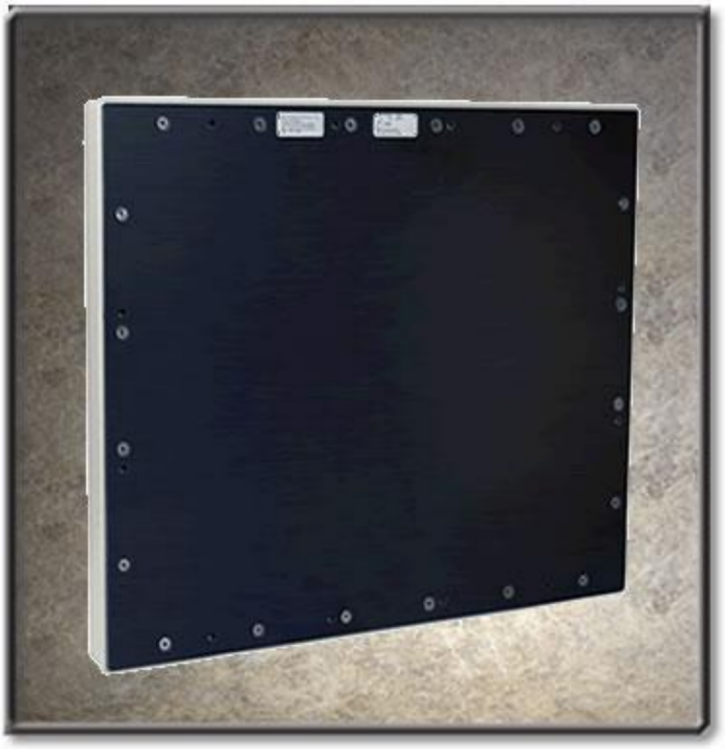
VARIAN
medical systems

X-RAY
PRODUCTS

PaxScan® 4030D
Operating Instructions

Digital Image Receptor



The PaxScan 4030D is a fluoroscopic digital x-ray imaging sub-system

19353 Rev B 02/2012

Abstract

The PaxScan® 4030D Operating Instructions (P/N 19353) covers safety, setup, operation, and maintenance of the PaxScan 4030D digital x-ray imager. The imager is a component sub-system; it cannot be used as a stand along device and is intended for integration by a qualified systems integrator.

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Notice

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The PaxScan® 4030D is an associated equipment x-ray medical equipment with respect to electrical shock, fire and mechanical hazards only in accordance with CAN/CSA-C22.2 NO. 601.1-M90, 2005 (Medical Electrical Equipment Part 1 General Requirements for Safety), IEC 60601-1 Medical Electrical Equipment Part 1 General Requirements for Safety - edition 2, UL 60601-1 Medical Electrical Equipment Part 1 General Requirements for Safety - edition 1.

Updates

For updates to these instructions, please refer to the *Release Notes*

CE Mark

Varian Medical Systems' imaging products are designed and manufactured to meet the Low Voltage Directive 2006/95/EC and MDD 93/42/EEC.

Trademarks

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Technical Support

If help is needed, please contact our applications support group by e-mail or telephone at the following locations.

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Chapter Summary

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Introduction

Designed and manufactured by Varian Medical Systems the PaxScan family of digital X-ray imagers uses amorphous silicon flat panel detectors (FPDs) for X-ray imaging. They are designed for incorporation into a complete X-ray system by a qualified equipment manufacturer.

The PaxScan 4030D is a real time, fluoroscopic digital X-ray imaging device commonly referred to as a flat panel detector (FPD). The detector together with image processing and command software, called Virtual Command Processor (VCP) or Virtual CP, is sold to OEM medical imaging system manufacturers of digital x-ray imaging system. The imaging system has three main components: The 40 x 30cm 194µm-pixel amorphous silicon FPD includes the solid-state, flat panel sensor, VCP software, and a single 30 VDC output power supply.

Shipment Contents

Flat Panel Receptor Assembly

Receptor Power Cable 10 meter (33 ft)

PaxScan Receptor Install CD

(Files specific to the receptor in the shipment)

PaxScan Software CD

Virtual CP/ViVA System Software L.05 (or higher)

PaxScan 4030D Operating Instructions

Optional Parts

External Power Supply – XP Power (OEM)

Immediately upon receipt, inspect the shipment and its contents against the Delivery Note enclosed with the shipment for evidence of damage or missing components. Save all shipping containers in case a return is warranted. If there is any discrepancy, please call the PaxScan Service Center at (800) 432-4422 or (801) 972-5000.

Intended Use

The 4030D is specifically designed to meet the needs of fluoroscopy and cone beam CT applications utilizing multiple sensitivity ranges and extended dynamic range modes. The PaxScan 4030D will acquire images at usual video frame rates over a wide range of dose. Excellent low dose performance is achieved by combining Varian's proprietary readout electronics with the high sensitivity of a custom cesium iodide scintillator.

In medical application, the function of the 4030D FPD is to absorb the x-rays that pass through the patient's anatomy, and to convert those X-rays into a digital image. The FPD is mounted into the OEM's mounting structure, such as a C-Arm and typical is completely covered by the mounting and contrast-enhancing screen.

Designed as a subsystem, it cannot be used as a stand-alone device. It must be incorporated into a complete X-ray system by a qualified equipment manufacturer.

PLEASE READ THIS ENTIRE MANUAL BEFORE USING. PRIOR TO USING PLEASE READ AND UNDERSTAND THE WARNING, PRECAUTIONS AND ADVERSE EFFECTS RELATING TO THIS DEVICE.

Safety Warnings, Precautions and Contraindications

The PaxScan 4030D is designed to be integrated into a complete X-ray system by qualified system integrator. The system integrator is responsible for obtaining FDA clearance for medical use.

Important:

No part of the PaxScan 4030D is intended to be attached to a patient and/or to contact the patient.

It is possible that during normal usage the Receptor could inadvertently contact the patient. The closeness of the Receptor to the patient is dependent upon the operator and the technique being performed.

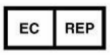
All parts of the PaxScan 4030D are suitable for use within the patient environment.

WARNING: The 4030D is not intended to be used as a primary barrier to X-rays. The user is responsible for insuring the safety of the operator, bystanders, and the subjects being radiographed.

WARNING: The metal enclosure of the 4030D must be connected to earth ground.

WARNING: The equipment is not suitable for use in the presence of a flammable anaesthetic mixture with air, oxygen or nitrous oxide.

Explanation of Symbols

	On (power: connection to the mains)		Caution / Warning / Important: Describes action or conditions that could result in equipment damage, data loss, or personal injury		Protective Earth Ground
	Alternating Current		Off (power: disconnection from the mains)		Direct Current
	Handle With Care		Indicates step-by-step description of the respective function follows		Useful / Important information
	Authorized Representative in the European Community/European Union		Manufacturer		Consult Instructions for Use
	Temperature Limits				

Getting Started

Connecting the Cables

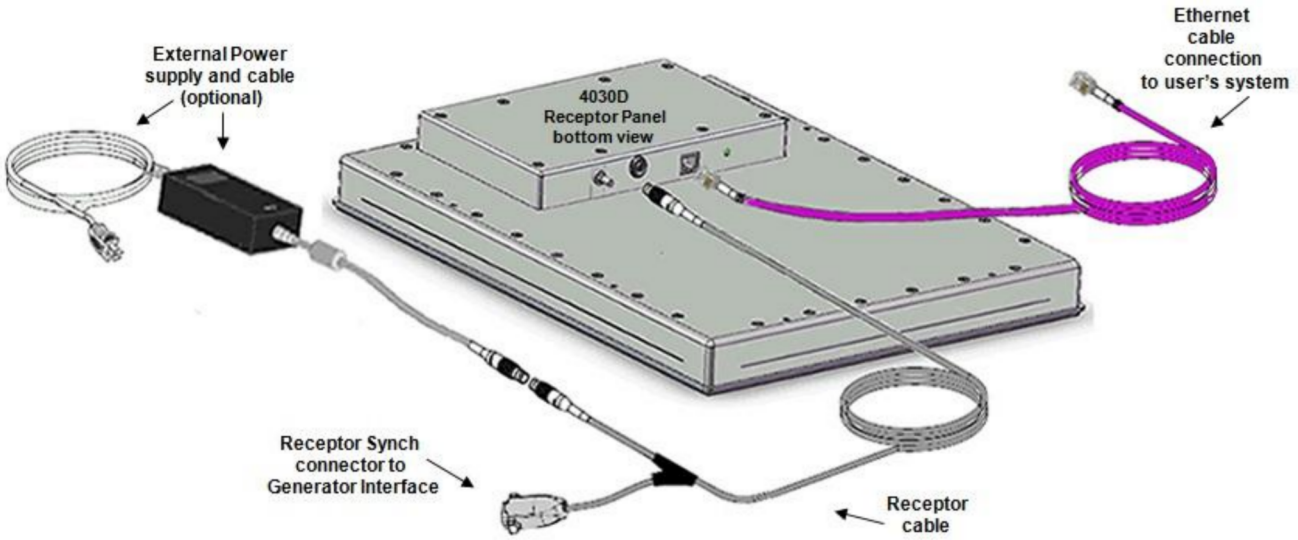
Connect the cables as described below in Table 1-0 and shown in Figure 1-0. ▶

Table 1-0 Cable Connection Details

Step	Action / Description
The Flat Panel Receptor includes a cable that terminates into two separate connectors: (a) Receptor Synch Connector to Generator Interface and (b) the Power Supply Connector (optional). Also included is an Ethernet connection cable. The cable connections are described below.	
1.	**Receptor Cable** The Receptor cable terminates into two separate connections that provide connection from the receptor to the power supply and the user's x-ray generator equipment. Connect the single-end of this connector to the receptor. The two separate connections are described in 2 and 3 below.
2.	**Receptor Synch Connection to Generator Interface** This connector is intended to provide the user with a means to synchronize the end-user system-level application with the imager. This connector provides the connections for two opto-isolated signals, one output, and one input. The output signal named "Expose OK" signals that the receptor is ready for the generator to produce X-rays and the input named "User Sync" allows the user to trigger the panel readout. See Appendix A, diagram 1.0 for "Expose OK" and "User Sync" signal schematic.
3.	**Power Supply - (Optional)** This connection provides power to the receptor. Connect the power supply connector to receptor then plug into the main AC supply.
4.	**Gigabit Ethernet Connection** Connect the Ethernet connector to a gigabit capable interface in the user's host computer. Please note that the interface must use the Intel PRO/1000MT or Intel PRO/1000GT Ethernet adapter and Varian supplied driver. An optional Intel PRO/1000GT adaptor PCI-board (PN 23872) is also available from Varian
5.	**Ground Lug** Connect chassis ground lug to acceptable ground connection.

