Digital Image Receptor

**The PaxScan 4336Wv4 is a radiographic
digital x-ray imaging sub-system**

UNRELEASED – DRAFT 090315

Abstract   The Operating Instructions (P/N 109724-000) covers safety, setup, operation, and maintenance of the PaxScan 4336Wv4 radiography digital image receptor. The imager is a component sub-system intended for integration by a qualified systems integrator.

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General Safety Information

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

Safety Warnings, Precautions and Contraindications

Warning: For portable applications, the operator and end-user must take precautions to protect themselves against dangerous X-ray exposure when using the flat panel imager in the X-ray beam path of an X-ray source.

Warning: The 4336Wv4 is not intended to be used as a primary barrier to X-rays. The user is responsible for ensuring the safety of the operator, bystanders, and the subjects being radiographed

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

Warning: Do not exceed maximum load weight of 100kg over a diameter of 40mm and 150kg distributed around the entire surface of the panel.

This device is not intended to supply heat to a patient. However, during normal use surfaces will become heated due to power dissipation in the imager.

Be aware that the 4336Wv4 is an applied part (patient contact device) and the surface shall not exceed 41 degrees C. See Figure 1-0 for the view of the patient contact surfaces. Internal temperature sensor data is provided in the diagnostic data attached to each image. These temperature measurements are well correlated with the panel external surface temperature. It is advisable to monitor this diagnostic data as an additional safety precaution.

⚠ CAUTION
Surface becomes heated during normal use
Operate accordingly

Note: There are no contraindication situations.

Explanation of Symbols

I	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	O	Off (power: disconnection from the mains)	⎓	Direct Current
♣	Handle With Care	▶	Indicates step-by-step description of the respective function follows		Useful / Important information
EC REP	Authorized Representative in the European Community/European Union		Manufacturer	📖	Consult Instruction for Use
IP51	Protected from limited dust ingress Protected from condensation - PaxScan 4336Wv4 Receptor	⚠	Heated Surface	🚶	Type B Applied Part
100kg	Load Weight Restriction		Temperature Limits	((•))	Non-ionizing radiation
IP20	Protected from touch by objects greater than 12 millimeters, not protected from liquids – Varian Battery Charger				

Chapter Summary

Introduction

The PaxScan 4336Wv4 is a radiographic digital image receptor commonly referred to as a flat panel detector (FPD). The detector together with image processing and command software called Varian Smart Panel (VSP) is designed for integration into a complete X-ray system. The imaging system has two main system components: The flat panel sensor, and VSP Software.

Shipment Contents

Flat Panel Receptor Assembly (includes a back-up cable for image recovery)

PaxScan Receptor Test Results DVD

(Files specific to the receptor in the shipment)

PaxScan Software DVD

VSP/ViVA System Software M01

PaxScan 4336Wv4 Operating Instructions

Optional Parts

Lithium-ion Battery – Varian model
– P/N 30773 (gray), 57834 (white), 81701 (black)

Battery Charger – Varian model

Laptop Style Power Supply for 1-Bay Battery Charger (includes power cable)
– P/N 82351 (black)
(OEM) Electrochem Solutions, Inc

Laptop Style Power Supply for 3-Bay Battery Charger (includes power cable)
– P/N 35205 (gray/white), 82350 (black)
(OEM) Electrochem Solutions, Inc.

Laptop Style Power Supply for 1-Bay Battery Charger (includes power cable)
– P/N 117402

Laptop Style Power Supply for 3-Bay Battery Charger (includes power cable)
– P/N 44666

Customer Specific Overlay

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 PaxScan 4336Wv4 receptor is a light weight, wireless flat panel detector designed for medical and veterinary use. The 4336Wv4 fits standard bucky trays and its wireless communication enables easy migration between table, above the table, chest stand, and mobile cart applications. This family model will acquire image over a wide range of dosage, while providing maximum access to the patient, with a minimum possible border on the active imaging area. An additional cable is supplied with the receptor to allow for set-up of the wireless interface and retrieve images from the receptor in the case of failed wireless transmission.

Figure 1-0 Patient Contact Surfaces – 4336Wv4

Getting Started

System Overview

In medical applications, the function of the 4336Wv4 FPD is to absorb the X-rays that pass through the patient's anatomy and convert them into a digital image.   The wireless access point is the interface between the FPD and the imaging system and may be mounted in an equipment enclosure, or it may also be wall or ceiling mounted to maximize wireless signal strength. The Receptor is provided with a software application package, Virtual Command Processor (VSP), which performs all the interface functions with the receptor; such as, communication and respective calibration. During operation, the Receptor is often draped or bagged to ensure cleanliness and sterilization, and is manipulated such that the Receptor's input window is located near, but on the opposite side of the patient, from the X-ray source.

Figure 2-0 shows the configuration of the Receptor in the context of the overall imaging system. The dimensions for receptor are 459.5mm x 383.5 x 15.13mm.

Figure 2-0 Imager Configuration
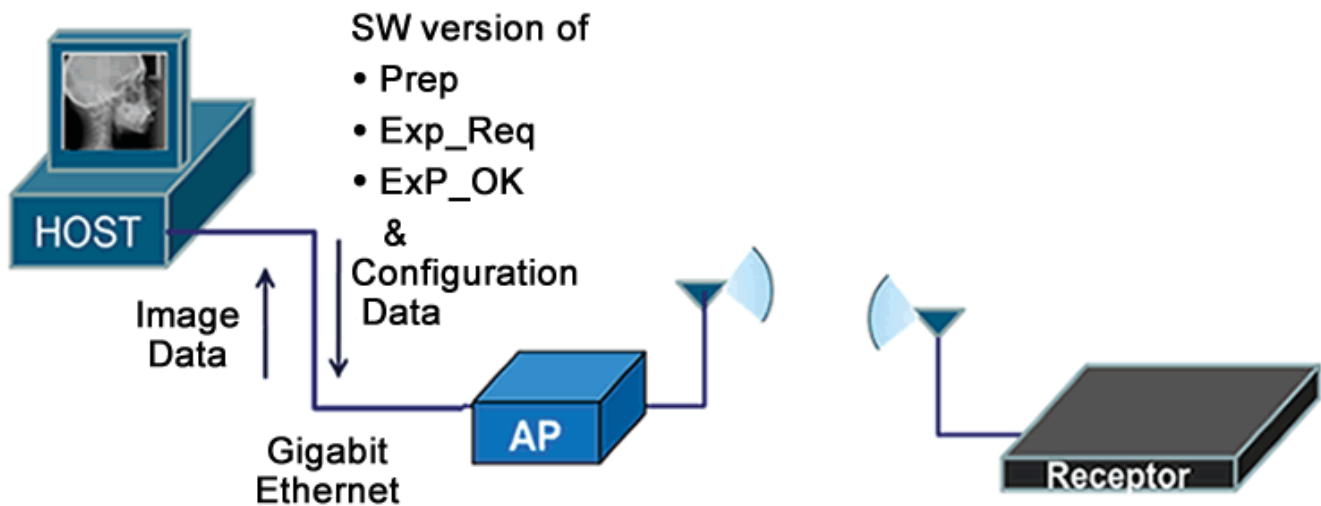
Figure 3-0 Imaging System Overview – without Router

Figure 3-1 Imaging System Overview – with Router

Figure 4-0 Imaging System Overview - Cable Connection

← USB Cover

Note: **There is one (1) cable connections for the 4336Wv4 Flat Panel Receptor which is the back-up cable.** This cable functions as an interface between the receptor and the workstation by providing a 100T Ethernet connection for set-up of the wireless interface and retrieval of images in the case of wireless transmission failure.

Power on Sequence

Step	Action / Results
1.	Place battery into receptor making sure the battery latches into place. The receptor will automatically power on when battery is inserted.
2.	The yellow and *green LEDs are solid while receptor boots*.
3.	Wireless connected is green blinking.
4.	The yellow LED indicates the status of the receptor. Refer to Figure 5-1 for explanation of LED status indicators.

