sensor	The cover safety interlock sensor detects the presence of a system cover. When the cover is not detected, the system motors, laser, and erase LED assembly will not work.
W0 Sensor	The W0 sensor detects screen movement into the drum when loading the screen.
15x30 Sensor	Installed in the tray assembly, this sensor detects the presence of a 15 x 30 in. cassette adapter.
Cassette In Place Sensor (CPS)	The CPS sensor signals to the control system when the cassette is inserted and locked into the scanner.
Linear Rail End of Travel Sensors	The left and right limit sensors indicate that the linear carriage has reached the end of its travel. The right limit sensor (X0) is home position. X1 - The left limit sensor.
X1 Left Limit Sensor	The left and right limit sensors indicate that the linear carriage has reached the end of its travel.
W1 - Screen Unload Sensor Eject	The W1 sensor detects screen movement out of the drum when ejecting screen and turns off the LED erase.
SD - Linear Motor Stall Detection	The SD sensor detects the linear motor movement .
Z4 - Screen End of Travel Sensor	When loading the 14 x 34 in. (LLI) screen, the Z4 sensor stops its travel from loading into the drum.

Block Diagram of the Vita CR System



Section 4: Vita CR Service Procedures

Service Tools and Preparation

The following is a list of tools required for service operations:

- Phillips screwdriver (medium)
- Allen wrenches (metric): 0.89, 1.5, 2, 2.5, 3, 3.5, 4, 5 mm
- Open ended wrenches (metric): 5.5, 7
- Cutters
- · Long-nose pliers
- · Flat screwdriver
- Hook tool
- Multi-Meter / AVO (DVM)
- Safety activation key (SK000100)
- Loader pusher gauge
- Safety eye wear (The required laser safety eye wear must be intended for HeliumNeon/PDT lasers, have an optical density of 4-5 wavelengths of 610-695 nm, and be marked as having CE approval.)

Replacing the Scanner Cover

Tools Required

• 5 mm Allen wrench

Removing the Scanner Cover

- [1] Switch OFF the scanner.
- [2] With the system upright, pull the scanner to the edge of the table, so that the front side is extended slightly over the table edge.

Scanner Cover Screws



- [3] Remove the two 6 mm screws (one on each side) at the front of the scanner from the underside.
- [4] Remove the two 6 mm screws at the back of the scanner (one on each side).
- [5] Lift off the Cover.

Installing the Scanner Cover

- [1] Check that:
 - a. The scanner is switched OFF.
 - b. The safety interlock key is not in the interlock.
 - c. The laser DIP switch is switched ON (see Laser Driver Board DIP Switch on Page 21).
- [2] Install the scanner cover.
- [3] Install the four 6 mm scanner cover screws.
- [4] Connect the power cable to the electrical outlet.
- [5] Switch ON the scanner.

Activating the Scanner without the Cover

When the scanner cover is removed, the safety electrical interlock switch disconnects the erasing LED assembly, the laser, and all motors.

Tools Required

Safety interlock activation key

Activating the Scanner without the Cover (LASER DE-ACTIVATED)



Possible damage from electrostatic discharge.

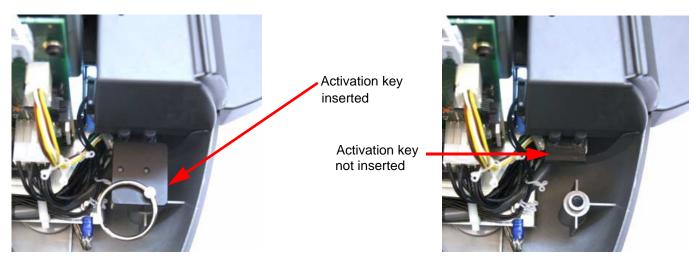
[1] Switch OFF the DIP switch on the laser driver board.

Laser Driver Board DIP Switch



[2] Insert the safety interlock activation key into the safety interlock to the left of the roof assembly.

Safety Interlock Activation Key



[3] Switch ON the scanner and perform the necessary tests.



Important

After performing service operations, prior to installing the scanner cover, you must:

- [4] Switch OFF the scanner.
- [5] Remove the safety interlock activation key from the safety interlock.

[6] Switch ON the DIP switch on the laser driver board.

Activating the Scanner without the Cover if the Laser is Needed



Possible damage from electrostatic discharge.



Laser Warning

When a service operation is taking place with the cover removed and the laser must be activated during the service procedure, wear protective safety glasses at all times. To prevent other people from being exposed to laser light, work in a closed room and/or place warning signs in the area.

When a service operation is taking place with the cover removed, disconnect the laser. If the laser must be activated during the service procedure, wear protective safety glasses at all times. The required laser safety eyewear must be intended for HeliumNeon/PDT lasers, have an optical density of 4-5 wavelengths of 610-695 nm, and be marked as having CE approval.

- [1] Insert the safety interlock activation key into the safety interlock.
- [2] Switch ON the scanner and perform the necessary tests.
- [3] If the laser is no longer needed, switch OFF the DIP switch.



Important

After performing service operations, prior to installing the scanner cover, you must:

- [4] Switch OFF the scanner.
- [5] Remove the safety interlock activation key from the safety interlock.

Replacing the Scanner Base

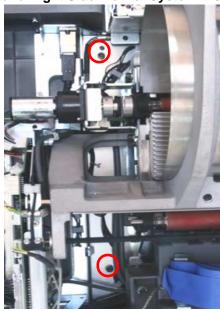
Tools Required

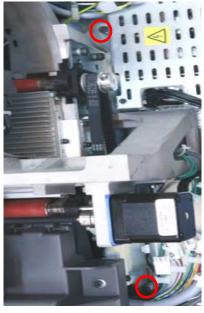
4 mm Allen wrench

Removing the Scanner Base

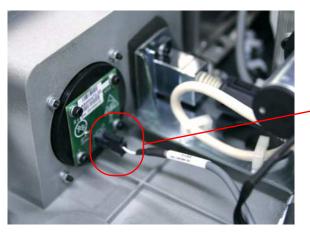
- [1] Remove the scanner cover (see Removing the Scanner Cover on Page 20).
- [2] Remove the four 5 mm screws located in the four corners of the system.

Bottom Left and Right Side View of System Displaying the 4 Screws Securing the Base





[3] Disconnect the iButton's cable.



iButton cable

- [4] Gently lift up the system and place it aside on a flat surface.
- [5] Remove the scanner base.

Installing the Scanner Base

- [1] Place the system on the scanner base.
- [2] Insert the four 5 mm screws.
- [3] Connect the iButton cable to the iButton board.
- [4] Install the scanner cover (see <u>Installing the Scanner Cover on Page 20</u>).

Replacing the Power Line Filter Module

Introduction

The power line filter module filters the AC supply to the scanner. The power inlet socket, ON-OFF switch, and two fuses are located on the module.



Laser Warning

See "Vita CR Laser Safety Instructions" on Page 6.

Tools Required

- Socket wrench
- 2 mm Allen wrench

Removing the Power Line Filter Module

- [1] Switch OFF the power and remove the power cable from the power inlet socket of the scanner.
- [2] Remove the scanner cover (see Removing the Scanner Cover on Page 20).
- [3] Remove the scanner base (see Removing the Scanner Base on Page 23).
- [4] Release the two 2 mm screws above and below the ON/OFF switch.

Power Line Filter Module



- [5] Release the nuts securing the ground cables to the ground stud using a socket wrench.
- [6] Remove the ground cable of the power line filter from the stud.
- [7] Disconnect the two power connectors.
- [8] Remove the module together with the module bracket from the scanner.



Installing the Power Line Filter Module

- [1] Insert the module into the module bracket.
- [2] Insert the module assembly into the scanner.
- [3] Connect the ground cable of the power line filter to the stud and fasten the nut.
- [4] Connect the two power connectors to the module.

Note

Connect black wire No.1 to P and black wire No.2 to N (see Step 8 Removing the Power Line Filter Module on Page 24).

- [5] Insert the power line and secure it with its two 2 mm Allen screws.
- [6] Connect the system to the main power.
- [7] Confirm that the system is operating properly.
- [8] Install the scanner cover (see Installing the Scanner Cover on Page 20).

Replacing the Fuse

Tools Required

- Flat Screwdriver
- Replacement Fuses (2)

Removing the Fuse

- [1] Switch OFF the scanner.
- [2] Disconnect the scanner from the main power.
- [3] Locate the fuse drawer on the power inlet module.



[4] Open the fuse drawer using a flat screwdriver to pull the plastic tab out gently from underneath.



[5] Remove the blown fuse.

Installing the Fuse

- [1] Install the fuse.
- [2] Close the fuse drawer.
- [3] Connect the power cable to the inlet socket of the scanner.
- [4] Switch ON the scanner.
- [5] Confirm that the scanner functions properly.
- [6] Verify that the system functions correctly.

Replacing the Controller Board

Tools Required

Phillips screwdriver

Removing the Controller Board



ESD

Possible damage from electrostatic discharge.



Important

When changing the controller board, backup the scanner settings (if possible) by copying the Calib folder to a secure location.

The Calib folder is located at C:\Program Files\Carestream\CarestreamCR\VitaCR\GenRAD.

- [1] Disconnect the scanner from the main power.
- [2] Remove the scanner cover (see Removing the Scanner Cover on Page 20).
- [3] Disconnect the 11 connectors.



Note

The connectors are marked by the boxes in the figure below.

- [4] Disconnect the USB cable from the left side of the board.
- [5] Remove the seven 3 mm Phillips screws securing the controller board to the system.

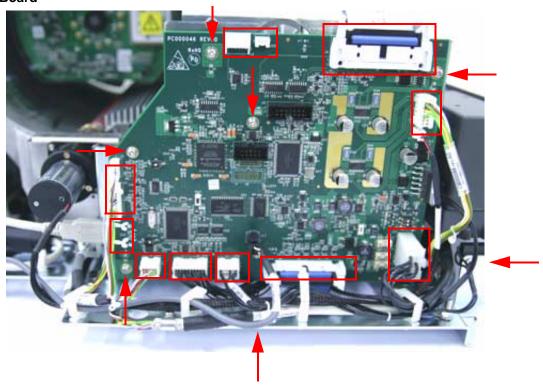


Note

The screws are marked by the arrows in the figure below.

[6] Remove the controller board by gently lifting out and upwards.

Controller Board



Installing the Controller Board



Possible damage from electrostatic discharge.

- [1] Install the controller board.
- [2] Insert the seven 3 mm Phillips screws.
- [3] Connect the USB cable.
- [4] Connect the 11 connectors.
- [5] Reconnect the USB and power cables to the back of the scanner.
- [6] Switch ON the scanner.
- [7] Insert the safety interlock key.
- [8] Switch OFF the laser DIP switch (see <u>Activating the Scanner without the Cover if the Laser is Needed on Page 22</u>).



The EEPROM screen appears.

- [9] Select Copy disk file to EEPROM.
- [10] Click OK.

EEPROM Screen



Confirming the Controller Board Function



Laser Warning

See "Vita CR Laser Safety Instructions" on Page 6.

- [1] Perform the following procedure before prior to installing the scanner cover:
 - (a) Perform a scan.
 - **(b)** Confirm that the system functions properly.
 - (c) Confirm that the image is black.
- [2] Switch OFF the scanner.
- [3] Check that:
 - a. The safety interlock key is not in the interlock.
 - b. The laser DIP switch is switched ON (see Laser Driver Board DIP Switch on Page 21).
- [4] Position the scanner cover without installing the scanner cover screws.
- [5] Switch ON the scanner.
- **[6]** Perform the following procedure after installing the scanner cover:
 - (a) Perform a scan.
 - (b) Confirm that the system functions properly.
 - (c) Confirm that the image is white.

- [7] Install the scanner cover screws.
- [8] Go to **Settings>Calibration** tab and check that the calibration values are marked with a green check mark; if not, copy the saved Calib folder back to its location C:\Program Files\Carestream\Carestream\CR\VitaCR\GenRAD.
- [9] Go to **Settings>About** tab and check that all version numbers of the hardware and software are correct.

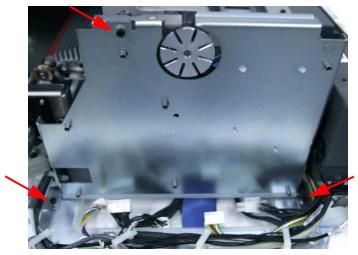
Replacing the Controller Board Bracket

Tools Required

• 2.5 mm Allen wrench

Removing the Controller Board Bracket

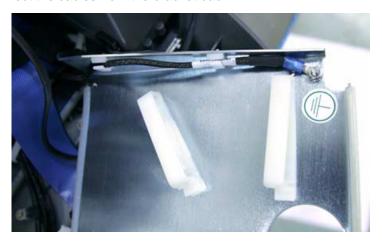
[1] Release the three 3 mm screws.



- [2] Open the plastic cable clasp and release the flex and grounding cables—without disconnecting them—from the left side of the board and from the bracket back.
- [3] Move the bracket slightly aside.



There is no need to disconnect the cables from the bracket back.



Installing the Controller Board Bracket

- [1] Place the controller board bracket in its designated location.
- [2] Secure the Flex and Ground cables with the two plastic clasps on the bracket's back.
- [3] Insert the three 2 mm screws and tighten them.

Replacing the Photo Multiplier Board

Tools Required

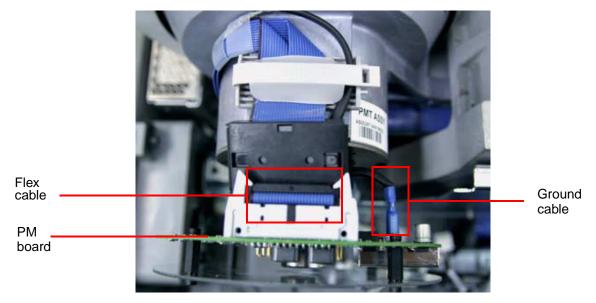
None

Removing the PM Card



Possible damage from electrostatic discharge.

- [1] Switch ON the scanner.
- [2] Go to Settings>Diagnostics tab.
- [3] Click **Left** to move the linear motor to the left side of the system.
- [4] Remove the scanner cover (see Removing the Scanner Cover on Page 20).
- [5] Disconnect the flex cable.
- [6] Disconnect the ground cable.
- [7] Hold the PM tube assembly with one hand while gently sliding out the PM board with the other hand.



Installing the PM Board

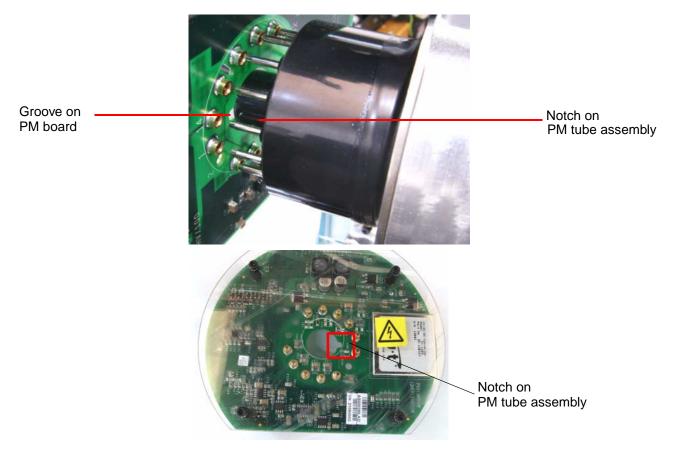


Possible damage from electrostatic discharge.

[1] Position the PM Board in correct alignment to fit with the PM tube pins.



Make sure to align the notch on the PM tube assembly with the notch on the PM board.



- [2] Push the PM tube assembly onto the pins.
- [3] Connect the flex cable.
- [4] Connect the ground cable.
- [5] Install the scanner cover (see <u>Installing the Scanner Cover on Page 20</u>).
- [6] Perform Offset calibration and System Gain Tuning (see "Offset Calibration" on Page 120 and "System Gain Tuning" on Page 122).
- [7] Perform a scan on a phantom object.
- [8] Confirm that the quality of the scan is acceptable.

Replacing the Photo Multiplier Assembly

Introduction

The Photo Multiplier (PM) tube collects the photons emitted from the screen.

Tools Required

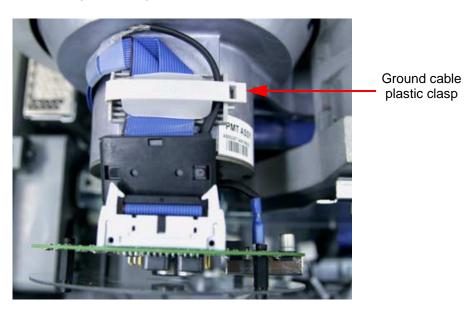
- 2 mm Allen wrench
- 2.5 mm Allen wrench
- 3 mm Allen wrench
- Wire cutters
- Tie wrap
- · Alignment gauge

Removing the PM Assembly



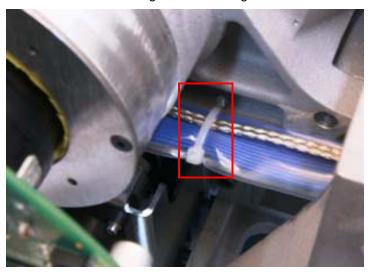
Possible damage from electrostatic discharge.

- [1] Switch ON the scanner.
- [2] Go to the Settings>Diagnostics tab.
- [3] Click Left to move the linear motor to the left side of the system.
- [4] Disconnect the scanner from the main power.
- [5] Remove the scanner cover (see Removing the Scanner Cover on Page 20).
- [6] Remove the controller board (see "Removing the Controller Board" on Page 27).
- [7] Remove the controller board bracket (see "Removing the Controller Board Bracket" on Page 30).
- [8] Release the ground cable from the plastic clasp.



- [9] Disconnect the flex cable.
- [10] Disconnect the ground cable.

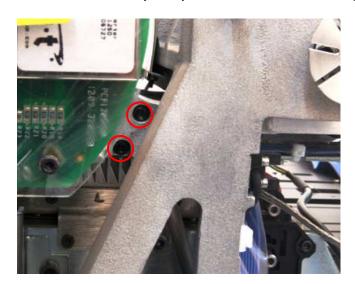
[11] Cut the tie wrap that holds the flex cable and ground cable together.

