

ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *Fotodyne 70-6020* at our website: *Click HERE*

INSTRUCTION MANUAL

FOTO/Analyst® Luminary 12-bit Cooled Camera Electronic Documentation System

Catalog Numbers:

6-8000	**6-8110**	**6-8130**
6-8010	**6-8215**	**6-8235**
6-8030	**6-8315**	**6-8335**
	6-8415	**6-8435**
	6-8515	**6-8535**

WARNING
Read and understand this manual before using this product.

FOTODYNE INCORPORATED

950 Walnut Ridge Drive • Hartland, WI 53029-9388 • USA
Website: www.fotodyne.com • E-mail: info@fotodyne.com

Research Products Division
Technical Service: 262-369-7000
Phone Orders: 1-800-DNA-FOTO (1-800-362-3686)
Fax Orders: 1-800-362-3642

Educational Products Division
Technical Service: 262-369-7000
Phone Orders: 1-800-362-4657
Fax Orders: 1-800-362-3642

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Instruction Manual for the FOTO/Analyst® Luminary Cooled Camera Electronic Documentation System

6-8000	6-8110	6-8130
6-8010	6-8215	6-8235
6-8030	6-8315	6-8335
	6-8415	6-8435
	6-8515	6-8535

Table of Contents

Introduction 2

Specifications 4

Safety Information 5

Unpacking Instructions 6

Set-Up Instructions

- Frame Grabber Board Installation 7
- Software Installation 7
- CCD Camera Assembly 8
- Transilluminator Installation 8
- Cable Connections 8
- Cable Connection Diagram 11

Operating Instructions

- UV or White Light 12
- Chemiluminescent Imaging 14

Helpful Hints for Imaging 17

Helpful Hints for Chemiluminescent Imaging 18

Servicing 19

Turning off the Warning Sound (Beep) 19

Troubleshooting 20

Ordering Information/Technical Assistance 21

©2007 FOTODYNE Incorporated
Part # 78-8000 Rev A

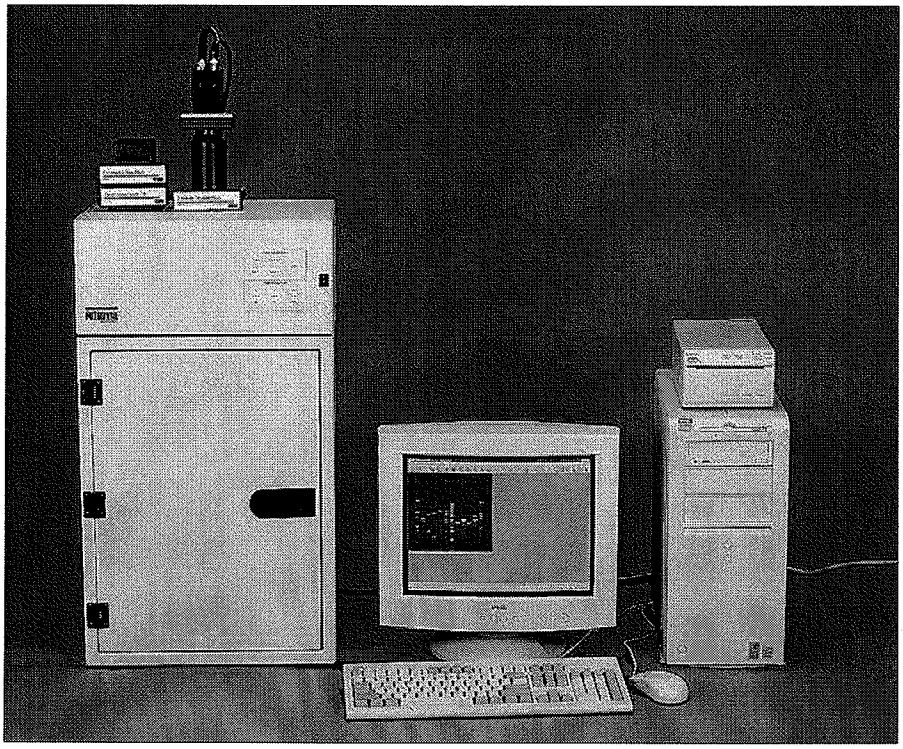
Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Introduction

The FOTO/Analyst® Luminary is designed for imaging more than just gels. You can also obtain high-quality digital images of chemiluminescent Southern, Western and Northern Blots, Petri plates, TLC plates, fluorescent samples, opaque samples and more.

A high resolution Peltier cooled CCD camera combined with the light-tight FOTO/Luminary Benchtop darkroom and extended integration software allow you to maximize exposure times for low light samples. The FOTO/Luminary enclosure features unique dual light epi-illumination with both UV and white light sources. Focus, zoom in and out, and adjust the iris without ever reaching for the camera lens. These functions are easily controlled by clicking your computer mouse or pressing buttons on the darkroom's intuitive membrane panel. The FOTO/Luminary benchtop darkroom features a gliding transilluminator platform for easy access to samples, convenient front-loading filter positioning and storage, matte black interior to minimize reflections and audible safety interlock to alert users that interior lights are illuminated. Files can be stored in nine file formats, including TIFF and BMP to preserve data integrity for downstream analysis.

All FOTO/Analyst Luminary systems consist of the following components: a 12-bit cooled CCD camera, motorized zoom lens, FOTO/Luminary Benchtop Darkroom, IEEE 1394 Firewire Card, PC Image Acquisition Software and all necessary cabling. FOTO/Analyst Luminary Workstations include a thermal printer, choice of transilluminator and corresponding imaging filters.