Figure 5-0 4336Wv4 Receptor Power/LED

LED Status Indicator
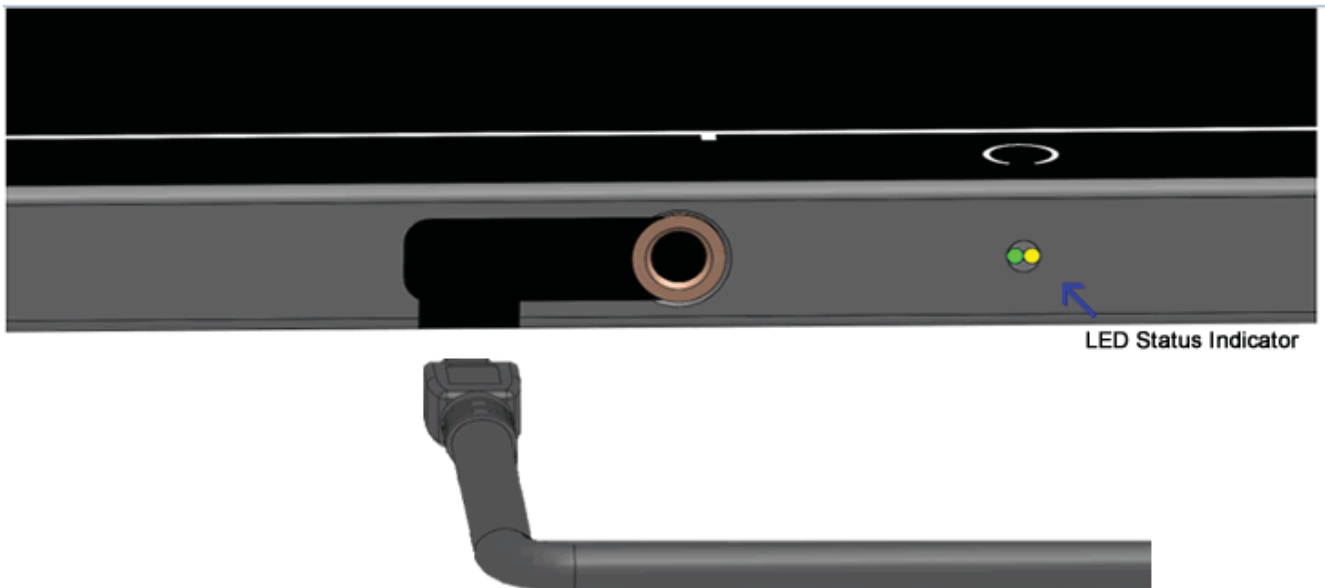
Figure 5-1 4336Wv4 LED Status - Details

Receptor LED's

LED Behavior	Action
Green and Yellow Solid	Booting
Green Blinking (100000)	Not Linked
Green Blinking (101010)	Connected Wireless
Green Solid	Link Opened
Green Blinking (1100)	Connected Service Cable
Yellow Solid	Panel Error

Note: The blinking behavior occurs based on a 4Hz clock. Each digit for the blinking pattern represents 1/4s.

Important: The Service Cable does not provide power to the receptor when tethered. Before servicing, ensure that a fully charged battery is inserted.

IP51

Warning: PaxScan *4336Wv4* Moisture Resistance Level Tested, horizontal position, x-ray window face up, without backup cable attached; protected against falling water equivalent to 3-5mm rainfall per minute for duration of 10 minutes.

Receptor Ingress Dust Level Tested, not entirely prevented, but must not enter in sufficient quantity to interfere with the satisfactory operation of the equipment; complete protection against contact (dust proof)

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.

Warning: Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

PaxScan System Software

The PaxScan 4336Wv4 receptor is part of a new series of Flat Panel Detectors which deploy the Varian Smart Panel (VSP) architecture. Imager software is composed of two parts: 1. Software necessary to capture, process, and correct x-ray images is embedded within the receptor; 2. The VSP COMM workstation libraries comprise the VSP SDK. Because the main software is embedded within the receptor, the only software required on the workstation is a small set of DLLs that should be copied from the DVD to the workstation.

The VSP COMM libraries are copied to the workstation. Software interfacing to this receptor will make API calls to these SDK libraries to control the image acquisition process. These libraries manage connections to the receptor and the transfer of files from the receptor to the workstation.

The contents of the DVD include the following files:

1. VSP COMM (SDK) files:
   a. libvsp.dll
   b. libvsp-zf.dll
   c. libwinpthread.dll
   d. vspcs.dll
   e. vsp.h

This set of files should be copied to the workstation. For customers working with C/C++, a vsp.h header file is included along with the libraries. For customer working with C#, the vspcs.dll provides the C# wrapper interface.

2. FP2032_VarianSmartPanel_SoftwareInterfaceSpecification.pdf – This .pdf file provides API documentation for the software.

3. Bonjour installation files
   a. Bonjour.msi
   b. Bonjour64.msi

Bonjour is an optional installation and is required if you use the List()/vsp_list() API function.

4. Sample Code
   a. vsp-example.cs – C# sample code project
   b. vsp-example.c– C/C++sample code project

5. Utility software
   a. vsp-example.exe

The vsp-file.exe utility is used to transfer a configuration file to the receptor.

Important: For interfaces connection, synchronization and timing diagrams information please reference the Software Interface Specification.

Modes of Operation

The PaxScan 4336Wv4 supports the radiography mode of operation as defined in Table 2-0. In general, there is a tradeoff between varying operation modes of resolution, or field of view, or cycle time, 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 cycle time and analog gain. Each mode requires a unique set of calibration files.

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

Note: 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 customers intended application

Table 1-0 PaxScan 4336Wv4 Operational Modes

Mode	Cycle Time	Pixel Binning	Panel Scan Time	X-Ray Window Time	Image Area	Frame Size	Acquisition Type
Radiography – Full Resolution	7 sec	1 x 1	550ms	0.35 to 3.5s	Full Field	2,476 x 3,072	Accumulation

Default Mode

Mode 0 is the default. The default mode will be invoked automatically upon system power-up when a link is opened or receipt of a reset state command.

Operation States

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

- **Radiography acquisition**: (Radiography-type)

- **Offset Calibration**: (OEM-initiated)

- **Gain calibration**: (always-OEM initiated)

- **Analog offset calibration**: (always OEM-initiated)

Each operating mode employs all types of calibration.   In radiography-type acquisitions, the PaxScan 4336Wv4 will acquire one frame with its respective offset.

Calibration Procedures

Offset Calibration

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.

Preview Offset Calibration

There are two types of offset calibration; one is used for the preview image and the other to calibrate the final image. Prior to acquiring images, an offset calibration must be performed in each mode. This offset calibration is used for the preview image. In addition, an offset calibration is automatically performed after each single acquisition.

Step	Action / Results

1. To perform offset calibration, click the *ViVA* icon launches the application

2. Ensure required receptor appears in the *Mode* drop down. The 4336WV4 currently supports Rad 1x1 3pf.   Click *Offset Calib. Button* or select from the menu bar under *Acquisition*.
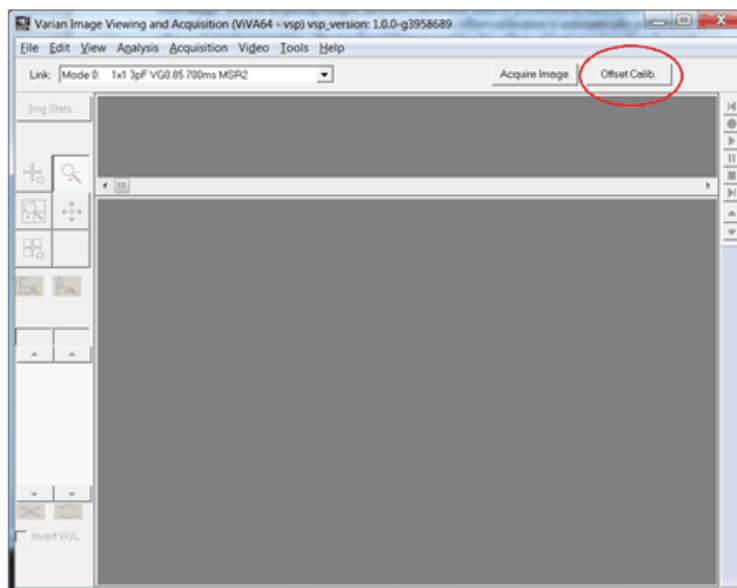
Step	Action / Results

3. A *Calibration Setting* window appears followed by an *offset Calibration Progress window*.

```
ViVA - Offset Calibration Progress

Waiting for the first frame...

    ┌─────────────────────────────────────┐
    │ Calibration Setting              [X] │
    │                                      │
    │    Please enter number of frames for │
    │              calibration             │
    │                                      │
    │   Calibration Frames:   8      ▼     │
    │                                      │
    │        Cancel          OK            │
    └─────────────────────────────────────┘

                                   Cancel
```
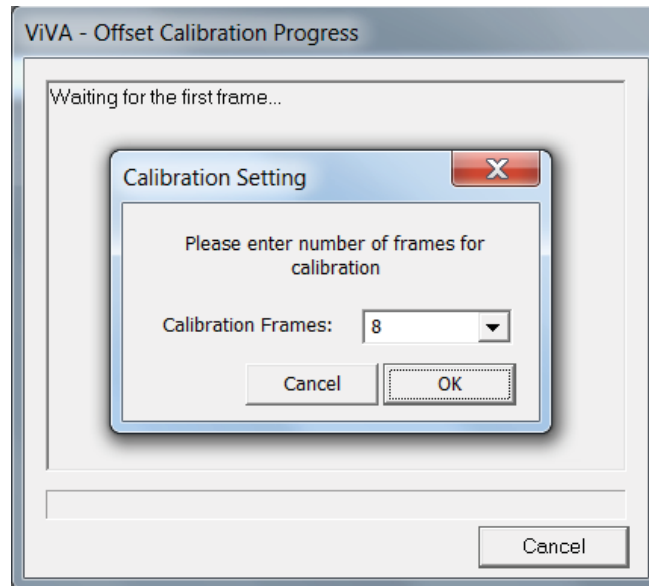
4 The number of frames acquired can be selected from the *Settings window*. Once all frames are acquired, the receptor is updated with the averaged offset calibration frame for the current mode. The updated message will show on the progress window and calibration process is complete.

