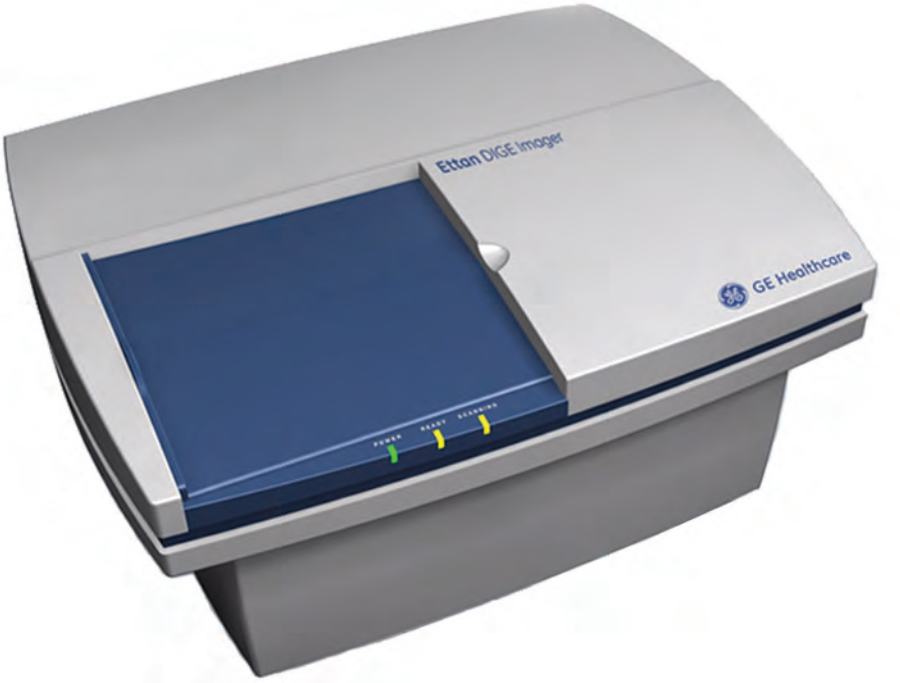
GE Healthcare

Ettan DIGE Imager

User Manual



Important user information

All users must read this entire manual to fully understand the safe use of Ettan DIGE Imager.

IMPORTANT! Ettan Dige Imager is intended for laboratory use only, not for clinical or in vitro use, or for diagnostic purposes.

WARNING!

The WARNING! sign highlights instructions that must be followed to avoid personal injury. Do not proceed until all stated conditions are clearly understood and met.

CAUTION!

The CAUTION! sign highlights instructions that must be followed to avoid damage to the product or other equipment. Do not proceed until all stated conditions are met and clearly understood.

Notes

Note: *A Note is used to indicate information that is important for trouble-free and optimal use of the product*.

Recycling

This symbol indicates that the waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of equipment.

WARNING!

This is a Class A product. In a domestic environment, it might cause radio interference, in which case the user might be required to take appropriate measures.

WARNING!

All repairs should be done by personnel authorized by GE Healthcare. Do not open any covers or replace any parts unless specifically stated in the instructions.

WARNING!

The computer should be installed and used according to the instructions provided by the manufacturer of the computer.

WARNING!

The mains power switch or other disconnect device must always be easy to access.

CE-certification

This product complies with the European directives listed below, by fulfilling corresponding standards.

A copy of the Declaration of Conformity is available on request.

- 73/23/EEC, Low Voltage Directive
- 89/336/EEC, EMC Directive

The CE logo and corresponding declaration of conformity, is valid for the instrument when it is:

- used as a stand-alone unit, or
- connected to other CE-marked GE Healthcare instruments, or
- connected to other products recommended or described in this manual, and
- used in the same state as it was delivered from GEHealthcare except for alterations described in this manual.

Note: The Declaration of conformity is valid only for systems that are marked with the CE logo:

CE

Contents

Preface

Ettan DIGE Imager

Ettan™ DIGE Imager is a scanner intended for scanning gels and membranes containing CyDye™ DIGE Fluor dye-labeled proteins or gels post stained with Deep Purple or Sypro Ruby. Ettan DIGE Imager should be used with gel cassettes from GE Healthcare.

The scanner is controlled with Ettan DIGE Imager software, which can be set up for a variety of gel formats. The software includes a report viewer with functions for image enhancement and distance measuring.

WARNING! Ettan DIGE Imager is intended for laboratory use only, not for clinical or *in vitro* use, or for diagnostic purposes.

The User Manual

The Ettan DIGE Imager User Manual is intended for lab personnel performing analysis of fluorescent 2D-gels, and for service personnel performing maintenance and repairs. The user manual comprises the following chapters:

Important User Information

Safety information, conventions used in the manual.

Installing the Scanner

Setting up the scanner and the software

Getting Started

Preparing gel cassettes and setting up a scan. Scanning samples.

Customizing Templates and Gel Formats

Using standard and customized gel formats.

Using the Report Viewer

Setting Image Contrast, measuring distances and saving modified images.

File Formats

File naming conventions

Maintaining the System

Cleaning the scanner and replacing spare parts.

Troubleshooting

Customer verification sheet, check that the instrument is working properly.

Appendix

Filter details, related products, consumables, and spare parts.

1 Important User Information

1.1 Warnings and Cautions

Hazardous conditions are indicated in the User Manual by Warning and Caution messages.

WARNING! The Warning sign highlights an instruction that must be strictly followed in order to avoid personal injury. Do not proceed until you clearly understand the instructions, and all stated conditions are met.

CAUTION! Indicates important information regarding potential damage to equipment or software.

Follow the instructions in detail in order to avoid damage to the instrument or other equipment. Do not proceed until you clearly understand the instructions, and all stated conditions are met.

1.2 Safety Information

The Ettan DIGE Imager system is equipped with safety labels and interlocks to help protect you from potential injury that may be caused by ultraviolet light, heat, or the high voltage of the scanner's lamp.

1.2.1 Ultraviolet Light and Heat

The following hazards are associated with the scanner lamp assembly's high-intensity, metal halide bulb:

- Damage to eyes and skin caused by exposure to ultraviolet radiation
- Burns caused by contact with a hot lamp assembly
- Fire ignited by hot lamp assembly
- Interaction of nearby chemicals with ultraviolet radiation
- Damage caused by placing apparatus too close to the scanner

To avoid injury or damage, do not remove the scanner cover. Also keep chemicals and equipment that are sensitive to ultraviolet radiation away from the scanner.

Note: *The rear cover is equipped with a safety interlock that turns the lamp off*

if the cover is removed while the lamp is on.

WARNING! Under certain conditions, the bulb can explode. If this occurs, the fumes can be toxic. Evacuate the room immediately and remain out of the room for at least 30 minutes.

1.2.2 Caution and Warning Labels

The following labels are found on the product.

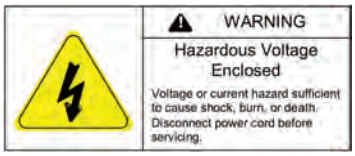
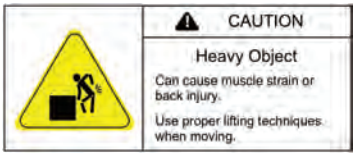
Hazardous Voltage Warning Label	
	WARNING—HAZARDOUS VOLTAGE ENCLOSED Voltage or current hazard sufficient to cause shock, burn, or death. Disconnect the system by unplugging the power cord before servicing.
Heavy Objects Caution Label	
	CAUTION—HEAVY OBJECT Can cause strain or back injury. Use proper lifting techniques when moving. Equipment marked with this label weighs 25 lbs. (11.34 kg) or more and should be lifted by two people.
Hot Surfaces Caution Label	
	CAUTION—HOT SURFACES Do not touch. Allow surfaces to cool prior to servicing.

Fig 1-1. Description of Caution and Warning Labels

Waste of electrical and electronic equipment

This symbol indicates that the waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment.

Fig 1-2. Recycle symbol

The following safety labels are found on the back of the product.

Access door at back of scanner

Back of scanner with Access door removed

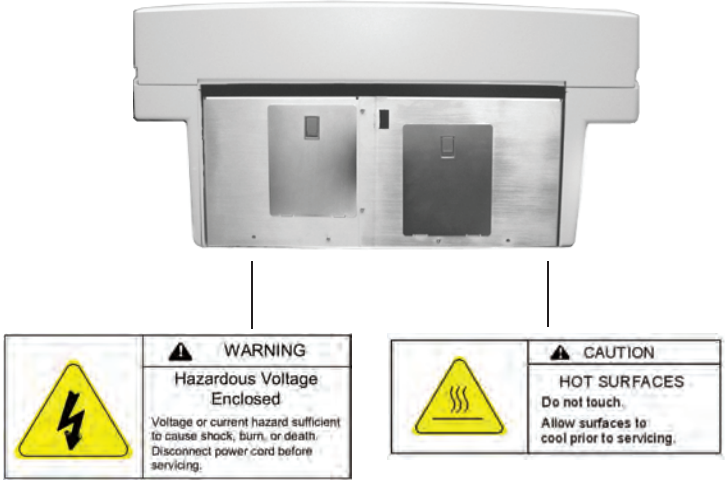


Fig 1-3. Location of Caution and Warning labels

1.3 CE Certification

This product meets the requirements of all applicable CE-directives. A copy of the corresponding Declaration of Conformity is available on request.

2 Installing the Scanner

This chapter describes the installation of the Ettan DIGE Imager (the scanner). It also describes components and applicable requirements.

2.1 About the Scanner

The scanner allows you to scan a variety of gel formats.

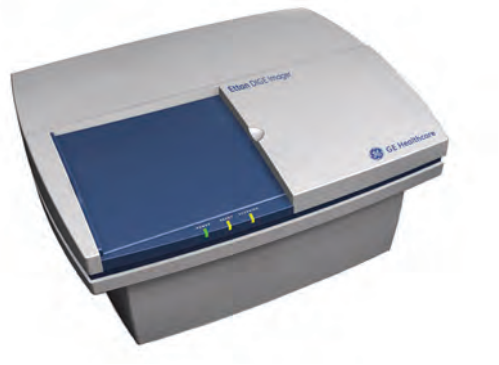


Fig 2-1. The scanner

The scanner has the following replaceable parts:

Component	Part Number
Lamp Assembly	28401403
Protective Window	28401414

2.2 Set Up the Scanner

Before you set up the scanner, review the installation requirements. Then use the following instructions to unpack the scanner and connect it to the workstation.

2.2.1 Installation Requirements and Recommendations

Before you install the scanner, make sure that your facility supports the following scanner requirements.

Electrical Requirements	Voltage: 100 - 240 VAC ± 10%
Frequency	50/60 Hz ± 2 Hz
Circuit Rating	100 V: 5.6 A 240 V: 2.1 A
Transient over-voltages	Must be in accordance with Installation Category II in IEC 664
Operating Environment Requirements	Indoor use
Temperature	59 - 90 °F (15 - 32 °C), daily variation of no more than 3 °F (1.8 °C)
Humidity	Maximum relative humidity less than or equal to 80% non-condensing. (High humidity can result in condensation on the camera window. Excessive humidity may also reduce filter life.)
Weight	Approximately 140 lbs. (64 kg.)
Altitude	Up to 6550 ft. (2000 m)
Pollution	POLLUTION DEGREE 2[1] in accordance with IEC 664
Space Requirements	Workstation: 3 ft. x 3 ft. (90 cm x 90 cm) counter space Scanner: 2.5 ft. x 3.5 ft. (77 cm x 107 cm) counter space

[1] UL 3101-1, First Edition, Underwriters Laboratories, Inc.® defines POLLUTION DEGREE 2 as "Normally only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected."

Fig 2-2. Scanner counter space requirements

2.2.2 Minimum Workstation Requirements.

Processor	P4 2GHz
Graphics card	64Mb with support for 1280x1024 display
System Memory	1 Gb
Operating System	Windows XP ver. SP2
Network cards	1Gb network card required to connect to the Ettan DIGE Imager Additional network card required if the workstation is connected to a LAN
PC Hard Drive Free Space	1Gb minimum (50 Gb recommended if images are stored locally)
Monitor	Supports 1280x1024 display
Mouse	Wheel Mouse

WARNING! The workstation should be installed and used according to the instructions provided by the manufacturer of the workstation.

2.2.3 Install the Scanner

Unpack and install the scanner as shown below.

To install the Scanner

1 Remove the scanner from the crate and place it on a flat level surface.

WARNING! Do not attempt to lift the scanner by yourself. Two people are required to lift the scanner.

2 Slide the door fully open to get access to the stage area.

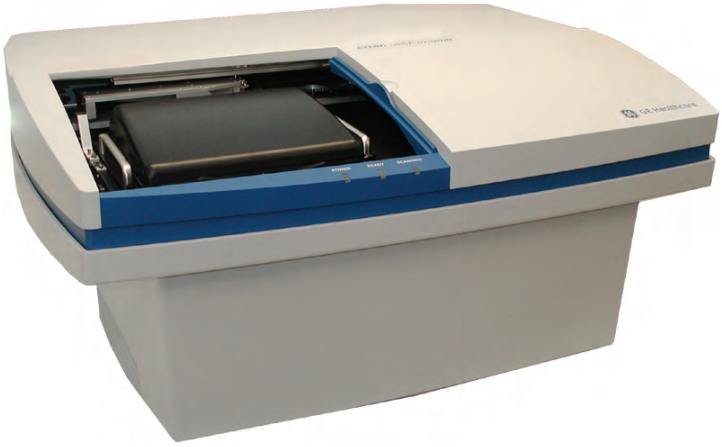


Fig 2-3. Opening the scanner door

3 In the upper left corner of the stage area, use a hex key to loosen the locking bolt that holds the stage in place and remove the locking bolt.

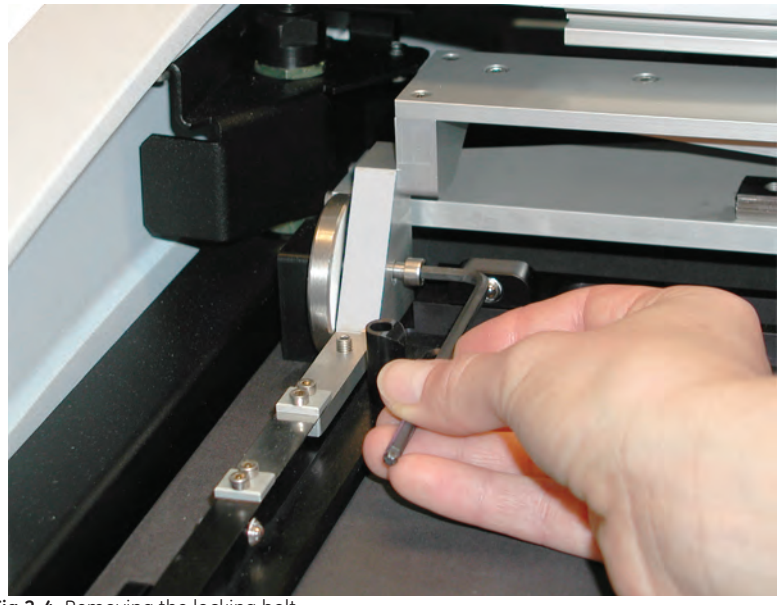


Fig 2-4. Removing the locking bolt

4 Remove the locking bolt and the round metal plate.

CAUTION! Do not discard the locking bolt and the plate. You will need them If you ever have to move the scanner.