Note: The X-Ray Generator Interface is user supplied equipment.

Figure 1-0 Cable Connection



Powering On The Receptor

Plug in the AC power cord going to the supplied power supply. There is an LED located just to the right of the Gigabit Ethernet connector. This LED is green when power is supplied to the receptor. The Led flashes at the selected frame rate when the software connection to the receptor is established (see Chapter 4).

Important: The Receptor should be mounted onto user supplied equipment using the eight mounting holes provided at the back of the receptor.

Important: The temperature at the back surface of the receptor should not exceed 35ºC when the unit is installed. This may necessitate air flow over the back surface of the receptor. Humidity levels should be between 10-90% with higher limits for storage.

Warning: The receptor is not sealed against dripping moisture.

Caution Accessory or optional equipment connected to the analog and digital interfaces must be certified to the respective IEC standards (i.e., IEC 60950-1 for data processing equipment and IEC 60601-1 for medical equipment). Furthermore, all configurations shall comply with the system standard IEC 60601-1-1. Anyone connecting additional or optional equipment to the signal inputs or signal outputs as part of a configuration for medical equipment is therefore responsible for compliance with the equipment standard IEC 60601-1. If in doubt, consult our technical support personnel.

Warning: Precautions should be taken to not open the receptor module. Depending upon the type of scintillator used, opening the receptor module may expose the user to potentially toxic materials.

Paxscan System Software

There are two CDs supplied with this product. The Software CD allows installation of the Virtual CP that provides the API to the receptor, allowing control and image transfer functionality; see the Virtual CP Interface document for more information. The Software CD also includes ViVA™ software which is the viewing application used to perform detector calibration, detector set-up, image acquisition, and image corrections in a Windows PC environment. NOTE: ViVA™ is intended to be used for development, testing, and maintenance purposes only. ViVA™ includes file translators for saving image files in .viv, .raw, .jpg, .bmp file formats and is Windows® XP compatible. A Software Developer Kit (SDK) including sample code is located in the default install directory:

c:\ProgramFiles\Varian\PaxscanL05\DeveloperFiles

The Receptor software CD is specific to the panel providing calibration and configuration files. Installation of the *Software* and *Receptor* files is briefly discussed in the following sections. Refer to the ViVA Online help for assistance operating ViVA™ and for complete details on software installation refer to VCP Install Guide documentation included in the software CD.

Software Installation

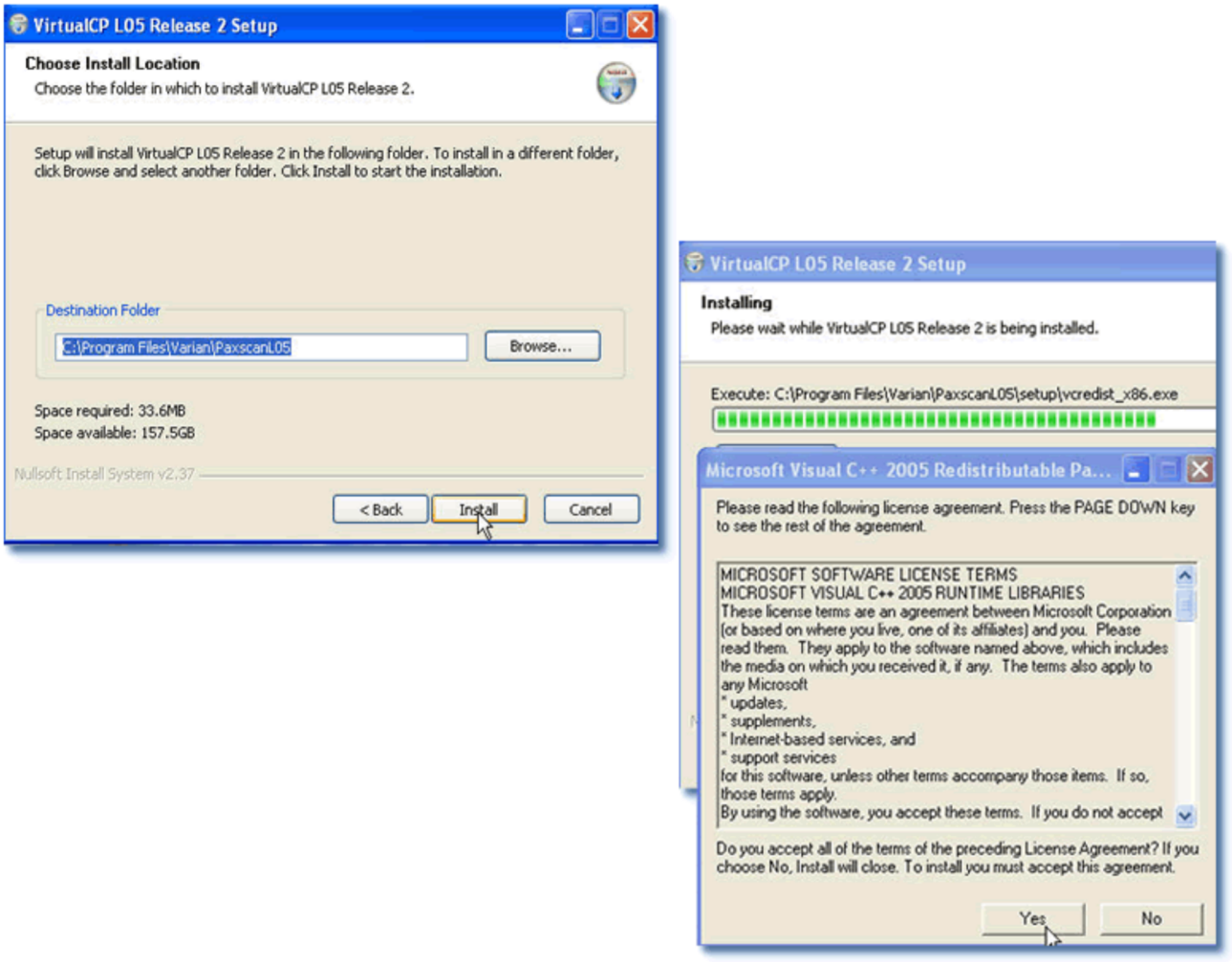
The Setup.exe in the root directory of the PaxScan CD provides an automated software installation process. Setup.exe automatically launches the L05 installer when the CD is inserted into a CD drives unless the Auto-Run CD option is turned off. ▶

Note:

For manual installation use the run command and follow through appropriately.

Step	Action / Results

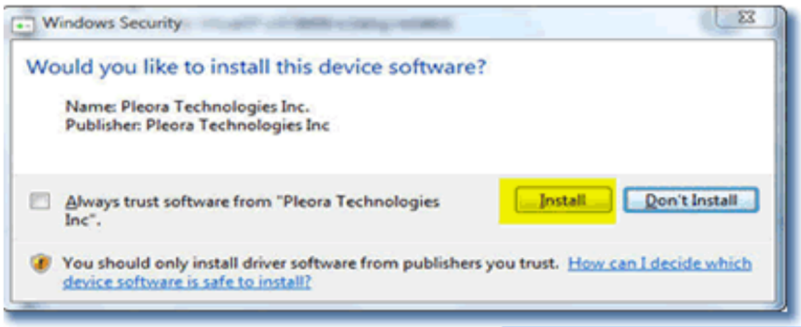
1. Launch of the L05 installer may display the below two screen shots prompting start of software installation – follow through appropriately.

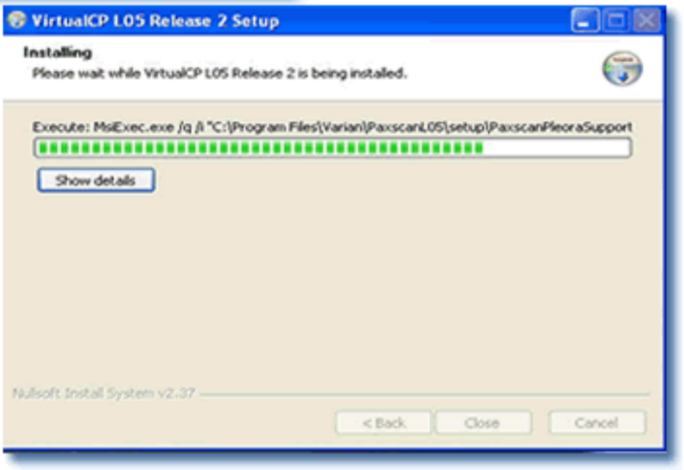


Step	Action / Results

2. The software installer will prompt as to whether you want to update the calibration files – IMAGERS directory. click "*No*" unless you have previously used L01, L02 or L03 with the calibration files. *Refer to the VCP Install Guide documentation included in the software CD for complete details regarding software installation.*