Press *Close button* to close the window.

```
ViVA - Offset Calibration Progress

updated
updating
stopped
received frame 2 of 2 in 7 seconds.
dark field 1
received frame 1 of 2 in 7 seconds.
dark field 0
started




▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐
                                  Close
```
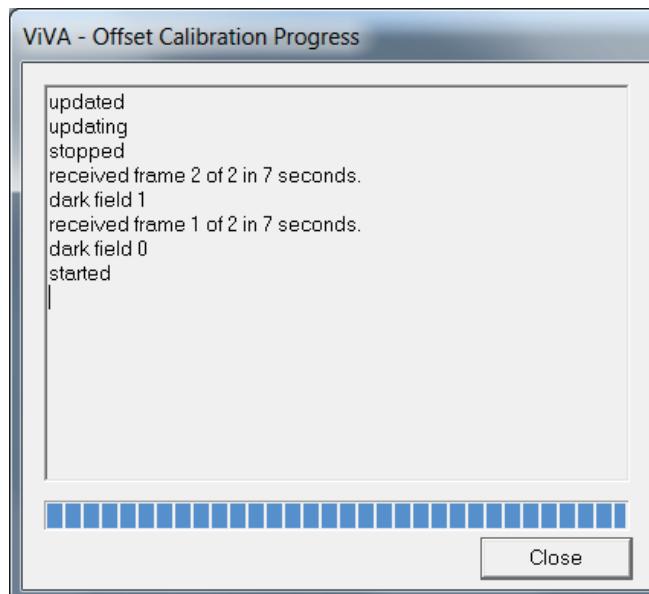
Gain Calibration

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 Varian Smart Panel (VSP) prior to acquiring images. The process of capturing the flat field image is known as Gain Calibration.

Note: Every time a gain calibration process is run, an offset calibration is enforced beforehand. This will ensure that the receptor is properly calibrated.

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 VSP. 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 approximately 13000 - 14000. 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.

Important: Gain calibration requires the production of X-rays and therefore certain precautions must be taken by the human operator.

The number of calibration frames used during Gain and Offset calibrations can be adjusted under the *Mode Settings* pull down menu. We recommend accumulating 32 frames for gain calibration and 8 frames for offset 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.

The general procedure for Gain calibration for all modes is as follows in Table 2-0 and described in the next section. Detailed instructions on performing gain calibrations are covered in the ViVA Online help documentation.

Table 2-0 Gain Calibration: All Modes

Step	Action	Results
1.	Warm Up	To ensure proper warm up, the PaxScan 4336Wv4 Receptor must be operational for a least 30 minutes prior to Gain calibration.
2.	Offset Calibration	Software performs a new Offset calibration referred to as dark field acquisition.
		Note: X-Rays must not be used for this part of the calibration.
3.	X-Ray Radiation	A uniform flat field with no obstructions 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 the general consideration outlined above.
4.	Repeat	The above procedure must be repeated for each of the stored imaging modes.

Radiographic Mode Gain Calibration

Radiography Gain calibration requires an Offset calibration performed prior to collecting the Flat Field image. Therefore an Offset Calibration process must be run prior to the gain Calibration. X-Ray illuminated frames are then offset-corrected and accumulated in the VSP. A series of accumulated frames equals one radiographic X-ray exposure. Exposures are averaged to obtain the Flat Field image used by the VSP. The number of exposures acquired can be selected from the *Settings window*.

Important:

VivA provides a convenience of running Offset Calibration as part of the Gain Calibration process.

However, API driven Gain Calibrations do not automatically run Offset Calibration. OEM Applications should be sure to run Offset Calibration prior to Gain Calibration.

Take the following steps to complete radiographic gain calibration. ▶

Step	Action / Results

1. Ensure the desired receptor and imaging mode appears in the *Mode* drop down.

2. Click *Gain Calibration* from the menu bar under *Acquisition* invokes hardware handshaking for the dark field calibration.

3. Finish Offset Calibration process as explained earlier
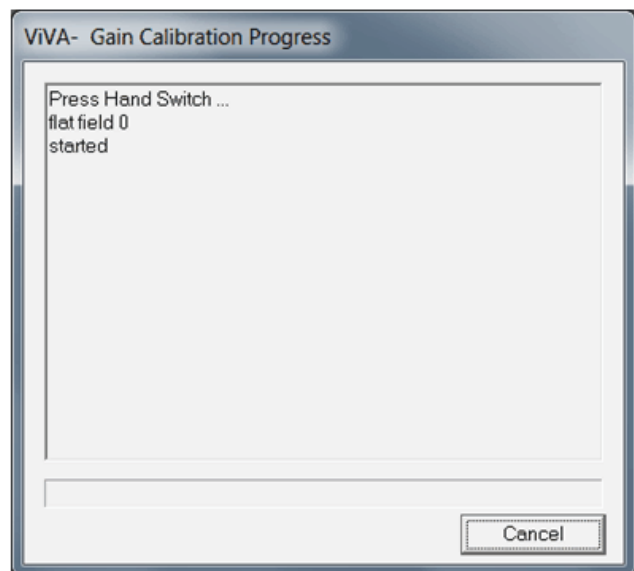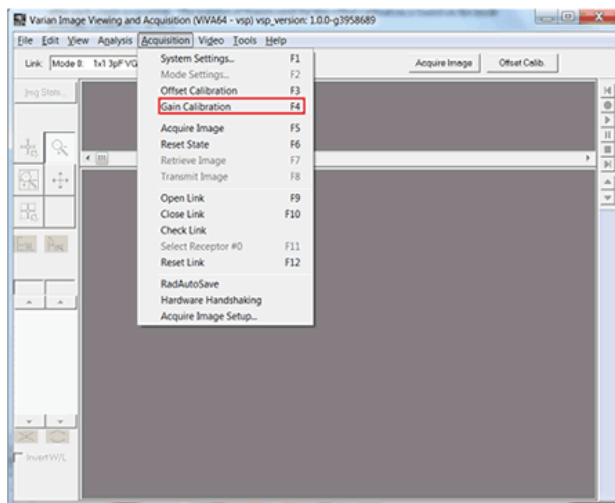
Step	Action / Results

4. Use *operator control* to perform an exposure. Once all x-ray frames have been acquired click Finish to Complete the calibration.

The number of frames acquired can be selected from the Setting window. Once all X-ray frames have been acquired, the receptor is updated with the averaged gain calibration from for the current mode. The updated message will show on the progress window and calibration process is complete. Press *Close button* to close the windo*w*.

Note: *Operator Control* is user supplied equipment.

Note: Gain calibration should be performed at regular intervals, typically once every six (6) 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.

Note: Varian recommends accumulating 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.