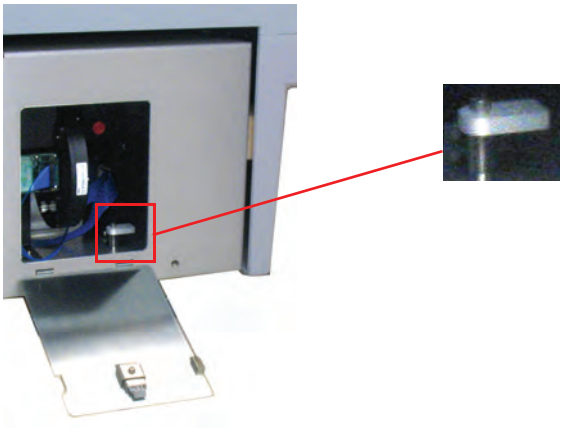
5 Store the locking bolt and the plate as follows:

1 Remove the rear panel by loosening the screws at the bottom of the panel.

2 Gently pull up on the panel as you open it to remove it.

3 Open the optics bay door (next to the lamp access door).

4 Install the locking bolt and the plate in their storage position.



5 Reassemble the rear panel.

6 Connect the scanner cable to the workstation as follows:

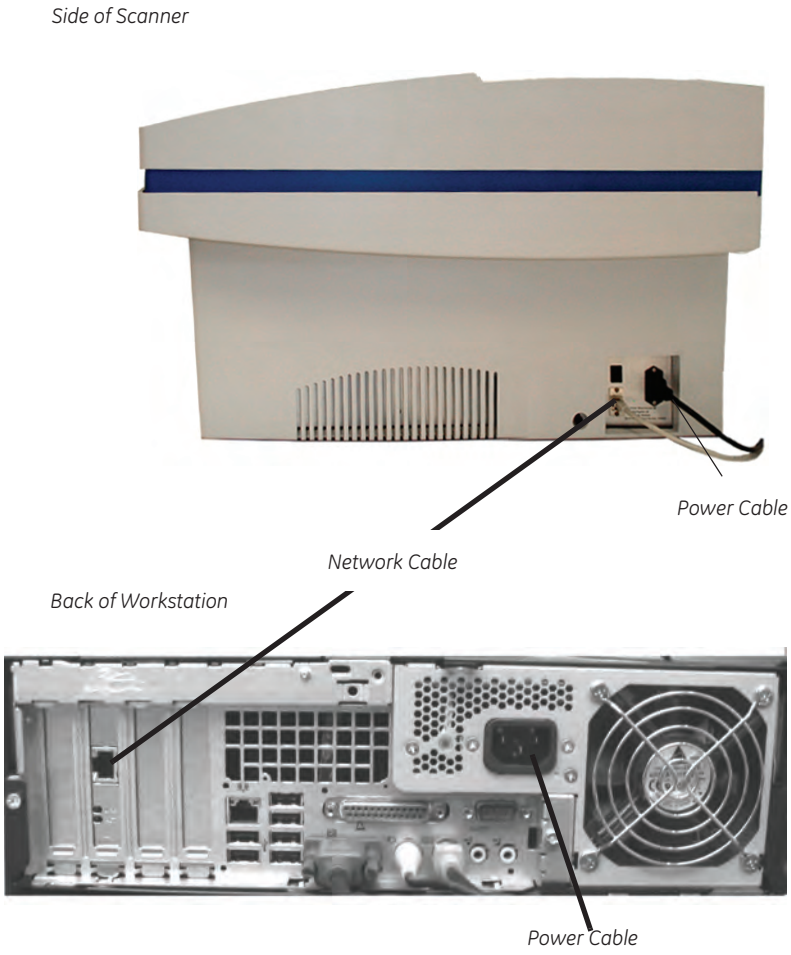
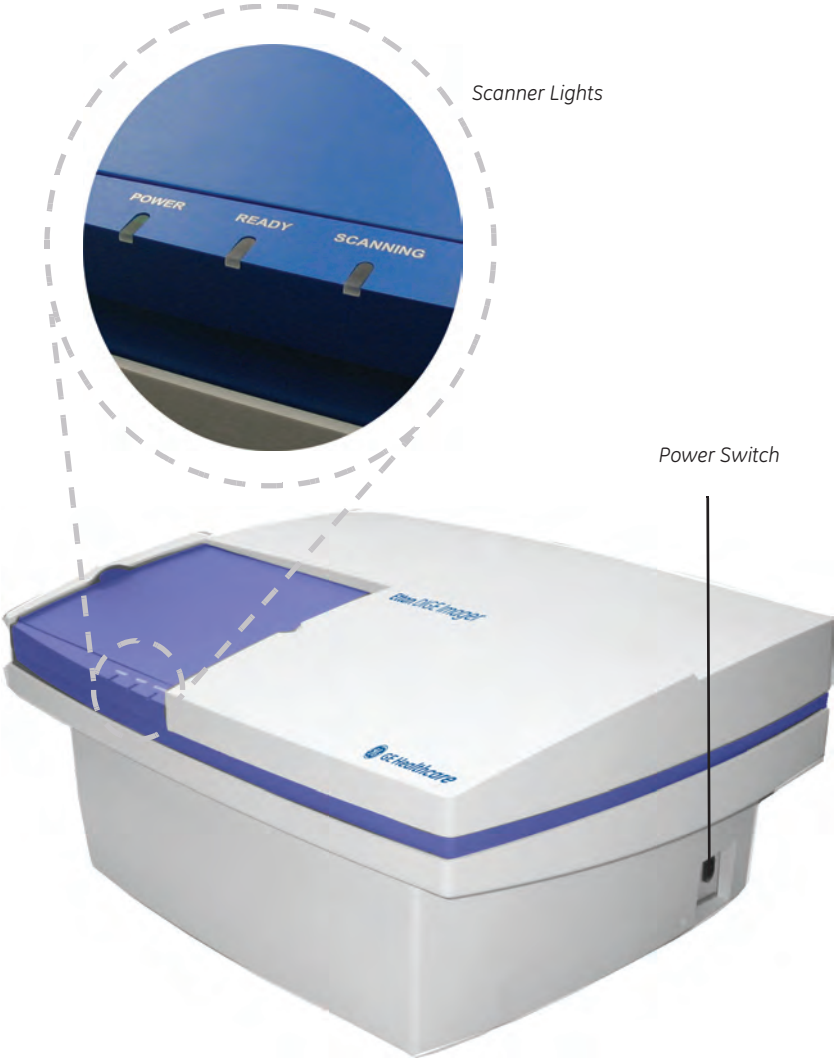


Fig 2-5. Power and cable connections

WARNING! To permit sufficient cooling, ensure that the vents on the side panels of the scanner are not covered.

7 Plug in the scanner and the workstation.

8 Press the **Power** switch on the side of the scanner and make sure that the **POWER** light turns on.



WARNING! Do not block the side panel of the scanner. The mains power switch must always be easy to access.

2.3 Set up the Workstation

2.3.1 Set up the Workstation Network Parameters

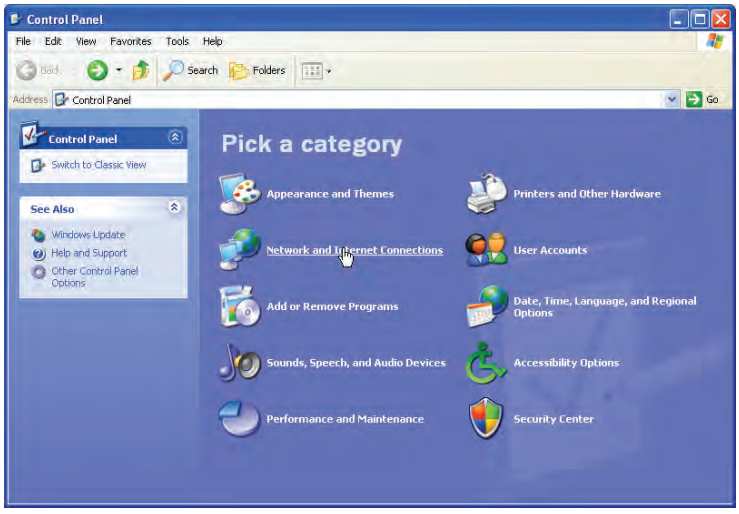
Use the following instructions to configure the workstation so that it can be connected to the scanner.

To Configure the Workstation Network Interface

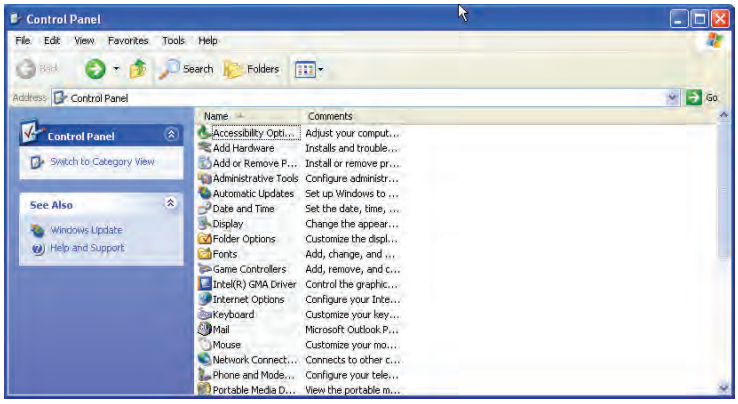
1 Turn on the Workstation and the monitor.

2 From the Windows **Start** menu, open the Control Panel.

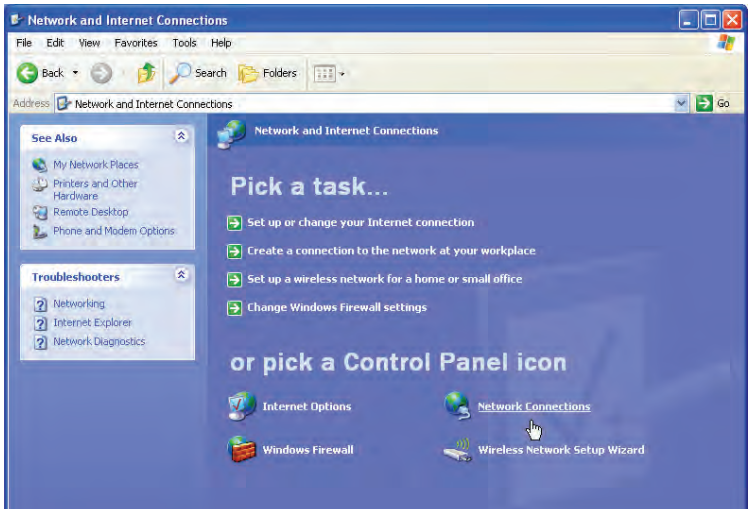
3 In the Control Panel, click **Network and Internet Connections**.



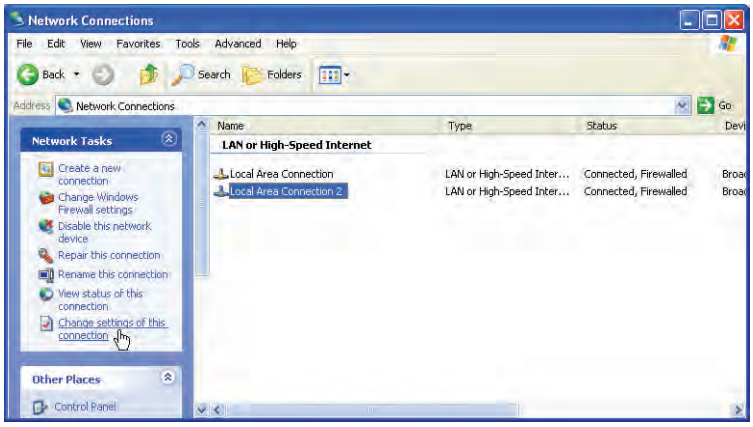
Note: *If the Control Panel view is different from the view shown above, click* ***Switch to Category View****.*



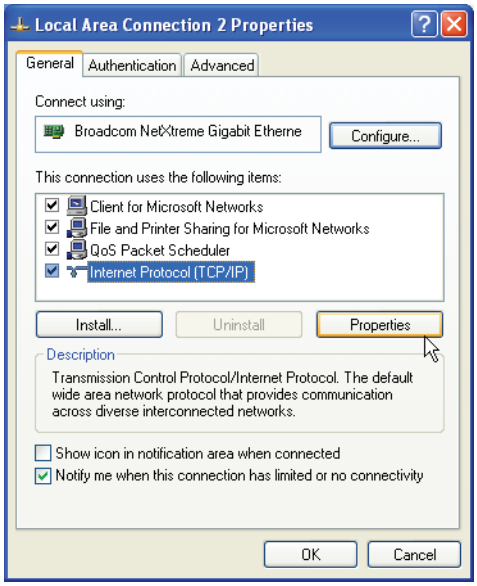
4 In the Network and Internet window, select **Network Connections**.



5 On the right side of the Network Connections window, select **Local Area Connection 2**. Then select **Change settings of this connection** (under Network Tasks).



6 In the Internet Protocol (TCP/IP) Properties dialog box, select **Internet Protocol (TCP/IP)**.



7 In the Internet Protocol (TCP/IP) Properties dialog box, enter the address as follows:

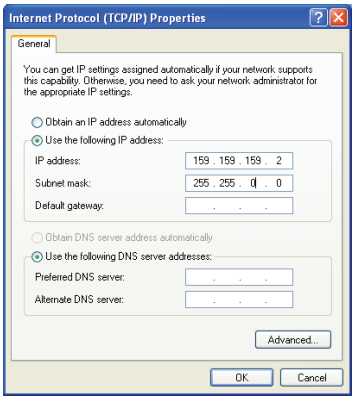
1 Select **Use the following IP address**.

2 In the **IP address** field, enter 159.159.159.2.

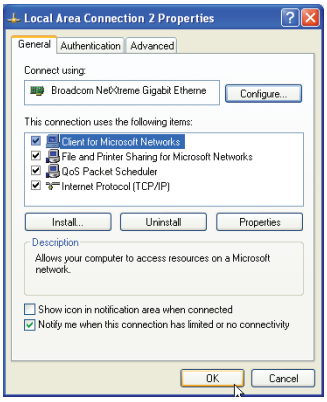
3 In the **Subnet mask** field, enter 255.255.0.0.

4 Leave the remaining fields blank.

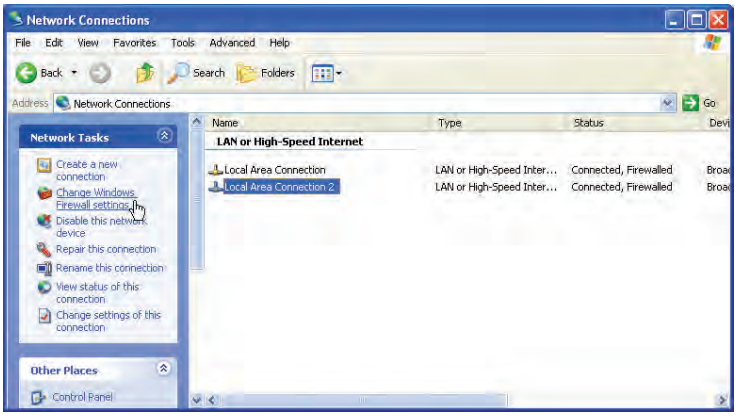
5 Click **OK**.



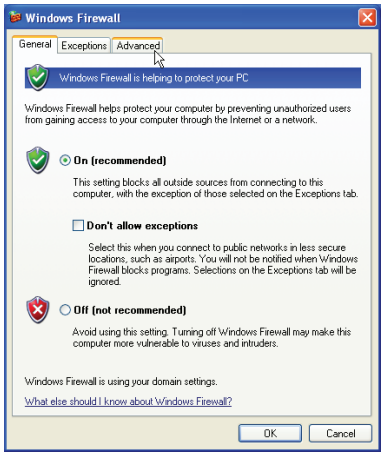
8 Close the Local Area Connection 2 Properties dialog box.



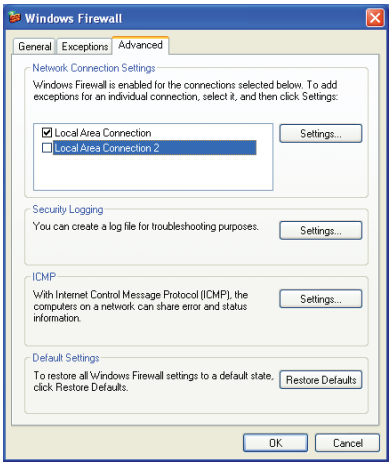
9 In the Network Connections window, select **Local Area Connection 2** and click **Change Windows Firewall Settings**.



10 In the Windows Firewall window, click the **Advanced** tab.



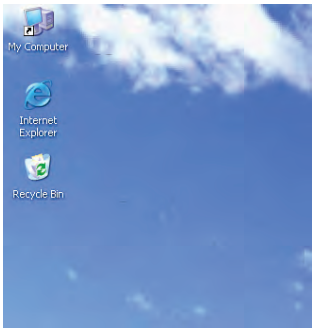
11 Verify the Local Area Connection 2 box is not checked and click **OK**.