3. If you see a Windows security dialog such as the one below, click "*Install*".





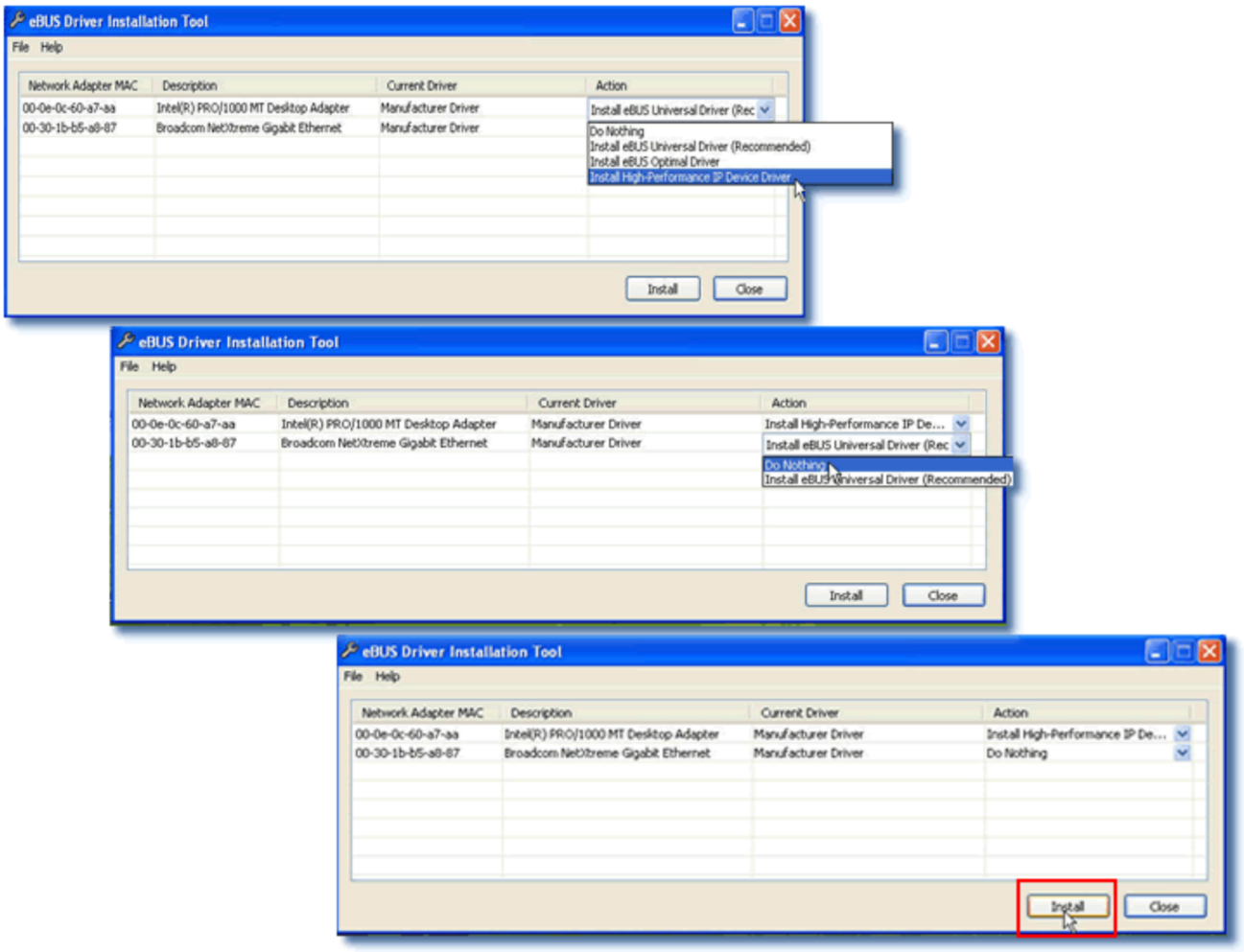
Step	Action / Results

4. Select the *Intel Pro/1000 MT Desktop Adapter* from the list of adapter options **and** *select the High performance IP Device Driver* from the dropdown.

Select *"Do Nothing"* from the dropdown for the other adapter listed as shown in the below screenshots.

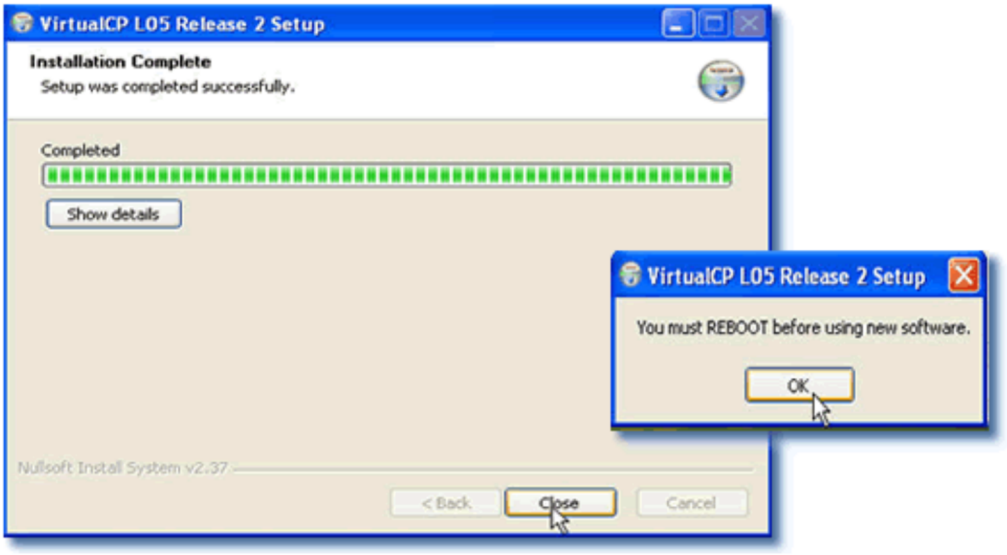
Finally – click "*Install*".

Important: Pleora detects what Ethernet adapters are present and by default selects the Universal Driver for all. **Varian Medial Systems recommends only the Pleora High Performance Driver which must be used together with the Intel Pro/1000 adapter series.**



Step	Action / Results

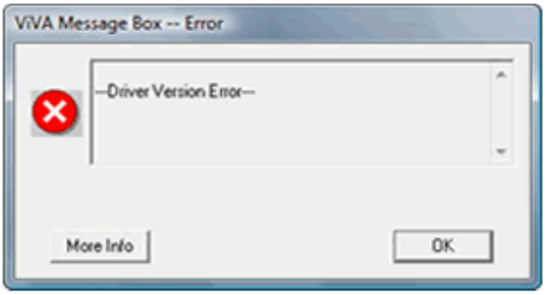
5. When installation is complete reboot the computer if it does not do so automatically.



Note:

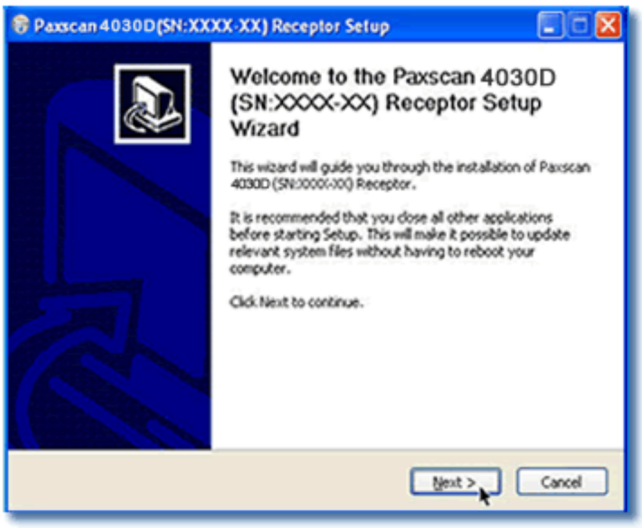
A WORD ABOUT DRIVERS → Previous versions of L05 as well as any previous versions of the Pleora High Performance drivers must be removed before attempting to install L05. Assure removal of previous L05 versions by running appropriate uninstaller from the control panel. In addition, previous Pleora drivers must be removed manually since the uninstallers for prior packages do not remove drivers.

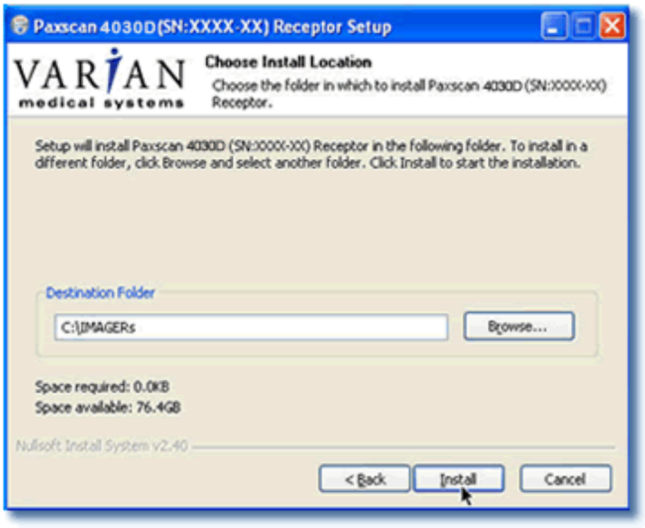
If the L05 installer is run without removing any prior driver version, it will run to completion with apparent success, but VCP (Virtual Control Panel) will not open a receptor link; it will generate a driver version error as shown by the below screen shot. In this case, run the L05 uninstaller; the L05 uninstaller will remove the driver including any older versions. Then re-install L05.

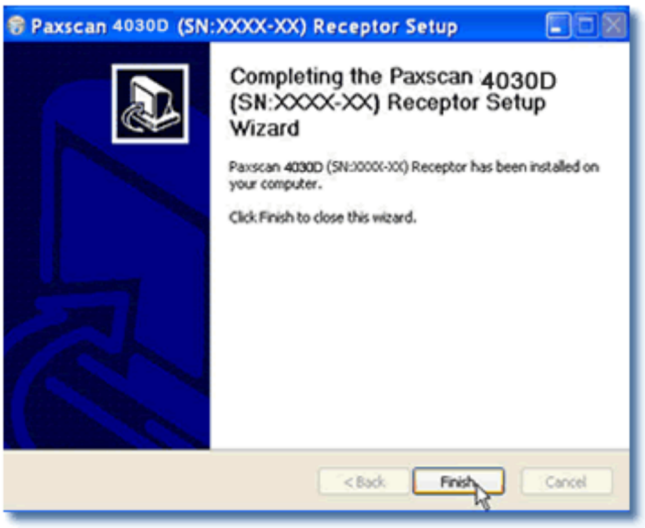


Receptor Files Installation

Follow through the install screens to complete the PaxScan Receptor installation. You must restart your computer for installation to take effect. ▶







Modes of Operation

The PaxScan 4030D supports a number of modes of operation as defined in Table 2.0. In general, there is a trade off between varying operation modes of resolution, or field of view, or frame rate, or noise. The sensitivity of the imager is optimized to match the X-ray dose used in each mode.

The purpose of each mode is to configure the detector to achieve optimal performance during specific imaging procedures. Modes are defined by a combination of factors, such as pixel binning, frame rates, analog gain, field-of-view, and continuous versus single acquisition. Each mode requires a unique set of calibration files. Refer to the ViVA Online help documentation for complete details.

Each operating mode employs all types of calibration. In accumulation-type acquisitions, the PaxScan 4030D will sum a number (limited by available memory) of frames, and normalize the result before displaying a new image via the video output ports.

Note:

The system can only be in one mode at a given moment.

Not every mode will be available with every system. The OEM should work with PaxScan technical support for configuration of the mode(s) which best suit the customer's intended application.

Table 2-0 PaxScan 4030D Operational Modes

Mode	Max Frame Rate (Hz)	Pixel Binning	Gain/ Capacitor	Image Area	Frame Size	Active Frame Size	Acquisition Type
High-Sense Fluoroscopy	30	2 x 2	2/0.5 pF	Full Field	1,024 x 768	1,014 x 758	Continuous
Normal Fluoroscopy	30	2 x 2	1/0.5 pF	Full Field	1,024 x 768	1014 x 758	Continuous
High-Sense Full-Resolution Fluoroscopy	7.5	1x1	4/0.5 pF	Full Field	2,048 x 1,536	2,028 x 1,516	Continuous
High-Dose Full-Resolution Fluoroscopy	7.5	1x1	2/4 pF	Full Field	2,048 x 1,536	2.028x 1,516	Continuous

Default Mode

Mode 0 is the default, although this can be configured to meet the customer's specific application requirements. The default mode will be invoked automatically upon system power-up when a link is opened or receipt of a reset state command. ViVA will normally remember the last mode used and select it for future launches.