ViVA Mode Settings

The calibration and system settings are verified as follows. ▶

Step	Action / Results

1. Make sure the desired receptor is selected from the *Mode* drop down menu; and, that **"Hardware Handshaking"** is *"checked"* from the menu bar under *Acquisition*. ViVA will remember your preference for future launches
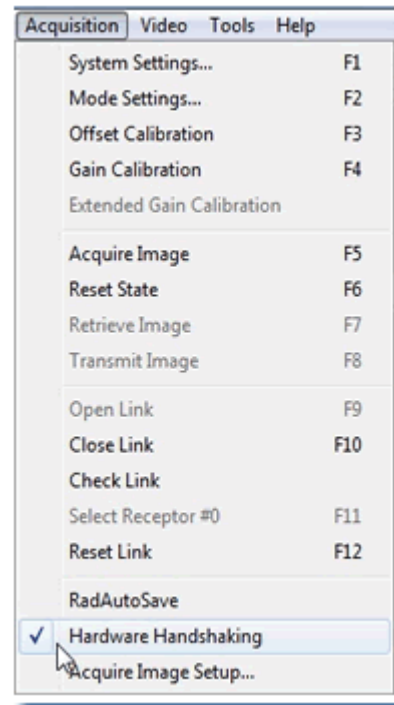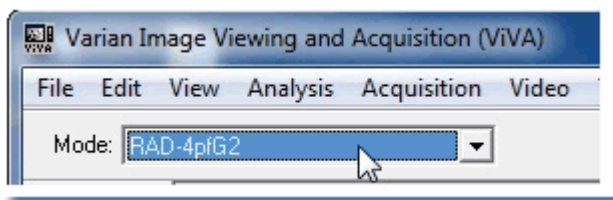
2. *Or* check the Hardware Handshaking from Radiographic *Acquisition Progress window*.
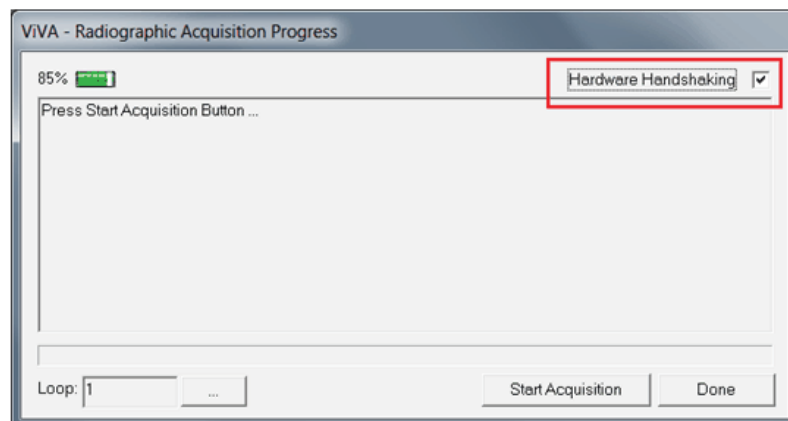
Step	Action / Results

3. System settings are verified as follows.
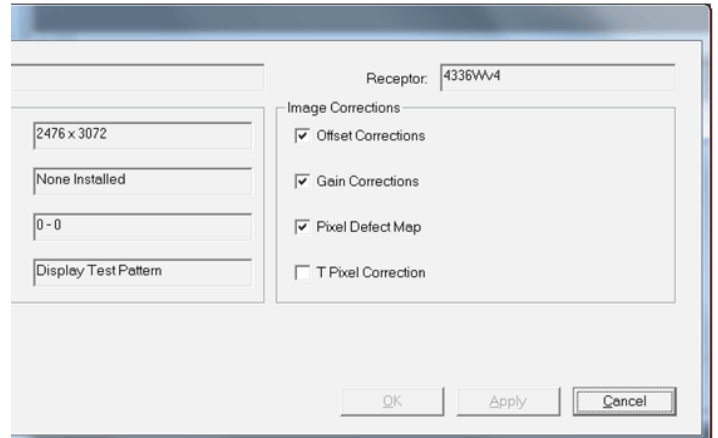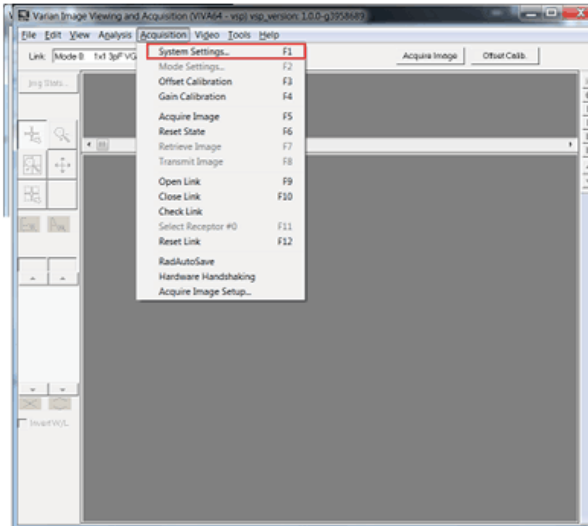
Image Acquisition

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

Radiography Mode

The Radiography mode provides the technician with superior single-shot, higher resolution images, for diagnosis. ▶

Step	Action / Results

1. Select required receptor from *Mode* drop down menu

2. Make sure hardware handshaking is checked.
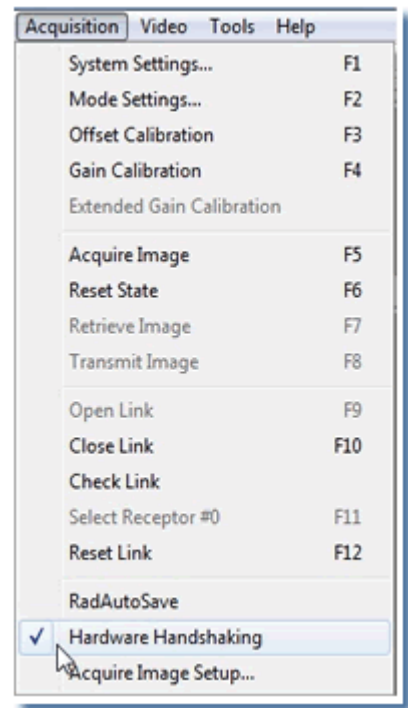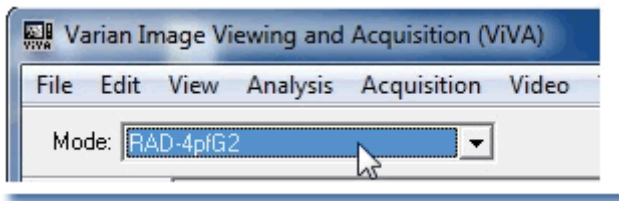
Step	Action / Results

3. Select the *Acquire Image button* to begin acquiring images. *Acquisition Progress window* will appear. Click *Start Acquisition button*.
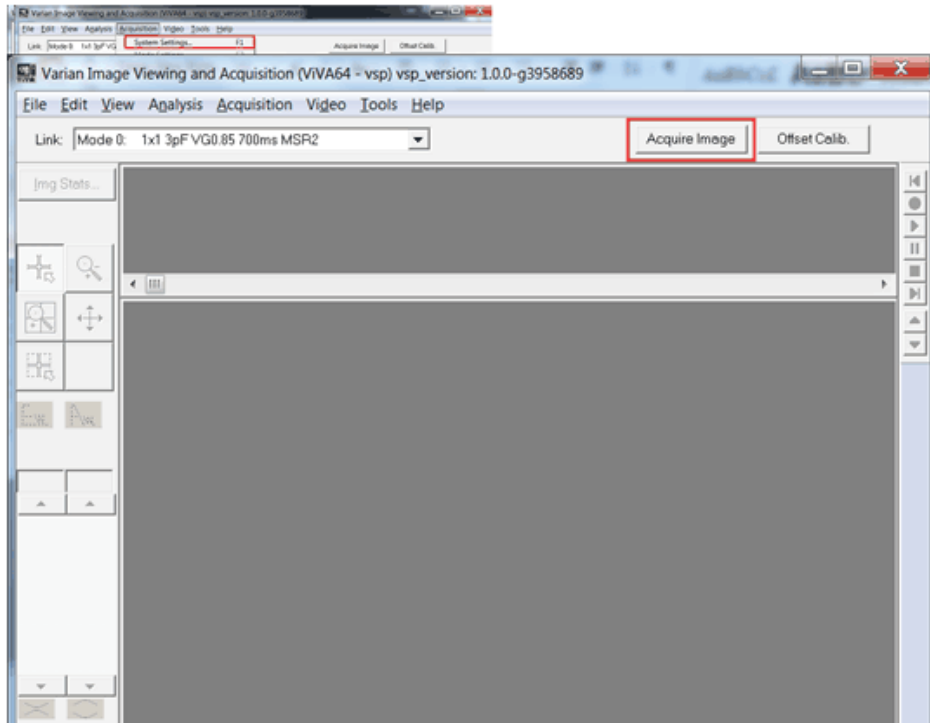
4. Press *Start Acquisition button*
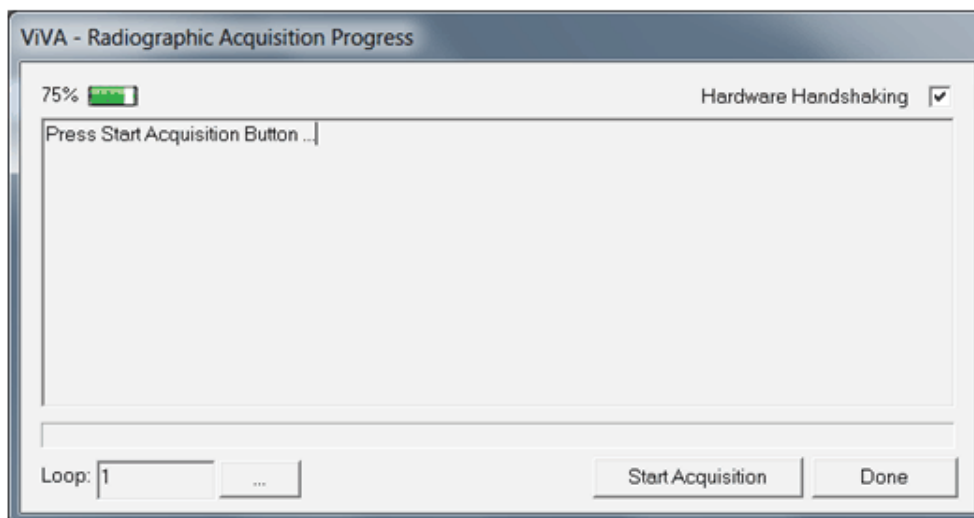
Step	Action / Results