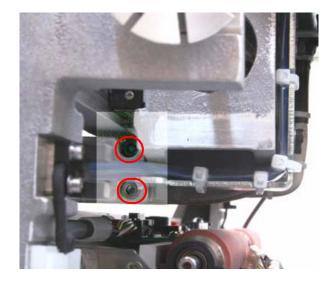


[12] Remove the four 4 mm screws securing the PM assembly to the system chassis. Two screws are on the left and two screws are on the right.

Note

Hold the PM assembly with your free hand while removing the fourth and final screw.





PM Assembly



Installing the PM Assembly



Possible damage from electrostatic discharge.

- [1] Place the PM assembly into position.
- [2] Install the four 4 mm screws that secure the PM assembly to the system chassis. Two screws are on the left and two screws are on the right.
- [3] Place a tie wrap around the flex and ground cable.
- [4] Connect the flex cable.
- [5] Connect the ground cable.
- [6] Secure the flex cable and the grounding cable with the plastic latch.
- [7] Install the controller board bracket (see "Installing the Controller Board Bracket" on Page 30).
- [8] Install the controller board (see "Installing the Controller Board" on Page 28).
- [9] Install the scanner cover (see Installing the Scanner Cover on Page 20).
- [10] Perform Offset calibration and System Gain Tuning (see "Offset Calibration" on Page 120 and "System Gain Tuning" on Page 122).
- [11] Perform a scan on a phantom object.
- [12] Confirm that the quality of the scan is good.

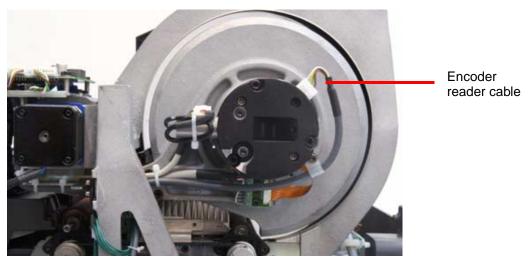
Replacing the Optical Assembly

Tools Required

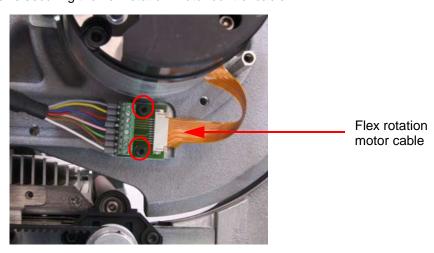
- 2 mm Allen wrench
- 2.5 mm Allen wrench
- 3 mm Allen wrench
- Alignment gauge

Removing the Optical Assembly

- [1] Switch ON the scanner.
- [2] Go to Settings>Diagnostics tab.
- [3] Click **Right** to move the linear motor to the right side of the system.
- [4] Disconnect the scanner from the main power.
- [5] Remove the scanner cover (see Removing the Scanner Cover on Page 20).
- [6] Disconnect the encoder reader cable.



- [7] Disconnect the flex rotation motor cable.
- [8] Remove the two 2.5 mm screws securing the flex rotation motor control cable.



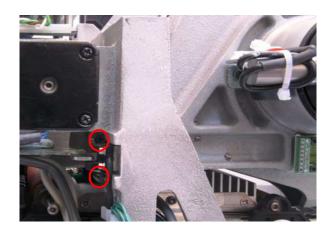
[9] Disconnect the laser cable.

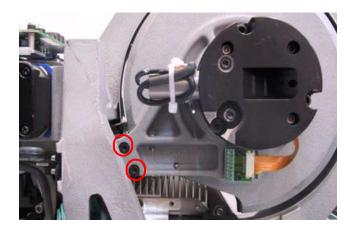


[10] Remove the four 4 mm screws that secure the optical assembly to the system chassis; two screws on the left and two screws on the right.



Hold the optical assembly with your free hand while removing the fourth and final screw.





[11] Remove the optical assembly.

Optical Assembly



Installing the Optical Assembly

Note

Do not touch the stainless surface of the optical head.

- [1] Position the optical assembly.
- [2] Insert the four 4 mm screws and tighten them.
- [3] Manually move the linear assembly to the left until the alignment gauge is released.
- [4] Connect the laser cable.
- [5] Connect the flex rotation motor cable.
- [6] Connect the rotation motor control cable and secure it with its two 2.5 mm screws.
- [7] Secure the cables with the metal tie wrap.
- [8] Connect the encoder reader cable.
- [9] Install the scanner cover (see <u>Installing the Scanner Cover on Page 20</u>).
- [10] Perform the Offset calibration and E-Gain calibration (see "Offset Calibration" on Page 120 and "System Gain Tuning" on Page 122).
- [11] Perform a scan on a phantom object and confirm that the quality of the scan is good.

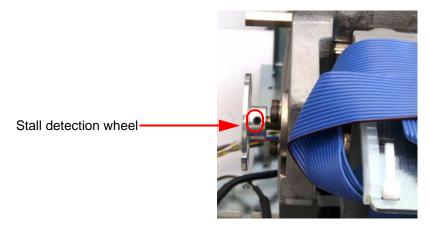
Replacing the Linear Screw Assembly

Tools Required

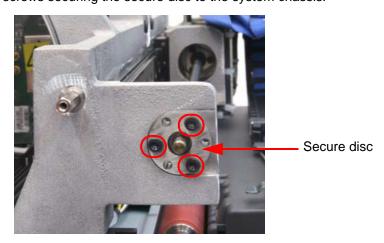
- 1.5 mm Allen wrench
- 2 mm Allen wrench
- Torque meter

Removing the Linear Screw Assembly

- [1] Switch ON the scanner.
- [2] Go to the **Settings>Diagnostics** tab.
- [3] Click Left to move the linear motor to the left side of the system.
- [4] Disconnect the scanner from the main power.
- [5] Remove the scanner cover (see Removing the Scanner Cover on Page 20).
- [6] Remove the controller board (see "Removing the Controller Board" on Page 27).
- [7] Remove the controller board bracket (see "Removing the Controller Board Bracket" on Page 30).
- [8] Remove the linear motor (see "Removing the Linear Motor" on Page 44).
- [9] Loosen the 2 mm screw securing the stall detection wheel to the linear screw located on the left side of the system.



- [10] Remove the stall detection wheel.
- [11] Remove the three 2.5 mm screws securing the secure disc to the system chassis.

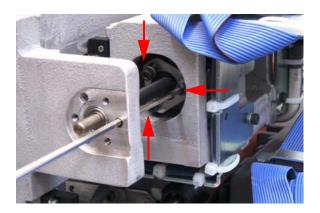


[12] Remove the secure disc.

[13] Insert the Allen wrench through the holes located on the system chassis in order to remove the three 2.5 mm screws securing the linear nut screw.

Note

- a. Disconnect the flex cable from the laser driver board for a clearer view of the linear nut screw located inside the linear assembly house.
- b. Connect the flex cable to the laser driver board once Step 13 is completed.





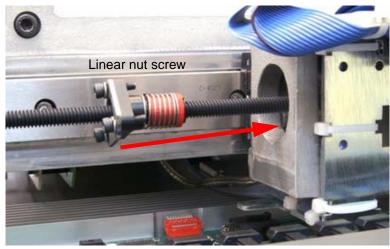
- [14] Gently slide the linear screw to the right until it is released from its bearing on the left side.
- [15] Slide the linear screw assembly slightly to the left and then remove the system assembly.

Linear Screw Assembly



Installing the Linear Screw Assembly

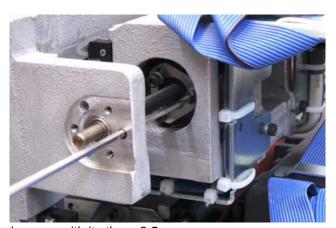
- [1] Gently Insert the linear screw assembly from the left side of the system.
- [2] Install the bearing on the left side of the linear screw.
- [3] Reconnect the linear motor to the coupling back (see "Installing the Linear Motor" on Page 45).
- [4] Insert the linear screw into the coupling up to its screw level and secure with its 2.5 mm screw.
- [5] Insert and align the three 2.5 mm screws located on the linear nut screw. Slowly slide the linear nut screw into the linear assembly house.



[6] Insert the Allen wrench through the holes located on the system chassis in order to secure the three 2.5 mm screws securing the linear nut screw. Tighten the screws to a torque value of 0.6 N.

Note

- a. Disconnect the flex cable from the laser driver board for a clearer view of the linear nut screw located inside the linear assembly house.
- b. Connect the flex cable to the laser driver board once Step 6 is completed.

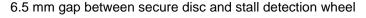


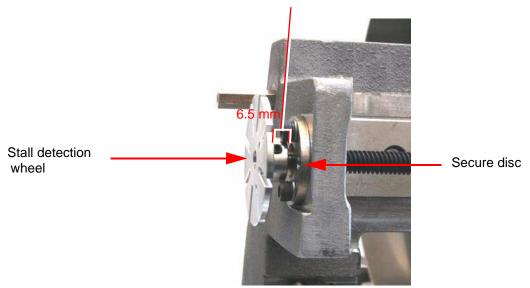
- [7] Insert the secure disc and secure with its three 2.5 mm screws.
- [8] Install the stall detection wheel and secure with its 2 mm screw.

Note

The stall detection wheel must sit at a distance of 6.5 mm from the secure disc.

Make sure the wheel is able to rotate freely without striking the screws of the secure disc.





- [9] Install the controller board bracket (see "Installing the Controller Board Bracket" on Page 30).
- [10] Install the controller board (see "Installing the Controller Board" on Page 28).



Laser Warning

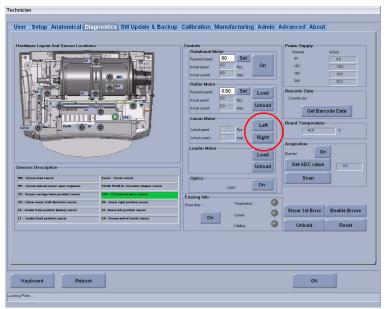
See "Vita CR Laser Safety Instructions" on Page 6.

- [11] Perform the following procedure prior to installing the scanner cover:
 - (a) Connect the power cable to the electrical outlet.
 - (b) Connect the USB cable to the back of the system.
 - (c) Switch ON the scanner.
 - (d) Go to Settings>Diagnostics tab.
 - (e) Click Left or Right in the Linear Motor section to activate the linear motor.



The linear motor is activated and moves in the desired direction, until it reaches the left/right limit sensor.

- (f) Click Left or Right to move the motor in the opposite direction, until it reaches the left/right limit sensor.
- (g) Confirm that the green LEDs next to the X0 and X1 display on the Hardware Layout And Sensor Locations section light up.



[12] Install the scanner cover (see Installing the Scanner Cover on Page 20).

Replacing the Linear Motor

Tools Required

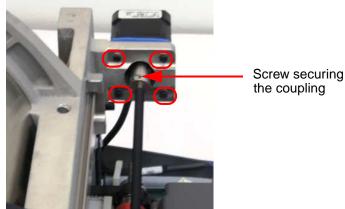
- 2 mm Allen wrench
- 2.5 mm Allen wrench

Removing the Linear Motor

- [1] Switch ON the scanner.
- [2] Go to Settings>Diagnostics tab.
- [3] Click Left to move the linear motor to the left side of the system.
- [4] Remove the scanner cover (see Removing the Scanner Cover on Page 20).
- [5] Remove the 2.5 mm screw securing the coupling to the linear screw.
- [6] Remove the four 3 mm screws securing the linear motor to the system chassis.



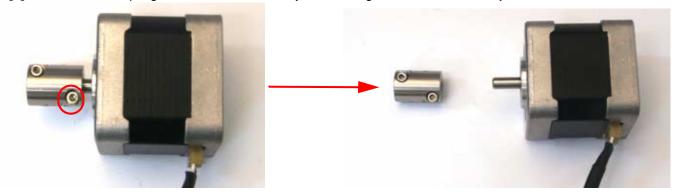
Hold the linear motor with your free hand while removing the fourth and final screw.



[7] Disconnect the linear motor cable.



[8] Remove the coupling from the linear motor by unscrewing the 2.5 mm screw adjacent to the motor.



Installing the Linear Motor

- [1] Place the coupling on the linear motor and secure the 2.5 mm screw adjacent to the motor.
- [2] Connect the motor cable.
- [3] Install the linear motor.
- [4] Install the four 2.5 mm screws securing the linear motor to the system chassis.
- [5] Install the 2.5 mm screw securing the coupling to the linear screw.



Laser Warning

See "Vita CR Laser Safety Instructions" on Page 6.

- [6] Perform the following procedure prior to installing the scanner cover:
 - (a) Connect the power cable to the electrical outlet.
 - (b) Connect the USB cable to the back of the system.
 - (c) Switch ON the scanner.
 - (d) Go to the **Settings>Diagnostics** tab.
 - (e) Click Left and Right to move the linear motor from side to side.
 - (f) Confirm that the optical assembly moves smoothly and that the wires do not get stuck during movement.

Diagnostics Tab



- [7] Install the scanner cover (see <u>Installing the Scanner Cover on Page 20</u>).
- [8] Perform the following procedure after installing the scanner Cover.
 - (a) Go to the Settings>Diagnostics tab.
 - (b) Click Left and Right to move the linear motor from side to side.
 - (c) Confirm that the optical head moves smoothly and that the wires do not get stuck during movement.

Replacing the Roller Motor Assembly

Tools Required

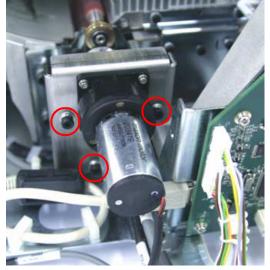
- 2 mm Allen wrench
- 2.5 mm Allen wrench

Removing the Roller Motor Assembly

- [1] Disconnect the scanner from the main power.
- [2] Remove the scanner cover (see Removing the Scanner Cover on Page 20).
- [3] Release the motor cable from the plastic cable holder.
- [4] Disconnect the motor cable from the controller board connector J19.



[5] Remove the three 3 mm screws securing the roller motor bracket to the system chassis.



- [6] Disconnect the encoder reader cable from the roller motor assembly.
- [7] Remove the roller motor assembly.

Roller Motor Assembly

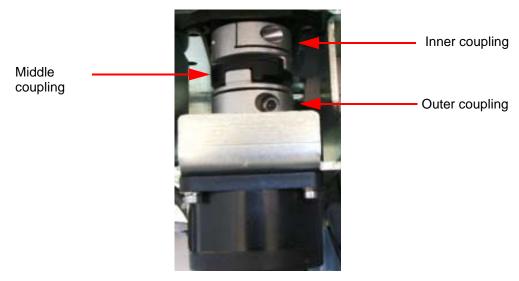


Installing the Roller Motor Assembly

- [1] Connect the outer coupling to the roller motor assembly pin, inserting it all the way—tight to the 2.5 mm screw.
- [2] Connect the encoder reader cable to the roller motor assembly.



[3] Connect firmly the outer and middle coupling piece to the inner coupling (intact) while inserting the roller motor assembly.



- [4] Install the three 3 mm screws securing the roller motor bracket to the system chassis.
- [5] Connect the motor cable to J19 on the controller board.

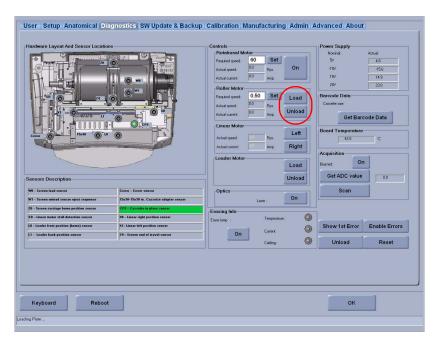


Laser Warning

See "Vita CR Laser Safety Instructions" on Page 6.

- [6] Perform the following procedure prior to installing the scanner cover:
 - (a) Connect the power cable to the electrical outlet.
 - **(b)** Connect the USB cable to the back of the system.
 - (c) Switch ON the scanner.
 - (d) Go to the **Settings>Diagnostics** tab.
 - (e) Click Load and Unload in the Roller Motor section.
 - (f) Confirm that the rollers spin forwards and backwards.
 - (g) Load a cassette into the scanner.
 - (h) Confirm that the scanner loads and unloads the cassette.

Diagnostics Tab



- [7] Install the scanner cover (see Installing the Scanner Cover on Page 20).
- [8] Perform the following procedure after installing the scanner cover:
 - (a) Load and unload a cassette a few times.
 - (b) Confirm that the rollers are functioning properly.

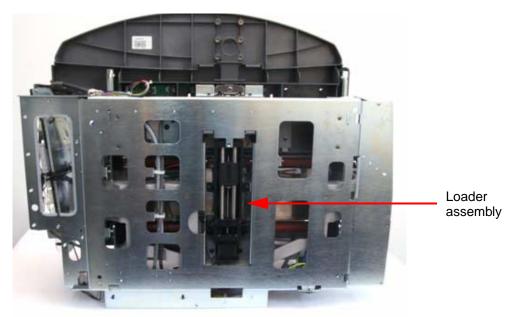
Replacing the Loader Assembly

Tools Required

• 2 mm Allen wrench

Removing the Loader Assembly

- [1] Disconnect the scanner from the main power.
- [2] Remove the scanner cover (see Removing the Scanner Cover on Page 20).
- [3] Remove the scanner base (Removing the Scanner Base on Page 23).
- [4] Place the system on its back.



[5] Remove the four 2.5 mm screws securing the loader assembly to the system.

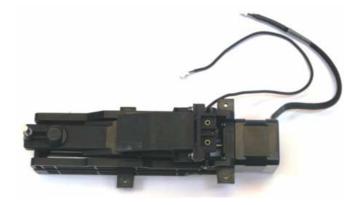


[6] Disconnect the motor and sensor cables.



[7] Gently remove the loader assembly.