12 Close the Network Connections window.

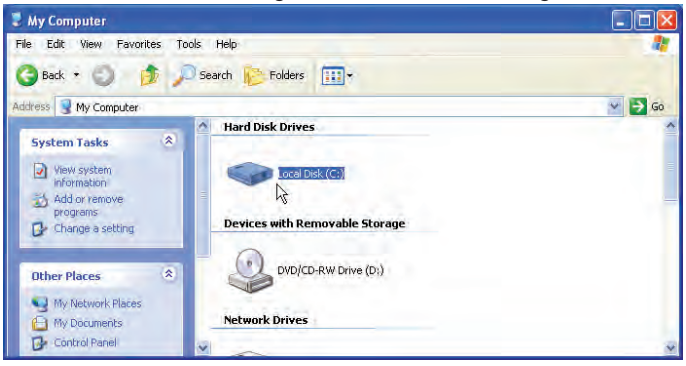
To Map the Scanner Address

1 Double click the **My Computer** desktop icon.

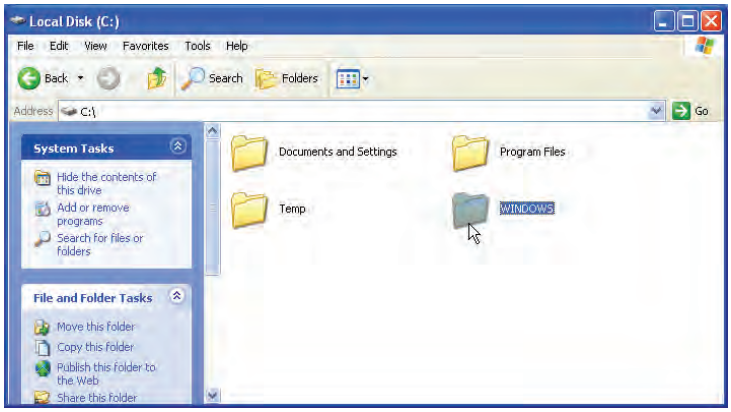


2 Double click the **Local Disk (C:)** icon

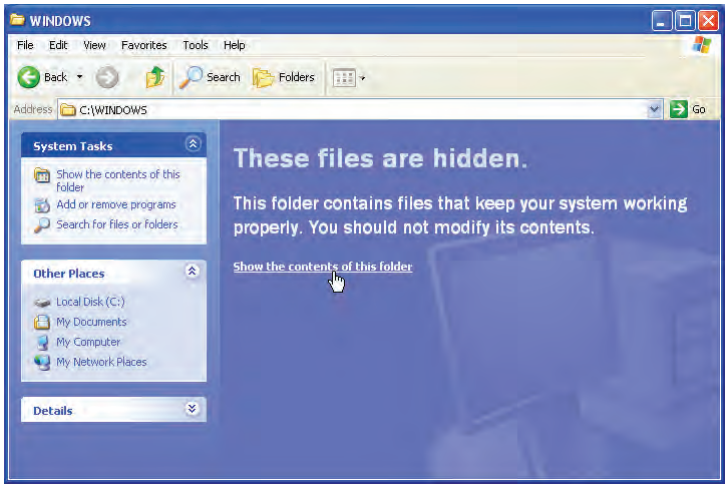
Note: *The C: drive may have be named differently than Local Disk.*



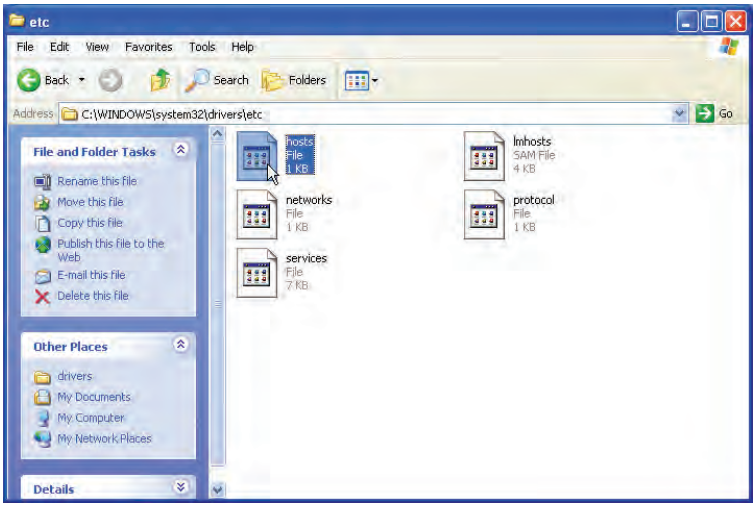
3 Double click the **Windows** folder icon.



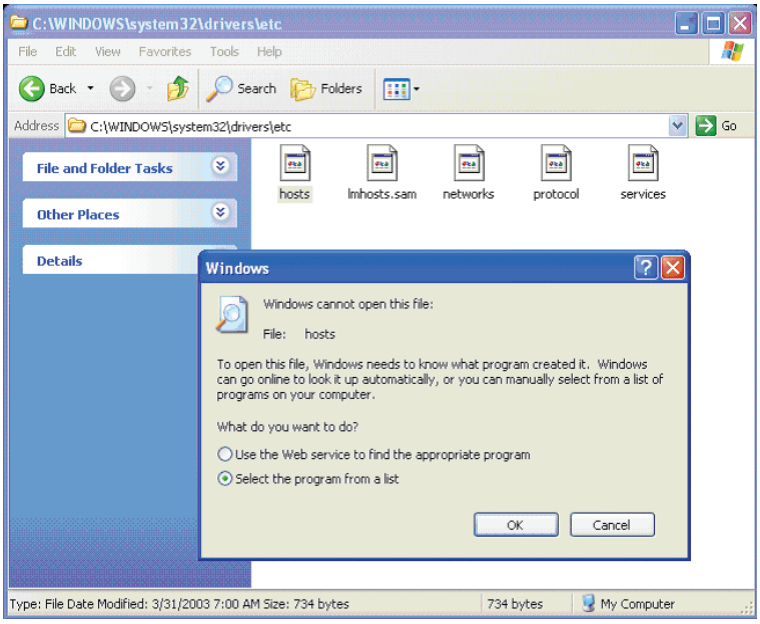
4 If the following message is displayed, click **Show the contents of this folder**.



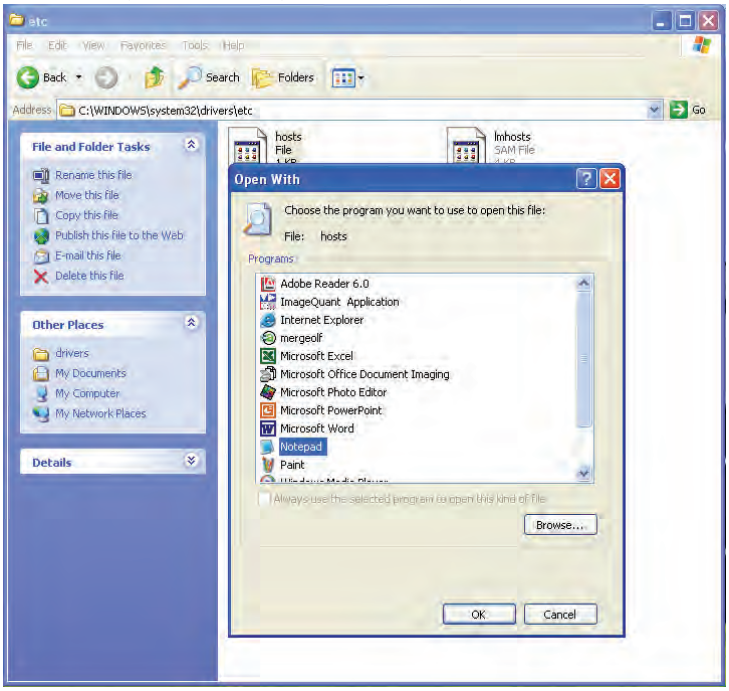
5 Browse to the Windows\system32\drivers\etc folder and double click the **hosts file** icon.



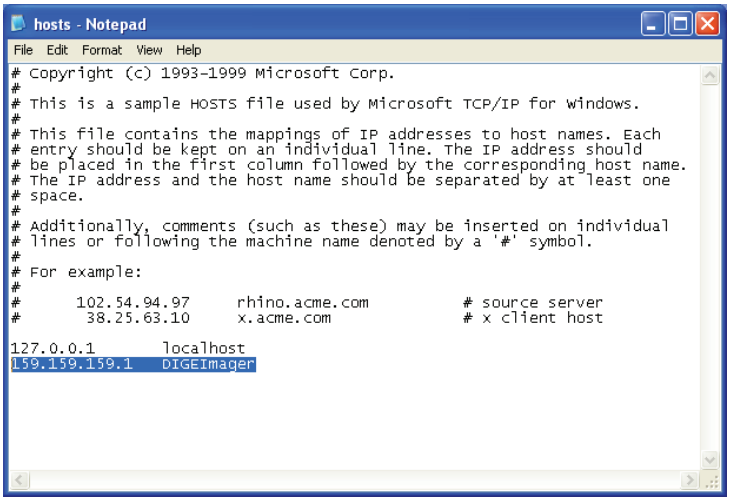
6 If the following message is displayed, click **Select the program from a list** and click **OK**.



7 In the **Open With** dialog box, select **Notepad** and click **OK**.



8 In the Notepad text editor, append the following line to the bottom of the text file: 159.159.159.1 DIGEImager.



9 From the **File** menu, click **Save**.

10 Close the Notepad window.

2.3.2 Install the Scanner software

Use the CD with the auto run script to install the software as follows.

IMPORTANT! Study the readme file thoroughly.

To verify that the workstation can connect to the scanner:

1 Start the workstation and place the CD in the CD ROM.

2 Follow the instructions on the screen to install the software.

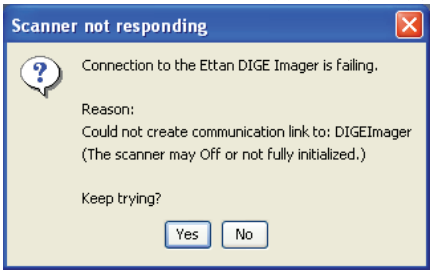
2.3.3 Verify the installation

To verify that the workstation can connect to the scanner:

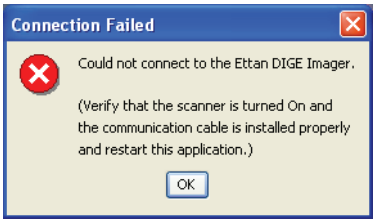
1 Make sure that the Scanner **SCANNING** light is off.

2 Double click the **Ettan DIGE** icon to start the workstation software.

3 If the "Scanner Not Responding" dialog is displayed, click **Yes** to keep trying.



If the monitor displays the “Connection Failed” message, make sure that the network cable is connected properly, and that the scanner **SCANNING** light is off.



When the workstation connects to the scanner, the Ettan DIGE Imager Window opens.

3 Getting Started

This chapter shows how to set up and run a scan, and print a scan report.

3.1 Turn the System On and Off

To turn on the system

1 Make sure that the scanner door is closed.

2 Turn on the scanner and the workstation. When you turn on the scanner, the **POWER** light turns on.

3 The yellow **SCANNING** light turns on as the scanner initializes. When the scanner completes its initialization, the **SCANNING** light turns off.

The Scanner has two other status indicators:

- The **SCANNING** light turns on when the system is acquiring data.
- The **READY** light turns on when the system is ready for scanning (the lamp is on and the camera has cooled to the required operating temperature).

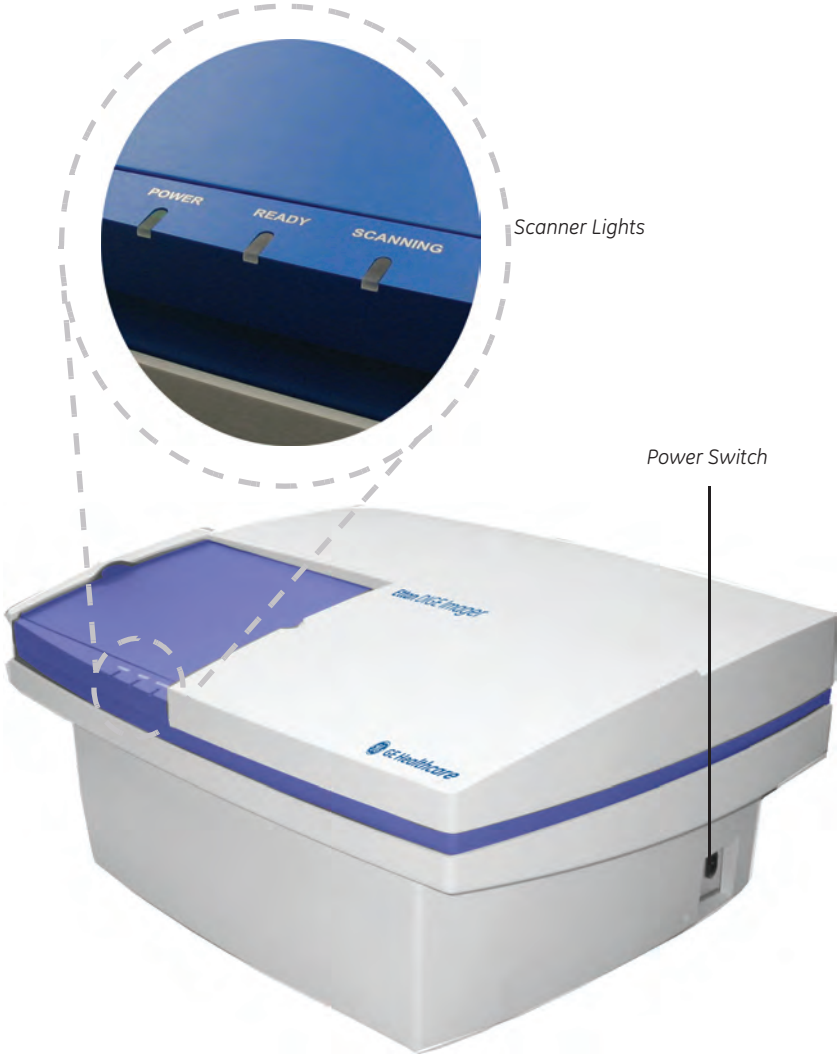
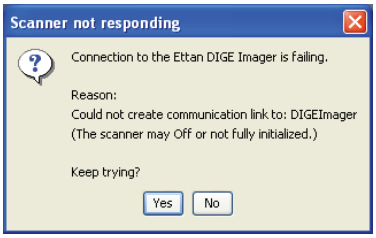


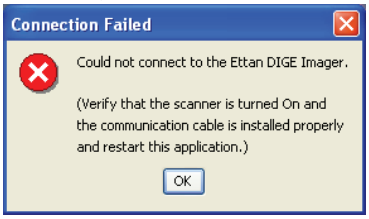
Fig 3-1. Scanner power switch and lights.

4 After the **SCANNING** light turns off, double click the **Ettan DIGE** icon on the desktop to start the DIGE software.

- If the “Scanner not responding” message is displayed, click **Yes**.



- If the monitor displays the “Connection Failed” message, make sure that the network cable is connected properly, and that the **SCANNING** light is off. Then double click the **Ettan DIGE** icon on the desktop.



5 When the workstation connects to the scanner, the Ettan DIGE Window opens.

3.2 Prepare the Cassette for a scan

Before scanning a sample, you must insert it in a cassette. Cassettes are designed to hold and store gels or membranes during scanning. They are chemically resistant and can withstand common gel buffers and fixatives such as acetic acid, ethanol, and PBS.

3.2.1 Types of Cassettes

Gels must be scanned in a cassette. Different types of cassettes are available for different purposes. The Ettan DIGE Imager can be used with the following cassettes:

- Ettan DALT Cassette (Ettan DIGE Imager 276x212 art no 11002704)
- SE600 Cassette (Ettan DIGE Imager 180x160 art no 11002732)
- Mounted Glass Cassette (Ettan DIGE Imager LF glass art no 11002733)

Ettan DALT Cassette

SE600 Cassette

Mounted Glass Cassette

Fig 3-2. Types of Cassettes.

3.2.2 Loading a cassette

Assembled Ettan DALT or SE600 gels

For Ettan DIGE Imager applications the recommended glass plates have low fluorescence characteristics. This allows the gels to be scanned while still assembled within the plates. There are a number of advantages:

- Manipulation is easier and there is less risk of damaging the gel.
- Scans may be performed prior to running the bromophenol blue dye front off the gel so images of low molecular weight proteins, that may otherwise be lost, can be obtained. Gels may then be replaced in the electrophoresis unit to complete the run. Similarly runs can be extended and multiple images captured to obtain greater separation of higher molecular weight proteins.

Note: *Wear powder free gloves. The powder used in laboratory gloves can fluoresce and may also scatter light affecting image quality.*

- Use the Ettan DALT Cassette for an assembled Ettan DALT gel.
- Use the SE600 Cassette for an assembled SE600 gel.

To load a cassette

1 Clean the gel glass plates with distilled water using a lint free cloth. It is important that the glass plates are clean, dry and free from lint. If necessary, clean the inside lid cover of the cassette with distilled water.

2 Insert the dried glass plates into the cassette with the shorter plate facing down. See figure *3-3 Inserting plates in a DALT Cassette.*

The shorter plate should rest in the seal at the bottom of the cassette. The large plate should hang over the area at the rear of the cassette.