5. Acquired image can be saved in the desired file format by selecting File / Save As.
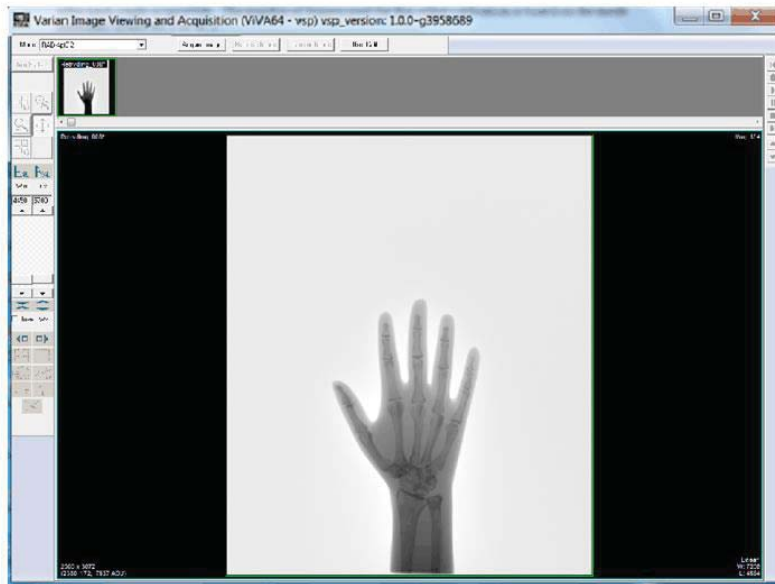
Safety

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 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.

This equipment uses wireless LAN (WLAN) radios for transferring images.   The WLAN power levels and antenna configurations have been tested and certified compliant through specific absorption rate (SAR) limit set by FCC/IC Canada (Less than 1.6W/kG) testing with separations as small as 0 cm between the panel antennas and human tissue. While compliant, it is still recommended to reduce exposure when possible by 1) positioning subject to be X-rayed away from the antennas (this also helps reduce image transfer time) and 2) removing the detector panel promptly when X-ray exposure is complete.   The I/O Box shall not be used at a distance of no less than 20cm to human tissue.

Table 3-0 Guidance and Mfgr Declaration - Electromagnetic Emissions

The PaxScan 4336Wv4 is intended for use in the electromagnetic environment specified below. The customer or the user of the PaxScan 4336W should assure that it is used in such an environment.		
Emissions test	*Compliance*	*Electromagnetic environment - guidance*
RF emissions CISPR 11	Group 1	The PaxScan 4336W v4 uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	The PaxScan 4336Wv4 is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/ Flicker emissions IEC 61000-3-3	Complies	

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Table 4-0 Guidance and Mfgr Declaration - Electromagnetic Immunity

The PaxScan 4336Wv4 is intended for use in the electromagnetic environment specified below. The customer or the user of the PaxScan 4336Wv4 should assure that it is used in such an environment.

Immunity test	*IEC 60601 test level*	*Compliance level*	*Electromagnetic environment - guidance*
Electrostatic discharge (ESD) IEC 61000-4-2	$\pm$ 6 kV contact $\pm$ 8 kV air	$\pm$ 6 kV contact $\pm$ 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.
Electrical fast transient/burst IEC 61000-4-4	$\pm$2 kV for power supply lines $\pm$1 kV for input/output lines	$\pm$2 kV for power supply lines NA – Only I/O is patient cable	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	$\pm$1 kV differential mode $\pm$2 kV common mode	$\pm$1 kV differential mode $\pm$2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines. IEC 61000-4-11	<5 % U_T (>95 % dip in U_T) for 0.5 cycle 40 % U_T (60 % dip in U_T) for 5 cycles 70 % U_T (30 % dip in U_T) for 25 cycles <5 % U_T (>95 % dip in U_T) for 5 sec	<5 % U_T (>95 % dip in U_T) for 0.5 cycle 40 % U_T (60 % dip in U_T) for 5 cycles 70 % U_T (30 % dip in U_T) for 25 cycles <5 % U_T (>95 % dip in U_T) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the PaxScan 4336Wv4 requires continued operation during power mains interruptions, it is recommended that the PaxScan 4336Wv4 be powered from an uninterruptible power supply or battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE U_T is the a.c. mains voltage prior to application of the test level.			

Table 4-0 continued			
Immunity test	*IEC 60601 test level*	*Complian ce level*	*Electromagnetic environment - guidance*
			Portable and mobile RF communications equipment should be used no closer to any part of the PaxScan 4336Wv4 , including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance**
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms	$d = 1.2\sqrt{P}$ $d = 1.2\sqrt{P}$ 80 MHz to 800 MHz
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	$d = 2.3\sqrt{P}$ 800 MHz to 2.5 GHz where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and *d* is the recommended separation distance in meters (m).[b] Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,[a] should be less than the compliance level in each frequency range.[b] Interference may occur in the vicinity of equipment marked with the following symbol:

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

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

[a]   Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast 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 PaxScan 4336Wv4 used exceeds the applicable RF compliance level above, the PaxScan 4336Wv4 should be observed to verify normal operation. If abnormal operation is observed, additional measures may be necessary, such as reorienting or relocating the PaxScan 4336Wv4

[b]   Over the frequency range 150 kHz to 80 MHz, field strengths should be less than [V_1] V/m.

**Table 5-0 Recommended Separation Distance Between
Portable and Mobile RF Communications and the PaxScan 4336Wv4**

The PaxScan 4336Wv4 is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the PaxScan 4336Wv4 can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the PaxScan 4336Wv4 as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter m		
	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	80 MHz to 800 MHz $d = 1.2\sqrt{P}$	800 MHz to 2.5 GHz $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

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 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 propogation is affected by absorption and reflection from structures, objects and people.

Electrical Protection

- The 4336Wv4 model is internally powered

Environment Limits

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

Temperature, Humidity & Atmospheric Pressure

Category	Limits
Storage & Transport (ambient)	Receptor: -20º C to +70º C Battery: -20º C to +60º C Battery Charger: -20º C to +60º
Storage Humidity Range (non-condensing)	Receptor: 10% to 90% Battery Charger:10% to 90% at 20º C
Normal Operation Temperature (measured at the center of the back cover)	Receptor: 10º C to 35º C
Operation Humidity (non-condensing)	10% to 90%
Atmospheric Pressure Range	700hPa to 1060hPa
Normal Operation Range (ambient) Note: that normal charging must be terminated if the battery cell temperature is above 45C or below -20C. Outside of the 0º C to 35C ambient temperature, the charger will remain active, but the charge current will be off or limited so that charge time will be extended.	Battery Charger: 0º C to 35C

Altitude Limits

The Paxscan Digital Imager Receptor is rated to operate at an altitude ≤ 3000m.
The Varian Battery Charger is rated to operate at an altitude -610m to 3050m (-2000 to 10,000 ft)

Varian Lithium-Ion Rechargeable Battery

Please only use the lithium-ion rechargeable battery listed below that is supplied with the receptor.

Battery type: Lithium-ion
Battery model: Varian – P/N 30773 (gray), 57834 (white), 81701 (black)
Rated voltage: 14.8V $---$ 2.1Ah, 31.1 Wh

Caution: Risk of fire, explosion or burns. Do not short circuit, crush, heat above 100℃, incinerate, or disassemble the battery. Charge only with the receptor or battery charger supplied. *Please follow local governing ordinances and recycling plans regarding proper disposal or recycling of the lithium-ion rechargeable battery*.

Note: Lithium-ion rechargeable battery is for use with the model PaxScan 4336Wv4.

Lithium-Ion Battery Handling, Storage, & Shipping

Handling

● Do not short circuit, crush, heat above 100℃, incinerate, or disassemble the battery.