FOTO/Analyst® Luminary Workstations include a cooled CCD camera with motorized zoom lens, light-tight FOTO/Luminary™ Benchtop Darkroom, acquisition software, thermal printer, choice of transilluminator and corresponding imaging filters.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Introduction To Luminary System Components

Luminary Enclosure

The FOTO/Luminary benchtop darkroom enclosure provides a light-tight enclosure for documentation of low light and chemiluminescent images. Its matte black interior prevents interference by stray light and minimizes reflections. The exterior of the enclosure features convenient front loading of filters and storage to keep frequently used filters at your fingertips. The membrane panel on the front of the unit allows for control of the motorized zoom lens, transilluminator and darkroom lights. The interior of the FOTO/Luminary enclosure has a focus light for easy positioning of samples. Epi white light and Epi UV light combined with a FOTODYNE transilluminator provide several illumination options in order to obtain maximum sensitivity from a wide range of samples. A gliding transilluminator drawer at the bottom of the enclosure provides easy access to low light samples. A slide-out tray at the top of the enclosure brings chemiluminescent samples as close to the imaging source as possible. The easy-open door features an audible safety interlock to alert the user when interior lights are illuminated.

Cooled Camera

The FOTO/Analyst® Luminary electronic documentation system features a 12-bit Peltier cooled CCD camera and motorized zoom lens. Combined with the FOTO/Luminary benchtop darkroom and extended integration software, the cooled CCD camera allows for maximum integration times for low light and chemiluminescent samples. Hands-free control of: zoom, focus and aperture settings is provided by either the FOTO/Luminary enclosure or by FOTO/Analyst® PC Image software.

Common FOTO/Luminary Options

Thermal Printer

The digital grayscale printer allows you to obtain hard copy thermal prints of your images. The printer plugs into the parallel or USB port of your computer. PC Image acquisition software drives the export of your image to the thermal printer to create a print measuring 10.0 x 6.9 cm.

Transilluminator

UV Transilluminators

The FOTO/UV line of ultraviolet transilluminators have 312 nm peak illumination with dual intensity settings. All FOTODYNE transilluminators feature uniform illumination, a cooling fan and unsurpassed quality and reliability. If your imaging needs include ethidium bromide staining or fluorescent staining with SYPRO® or SYBR® stains, a FOTO/UV 15, 21 or 26 Transilluminator is the perfect add-on to your FOTO/Luminary system.

White Light Transilluminators

If your imaging needs include documentation of autoradiograms or Coomassie blue-stained gels, a VariQuest26 White Light Transilluminator is the right option for your FOTO/Luminary system. FOTODYNE white light transilluminators exhibit uniform illumination over the entire surface.

Dual Light Transilluminator

The FOTO/Convertible dual light transilluminator offers ultraviolet and white light output in one small footprint by utilizing advances in electroluminescent technology. Large format (21 cm by 26 cm) UV illumination is complemented by a flip-down white light panel that provides unparalleled uniformity of illumination over its 21 cm x 26 cm surface. The FOTO/Convertible gives you performance and versatility without occupying excessive bench space.

Electronic Imaging Filters

Unlike conventional film, the FOTO/Analyst CCD camera is sensitive to infrared radiation. Using standard "cut-off" type filters with your FOTO/Luminary system, will produce images with the UV bulbs of the transilluminator visible. To eliminate this effect, FOTODYNE offers a variety of bandpass filters to fit your application needs. Contact the FOTODYNE Technical Service Department to determine which filter will best meet your electronic imaging needs.

TotalLab Image Analysis Software

Digital images generated by the FOTO/Analyst Luminary may be analyzed on a PC computer. TotalLab Image Analysis software lets you calculate molecular weight of bands in a 1D gel, densitometrically measure gels or arrays, count colonies on a petri plate, or produce area measurements of spots in 2D gels. The program converts your raw image into clear and usable data tables.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Specifications

FOTO/Luminary Benchtop Darkroom Enclosure

- Sliding drawer accommodates FOTO/UV 15, 21 or 26, VariQuest 26 WL, or FOTO/Convertible Dual Transilluminators and permits complete access to samples.
- Slide-out tray brings chemiluminescent samples as close to the imaging source as possible
- Safety interlocked front door
- Two 8-watt fluorescent bulbs for epi illumination
- Two 366 nm UV bulbs for epi illumination
- Storage for extra filters
- Matte black interior prevents (stray light) interference and minimizes reflections
- Dimensions:
  42.3 cm wide x 34.8 cm deep x 75.8 cm high
  (16-3/4 in wide x 13-3/4 in deep x 30-1/8 in high)

FOTO/Luminary Cooled CCD Camera

- 12 bits
- 1344 x 1024 pixels (EIA)
- 2:1 interlace scanning
- 67 dB signal to noise ratio
- Power: 12V DC, 180 mA
- -10°C Peltier cooling
- IEE-1394Firewire Connection
- Sensitivity: 60 - 70% QE @ 425-625 nm

PC Image Acquisition Software

- Control of acquisition parameters: Integration (up to 40,000 frames), Brightness, and Contrast
- Image Manipulation: Invert, Zoom, Mirror, Rotate, Annotate
- Image storage in user choice of 9 file formats, including TIFF, JPG, BMP
- Control of FOTO/Luminary Darkroom lighting and zoom lens

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Safety Information

Safety Precautions

1. **Electrical Instruments**
   Use the same precautions as with any electrical device. Do not operate without the sides and chassis fully assembled. Do not operate in a damp or humid atmosphere or where condensed moisture may short circuit internal electrical components. Make sure the transilluminator, and FOTO/Analyst® Luminary are unplugged before performing maintenance of any kind, including bulb replacement. When moving the unit from a normal room temperature condition to a cold room or vice versa, allow at least eight hours for the temperature of the unit to equilibrate before use.

2. **Ultraviolet (UV) Light**
   UV Caution

   CAUTION: Ultraviolet (UV) radiation can cause severe eye and skin damage! Do not view a UV light source with unprotected eyes.

   For maximum protection from skin damage, wear protective clothing and a UV-blocking face shield over UV blocking eyeglasses. UV blocking eyeglasses are necessary with a face shield to prevent accidental exposure when the shield is raised or removed.