Note: *The positioning of the strip on the gel is of importance in order to achieve the correct orientation of your image. After inserting the gel into the cassette and looking from above, if the acidic side of the strip is pointing to the right, the image needs to be flipped to achieve the correct orientation. This can easily be done using the Report viewer (see 5.5 Rotate or Crop the Image).*

Note: *For experimental guidelines refer to the Ettan DIGE System User Manual, 18-1173-17.*

Fig 3-3. Inserting plates in a DALT Cassette.

3 Put the lid on the cassette and close the cassette by turning the locking cams up, as illustrated in Fig 3-4.

Fig 3-4. Closing the cassette locking cams.

Bound gels

Gels that are cast on Bind-Silane treated glass plates remain attached to the treated plate when the top plate is removed.

Note: *Make sure that the smaller glass plate of the Ettan DALT is the one treated with Bind-Silane.*

Gel fixing and staining is performed on the bound gel (e.g. using Deep Purple stain). Once the staining procedure has been completed the gel can be placed in the cleaned Ettan DALT/SE600 Cassette in two ways:

1 Gel side up - place in the cassette with the gel side up, in the same manner as described for assembled gels. Ensure that the glass plate is cleaned and dried before inserting it into the cassette.

   Note: *To achieve the correct orientation of your image, it is assumed that you have bind silane treated the shorter plate and that the strip was placed with the acidic side to the right (having the shorter plate towards you when putting on the strip). However, the image can easily be flipped using the Report Viewer (see 5.5 Rotate or Crop the Image).*

2 Re-assembled - the untreated plate (which was previously removed), can be replaced to reform the glass-gel-glass sandwich. To do this a small quantity of the gel storage buffer / fix solution needs to be applied to the bound gel and the upper plate carefully lowered onto the gel taking care to exclude air bubbles. Alternatively, the bound gel can be kept submerged in the gel storage solution and the upper plate applied. In either case the outer plates need rinsing with de-ionized water and then wiping dry with lint free tissues before being placed in the cassette. Follow the instructions for assembled gels.

Naked gels or gels other than Ettan DALT and SE600

For naked gels and gels other than Ettan DALT or SE 600, the cassette with the permanently mounted glass plate - Mounted Glass Cassette - should be used.

1 Clean the glass plate with distilled water and dry it using a lint free cloth. Since fluorescent material has come into direct contact with the glass plate we recommend using a lint free tissue moistened with 10% hydrogen peroxide to remove this material, followed by cleaning with distilled water.

2 Place the gel(s) directly on the plate. First squirt a small amount of distilled water onto the plate, taking care to exclude air bubbles as the gel is positioned.

   Note: *Up to six small gels can be placed on the gel plate.*

3 Note the positions of the gel boundaries on the plate, See Fig 3-5. You will use this information to determine the area(s) to be scanned, see *3.3 Set Up a scan*.

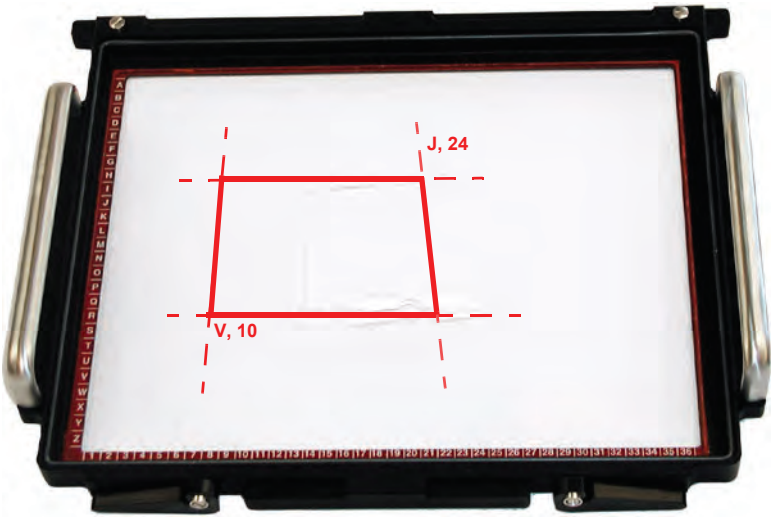


Fig 3-5. Marking gel position on a standard cassette.

4 Put the lid on the cassette, see Fig 3-4, and close the cassette by turning the locking cams up.

Membranes

When scanning membranes the cassette with permanently mounted glass plate - Mounted Glass Cassette - should be used. In order to achieve optimal calibration when scanning, the black plastic hold down plate should be placed on top of the membranes.

Note: *Wear powder free gloves when handling the cassette and membranes. The powder used in laboratory gloves can fluoresce and may also scatter light affecting image quality.*

To load a cassette

1 Clean the glass plate with distilled water and dry it using a lint free cloth. Since fluorescent material has come into direct contact with the glass plate we recommend using a lint free tissue moistened with 10% hydrogen peroxide to remove this material, followed by cleaning with distilled water.

2 Place the membrane(s) directly on the plate with the protein side facing down. If the membrane(s) is wet make sure to exclude air bubbles when positioning it.

3 Note the positions of the membrane boundaries on the plate. You will use this information to determine the area(s) to be scanned, see Set Up a scan.

4 Place the hold down plate in the cassette on top of the membranes.

5 Put the lid on the cassette (see Fig 3-4), and close the cassette by turning the locking cams up.

3.2.3 Inserting a cassette

To insert the cassette

1 Slide the Scanner door (at the top of the scanner) until it is fully open.

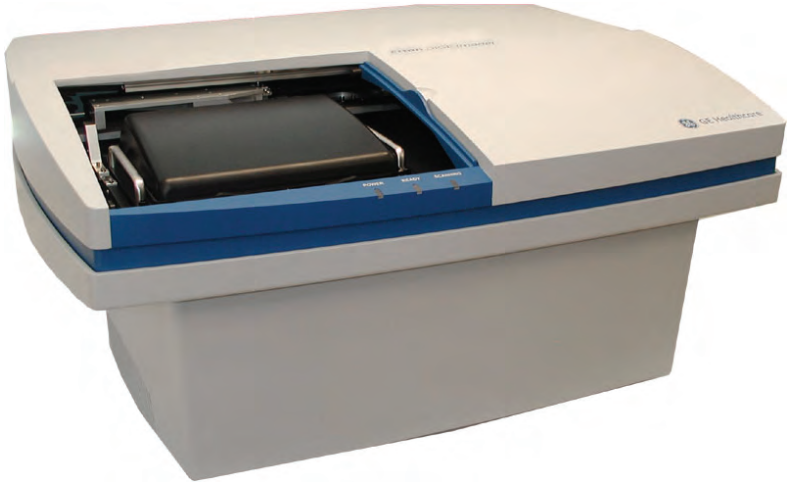


Fig 3-6. The Scanner door

2 Insert the cassette into the scanner as follows:

Insert the cassette with the cams towards you and tilted up so that the cassette fits under the beveled edge on the carrier.

Fig 3-7. Inserting the cassette

Push down and in on the front of the cassette to lock it in place.

Fig 3-8. Locking the cassette

3 Close the scanner door.

3.3 Set Up a scan

Start the Scanner Software by double clicking the **Ettan DIGE Imager** icon on the workstation desktop or by using the start menu: **Start:Programs/ GE Healthcare/Ettan DIGE Imager**. The scanner software Ettan DIGE Imager window opens in Setup View.

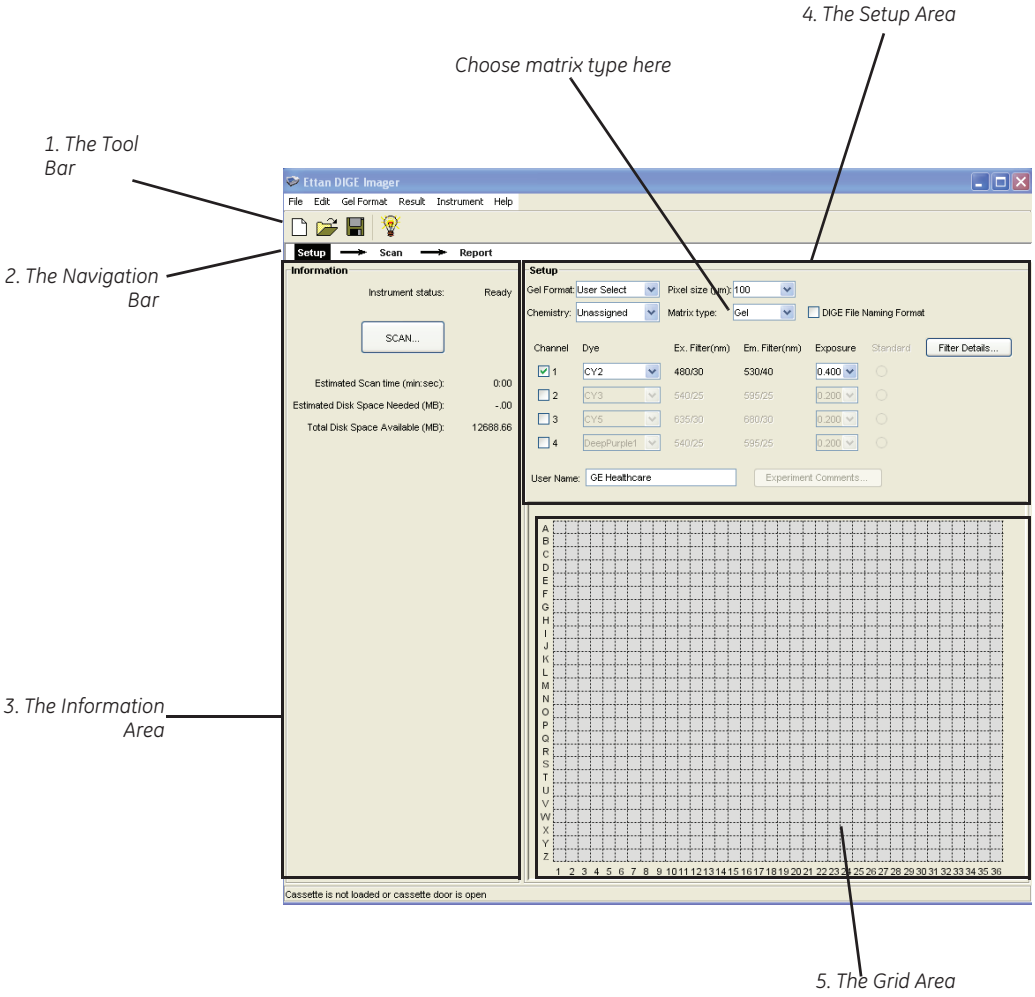


Fig 3-9. The Ettan DIGE Imager Setup View

1 The **Tool Bar** is used to manage scan templates and to turn on the scanner light

2 The **Navigation Bar** shows the status of the scan workflow.

3 The **Information Area** shows the instrument status, displays information about the scan, and includes the **SCAN** button that is used to start a scan.

4 The **Setup Area** contains the parameters and settings for the scan.

5 The **Grid Area** defines the area or areas to scan. The grid coordinates are aligned with those on the cassette.

3.3.1 Scanning gels

Set up a gel scan

In the Setup Area of the setup view, the parameters and settings for the scan are set.

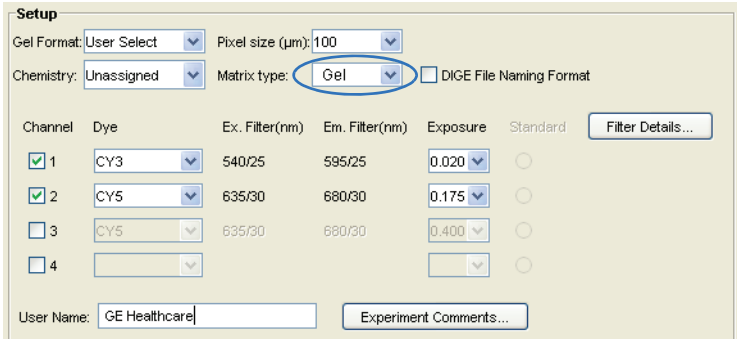


Fig 3-10. Parameters and settings in the Setup Area

The steps below do not have to be performed in a strict order.

1 **Matrix type**
Choose **Gel** in the **Matrix type** drop down list.

2 **Gel format**
The **Gel format** list is used to set the scan area. There are three options for setting the scan area:

Option 1 - Predefined Gel Formats
For Ettan DALT, SE600 gel and for one to six naked miniVE gels there are predefined gel formats (see section *4.2 Standard and Custom Gel Formats*)

Option 2 - User Select
In this mode, you can manually set the area to be scanned (e.g. can be used when scanning two naked minVE gels). In the **Gel Format** list in the Setup Area, choose **User Select**. Then use the mouse and drag a box.

Option 3 - User defined gel format /custom gel format
You can use a predefined (custom created) gel format from the **Gel Format**

list in the Setup Area. See section *4.2.2 Create Custom Gel Formats* for information about how to create custom gel formats.
Select the appropriate gel format for your sample.
The scan area is shown as a blue box in the Grid Area

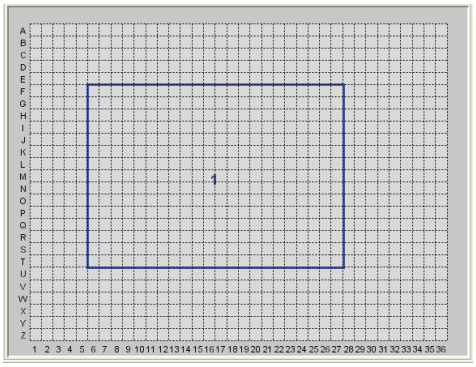


Fig 3-11. Grid Area.

3 **Chemistry**
Specify the type of chemistry used for your sample by selecting an item in the **Chemistry** list.

4 **Pixel Size**
Select the pixel size, i.e. resolution to use, in the **Pixel size** list. 100 µm should be used if images are to be analyzed by DeCyder.

5 **Channels and dyes**
Select the number of channels to be scanned by clicking the **Channel** check box. Between one and four channels can be programmed. Selection of the **Channel** check boxes must be performed in sequential numerical order. For each selected channel, select a dye to be scanned in that channel. When selecting a dye, the excitation and emission filters that are used with that dye are automatically displayed by the software. The excitation and emission filter combinations have been selected to deliver optimum results with a minimum of crosstalk.

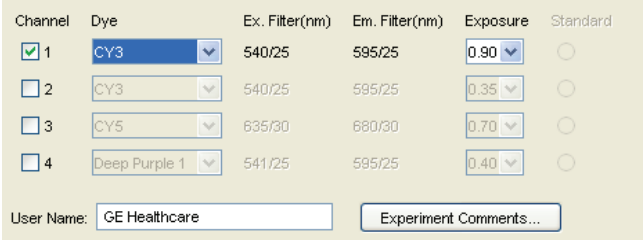


Fig 3-12. Filter settings

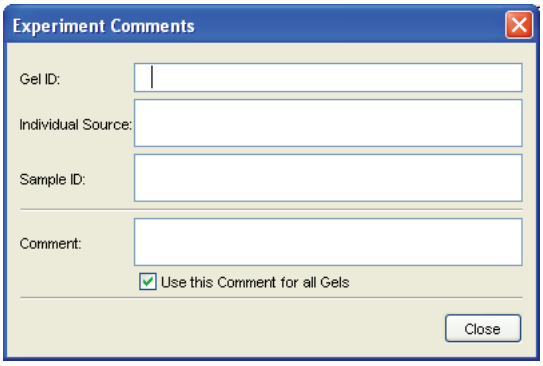
Note: *There are two filter combinations for Deep Purple and Sypro Ruby, available as Deep Purple/Sypro Ruby 1 and Deep Purple/Sypro Ruby 2. Deep Purple 1 and Sypro Ruby 1 should be used for optimum results whereas Deep Purple 2 and Sypro Ruby 2 are optional filters to be used in order to minimize crosstalk, i.e. when Cy dyes are present in the gel.*

If you have selected DIGE file naming format, and have a standard defined in your experiment, specify which dye represents the standard under **Standard**.

6 **Exposure**
Select the exposure to be used for each channel in the **Exposure** list. A quick test scan on a small area should be performed initially to identify a suitable exposure. See section 3.4.1 Finding the optimal settings.

7 **Comments**
You can optionally add comments to your data. To add comments to the data:

1. At the bottom of the Setup Area, click **Experiment Comments** to open the Experiment Comments dialog box.



2. Enter the Gel ID, the Individual Source, and the Sample ID.

3. Enter Comments for the scan. To use the same comments for all the gels in this scan, select **Use this Comment for all Gels**. (This option only applies to the Comments field. All other fields are always specific to each gel area.)