● Do not dispose of battery in fire or water.

● Do not expose battery to temperatures above 60 °C (140 °F).

● Do not use a damage battery.

Storage

● Remove battery and store it separately from device.

● Charge or discharge the battery to approximately 50% of capacity before storage.

● Charge the battery to approximately 50% of capacity at least once every six month.

● Store the battery at temperatures between -20 °C and 60 °C (-4 °F and 140 °F).

Shipping

● Always check all applicable local, national, and international regulations before transporting a Lithium-Ion battery.

● It is customers responsibility to ship battery according to local and international shipping regulation for Lithium-Ion battery in effect at the time of shipment.

Regulatory

- The PaxScan® 4336Wv4 model family is a component sub-system with Type B per Standard for Medical Electrical Equipment.   The PaxScan® 4336Wv4 model family and the Varian Battery Charger are an associated equipment x-ray medical equipment with respect to electrical shock, fire and mechanical hazards only in accordance with:

  UL 60601-1 Medical Electrical Equipment, Part 1: General Requirements for Safety 1st ed.

  IEC 60601-1 Medical Electrical Equipment Part 1: General Requirements for Safety 2nd ed.

  IEC 60601-1 Medical Electrical Equipment Part 1: General Requirements for Basic Safety and Essential Performance 3rd ed.

  ANSI/AAMI ES60601-1 (2005) Medical Electrical Equipment – Part 1: General Requirements for Basic Safety and Essential Performance.

  CSA-C22.2 No 60601-1 (2008) Medical Electrical Equipment, Part 1 General Requirements for Basic Safety and Essential Performance.

  CAN/CSA-C22.2 No 601.1-M90, 2005 Medical Electrical Equipment, Part 1 General Requirements for Safety.

  EN/IEC 60601-1-2 Medical Electrical Equipment Part 1-2: General Requirements for Basic Safety and Essential Performance Collateral Standard: Electromagnetic Compatibility 3rd ed.

  RF compliant in accordance with FCC Part 15 Subpart C and Part 15 Subpart E.

- Type B Applied Part

- CE Mark - Varian Medical Systems' imaging products are designed and manufactured to meet the Low Voltage Directive 2006/95/EC, MDD 93/42/EEC, and R&TTE Directive 1999/5/EC

- MDD Class IIa

- A Declaration of Conformity has been filed for this product and available upon request by contacting Varian Medical Systems.

- The Varian Battery Charger is a Class 1, continuous operation device and meets the following:

  IEC 61000-4-2 Electro-Static Discharge

  IEC 61000-4-3 RF Electromagnetic Fields Immunity

  IEC 61000-4-4 EFT/Burst

  IEC 61000-4-5 Surge Immunity

  IEC 61000-4-6 Conducted RF Disturbances Immunity

  IEC 61000-4-8 Magnetic Field Immunity

  IEC 61000-4-11 Dips, Interruptions, and Variations

  IEC 61000-3-2 Harmonics Current Emission

  IEC 61000-3-3 Voltage Fluctuation and Flicker

Radio Frequency (RF) Compliance Information

FCC/IC Compliance

This device complies with Part 15 of the FCC Rules and RSS-Gen (RSS-210, etc.) of IC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.

2. This device must accept any interference received, including interference that may cause undesired operation.

   Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules and Canadian ICES-003. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

If this equipment does cause harmful interference to radio or television reception, 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 following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from the one the receiver is connected to.
- Consult the dealer or an experienced radio/TV technician for help.

The user may find the following booklet prepared by the Federal Communications Commission helpful:

> The Interference Handbook
> This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402. Stock No. 004-000-00345-4.

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment under FCC rules.

In the 5150 to 5250 MHz frequency range this transmitter is restricted to indoor use only.

Industry Canada Notice

To prevent radio interference to the licensed service, this device is intended to be operated indoors and away from windows to provide maximum shielding. Equipment (or its transmitting antenna) that is installed outdoors is subject to licensing. The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's web site www.hc-sc.gc.ca/rpb.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada

Avis de Conformité à la Réglementation d'Industrie Canada:

Pour empêcher toute interférence aux services faisant l'objet d'une licence, cet appareil doit être utilisé à l'intérieur seulement et devrait être placé loin des fenêtres afin de fournir un écran de blindage maximal. L'installateur du présent matériel radio doit s'assurer que l'antenne est située ou pointée de manière à ce que cette dernière n'émette pas de champs radioélectriques supérieurs aux limites specifées par Santé Canada pour le grand public; consulter le Code de sécurité 6, disponible sur le site Web de Santé Canada, à l'adresse suivante: www.hc-sc.gc.ca/rpb.

This equipment complies with FCC RF radiation and RSS 102 exposure limits set forth for an uncontrolled environment.   Body-worn operation and use near the head this device has been tested and meets both FCC/ IC RF exposure guidelines when used within this product guideline. The maximum SAR Value (Head) is 1.34W/kg. The maximum SAR Value (Body) is 1.37W/kg."

Cet équipement est conforme aux rayonnements RF de la FCC et RSS 102 limites d'exposition définies pour un environnement non contrôlé. Opération Porté au corps et utiliser près de la tête de ce dispositif a été testé et répond aux consignes d'exposition à la fois FCC / IC RF lorsqu'il est utilisé dans ce produit directive. La valeur maximale SAR (Head) est 1.34W / kg. Le maximum Valeur SAR (Body) est 1.37W/kg."

European Community – CE Notice   C€ ⊕

The CE! mark indicates compliance with the essential requirements of Directive 1999/5/EC. Such marking is indicative that this equipment meets or exceeds the following technical standards:

- EN 300 328
- EN 301 893
- EN 301 489-17
- EN 60950

Marking by the symbol: **!** indicates that usage restrictions apply in countries listed on this product's packaging.

Europe - Declaration of Conformity in Languages of the European Community.

cs Česky [Czech]	*Varian Medical Systems, Inc.* tímto prohlašuje, že tento Radiolan je ve shodě se základními požadavky a dalšími příslušnými ustanoveními směrnice 1999/5/ES.
da Dansk [Danish]	Undertegnede *Varian Medical Systems, Inc.* erklærer herved, at følgende udstyr Radiolan overholder de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF.
de Deutsch [German]	Hiermit erklärt *Varian Medical Systems, Inc.*, dass sich das Gerät Radiolan in Übereinstimmung mit den grundlegenden Anforderungen und den übrigen einschlägigen Bestimmungen der Richtlinie 1999/5/EG befindet.
et Eesti [Estonian]	Käesolevaga kinnitab *Varian Medical Systems, Inc.* seadme Radiolan vastavust direktiivi 1999/5/EÜ põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.
en English	Hereby, *Varian Medical Systems, Inc.*, declares that this Radiolan is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.
es Español [Spanish]	Por medio de la presente *Varian Medical Systems, Inc.* declara que el Radiolan cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE.
el Ελληνική [Greek]	ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ *Varian Medical Systems, Inc.* ΔΗΛΩΝΕΙ ΟΤΙ Radiolan ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1999/5/ΕΚ.
fr Français [French]	Par la présente *Varian Medical Systems, Inc.* déclare que l'appareil Radiolan est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE.
it Italiano [Italian]	Con la presente *Varian Medical Systems, Inc.* dichiara che questo Radiolan è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 1999/5/CE.
Latviski [Latvian]	Ar šo *Varian Medical Systems, Inc.* deklarē, ka Radiolan atbilst Direktīvas 1999/5/EK būtiskajām prasībām un citiem ar to saistītajiem noteikumiem.
Lietuvių [Lithuanian]	Šiuo *Varian Medical Systems, Inc.* deklaruoja, kad šis Radiolan atitinka esminius reikalavimus ir kitas 1999/5/EB Direktyvos nuostatas.

nl Nederlands [Dutch]	Hierbij verklaart *Varian Medical Systems, Inc.* dat het toestel Radiolan in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/EG.
mt Malti [Maltese]	Hawnhekk, *Varian Medical Systems, Inc.*, jiddikjara li dan Radiolan jikkonforma mal-ħtiġijiet essenzjali u ma provvedimenti oħrajn relevanti li hemm fid-Dirrettiva 1999/5/EC.
hu Magyar [Hungarian]	Alulírott, *Varian Medical Systems, Inc.* nyilatkozom, hogy a Radiolan megfelel a vonatkozó alapvetõ követelményeknek és az 1999/5/EC irányelv egyéb elõírásainak.
pl Polski [Polish]	Niniejszym *Varian Medical Systems, Inc.* oświadcza, że Radiolan jest zgodny z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 1999/5/EC.
pt Português [Portuguese]	*Varian Medical Systems, Inc.* declara que este Radiolan está conforme com os requisitos essenciais e outras disposições da Directiva 1999/5/CE.
sl Slovensko [Slovenian]	*Varian Medical Systems, Inc.* izjavlja, da je ta Radiolan v skladu z bistvenimi zahtevami in ostalimi relevantnimi določili direktive 1999/5/ES.
Slovensky [Slovak]	*Varian Medical Systems, Inc.* týmto vyhlasuje, že Radiolan spĺňa základné požiadavky a všetky príslušné ustanovenia Smernice 1999/5/ES.
fi Suomi [Finnish]	*Varian Medical Systems, Inc.* vakuuttaa täten että Radiolan tyyppinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.
sv Svenska [Swedish]	Härmed intygar *Varian Medical Systems, Inc.* att denna Radiolan står I överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/5/EG.