Operation States

The operational states of the imager can be categorized as follows:

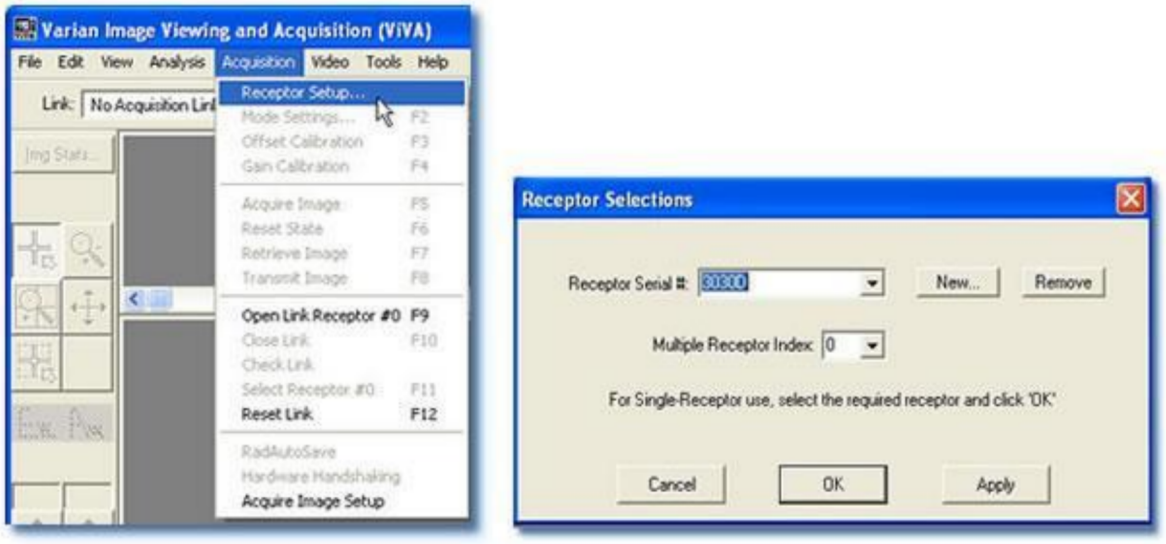
- **Offset calibration**: (OEM-initiated)
- **Gain calibration**: (always OEM-initiated)
- **Analog offset calibration**: (always-OEM initiated)
- **Continuous acquisition**: (fluoroscopy-type)

Multiple Receptor Feature

The Virtual Command Processor software supports multiple connections to two or more receptors of the same type. The receptor setup feature is accessed from the *Acquisition* drop down menu and must be performed before open link to Virtual CP – otherwise the receptor setup option is not available. This feature is typically useful in a testing environment. Take the following steps to complete multiple receptor setup. ▶

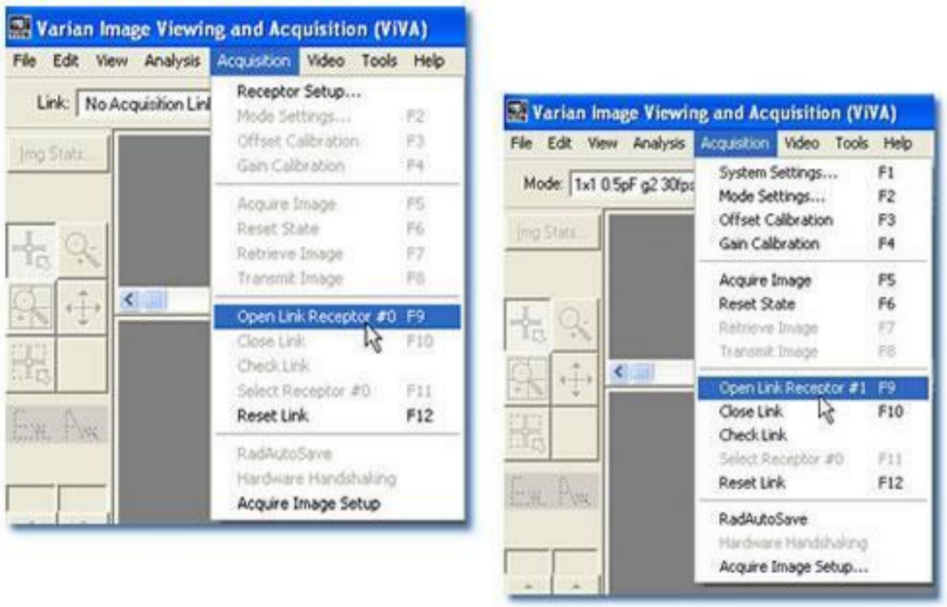
Step	Action / Results

1. *For multiple receptor setup* → Select receptor setup from the menu bar under Acquisition. Then select the receptor index *0* from the receptor serial # drop down and click ok. Each receptor is identified by an index number starting with *0*. Repeat setup for all required receptors before initiating the *Open Link Receptor*.



2. Select *Open Link Receptor #0* under Acquisition from the drop down menu bar to establish connection of the receptor to the PaxScan imaging system.

3 Establish connection to 2nd (second) and subsequent receptors by selecting *Open Link Receptor #1* and so forth.



Calibration Procedures

Offset Calibration

Prior to acquiring images, an offset calibration must be performed for each mode you intend to use. Offset calibration compensates for fixed pattern pixel intensity variations in the image, associated with the dark current and electronic offsets. The Offset reference image is an average of a series of frames acquired without X-ray illumination and referred to as dark fields. ▶

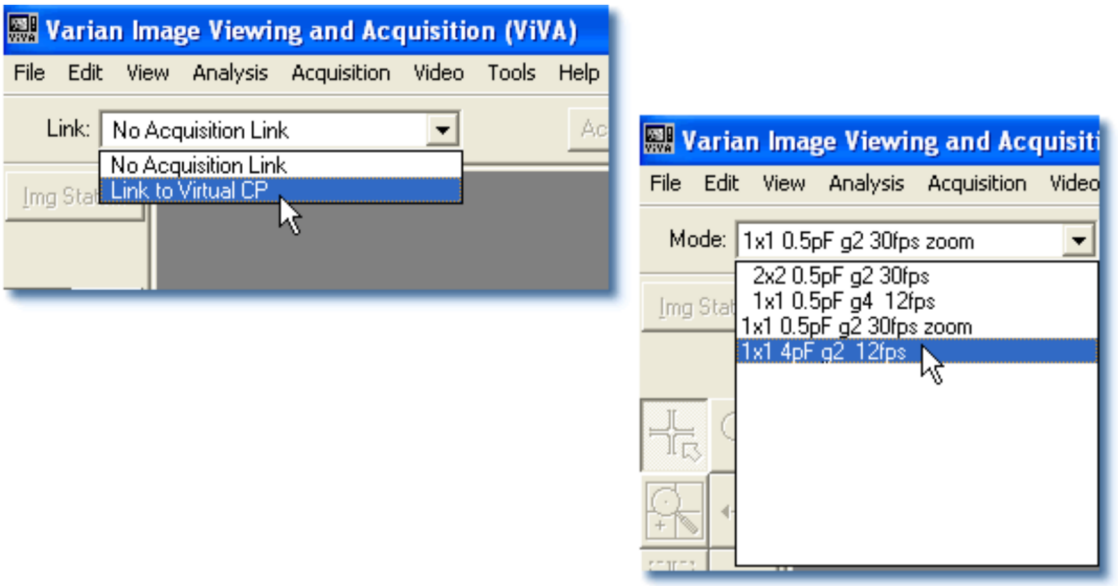
- Offset calibration should not be performed during X-ray.
- The X-ray-to-digital conversion factor does not change as a result of calibration.
- An offset calibration should be performed as often as necessary for acceptable images in the application the receptor is being used in. The offset varies as a function of panel temperature and frame rate.
- A different offset reference image is necessary for each operating mode, therefore it is important to update the offset data for each of the operating modes.

Step	Action / Results
1.	To perform offset calibration, click the *ViVA* icon  launches the application.

Step	Action / Results

2. Select the *Link to Virtual CP* (VCP) option under Acquisition from the menu bar or the *Link / Mode* drop down box. The main purpose of the VCP is to establish connection to the PaxScan imaging system to control the acquisition of digital images captured.

3. Then, select desired Mode from the *Link / Mode* drop down *box*: The 4030D supports a number of Fluoroscopy modes of operation as defined in Table 2.0 and shown in below screenshot.

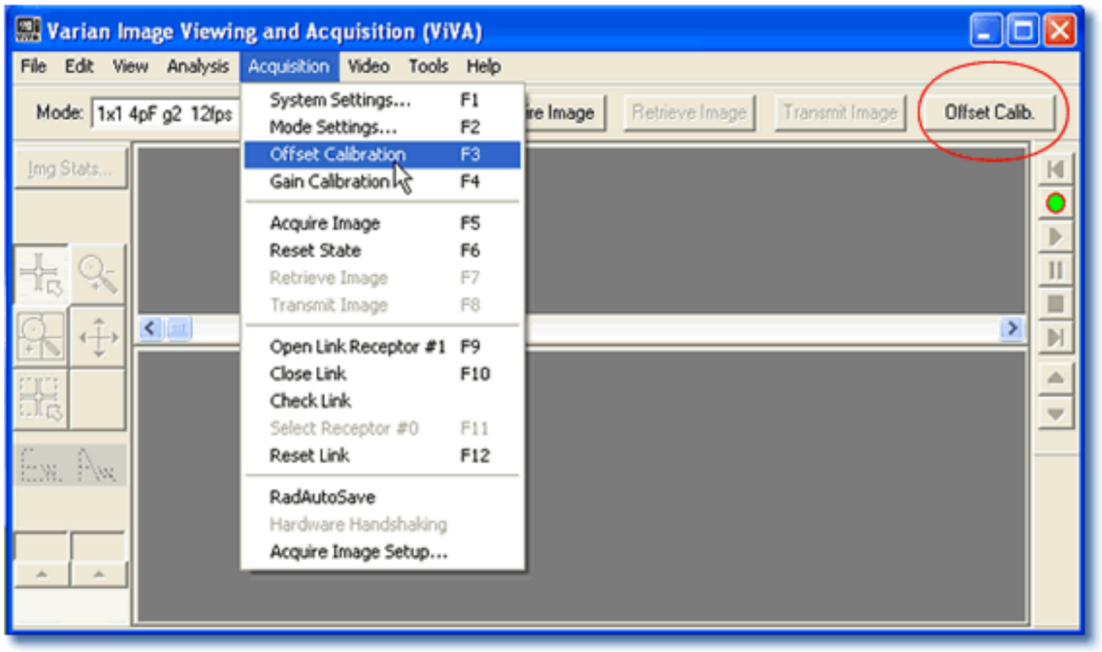


Note:

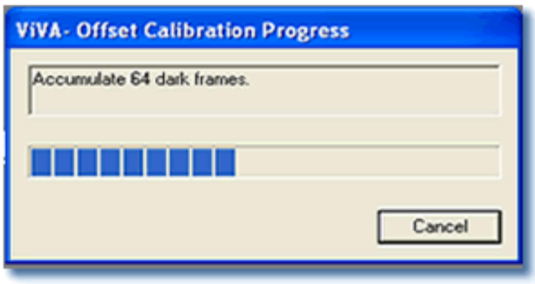
It is recommended that a delay of at least 20 seconds be allowed after an X-ray exposure, before commencing with offset calibration. Since there is some inherent lag in the detector, this delay avoids introduction of a latent image into the offset reference image.