4. Click **Close**.

3.3.2 Scanning membranes

Set up a membrane scan

In the Setup Area of the setup view, the parameters and settings for the scan are set.

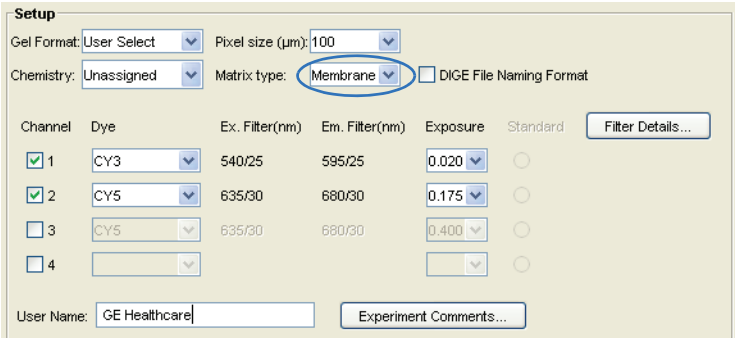


Fig 3-13. Parameters and settings in the Setup Area.

1 **Matrix type**:
Choose Membrane from the **Matrix Type** list.

Note: *When scanning membranes the black plastic hold down plate should be used. See page 36.*

The following steps do not have to be performed in a strict order.

2 **Gel format**
The **Gel format** list is used to set the scan area. In the **Gel Format** list in the Setup Area choose **User Select**. In this mode, you can manually set the area to be

scanned. Then use the mouse and drag a box from the positions of the membrane boundaries. The scan area is shown as a blue box in the Grid Area.

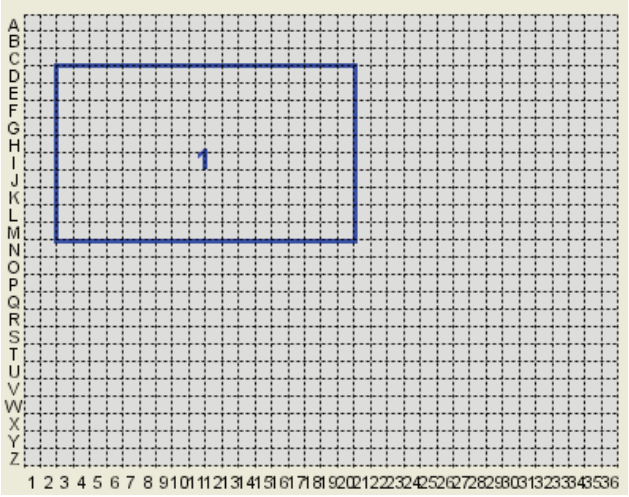


Fig 3-14. Grid Area.

3 **Chemistry**
When scanning membranes the **Chemistry** should be **Unassigned**.

4 **Pixel Size**
Select the pixels size, i.e. resolution to use, in the **Pixel size** list. 100 µm should be used.

5 **Channels and dyes**
Select the number of channels to be scanned by clicking the **Channel** check box. Between one and four channels can be programmed. Selection of the **Channel** check boxes must be performed in sequential numerical order. For each selected channel, select a dye to be scanned in that channel. When selecting a dye, the excitation and emission filter to be used for that dye are presented automatically by the software. The excitation and emission filter combinations have been selected to deliver optimum results with a minimum of crosstalk.

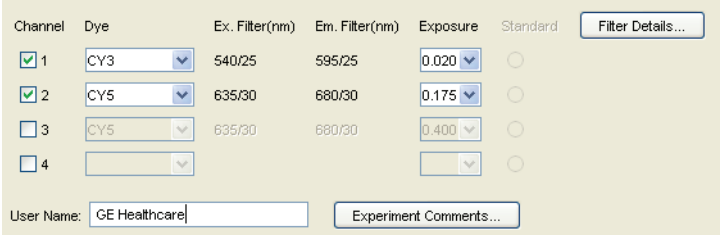


Fig 3-15. Filter settings.

6 **Exposure**
Select the exposure to be used for each channel in the **Exposure** list. Generally low exposures are used for membranes. However, a quick test scan on a small area should be performed to identify an optimal exposure. See *Finding the optimal settings* in section 3.4.1.

7 **Comments**
You can optionally add comments to your data. To add comments to the data:

1 1 At the bottom of the Setup Area, click **Experiment Comments** to open the Experiment Comments dialog box.

2 2 Enter the Membrane ID, the Individual Source, and the Sample ID.

3 3 Enter Comments for the scan. To use the same comments for all the gels in this scan, select **Use this Comment for all Gels**. (This option only applies to the Comments field. All other fields are always specific to each gel area.)

4 4 Click **Close**.

To start the scan and for more information see *Start a scan* and following chapters.

3.4 Scan a sample

3.4.1 Finding the optimal settings

The exposure can be set from 0.02 to 4. The exposure chosen depends on the type and quantity of fluorophore present. A test-scan, scanning only a small area, should be performed to identify a suitable exposure. This allows a rapid scan that will help finding the optimal settings. The area should be placed somewhere on the gel were the most intense spots are supposed to be.

CAUTION: The maximum pixel value should not exceed 65 000 counts. If some of the pixel values are equal to or greater than 65 000 counts, part of your image is at or near saturation. This will prevent correct quantitative analysis.

For the E.coli model system used at GE Healthcare (50 µg protein labeled with 400 pmol dye, run on 24 cm pH4-7 NL Immobiline DryStrips strips that are then used with the second dimension run on Ettan DALT gels) the following exposure levels can be used as guidelines:

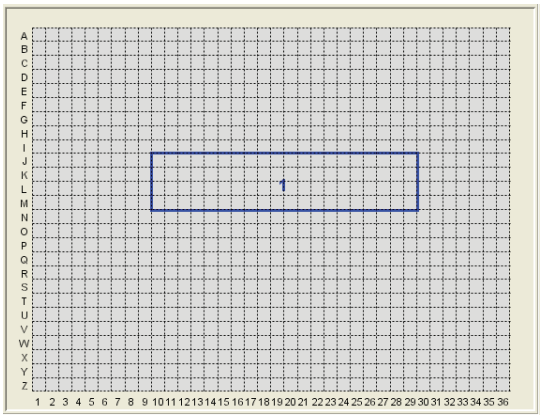


Fig 3-16. Choosing a small test scan area

Fluorophore	Exposure levels
Cy2	0.8
Cy3	0.3
Cy5	0,5

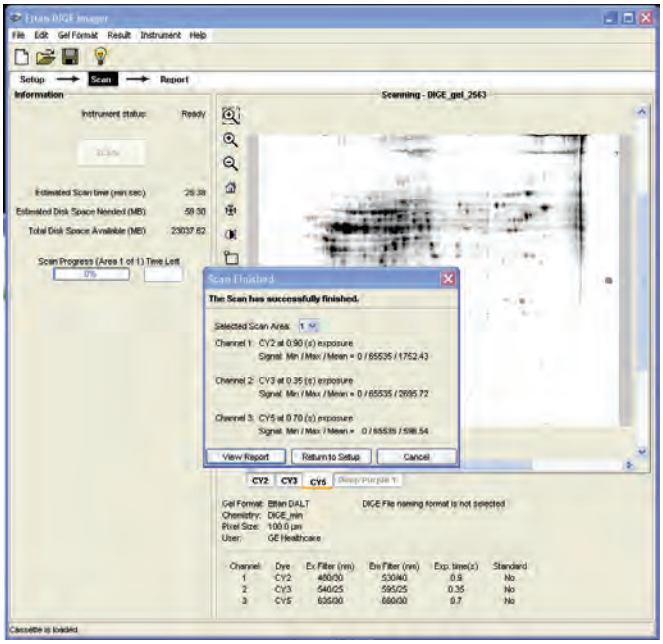


Fig 3-17. Scan finished.

A target signal of 30 000 to 55 000 is usually suitable. Similarly if only one or two spots show saturation then only minor downward adjustments to the exposure setting are normally required. It is not necessary to optimize scan settings for every gel. To avoid problems with saturated images it is recommended that users confirm that suitable image signals have been obtained before discarding gels. Once the exposure has been selected for one gel in an experiment all similar gels within the same experiment should be scanned using the same exposure.

After you have entered the settings for the scan, use the following instructions to scan the sample.

3.4.2 Start a scan

1 Make sure that the Instrument status in the Information area displays "Ready" and that the **READY** light on the scanner is on.

2 If the Instrument status is "Lamp Off", click  on the toolbar or go to the menu under Instrument/Toggle Lamp and wait until the lamp warms up. The Scanner Lamp Warming Up Message box displays an estimated time of "when the scanner will be ready" and closes when the lamp is warmed up, this takes approximately 5 minutes. When the Scanner Lamp is warm the **READY** light is on.

3 Click the **SCAN** button to start the scan.

4 In the File Name Dataset dialog box, browse to a directory and enter a name for the dataset, or choose **New folder** to create a new folder.

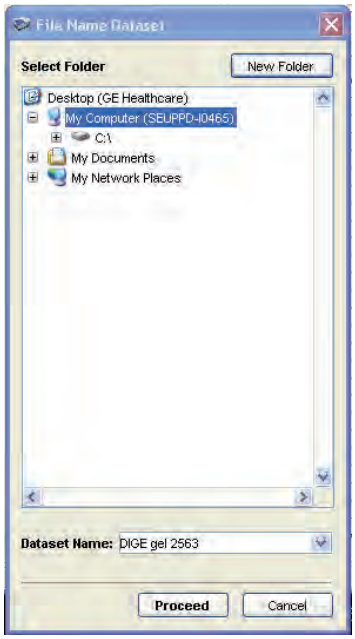


Fig 3-18. File Name Dataset dialog box

Note: *Depending on whether the DIGE File Naming Format check box has been selected or not the scanned files will end up with different filenames and folder structure, see 6 File formats for more information on DIGE File Naming Format.*

Note: *Dataset names must be unique. If you enter the name of an existing dataset, you will be prompted to overwrite it.*

5 Click **Proceed** to start the scan.

After you press the **SCAN** button, the view changes to Scan and the bottom label changes to **STOP**.

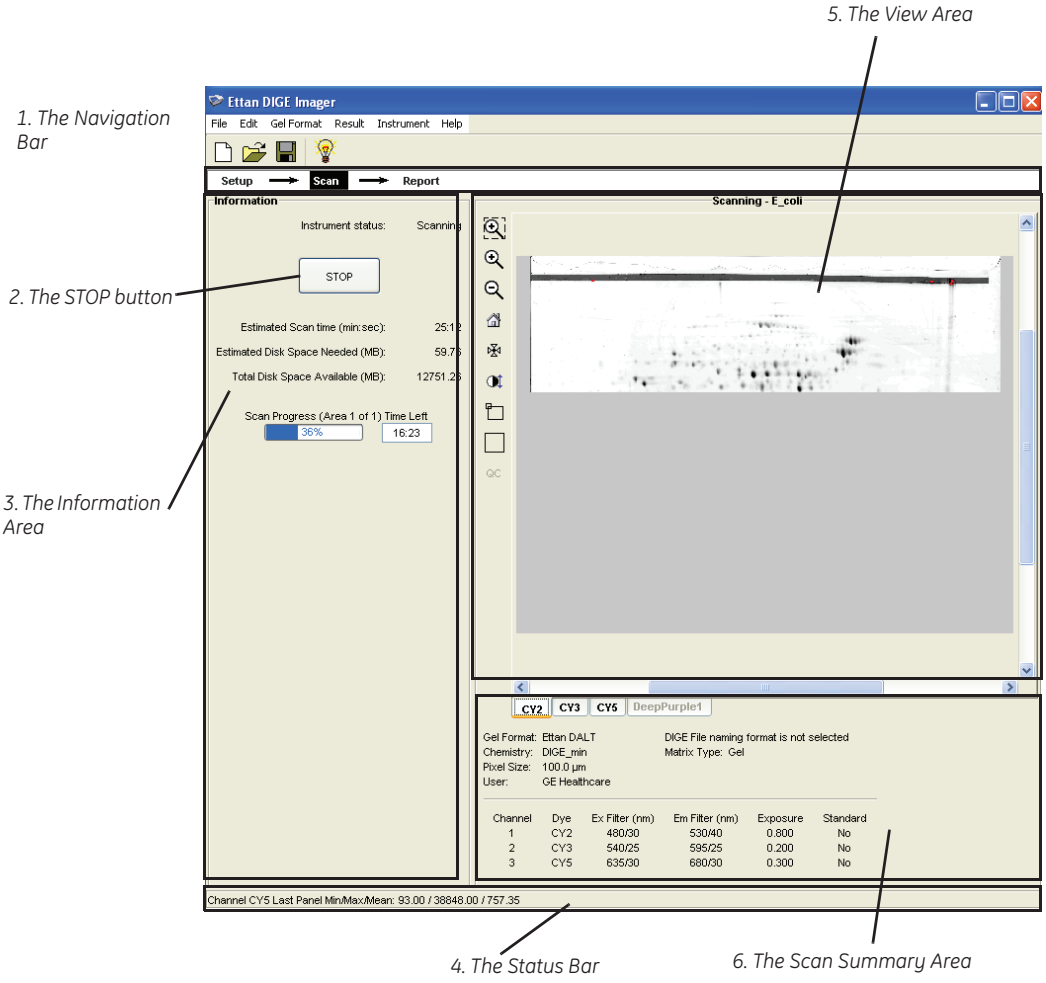


Fig 3-19. The Scan View

1 The **Navigation Bar** indicates Scan View.

2 The **STOP button** interrupts a scan.

3 The **Information Area** displays the estimated scan time and the progress of the scan.

4 The **Status Bar** displays the channel intensity ranges and saturation values for each panel after it is scanned.

5 The **View Area** displays scan data for each channel as it is scanned.

6 The **Scan Summary Area** at the bottom right corner shows the scan settings.

While the samples are being scanned, monitor the data quality of each channel in the View Area and Status bar.

The data is scanned in horizontal panels (strips) across the scanned area. The data for all of the channels in a panel is scanned before moving to the next panel.

1 The Status bar displays the channel intensity ranges and saturation values for each panel after it is scanned. Saturated areas of the displayed channel are shown in red.

2 If the data for any of the channels are saturated or underexposed, you can stop the scan and change the scan settings as follows:

a) On the left side of the Scan window, click the **STOP** button.

Note: *When you click the **STOP** button all scanned data is deleted.*

b) When prompted, click **OK** to cancel the scan.

c) On the Navigation Bar, click **Setup**.

d) In the **Exposure** field, change the exposure. (If the scan data is too faint, enter a larger exposure. If it is overexposed, enter a smaller exposure.)

e) Click the **SCAN** button to restart the scan.

3 Monitor the scan and adjust exposure values, as shown in Steps 2c and 2d above, until you are satisfied with the quality of the data and let the scan finish. Please see *3.4.1 Finding the optimal settings* for a quick way of finding the right settings.

4 As the scan is completed, a message indicates that the scanner is creating gel files.

Note: *When scanning more than one channel, scan data files (in a .gel format) are created in the dataset directory. Two identical index files (in a .ds format) are also created. One index file resides in the dataset directory. The other index file resides at the same level as the dataset directory. When scanning one channel only scan data files in a .gel format are created.*

When the scan is complete, the Scan Finished dialog box appears.

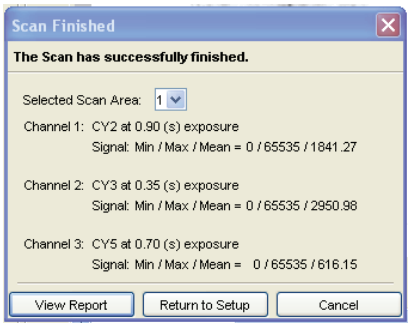


Fig 3-20. Scan finished dialog box

5 To close the Scan Finished dialog box and return to the Setup View, click **Return to Setup**.

6 To view a report, choose a scan area in the **Select Scan Area** list and click **View Report**.

3.5 The Report view

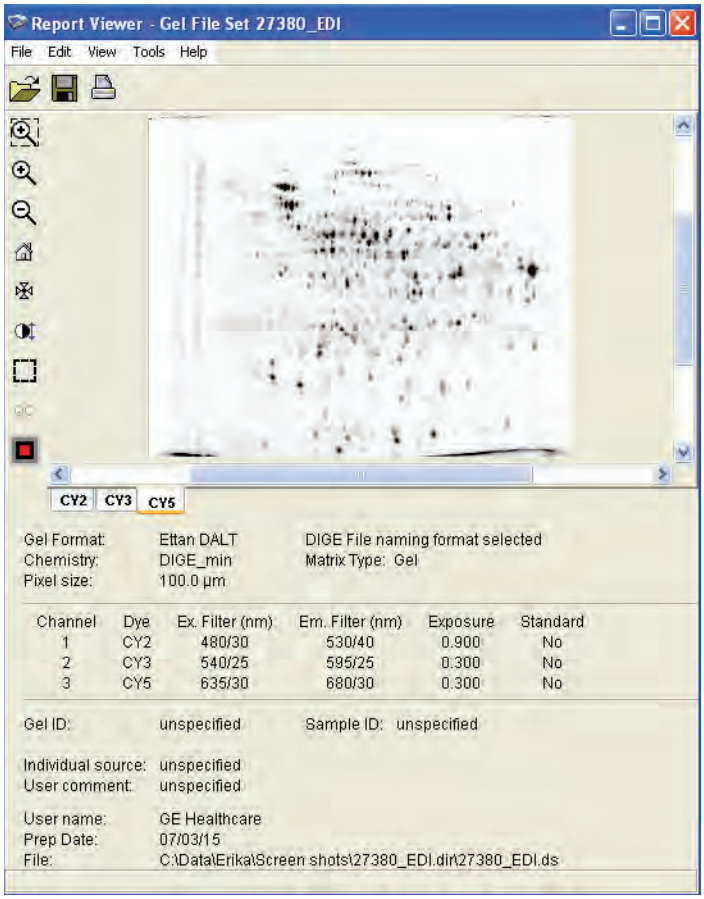


Fig 3-21. The Report Viewer

The Report Viewer summarizes the View area and the Information Summary area of the Scan View.