Loader Assembly



Installing the Loader Assembly

- [1] Connect the motor and sensor cables.
- [2] Insert the pusher pin first and then slide the assembly into its position.
- [3] Install the four 2.5 mm screws securing the loader assembly to the system.
- [4] Place the system in the upright position.



Laser Warning

See "Vita CR Laser Safety Instructions" on Page 6.

- [5] Perform the following procedure prior to installing the scanner cover:
 - (a) Connect the power cable to the electrical outlet.
 - (b) Connect the USB cable to the back of the system.
 - (c) Switch ON the scanner.
 - (d) Go to the **Settings>Diagnostics** tab.
 - (e) Click Left and Right to move the linear motor from side to side.
 - (f) Confirm that the wires do not interfere with the movement of the optical assembly.



- [6] Install the scanner base (see <u>Installing the Scanner Base on Page 23</u>).
- [7] Install the scanner cover (see Installing the Scanner Cover on Page 20).
- [8] Perform the following procedure after installing the scanner cover.
 - (a) Go to the Settings>Diagnostics tab.
 - (b) Click Left and Right in the Linear Motor section to move the linear motor from side to side.
 - (c) Confirm that the optical head moves smoothly and that the wires do not get stuck during movement.

Replacing the Laser Driver Board

Tools Required

• 2.5 mm Allen wrench

Removing the Laser Driver Board



Possible damage from electrostatic discharge.

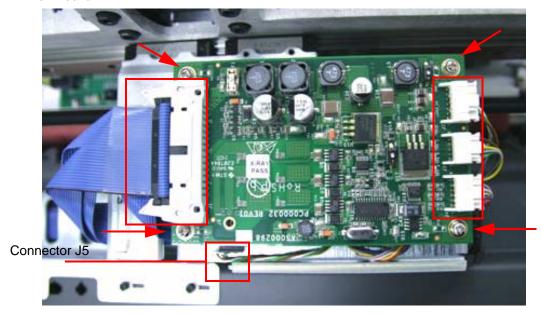
- [1] Disconnect the scanner from the main power.
- [2] Remove the scanner cover (see Removing the Scanner Cover on Page 20).
- [3] Disconnect the 4 connectors from the laser driver board.

Note

The connectors and screws are marked in the figure below.

- [4] Remove the four Phillips screws securing the laser driver board to the system.
- [5] Disconnect the Connector J5.
- [6] Carefully remove the laser driver board.

Laser Driver Board



Installing the Laser Driver Board



ESD

Possible damage from electrostatic discharge.

- [1] Position the laser driver board.
- [2] Connect the Connector J5.
- [3] Insert the four Phillips screws securing the laser driver board to the system.
- [4] Connect the 4 connectors.



Laser Warning

See "Vita CR Laser Safety Instructions" on Page 6.

- [5] Perform the following procedure prior to installing the scanner cover:
 - (a) Connect the power cable to the electrical outlet.
 - (b) Connect the USB cable to the back of the system.
 - (c) Switch ON the scanner.
 - (d) Perform a scan.
 - (e) Confirm that the laser unit is functioning properly and a steady beam is produced.
- [6] Install the scanner cover (see Installing the Scanner Cover on Page 20).
- [7] Perform a scan and confirm that the laser unit is functioning properly and a steady beam is produced.
- [8] Perform a scan on a phantom object and confirm that the quality of the scan is acceptable.

Replacing the Power Supply

Tools Required

- 2.5 mm Allen wrench
- 5 mm open key
- · Phillips screwdriver

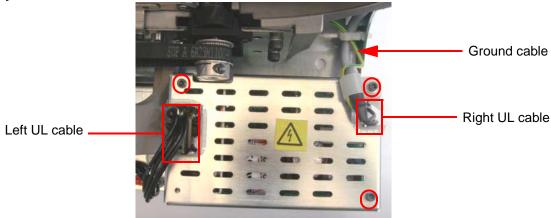
Removing the 5V, ±15V Power Supply Unit

- [1] Remove the power cable from the power inlet socket of the scanner.
- [2] Remove the scanner cover (see Removing the Scanner Cover on Page 20).
- [3] Remove the three 3 mm screws securing the power supply cover.
- [4] Disconnect the left UL cable.
- [5] Disconnect the right UL cable.



Do not disconnect the ground cable.

Power Supply Unit



- [6] Gently lift the power supply cover until the ground cable is exposed.
- [7] Disconnect the ground cable and remove the cover.
- [8] Remove the 3 standoff screws using the 5 mm open key.



[9] Remove the power supply unit.

Installing the 5V, ±15V Power Supply Unit

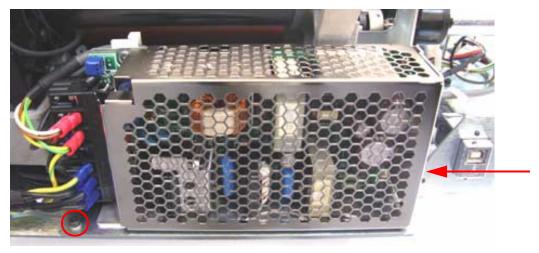
- [1] Position the power supply unit.
- [2] Install the 3 standoff screws.
- [3] Route the ground cable through the hole on the right hand side of the power supply cover.
- [4] Install the power supply cover.
- [5] Connect the ground cable.
- [6] Connect the left and right UL cables.
- [7] Install the three 3 mm screws securing the power supply cover.
- [8] Proceed to Step 5 of Installing the 24V Power Supply Unit on Page 58.

Replacing the 24V Power Supply Unit

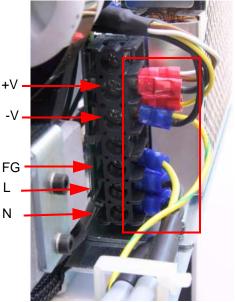
Removing the 24V Power Supply Unit

- [1] Remove the power cable from the power inlet socket of the scanner.
- [2] Remove the scanner cover (see Removing the Scanner Cover on Page 20).
- [3] Remove the scanner base (see Removing the Scanner Base on Page 23).
- [4] Remove the two 3 mm screws securing the power supply unit to the system.

Power Supply Unit



[5] Disconnect the 9 cables connected to the power supply unit by loosening the 5 corresponding screws.



[6] Remove the power supply unit.

Installing the 24V Power Supply Unit

- [1] Position the power supply unit.
- [2] Connect the 9 cables to the unit by securing the 5 corresponding screws. Use the table below as a guide.

Wire Colors	Connection
White + brown	+V
Black 1	+V
Yellow + green	-V
Black 2 + Grd	-V
Grd	FG
Black 1 (from line filter)	L
Black 1 (from 24V PS)	L
Black2 (from line filer)	N
Black 2 (from 24 PS)	N

- [3] Install the two 3 mm screws securing the power supply unit to the system.
- [4] Install the scanner base (see <u>Installing the Scanner Base on Page 23</u>).



Laser Warning

See "Vita CR Laser Safety Instructions" on Page 6.

- [5] Perform the following procedure prior to installing the scanner cover:
 - (a) Connect the power cable to the electrical outlet.
 - (b) Connect the USB cable to the back of the system.
 - (c) Switch ON the scanner.
 - (d) Insert a cassette and perform a full scan.
 - (e) Confirm that the scan was complete.
- [6] Install the scanner cover (see Installing the Scanner Cover on Page 20).

Replacing the Erase LED Assembly

Tools Required

- 2.5 mm Allen wrench
- 3 mm Allen wrench

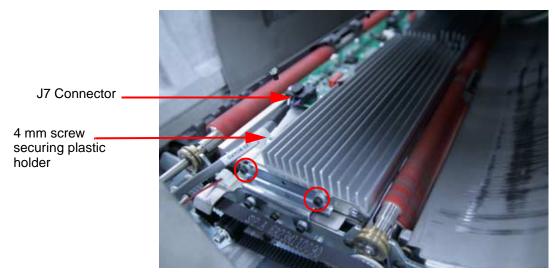
Removing the Erase LED Assembly



Possible damage from electrostatic discharge.

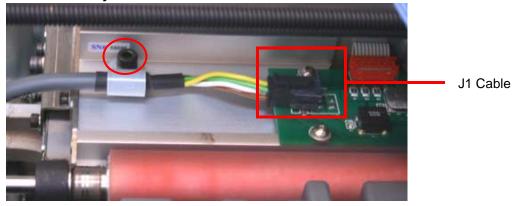
- [1] Switch ON the scanner.
- [2] Go to the **Settings>Diagnostics** tab.
- [3] Click **Left** to move the linear motor to the left side of the system.
- [4] Remove the scanner cover (see Removing the Scanner Cover on Page 20).
- [5] Remove the two 3 mm screws securing the erase LED assembly to the bracket on the right side of the system.
- [6] Disconnect the J7 connector.
- [7] Remove the 4 mm screw securing the plastic cable holder.

Right Side View of Erase LED Assembly



- [8] Manually rotate the linear screw to move the optical assembly to the right side of the system until cable J1 is fully exposed.
- [9] Disconnect the cable J1.
- [10] Remove the 4 mm screw that secure the plastic cable holder.

Left Side view of Erase LED Assembly



[11] Remove the two 3 mm screws that secure the erase LED assembly to the bracket on the left side of the system.



- [12] Manually rotate the linear screw to move the optical assembly to the left side of the system.
- [13] Gently lift and remove the erase LED assembly out of the drum from the right side of the system.

Erase LED Assembly



Installing the Erase LED Assembly



Possible damage from electrostatic discharge.

- [1] Gently insert the erase LED assembly into the drum.
- [2] Install the two 2 mm screws on the left side of the assembly.
- [3] Connect cable J1.
- [4] Insert the 4 mm screw securing the plastic cable holder.
- [5] Manually rotate the linear screw to move the optical assembly to the left side of the system.
- [6] Connect the J7 connector.
- [7] Insert the 4 mm screw securing the plastic cable holder.
- [8] Install the two 3 mm screws on the right side of the assembly.

Confirming the Motor Function

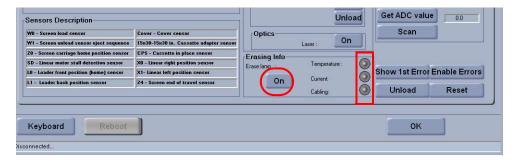


Laser Warning

See "Vita CR Laser Safety Instructions" on Page 6.

- [1] Perform the following procedure prior to installing the scanner cover:
 - (a) Connect the power cable to the electrical outlet.
 - (b) Connect the USB cable to the back of the system.
 - (c) Switch ON the scanner.
 - (d) Perform a scan.
 - (e) Confirm that all the motors are functioning properly.
- [2] Perform the following procedure:
 - (a) Go to the Settings>Diagnostics tab.
 - (b) Click On in the Erasing Info section.
 - (c) Confirm that the three indicators are illuminated.

Erasing Information on the Diagnostics Tab



[3] Install the scanner cover (see Installing the Scanner Cover on Page 20).

Replacing the Roof Assembly

Tools Required

- 3 mm Allen wrench
- 2.5 mm Allen wrench

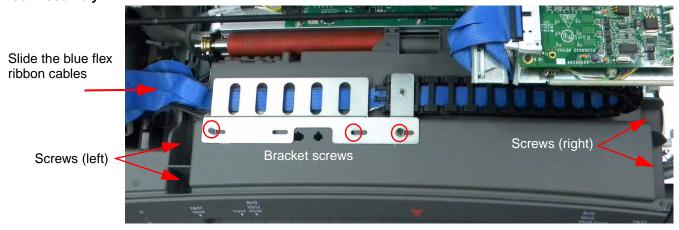
Removing the Roof Assembly



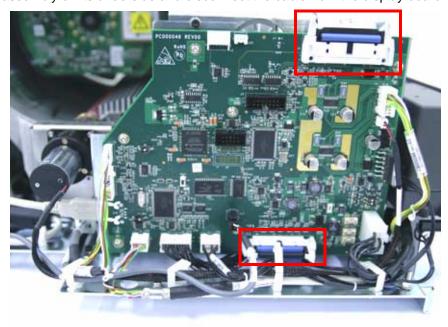
Possible damage from electrostatic discharge.

- [1] Move the linear assembly to the right position.
- [2] Remove the scanner cover (see Removing the Scanner Cover on Page 20).
- [3] Remove the three 3 mm screws that secure the bracket to the roof assembly.
- [4] Remove the four 4 mm screws that secure the roof assembly to the system from the left and right sides.
- [5] Slide the blue flex ribbon cables out from underneath the bracket.

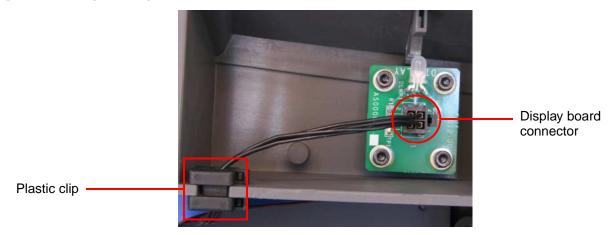
Roof Assembly



[6] Turn the roof assembly on its underside and disconnect the cable from the display board.



[7] Release the plastic clip.



[8] Remove the roof assembly.

Roof Assembly



Installing the Roof Assembly



Possible damage from electrostatic discharge.

- [1] Turn the roof assembly on its underside and insert the plastic clip.
- [2] Connect the cable to the display board.
- [3] Insert the roof assembly into its position.
- [4] Insert the three 3 mm screws securing the bracket to the roof assembly.
- [5] Insert the four 4 mm screws securing the roof assembly to the system.
- [6] Install the scanner cover (Installing the Scanner Cover on Page 20).

Replacing the Tray Assembly

Tools Required

• 2.5 mm Allen wrench

Removing the Tray Assembly



Possible damage from electrostatic discharge.

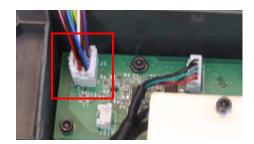
- [1] Remove the scanner cover (see Removing the Scanner Cover on Page 20).
- [2] Remove the roof assembly (see Removing the Roof Assembly on Page 62).
- [3] Remove the eight 3 mm screws securing the tray assembly to the system.



Make note of the locations of these screws, as the 4 outer screws are longer than the 4 inner screws.

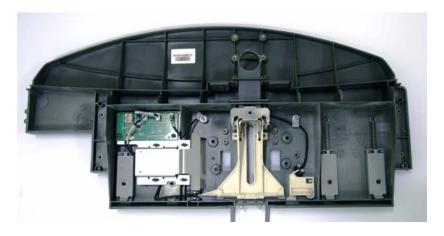


- [4] Gently lift the tray assembly and turn it on its underside.
- [5] Disconnect the Cable J1 from the connector board.



[6] Remove the tray assembly.

Tray Assembly



Installing the Tray Assembly



Possible damage from electrostatic discharge.

- [1] Connect the Cable J1 to the connector board.
- [2] Install the tray assembly into its position.
- [3] Install the eight 3 mm screws securing the tray assembly to the system.
- [4] Install the roof assembly (see Installing the Roof Assembly on Page 64).
- [5] Install the scanner cover (see Installing the Scanner Cover on Page 20).

Replacing the Barcode Reader

Tools Required

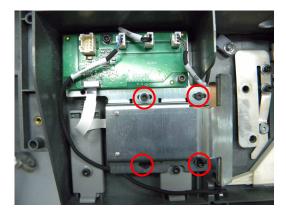
• 2.5 mm Allen wrench

Removing the Barcode Reader

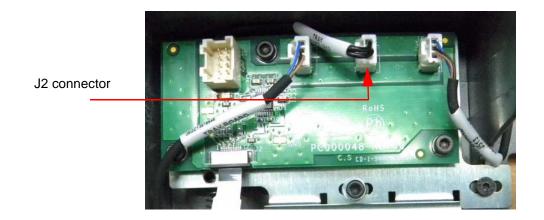


Possible damage from electrostatic discharge.

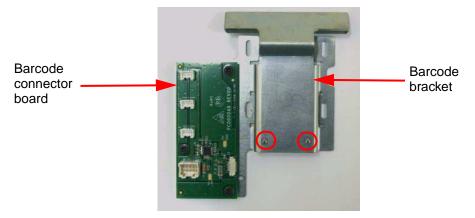
- [1] Remove the scanner cover (see Removing the Scanner Cover on Page 20).
- [2] Remove the roof assembly (see Removing the Roof Assembly on Page 62).
- [3] Remove the tray assembly (see Removing the Tray Assembly on Page 65).
- [4] Turn the tray assembly on its underside.
- [5] Remove the four 3 mm screws securing the Barcode reader bracket.



[6] Disconnect the connectors from the connector board.



[7] Remove the barcode reader with its bracket and connector board.



- [8] Remove the two Phillips screws that secure the barcode reader to its bracket
- [9] Remove the barcode from its location on the bracket.

Barcode Reader



Installing the Barcode Reader

[1] Position the barcode reader.



The white label should be facing up.

- [2] Install the two Phillips screws in the reader bracket.
- [3] Attach the reader/bracket assembly to the main bracket with two Phillips screws.
- [4] Connect the connectors to the connector board.
- [5] Install the four 3 mm screws securing the barcode reader bracket.
- [6] Install the tray assembly (see <u>Installing the Tray Assembly on Page 66</u>).
- [7] Install the roof assembly (see Installing the Roof Assembly on Page 64).
- [8] Install the scanner cover (see Installing the Scanner Cover on Page 20).

Replacing the Sensor Z4

Tools Required

• 1.5 mm Allen wrench

Removing the Sensor Z4

- [1] Remove the scanner cover (see Removing the Scanner Cover on Page 20).
- [2] Remove the 2 mm screw securing the Sensor Z4 to the black plastic mold.



The Sensor Z4 is located on the inner left hand side of the black plastic mold when standing opposite the front of the system.



- [3] Disconnect the cable attached to the Sensor Z4.
- [4] Remove the Z4 sensor.

Installing the Z4 Sensor

- [1] Position the Z4 sensor.
- [2] Connect the Z4 sensor cable.
- [3] Insert the 2 mm screw securing the Z4 sensor to the black plastic mold.

Confirm the Sensor Function



Laser Warning

See "Vita CR Laser Safety Instructions" on Page 6.