Europe - Restrictions for Use of 2.4GHZ Frequencies in European Community.

België/ Belgique:	For private usage outside buildings across public grounds over less than 300m no special registration with IBPT/BIPT is required. Registration to IBPT/BIPT is required for private usage outside buildings across public grounds over more than 300m. For registration and license please contact IBPT/BIPT.
	Voor privé-gebruik buiten gebouw over publieke groud over afstand kleiner dan 300m geen registratie bij BIPT/IBPT nodig; voor gebruik over afstand groter dan 300m is wel registratie bij BIPT/IBPT nodig. Voor registratie of licentie kunt u contact opnemen met BIPT.
	Dans le cas d'une utilisation privée, à l'extérieur d'un bâtiment, au-dessus d'un espace public, aucun enregistrement n'est nécessaire pour une distance de moins de 300m. Pour une distance supérieure à 300m un enregistrement auprès de l'IBPT est requise. Pour les enregistrements et licences, veuillez contacter l'IBPT.
Deutschland:	License required for outdoor installations. Check with reseller for procedure to follow
	Anmeldung im Outdoor-Bereich notwendig, aber nicht genehmigungspflichtig.Bitte mit Händler die Vorgehensweise abstimmen.
France:	Restricted frequency band: only channels 1 to 7 (2400 MHz and 2454 MHz respectively) may be used outdoors in France.
	Bande de fréquence restreinte : seuls les canaux 1- 7 (2400 et 2454 MHz respectivement) doivent être utilisés endroits extérieur en France. Vous pouvez contacter l'Autorité de Régulation des Télécommuniations (http://www.art-telecom.fr) pour la procédure à suivre.
Italia:	License required for indoor use. Use with outdoor installations not allowed.
	E'necessaria la concessione ministeriale anche per l'uso interno. Verificare con i rivenditori la procedura da seguire.
Nederland	License required for outdoor installations. Check with reseller for procedure to follow.
	Licentie verplicht voor gebruik met buitenantennes. Neem contact op met verkoper voor juiste procedure.
All EU member states and EFTA countries	This device may only be used indoors in the frequency bands 5150 – 5250 MHz and 5250 – 5350 MHz.

To remain in conformance with European spectrum usage laws for Wireless LAN operation, the above 2.4GHz channel limitations apply for outdoor usage. The user should use the wireless LAN utility to check the current channel of operation. If operation is occurring outside of the allowable frequencies for outdoor use, as listed above, the user must contact the applicable national spectrum regulator to request a license for outdoor operation.

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/magnesium 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 Sani-Cloth® Plus, 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 instructions.   Alternatively, the below chemical cleaning solutions may also be used.

Cleaning and disinfecting of the battery and battery compartment should also be performed as needed using the same practices described above. Care should be taken when cleaning the battery contacts, use a non-abrasive cleaner that will not damage the copper contact material.

The battery charger can be cleaned with a wet cloth using one of the chemicals below. The battery charger cannot be submerged any time during cleaning.

Chemical Cleaning Solutions Recommended:

- Isopropyl alcohol, 70% aqueous solution.

- Mild soap and water.

- Chlorine bleach, 3% aqueous solution.   *Do not clean electrical contacts or connector with bleach*.

- Quaternary ammonium compounds, such as Steris "Coverage Plus NPD" (one part Coverage Plus NPD to 255 parts water).

- CAVI-Wipes. *Use in accordance with the manufacturer's instructions*.

⚠ **Caution:** Do not use flowing liquid or immersion on the receptor, battery, battery compartment, or battery charger.

Do not sterilize

Repairs

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

The least replaceable units (LRU) are:

- Receptor Assembly
- Back-up Cable
- Varian Battery
- Varian Battery Charger

Proper Disposal

The 4336Wv4 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

Do not dispose of the lithium-ion rechargeable battery in the garbage.   Please consult local governing ordinances and recycling plans regarding proper disposal.

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 wireless connection or cable connections.
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 4336Wv4 Problem Report. 2. Email the error log file generated to: paxscan.rma@varian.com. This log file is normally found at C:\users\{username}\AppData\Local\crashdumps\viva.log
Drop Receptor.	1. Remove battery from receptor and inspect for damage. 2 If the battery does not appear damage place into battery charger to see if battery charger reports an error. 3 Inspect the receptor for any physical damage. 4. Insert a charged battery into the detector and see if it powers on. Note: It is best to use a different battery than the one that was in the receptor when it was dropped. 5. Generate a link to the workstation. 6. Acquire an image from the receptor and inspect for regions of missing data. 1. For additional information on how to handle dropped receptor refer to OEM System Service Manual

PaxScan 4336Wv4 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):

E-mail: PAXSCAN.RMA@varian.com

Appendix A

Battery Installation/Removal for 4336Wv4

Battery installation

Step	Action / Results
1.	Insert battery at a slight angle so that the side with contacts sits over the adjoining contacts in the battery compartment.
2.	Press down on the lifted side of battery snapping it into place in the battery compartment. Receptor is now ready for user.
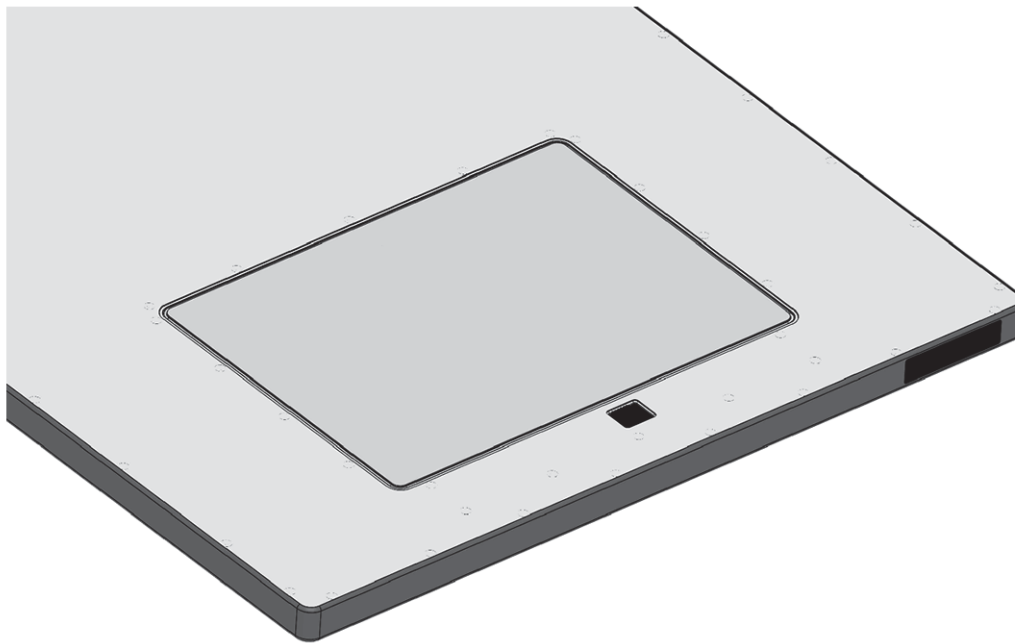
Battery removal

Step	Action / Results

1. First ensure that the receptor is powered off. Then slide the battery latch release to the side, which will cause one side of the battery to life out of the battery compartment.

