VIDAR TWAIN
User's Guide

Version 5.2

VIDAR
systems corporation
The Image of Reliability

Note: Your system configuration may not be covered by this
document. Although the TWAIN 5.2 module operates with a
range of configurations, VIDAR does not support systems with
specifications outside those listed in this manual.

VIDAR systems corporation
The Image of Reliability

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Contents

Introduction

About this manual

This manual is for users who plan to capture x-ray images from film in digital form using a VIDAR film digitizer and the VIDAR TWAIN software interface.

The manual explains how to use VIDAR film digitizers with commercially available TWAIN-compliant applications for Windows 2000 or Windows XP.

The VIDAR TWAIN software interface is compatible with these VIDAR film digitizers:

- DiagnosticPRO Advantage, DosimetryPRO Advantage and CadPRO Advantage

- DiagnosticPRO™ and DiagnosticPRO *plus*™.

- SIERRA™ and SIERRA *plus*™.

- VXR-16™ and VXR-16 DosimetryPRO™.

- MammographyPRO™.

- VXR-12 *plus*™.

- VXR-8 *plus*™.

- TeleRadPRO™.

Conventions used in this manual

- Special keys you press on the keyboard appear in small capitals. For example, ENTER and TAB.

- File and directory names appear in *italic*. For example, *\My Documents\Notes.txt*.

- Menu names and menu commands appear in **Block Letters**. For example, **File > Open...** .

- Windows, buttons, dialog boxes and other on-screen features are named in **Bold** type. For example, the **Save** button.

- Hyperlinks are <u>underlined</u>. If you are viewing this document electronically, click a hyperlink to view related material.

Skills required

You should have experience using computer applications running under Windows 2000 or Windows XP. Experience with film digitizers and imaging software is also helpful.

Customer support

Note: For customer support questions, VIDAR recommends that you first contact the system integrator that supplied your system, since the integrator is more familiar with the specific system setup than VIDAR personnel.

Before calling or e-mailing VIDAR, be sure you have the following information:

- Customer name and contact information, including telephone number and e-mail address
- Software name and version
- Scanner serial number

Contacting VIDAR

Technical support for film digitizers is available from VIDAR Monday through Friday from 8:00 am to 12:00 pm, and 1:00 pm to 5:00 pm Eastern Time.

- By e-mail: medtech@vidar.com.

- By telephone: call 800-471-7226 (in the U.S. only) or 703-471-7070 and ask for Medtech.

Technical and sales information is also available on the web at www.filmdigitizer.com.

More information about digitizers

For more information about VIDAR film digitizers, refer to your film digitizer's installation guide, or visit www.filmdigitizer.com.

Getting started

For instructions on setting up and using your VIDAR film digitizer, please refer to the film digitizer installation guide.

System requirements

You must supply a computer system that meets or exceeds the following requirements:
- 600 MHz
- 512 megabytes (MB) of random access memory (RAM)

> **Note:** Scanning 14" x 17" (or larger) films at high re olution and bit depth produces very large files, which must fit int system memory. If installed memory is not sufficient, softwa e and/or system crashes may occur.

- Windows 2000 (Service Pack 4 or higher) or Windows XP Professional Edition (Service Pack 1 or higher).
- SVGA monitor
- Display card with 8 MB of video RAM
- CD-ROM drive
- VIDAR-supported Adaptec® 2930 Ultra PCI SCSI adapter
- TWAIN-compliant host application. VIDAR TWAIN has been tested with Jasc PaintShop Pro and Adobe Photoshop imaging applications.

Important Information

VIDAR's TWAIN is not fully compliant to the TWAIN standard, and is therefore supported only as a baselining test tool for use with the aforementioned applications. VIDAR does not provide support for new third party software integrations using the TWAIN. VIDAR has an Active X Toolkit available for developers who wish to integrate software for use with its film digitizers.

Due to the lack of display look-up tables (LUTs) in graphical imaging applications, acquired images may appear too light, and may require minor gamma corrections to make them look like the film. For further instructions, see "Appendix: Improving image quality."

Turning on the VIDAR film digitizer

Always turn on the VIDAR film digitizer **before** turning on the computer (this allows the computer to recognize the film digitizer). Refer to the hardware manual for the location of the film digitizer's power switch.

Installing the VIDAR TWAIN software

> **Note:** This version of TWAIN will not work with Windows 2000 or Windows XP systems with ASPI drivers installed. If you are using either of those operating systems, you must install VIDAR's STI drivers before using TWAIN. See Appendix: VIDAR device drivers.

You may obtain the TWAIN 5.2 from Vidar's technical support (medtech@vidar.com) or via Vidar's web page, www.filmdigitizer.com/. Please note that the TWAIN-compliant host application m ust be intalled **before** installing the TWAIN.

■ *To install the TWAIN:*

1. Double-click on **twain5-2.exe**.

2. The InstallShield Wizard will launch.

3. Click **Next** in the Welcome window.

4. Click **Yes** to accept the License Agreement.

5. Click **Next** in the Driver Information window after confirming that the system is using the correct driver setup.

6. Wait a few seconds while files are installed.

7. Click **Finish** when you see the *InstallShield Wizard Complete* message.

Accessing the VIDAR TWAIN interface

Applications such as PaintShop Pro and Photoshop use the TWAIN software to enable communications between the application and the film digitizer.

■ *To access the TWAIN interface:*

1. Launch the host application.

2. In the host application, select the VIDAR TWAIN interface.

3. Use the host application's import or acquire function to access the TWAIN scanning interface. The method for doing this depends on the host application (refer to the host application software manual for instructions on selecting and opening TWAIN scanning interfaces). In Photoshop, for example, use the **File > Import > TWAIN_32** command to open the **Select Source** window:
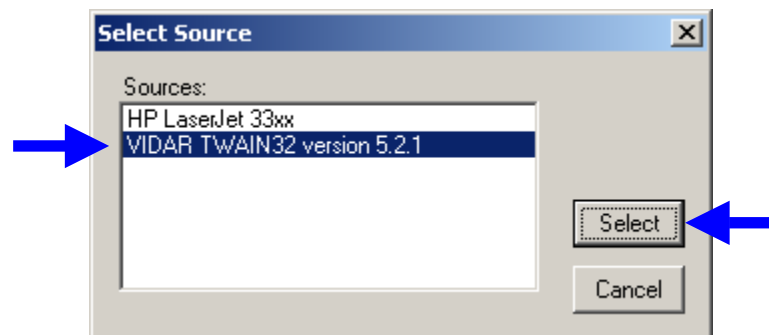
Note: In most TWAIN-compliant host applications, you must select the appropriate TWAIN interface before you can import from a peripheral device. If you have just one TWAIN interface installed, you only need to select it once—before its first use. If you have multiple TWAIN interfaces, you must select the desired TWAIN).

If the digitizer is performing it's warming up sequence when you launch the TWAIN, you will see the following message:
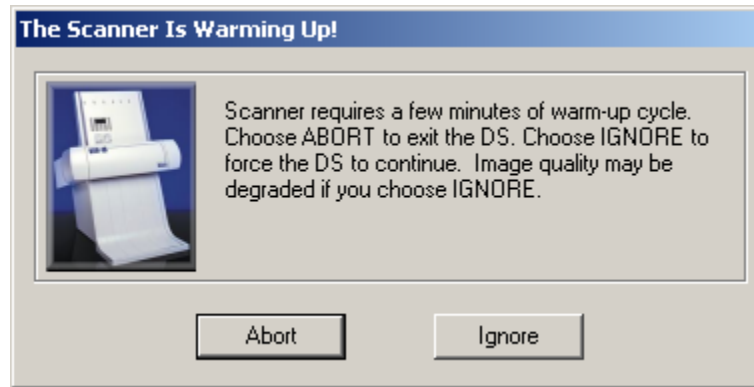
It is strongly recommended that you allow the digitizer to completely warm up, otherwise image quality will be compromised. If the **Scanner Is Warming Up!** window appears:

- *If you don't click either button:* The TWAIN interface will appear when the digitizer completes its warm-up cycle. This is the preferred technique.

- *To abort the TWAIN software and return to the host application:* Click **Abort**.

- *To proceed before the digitizer is warmed up (this may degrade image quality):* Click **Ignore**.

The first time you launch the TWAIN software, a message about film orientation will appear (see below). Read the message, then click **OK**.

When using the TWAIN software:

■ When scanning to disk, use lightbox loading, as specified in the message above.

■ When **Multi-Film Mode** or **Save To Disk** are deactivated, you will be required to load films differently to produce an image in the proper orientation:
1. Hold the film in front of you, as you would view it on a lightbox.
2. Turn the film end over end, then place it in the scanner.

> **Note:** Additional details about film loading are in the "Scanning films" chapter.