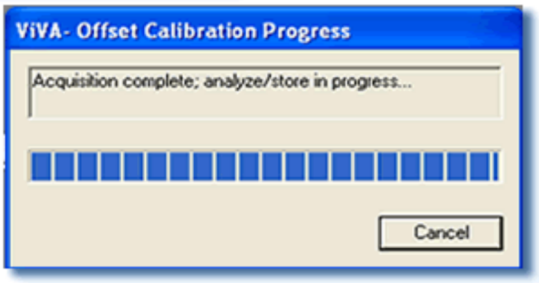
Step	Action / Results

4. Click Offset Calibration button or select from the menu bar under Acquisition.



3. An accumulating Dark Frames window appears followed by an offset calibration acquisition completion. Offset calibration is required for each additional receptor, respectively.





Gain Calibration

To compensate for non-uniformities in the Receptor, a gain reference image (flat field) is used by the Corrections module as required to correct all images. The flat field image must be captured by the Virtual Command Processor (VCP) prior to acquiring images. The process of capturing the flat field image is known as Gain Calibration.

Gain calibration is based upon the linear response of the Receptor to dose. Normalization is achieved by applying the flat field image acquired during the Gain calibration to all images corrected by the VCP. Normalization will fail with pixels that are responding to dose in a non-linear manner. Pixels responding to dose in a non-linear manner are usually caused by the saturation of the Receptor, or a low signal-to-noise ratio.

Note: It is critical to acquire the flat field image within a range that is large enough to be higher than the background noise created by the X-ray source and readout electronics of the Receptor, but lower than the saturation point of the imager.

Flat field images acquired near or exceeding the saturation point will cause normalization failures with all images acquired until a Gain calibration with the correct dose is performed. We recommend that flat field images be acquired with a median count of 2,000 – 4,000. This range will ensure that Gain calibration will meet both the upper and lower dose requirements under all modes of operation. Dose requirements are determined by the settings of the generator X-ray source.

To reduce the effects of noise, the average of each pixel in the flat field image is calculated by accumulating a number of frames into an internal memory buffer, then dividing the sum of each pixel by the number of frames acquired.

Note: Using larger numbers of calibration frames to capture the flat field image will result in more accurate calibration.

The number of calibration frames used during Gain and Offset calibrations can be adjusted under the *Mode Settings* pull down menu. We recommend accumulating a minimum of 32 frames.

The general procedure for Gain calibration for all modes is as follows in Table 3-0 and described below. Detailed instructions on performing gain calibrations are covered in the ViVA Online help documentation.

Table 3-0 Gain Calibration: All Modes

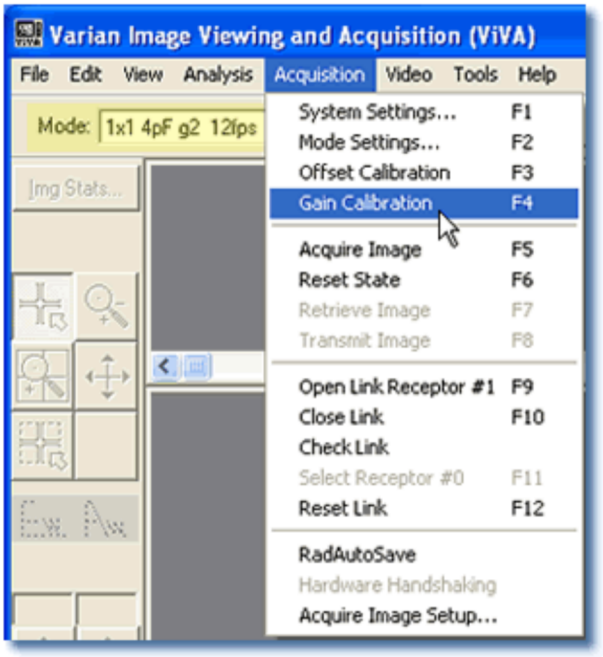
Step	Action	Results
1.	Warm Up	To ensure proper warm up, the PaxScan 4030D Receptor must be operational for a least two (2) hours prior to Gain calibration.
2.	Radiation	A uniform flat field with no object in the path of the X-Ray beam. The radiation should ideally be at a level and technique representative of the typical radiation dose for the Receptor during typical procedures, keeping in mind general consideration outlined above. Note: The exact level of the radiation during calibration will not influence the calibration as long as the signal level is not saturated.
3.	Offset Calibration	Software automatically performs a new Offset calibration referred to as dark field acquisition. Note: X-Rays *must not be used* for this part of the calibration.
4.	Repeat	The above procedure must be repeated for each of the stored imaging modes.

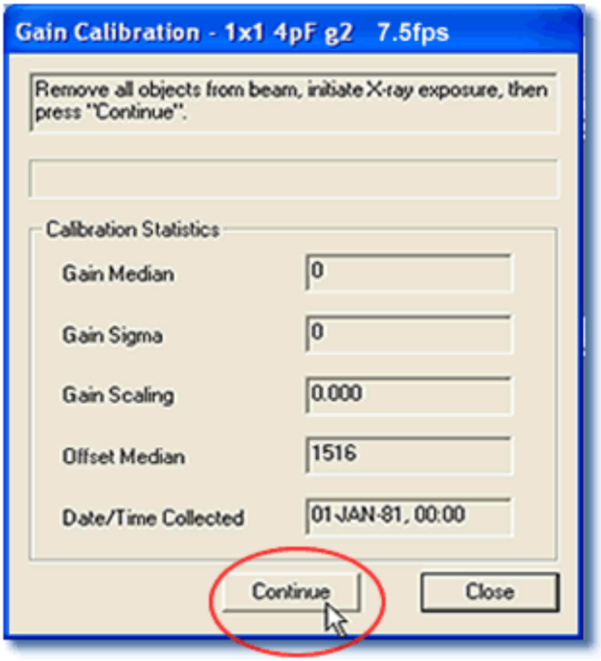
Fluoroscopic Mode Gain Calibration

Take the following steps to complete fluoroscopic gain calibration. ▶

Step	Action / Results

1. Ensure the desire receptor and imaging mode appears in the *Link Mode* drop down box.
2. Select Gain Calibration from the menu bar under *Acquisition*
3. Remove all objects from beam, initiate X-ray exposure, then press “Continue”.

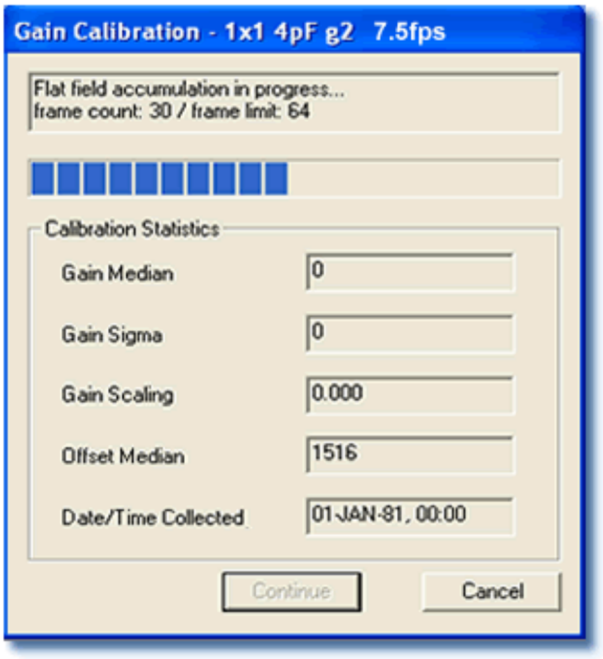


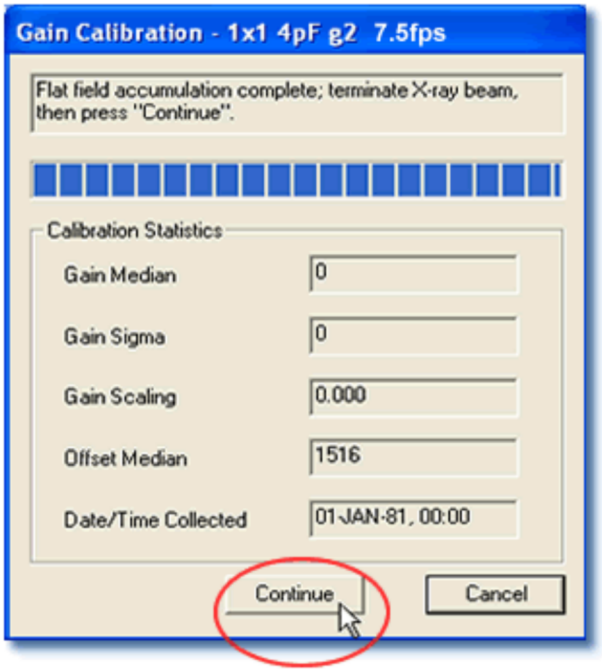


Step	Action / Results

4. The imager will now begin acquiring Flat Field images.

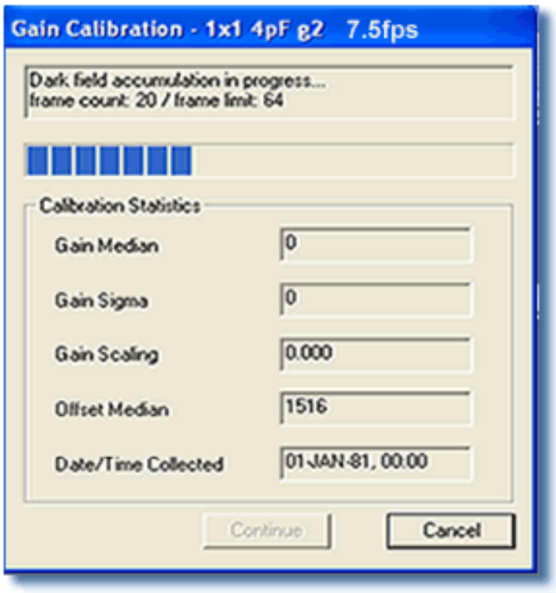
5. With Flat Field accumulation complete, terminate X-ray beam, and press “continue”.