   Always turn off midrange and short wave UV light sources when setting up a system or setting up objects to be photographed. The ultraviolet lights should be activated only when observing or photographing objects.

   Ultraviolet Fluorescent Bulbs
   There are several hazards associated with using ultraviolet bulbs. Among them are:

   a. **The radiation itself:** All radiation below 350-nanometer wavelength and especially below 280 nanometers must be considered dangerous. Ultraviolet blocking eyeglasses and a face shield must be worn, along with protective gloves and clothing to cover exposed skin.
   b. **Secondary or reflected radiation:** The above personal safety considerations are also important in protection from ultraviolet radiation that is reflected from surrounding working surfaces such as metal and glass.
   c. **The bulbs themselves:** As ultraviolet absorbing film develops on the interior walls of the bulb as it is used, reducing its useful life and sometimes causing the temperature to rise above normal operating levels. All FOTO/Analyst® UV Transilluminators are built with a cooling fan to help alleviate this temperature problem.
   d. **Care in handling UV bulbs:** Ultraviolet bulbs contain small amounts of mercury therefore special care in handling them is advised. When replacing ultraviolet fluorescent bulbs, never hold them in the center. Instead, hold both ends of the bulb and gently twist it free from the socket to prevent breakage. In the event of a broken bulb, wear protective gloves during clean up. Since the bulbs contain a very minimal amount of mercury, they do not have special disposal requirements.

Health Hazards Associated With UV Light

Eyes
Exposure of the eyes to UV radiation (including 312 nm) can result in inflammation of the cornea and of the conjunctiva. A combination of these conditions is referred to medically as "Kerato-conjunctivitis," more commonly known as "snow blindness." Symptoms include irritation, sensation of dirt in the eye, excessive watering, sensitivity to bright lights, and sometimes eyelid spasms. These symptoms appear after exposure, when it is too late to avoid their cause. Wearing ultraviolet blocking eyeglasses is a must and should never be circumvented, even for "just a few seconds."

It is important to realize that the eye does not build up tolerances to repeated ultraviolet radiation as does the skin. Even though the symptoms described above usually disappear within two or three days, medical attention should be sought in all ultraviolet eye burn situations to help prevent more serious complications.

Skin
Excessive exposure of the skin to UV radiation can cause "sunburn-like" symptoms. Wear protective clothing, giving special attention to the chin and neck areas. A UV blocking face shield is recommended. Exercise care when performing preparative techniques, or any other manipulations that require working in close proximity to a UV light source for extended periods of time.

Ozone
Another potential hazard associated with the use of shortwave ultraviolet light in the research lab is ozone. Shortwave ultraviolet radiation below 242 nm reacts with molecular oxygen to form ozone. Ozone above the threshold level of 0.1 ppm causes eye irritation and discomfort of the respiratory tract. Because of its toxicity, ozone can cause serious medical problems at higher concentrations.

Although shortwave radiation below 242 nm from 15 watt or less fluorescent bulbs is nominal, the potential hazard does exist. It is recommended that adequate ventilation or air movement be provided. Ultraviolet bulbs should be turned on only for viewing and photographing and then immediately shut off.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Unpacking Instructions

1. **Unpack and examine the FOTO/Analyst Luminary Electronic Documentation System carefully.** Immediately report any damage to the transporting carrier and to FOTODYNE Incorporated. Be sure to save all cartons for claim purposes if damage is found.

2. **Identify the following components:**
   a. Cooled CCD/Motorized Zoom Lens Assembly
      - 12-bit Cooled CCD Camera
      - Motorized zoom lens
      - Mounting Bracket/Lens Adapters
      - Zoom Lens Cable (Cable B)

   b. IEEE-1394 Firewire Expansion Board
   c. PC Image Acquisition Software
   d. FOTO/Luminary benchtop darkroom enclosure
      - Lumi/Tray Chemiluminescent Sample Tray
      - Close-Up Lens for Chemiluminescent Imaging
      - Power Cord
      - Blank Filter Holder

   e. Thermal Printer Package (optional)
      - Thermal Printer
      - 1 Roll Thermal Print Paper
      - Power Cord
      - Printer Cable (Cable E)
   f. FOTO/Analyst® Electronic Imaging Filters
   g. Cable Package
      - HRS12 to 15 pin connector (Cable A)
      - Firewire Cable (Cable C)
      - 9 pin connector to 9 pin connector (Cable D)
      - Instruction Manual
      - Warranty Card
   h. Camera Power Supply
      - Power Supply
      - Power Cord
   i. Transilluminator
      - UV Blocking Eye Glasses
      - Power Cord

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Set-Up Instructions

Firewire Board Installation

You may install your IEEE-1394 Firewire board in any available 32-bit PCI bus master expansion slot in your computer. Because computer configurations vary greatly, detailed instructions cannot be written specifically for each. Please follow the following general instructions for installation of your Frame Grabber Board:

1. **Turn off Your Computer**. Make sure the power to your computer is completely off.

2. **Turn off Accessories.** Make sure that power is completely off to any accessories (printer, modem, monitor, etc.) connected to your computer.

3. **Unplug computer and Accessories.** Disconnect the power cords of the computer and all attached accessories from wall outlets.

4. **Remove Computer Cover.** Refer to your computer system's user manual for instructions to remove the cover from your computer.

5. **Attach strap to wrist.** Remove the Disposable Wrist Strap from its envelope. Unwrap the fist two folds of the band and wrap the exposed adhesive side firmly around your wrist such that strong contact is made with your skin. Unroll the remainder of the Wrist Strap band. Carefully peel the liner from the strip of copper foil at the end opposite your wrist. Attach the copper foil securely to an exposed electrical ground. For most computers, the power supply is the most effective and convenient access to ground. It is recognized as a large metal encased box somewhere inside the computer. Attach the copper foil of the wrist strap directly to the metal case.

6. **Select and Expansion Slot.** Referring to your computer system's user manual, determine which slots are bus masters and choose a 32-bit PCI bus master expansion slot of your Firewire Board.