Main window

After setting up the VIDAR film digitizer, connecting it to your computer, and installing the TWAIN software, you may begin digitizing films. This chapter explains each of the controls in the **Main** window.

Options in the **Main** window (shown below) of the VIDAR TWAIN software control the film digitizer's basic scan parameters.

VIDAR TWAIN version 5.2   - Multi Film Support

Image Properties
- Resolution: 75
- Depth: 12
- Num. Films: 1

Scan Size
- Width: 14.0
- Length: 17.0
- Units: Inches
- Image Size: 2677K
- Auto Size ☐   Scan Size

Multi-Film Mode ☑
Save To Disk ☑
File Format

Advanced...   Pre Scan
VIDAR systems corporation   Scan   Eject

This space is the Preview area, where images will appear when a **PreScan** is performed.

When the **Scan** command is used, images will appear in the host application.

About
Digitizer Info.
Exit
Cancel

OK
Ready

When the TWAIN software is installed, **Multi-Film Mode** and **Save To Disk** will be activated by default if the film digitizer is a multi-film model. To change the **Save To Disk** option, first deactivate **Multi-Film Mode**.

Note: TWAIN 5.2 supports single film scans to memory, but multi-film or batch scans can only be saved to disk. This means the images will not appear in the host application—they will be saved to the chosen location on the hard disk. Third party medical imaging application vendors cannot support scanning multiple films to the screen (memory) with the VIDAR TWAIN interface. For images to appear in the host application, the TWAIN interface must be in **Single Film Mode** (i.e., **Multi-Film Mode** deactivated) and **Save To Disk** must be deactivated.

Image Properties
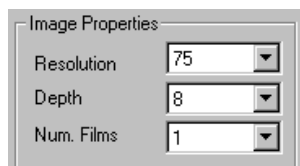
The **Image Properties** section in the **Main** window contains options for the resolution, depth and number of films for scanning.

Resolution

Resolution determines the amount of detail captured in the film. Scanning at a higher resolution captures finer detail than scanning at a lower resolution. However, a lower resolution image has a smaller file size and requires less memory. Select a resolution value based on the display capabilities of your computer monitor, the amount of available disk storage space, the transmission time requirements, and the need for fine detail.

The **Resolution** list allows you to select one of the resolutions supported by the film digitizer. The list shows resolutions in dots per inch (dpi). The resolutions available depend on the digitizer model you are using.

- *To set resolution:* Open the **Resolution** list and click the desired resolution.

Depth

Depth refers to the number of data bits the film digitizer captures per pixel. It determines the maximum number of grayscale levels the film digitizer can distinguish in an image. Use the **Depth** list to select the number of data bits saved for each pixel in a scan. The depths available depend on the digitizer model you are using.

■ *To set depth:* Open the **Depth** list and click the desired depth.

Number of films

The **Num. Films** list allows you to select the number of films you want to scan when in multi-film mode. Note that this option is grayed out if:
■ You are using a TeleRad PRO™, VXR-12 *plus*™, VXR-8™, SIERRA™ or SIERRA *plus*™ with single-sheet feeder; or,
■ You have not activated **Multi-Film Mode** in the **Main** window.

■ *To set the number of films:* Open the **Num. Films** list by clicking on the down arrow and click the desired number.

Scan Size
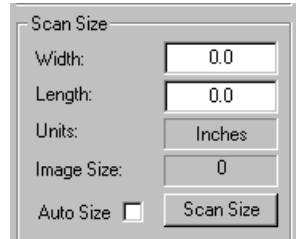
The **Scan Size** section of the **Main** window allows you to define the length and width of the film to be scanned.

- *To set film length and width:*

    Enter values in the **Width** and **Length** boxes.
        or
    Click **Scan Size** to select from a list of standard film sizes (see next page).

The **Units** menu (in the **Advanced Options** window) determines the unit of measure (inches, centimeters or pixels) for the **Width** and **Length** boxes.

Scan Size

If you are digitizing a standard film size, you may select the size from a list of standard film sizes available in the **Scan Size** window. **Auto Size** must be deactivated for the **Scan Size** button to be available.

■ *To select a standard film size:*

1. Click the **Scan Size** button in the **Main** window. This opens the **Scan Size** window:
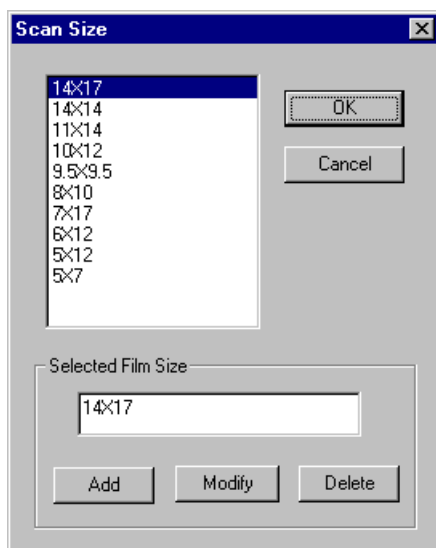
2. Click the appropriate film size in the list.

3. Click **OK**. The **Scan Size** window closes, and the selected size appears in the **Width** and **Length** boxes.

■ *To add a custom scan size to the list:* Enter the new size in the **Selected Film Size** box, then click **Add**.

■ *To modify an existing size in the list:* Click the desired size, edit the values in the **Selected Film Size** box, then click **Modify**.

■ *To remove a size from the list:* Click the size, then click **Delete.**

If you change the **Units** value in the **Advanced Options** window, the dimensions in the **Scan Size** window change accordingly.

> **Note:** The TeleRad PRO™, VXR-8™ and VXR-12 *Plus*™ film digitizers have moveable film guides that detect film widths. For an accurate scan width on these models, you must move the film guides so they are close to, but not touching, the sides of the film.

Auto Size

The Auto Size option is particularly helpful for scanning films of different sizes. It enables the film digitizer to automatically detect the size of each piece of film. If **Auto Size** is activated, the **Width** and **Length** boxes are grayed-out.

■ *To have the film digitizer automatically determine film size:* Activate **Auto Size**.

> **Note: Auto Size** is automatically activated when you click the **Pre Scan** button.

Multi-Film Mode

You must activate **Multi-Film Mode** to scan films in batches. **Save To Disk** is automatically activated when **Multi-Film Mode** is activated.
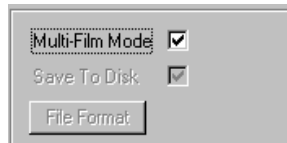
- ◼ *To scan films in batches:* Activate **Multi-Film Mode**.

> **Note:** TWAIN 5.2 supports multi-film scans to disk only. This means the images will not appear in the host application—they will be saved to the chosen location on the hard disk. Third party medical imaging application vendors cannot support scanning multiple films to the screen (memory) with the VIDAR TWAIN interface. For images to appear in the host application, the TWAIN interface must be in **Single Film Mode** (i.e., **Multi-Film Mode** deactivated) and **Save To Disk** must be deactivated.

Save To Disk

Activate **Save To Disk** to scan images and save them to a BMP (bitmap) or TIFF (tagged image file format) file in one operation. The **Save To Disk** function adds a header to each file so an application knows how to open the file. This can be useful if your imaging application does not support scanning to screen in a specific bit depth. If you are scanning to screen and the software cannot process the image data you may get a) an error message, b) a black image or c) a poor quality image (image looks like television static).

The VIDAR TWAIN interface supports scanning of 8-, 12- and 16-bit images to TIFF files. Bit depth options depend on the digitizer being used. Support for BMP files is 8-bit only. If the **Bitmap** format is selected, the software will prompt you to select an appropriate file format for 12- or 16-bit scans.

> **Note:** The **File Format** button may be grayed-out, but you will be prompted to select the file format in the **File Naming** window each time a batch scan is initiated.

> **Note: Save To Disk** is activated and grayed-out when **Multi-Film Mode** is activated.

■ *To save images directly to disk:* Activate **Save To Disk**.