Use the Report Viewer to view an image of each channel, along with the scan settings and comments associated with the scan data.

You can use the Report Viewer to reorient or crop the scan data. You can also use it to adjust brightness and contrast of the display, measure features, and add a scale bar. See 5 Using the Report Viewer.

To print reports

- To print Scan reports for all of the dyes, choose **File:Print All** in the **Report Viewer** menu.

- To print a scan report for a specific dye, select the **Dye** tab 

in the Report viewer. Then choose **File:Print Current** in the **Report Viewer** menu.

3.6 To turn off the system

1 Save all data files.

2 In the Ettan DIGE window, choose **File:Exit** to close the scanner software.

3 Shut down the workstation.

4 Turn the **Power** switch off to shut down the scanner.

4 Customizing Templates and Gel Formats

This chapter shows how to create and modify a template and how to set up a custom format to scan gels.

4.1 Templates

You can create templates that save the gel formats and scanner parameters for a scan. When you load a similar type of sample in the cassette, you can open the template that loads these scan settings. This is useful when you are scanning a number of samples that have similar attributes.

4.1.1 Create a New Template

You can create a new template after you set up a scan. If you have already created a template that is similar to what you need, you can load it, modify it, and save it with a different name using ***Save as***.

To create a template from a scan

1 Set up a scan as shown in *3.3 Set Up a scan*.

2 In the ***File*** menu, choose ***Save Template As.*** Then enter the name for the new template in the ***Scan Template Name*** field and click ***OK***.

The new template is saved in your user preferences. When you are logged on to your account, it appears in the Open Scan template dialog box. (The template is not available to other users.)

To create a template from an existing template

1 In the Ettan DIGE Imager window, choose ***File:Open Template*** and select a template in the Open scan template dialog box.

2 In the Setup area, modify the settings for the Gel Format, Chemistry, and other parameters and select the dyes for the new template.

3 In the **File** menu, choose **Save Template As**. Then enter the name for the new template in the **Scan Template Name** field and click **OK**.

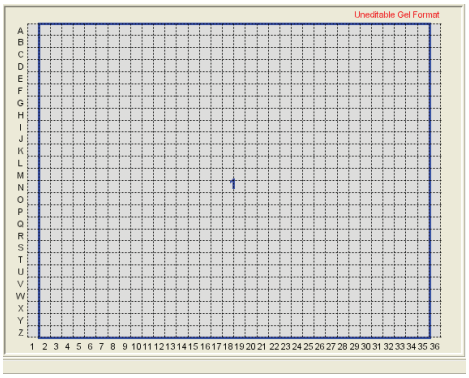
4.2 Standard and Custom Gel Formats

The gel format controls the shape of the scan area. If you are using a DALT gel, you can use the standard DALT gel format (Ettan DALT). You can also use standard formats for any other gels, provided that these formats scan all of the areas covered by the gels.

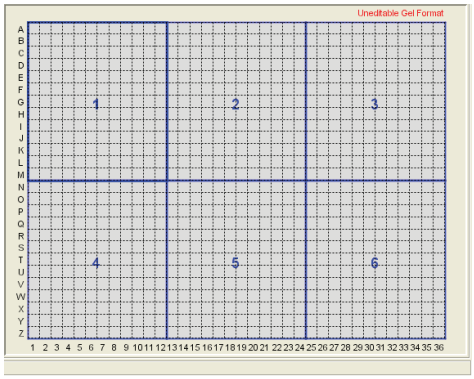
CAUTION! When setting up a gel format, make sure that the scan area includes all of the area covered by the gel. (Because the gels have irregular shapes, some areas outside of the gel perimeter should be scanned.)

4.2.1 Standard Gel Formats

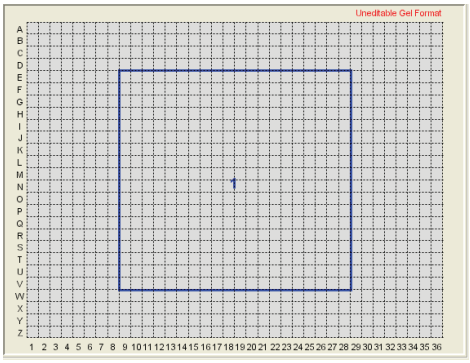
The **Gel Format** list includes the following standard Gel formats. These formats are read only and cannot be modified.



Ettan DALT



Hoefer miniVE



Hoefer SE600

Fig 4-1. Standard Gel Formats

4.2.2 Create Custom Gel Formats

You can create custom gel formats to scan irregular areas. This is especially useful when you are scanning “naked” gels.

To create a custom gel format

1 Open the cassette and note the position of the gel areas, based on the numbers and letters on the side of the cassette. Make sure that the rectangles formed by the coordinates cover the entire sample. Then load the cassette into the scanner.

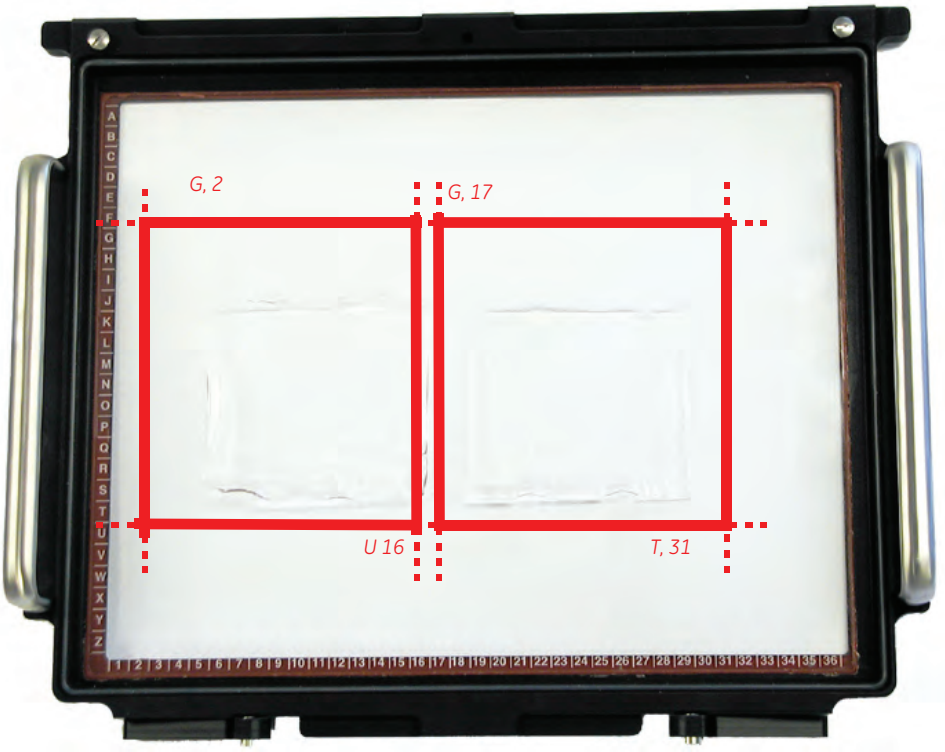
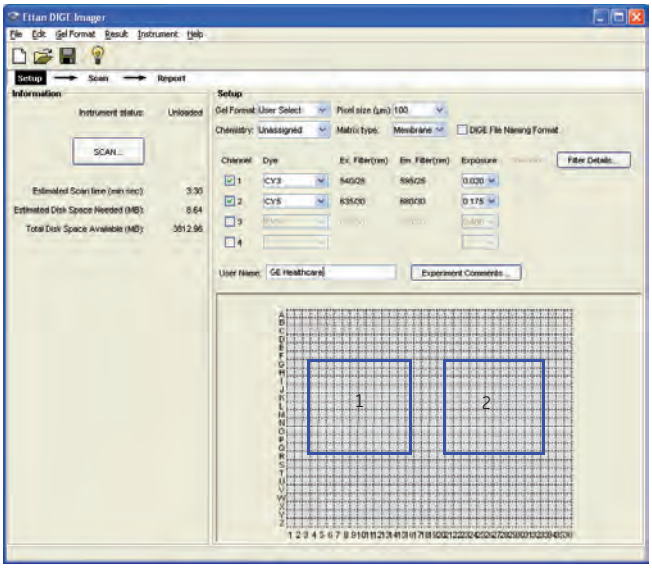


Fig 4-2. The gel area

2 In the **Gel Format** list on the Ettan DIGE Imager window Setup area, choose **User Select**.

3 Click and drag the mouse across the grid area to create new scan areas that match the areas on the cassette.



Tips for modifying scan areas

To move the scan area, hold down the left mouse button on the area and drag the mouse.

To change the size of the scan area, use the mouse to drag an edge or corner of the scan area.

To delete a scan area, select it and press the **Delete** key.

To specify not to scan an area, double click on the area. (The area is grayed out.)

Fig 4-3. Creating a custom scan area

4 From the **Gel Format** menu, choose **Save** to save the changes to the new format.

5 In the Save Gel Format dialog box, enter a new format name, and click **OK** to save the new format.

The new Gel format is added to the **Gel Format** list.

5 Using the Report Viewer

This chapter shows how to use the Report Viewer to document scan data.

5.1 About the Report Viewer

You can use the Report Viewer to perform quality control checks, crop images and to print scanned images. This tool allows you to examine the scanned images and to rotate and flip them, if needed, to get the orientation used in DeCyder. You can choose to open the Report when a scan is complete or you can open it by clicking **Report** in the navigation bar.

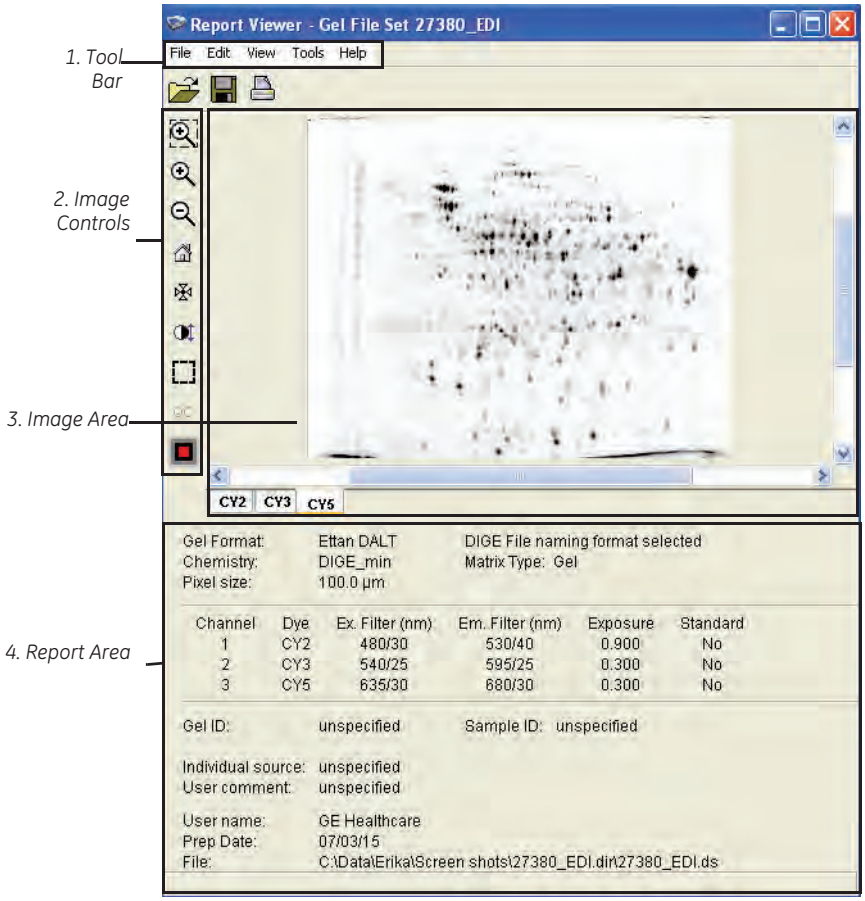


Fig 5-1. The Report Viewer window has four main areas.

1 The **Tool Bar** across the top of the window is used to open, save, or print images.

2 The **Image Controls** on the left side of the window allow you to control the display of the image.

Use	To
	Zoom in on a specific area. After you select this tool, drag the mouse across an area to select it.
	Zoom in on the entire image.
	Zoom out on the entire image.
	Return the image to its original center and reset the zoom to the default level (1:1).
	Reset the center of the image to a particular point of interest.
	Open the Image Scaling tool to adjust the brightness and contrast of each channel.
	Select an ROI for cropping the image.
	"Quick Compare" a channel with the standard channel. This quick comparison is useful for quality checks.
	Show saturated areas in red.

3 The **Image Area** displays one channel of the scanned image. Use the tabs at the bottom of the window to view different channels.

4 The **Report Area** at the bottom of the window displays the data for the scan, including the user, date, channel descriptions, scan parameters, and comments.

5.2 Set the Image Contrast

You can improve the contrast of selected data in a channel by changing the channel's intensity scale.

The Report Viewer uses grayscale values to display an intensity scale. The lightest grayscale value is mapped to the lowest (dimmest) intensity value in the wavelength and the darkest grayscale value is mapped to the highest (brightest) intensity value. The remaining grayscale values are mapped to values between the lowest and highest values.

Grayscale values can be mapped to create linear or nonlinear intensity scales. In linear scales, the grayscale values are mapped to intensity values that are distributed evenly from the minimum to the maximum values. In nonlinear

scales, the grayscale values are mapped to intensity values that are distributed unevenly throughout the range.

To change the intensity scale

1 In the Report Viewer window, click  to open the Image Contrast window. This window shows the image intensity scale. The histogram is a frequency plot that shows the distribution of pixel intensities in the image file. The Y-axis shows the number of pixels for a given intensity.

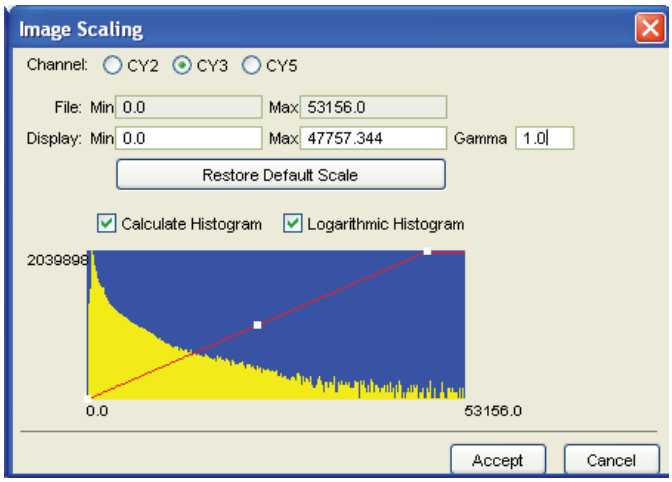


Fig 5-2. The Image Contrast window

2 Select a **Channel** option to specify which channel to scale (in our example, we selected **Cy3**).

3 To change the minimum or maximum scale value, click and drag on the left or right white control point.

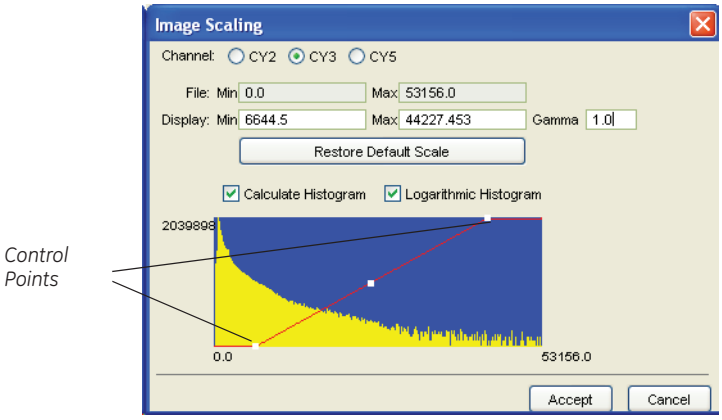


Fig 5-3. Image Contrast: left and right control points

As you move the control points, the displayed image changes interactively. Data values higher than the maximum value are assigned the lightest shade. Values lower than the minimum value are assigned the darkest shade.