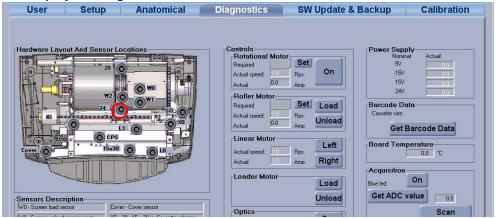
- [1] Perform the following procedure prior to installing the scanner cover:
 - (a) Connect the power cable to the electrical outlet.
 - **(b)** Connect the USB cable to the back of the system.
 - (c) Switch ON the scanner.
 - (d) Go to Settings>Diagnostics tab.
 - (e) Insert a piece of paper into the sensor where the screen carriage passes during the procedure.

Note

This blocks the sensor signal.

(f) Confirm that every time the paper blocks the sensor, the green LED to the right of the Z4 display on the Hardware Layout And Sensor Locations section lights up.

Sensor Locations Display on Diagnostics Tab



- [2] Install the scanner cover (see Installing the Scanner Cover on Page 20).
- [3] Perform the following procedure after installing the scanner cover:
 - (a) Insert an LL1 cassette.
 - (b) Confirm that the software identifies the cassette size as 14 x 33 in. in the Quality Control screen.

Replacing the Sensor Z0

Introduction

The Z0 sensor sends a signal indicating that the screen carriage is in home position.

Tools Required

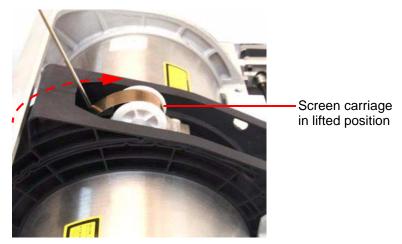
- 1.5 mm Allen wrench
- · Long shaft Allen wrench (size insignificant)

Removing the Sensor Z0

- [1] Remove the scanner cover (see Removing the Scanner Cover on Page 20).
- [2] Remove the scanner base (Removing the Scanner Base on Page 23).
- [3] Lift the screen carriage up and secure it in place using a long shaft Allen wrench.

Note

The screen carriage is located on the bottom half of the black plastic mold.



[4] Remove the 2 mm screw securing the Z0 sensor to the black plastic mold.



The Z0 sensor is located on the bottom half of the black plastic mold, inner right hand side.



- [5] Disconnect the Z0 sensor cable attached to the Z0 sensor.
- [6] Remove the sensor.

Installing the Sensor Z0

- [1] Position the Z0 sensor.
- [2] Connect the Z0 sensor cable.
- [3] Insert the 2 mm screw securing the Z0 sensor to the black plastic mold.
- [4] Install the scanner base (see <u>Installing the Scanner Base on Page 23</u>).

Confirm the Sensor Function



Laser Warning

See "Vita CR Laser Safety Instructions" on Page 6.

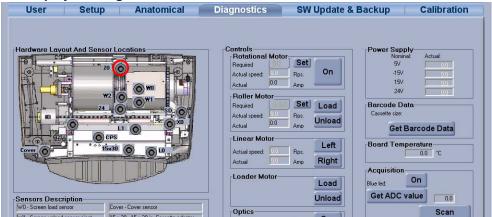
- [1] Perform the following procedure prior to installing the scanner cover:
 - (a) Connect the power cable to the electrical outlet.
 - (b) Connect the USB cable to the back of the system.
 - (c) Switch ON the scanner.
 - (d) Go to the **Settings>Diagnostics** tab.
 - (e) Insert a piece of paper into the sensor where the screen carriage passes during the procedure.



This blocks the sensor signal.

(f) Confirm that every time the paper blocks the sensor, the green LED to the right of the Z0 display on the Hardware Layout And Sensor Locations section lights up.

Sensor Locations Display on Diagnostics Tab



- [2] Install the scanner cover (see <u>Installing the Scanner Cover on Page 20</u>).
- [3] Perform the following procedure after installing the scanner cover:
 - (a) Insert an LLI cassette.
 - (b) Confirm that the software identifies the cassette size as 14 x 33 in. in the Quality Control screen.

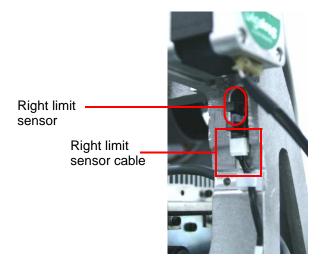
Replacing the Right and Left Limit Switch Sensors

Tools Required

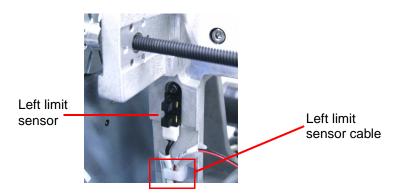
• 1.5 mm Allen wrench

Removing the Right and Left Limit Switch Sensors

- [1] Remove the scanner cover (perform Steps 4 7 of Removing the Scanner Cover on Page 20).
- [2] Switch ON the scanner.
- [3] Go to Settings>Diagnostics tab.
- [4] Click Left or Right to move the linear motor to the center of the system.
- [5] Switch OFF the scanner.
- [6] Remove the 2 mm screw securing the right limit sensor to the system chassis.
- [7] Disconnect the right limit sensor cable.



- [8] Remove the right limit sensor.
- [9] Remove the 2 mm screw securing the left limit sensor to the system chassis.
- [10] Disconnect the left limit sensor cable.



[11] Remove the left limit sensor.

Installing the Right and Left Limit Switch Sensors

- [1] Install the right and left limit sensors.
- [2] Connect the left limit sensor cable.
- [3] Insert the 2 mm screw securing the left limit sensor to the system chassis.
- [4] Connect the right limit sensor cable.
- [5] Insert the 2 mm screw securing the right limit sensor to the system chassis.

Confirming the Right and Left Limit Switch Sensors Function



Laser Warning

See "Vita CR Laser Safety Instructions" on Page 6.

- [1] Perform the following procedure prior to installing the scanner cover.
 - (a) Connect the power cable to the electrical outlet.
 - (b) Connect the USB cable to the back of the system.
 - (c) Switch ON the scanner.
 - (d) Go to the Settings>Diagnostics tab.
 - (e) Click Left and Right in the Linear Motor section and confirm that the linear motor moves from side to side.
 - (f) Confirm that the linear motor stops once its flag reaches the left/right limit sensor.
- [2] Install the scanner cover (see Installing the Scanner Cover on Page 20).
- [3] Perform the following procedure after installing the scanner cover:
 - (a) Go to the Settings>Diagnostics tab.
 - (b) Click Left and Right in the Linear Motor section.
 - (c) Confirm that the green LEDs next to the X0 and X1 display on the Hardware Layout And Sensor Locations section light up as the linear motor reaches the left and right limit sensors.
- [4] Perform a flat field scan and check the origin. If the image is not centered, perform an Origin calibration (see "Origin Calibration" on Page 118).
- [5] After performing the Origin calibration, perform a flat field scan to confirm that the calibration was successful.

Replacing the LED Indicator

Tools Required

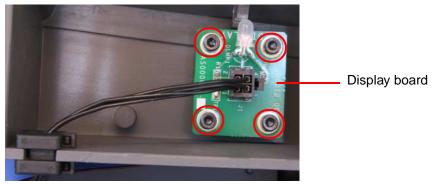
• 2.5 mm Allen wrench

Removing the LED Indicator unit



Possible damage from electrostatic discharge.

- [1] Perform Step 1 to 8 of "Removing the Roof Assembly" on Page 62.
- [2] Remove the four 3 mm screws securing the display board connector.



[3] Remove the display board.

Installing the LED Indicator unit



Possible damage from electrostatic discharge.

- [1] Install the display board.
- [2] Insert the four 3 mm screws securing the display board.
- [3] Insert the plastic clip.
- [4] Perform Step 2 to Step 5 of "Installing the Roof Assembly" on Page 64.
- [5] Install the scanner cover (see Installing the Scanner Cover on Page 20).
- [6] Load/unload a cassette several times.
- [7] Visually examine that the LED indicator is functioning according the definitions outlined in the table below.

System Status	LED
Powering up and Homing	Orange
Ready for Scan	Green
Scanning	Green blinking
Error	Orange blinking

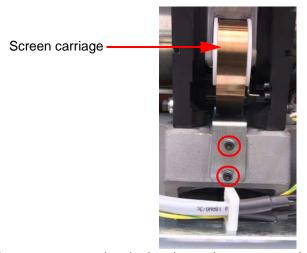
Replacing the Screen Carriage

Tools required

- 1.5 mm Allen wrench
- 2.5 mm Allen wrench
- Flat screwdriver

Removing the Screen Carriage

- [1] Remove the scanner cover (see Removing the Scanner Cover on Page 20).
- [2] Remove the scanner base (see Removing the Scanner Base on Page 23).
- [3] Remove the two 3 mm screws securing the bracket to the system chassis.



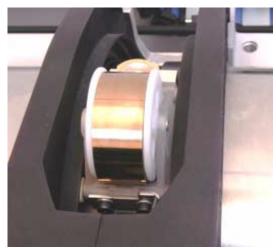
[4] Remove the 2 mm screw securing the bracket to the screen carriage spring.



[5] Lift up the screen carriage until the screw is aligned with the small hole in the black plastic mold.



[6] Insert the flat screwdriver through the hole until it reaches the flat screw. Remove the flat screw securing the screen carriage to the plastic carriage holder.



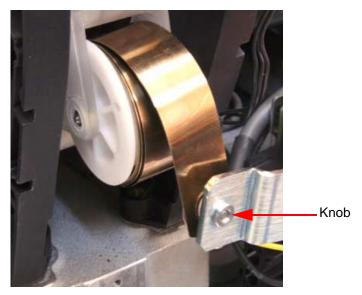
[7] Remove the screen carriage.

Installing the Screen Carriage

- [1] Gently insert the screen carriage.
- [2] Insert the flat screw securing the screen carriage to the plastic carriage holder.
- [3] Insert the 2 mm screw securing the bracket to the screen carriage spring.



The knob on the bracket must be facing outward.



[4] Insert the two 3 mm screws securing the bracket to the system chassis.

Confirming the Proper Function

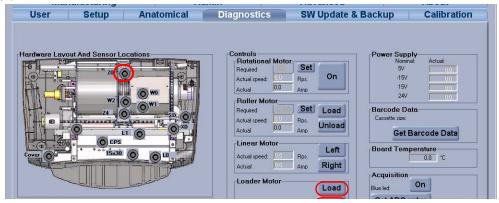


Laser Warning

See "Vita CR Laser Safety Instructions" on Page 6.

- [1] Perform the following procedure prior to installing the scanner cover:
 - (a) Connect the power cable to the electrical outlet.
 - (b) Connect the USB cable to the back of the system.
 - (c) Switch ON the scanner.
 - (d) Load/unload a cassette 2 times.
 - (e) Confirm that the cassette loads/unloads properly.
- [2] Go to Settings>Diagnostics tab.
 - (a) Click Load/Unload in the Loader Motor section.
 - **(b)** Confirm that the screen carriage returns to home position.
 - (c) Confirm that the green LED to the right of the Z0 sensor on the Hardware Layout And Sensor Locations lights up.

Diagnostics Tab

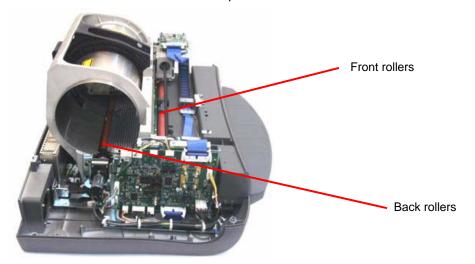


[3] Install the scanner cover (see Installing the Scanner Cover on Page 20).

Rollers Replacement

Introduction

These instructions describe how to replace the front and back rollers.

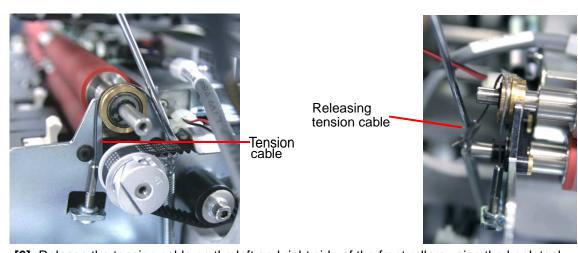


Tools Required

- Phillips screwdriver
- Allen wrenches (metric): 1.5, 2, 2.5, 3, 4
- Open-ended wrench (metric): 5.5
- LOCTITE 242
- Hook tool (metric)

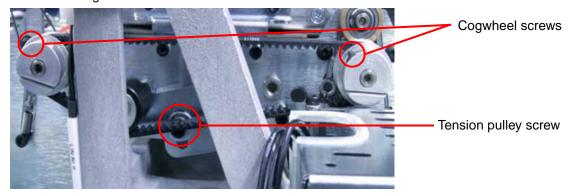
Removing the Front Rollers

- [1] Disconnect the scanner from the main power.
- [2] Remove the scanner cover. (see "Removing the Scanner Cover" on Page 20).
- [3] Remove the roof assembly and tray assembly. (see <u>"Removing the Roof Assembly" on Page 62</u> and <u>"Removing the Tray Assembly" on Page 65</u>.)
- [4] Remove the 5V, ±15V power supply cover (see <u>Step 1</u> to <u>Step 7</u> in <u>"Removing the 5V, ±15V Power Supply Unit" on Page 55</u>).
- [5] Manually rotate the linear screw to move the linear assembly to the middle of the system.



[6] Release the tension cable on the left and right side of the front rollers using the hook tool.

- [7] Gently remove the top front roller by pulling it up and out from its location: pull the roller to the left, releasing it from the tension cable and remove the roller from the left side of the system.
- [8] Loosen the 1.5 mm tension pulley screw located on the left side of the system. This allows for the loosening of the timing belt.

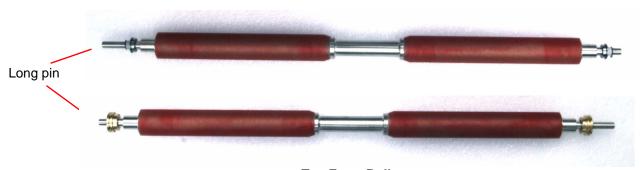


[9] Loosen the two 3 mm cogwheel screws on the left side of the system and remove the timing belt.



- [10] Remove the two 2.5 mm screws securing the black plastic bracket to the chassis on the left side of the system.
- [11] Remove the two 2.5 mm screws securing the black plastic bracket to the chassis on the right side of the system.
- [12] Gently lift up and remove the bottom front roller.

Bottom Front Roller



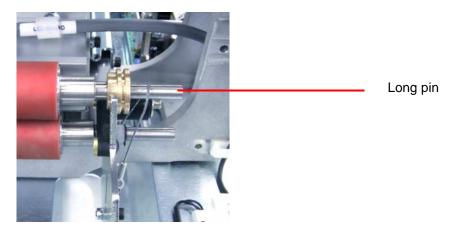
Top Front Roller

Installing the Front Rollers

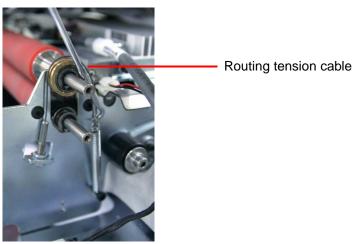
- [1] Install the bottom front roller.
- [2] Apply LOCTITE 242 on the four 2.5 mm screws securing the black plastic brackets to the chassis and install: 2 on the left side and 2 on the right side of the system.
- [3] Slide the top front roller from the left side, through the cable tension loop, into its position.



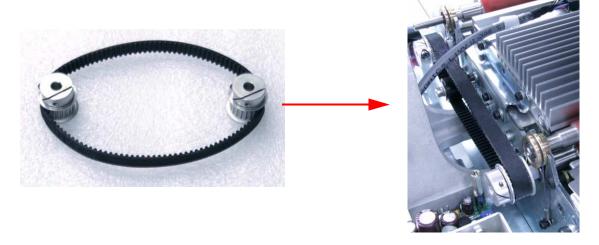
The long pin is to the right side



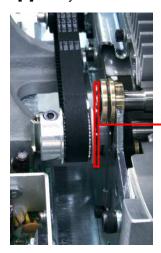
[4] Route the tension cable around the top front roller ring on the left and right side using the hook tool.



[5] Place the timing belt around both cogwheels as shown in the figure below (right).

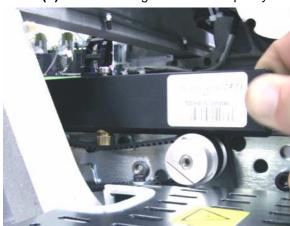


- [6] Insert the timing belt with the cogwheels in its position on the right side of the system.
- [7] Verify that there is a 1.5 mm gap between the back top roller disc and the cogwheel.



1.5 mm gap

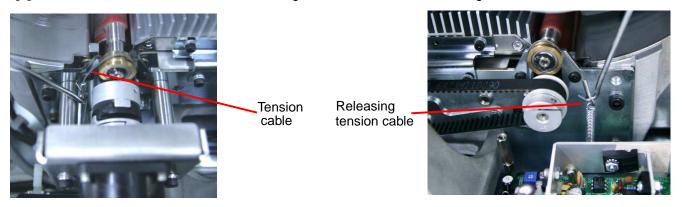
- [8] Tighten the two 3 mm cogwheel screws.
- [9] Adjust the belt tension using a dynamometer.
 - (a) Press down the dynamometer using 1 kg of force. The belt should not stretch more than 5-6 mm.
 - (b) Close the cogwheel tension pulley nut screw after you receive the definition tension.



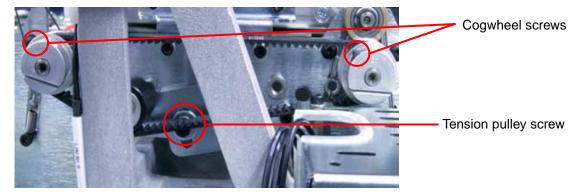
- [10] Install the 5V, ±15V power supply cover (see Step 7, "Installing the 5V, ±15V Power Supply Unit" on Page 56).
- [11] Install the roof assembly and tray assembly (see "Installing the Roof Assembly" on Page 64 and "Installing the Tray Assembly" on Page 66).
- [12] Install the scanner cover. (see "Installing the Scanner Cover" on Page 20).