File Format

■ *To select a file format before scanning:*

1. Click **File Format** in the **Main** window. This opens the **File Naming** window:
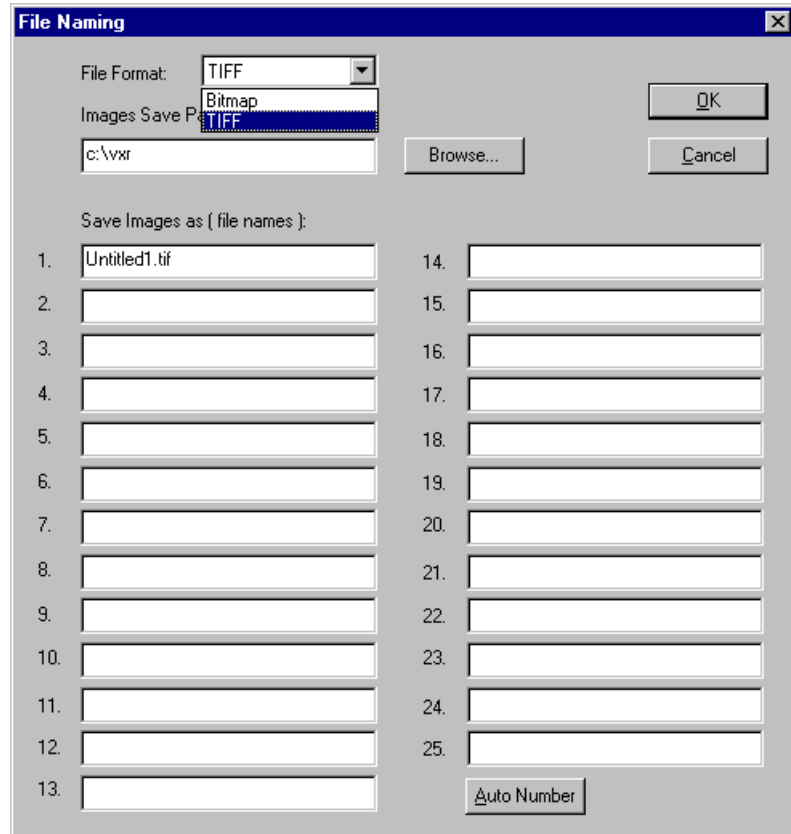
2. Open the **File Format** list and select a format. Options are **Bitmap** (*.bmp*) and **Tagged Image File Format** (TIFF, *.tif*).

> **Note:** This window will also appear after you click the **Scan** button if **Scan To Disk** is activated. At that time, enter the image file path and file name(s). Path and file format defaults to the last path and format used. Image file names default to Untitled1, Untilted2, etc.

3. Click **OK** to return to the **Main** window.

You can only save an image directly to a file during scanning if the **Save To Disk** option is activated in the **Main** window. When **Save To Disk** is activated, the **File Naming** window appears when you click **Scan** in the **Main** window. Select the format, enter the file name, then click **OK**.

> **Note:** The **Bitmap** file format does not support 12-bit or 16-bit grayscale images. If the **Bitmap** format is selected, the software will prompt you to select an appropriate file format for 12- or 16-bit scans.

Advanced Options

Advanced options control **Main** window setup and include film digitizer controls that are not in the **Main** window. The "Advanced Options window" chapter, next in this manual, provides details.

■ *To access the Advanced Options window:* In the **Main** window, click the **Advanced** button.

About

The **About** window displays version and copyright information about the TWAIN software you are running. It also displays information about hard drive space and available memory on the host computer.

■ *To view the VIDAR TWAIN version:* In the **Main** window, click the **About** button.
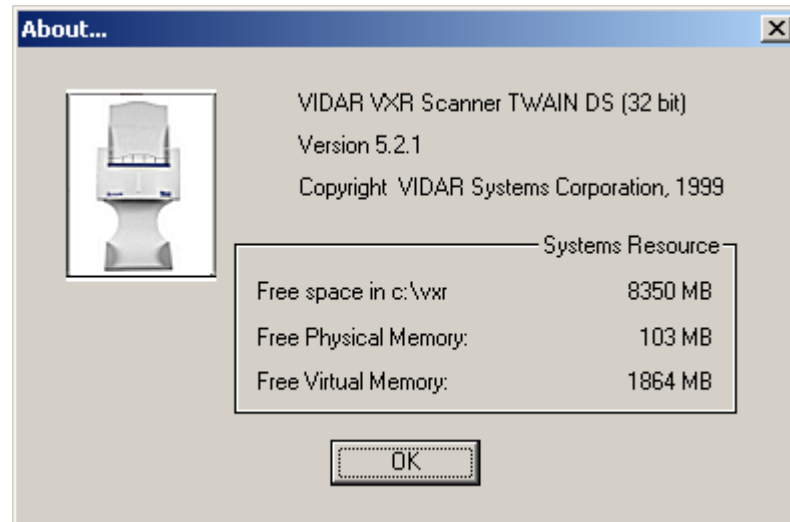
Digitizer Information

The **Digitizer Info** button provides access to information about the digitizer. Before calling for technical support, note this information and the film digitizer's serial number. This information helps the technical support representative address your questions.

■ *To view digitizer information:* In the **Main** window, click **Digitizer Info**.
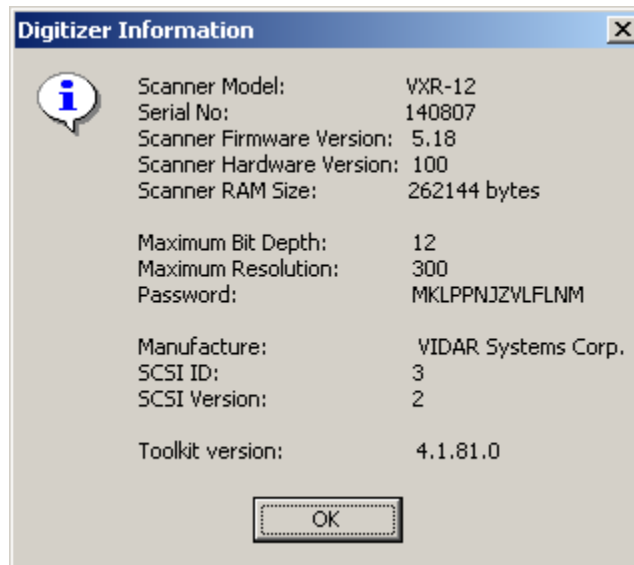
Please note that most Vidar film digitizers report on the SCSI bus as "VXR-12" for backward compatibility purposes.

The illustration above is an example. Depending on the digitizer model that is installed, you may see different information than what is shown above.

Pre Scan, Scan and Eject buttons

The **Pre Scan, Scan** and **Eject** buttons are described in the "Scanning films" chapter, later in this manual.

Closing the TWAIN interface

■ *To close the TWAIN interface without performing a scan:* In the **Main** window, click **Exit**. After changes to the TWAIN controls are saved, control returns to the main (host) application (for example, PaintShop Pro).

> **Note:** The **Exit** button is not available when a scan is in progress.

■ *To cancel the current scan or prescan:* In the **Main** window, click **Cancel**. Control returns to the main (host) application (for example, PaintShop Pro). Changes to the TWAIN controls are **not** saved.

> **Note:** If you are scanning a batch of films, clicking Cancel only cancels the film being scanned. To cancel a large batch of films, remove all films from the feeder (this forces a TWAIN error).

Advanced Options window

The **Advanced Options** window controls the setup of the <u>**Main** window</u> and provides options in addition to those in the **Main** window.

■ *To access the **Advanced Options** window:* In the **Main** window, click the **Advanced** button.
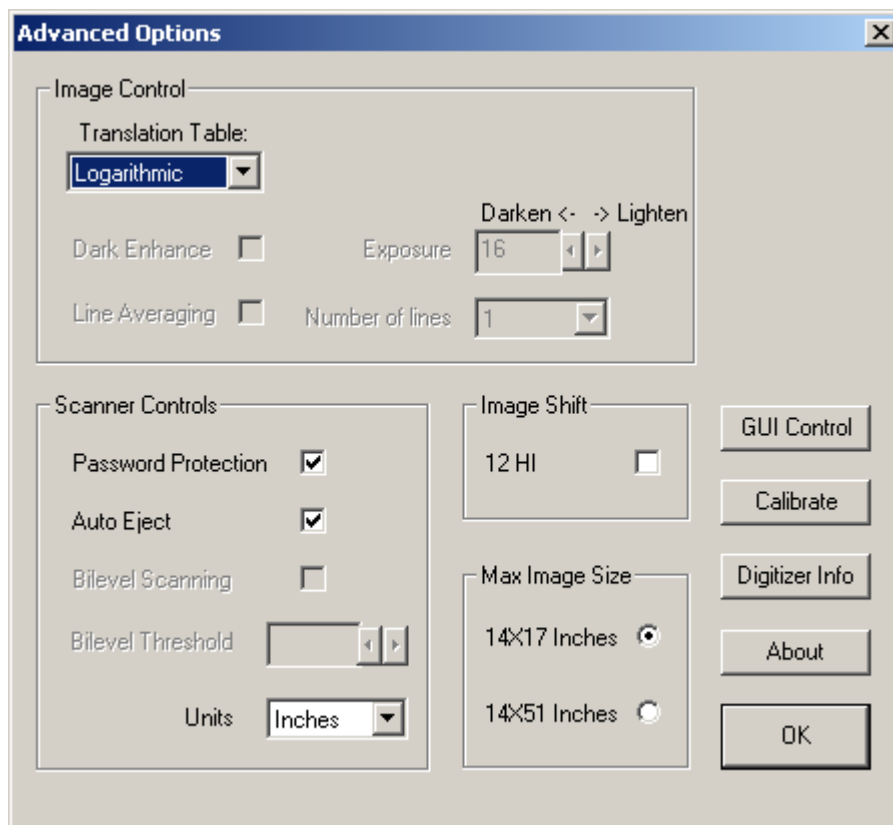
> **Note:** You can protect access to many TWAIN func ons by setting up a password. See "[Password protection](#)," ιter in this chapter.