   In most PCI systems, any PCI slot can be a bus master.

7. **Remove expansion slot cover.** Remove the cover from the selected expansion slot. Retain the screw that held it in place. It will be used later with the Firewire Board.

8. **Remove Board from Protective Bag.** Before handling the board, discharge any static buildup on your body by touching the metal case of the computer. After you remove the board from its anti-static bag, hold it only be the edge and do not touch the components.

9. **Align board with expansion slot.** Position the board so that the connectors are facing the rear of the computer.

10. **Insert board into slot.** Carefully lower the board into the expansion slot using the card guide to properly align the board in the slot. When the bottom of the board contacts the bus connector, gently press down on the board until it is fully seated.

11. **Secure board in place.** Using the screw removed from the slot cover in step 7, secure the board in place at the rear panel of the system unit. *Be sure to use the retaining screw to secure the board. Do NOT rely on the bus connector to physically restrain the board.*

12. **Replace computer cover.** Replace and secure the cover. Then reconnect the power cords to the computer and accessories.

13. **Procede to CCD camera Assembly.** Do not start your computer at this point.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Set-Up Instructions

CCD Camera Assembly

1. **Attach Camera Assembly (preassembled) to FOTO/Luminary Enclosure.** Carefully remove the camera assembly from the shipping box. Position the zoom lens so that it is facing down and insert the lens into the hole on top of the darkroom. Align the zoom lens mounting bracket with the mounting bracket on top of the darkroom enclosure. Tighten the screws until the unit is secure. (Figure 1)

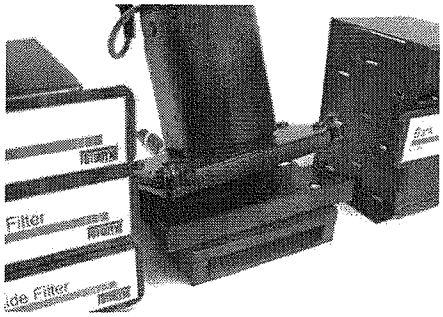


Figure 1. Attach Zoom Lens to FOTO/Luminary Enclosure

Transilluminator Installation

1. **Prepare Transilluminator for Installation**. Unplug the power cord from the back of your FOTO/UV, VariQuest White Light or FOTO/Convertible Dual Transilluminator. Turn the power switch on the UNPLUGGED transilluminator to the ON position.

2. **Position Transilluminator in the FOTO/Luminary Enclosure.** Press to access the recessed drawer handle. Pull out the transilluminator drawer from the FOTO/Luminary Darkroom until it is fully extended. Set the transilluminator in the center of the drawer.

3. **Attach power cord.** A short power cord is located on the back left corner of the drawer. Plug it into the power cord connector on the transilluminator.

4. **Enclose transilluminator.** Return drawer to fully retracted position in the FOTO/Luminary darkroom. Fold drawer handle back into its receptacle and close the front access door. (Figure 2)

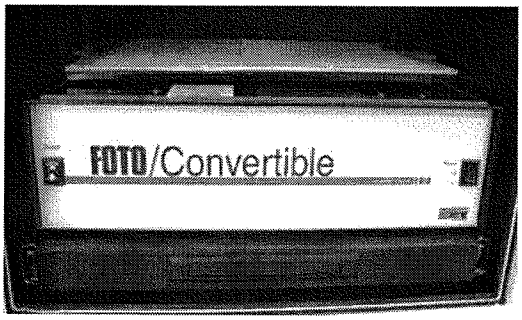


Figure 2. Transilluminator inside the FOTO/Luminary Enclosure

Cable Connections

Refer to Figure 4 on page 11 for help with cable connections.

1. **Connect CCD Camera to FOTO/Luminary Controller Module**

   a. **Identify Cable A.** One HRS12 connector and one 15 pin connector.

   b. **Connect the HRS12 connector the camera.** Align bars on the HRS12 connector onto the corresponding notches on the "POWER" port on top of the CCD camera. Insert the connector fully onto the camera port until it clicks into place.

   c. **Connect the 15 pin D-connector on the other and of Cable A to the port at the rear of the Camera Power Supply**. Insert the connector fully onto the port. Tighten thumb-screws on either side of the connector to secure.

2. **Connect the camera to the Computer.**

   a. **Identify Cable C.** IEE-1394 connectors on both ends

   b. **Connect one connector to the "IEE1394" port on the top of the camera.**

   c. **Connect the other end to the Firewire card that is installed in your computer.**

3. **Connect FOTO/Luminary Darkroom to the Computer.**

   a. **Identify Cable D.** 9 pin connectors on both ends.

   b. **Connect one 9 pin connector to the RS232 serial connector (COM1) on the back of your computer.** Refer to the documentation that came with your computer for the serial port location.

   c. **Connect the other 9 pin connector to the DARKROOM receptacle at the rear of the FOTO/Luminary Darkroom Enclosure.**

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

4. **Connect Thermal Printer to Computer** (optional)

   a. A printer cable with a 25 pin D connector on one end and a 36 pin D-sub connector on the other end has been supplied with the printer.

   b. **Connect the 36 pin D-sub connector to the corresponding port on the thermal printer.** *Take care not to disrupt the DIP switches at the rear of the Thermal Printer. The switches control printing parameters and have been factory-set at FOTODYNE for optimal performance.*

   c. **Connect the 25-pin connector to the receptacle of Parallel Port 1 (LPT1) of your computer.**

5. **Connect the Motorized Zoom Lens to the FOTO/Luminary Enclosure.**

   a. **Locate the zoom lens cable.** One end of the cable is attached to the motorized zoom lens. The other end has a 4-pin round connector.

   b. **Plug the 4 pin connector into the ZOOM receptacle at the rear of the FOTO/Luminary Enclosure.**

6. **Connect Power cords.** Plug power cords into the FOTO/Luminary Enclosure and Thermal Printer (optional). Power cords should be plugged into a properly grounded surge protector or outlet. Do not use conversion plugs inserted into two-wire receptacles.