Removing Back Rollers

- [1] Disconnect the scanner from the main power.
- [2] Remove the scanner cover. (Refer to the Vita CR Service Guide.)
- [3] Remove the 5V, ±15V power supply cover. (See <u>Step 1</u> to <u>Step 7</u>, in <u>"Removing the 5V, ±15V Power Supply Unit" on Page 55</u>.)
- [4] Shift the 24V power supply unit to the right without disconnecting the cables. (See <u>Step 4</u> in <u>"Removing the 24V Power Supply Unit" on Page 57.</u>)
- [5] Release the tension cable on the left and right side of the back rollers using the hook tool.

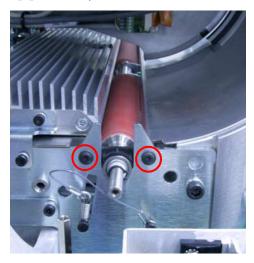


- [6] Gently lift up the top back roller out from its location and remove from the right side of the system.
- [7] Loosen the 1.5 mm tension pulley screw located on the right side of the system. This allows for the loosening of the timing belt tension.



[8] Loosen the two 3 mm cogwheel screws on the right side of the system and remove the belt.

[9] Manually rotate the linear screw to move the linear assembly to the middle of the system.



- [10] Remove the two 2.5 mm screws securing the black plastic bracket to the chassis on the left side of the system.
- [11] Remove the two 2.5 mm screws securing the black plastic bracket to the chassis on the right side of the system
- [12] Remove the roller motor (see "Removing the Roller Motor Assembly" on Page 46).
- [13] Remove the four 4 mm screws securing the silver brackets to the screen carriage rails.





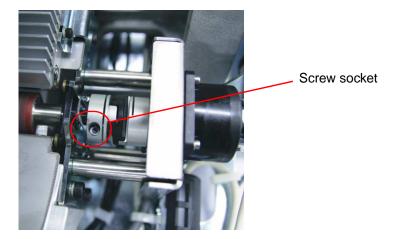
[14] Remove the two metal brackets.



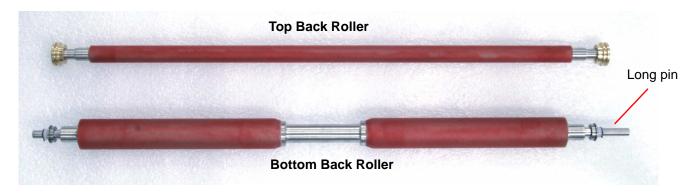
[15] Remove the four 3 mm screws securing the erase LED assembly to the system chassis: 2 on the left side and 2 on the right side of the system.



- [16] Push the erase LED assembly towards the front of the system.
- [17] Remove the Motor Loader (see "Removing the Loader Assembly" on Page 50).
- [18] Release the screw that secures the inner coupling.



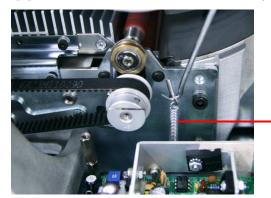
[19] Lift up and remove the bottom back roller.



Installing the Back Rollers

- [1] Install the bottom back roller into position. (Longer end to the right side.)
- [2] Install the four 3 mm screws securing the erase LED assembly to the system chassis: 2 on the left side and 2 on the right side of the system.

- [3] Install the four 4 mm screws securing the metal brackets to the screen carriage rails.
- [4] Return the 24V power supply unit back to its place. (see step 3 in "Replacing the 24V Power Supply Unit" on Page 57.)
- [5] Apply LOCTITE 242 on the four 2.5 mm screws securing the black plastic brackets to the chassis and install: 2 on the left side and 2 on the right side of the system.
- [6] Install the top back roller into position.
- [7] Route the tension cable around the top back roller ring on the left and right side using the hook tool.



Route tension cable

[8] Install the 2.5 mm coupling screw adjacent to the bottom back roller.

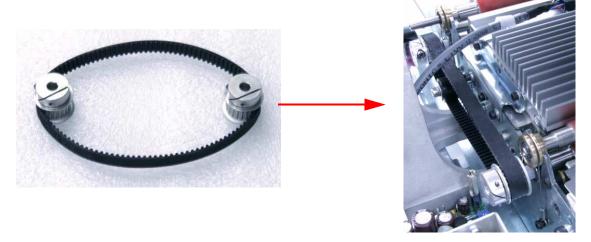


[9] Install the roller motor (see "Installing the Roller Motor Assembly" on Page 48).

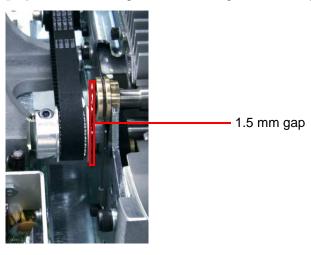


[10] Release the 2.5 mm coupling screw adjacent to the top back roller in order to adjust the coupling. Verify that all three couplings are secured together and there is no space between them. Once adjusted, secure the 2.5 mm coupling screw.

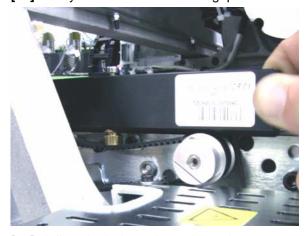
[11] Place the timing belt around both cogwheels as shown in the figure below.



[12] Insert the timing belt with the cogwheels in its position all the way over to the right side of the system.



[13] Verify that there is a 1.5 mm gap between the back top roller disc and the cogwheel.



- [14] Adjust the belt tension using a dynamometer.
 - (a) Press down the dynamometer using 1 kg of force. The belt should not stretch more than 5-6 mm.
 - (b) Close the cogwheel tension pulley nut screw after you receive the definition tension.
- [15] Tighten the two 3 mm cogwheel screws.
- [16] Install the 5V, ±15V power supply cover (see Step 7, "Installing the 5V, ±15V Power Supply Unit" on Page 56).
- [17] Install the scanner cover (see "Installing the Scanner Cover" on Page 20).

Section 5: Vita CR Adjustments

Loader Pusher Adjustment

Tools Required

- · Loader pusher adjustment gauge
- 2.5 mm Allen wrench

Adjusting the Loader Pusher

- [1] Go to the **Settings>Diagnostics** tab.
- [2] Click Unload.



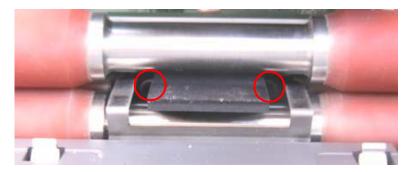
The loader pusher is in home position.

- [3] Disconnect the scanner from the main power.
- [4] Remove the scanner cover (see "Removing the Scanner Cover" on Page 20).
- [5] Remove the roof assembly (see "Removing the Roof Assembly" on Page 62).
- [6] Loosen, but do not remove the two 2 mm screws.

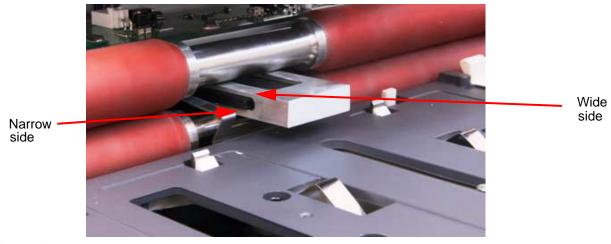
Note

Use a strong flashlight to illuminate the area.

Loader Pusher



[7] Slide the gauge over the loader pusher. The narrow side is on the bottom.



- [8] Secure the two screws.
- [9] Remove the gauge.
- [10] Install the roof assembly (see "Replacing the Roof Assembly" on Page 62).
- [11] Install the scanner cover (see "Replacing the Scanner Cover" on Page 20).

Section 6: Maintaining and Cleaning the System

Cleaning the VITA CR Rollers

The Roller Cleaning Cycles

The roller-cleaning device enables you to clean the rollers that feed the storage phosphor screen from the cassette into the scanner. Clean the rollers periodically to remove dust and small particles.

Every 1,000 scanning cycles you will receive a reminder (popup window message) to clean the rollers.

Cleaning the rollers resets the roller cleaning counter.

If you do not clean the rollers the reminder message will appear every 100 scanning cycles.



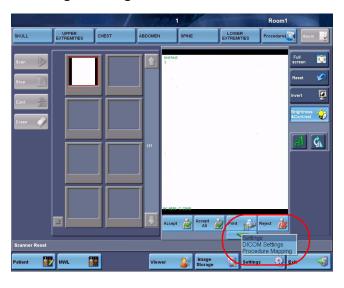
Important

Not cleaning the rollers periodically will reduce the image quality.

The Roller Cleaning Procedure

The cleaning device includes the following items:

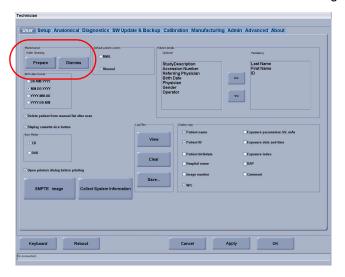
- · Cleaning tray
- · Cleaning plate with adhesive strips inside a protective envelope
- [1] Remove any cassettes and screens from the scanner.
- [2] Start the CARESTREAM VITA CR SYSTEM SOFTWARE.
- [3] In the main screen, select Settings>Settings>User tab.



Main screen

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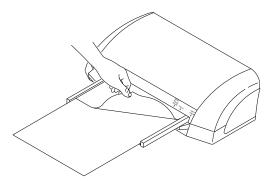
[4] Click the **Prepare** button in the Maintenance subsection next to "Roller Cleaning".



User tab

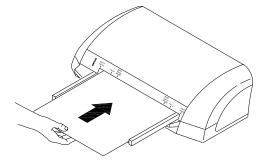
- [5] When a warning message appears, click **OK** to continue.
- [6] Insert the Cleaning Tray into the unit tray. Make sure it locks into place.
- [7] Place the cleaning plate on the tray. Make sure the cleaning plate is placed in the correct direction, as specified on the plate.

Remove the protective paper from the cleaning plate to expose the adhesive.



Removing the protective strips

- [8] Click OK.
- [9] While holding onto the plate, push the plate gently into the scanner until the rollers start to pull it into the scanner. It should go in almost entirely, with approximately a quarter of the plate remaining outside.



Pushing the cleaning plate into scanner

- [10] An on-screen message appears. Click **OK** and pull out the cleaning plate and the tray.
- [11] Repeat Steps 4 through 10 three times.
- [12] To complete the procedure, turn off the scanner, then turn on the scanner.

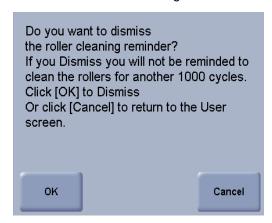
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Dismissing Roller Cleaning Reminder

To prevent the roller cleaning reminder from appearing every 100 cycles, click the **Dismiss** button on the User screen.



The following message appears; click **OK** to dismiss the message or **Cancel** to return to the User screen.



Roller cleaning dismiss message



Important

Not cleaning the rollers periodically will reduce the image quality.

Cleaning the VITA CR

Clean the outer surfaces only with water using a soft, lint-free cloth. Dampen the cloth. Then wipe the outer surfaces lightly.



Caution

Do not use alcohol or alcohol-based products to clean any of the scanner components.

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Section 7: Key Operator Settings

The advanced settings wrench is used to access advanced features of the CARESTREAM VITA CR System Software. Available tabs depend on the user's designation. (See <u>"Admin Tab" on Page 110</u>)

Accessing Advanced Settings

To enter Advanced Settings, click Settings on the User tab.

When an operator level user clicks on the Settings button, a dialog box opens with three options: **Settings, Procedure Mapping,** and **Annotation Tool**.



Settings enables two options for the operator: About tab and User tab.

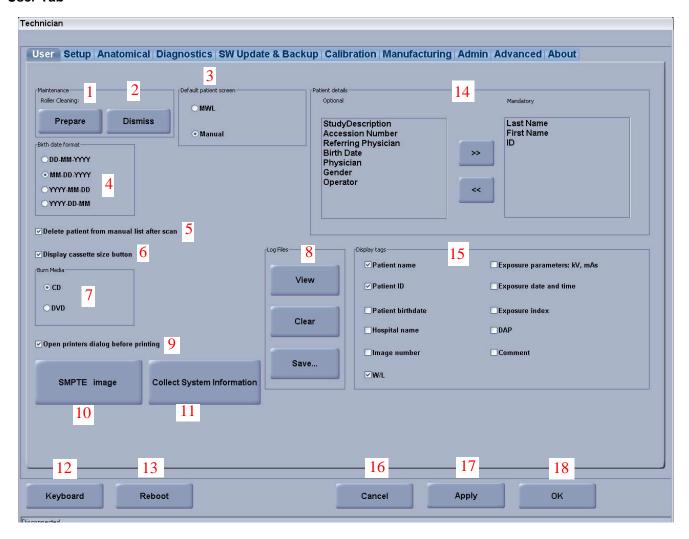
When a key operator or a full service operator clicks on the Settings button, the dialog box opens four options: **Settings, DICOM Settings, Procedure Mapping,** and **Annotation Tool**.



User Tab

The User tab is accessible by all user levels. It contains parameters that may be set for local clinical preferences: birth date format, the default screen that opens when the interface is opened, patient detail field settings, and which display tags can be used. In addition the roller cleaning procedure is initiated in the User tab.

User Tab



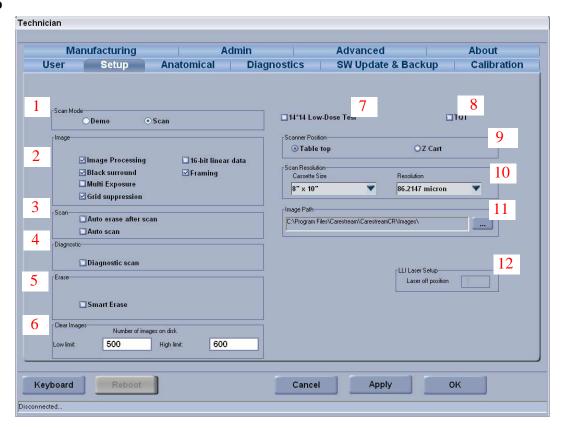
#	Component	Description	
1	Prepare	Enables you to commence roller cleaning. See "Cleaning the VITA CR Rollers" on Page 91".	
2	Dismiss	Defers roller cleaning after receiving message to perform the procedure.	
3	Default patient screen	Determines whether Manual or MWL patient list will be the default display. MWL is usually set as default. MWL - Operator chooses from patient list. Manual mode - Operator enters the patient details.	
4	Birth date format	Allows you to select the preferred format.	
5	Delete patient from manual list after scan	When checked, the patient is automatically deleted from the Manual Patient list after scanning. If not selected, the operator will need to manually delete patient names from the Manual patient list periodically.	
6	Display cassette size button	When checked, the Cassette Size button will be displayed on the scan screen and the operator can select the cassette size. If not checked, the Cassette Size button will appear only if there is a problem with the barcode reader.	

#	Component	Description	
7	Burn Media	This option is for the Burn CD/DVD from Image Storage. Choose between CD and DVD writing. For DVD option, NERO software must be installed.	
8	B Log Files View, clear, and save system Log files.		
		View: opens the Log File drop down list.	
		Clear: saves the present Log File in "Archive Log Files" directory and creates a new Log File list.	
		Save: retains existing Log file and saves it to the selected file location.	
		Full service operator can delete log files.	
9	Open printers dialog before printing	When checked allows the operator to choose different print options.	
10	SMPTE image	Loads a grayscale SMPTE screen image for a screen quality check.	
11	Collect System Information	Save system information for problem analysis.	
12	Keyboard	Activates on-screen virtual keyboard.	
13	Reboot	Switches the system OFF and ON.	
14	Determining mandatory	Determines which fields will appear on the manual patient selection screen.	
	and optional Patient details	Mandatory Patient Details:	
	details	 Have a red asterisk to the right of the field name. 	
		 Are displayed in red letters on the Manual Patient Entry. 	
		 Last Name, First Name, and ID are defaults and cannot be transferred from the mandatory list. 	
		 Other details may be set as mandatory. 	
		To transfer a patient details between the mandatory and optional lists:	
		Select the patient detail.	
		 Click the arrow symbol >> or << to move the detail to the opposite list. 	
15	Display tags	Select which tags (values) will appear on the image window after a scan.	
16	Cancel	Cancel all changes made on the screen.	
17	Apply	Save all changes made on the screen.	
18	OK	Closes the User tab; if unsaved changes were made, a pop-up message will prompt the user to save or cancel the changes.	

Setup Tab

The Setup tab is used to enable or disable certain applications. It can be accessed by both the key operator and the full service level operator.

Setup Tab



#	Component	Description
1	Scan Mode	Set Scan Mode to Scan for normal scanning of cassettes. Demo can be selected when you want to simulate a scan that displays example images. No cassette is required in Demo mode.
2	Image options	Determines which image processing options will be integrated into the scanned image.
		Image Processing is an optional image enhancement tool which includes six different looks. "Looks" are determined in the Anatomical tab. A license is required.
		Black Surround activates automatic detection of the collimation regions and surrounds them with black borders. Default state is checked.
		Multi-exposure on a single screen displays all sub-image fields and black-masks the collimation. Default state is unchecked.
		Grid Suppression applies an algorithm to remove grids lines caused by using stationary grid. Grid Suppression algorithm requires 103 lp/mm. Default state is checked.
		16-bit Linear data will save the raw unprocessed images as a 16 bit image in C:\Program Files\Carestream\CarestreamCR\Images\Linear Images (Service use only).
		Framing removes the white screen overscan. Default state is checked.