Image Control

Translation tables

Standard configurations of the SIERRA™, SIERRA *plus™*, Diagnostic PRO™ and Diagnostic PRO *plus™* allow for one default translation table. This table, called *Logarithmic*, will be the only option in the **Translation Table** list. While this may appear to be a loss of functionality, limiting the choice to a single translation table minimizes the risk of poor image quality due to improper table selection.

If you have a VXR-8™, VXR-12™, VXR-12 *plus™*, VXR-16™, VXR-16 Dosimetry PRO™ or TeleRad PRO™ film digitizer, the **Translation Table** list allows you to select one of eight translation tables defined in the film digitizer. The tables are:
- LinearHI
- Logarithmic
- LinearOD
- SQROOT
- POWER07
- POWER05
- POWER03
- POWER10.

The tables are used to convert, or map, data from the film digitizer into a range better suited to your requirements. They are used, for example, to map data from one set of grayscale values to another.

The names of the default translation tables in the film digitizer reflect the mathematical functions they perform on grayscale data. On the next two pages are brief explanations of the default translation tables built into the film digitizer.

Translation table notes:
- **Dark Enhance** is not available on all models.
- 16-bit functions are similar to the calculations below.

Linear Optical Density (OD) Translation Table

12-bit depth
- Maps grayscale 0 to 0 and grayscale 4095 to (1000) * (maximum OD value) with a log function for the values between. Subtract the result from (1000) * (maximum OD value). This grayscale value is about 1000 times the OD value for that pixel. There should be no grayscale values above 1000 times the maximum OD value for the film digitizer.
- Results in an image similar to the result of inverting the Logarithmic Translation Table.
- Activates **Dark Enhance** automatically.

8-bit depth
- Starts with the 12-bit depth table and maps grayscale 0 to 0 and grayscale (1000) * (maximum OD value) to 255. The resulting grayscale value multiplied by 3.0 and divided by 256 is about equal to the OD value for that pixel.
- Results in an image similar to the result of inverting the Logarithmic Translation Table.
- Activates **Dark Enhance** automatically.

Logarithmic Translation Table

12-bit depth
- Maps grayscale 0 to 0 and 4095 to 4095 with a log function for the values between.
- Results in the lightest images of the default translation tables.
- Activates **Dark Enhance** automatically.

8-bit depth
- Maps grayscale 0 to 0 and 4095 to 255 (equivalent to discarding the least significant 4 bits from the 12-bit table) with a log function for the values between.
- Results in the lightest images of the default translation tables.
- Activates **Dark Enhance** automatically.

Linear Histogram-Independent (HI) Translation Table

12-bit depth
- Outputs the same grayscale value that was input to the translation table.
- Results in the darkest images of the default translation tables if you deactivate the **Dark Enhance** option.

8-bit depth
- Maps 12-bit values 0-15 to 8-bit value 0, 16-31 to 1, etc. (equivalent to discarding the least significant 4 bits from the 12-bit table).
- Results in the darkest images of the default translation tables if you deactivate the **Dark Enhance** option.

Power-Based Translation Table

12-bit depth

- Outputs from 0 to 4095 are derived from curves that are linear approximations of the root function $Y = X_i$, where $i = 0.1, \ldots , 1.0$ and X is the calculated value at each OD step (not the direct data from the array).
- You can generate power functions by selecting a different power level between 1 and 10. 1 results in the lightest image, while 10 results in the darkest image. Use 1 for dark films and 10 for light films.
- Activates **Dark Enhance** automatically.

8-bit depth

- Generated by discarding the least significant 4 bits from the 12-bit table.

Square Root Translation Table

12-bit depth

- Maps grayscale 0 to 0 and 4095 to 4095, with a square root function for the values between.
- Results in a lighter image than the Linear OD Translation Table, but darker than the Logarithmic Translation Table.
- Activates **Dark Enhance** automatically.

8-bit depth

- Maps grayscale 0 to 0 and 4095 to 255 (equivalent to discarding the least significant 4 bits from the 12-bit table), with a square root function for the values between.
- Results in a lighter image than the Linear OD Translation Table, but darker than the Logarithmic Translation Table.
- Activates **Dark Enhance** automatically.

Dark Enhance

Dark Enhance is not available for newer VIDAR film digitizers, since it is not required for optimum image quality. This feature will be activated by default when an older product, such as a TeleRad PRO™, VXR-8™ or VXR-12 *plus*™, is in use.

Dark Enhance lightens the image or increases the contrast in the dark areas of the image.

> **Note:** Some of the built-in translation tables automatically activate **Dark Enhance**. If you select one of these tables, you cannot deactivate **Dark Enhance**.

■ *To use dark enhancement:* Activate **Dark Enhance**.

Exposure

Most newer VIDAR film digitizers (SIERRA™, SIERRA *plus*™, Diagnostic PRO™ and Diagnostic PRO *plus*™) are configured with a default exposure time for the best image quality. If you have one of these products, the Exposure feature will be grayed out. This feature is available when an older product, such as a TeleRad PRO™, VXR-8™ or VXR-12 *plus*™, is in use.

Exposure is the amount of time light strikes the CCD array for each scan line. The longer the exposure, the lighter the scan; the shorter the exposure, the darker the scan. The exposure setting changes the scan speed: the shorter the exposure time, the faster the scan.

■ *To set exposure time:* Enter a value in milliseconds in the **Exposure** box.

> **Note:** The exposure range is 10 to 40 milliseconds in 1 millisecond increments for VXR-12s with serial numbers greater than 22999. Exposure time for VXR-12s before serial number 23000 is 10 to 20 ms.

Note: If the exposure is too high, detail will be lost i light areas of the film.

Note: Each time you change the **Exposure** value,   dark normalization is initiated when you exit the **Advance Options** window.

Line Averaging

Line Averaging is not available for newer VIDAR film digitizers, since it is not required for optimum image quality. This feature is available when an older product, such as a TeleRad PRO™, VXR-8™ or VXR-12 *plus™*, is in use.

Line averaging increases the signal-to-noise ratio, which improves grayscale accuracy, thereby improving image clarity. It is implemented in the Y-axis by averaging together 2 or 4 lines during the scan. Higher line averaging improves grayscale accuracy in the scans of the grayscale step wedge by a smaller standard deviation for the dark steps.

■ *To use line averaging:* Activate **Line Average** and select the **Number of lines** (2 or 4).

If Line Averaging is grayed-out, the digitizer model you are using does not support this function.

Scanner Controls section

Password Protection

Password protection controls access to some of the TWAIN settings, such as:

- Resolution and unit of measure
- Depth
- Translation tables
- Pre scan
- ROI selection controls
- Line averaging
- Dark enhance
- Exposure
- Save to disk

- *To establish a password:*

    1. Activate **Password Protection**. This opens the **Password** window. You are prompted to enter a password.

    2. If this is the first time a password is being set up: Do not enter anything in the **Password** window. Click **OK** to return to the **Advanced Options** window. (By default there is no password.)
        or
        If a password was previously set up: Enter the password in the **Password** window, then click **OK**.

    3. Click **GUI Control**. This opens the **Custom User Interface** window.

4. In the **Custom User Interface** window, click **Change Password**. This opens the **Change Password** window:

5. In the **Change Password** window, enter the new password, then confirm the new password. (A password can be any combination of characters.) Finally, click **OK** to close the **Change Password** window.

■ *To disable password protection:* In the **Advanced Options** window, click **Password Protection** again, then click **OK** in the **Password** window.

When password protection is deactivated, the software still remembers your last password.

> **Note:** If your password is lost, you must reload the WAIN software.

Auto Eject

The **Auto Eject** option controls what happens to films that have been scanned.

■ *To eject each film into the exit tray after each scan:* Activate **Auto Eject**. The film digitizer will be ready to accept another film when a scan is complete. Auto ejection is useful when you are scanning many films consecutively.

■ *To retain the film in the digitizer after each scan:* Deactivate **Auto Eject**. The film will stop moving when the scan is complete or at the end of the film (whichever comes first). This is useful when you want to perform multiple scans on one film. When you click the **Scan** button, the digitizer automatically backs up and stages the film in preparation for another scan. However, when you load a new film, the previously scanned film will be automatically ejected.