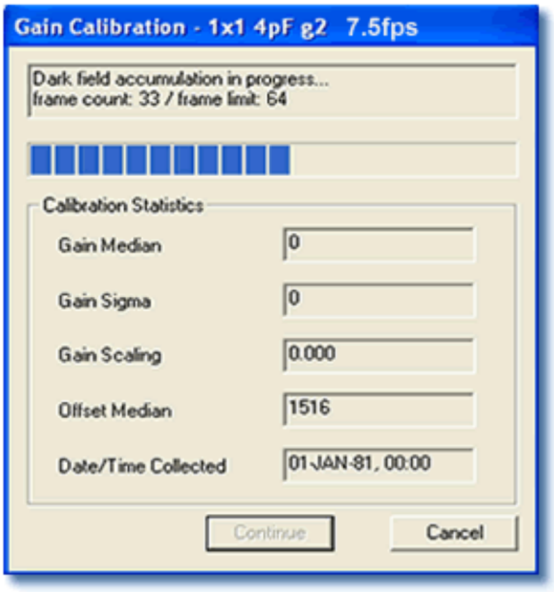




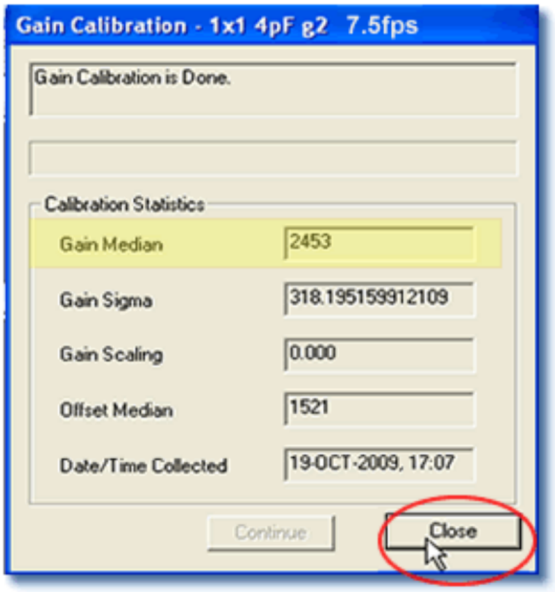
Step	Action / Results

6. Dark field accumulation begins with progress status shown in the display window.





7. Fluoroscopic gain calibration completes with display of the gain calibration statistics. Gain median count should be between 3000 +/- 1000 as shown in below screenshot.



Important: *Points of note about Fluoroscopic Gain calibration*:

• If the median value is higher than 4,000, the dose used needs to be decreased and the gain calibration repeated.

• If the median valued is lower than 2,000, the dose needs to be increased and the gain calibration repeated

• Gain calibration should be performed at regular intervals, typically once every three (3) months, or whenever the central beam of the X-ray source has been moved relative to the Receptor.

• Replacement of the X-ray tube will require a new gain calibration to be performed.

• We recommend accumulating a minimum of 32 frames for gain calibration for optimal image quality. However, the actual number of calibration frames used must be determined solely by the system integrator depending upon their specific performance requirements.

Note: For additional assistance operating ViVA™, use the ViVA Online help documentation.

Note: *Operator Control* is user supplied equipment.

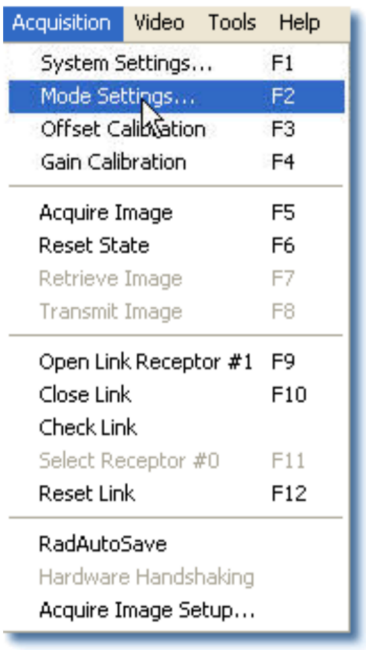
ViVA Mode Settings

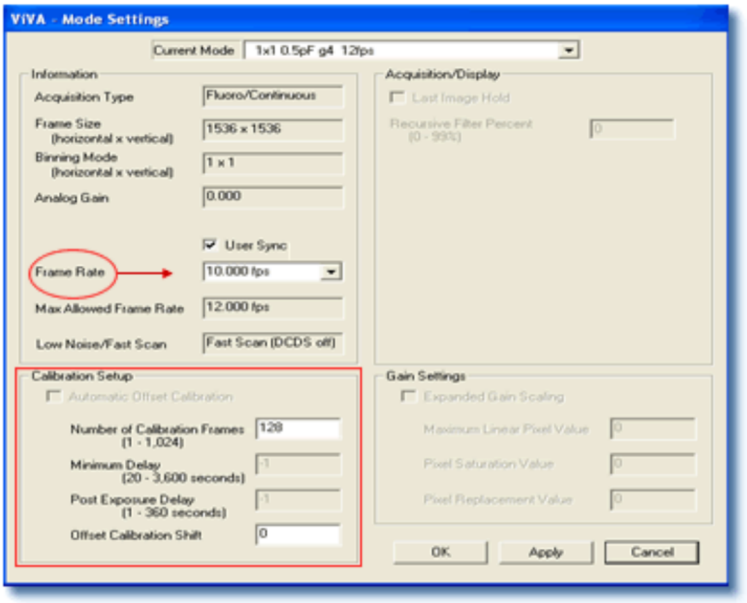
The calibration and system settings are verified as follows. To view these settings take the following steps. ▶

Step	Action / Results

1. Make sure the link to the VCP is established and desired receptor is selected from the *Link / Mode* drop down *box*.

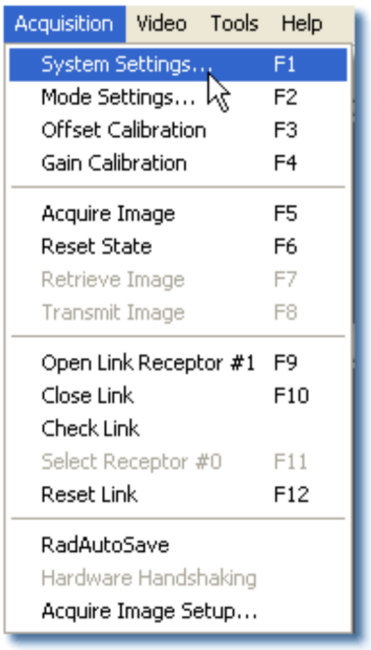
2. Select *Mode Settings* from the menu bar under *Acquisition* to make adjustments to Calibration settings. Frame Rate settings are changeable. If the User Sync is checked, the user must supply an external trigger which determines the frame rate.





Step	Action / Results

3. System settings are verified as follows. Select system settings from the menu bar under *Acquisition* which will bring up a dialog box. On the left side of the dialog box, unchangeable information about the system is displayed. On the right side are *Image Correction* settings. These check boxes allow the user to select which image correction algorithms are applied.



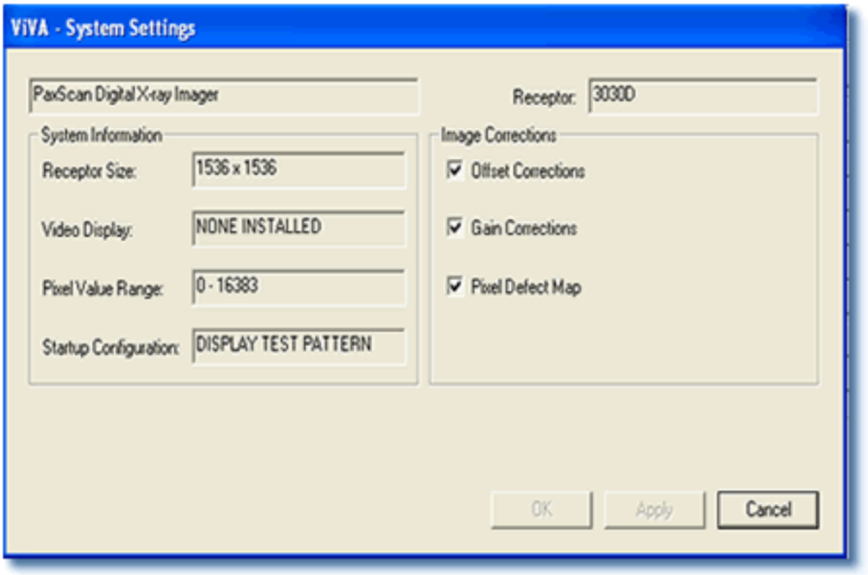


Image Acquisition

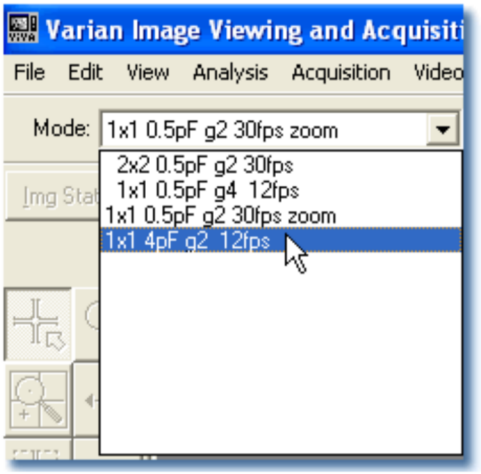
Once Offset and Gain Calibration is performed, you are ready to acquire images.