#	Component	Description	
3	Scan options	Auto erase after scan erases the cassette after each scan. Default state is checked.	
		Auto scan initiates a scan automatically when scan prerequisites have been met. Default state is unchecked.	
		For Auto-scan to be performed, the following should be done:	
		Patient details entered	
		Cassette loaded	
		Body part and sub-part selected	
4	Diagnostic	Diagnostic scan is used by full service operators to evaluate the image data of a scan for troubleshooting scanner image quality problems. When selected the Scan Parameters screen appears in the scan window while the image is being scanned. Default setting is unchecked.	
5	Erase	Smart Erase sets the erase time according to the level of phosphor screen exposure. Default state is checked.	
6 Clear Images High limit: The maximum number of images to be stored in the		High limit: The maximum number of images to be stored in the hard drive.	
		Low limit: The number of images that will remain in the data base after the deleting process is initiated by the number of images reaching the high limit value.	
		The oldest images are always deleted first.	
7	14*14 Low-Dose Test	Not applicable.	
8	TQT	To activate TQT (Total Quality Tool) image analyzing module. For details of this optional acquisition see the TQT Users' Guide)	
9	Scanner Position	Check according to scanner placement: on a table top or in a Z-cart at 60°. (This is normally defined during the installation procedure)	
10	Scan Resolution	Select scan resolution for cassettes that can be given more than one option. Currently only large cassettes have more than one option.	
11	Image Path	Set the file destination path. The CR System image store path default is C:\Program Files\Carestream\CarestreamCR\Images	
12	LLI Laser Setup	Not applicable.	

Anatomical Tab

Room Configuration enables pre-defined configuration according to specific X-ray units in the location. "Rooms" represent a set of user-defined parameters that correspond to a specific X-ray unit; its name and the position names of the organ and sub-organ images acquired there.

Organ Configuration is limited to six organs. The Body Part is included in the DICOM header and to define Image Processing parameters.

Image Processing Look

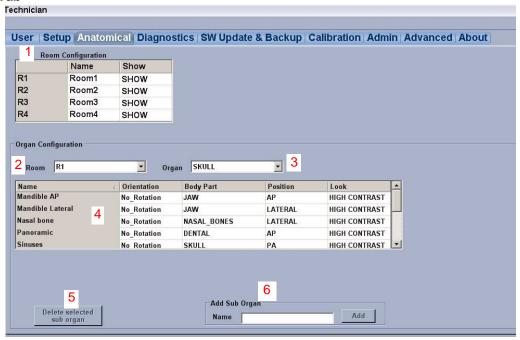
For each Body Part name, a different Image Processing look can be selected.

Image Processing		
Look	Characteristics	Usage
High contrast	System default setting.	Suitable for all body parts.
Wide latitude	For images needing wide latitude.	Abdomen, spine, and chest.
Extremity	High contrast, narrow latitude	Extremity imaging.
Medium contrast	Universal look, less contrast than high contrast.	Suitable for all body parts.
Standard	Less contrast than medium contrast. Soft or smooth look.	Suitable for all body parts.
Traditional	Contrast, latitude and sharpness remain fixed, like film. Brightness adjusted to correct for under- and over- exposure.	Suitable for all body parts.

There is no limitation for sub-organs (body parts). Sub organs are listed in alphabetical order.

The Anatomical tab can be accessed by a key operator and a full service operator.

Anatomical Tab



#	Component	Description
1	Room Configuration	Edit room names, select Show/Hide rooms. At least one room must be in Show mode.
2	Room list boxes	Select room from the drop-down list.
3	Organ list boxes	Select Organ (body part). Related sub organs (view positions) appear in the main list.
4	Main list	Displays the Sub Organ list for the selected room and organ.
5	Delete selected sub organ	Select a Sub Organ and click Delete selected sub organ button to delete it from the list. A sub organ that is assigned to a procedure in the Procedure Mapping Tool cannot be deleted.
6	Add Sub Organ	Enter a name and click Add to add to list.

Diagnostics Tab

The Diagnostics tab monitors the system's operations. It allows the user to operate each component separately and check the system's response. It can be accessed by both the key operator and the full service level operator.

The Diagnostics tab is divided into four sections:

- Hardware Layout And Sensor Locations displays the location and functionality of the system's sensors using a green (active) LED indicator and a gray (inactive) default indicator.
- · Controls operates the system's various motors and laser while checking its performance quality.
- Information section Erasing Info, Power Supply, Barcode Data, and Acquisition.
- General Show 1st Error, Enable Errors, Unload, and Reset buttons.

Diagnostic Tab

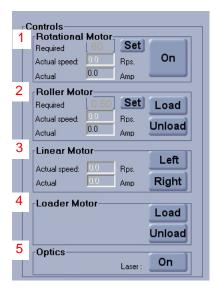


Diagnostics Tab - Hardware Layout And Sensor Locations

Sensor Name	Sensor Description	Sensor Name	Sensor Name
W0	Screen load sensor	Cover	Cover sensor
W1	Screen unload sensor eject	15 x 30	15 x 30 in. Cassette adapter
Z0	Screen carriage home position	CPS	Cassette in place sensor
SD	Linear motor stall detection	X0	Linear right position sensor
L1	Loader back position sensor	X1	Linear left position sensor
L0	Loader front position (home)	Z4	Screen end of travel sensor

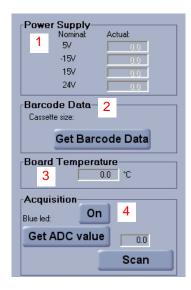
^{*} Sensor LED indicators - View status of sensors in the system. When green LED is on, the sensor is active, otherwise, it is inactive.

Diagnostics Tab - Controls



No.	Component	Description	
1	Rotational Motor	Activates the rotational motor. Set the required speed and use the On/Off button to activate/deactivate the motor. Actual revolution speed appears in the Actual window.	
2	Roller Motor	Activates the rollers motor. Set the required speed and use the Load/Unload buttons to choose the movement direction. Actual revolution speed appears in the Actual window.	
3	Linear Motor	Activates the linear motor. Use the Left/Right buttons to choose the direction. Actual revolution speed appears in the Actual window.	
4	Loader Motor	Activates the loader motor. Click Load/Unload to activate the Loader motor.	
5	Optics	Activates the laser. Click On/Off to activate/deactivate the laser.	

Diagnostics Tab - Information Section





No.	Component	Description	
1	Power Supply	The system is operated by four different power supplies. The main power supply reaches the controller board where the voltage is converted and then sent to the system's various components. A sample of the main power supply is taken from the controller board and displayed in the diagnostics tab. The Actual values should be identical to the Nominal values. If the Actual value appears in red, there is a problem with the power supply.	
2	Barcode Data	Each cassette contains a barcode label. The barcode reads this label and determines the cassette size after clicking on the Get Barcode Data button.	
3	Board Temperature	Displays the internal temperature of the controller board. If the controller board is overheating, the value appears in red.	
4	Acquisition	Not applicable.	
5	Erasing Info	Erase lamp activates the erase LED assembly. Use the On/Off button to activate/ deactivate the erase LED assembly.	
		Over temperature provides information about the internal temperature of the erase LED assembly. If the assembly is overheating, the red LED indicator lights up.	
		Light error measures current values of the erase LED assembly. If the assembly is faulty and does not light up in its entirety, the red LED indicator lights up.	
		Cable detection provides information about the erase LED assembly cable. If the assembly cable is not properly connected, the red LED indicator lights up.	

Diagnostics Tab - General Buttons



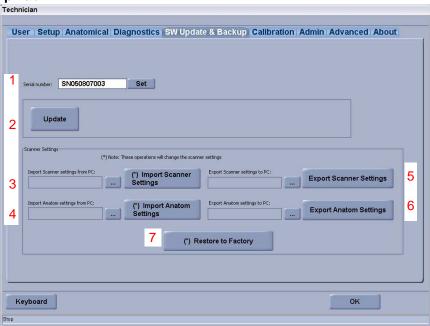
No.	Component	Description
1	Show 1st Error	When activated, the first error message that comes from the Firmware will appear.
2	Enable Errors	The error message mechanism is disabled when entering diagnostic mode. Click to activate the error message mode. To deactivate the error mode, exit and re-enter the Diagnostic tab.
3	Unload	Click the Unload button to return the screen to the cassette.
4	Reset	Click the Reset button to reset system operation.

SW Update & Backup Tab

The SW Update & Backup tab is used:

- To update the scanner's Firmware and FPGA settings
- To restore the scanner and Anatom settings
- To perform backups

SW Update & Backup Tab



No.	Component	Description
1	Serial number	Displays the scanner Serial Number. Set Serial Number is a procedure available to Admin level users only.
2	Update	Opens the Update options dialog on the screen in order to update Firmware and FPGA.
3	Import Scanner Settings	Enter path to scanner settings file and click button to import.
4	Import Anatom Settings	Enter path to Anatom settings file and click button to import.
5	Export Scanner Settings	Enter a path and file name to create the scanner settings file and click the button to export. Use to backup scanner settings.
6	Export Anatom Settings	Enter a path and file name to create the Anatom settings file and click the button to export. Use to backup Anatom settings.
7	Restore to Factory	Click to restore the factory settings. This will erase all calibrations and system settings; full calibration will be required.

Note

Backing up (Export) of the scanner and Anatom Settings should be performed when you first arrive at the site and as last step before leaving the site.

Backing Up (Export) Scanner and Anatom Settings:

[1] Click the "..." button next to the **Export Scanner Settings** button.

Note

A dialog box appears.

[2] Enter an appropriate file name such as "Scanner_Backup_Date." Click Save.

- [3] Click Export Scanner Settings to back up.
- [4] Repeat Steps 1 to 3 to backup Anatom settings.

Restoring (Import) Scanner and Anatom settings:

[5] Click the "..." button next to the **Import Scanner Settings** button.



A dialog box appears.

- [6] Select the file that you previously created to export the settings to and Click Open.
- [7] Click the Import Scanner Settings button to restore.
- [8] Repeat Steps 5 to 7 to restore Anatom settings.

Note

The **Restore to Factory** button restores the pre-defined Factory scanner and Anatom values. This button should only be used when you suspect that the current setting and backup values are corrupt. The **Restore to Factory** button is used return the scanner to an operational state. After using the **Restore to Factory** button the four calibrations need to be performed.

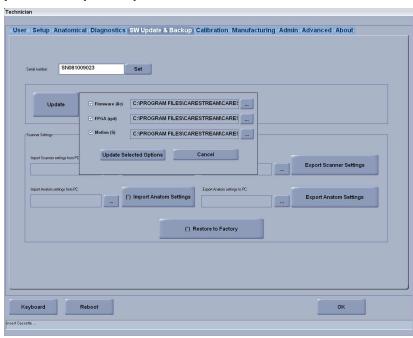
Updating the Firmware:

[9] Click Update.



An update options dialog box opens.

SW Update & Backup Tab with Update Options



Firmware and FPGA can be updated consecutively by selecting both options prior to clicking **Update Selected Options**.

[10] To update Firmware from the default path, select **Firmware (iic)**.

To update Firmware from another path, click the "..." button to the right of the Firmware default path name, and enter the path details.

[11] Click Update Selected Options.

Note

When the update is complete, a message appears requesting to restart the system.

Updating the FPGA:

[12] To update FPGA from the default path, select FPGA (rpd).

To update FPGA from another path, click the "..." button to the right of the FPGA default path name, and enter the path details.

[13] Click Update Selected Options.

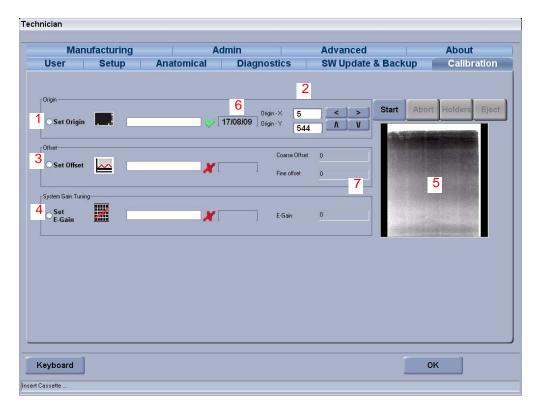


When the update is complete, a message appears requesting to restart the system.

Calibration Tab



The scanners are calibrated before leaving the assembly site. Calibration should not be performed unless you suspect the scanner has a problem or if an optical path component has been replaced. See <u>"Calibrations" on Page 117</u> for calibration procedures descriptions.



#	Component	Description
1	Origin calibration	Determines the X, Y values that will be used for the start of a scan.
2	Manual origin calibration	To perform manual calibration of the origin parameters.
3	Offset calibration	Determines the offset value that will be used for each PM value.
4	Gain calibration	Sets the electronic gain level to adjust the system response.
5	Calibration preview	Previews the scan progress during the calibration process.
6	Calibration date	Date on which the calibration was performed.
7	Calibration values	Displays the settings values that were found and will be used in normal operations.

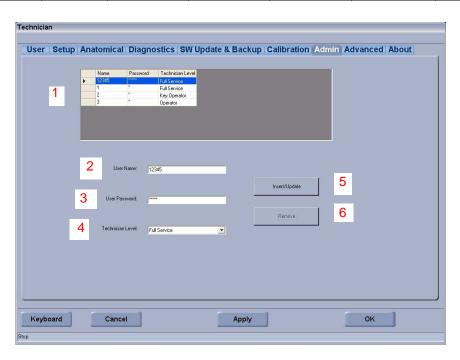
^{*}The green checkmark indicates that a calibration has successfully been completed and the date to the right of the checkmark indicates the date of the successful calibration.

Admin Tab

The Admin tab can be accessed by a key operator and a full service operator in order to manage the list of registered users of the system and their access levels. There are three user access levels: operator, key operator and full service operator.

Operator					SW Update			
Level	User	Setup	Anatomical	Diagnostic	& Backup	Calibration	Admin	About
Operator	+							+
Key Operator	+	+	+		+		+	+
Full Service	+	+	+	+	+	+	+	+

Admin tab



#	Component	Description	
1	User list	List of users registered in the system.	
2	User Name	User name of selected user or new user.	
3	User Password	Enter password of selected user or new user.	
4	Technician Level	Drop down list of permissible user access levels.	
5	Insert/Update button	Click to add or update user details.	
6	Remove button	Click to remove the selected User from the system.	

To add new user:

- [1] Enter User Name.
- [2] Enter Password.
- [3] Select Level.
- [4] Click Insert/Update.

Note

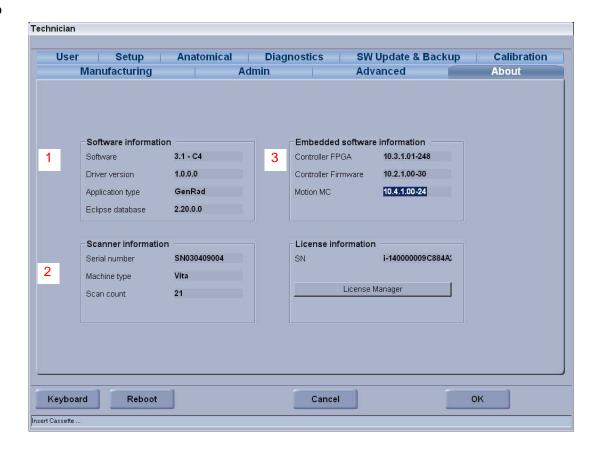
A key operator cannot remove himself (or the last operator) from the list.

A key operator can add or remove an operator or a key operator, but not a full service operator.

About Tab

The About tab displays information about the unit and the software version installed. FPGA, Firmware, and Software version details are updated each time the particular software version is updated.

About tab



#	Component	Description			
1	Scanner ID	The Serial number is comprised of 9 digits (SN XX XX XXXX): XX - day of manufacture			
		XX - month of manufacture			
		XX - year of manufacture			
		XXX - factory's ranking designation number (indicative of total units produced on that day)			
		Machine Type - name of product type			
		Scan Count - number of scans performed to date			
2 Software Version SW version - CR System Software version		•			
		Driver - system HW driver version			
		Application Type - GENRad, light, or grayling			
		Eclipse DB Version - database of the image filter version			
		USB/FPGA - Software burned on the controller board and responsible for the linear function and image structure.			
		FirmWare - Software burned on the controller board and responsible for the			
		error report linked to the FPGA SW and the computer connection.			
		Motion version - Software burned on the controller board and responsible for the system operation timing and the various motor functions.			

Section 8: Configuring DICOM

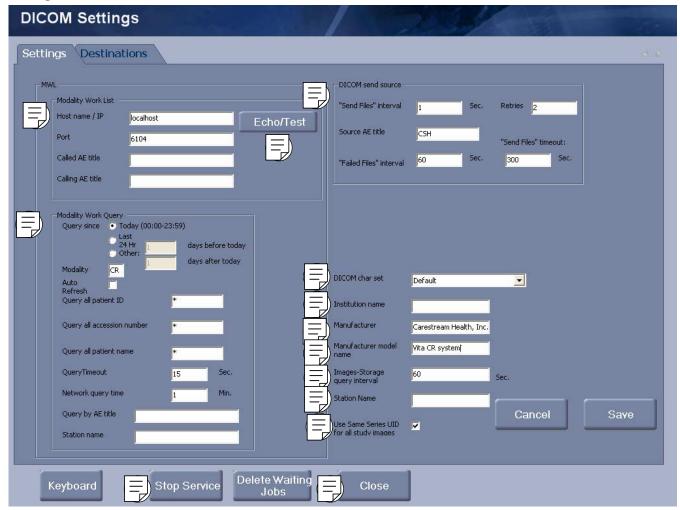
Configuring DICOM Settings for Modality Work List (MWL)

When working with the HIS/RIS PACS services in an imaging facility, you must configure the DICOM Settings tab to enable the use of the DICOM Services.

To access DICOM Settings, select **Settings>DICOM Settings**.

See the table below for configuration information in each field.