> **Note: Auto Eject** does not affect prescanning. After a prescan, the film is restaged rather than ejected.

Bilevel Scanning

> **Note:** TWAIN 5.2 does not support **Bilevel Scanning** with any VIDAR product.

Units

The **Units** list controls the unit of measure for the **Scan Size** list and the dimension boxes in the **Main** window. If you change the unit of measure in the **Units** list, the **Scan Size** window changes accordingly.

When you select a different unit of measure, the software automatically selects the closest scan size in the new units. For example, if the scan size is 14 by 17 inches and you change the value in the **Units** list to centimeters, the new scan size is 35.6 by 43.2 cm. For pixels, the software multiplies the dimensions in inches by the resolution in dots per inch (dpi) to obtain the value in pixels.

■ *To select a unit of measure:* Open the **Units** list and click **Inches**, **Centimeters** or **Pixels**.

Image Shift

Image shift converts 12-bit data to16-bit data before the data is transferred to the host application. This allows you to perform a 12-bit scan to screen, rather than saving the image to disk, if your host application supports 16-bit data.

```
┌─ Image Shift ──────────┐
│                        │
│  12 HI        ☑        │
│                        │
└────────────────────────┘
```
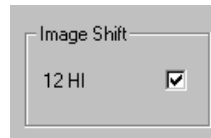
> **Note:** Only activate the **12 HI** option if the host application supports 16-bit data.

> **Note:** When **Depth** is set to 8-bit in the **Main** window, the **12 HI** option in the **Image Shift** section will not be visible.

■ *To use image shift:* Activate **12 HI** by clicking on the checkbox.

Maximum Image Size

The **Max Image Size** options in the **Advanced Options** window allow you to specify the maximum film size as up to 14 inches x 17 inches or up to 14 inches x 51 inches. Unless you are scanning long films, set the maximum film size to 14 inches x 17 inches.

When digitizing films longer than 17 inches, you must support the film above the feed tray and lift the film over the bottom lip on the exit tray so that the film can pass easily through the film digitizer.

Max Image Size

14X17 Inches ⦿

14X51 Inches ○

■ *To set the maximum image size:* Select the option appropriate for your scanning needs.

> **Note:** The maximum film length that can be scanned with TWAIN is 51 inches.

> **Note:** When scanning perforated films, you may need to manually set the size instead of using **Auto Size**. The scanner may see the perforations as a film end.

GUI Control button

GUI (graphic user interface) **Control** is used to manage which functions are available in the **Main** window and the **Advanced Options** window. This allows the TWAIN interface to be configured to limit the controls an operator can change.

■ *To configure the interface:*

1. In the **Advanced Options** window, click **GUI Control**. This opens the **Custom User Interface** window:
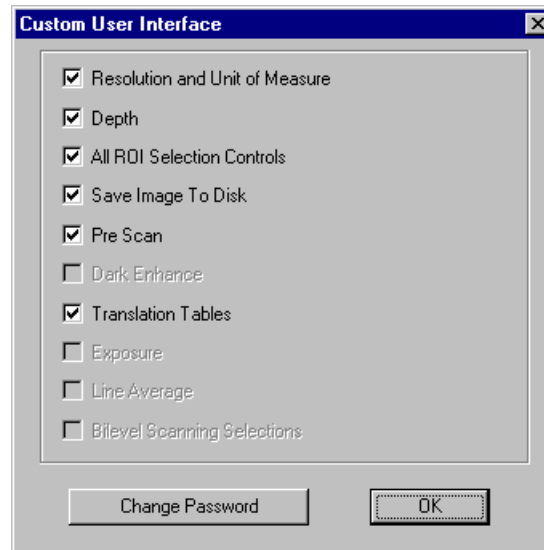
> **Note:** If **Password Protection** is deactivated in the **Advanced Options** window, **GUI Control** is not available (the button is grayed out).

2. Use the check boxes in this window to enable or disable the desired functions in the **Main** window.

> **Note:** Features not supported by the scanner in use will be grayed-out and unavailable.

Calibrate button

Calibrate directs the film digitizer to calibrate white and black levels. Calibration compensates for pixel-to-pixel variations in both the white and black ends of the grayscale to produce an even, consistent scan. Calibration is also automatically performed when the film digitizer is turned on. VIDAR provides recommendations for calibration, which depend on the firmware version in the digitizer. Check with Medtech to determine your firmware version and calibration requirements. In most cases, the firmware can be updated in the field at no cost.

■ *To begin calibration:* Click **Calibrate**. When calibration is finished, a success message appears.

> **Note:** If you are using a **TeleRad PRO™, VXR-8™ or VXR-12 *plus*™**, recalibrate after adjusting shutter width to optimize light levels for best image quality. To recalibrate, the shutters must be opened the full width.

If black vertical bands appear on the very outside of one or both sides of images scanned with a TeleRad PRO™, VXR-8 *plus*™, or VXR-12 *plus*™, either the unit was not calibrated with the film guides all the way open after scanning a small film then going to a larger film, **OR** one or both shutters may have become detached from the film guides on the film feeder. To check the film guides:

1. Turn off and unplug the digitizer.
2. Unscrew the two thumbscrews on the back of the film feeder, then remove the film feeder.
3. In the throat of the digitizer, slide the two black tabs as far as they will go toward the outside.
4. Reinstall the film feeder with shutters and film guides open all the way.
5. Plug in and turn on the digitizer. (It will recalibrate the full array now that the shutters are fully open.)

Digitizer Info button

The **Digitizer Info** button provides access to information about the digitizer. Before calling for technical support, note this information and the film digitizer's serial number. This information helps the technical support representative address your questions.

- *To view digitizer information:* In the **Advanced Options** window, click **Digitizer Info**.

OK button

- *To accept changes and close the **Advanced Options** window:* Click **OK**. Control returns to the **Main** window.

Scanning films

Overview

Here are the major steps required to scan one or more films (with references to sections later in this chapter):

1. Load film or film stack into digitizer's feed tray.

   See "Loading films," which covers loading both single films and multiple films.

2. (Optional) Prescan film, then (optional) define a region of interest (ROI).

   See "Prescanning and defining a region of interest (ROI)."

3. Scan film or stack of films.

   See "Scanning," which covers scanning single films and multi-film stacks.

4. (If film is not automatically ejected...) Manually eject film.

   See "Ejecting a film."

5. Accept or discard image.

   See "Finishing up."

Loading films

## Loading a single film — Scan to Screen Mode

Use the following procedure to load a single film in **Scan to Screen** mode.

> **Note:** Films longer than 17 inches must be scanned in the single film mode. Even though the long film option is always available, not all digitizers support this function.

1. Hold the film in front of you as you would view it on a light box.

2. Flip the film toward you so that the top and bottom edges of the film are reversed. (The film is upside down.)

3. If the digitizer is capable of multi-film scanning, you can load a single film into the throat of the scanner or in front of the blue lip. If a film is not sensed in the throat, the software prompts the digitizer to load film from the blue lip. (However, not all scanning applications can look in multiple locations for film.)

   If the digitizer handles only single films, load the film into the throat of the digitizer.

   When scanning a tall film, make sure the film support is fully extended if the digitizer is equipped with this feature.
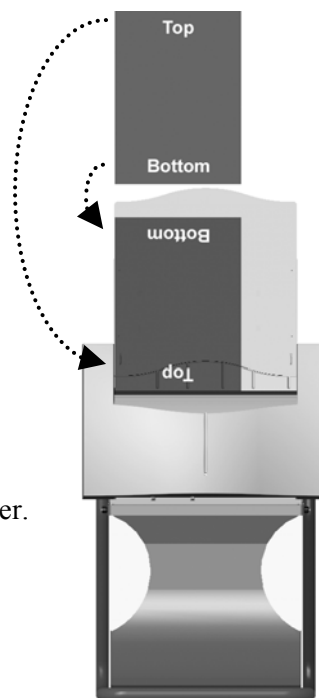
4. Position the film within the guides:

- VXR-8 *plus*™, VXR-12 *plus*™ or TeleRad PRO™: Center the film between the film guides. Adjust the film guides so that they are close to, but not touching, the edges of the film. Use the rulers on the input tray to help adjust the film guides.

- Diagnostic PRO™, Diagnostic PRO *plus*™, SIERRA™ and SIERRA *plus*™, DiagnosticPRO Advantage and DosimetryPRO Advantage models: Place the film against the left film guide.

- CadPRO Advantage: Place 8" by 10" films into the film feeder horizontally (landscape orientation). Place 10" by 12" films in to the film feeder vertically (portrait orientation).

Loading single or multiple films (Multi-Film Mode or Save To Disk Mode)

Use the following procedure to load one or more films in either **Multi-Film Mode** or **Save To Disk Mode** (single films or batch scans).