Software Installation Instructions

1. **Start your computer.** Make sure the cables are properly connected and the power is switched to off on the camera power supply.

2. **Cancel the Driver Installation Wizard.** Wait for your computer to fully boot into the operating system then turn the power on to the camera. Your computer will automatically recognize the Camera and start an automatic device driver installation wizard. Click cancel.

3. **Insert the PC Image disk.** Insert the PC Image disk into your cdrom drive. Your computer should automatically launch into the PC Image software installation program.

4. **Install Mega Pixel Camera Drivers.** Select "Install Mega Pixel Camera Drivers" from the PC Image installation program. Follow the directions presented on the screen to install the camera drivers.

5. **Install PC Image.** Install PC Image when your computer is done installing the camera drivers.
   a. Click on "New Install".
   b. PC Image Installation Program will start. Click "Next"
   c. This program is like any other software installation program. Follow the instructions presented. If you are unsure about any option, select the default.
   d. Restart your computer

6. **Configure PC Image.** Pcimage needs to be configured to run your Luminary 12-bit system
   a. Turn on the Luminary enclosure.
   b. Open PC Image.
   c. An error will appear that states "Frame Grabber Not Found". Click Yes to continue
   c. Pull down the File menu and click "System Options".
   d. Select "Cooled Mega Pixel Camera" and "Luminary" from the pull down menu. click "OK"
   e. PC Image should now be open with two live icons in the upper right hand corner of the screen

7. **Installing the Thermal Printer Driver.** Follow the directions that are included with your printer.

   NOTE: If any errors occur when launching or installing PC Image, contact FOTODYNE for assistance.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