Settings Tab



Item	Part No.	Description
	Modality Work List	Enter parameters for HIS/RIS. Note that some parameters might not be mandatory, depending on the HIS/RIS definitions.
	Modality Work Query DICOM send source	Enter parameters for the query from the HIS/RIS. "Send Files" interval - The interval between attempts to send accepted images.
	Die em eena ee aree	Retries - The number of times the system will try to send the images.
		Source AE title - The title of the local station sending the images to PAC.
		"Failed files" interval - The time interval between attempts to send unsent images.
		"Send Files" time-out - The time-out to send an image to PACS.
		Note
		After the maximum number of attempts have been made to send an image, the image is sent to the "failed files" folder. The image status is changed from progress to failed status in the Images Storage screen. The system will then attempt to send the next accepted image.
	DICOM char set	Allows you to choose character sets within the software DICOM header. For example ISO_IR 100 is used for Latin languages. For information about specific character sets support, See the DICOM Conformance Statement.
	Institution Name	Enter the site name to appear in the image header and/or printed on the image.
	Manufacturer	Enter the name of the manufacturer to appear on the image header and/or printed on the image. This value should be Carestream Health, Inc.
	Manufacturer model name	Enter the model name of the equipment to appear on the image header and/or printed on the image. This value should be "Vita CR."
	Image Storage query interval	Enter the time interval, in seconds, that the system will query the internal database to upload Accepted images.
	Station Name	Name of the station/site within the institution where the system is set up at.
	Use Same Service UID for all study images	When checked, all images in the scan screen are related to the same series of images. When unchecked, images from different series will be shown.
	Start/Stop Service button	The Stop Services button is used to stop the DICOMSendService. Changes to the DICOM devices cannot be saved until the service is stopped. After Stop Service is clicked and the service stops, the button changes to Start Service. Click Save , to save changes to DICOM devices. Click Start Service to start DICOMSendServices again.
	Delete Waiting Jobs	The Delete Waiting Jobs button deletes images that were not successfully sent to the PACS as a result of connectivity problems.
		Note
		The images will not be deleted from the database and must be sent again at a later date.
	Echo/Test	Click to verify that Modality Work List (MWL) is visible on the network.

DICOM and PACS Workstation Destinations

This tab is used to list PACS stations and DICOM workstation destinations.

To access, select **Settings>DICOM Settings>Destinations**.

See the table below for configuration information in each field.

DICOM Destinations



Destinations and Printers Tab Fields

No.	Title	Description
1	DICOM Store	List of PACS stations. IP, port,and AE title are obtainable from the network
	Destination	administrator. Select store for PACS.
2	Add, Modify, and	Add, modify, or delete a station or printer in the list.
	Delete buttons	
3	Storage Commitment	Enters information for DICOM destination when "store" is selected.
4	Add/Update	
5	Keyboard	
6	Start/Stop Service	Stop and then restart DICOM service to apply changes that have been made.
7	Delete Waiting Jobs	
8	Close	Close the DICOM Settings screen
9	Echo/Test	Verify the network connection to PACS, Storage Commitment or DICOM workstation destinations.

Section 9: Calibrations

Introduction

The Vita CR is calibrated at the factory before it is shipped. However, it is necessary to calibrate the system after replacing certain system components.

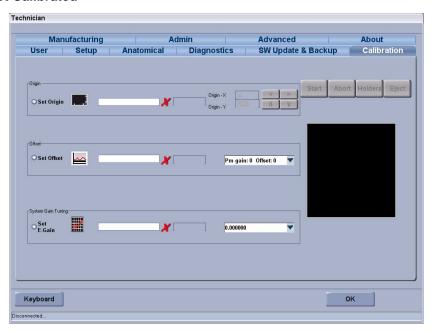
There are three parameters that need to be calibrated in the system (in this order):

- 1. Origin. See "Origin Calibration" on Page 118
- 2. Offset. See "Offset Calibration" on Page 120
- 3. System gain. See "System Gain Tuning" on Page 122

Note

- A red X next to a de-activated date box indicates that the system is not calibrated. (In place of the green check-mark)
- The green check-mark next to the date box indicates that the system is calibrated.
- The date box indicates the date that the calibration took place.
- If a calibration procedure does not succeed, repeat the procedure.

Calibration Tab - Not Calibrated



Equipment Required

- · Calibrated dosimeter
 - Dose Range from <0.1 mR to >10 mR
 - Precision 5%
- Rectangular plates for X-ray filtration
 - 0.5 mm Copper (Cu)
 - 1 mm Aluminum (Al)
- Lead sheet or lead apron (use the lead apron throughout the test to avoid backscatter)
- Calibration results report ("Calibration Results Report" on Page 145)

Origin Calibration

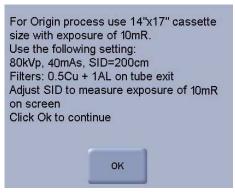
The origin calibration determines the starting point of a scanning procedure (x,y coordinates).

Origin calibration must be performed after replacing the linear slide, optical head, or the linear limit (origin) sensors.

- [1] Go to the **Setup** tab and select **16-bit linear data**.
- [2] Go to the Calibration tab and select Set Origin.
- [3] Click Start.



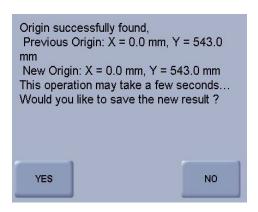
A message with the exposure setting for the origin calibration appears.



- [4] Make a 10 mR exposure of 14 x 17 in. flat field.
 - Settings: 80 kVp, 40 mAs, SID=200
 - Filters: 0.5 mm CU and 1.0 Al on the tube exit
 - Adjust the SID to measure exposure of 10 mR (± 0.2 mR) on screen
- [5] Insert the cassette into the scanner.
- [6] Click OK.

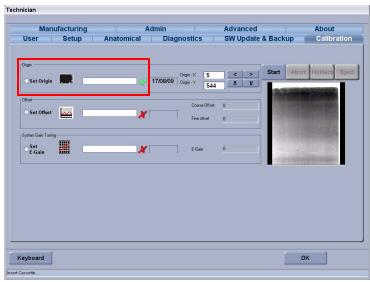


- · The system performs the calibration automatically.
- A message with the new X and Y coordinates will appear at the end of the scanning process.
- [7] Click YES to accept the new values.



Note

The calibration process ends. A green check mark should appear next to the Origin calibration field.



[8] Record the results in the calibration report (see "Calibration Results Form" on Page 145).



Typical results: x=0, y=530

Offset Calibration

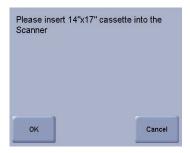
The offset calibration can be performed only if the origin parameter is calibrated.

The offset calibration is required to set the zero level required to convert output signals from analog to digital signals. This auto zero process determines the noise level before any image acquisition and provides the appropriate offset.

- [1] Go to the **Setup** tab and select **16-bit linear data**.
- [2] Go to the Calibration tab and select Set Offset.
- [3] Click Start.



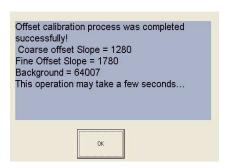
A message instructing you to insert a 14 in. x 17 in. cassette appears.



- [4] Click OK.
- [5] Insert an erased cassette into the scanner.



- The system performs an erasing procedure and reloads the cassette.
- The offset calibration is performed.
- When the offset calibration has successfully completed, a message appears showing the calibration results.
- [6] Click OK.





The offset calibration ends. A green check mark should appear next to the Offset calibration field.



[7] Record the results in the calibration report (see "Calibration Results Form" on Page 145).

System Gain Tuning

Purpose

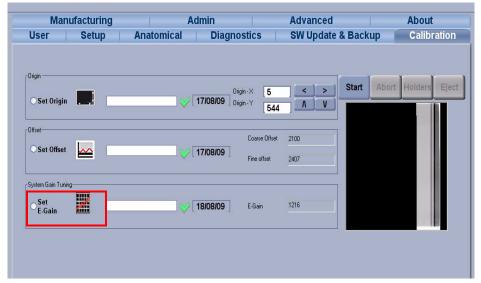


System gain tuning can be performed only if the origin and offset parameters are calibrated.

System gain tuning sets the internal electronic gain. The electronic gain is tuned using a 10mR exposure to obtain a target code value of 48,000 (16,000 counts). In log-space it is equivalent to APV of 3,000. The PMT high-voltage is kept at fixed value and electronic gain is tuned slightly in the nominal value proximity. In this test a 12-bit raw image should be inspected (AR folder image).

System Gain Tuning Procedure

[1] In Calibration, select Set E-Gain and click OK.



- [2] Make a 10 mR exposure of 14 x 17 in. flat field according to the values presented in the screen message that appears.
 - Settings: 80 kVp, 40 mAs, SID=200
 - Filters: 0.5 mm CU and 1.0 Al on the tube exit
- [3] Adjust the SID to measure exposure of 10 mR (± 0.2 mR) on screen
- [4] Click **OK** to continue or **Cancel** to stop the process and return to the main window.
- [5] Wait five minutes, insert the cassette into the scanner, and click **OK**. The screen scanning begins.



- [6] Click **OK** to return to the **Calibration** window.
- [7] Verify that **Set E-Gain** is marked with a green check mark.
- [8] Record the results in the Calibration Report. See "Calibration Results Form" on Page 145.
- [9] Manually erase the cassette.

Section 10: System Performance Acceptance Testing Procedure (ATP)

Scope of the Acceptance Testing Procedure (ATP)

The Acceptance Test Procedure (ATP) is a group of tests designed to determine that the overall system performance/response falls within acceptable parameters, and according to manufacturer's design and specifications. This battery of tests should be performed as the final step of a new CR System installation.

ATP testing is performed as follows:

- 1. "Gather Tools and Materials Required to Perform the ATP" on Page 123
- 2. "Prepare the CR System for ATP Testing" on Page 124
- 3. "Perform the "Dark Noise" Test" on Page 125
- 4. <u>"Spatial Frequency Resolution, Exposure Response, and Contrast Resolution Testing: Prepare the Cassette" on Page 126</u>
- 5. "ATP Testing: General Examination of the Scanned Image" on Page 127
- 6. "ATP Testing: Inspect the Spatial Resolution of the Scanned Image" on Page 128
- 7. "ATP Testing: Inspect the Low Contrast Resolution of the Scanned Image" on Page 129
- 8. "ATP Testing: Inspect the Exposure Response of the Scanned Image" on Page 130
- 9. "Test the Erasure Efficiency of the System" on Page 131

The complete set of ATP tests will take approximately one hour to complete



Important

The ATP should be performed once installation of a new CR System is completed.



Important

The ATP should be performed by the field engineer responsible for installing the CR System.

Gather Tools and Materials Required to Perform the ATP

- SK0000170 Image Quality Toolkit, containing:
 - Spatial resolution test pattern (model 07-256)
 - 0.5 mm copper (Cu) plate for x-ray filtration
 - 1 mm aluminum (Al) plate for x-ray filtration
 - Step wedge phantom
 - Low contrast discs phantom
- · Lead sheet or apron
- WIISE Image Viewer and a basic knowledge of how to use the utility (for details on WIISE, see "Using WIISE to Verify Correct System Performance and Calibration" on Page 133)
- Access to facility x-ray imaging environment/equipment

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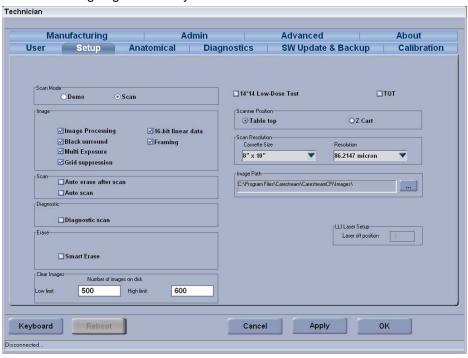


Radiation

Always use a lead sheet or apron throughout the course of this testing to avoid backscatter.

Prepare the CR System for ATP Testing

- 1. In the CARESTREAM VITA CR Systems Software Patient screen, enter a new sample patient:
 - a. Click New
 - b. Fill in the three mandatory fields: Last name, First name, Patient ID.
 - c. Click OK. The patient's name will appear in the Patients list.
- 2. Select the new patient.
- 3. Click Acquire. The Scan screen appears.
- 4. Click Settings and select Settings from the dropdown list. The Technician Mode screen appears.
- 5. Select the **Setup** tab.
- 6. Confirm that ALL of the following checkboxes are selected (see screen shot below):
 - a. Image Processing
 - b. Black surround
 - c. Grid suppression
 - d. 16-bit linear data
 - e. Framing
 - f. Multi-exposure
- 7. In the Scan screen, click SKULL.
- 8. Select the PATTERN view position from the sub-list.
- 9. Finally, on the PC desktop, create a folder called "ATP" or some other meaningful term. This folder will be used to store the test images generated by the various ATP tests.



Perform the "Dark Noise" Test

This test measures the noise level inherent in the System.

- 1. Scan an erased 14 x 17 inch cassette.
- 2. Click Accept.
- 3. Open the resulting 16-bit image with the WIISE application. For details, see <u>"Launching the WIISE Viewer Application"</u> on Page 133.
- 4. Confirm that the entire screen is visible with overscan bands frame placed around it.
- 5. Use the WIISE ROI tool to select an area comprising at least 80% of the image. For details, see "Using the Region of Interest (ROI) Tool in the WIISE Viewer Application" on Page 134.
- 6. Record the following parameters in the table provided below:
 - a. Average Pixel Value (APV)
 - b. Maximum Pixel Value (MaxPV
 - c. Average Standard Deviation (STD Dev)

Dark Noise Testing Results					
Parameter Actual Required Pass/Fail					
APV		63980 < APV < 64020			
MaxPV		MaxPV < 65534			
STD Dev		PVSD < 5			

Troubleshooting Dark Noise Testing Results						
Problem	Problem Possible Cause Solution					
APV is out of range	Offset is not calibrated	Perform and Offset Calibration. For details, see				
STD is out of range	Dirt on the screen	Clean the screen. For details, see				
Black/White pixels	Size of the ROI is incorrect	Select a smaller ROI and measure the STD. For details, see "Using the Region of Interest (ROI) Tool in the WIISE Viewer Application" on Page 134.				

Basic X-Ray Exposure Procedure

- 1. Set the X-ray parameters:
 - a. 80 kVp
 - b. 40 mAs
 - c. Large focal spot
 - d. Position the X-ray tube as SID 180 cm (72 in.)
- 2. Adjust the collimator to produce an X-ray field that fits a 14 x 17 in. cassette.
- 3. Place the dosimeter centered in the X-ray field.
- 4. Add the Aluminum and Copper filters to the tube exit with the copper closest to the tube.
- 5. Measure the exposure level:
 - a. Adjust the SID to result in an exposure level of 10 mR (adjustment range +/- 10cm).
 - b. If required, change the mAs to reach 10mR +/- 0.1.

Note

If a dosimeter is not available, use the general settings listed in step 1.

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Spatial Frequency Resolution, Exposure Response, and Contrast Resolution Testing: Prepare the Cassette

- 1. Place the following test tools on the 14 x 17 in. cassette:
 - a. Step wedge phantom
 - b. Low contrast discs phantom
 - c. Spatial resolution test pattern (model 07-256)
- 2. Expose the cassette and the test tools using the Basic X-Ray Exposure Procedure.
- 3. Scan the cassette.
- 4. Open the 12-bit raw image (Ar folder) using the WIISE viewer. For details, see "Opening an Image in the WIISE Viewer Application" on Page 133.
- 5. Set the Viewer window magnification to 100%.
- 6. Set the window width to 400.
- 7. Set the window level to 3000.

ATP Testing: General Examination of the Scanned Image

After having exposed the cassette containing the test tools, scanned the cassette, and opened the resulting test image in WIISE (see <u>"Spatial Frequency Resolution, Exposure Response, and Contrast Resolution Testing: Prepare the Cassette" on Page 126</u>):

- 1. Visually examine the image for low-contrast dark or light bands, or streaks running horizontally or vertically across the image.
- 2. If any artifacts appear, measure and record the average pixel value (based on an extended rectangular ROI) along the artifacts.
- 3. Record the results in the table below. If any of the results do not meet the requirements, see the troubleshooting table.

Image Artifacts				
Appears in test image? (yes Description or no) Pass/Fail				
Artifacts and missing pixels				
Scratches				
Line shifts				

Image Artifacts Troubleshooting Table				
Description of problem	Possible cause	Solution		
Artifacts, missing pixels, or	Malfunctioning electronic	Replace Controller Board. See		
line shifts	board	If the artifacts continue to appear on tests after replacing Controller Board, replace the PMT Board. See		
		3. Perform an E-Gain calibration. See		
Scratches or streaks	Damaged screen	Replace the screen.		

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ATP Testing: Inspect the Spatial Resolution of the Scanned Image

After having exposed the cassette containing the test tools, scanned the cassette, and opened the resulting test image in WIISE (see <u>"Spatial Frequency Resolution, Exposure Response, and Contrast Resolution Testing: Prepare the Cassette" on Page 126</u>):

- 1. Adjust the window width and level to maximize the visibility of the line pair target.
- 2. Visually examine the spatial resolution/line pairs target on the test image (see graphic below).
- 3. Record the highest spatial frequency, or the highest number of discernable line pairs.
- 4. Record the results in the table below. If any of the results do not meet the requirements, see the troubleshooting table.



Spatial Resolution Results						
Parameter Actual Line Pairs (LP) visible Requirement Pass/Fail						
14 x17 (160 um)		> 2.5 LP/mm				

Spatial Resolution Troubleshooting Table					
Description of problem	Possible cause	Solution			
Discernable/Visible line pairs (LP) < 2.5 LM/mm	There is dirt or other contamination on the screen.	Clean the screen			
	Electronic/RF noise interference from nearby equipment.	Move any equipment producing RF away from System.			

ATP Testing: Inspect the Low Contrast Resolution of the Scanned Image

After having exposed the cassette containing the test tools, scanned the cassette, and opened the resulting test image in WIISE (see <u>"Spatial Frequency Resolution, Exposure Response, and Contrast Resolution Testing: Prepare the Cassette" on Page 126</u>):

- 1. Adjust the window width and level to maximize the visibility of the circular contrast discs target.
- 2. Visually examine the circular contrast discs target on the test image (see graphic below).
- 3. Record the number of circular discs that are visible on the image.
- 4. Record the results in the table below. If any of the results do not meet the requirements, see the troubleshooting table.