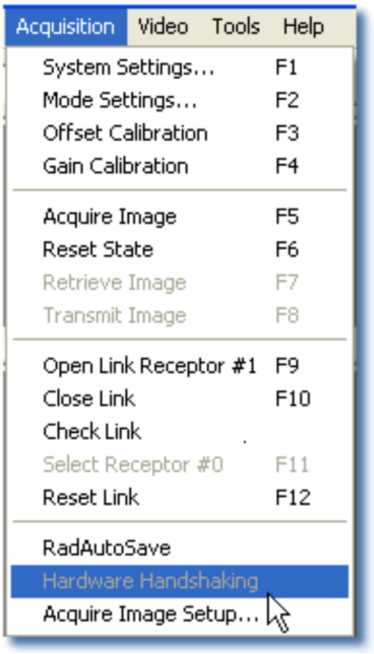
Fluoroscopy Normal / Fluoroscopy Full – Res Mode

The Fluoroscopy mode is commonly used for its ability to provide real-time moving images for positioning and verification. ▶

Step	Action / Results

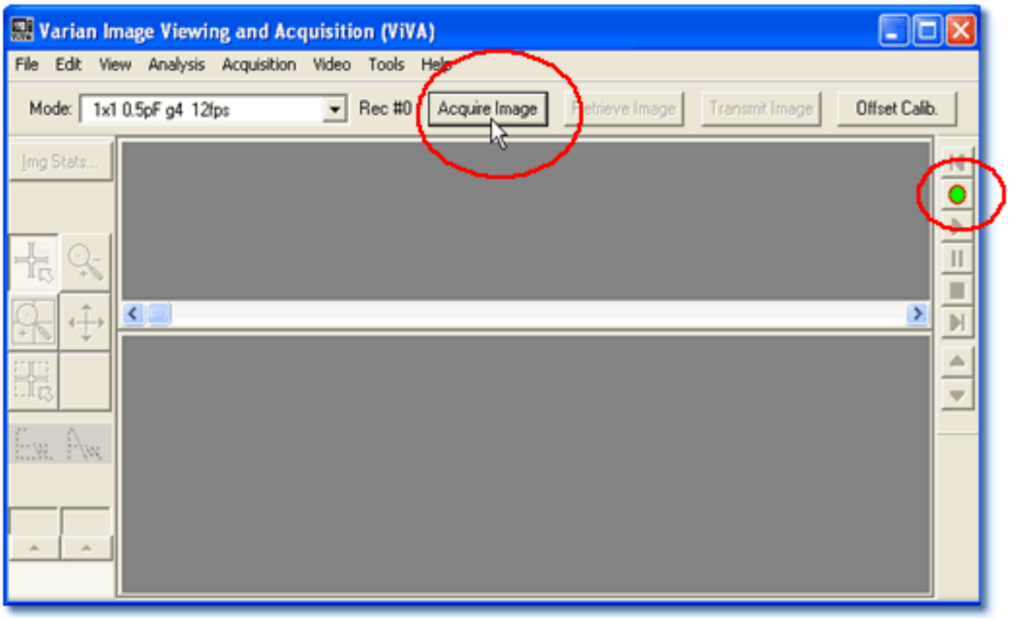
1. Select desired mode from the *Link Mode* drop down box.
2. Make sure hardware handshaking is unchecked.



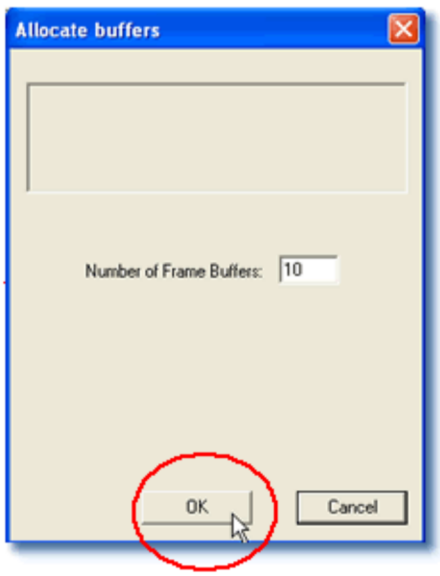


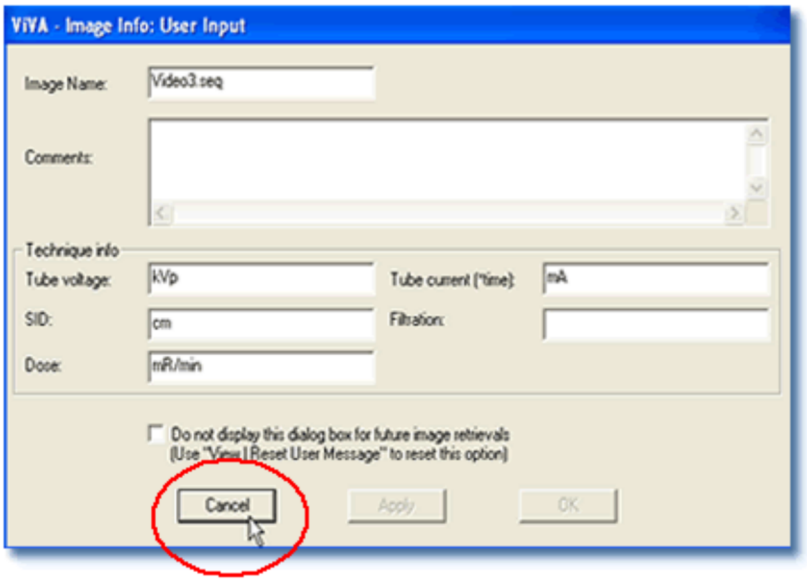
Step	Action / Results

3. Select the *Acquire Image* button or the green radio button on right invokes imager to begin acquiring images.



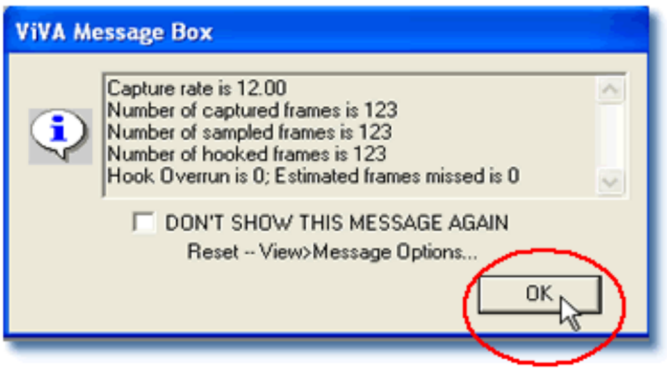
4. *Upon first acquisition* the following two windows will appear — the first one provides buffer allocation information and the other an area for user comments. Select the ok and cancel button, respectively to continue.



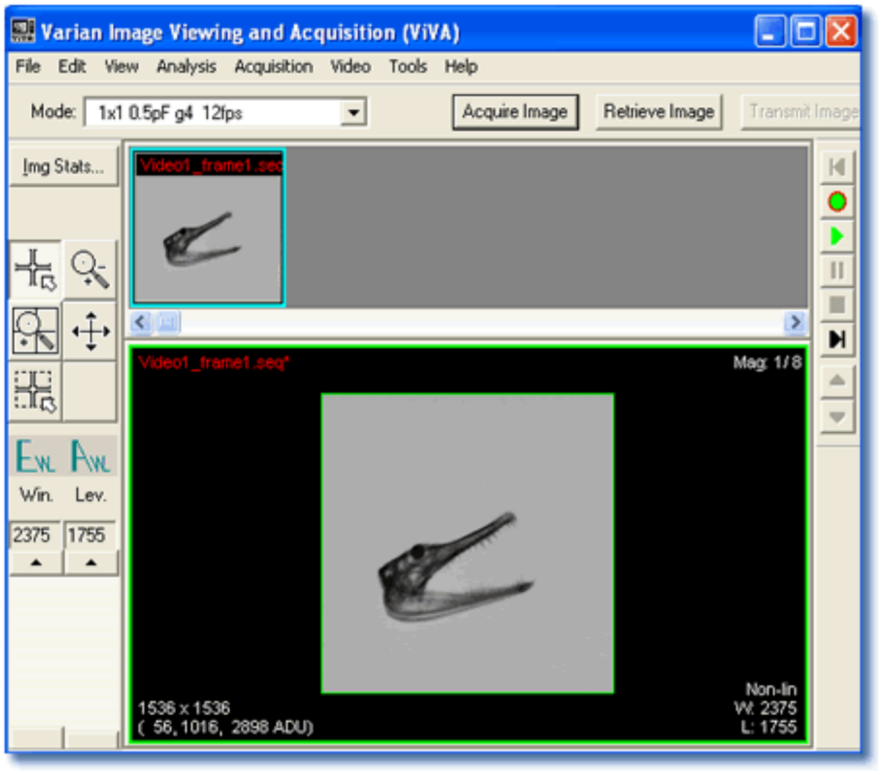


Step	Action / Results

5. The following acquisition the below window will appear providing active image capture data.



6. Acquired image can be saved in the *seq/avi* file format by selecting File / Save As.



Safety

Electro-Magnetic Interference

This equipment generates, uses and can radiate radio frequency (RF) energy and, if not installed and used in accordance with the instructions, may cause harmful interference to other devices in the vicinity. In any and all circumstances; however, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to other devices, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the measures listed in the **Troubleshooting** section.

Electrical Shock Protection

- Compliance with CAN/CSA-C22.2 NO. 601.1-M90, 2005 (Medical Electrical Equipment Part 1 General Requirements for Safety), IEC 60601-1 Medical Electrical Equipment Part 1 General Requirements for Safety – edition 2, UL 60601-1 Medical Electrical Equipment Part 1 General Requirements for Safety – edition 1
- External Power Supply (optional)
  – type: AMM90PS30: Input Voltage 90 – 264 VAC, Input Frequency 47 to 63 Hz, Input Current 1.2A, DC Output: +30V / 2.5A
- Class I

Environment Limits

Rigorous environmental testing is conducted on an engineering basis using a sample imager.

Temperature & Humidity

Category	Limits
Storage & Transport (ambient)	-20º C to +70º C
Storage & Transport Humidity (non-condensing)	10% to 90%
Normal Operation Temperature (measured at the center of the back cover)	10º C to +38C
Operation Humidity (non condensing)	10% to 90%

Altitude Limits

The Paxscan Digital Imager Receptor is rated to operate at an altitude ≤ 3000m.

Maintenance

Cleaning and Disinfection

The flat panel receptor and connected cables are likely to be soiled during use. The specific material most likely to become soiled is the X-ray grade carbon fiber input window and aluminum housing.

Cleaning and disinfecting of the input window should be performed as needed. Wiping the surfaces with a soft cloth dampened with soap and water will generally clean the surfaces.

Proper disinfection requires that a disinfectant solution be used; such as a hospital grade, EPA registered low to intermediate-level product for hard, non-porous surfaces and equipment. Use disinfectants in accordance with the manufacturer's instructionss.