> **Note:** It is possible to select and scan one film at a time when scanning in **Multi-Film Mode**.

> **Note:** Films longer than 17 inches must be scanned in single film mode.

1. Hold the film stack in front of you as you would view it on a light box. The first film to be scanned should be at the back of the stack.

   - VXR-8 *plus*™, VXR-12 *plus*™ and TeleRad PRO™ film digitizers could have been ordered with an optional 10-sheet feed tray. When the digitizer is equipped with this feed tray, films scanned in batch mode can be of multiple lengths, but must be the same width.
   - Diagnostic PRO *plus*™, Mammography PRO™, Dosimetry PRO™, Dosimetry PRO Advantage, Diagnostic PRO Advantage and VXR-16™ film digitizers have standard 25-sheet feed trays that handle mixed film sizes.

     The CadPRO Advantage is available with either a 50-sheet film feeder or a 100-sheet film feeder.

   - SIERRA™ and SIERRA *plus*™ units with serial numbers in the range 140000 to 140799 could have been ordered with optional 6-sheet film feeders.

   - SIERRA *plus*™ film digitizers with serial numbers 140800 and above can be ordered with optional 10-sheet film feeders.

2. Place the film stack in the feed tray (top of the film digitizer) with the edge of the stack resting **in front of the lip** (blue edge). Be sure the film support is fully extended when scanning tall films.

3. Position the films within the guides:

- VXR-8 *plus*™, VXR-12 *plus*™ or TeleRad PRO™: Center the films between the film guides. Adjust the film guides so that they are close to, but not touching, the edges of the films. Use the rulers on the input tray to help adjust the film guides.

- Diagnostic PRO™, Diagnostic PRO *plus*™, SIERRA™ and SIERRA *plus*™: Place the films against the left film guide.

- CadPRO Advantage: Place 8" by 10" films into the film feeder horizontally (landscape orientation). Place 10" by 12" films in to the film feeder vertically (portrait orientation).

# Prescanning and defining a region of interest (ROI)

Prescanning digitizes the entire film at the lowest resolution and displays the image in the **Preview area** of the **Main** window. A prescan makes it easier to define a region of interest (ROI). A film automatically restages after a prescan in preparation for a scan. **Pre Scan** automatically sizes the original film and allows you to use the image preview to define the region of interest.

> **Note:** SIERRA™ and SIERRA *plus*™ units with serial numbers 140799 and below do not support prescanning.

■ *To perform a prescan:*

1. Load the film into the film digitizer (as described in "Loading films," earlier in this chapter).

2. In the VIDAR TWAIN interface **Main** window, click **Pre Scan**.

   ● *To cancel the prescan before it is complete:* Click **Cancel**.

   The film moves through the film digitizer. After the preview scan is completed, a thumbnail of the image appears in the **Preview area** of the **Main** window and the progress bar under the **Preview area** displays the number of kilobytes scanned (see example on next page). The film will move back up into the ready position.

> **Note:** If a prescan is attempted while in **Multi-Film Mode**, the following message will appear and **Multi-Film Mode** will automatically be deactivated in preparation for a prescan.
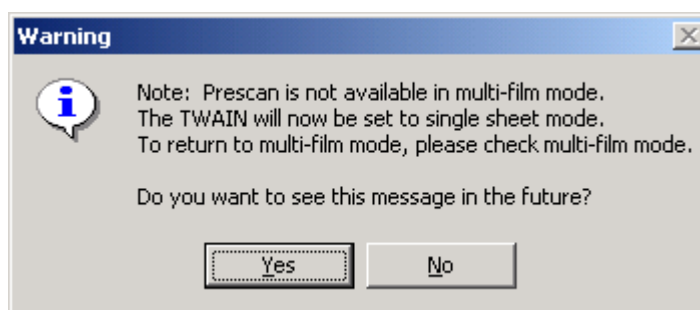
3. Adjust the ROI to the area you want to scan: <u>right</u>-drag the mouse over the desired area.

As you drag, the coordinates of the ROI are displayed to the right of the **Preview area**.
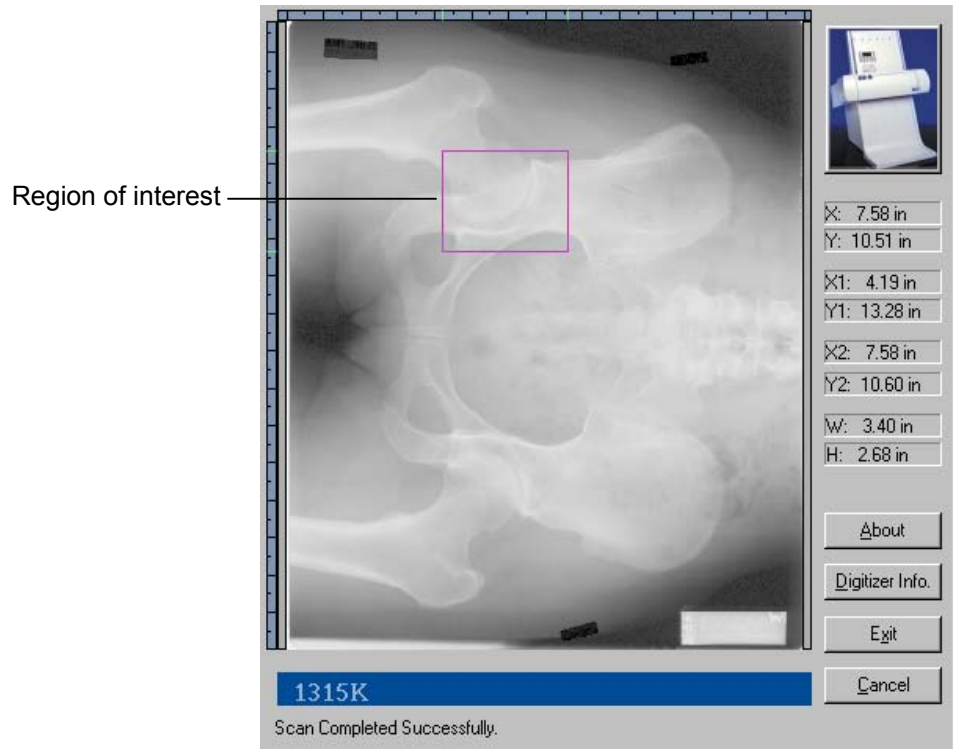
Region of interest

- *To redraw the ROI:* Reposition the mouse and drag again.

You are now ready to scan the ROI: when you click the **Scan** button (as described in "Scanning," the next section in this chapter), only the region of interest will be scanned using the selected scanning parameters.

Scanning

Scanning single films

After loading the film and specifying scanning parameters, you are ready to scan. The **Scan** command directs the film digitizer to scan the film loaded in the film digitizer.

■ *To initiate a scan:* In the VIDAR TWAIN interface **Main** window, click **Scan**.

The film is staged before scanning takes place. This means that the film will be fed down about 1.5" into the digitizer, then come back up about 0.5".

During the scan, the progress bar under the **Preview area** displays the number of kilobytes scanned.

> **Note:** If no film is loaded when you click **Scan**, a message box appears to tell you no film is loaded. Click **OK**, then oad a film. You must click the **Scan** button again to scan.

■ *To stop a scan before it is completed:* Click **Cancel**.

Scanning films (Multi-Film Mode and Scan To Disk Mode)

Scan To Disk Mode enables scanning directly to a TIFF or BMP file format. TIFF images may be saved in 8-bit, 12-bit or 16-bit depth, depending on the capabilities of the digitizer attached. The BMP file format only supports 8-bit depth. It is not possible to scan in **Multi-Film Mode** unless **Save To Disk** is activated.

> **Note:** This TWAIN interface does not support scanning multiple images to screen.

1. In the VIDAR TWAIN interface **Main** window, select the number of films to be scanned.

   > **Note:** An error will occur if the number of successfully scanned films does not equal the number requested.

2. Click the **Scan** button.

3. Select the **File Format** at the top of the window.

4. Select the disk location for the saved files in the **Images Save Path** box. Enter the path or click **Browse** to find the desired path.

5. The lower portion of the window provides boxes for naming each image, corresponding to the number of films selected. Enter a file name for the first image in the first box provided.

6. Click in the next box. Name the rest of the files using one of these methods:

   - Click the **Auto Number** button to replicate the first filename and append a number (e.g., Film2, Film3, etc.) to the remaining films.
     or
   - Enter a new path and file name for each of the remaining films.

7. After naming all the files, click **OK** to start the batch scan.

● *To stop the batch scan before it is complete:* Click **Cancel** for each film, or remove films to force an error.

8. After the batch completes, the **Main** window appears.

Ejecting a film

Ejecting causes the feed rollers in the film digitizer to turn until the film is free of the rollers and drops into the exit tray.