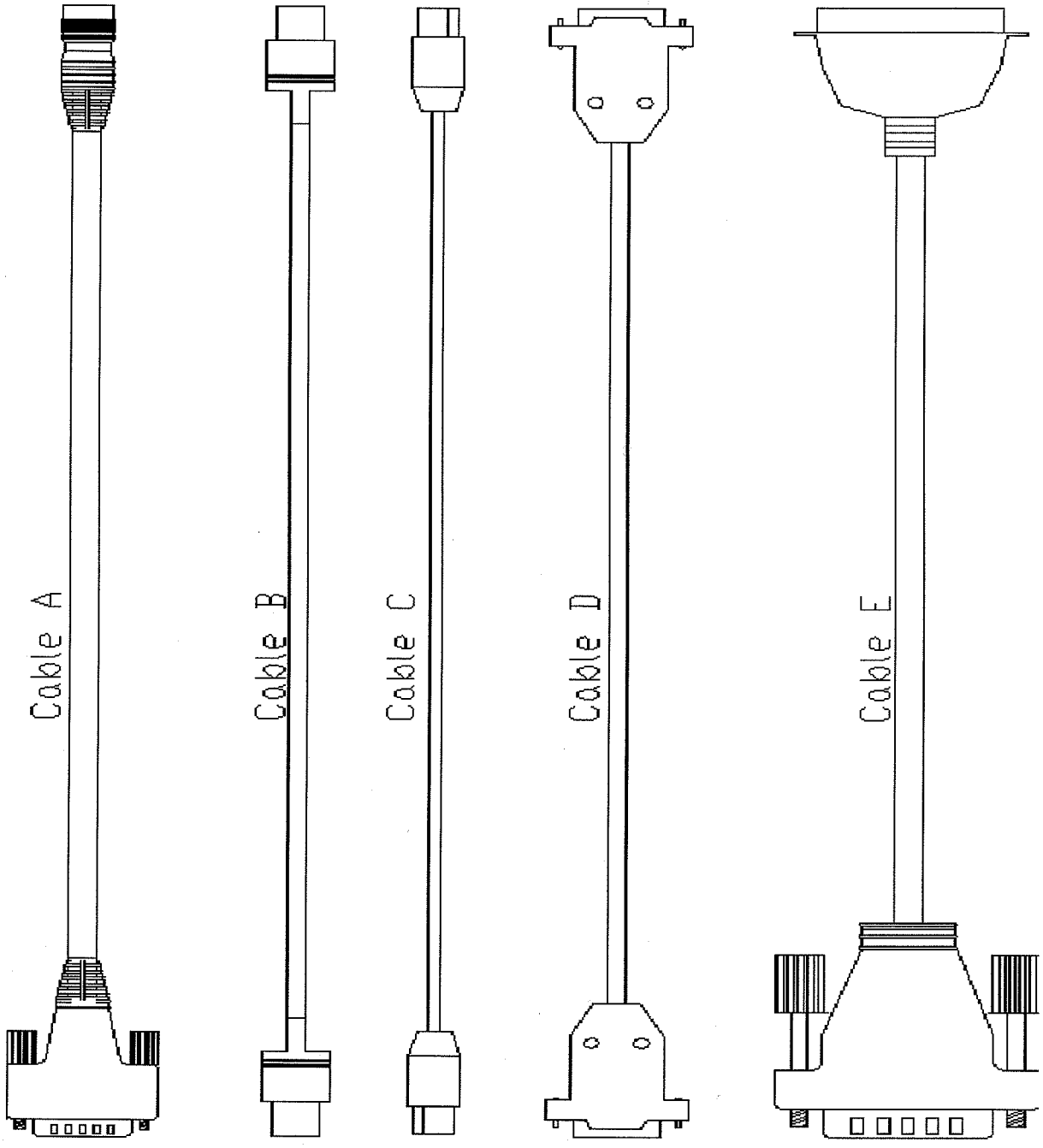


Figure 3. List of included Cables

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

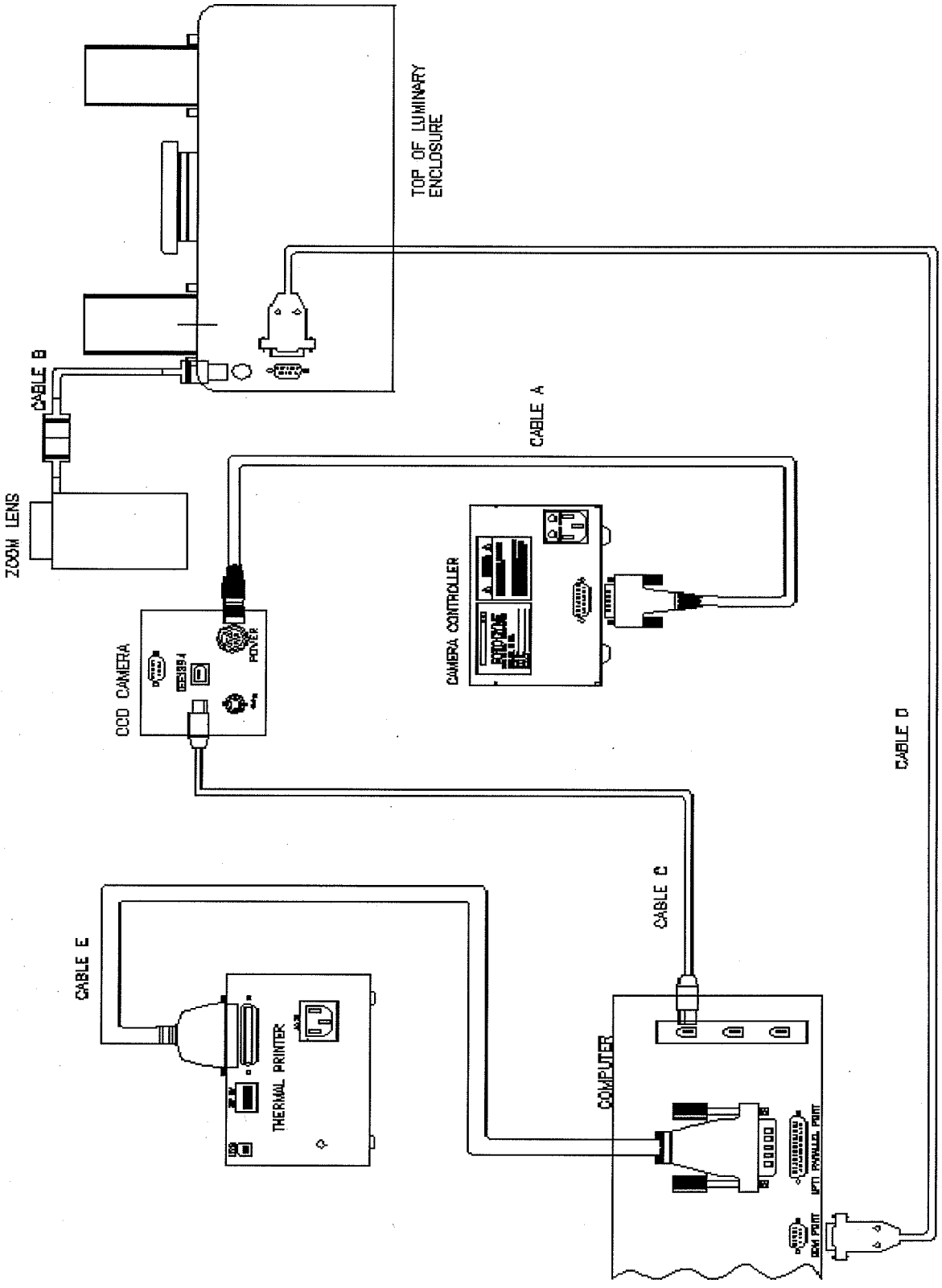


Figure 4. Cable Diagram

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Operating Instructions: UV or White Light Transillumination

1. **Place subject on transilluminator.** Open the front access door to the FOTO/Luminary darkroom. Pull the drawer at the bottom of the enclosure all the way forward. Place subject in the center of the transilllu-minator filter glass or white light panel. Slide the drawer back to the fully retracted positions. Close the front access door.

2. **Select proper filter**. Select the filter appropriate to your application. Slide the filter into the slot on the FOTO/Luminary Darkroom just below the zoom lens. The aluminum plate will face the user; a magnet on the plate will hold the filter in place.

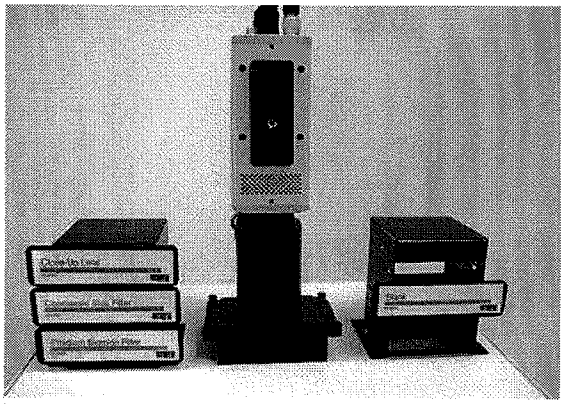


Figure 5. Convenient Storage of up to six filters allows you to keep those frequently used filters at your fingertips.



Figure 6. The filter frame slides easily into the slot below the camera's zoom lens.

3. **Turn on power.** Press the top half of the power switch on the front of the FOTO/Luminary Darkroom; the switch is found in the upper right of the unit. Turn on the power to the camera control box, your computer, the thermal printer, and all required accessories.

4. **Open PC Image software.** Select the PC Image icon and open the application.

5. **Turn on lights.** You must first choose "Acquire Image" on the PC Image toolbar or from the File pull-down menu. The Video Capture dialog box (Figure 7) will appear. Click the "Direct 1" button in PC Image to turn on white light for focusing. You should see an image on your computer monitor at this point.