2. Grab the lifted side of the battery and finish removing.
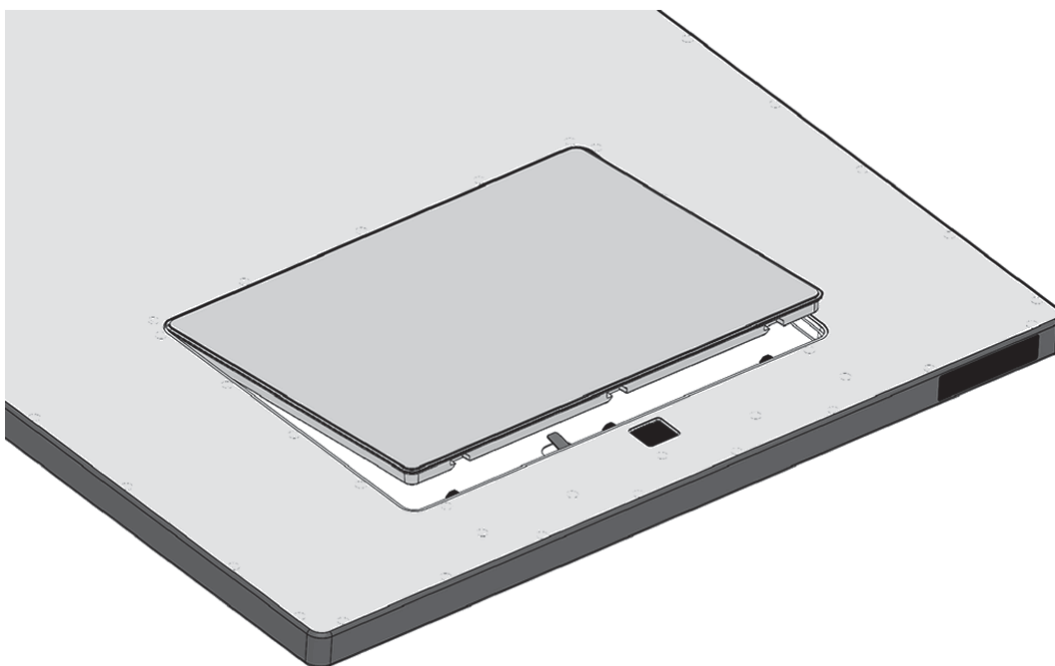
Battery Charger

The Varian 1 bay and 3-bay charger is intended for use with the Varian Lithium-ion Battery. The Varian charger will fully charge a Varian battery in maximum 3 1/2 hours when operating at room temperature (20º C Ambient) for the 2020mAh battery to 97% of available capacity in the battery. The charge time may change depending on the battery cell temperature. The charger is used with the PaxScan wireless radiographic digital image receptors.

Over-Discharged Battery Wake-up

The charger will wake up a battery that is in over-discharge protection mode.

Over-Charge Battery Protection

Over-charge due to excessive or uncontrolled current is prevented by redundant software functions monitoring a minimum of two independent sources combined with an software independent method.

Over charge due to excessive or uncontrolled voltage is prevented through continual monitoring of two independent measurement sources. The charger has charge timeout functionality.

Setting Up the Varian Charger

Step	Action / Results
1.	The Varian Charger must be installed near the outlet to which it will be connected.
2.	Do not block the charger's ventilation slots underneath the charger.
3.	Use the charger only with Varian batteries and the provided external power supply
4.	To connect the charger to power:

- Plug the DC cable from the power supply into the charger
- Plug the AC cable into the power supply
- Plug the AC cable into the appropriate power outlet

The charger is now ready for use.

## Battery charging using the stand alone 3-Bay Battery Charger

The Varian 3-bay charger requires

1. 24V DC, 3.3A max input.
2. The output of the charger is 16.8V DC, 1.5A max (+/1 1% and 10 Hz).

Step	Action / Results
1.	Hold battery on end opposite of the contacts with the contacts facing toward the charger.
2.	Gently slide battery into battery compartment on the charger. When properly inserted, a light next to the battery slot will turn on showing the charge status of the battery. When the battery is charging the light will be orange, when charging is complete the light will turn green and when there is a fault the light will be red.

Charging a fully discharged battery will take 3.5 hours maximum and 2.5 hours typical when operating at room temperature.   Up to three batteries can be charged at a time. Refer to below Figure B-1 for explanation of LED status indicators.
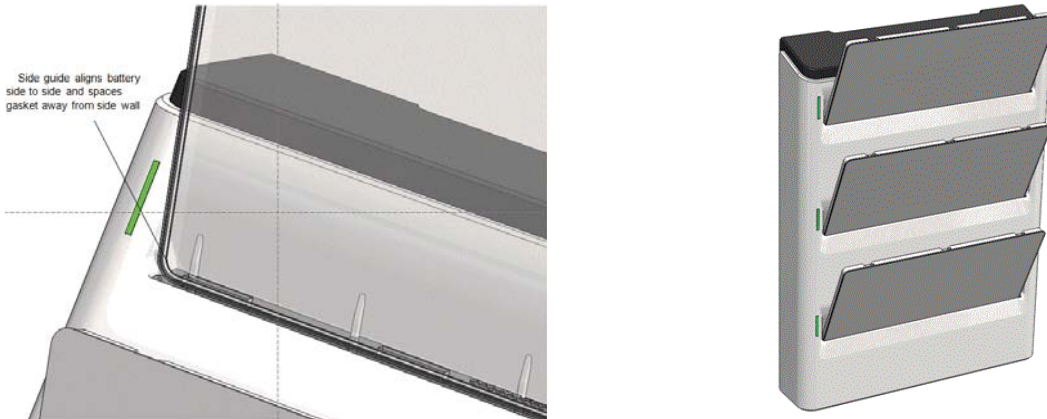
Battery Charger LED's

LED	LED State	Description
Green	Solid	Battery Full
Orange	Solid	Battery is charged
Red	Solid	Charger timeout, or bad battery ID
	2 Blinks	Bad Smbus
	3 Blinks	Voltage Fault
	4 Blinks	Temperature Fault

Figure A-1   3-Bay Battery Charger Status Indicators

Battery charging using the stand alone 1-Bay Battery Charger

The Varian 1-bay charger requires:

1. 19V DC, 2.1A max input.
2. The output of the charger is 16.8V DC, 1.4A max (+/-1% and 10 Hz).

Step	Action / Results

1. The Varian battery communicates with the Varian 1-bay charger when it is plugged into the charger. The battery monitors its readiness state and is mechanically keyed to charger for easy installation.

2. The charger provides the following LED indicators to identify charge process and charge faults (see below Figure B-2).

- When all four (4) green LEDs are continuously illuminated (with the red LED off), the battery has reached maximum charge. It can either be removed or left in the charger to maintain full charge. Charging time typically is 2.5 hours, maximum 3.5 hours.

Description	Green LEDs	Red LED	Example
Battery Charging Normally – up to 25%	1 – On – Blinking 2 – Off 3 – Off 4 – Off	Off	
Battery Charging Normally – 26% to 50%	1 – On – Continuously 2 – On – Blinking 3 – Off 4 – Off	Off	
Battery Charging Normally – 51% to 75%	1 – On – Continuously 2 – On – Continuously 3 – On – Blinking 4 – Off	Off	
Battery Charging Normally – 76% to 99%	1 – On – Continuously 2 – On – Continuously 3 – On – Continuously 4 – On – Blinking	Off	
Battery Charging Normally – Fully Charged	1 – On – Continuously 2 – On – Continuously 3 – On – Continuously 4 – On – Continuously	Off	
Fault – No Charge Current accepted or Battery Voltage too high	1 – On – Blinking 2 – Off 3 – Off 4 – Off	On	
Fault – Battery Over-discharged cannot wakeup in less than 210 seconds	1 – On – Blinking 2 – On – Blinking 3 – Off 4 – Off	On	
Fault – Battery exceeds allowable charge time	1 – On – Blinking 2 – On – Blinking 3 – On – Blinking 4 – Off	On	
Fault – Battery ID does not match V4336W or non-recoverable over-discharged battery	1 – On – Blinking 2 – On – Blinking 3 – On – Blinking 4 – On – Blinking	On	
Fault – Battery Temperature either too high or too low	1 – Off 2 – Off 3 – Off 4 – Off	On	
Fault – SMBus between the charger and battery is not operating properly	1 – On – Blinking 2 – Off 3 – On – Blinking 4 – Off	On	
Fault – Battery Permanent Fault	1 – Off 2 – On – Blinking 3 – Off 4 – On – Blinking	On	

Figure A-2   1-Bay Battery Charger Status Indicators

⚠	**Warning:**	Do not remove the charger cover. The Charger has no internal user serviceable parts.

⚠	**Warning:**	Do not use in operating room or other oxygen rich environment. Do not use in conjunction with flammable agents. Do not use in an environment with condensing moisture.

⚠	**Caution:**	Do not use flowing liquid or immersion on the receptor, battery, battery compartment, or battery charger. Do not sterilize.

⚠	**Caution:**	Do not attempt to insert objects other than the Varian battery into the charger bay.

✍	**Important:**	Use the Varian Battery Charger only with the Varian supplied power supply and power cord.

✍	**Important:**	Use only the Varian supplied batteries in the battery charger and receptor. The systems are not designed to work in conjunction with any other battery type or design.