> **CAUTION:** If a film is held in the film digitizer by the feed rollers, pulling it down and out slowly will not harm the digitizer, but may scratch the film; however, it's best to use the TWAIN interface to eject the film, as described below.

Note:
■ If **Auto Eject** is activated in the **Advanced Options** window, films are ejected automatically.
■ In **Multi-Film Mode**, films are ejected automatically.

If a film is not automatically ejected (**Auto Eject** is deactivated in the **Advanced Options** window), then after the scan is complete:

■ *To eject the film from the feed path:* Click **Eject**.

■ *To scan the film again:* Leave the film in the feed path and click **Scan**. The digitizer will automatically reset the film and scan it.

Finishing up

After the film digitizer captures the image, the image will either appear in the host software application, or the image will be saved to the specified location (**Multi-Film Mode** and **Save To Disk Mode**). If the image was saved to disk, it will not appear in the host application; you will need to open the file to view the image.

> **Note:** If you defined an ROI, the ROI image will appear in a separate window behind the TWAIN window, unless **Save To Disk** is activated in the **Advanced Options** window.

■ *To close the TWAIN interface:* Click **Exit**.

Using the image application

For details on zooming, panning and other image controls, refer to the manual for the host application.

Appendix:
Improving image quality

Calibrating your monitor

Good image quality depends on proper monitor output. When your monitor accurately displays an image, you can effectively evaluate image quality and successfully optimize the image. Without an accurate image, you may not be able to obtain good quality. Here is one easy method for calibrating a monitor:

1. Open an SMPTE pattern image (you can open an SMPTE pattern— shown on the next page— in your Web browser by clicking www.dclunie.com/images/smpte.512.512.8.gif).

2. Minimize the monitor's contrast and brightness controls.

3. Increase the brightness until you just see the bars in the corners.

4. Increase the contrast to about 80% or greater until you can see the 0%/5% and 95%/100% squares on the image as clearly as possible.

0%/5% square   95%/100% square
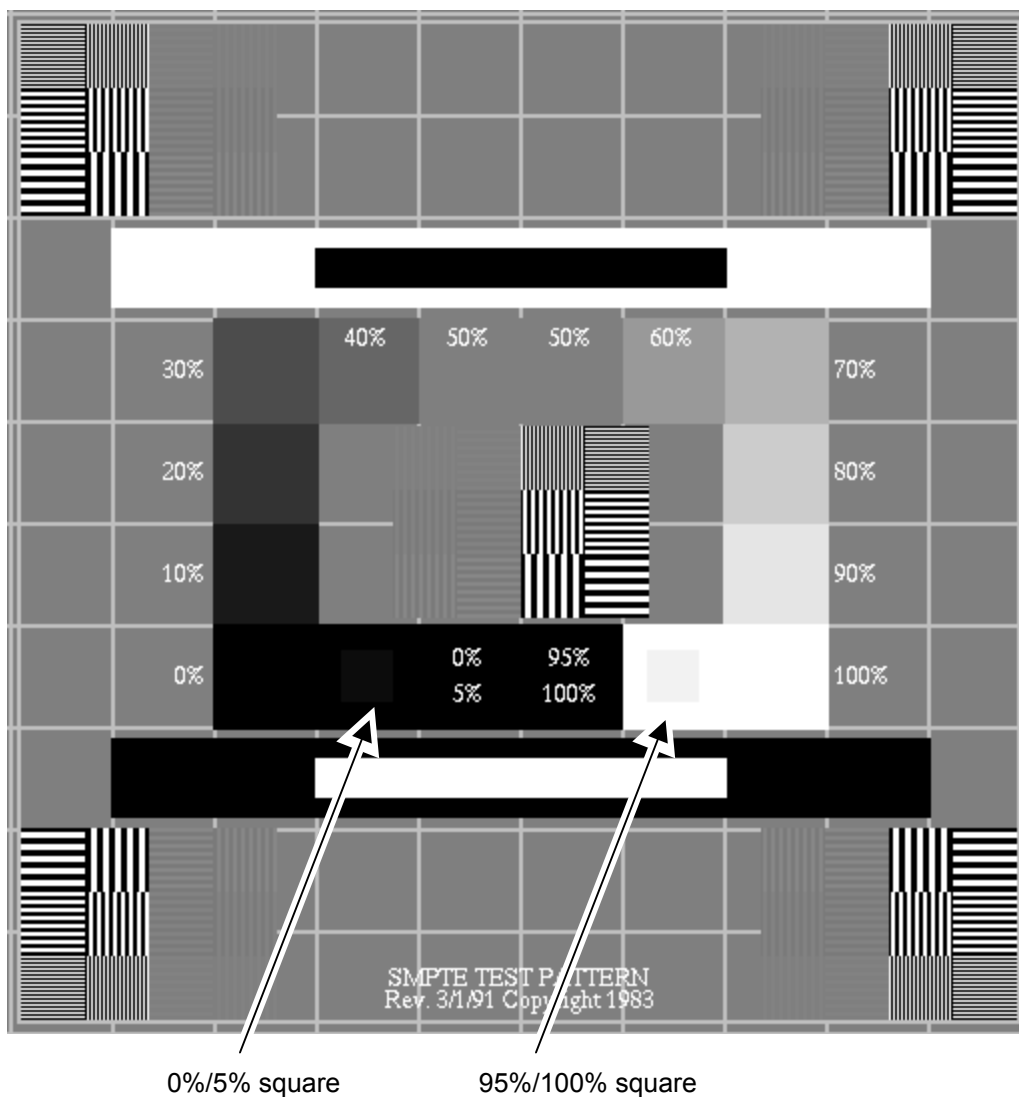
Note: If you are viewing an electronic copy of this document on a monitor and you can't see either the 0%/5% square or the 95%/100% square on this page (indicated by the arrows), your monitor needs to be calibrated.

Optimizing image quality in image processing applications

This section describes quick adjustments you can make to images to compensate for the lack of a display look-up table in non-clinical image processing applications, such as PaintShop Pro and Photoshop. The applications covered here—PaintShop Pro 7 and Photoshop 6—have been extensively tested as host applications for the Vidar TWAIN interface, **and are only recommended as a means for checking film digitizer operation, not as a substitute for a high quality medical imaging/PACS system.**

Corel PaintShop Pro™

Adjusting image gamma

Use the **Gamma Correction** command to adjust the brightness and contrast of an image in unison. On a computer monitor, a small difference in brightness at a low brightness level is not equal to the same variation at a high level. Gamma correction compensates for this.

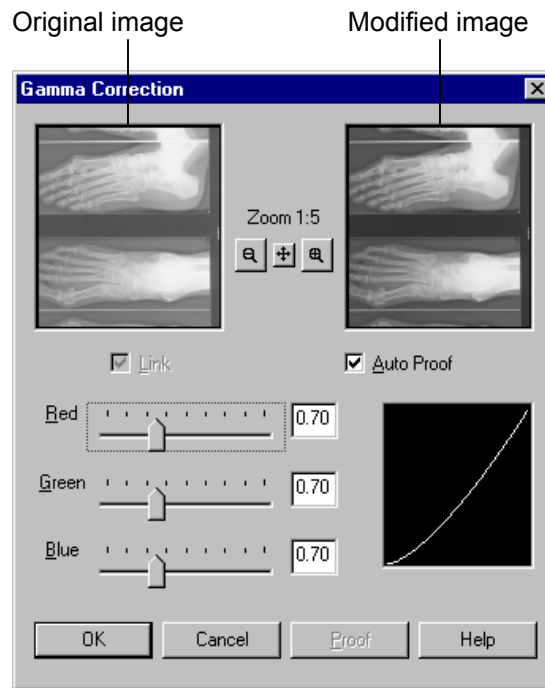■ *To adjust gamma:*

1. **Colors > Adjust > Gamma Correction**.
    or
   Press SHIFT-G.
    or
   Click the **Gamma Correction** button in the toolbar.

   This opens the **Gamma Correction** window (see next page):

Original image   Modified image

2. By default, the **Red**, **Green** and **Blue** slider bars in the **Gamma Correction** window are linked so they move in unison. The graph to the right of the sliders represents the shadows and highlights of the image. Click and drag any slider (or type a number into any box) to move the curve in the graph. Dragging to the right pushes more pixels into a higher lightness value, which lightens the image. Dragging to the left darkens the image.

3. Click **OK** to close the dialog box and apply the settings.

Because gamma correction can leave an image looking somewhat "flat," you may need to increase contrast after correcting gamma.

Adjusting brightness and contrast

The **Brightness** command lightens or darkens the entire image or selection. The **Contrast** command changes the amount of shading between areas. You can use it to sharpen an image and make specific areas stand out.