Repairs

Note: No user serviceable parts. If repairs are necessary, please see *How To Reach Us.*

The least replaceable units (LRU) are:

• Receptor Assembly

Proper Disposal

The 4030D receptor should be returned to Varian Medical Systems for disposal. We request that you obtain an RMA number using the same procedure for warranty/returns of products.

Contact: PAXSCAN.RMA@VARIAN.COM

Warning: Precautions should be taken to not open the receptor module. Depending upon the type of scintillator used, opening the receptor module may expose the user to potentially toxic materials.

Troubleshooting

Problem	Solution
Imager fails to respond	1. Check cables.
Imager causes Electro-Magnetic Interference	1. Reorient or relocate the receiving device. 2. Increase the separation between the equipment. 3. Connect the other device(s) into an outlet on a different circuit. 4. Consult the manufacturer or field service technician for help.
Poor Image Quality.	1. Confirm that image corrections are all selected in the Systems Settings dialog box in ViVA . 2. Re-acquire gain and offset images. 3. Assure that the exposures are appropriate for gain calibration images (not saturated).
Software hangs up.	Restart ViVA.
Acquired image is completely dark.	Increase the exposure and acquire a new image. If the image is still dark, verify that all cables are properly connected. Turn the power “OFF” and “ON”. Acquire a new image.
Out of virtual memory.	Close some of the windows that are currently open.
Residual x-ray image from previous exposure shows in current image.	Charge on the sensor pixels from a super saturated exposure may cause a residual image. It can be erased by taking another image or multiple images without X-rays until the residual image is gone.
ViVA error message	1. Please complete PaxScan 4030D Problem Report. 2. Email the error log file generated to: paxscan.service@varian.com. This log file is normally found at C:\Documents and Settings\All Users\Documents\DrWatson\ drwtsn32.log

How To Reach Us

In order to provide you with the most comprehensive technical support, (hardware or software), please complete the problem report on following page before contacting your Varian representative. If you prefer E-mailing the information to us, a .pdf version of this form is included on the CD you received with your system. You may also fax the completed form.

To speak with our technical support personnel:

- Call (800) 432-4422 or (801) 972-5000.
- E-mail the report to paxscan.service@varian.com, or
- Fax a copy of the Problem Report to (801) 972-5023

PaxScan 4030D Problem Report Customer Information

Date:	Your Name	Company/Unit Name:
Email:	Phone Number:	Fax Number:
Product Information.		
PaxScan Part Number: Imager Serial Number: Software Revision #:		
Operation I was trying to perform (be as specific as possible:		
What happened (use additional sheets as necessary):		

Fax to: (801) 972-5050 or E-mail: paxscan.service@varian.com

Appendix A

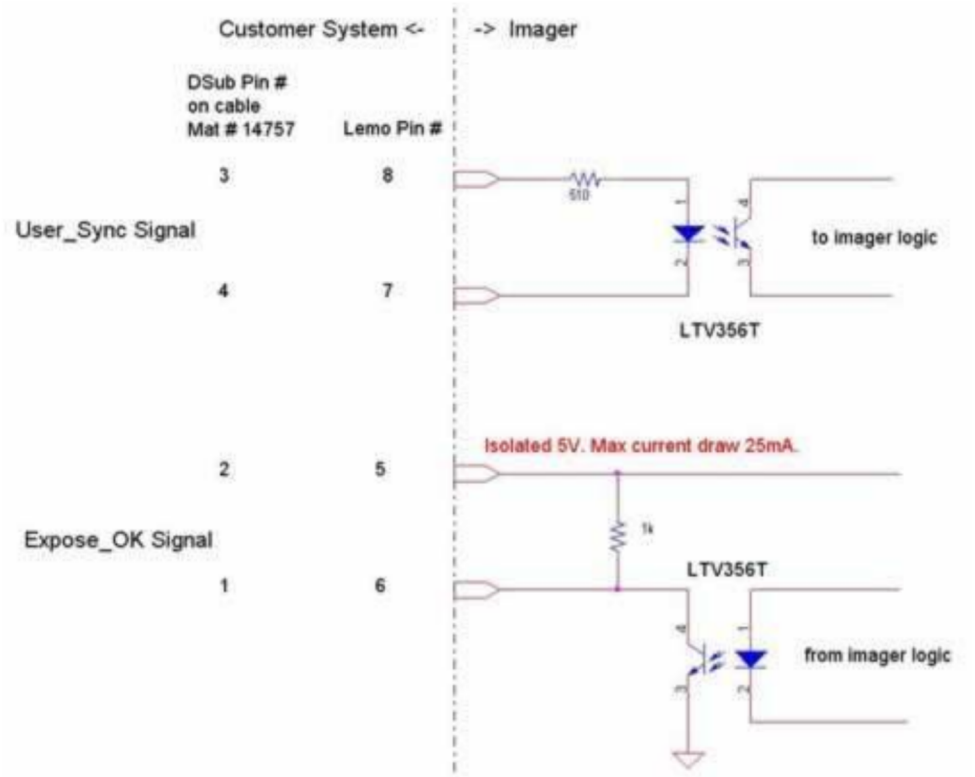
The synchronization interface to the imager consists of one opto-isolated input signal and one opto-isolated output signal. Connection to these two signals can be made via the 8 pin LEMO connector on the imager or via 9 pin D-Sub connector on Varian cable Mat # 14757.

The *User_Sync* input is used to trigger imager readout if the imager is in User Sync mode (see chapter 5, Mode Settings). In order to activate this input the customer system needs to provide a current of at least 5mA (Vin_min = 4V) to the imagers opto-coupler input . Maximum forward photodiode current is 27mA (Vin_max = 15V). Depending on the *User_Sync* input pulse duration, the imager will respond with the following:

User_Sync pulse duration	
pulse duration < 2ms	User Sync signal is ignored
2ms < pulse duration < 4ms	Imager readout is activated but no image data is transmitted via Ethernet
Pulse duration > 4ms	Imager readout is activated and image data is transmitted via Ethernet

The output from the imager is the *Expose_OK*, signal which can be used to trigger the generator. In order to use this signal it is necessary to connect the photodiode of an opto-coupler in series with a resistor between the provided 5V output and the *Expose_OK* pin. Current should be limited to 25mA.

Figure A.1 Schematic for "User_Sync" and "Expose_OK" Signal



Appendix B

4030D Alternative Power Supply Requirements

It is possible to power the 4030D imager from a power supply other than the Varian provided external power supply. The following needs to be taken into consideration when selecting or designing a power supply for the 4030D.

The 4030D is supplied with a single voltage, and uses internal, isolated DC-DC converters to generate the different voltages necessary to run the imager.

Power is connected to the 4030D via the imagers Lemo EXA.1B.308.HLN 8 pin receptacle. A Lemo FGA.1B.308 CLAD727 connector should be used on the power cable.
Pins 3 and 4 have to be connected to GND, and pins 1 and 2 have to be connected to the positive supply voltage.

Input Voltage Range Requirement

The input voltage **measured at the input of the imager** shall be in the range of:

21V – 30V

The 21V minimum voltage needs to be maintained during configuration of the imager. The voltage drop across the power supply cable has to be taken into account when designing a power supply and power cable for the 4030D imager.

Input Current

The 4030D imagers rated power consumption is **52W**. The nominal current for any given input voltage within the above range is therefore

$$I = \frac{52\ W}{U_{input}}$$

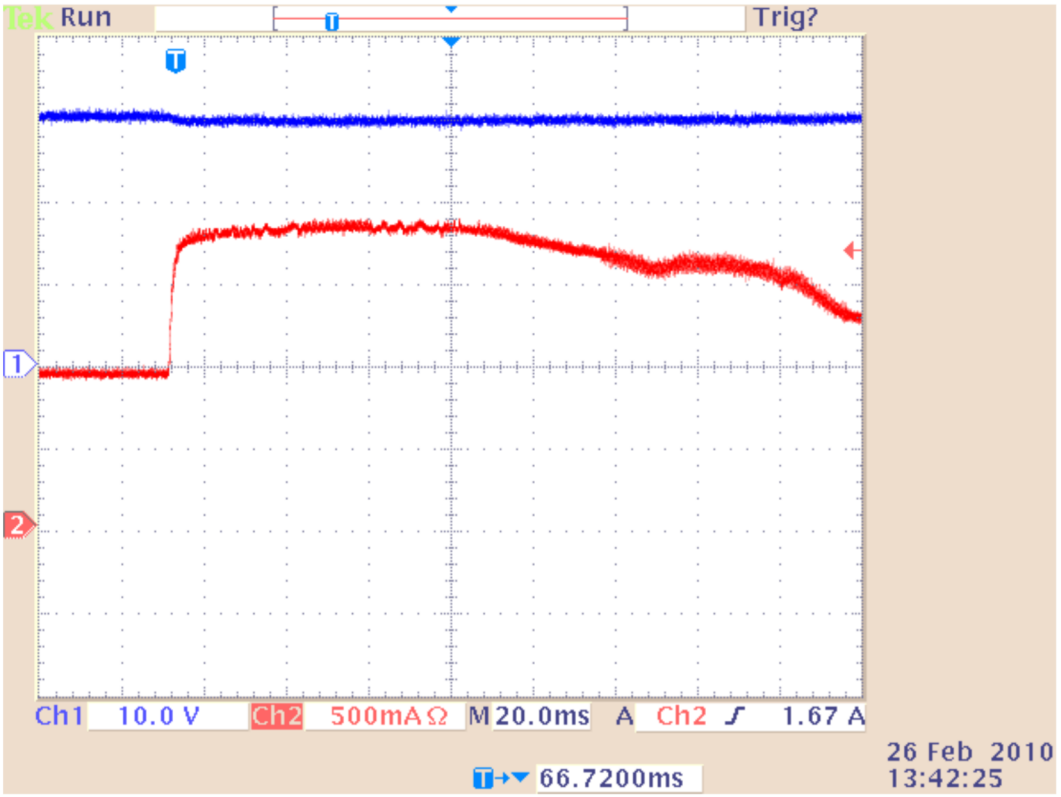
During configuration of the imager, a peak in power consumption of approx. 60W for 150ms occurs (see Figure 1 below). Peak current during configuration of the imager is given by

$$I = \frac{60\ W}{U_{input}}$$

During initial power up, the imagers internal DC-DC converters present a low impedance load and it is therefore important that the power supply can maintain its limiting current without voltage drop.

Figure B.1 Increased power consumption during configuration of the Imager

Ch1: Input voltage at the imager (10V/Div, 30V)
Ch2: Input Current to the imager (500mA/Div)



Input Voltage Noise Requirement

Ripple and Noise should not exceed 300mV$_{pk-pk}$, 20 MHz BW.