4 To slide the range to the left or right, click and drag on the center control point.

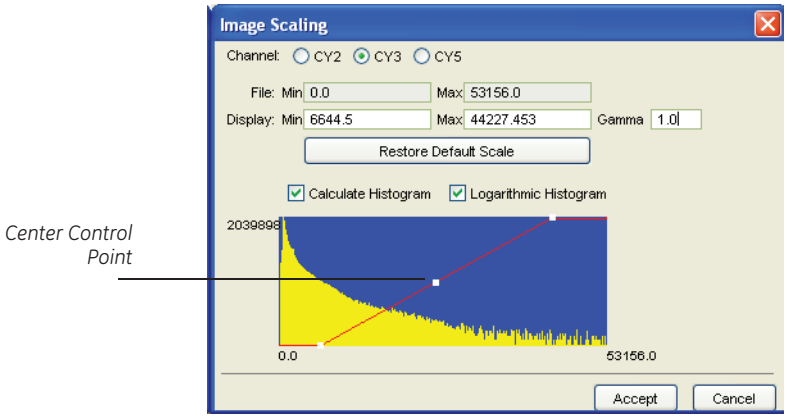


Fig 5-4. Image Contrast: center control point

5 To change the intensity scale distribution, click anywhere in the histogram (except on the control points) and drag the mouse up or down.

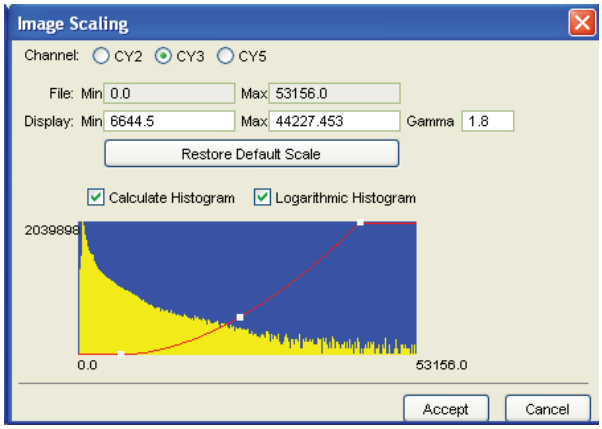


Fig 5-5. Image Contrast: scale distribution

6 To undo all of the contrast changes, click **Cancel**.

7 To save the contrast settings, click **OK**.

5.3 Display the Image Scale Bar

You can display or hide a scale bar to show the scale of the image. You can also set options to move the scale bar (to show the scale of a point of interest in the image) or to control how the scale bar is displayed. The scale bar is not displayed by default.

To change the image scale bar

1 Choose **View:Scale Bar** from the menu to open the Scale Bar dialog.

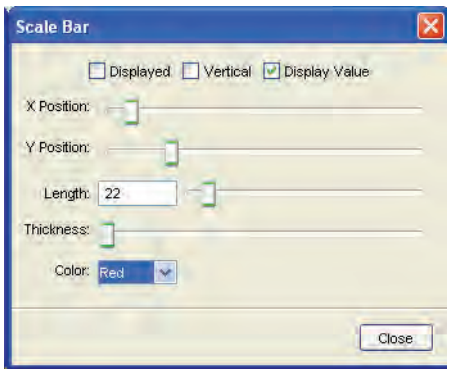


Fig 5-6. The Scale Bar dialog box

2 Select **Displayed** to show the Scale Bar.

3 To display the scale as a vertical bar, select **Vertical** (the default is horizontal).

4 Adjust the **Position**, **Length**, **Thickness**, and **Color** of the scale bar. The scale bar changes interactively as you set these properties.

Note: *To specify length, you can enter a value (in mm) in the* ***Length*** *field or use the slider.*

5 To hide the scale bar, un-select the **Displayed** option.

5.4 Measure Distances

Use the Measure Distance tool to measure the distance between two points, the distance from a single reference point to a series of points, or the distance between a series of points. After you complete your measurements, you can export them as a comma delimited list to a file that can be opened in a spreadsheet.

To measure distance

1 In the Report Viewer window, choose **Tools:Measure Distance** to open the Measure Distances dialog box.

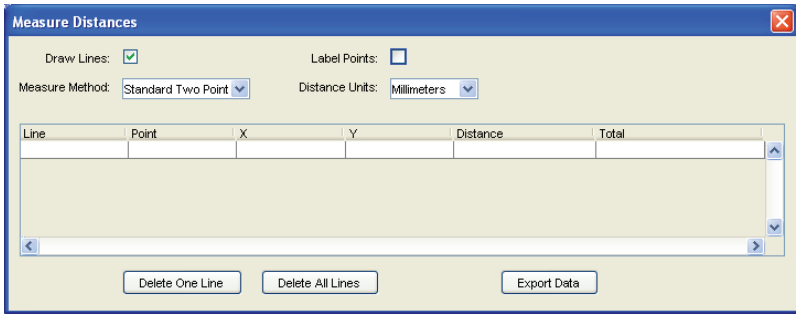


Fig 5-7. The Measure Distance tool

2 Select the **Standard Two Point** method in the **Measurement Method** list. The **Measurement Method** list has the following options:

Standard Two Point measures the distance between two points. Measurement starts over after the second point.

Single Reference measures distances from a single reference point. The first point serves as the reference point. The distance is measured between this reference point and subsequent points.

Leap Frog measures the distance between two points. The end point of each measurement serves as the start point of the subsequent measurement.

Multiple Segment measures the distance between a series of points.

3 Select which unit to use for measurement in the **Distance Units** list.

4 To display lines between points, select **Draw Lines**.

5 To display point labels on the image, select **Label Points**.

6 Use the mouse to select two points in the Image window.

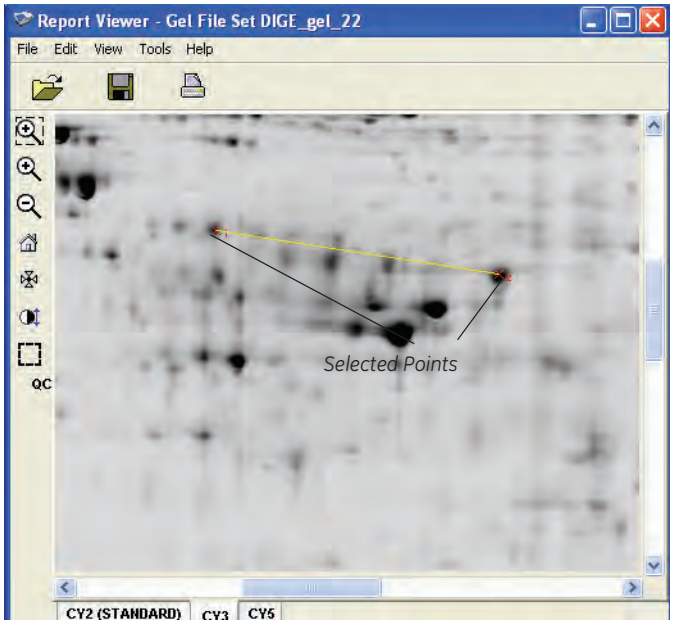
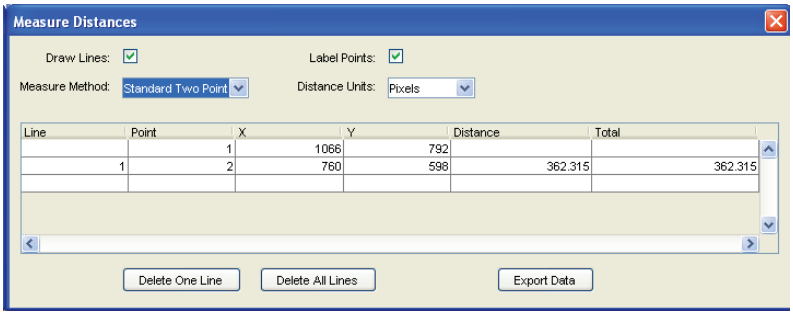


Fig 5-8. Selecting points to measure

7 In the following example, Line 1 consists of Point 1 and 2 and is 362.365 millimeters long.



8 When you are finished, click **Export Data** to save the list as a .csv file. (This format can be opened in a spreadsheet.)

9 View the results of measurements in the Point List table.

5.5 Rotate or Crop the Image

You can rotate or crop the image in the Report Viewer. This can be useful for interpreting or presenting the data.

5.5.1 Rotate the Image

You can use several methods to reorient the image.

To Reorient the Gel Image

- In the **Edit** menu, choose one of the following items:
  Flip X flips the image horizontally.

  Flip Y flips the image vertically.

  Rotate 90 rotates the image 90° clockwise.

  Invert XY switches the X and Y axis and reverses the orientation of the axes.

5.5.2 Crop the Image

Crop the image to include only the areas that include data.

To Crop the Image

1 On the Report Viewer tool window, select the **ROI** (Region of Interest) tool.

2 Drag the mouse across the area of interest to define the ROI.
The ROI is displayed as a square

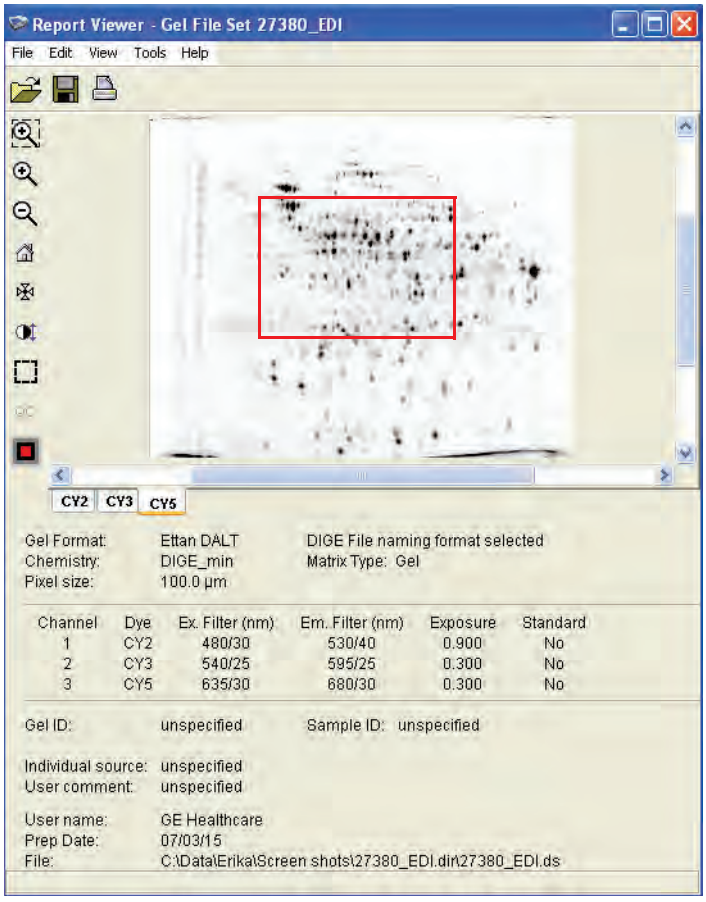


Fig 5-9. Region of Interest (ROI)

3 In the **Edit** menu, choose **Crop**.
The image is cropped to include only the data that is within the ROI.

5.5.3 Restore the Image

You can restore the image to its original state.

To restore the Image

- In the **Edit** menu, choose **Restore**.
  The image is restored to its original position and size.

5.5.4 Save the Modified Data

You can save the modified data to a new data set.

To save the data

1 On the **File** menu, choose **Save As** to save the dataset

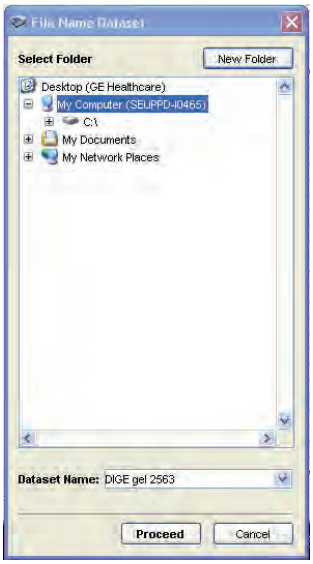


Fig 5-10. File Name Dataset dialog box

2 In the File Name Dataset dialog box, browse to the directory in which to save the dataset. Then enter the **Dataset Name** and click **Save**.

5.5.5 Improve Report Viewer performance

You can improve the performance of Report Viewer tools by allocating a second memory buffer in the Preferences dialog box.

To improve performance of Report Viewer tools

1 From the Ettan DIGE Imager window **Edit** menu, choose **Preferences**.

2 On the Preferences Dialog box, select **Allocate second buffer** for quick rotate.

6 File formats

6.1 DIGE File Naming Format

Using the DIGE File Naming Format option results in all files having user defined (and ideally unique) filenames. All scan images from a given experiment can be saved into a single user defined directory. This method of file naming and directory selection results in structures that can be directly used by DeCyder image analysis software.

If a single scan setting has been chosen, e.g. for a Deep Purple stained gel, then the resulting output on scan completion will be a filename.gel file in the selected directory. If two or more scan parameter settings were chosen, e.g. for a Cy2/ Cy3/ Cy5 gel, then the resulting output on scan completion will be a filename.ds file in the selected directory and a new directory called filename.dir. In this new directory will be a filename.ds file and filename suffix.gel files, were the suffix can be Cy2, Cy3 or Cy5 and the channel that is selected as standard will also have STANDARD as suffix, e.g. Scan1 STANDARD Cy2.gel. The filename.ds file allows the scanned images to be overlaid in ImageQuant whilst the filename suffix.gel files are the individual scan channel outputs and can be viewed as separate files.

6.2 Standard File Naming Format

The DIGE File Naming Format check box is left unselected in this mode. If a single scan setting has been chosen, e.g. for a Deep Purple stained gel, then the resulting output on scan completion will be a filename.gel file in the selected directory. If two or more scan parameter settings were chosen, e.g. for a Cy2/ Cy3/Cy5 gel, then the resulting output on scan completion will be a filename.ds file in the selected directory and a new directory called filename. In this new directory will be a filename.ds file and files called UNSEP1.gel, UNSEP2.gel and UNSEP3.gel. The filename.ds file allows the scanned images to be overlaid in ImageQuant whilst the UNSEPn.gel files are the individual scan channel outputs and can be viewed as separate files.

6.3 Gel file format

The images generated by the Ettan DIGE Imager are saved as tiff files. However, in order to get more information (e.g. instrument settings and comments) saved with the image, *.gel* files are automatically created.

7 Maintaining the System

This chapter describes procedures required to keep the system hardware in optimum operating condition.

7.1 Electrostatic Discharge (ESD)

There is a risk of damaging electronic components with electrostatic discharge when you are performing the maintenance tasks described in this chapter. The following guidelines will help you avoid electrostatic discharge.

Electrostatic discharge is the release of static electricity from one place to another. Static charges are easily generated and can be stored on people and various materials, including plain plastics. People often carry charges of 1000 to 5000 V but do not feel the sensation of a discharge under 3000 V. Plastics can hold charges of several hundred to 25,000 V. A few hundred volts can damage most semiconductor devices in a fraction of a microsecond.

CAUTION! When you turn off the scanner, keep the power cord plugged in so that the system is electrically grounded. The system contains microelectronic devices that can be damaged by electrostatic discharge.

7.2 Clean the System

Wipe the surfaces of the scanner as needed with a lint-free cloth slightly moistened with water or 10% ethanol in water.

7.3 Replace the Protective Window

The Protective Window is a sealed glass window that protects the optics from spills and exposure to cleaning fluids. It fits over the camera lens. If the window is scratched or damaged in any other way, order a new window and use the following instructions to replace it.