6. **Frame and focus the subject.**

   a. **Adjust the aperture.** Use the "Close Iris" and "Open Iris" buttons on the FOTO/Luminary membrane panel or in PC Image to adjust the amount of light entering the camera.

   b. **Frame the subject.** Use the "Zoom In" and "Zoom Out" buttons on the FOTO/Luminary membrane panel or in PC Image to zoom in or out. Adjust the zoom until your subject is framed properly.

   c. **Focus the subject.** Adjust the fine focus using the "Focus Far" or "Focus Near" buttons on the FOTO/Luminary membrane panel or in PC Image. *If you are imaging an agarose gel, focus on the sample wells.*

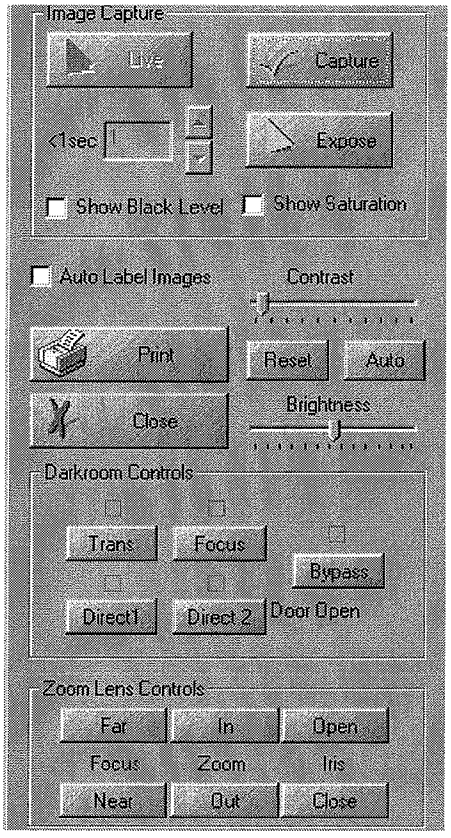


Figure 7 The Video Capture dialog box allows you to adjust exposure time and control the motorized zoom lens and FOTO/Luminary Darkroom

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

7. **Turn off Focus lights.** For imaging opaque objects using white light, skip steps 7 and 8. For all others, click the "Direct 1" button in PC Image to turn off the focusing lights.

8. **Turn on the transilluminator.** Click the corresponding button in PC Image to turn on the transilluminator. When using a dual light transilluminator, this button will turn on the transilluminated white light if the panel on the transilluminator is down and will turn on the UV light if the panel is flipped up.

   OR

   Turn on epi UV illumination. Press "Direct 2" on the panel or in the software to illuminate the UV side lights in the FOTO/Luminary darkroom. *Epi illumination is recommended for applications such as SYBR Green staining of nucleic acids and visualization of TLC plates.*

9. **Integrate the image.**
   a. **Set the number of frames to integrate.** Click Capture to stop Live Video. Set the number of frames to integrate by typing the number of frames in the box next to the Expose button. Exposure may also be adjusted using the arrows next to the Timed Exposure box. *For UV applications the suggested starting integration time is 50 frames. For white light applications the suggested starting integration time is 5 frames. The actual value will vary from application to application.*

   b. **Click Expose button to start integration.** *Longer integration periods will take longer to be displayed and continually refreshed on the screen. For example, 300 frames of integration will take 10 seconds to be acquired and displayed on the computer monitor.*

   c. **Adjust integration.** If the image appears optimal, go on to the next step. If the image is too bright, repeat the exposure with a lower number of frames. If the image is too dark, repeat the exposure with a higher number of frames. *For better contrast with UV applications, decrease aperture settings and increase integration time.*

10. **Print image (optional).** Click the Print button. The image will be sent to the thermal printer and printed in a few seconds.

11. **Indicate saturation or black level (optional).**
   a. **Check the Show Saturation box.** Any pixels in your image that have are measured at the highest level of grayscale for your camera (i.e. Are true white) will be marked with red. If important areas of your image, such as the bands in a gel, show up as red, decrease the number of exposures that have been integrated until the red pixels are eliminated. *Saturated pixels will not be analyzed accurately by image analysis software because the linear range of the camera has been exceeded.*

   b. **Check the Black Level box.** Any pixels in your image that have are measured at the lowest level of grayscale for your camera (i.e. Are true black) will be marked with green.

12. **Adjust brightness and contrast. (optional)** Use the slide pulls to adjust brightness and contrast. Use the Auto button to perform an automatic image optimization.

13. **Close the Video Capture dialog box.**

14. **Save the image (optional).** Choose Save from the File pull-down menu. Alternatively, click the Save icon in the PC Image toolbar. Type in the file name. Choose file type. Images acquired by PC Image may be saved in any of nine file types including BMP and JPEG. *TIF file type is recommended if the image will be analyzed using image analysis software.*

15. **Turn off all lights when you are done.**

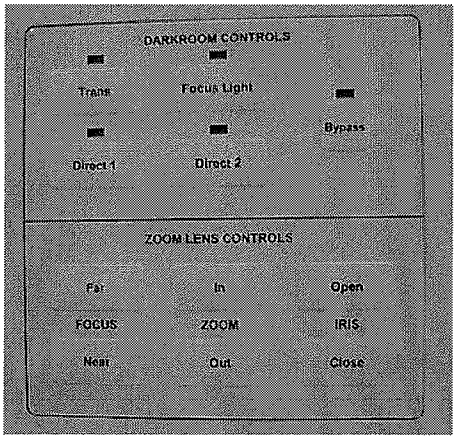


Figure 8 The intuitive membrane panel allows you to view the status of the darkroom interior lighting. The membrane panel is only functional when the acquisition software is closed.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Operating Instructions: Chemiluminescent Imaging

1. **Position sample.** Open the front access door to the FOTO/Luminary Darkroom. Remove the Lumi/Tray from its storage place on the inside of the door. Place subject in the center of the sample tray. Fit the tray into the track near the top of the enclosure, above the darkroom unit's sidelights. Slide the tray to the fully retracted position. Close the front access door. *Samples that are too large for this tray can be placed on the UV surface of the transilluminator.*