Low Contrast Resolution Results						
Parameter Actual Line Pairs (LP) visible Requirement Pass/Fail						
14 x17 (160 um)		> 10 circular discs				

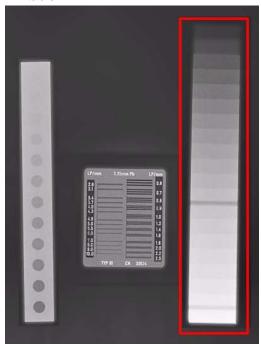
Low Contrast Resolution Troubleshooting Table					
Description of problem	Possible cause	Solution			
Cannot see/discern at least 10 or more discs.	There is dirt or other contamination on the screen.	Clean the screen			
	Electronic/RF noise interference from nearby equipment.	Move any equipment producing RF away from System.			
	The window level is not set at optimum level.	Adjust the window level, moving the low contrast towards the discs level. For details, see "Adjusting the Window Width and Leveling in the WIISE Viewer Application" on Page 135.			

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ATP Testing: Inspect the Exposure Response of the Scanned Image

After having exposed the cassette containing the test tools, scanned the cassette, and opened the resulting test image in WIISE (see <u>"Spatial Frequency Resolution, Exposure Response, and Contrast Resolution Testing: Prepare the Cassette" on Page 126</u>):

- 1. Adjust the window width and level to maximize the visibility of the step wedge target.
- 2. Visually examine the step wedge target on the test image (see graphic below).
- 3. Confirm that all of the steps are discernable and are not saturated.
- 4. Record the results in the table below. If any of the results do not meet the requirements, see the troubleshooting table.



Exposure Response Results				
Parameter	Requirement	Pass/Fail		
14 x17 (160 um)		ALL steps discernable, with no saturation.		

Exposure Response Troubleshooting Table						
Description of problem	Possible cause	Solution				
Cannot see/discern at least 10 or more discs.	There is dirt or other contamination on the screen.	Clean the screen				
	Electronic/RF noise interference from nearby equipment.	Move any equipment producing RF away from System.				
	The window level is not set at optimum level.	Adjust the window level, moving the low contrast towards the discs level. For details, see "Adjusting the Window Width and Leveling in the WIISE Viewer Application" on Page 135.				

Test the Erasure Efficiency of the System

This procedure tests the plate for residual signals/images following a scanning and erasure cycle.

- 1. Erase the plate (done automatically at the end of previous scanning cycle).
- 2. Set the X-ray parameters:
 - a. 80 kVp
 - b. 40 mAs
 - c. Large focal spot
 - d. Position the X-ray tube as SID 180 cm (72 in.)
- 3. Adjust the collimator to produce an X-ray field that fits a 14 x 17 in. cassette.
- 4. Place the dosimeter centered in the X-ray field.
- 5. Add the Aluminum and Copper filters to the tube exit with the copper closest to the tube.
- 6. Scan the cassette.
- 7. Accept the image.
- 8. Open the resulting 12-bit raw image (Ar folder) using the WIISE viewer. For details, see "Opening an Image in the WIISE Viewer Application" on Page 133.
- 9. Visually examine the image for previous image marks.
- 10. Are any previous image marks visible?

If **YES**, an ROI analysis is required to determine a Pass/Fail verdict. See <u>"Performing an ROI Analysis" on Page 132</u>. If **NO**, the test is complete.

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Performing an ROI Analysis

With the test image opened in WIISE:

- 1. Calculate the number of ADC counts on peak-to-peak range, using the X-rows line profile. For details, see <u>"Using the Line Profiles Tool in the WIISE Viewer Application" on Page 135</u>.
- 2. Record the results in the table below. If any of the results do not meet the requirements, see the troubleshooting table.

ROI Analysis (Erasure Efficiency) Results			
Actual number of steps Parameter visible		Requirement	Pass/Fail
APV difference		ADC count = 6.</td <td></td>	

Exposure Response Troubleshooting Table				
Description of problem	Possible cause	Solution		
ADC count > 6.	The Erase LED is not working at full capacity.	Replace the Erase LED assembly. See		

Section 11: Using the WIISE Diagnostics Tool

Using WIISE to Verify Correct System Performance and Calibration

WIISE is a simple analysis tool that can be used any time you need to verify system performance. For example, during final system Acceptance Testing, or during system Calibration. WIISE gathers and analyzes pixel values for several system performance tests:

- · Dark Noise
- System Response
- Spatial Resolution



This documentation only covers the controls and features in WIISE related to ATP testing and general system calibration verification.

Launching the WIISE Viewer Application

You can launch the WIISE Viewer application with any of the following methods:

- double-click the WIISE desktop icon (shortcut)
- In Windows Explorer, browse to the location of "WIISE.exe" It is normally found at [C:\Program Files\wiise].
 Double-click to launch.



If you do not know where WIISE has been placed, simply perform a Search for "WIISE.exe".

Opening an Image in the WIISE Viewer Application

With the WIISE Viewer launched:

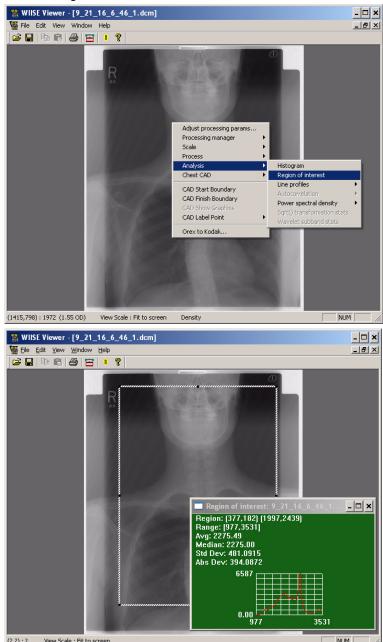
- 1. Select [File: Open]
- 2. Browse to the storage location of the images
- 3. Select an image
- 4. Select Open

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Using the Region of Interest (ROI) Tool in the WIISE Viewer Application

With an image opened:

- 1. Right-click anywhere in the image
- 2. In the menu revealed, select [Analysis: Region of Interest]
- 3. A "Region of interest" window appears, containing the message "No region selected."
- 4. Click and drag a marquee box over the image, making sure to include at least 80% of the image. Values will fill the "Region of interest" window.



The Region of Interest window should now display data. Record these data and use for the various ATP/System Performance tests.

Adjusting the Window Size/Scaling in the WIISE Viewer Application

With an image opened:

- 1. Right-click anywhere in the image
- 2. In the menu revealed, select [Scale: 100%] (or whatever size you require for your testing)

Adjusting the Window Width and Leveling in the WIISE Viewer Application

With an image opened, do either of the following:

- 1. Right-click anywhere in the image
- 2. In the menu revealed, select [Adjust processing params...]

OR

Click the "Window/Level" button in the WIISE toolbar.



The "Window-Level" window appears.

To adjust the "Window" and "Level" values, either click and drag the slider control, or type the value directly in the value boxes.

Using the Line Profiles Tool in the WIISE Viewer Application

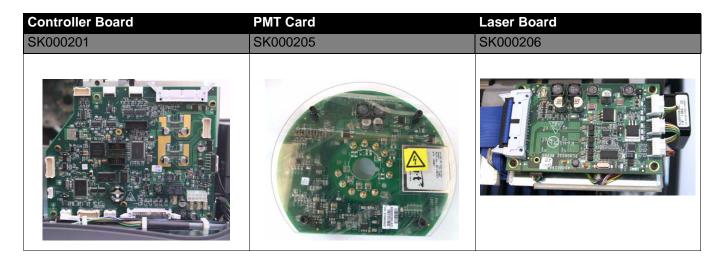
With an image opened, do either of the following:

- 1. Right-click anywhere in the image
- 2. In the menu revealed, select [Analysis: Line profiles]
- 3. Depending on the test being performed, choose either **x** (rows) or **y** (columns).

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Section 12: Spare Parts

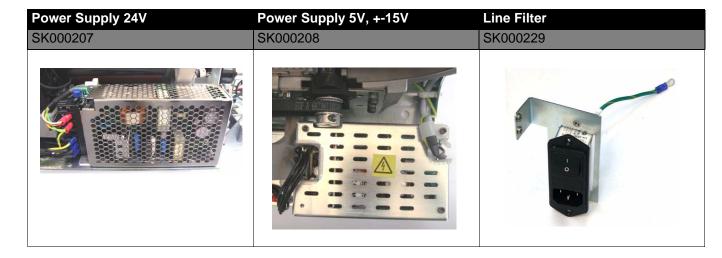
Electronics Board



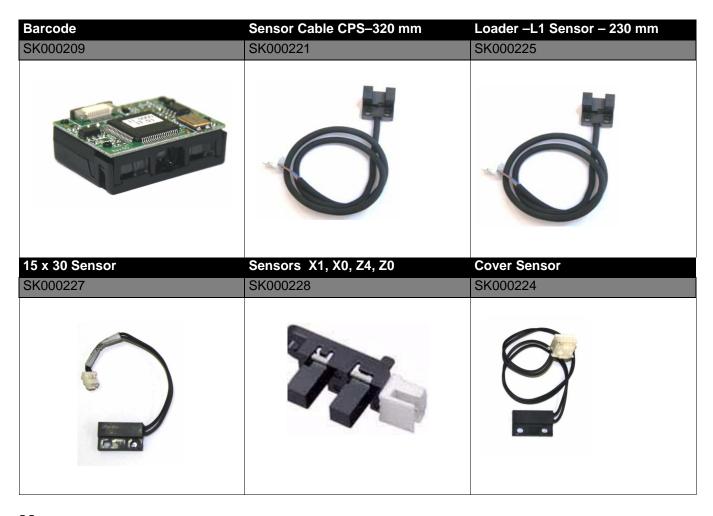
Optics



Power Supply



Sensors



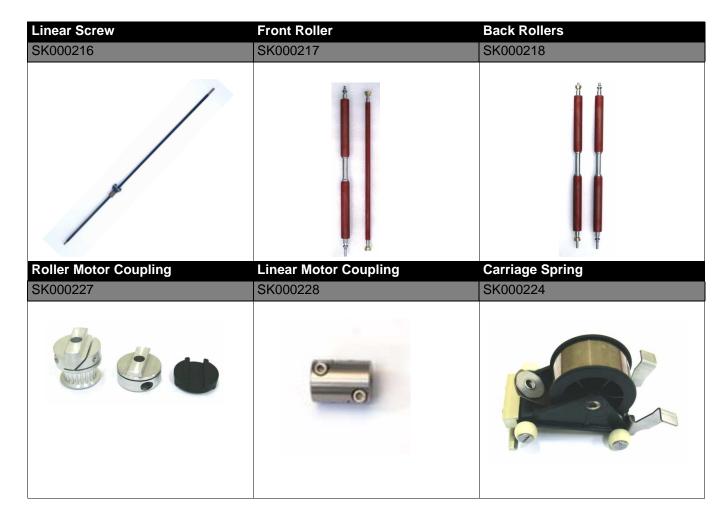
Motors



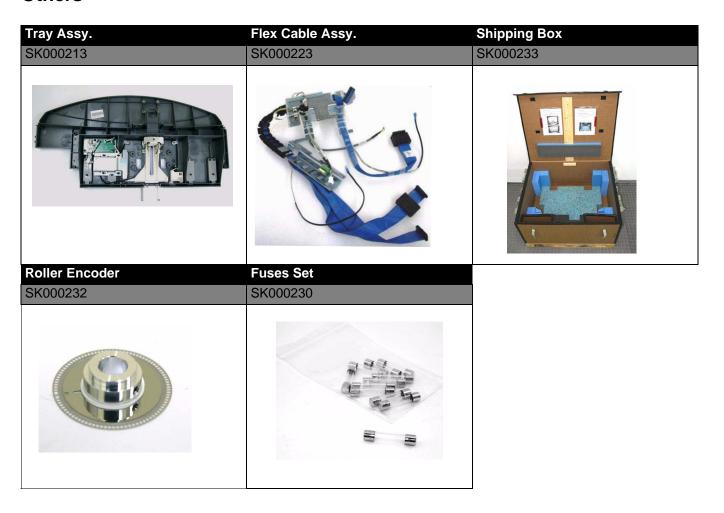
Covers



Mechanic Accessories

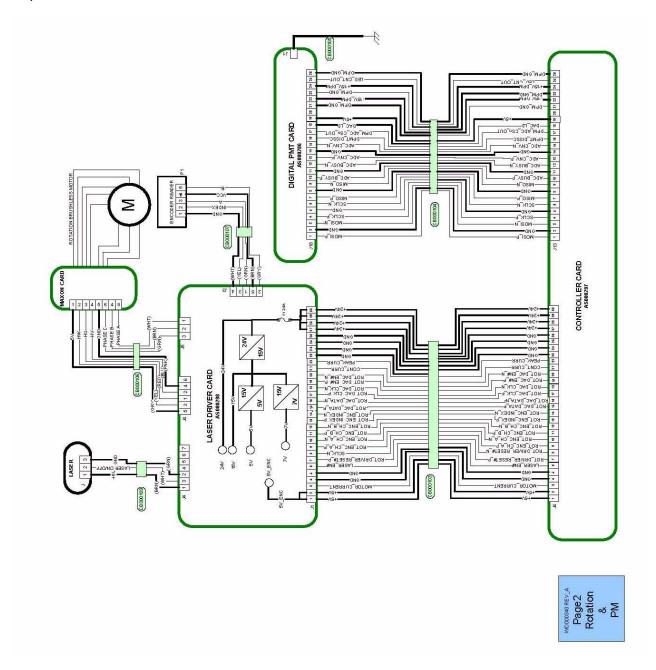


Others

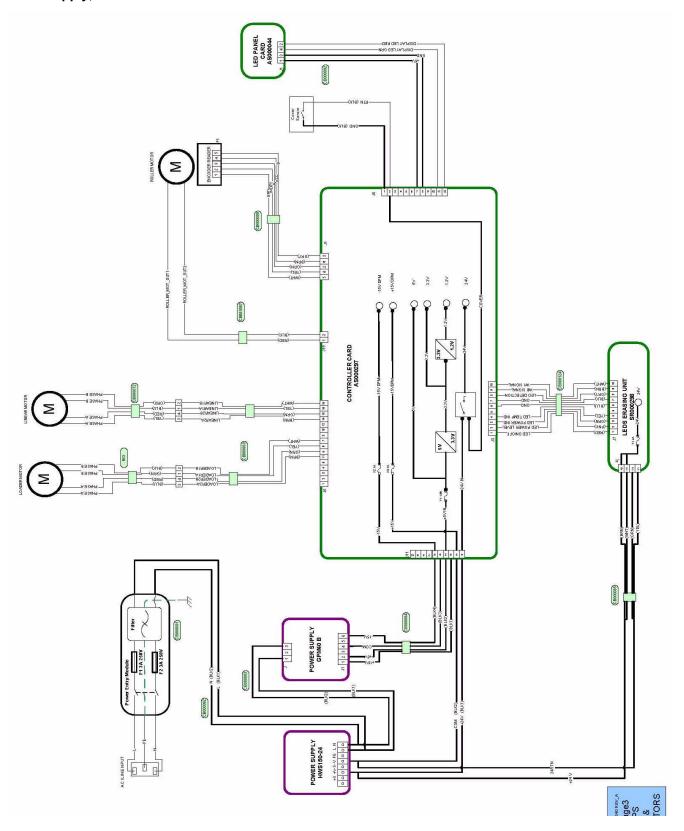


Section 13: Electric Schematic Diagrams

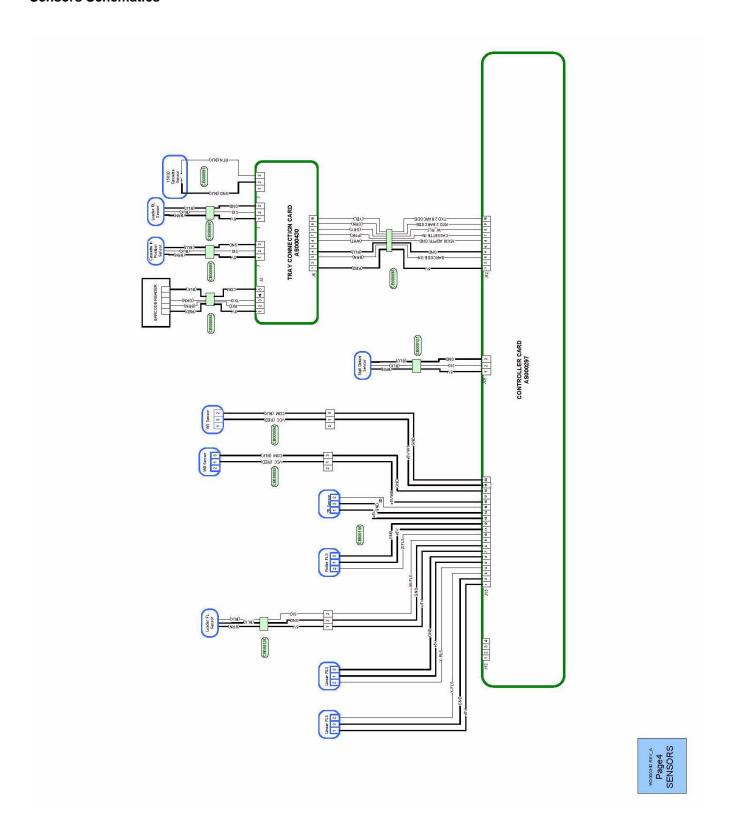
Rotation, PM Schematics



Power Supply, Motors Schematics



Sensors Schematics



Section 14: Calibration Results Form

Calibration Results Report

Scanner General Details	
Machine Serial Number: Software Version: Date: Tested by: Approved by:	

Calibration Test Results:							
Parameter	Results		Requirement		Actual		Notes
1. Origin setting:	Х	Y	For all casette sizes - the 16-bit image should be viewed with white over-scan bands	14 x 17 Pass/Fail	12 x 10 Pass/Fail	8 x 10 Pass/Fail	
2. Offset setting:	Fine Offset	Coarse Offset	On 16-bit image empty screen: APV-64000 ± 50	14 x 17	12 x 10	8 x 10	
3. Gain setting:	E-C	Sain	On 12-bit raw image: APV-3000 ± 50	14 x 17	12 x 10	8 x 10	

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