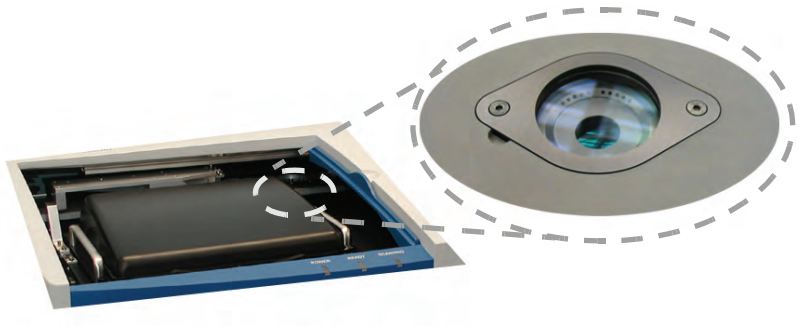


Fig 7-1. The Protective Window

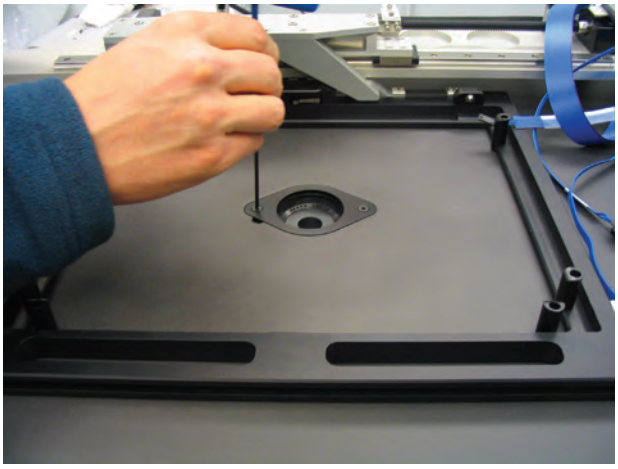
To replace the Protective Window

1 Turn off the scanner.

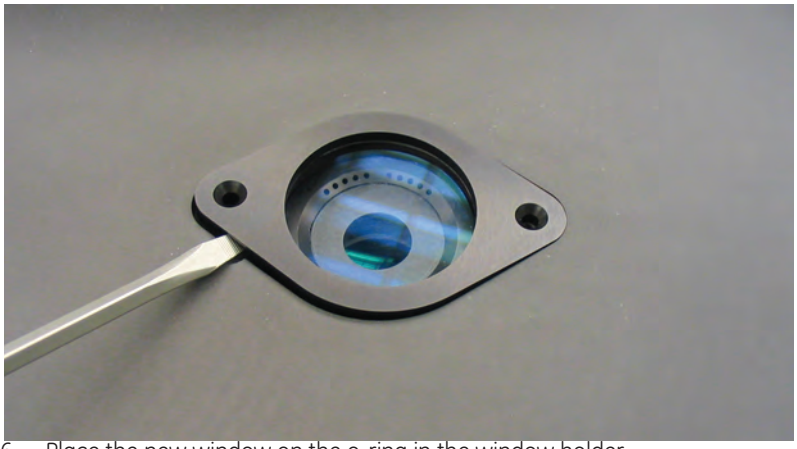
2 If a cassette is on the stage, remove it.

3 Slide the stage to the right to expose the Protective window.

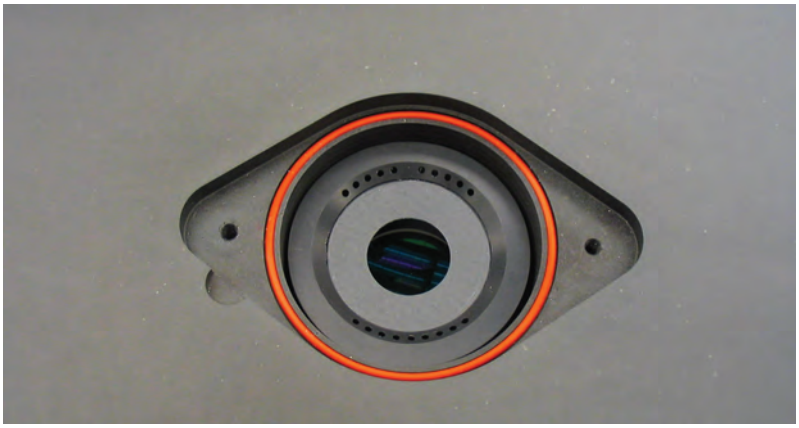
4 Remove the two screws that hold the window to the stage platform.



5 Insert a screwdriver under the indented slot and lift the edge of the window up to remove it.



6 Place the new window on the o-ring in the window holder.



7 Tighten the two screws that hold the window in place until they are snug.

8 Turn on the scanner. (The stage homes itself to its original position.)

7.4 Replace the Lamp Assembly

The lamp assembly provides light to the optical system. The assembly consists of a metal-halide bulb and lamp housing.

After 1000 hours of use, the bulb in the lamp assembly can no longer supply the intensity and spectral range of light required by the scanner's optics.

In order to ensure that the bulb is properly aligned in the optical system, replace the entire assembly as a unit.

7.4.1 Safety

There are three risks associated with handling the lamp assembly: exposure to heat, exposure to ultraviolet light, and exposure to mercury vapor. Oil from fingerprints on the bulb can heat up and cause the bulb to explode when it is turned on, releasing dangerous vapor.

Observe the following safety precautions when handling the bulb assembly:

- Do not open the lamp access door while the lamp is turned on.
- Wait for the lamp assembly to cool before handling the assembly.
- Do not touch the bulb. Use lens tissue or a lint-free cloth to handle the bulb. Clean fingerprints from the bulb using an organic solvent such as ethanol and a lint-free cloth.

Note: *The rear panel is equipped with a safety interlock. If you open the rear panel while the lamp is turned on, the safety interlock turns off the lamp.*

WARNING! Under certain conditions, the bulb can explode. If this occurs, the fumes can be toxic. Evacuate the room immediately and remain out of the room for at least 30 minutes.

7.4.2 Overall steps for replacing the lamp assembly

A: Turn off the scanner and allow the lamp assembly to cool.

B: Replace the assembly.

C: Reset the bulb age counter in the scanner software.

D: Perform a flat-field calibration.

WARNING! The lamp assembly can get extremely hot. Make sure that the lamp is turned off and has cooled for at least fifteen minutes before replacing the lamp assembly.

To change a lamp assembly

1 Turn off the scanner as follows:

- Make sure that there is not a cassette in the scanner.
- Turn off the scanner.
- If you just turned off the lamp, wait fifteen minutes for it to cool.

2 Replace the lamp assembly:

- Remove the rear panel of the scanner by loosening the two screws at the bottom of the panel.

Fig 7-2. Removing the rear panel screws

- Gently pull up on the panel as you open it and remove the door.

Fig 7-3. Removing the rear pane

- Open the lamp Access door.

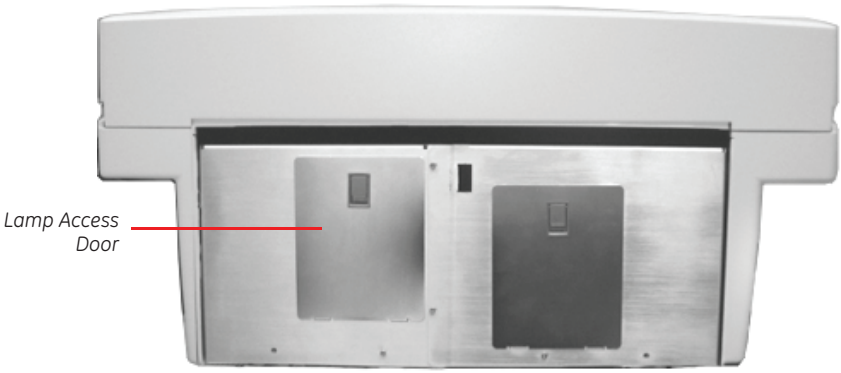


Fig 7-4. The Lamp Access door

- Remove the two lamp assembly thumb screws at the lower left and upper right hand corners of the lamp base.

CAUTION! If the plate is hot, wait for it to cool before unscrewing the lamp assembly screws

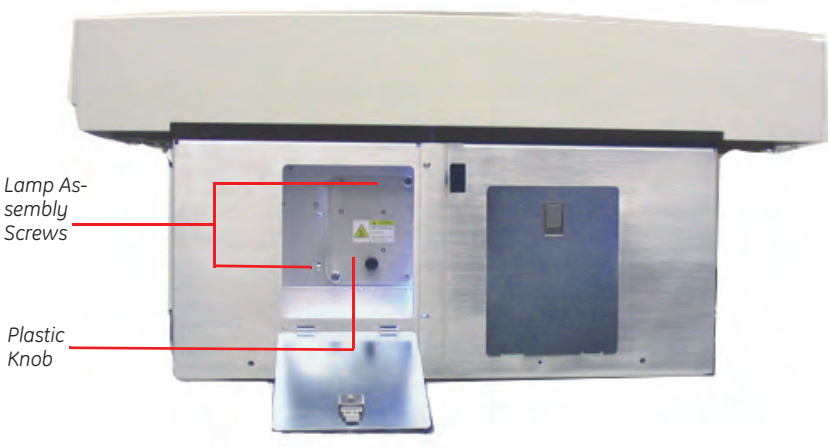


Fig 7-5. Lamp assembly screws and plastic knob

- Grasp the plastic knob and gently pull out the lamp assembly.

WARNING! DO NOT TOUCH THE BULB! Fingerprints on the bulb can cause it to overheat when it is turned on and possibly explode. If this occurs, evacuate the room immediately and remain out of the room for at least 30 minutes. Order a replacement bulb assembly.

- Disconnect the lamp cable from the assembly and put the assembly aside.

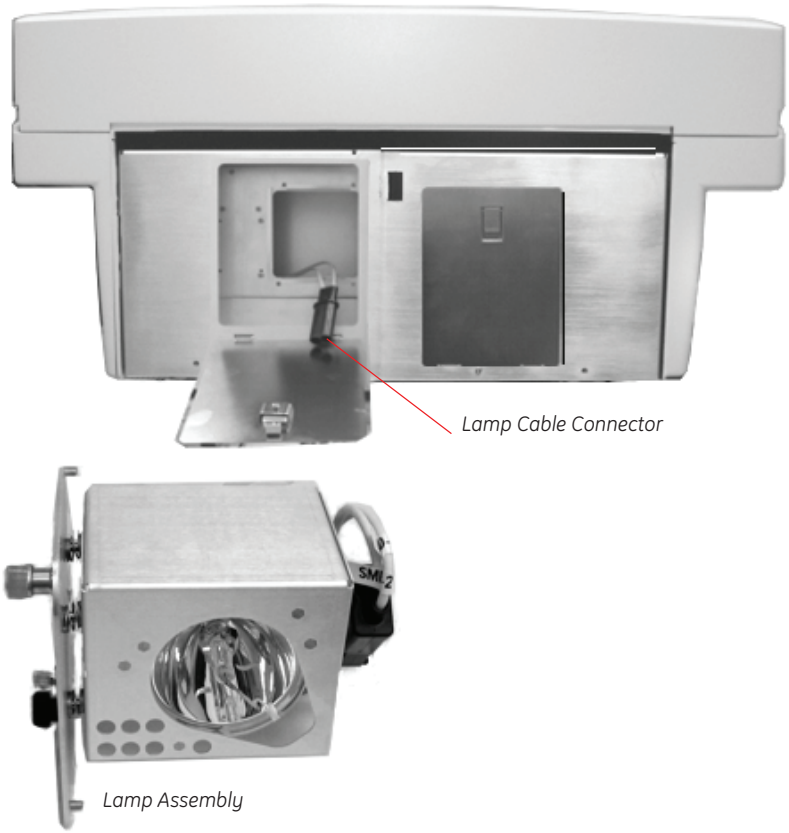


Fig 7-6. Lamp Cable Connector and Assembly

- Remove the new lamp assembly from its packaging.

Note: *Use only replacement bulbs supplied for this system.*

- Being careful not to touch either the front or back of the bulb, make sure that the clips securely attach the bulb to the plate.
- Connect the lamp cable to the new assembly. The cable connectors are keyed so that they only connect in the correct position.
- Install the lamp assembly. Be careful not to pinch the cables.
- Hold the lamp assembly plate flush against the scanner frame and finger-tighten the two lamp assembly thumb screws clockwise.

CAUTION! Do not use a screwdriver to tighten the assembly plate screws.

- Close the lamp access door and install the rear panel.

3 Reset the bulb age counter as follows:

- Start the system.
- Open the Ettan DIGE Imager Scan window and choose **Instrument:Reset Lamp Age**.
- When prompted, click **OK** to set the lamp age to zero.

4 Perform a flat-field calibration as follows:

- Place the special calibration paper in a cassette and then place the cassette in the scanner.
- From the Ettan DIGE Imager window menu, choose **Instrument:Flat Field Calibration**.
- When prompted, click **OK** to calibrate the scanner.

8 Troubleshooting

8.1 Customer verification test target

Enclosed with the instrument is an instrument verification test target. It can be used to check that the instrument is working properly. Simply place the target on the glass plate of the sample cassette so that the numbers appear with normal orientation, prevent the target from moving by securing it with two pieces of tape and scan the whole area with 100 µm resolution. If the target is not completely flat, put a glass plate on top. Recommended settings are: Cy2 channel, 0.12 exposure level.

The result should be an image similar to the one in Fig 8-1 Test result and the resulting image can be evaluated to check for the following issues:

Stitching accuracy: All horizontal and vertical lines should appear stepless in the image

Camera focus: With 100 µm resolution one line should not cover more than 2 pixels

Pixel size accuracy: The distance printed on the test target should match the distances measured with an image evaluation program.

The test target should be stored in a dark place.

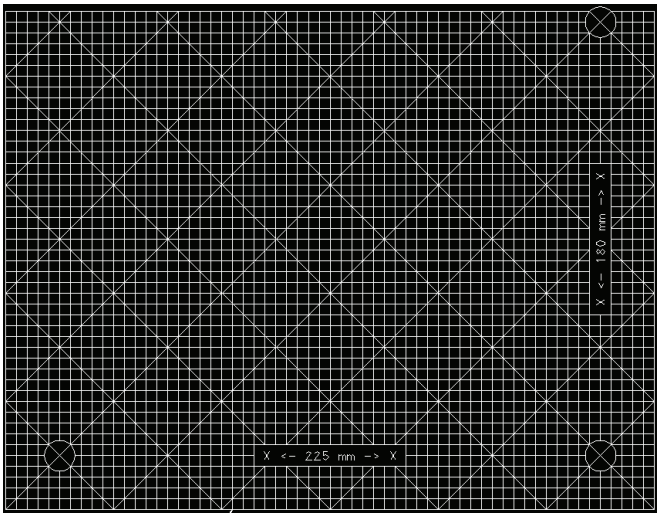


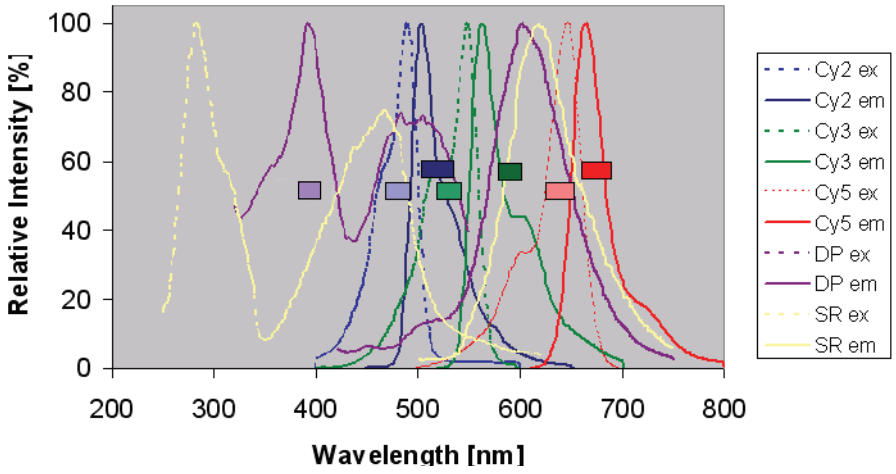
Fig 8-1. Test result

Note: *Other problems should be handled by GE Healthcare service personnel.*

8 Troubleshooting
8.1 Customer verification test target

Appendix A

A.1 Filter Details



Dye	Excitation Filter	Emission Filter
Cy2	480/30 nm	530/40 nm
Cy3	540/25 nm	595/25 nm
Cy5	635/30 nm	680/30 nm
Deep Purple 1	540/25 nm	595/25 nm
Deep Purple 2	390/20 nm	595/25 nm
SYPRO Ruby 1	480/30 nm	595/25 nm
SYPRO Ruby 2	390/20 nm	595/25 nm

A.2 Spare Parts

Article	Article no.
Lamp Assembly	28401403
Protective glass window	28401414

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