■ *To adjust brightness and/or contrast:*

1. **Colors > Adjust > Brightness/Contrast**.
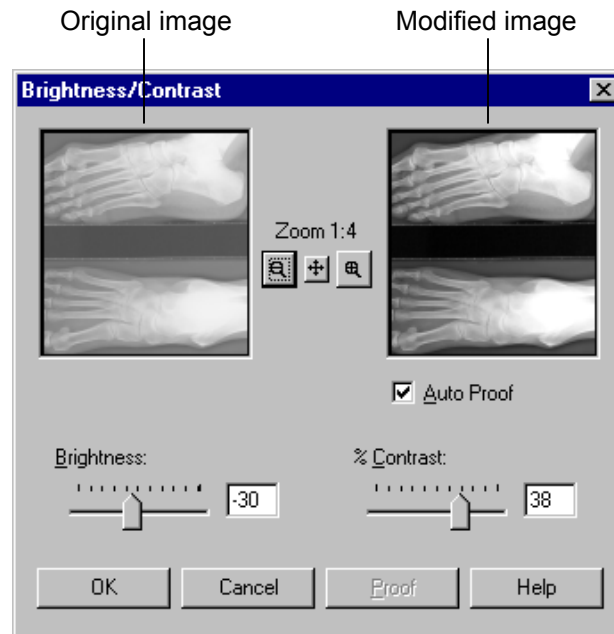   or
     Press SHIFT-B.
       or
     Click the optional **Adjust Brightness/Contrast** button in the toolbar.

     This opens the **Brightness/Contrast** window:

2. In the **Brightness/Contrast** window:

■ *To update the original image as you change the settings:*
Activate **Auto Proof**.

■ *To brighten the image:* Move the **Brightness** slider to the right,
or type a positive number in the box.

■ *To darken the image:* Move the **Brightness** slider to the left, or
type a negative number in the box.

(The brightness value is added to or subtracted from the
brightness values of all the pixels.)

■ *To increase the contrast:* Move the **Contrast** slider to the right,
or type a positive number in the box.

■ *To decrease the contrast:* Move the **Contrast** slider to the left,
or type a negative number in the box.

3. Click **OK** to close the window and apply the settings.

Equalizing

Equalizing distributes the grayscale values of pixels more evenly across
the range from black to white. It makes the darkest pixel as close to
black and the lightest pixel as close to white as possible. It then
distributes the remaining pixels evenly between these two values. This
produces an averaging, or tempering, of image brightness.

■ *To equalize an image:*

Colors > Histogram Functions > Equalize.
    or
Press SHIFT-E.

Stretching

If the grayscale values of an image don't extend across the entire range from black to white, the image lacks contrast. Stretching distributes the highest and lowest grayscale values closer to the extremes so they cover more of the range.

■ *To stretch the grayscale values:*

Colors > Histogram Functions > Stretch.
    or
Press SHIFT-T.

Adobe Photoshop™

Adjusting black and white points

The Auto Levels feature and **Auto** button in the **Levels** window automatically define the lightest and darkest pixels in each channel as white and black, then redistribute the intermediate pixel values proportionally. This feature gives good results when an image with an average distribution of pixel values needs a simple contrast adjustment.

■ *To set black and white points automatically:*

Image > Adjust > Auto Levels.
    or
Image > Adjust > Levels (this opens the **Levels** window, shown on the next page), then click **Auto**.

In the **Levels** window, you can also enter values directly in the **Input Levels** and **Output Levels** boxes. Entering values into the **Output Levels** box decreases the contrast in highlight areas, darkening the image.
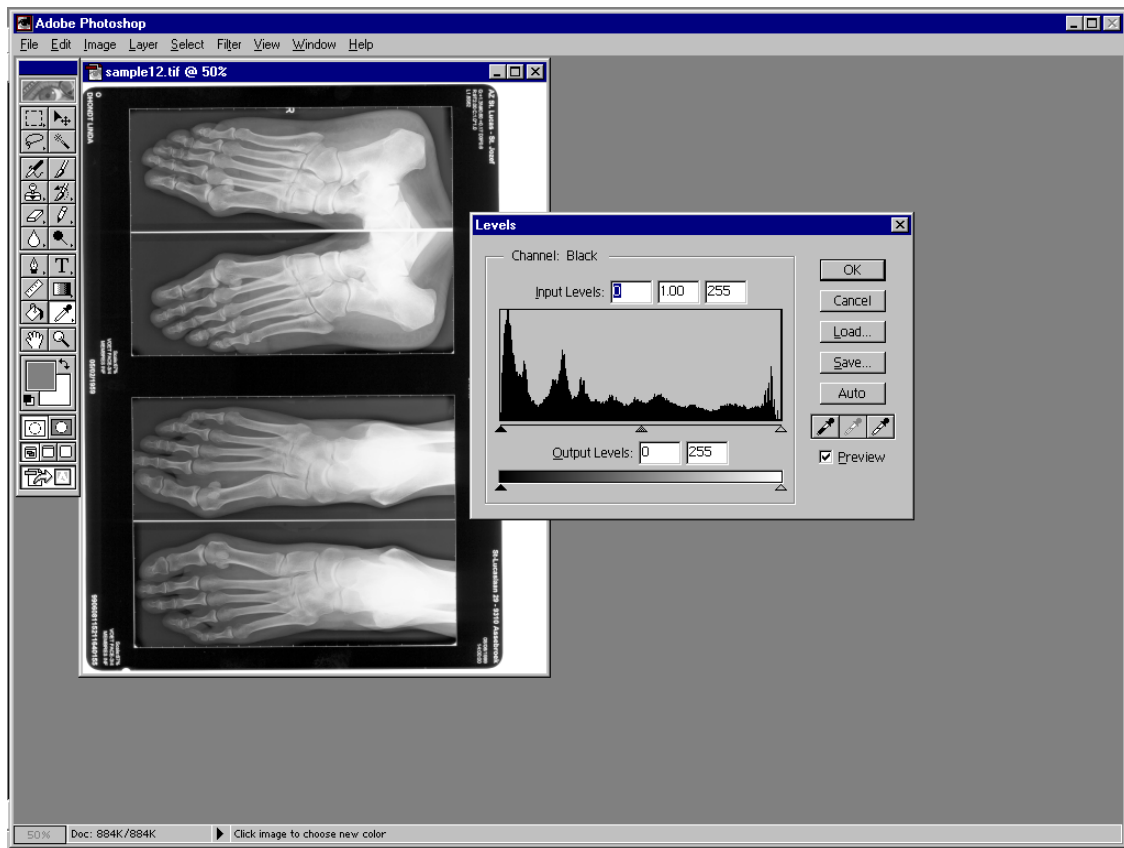
Equalizing

The equalizing function redistributes an image's grayscale values to more evenly represent the entire grayscale range. With this function, Photoshop finds the brightest and darkest values in the image and attempts to equalize the brightness—that is, to distribute the intermediate grayscale values evenly throughout the range between black and white.

■ *To equalize an image:* **Image > Adjust > Equalize**.

Adjusting contrast

The Auto Contrast function is used to automatically adjust contrast or highlights and shadows. Adjusting contrast maps the darkest and lightest pixels in the image to black and white. The Auto Contrast function clips the white and black pixels by 0.5%—that is, it ignores the first 0.5% of either extreme when identifying the lightest and darkest pixels in the image. This clipping of grayscale values ensures that white and black values are representative areas of the image's content, rather than extreme pixel values.

■ *To adjust contrast automatically:* **Image > Adjust > Auto Contrast**.

Adjusting tonal values with the Curves feature

The Curves feature lets you make precise adjustments to one area of the tonal range while minimizing the effects on the others.

1. **Image > Adjust > Curves**. This opens the **Curves** window:
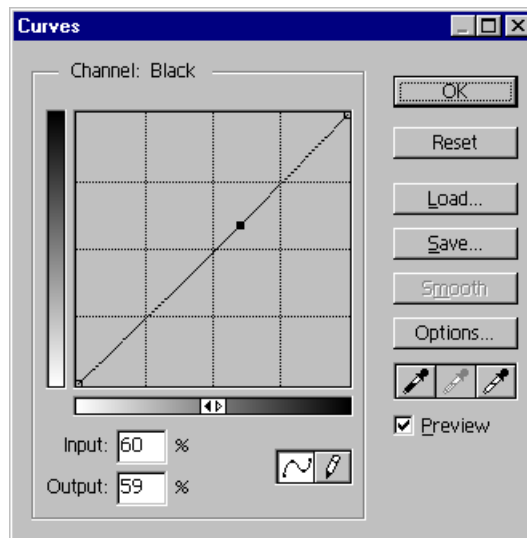
2. Click the part of the curve you want to adjust. Drag until the image looks as you want.
  or
Click to fix a point on the curve. Click and drag to adjust.
  or
Enter an **Input** and **Output** value for the selected point on the curve.