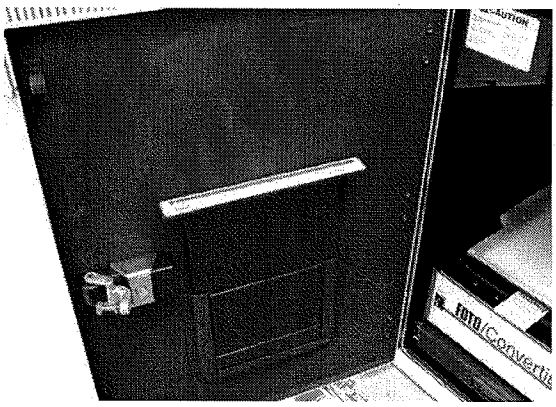


Figure 9 Sample Tray Storage Location

2. **Insert proper filter**. If you placed your sample on the Lumi/Tray in the last step, use the Close-Up Adapter. If you placed your sample on the transilluminator, use the Blank filter. Slide the filter into the slot on the FOTO/Luminary Darkroom just below the zoom lens. The aluminum plate will face the user; a magnet on the plate will hold the filter in place.

3. **Turn on power.** Press the top half of the power switch on the front of the FOTO/Luminary Darkroom; the switch is found in the upper right of the unit. Turn on the power to the camera control box, your computer, the thermal printer, and all required accessories.

4. **Open PC Image software.** Select the PC Image icon and open the application.

5. **Choose Acquire Chemi Image** (the second icon from the left) **on the PC Image toolbar or from the File pull-down menu.** The Chemi Capture dialog box will appear. (figure 10)

6. **Turn on Focus lights.** Click the **Focus** button in PC Image to turn on white light for focusing. You should see an image on your computer monitor at this point.

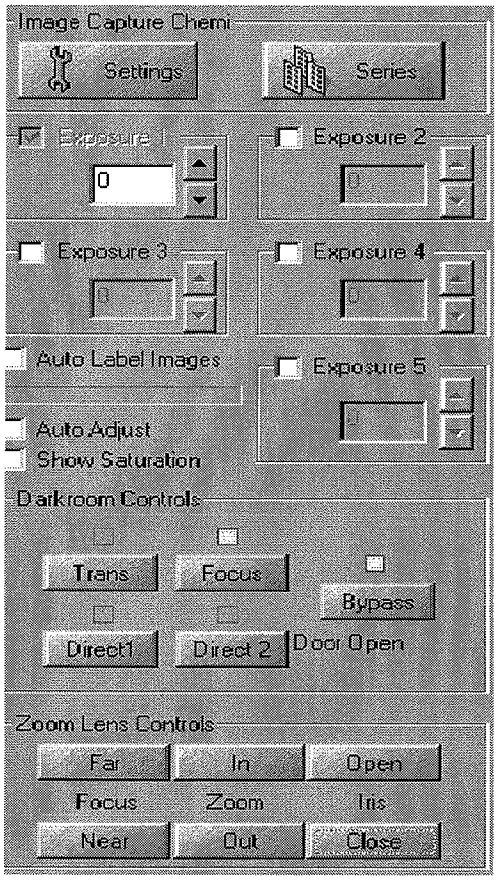


Figure 10 The Chemi Capture dialog box allows you to set up to five different exposure times. It also allows you to control the motorized zoom lens and FOTO/Luminary Darkroom interior lighting.

7. **Frame and focus the subject.**
   a. **Adjust the aperture.** Use the "Close Iris" and "Open Iris" buttons on the FOTO/Luminary membrane panel or in PC Image to adjust the amount of light entering the camera.

   b. **Frame the subject.** Use the "Zoom In" and "Zoom Out" buttons FOTO/Luminary membrane panel or in PC Image to zoom in or out. Adjust the zoom until your subject is framed properly.

   c. **Focus the subject.** Adjust the fine focus using the "Focus Far" or "Focus Near" buttons on the FOTO/Luminary membrane panel or in PC Image.

8. **Open the Aperture.** Using the "Open Iris" button open the aperture as far as it will go. Your image will probably appear all white.

9. **Turn off Focus lights.**

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

10. **Integrate the image.**
    a. Set the number of frames of exposure in the "Exposure 1" box.

    b. **Optional:** Check the boxes next to "Exposure 2", "Exposure 3, etc."if you want multiple pictures of the same sample. This allows you to experiment with different exposure settings. Set the number of frames of integration for each box you checked.

11. **Hit the Settings button.** (Figure 11) This will bring up a dialog box in which you can adjust binning settings for each of the exposures. "None" will result in a picture that is displayed exactly as it is received from the camera (i.e. full resolution) "2x2" causes the software to view 2 pixels of the camera in each direction as a single pixel, increasing the pixel size and therefore the light sensitivity. Similarly "4x4" treats sixteen pixels as one and "8x8" view a grid of 64 pixels as a single pixel. *Keep in mind tat resolution is decreased as binning settings are increased.* This also produces a decrease in resolution.

12. **Optional: Set other parameters.**
    a. "Auto" will produce pictures with automatic brightness and contrast optimization.

    b. "Auto Label" will put a date, time, and exposures stamp on the bottom of the image.

    c. "Show Saturation" will indicate any areas of your image that have been overexposed.

13. **Hit "Expose Series".** This will start the exposures.

14. **Choose and Save the image.**
    a. Pick an image from the multiple exposures. Click on the image.

    b. Choose Save from the File pull-down menu. Alternatively, click the Save icon in the PC Image toolbar.

    c. Type in the file name.

    d. Choose file type. Images acquired by PC Image may be saved in any of nine file types including BMP and JPEG. TIF file type is recommended if the image will be analyzed using image analysis software.

15. **Make a Thermal Print of the image (optional).** Click the Print button in the tool bar or select Print from the File pull-down menu. The image will be sent the thermal printer and printed in a few seconds.

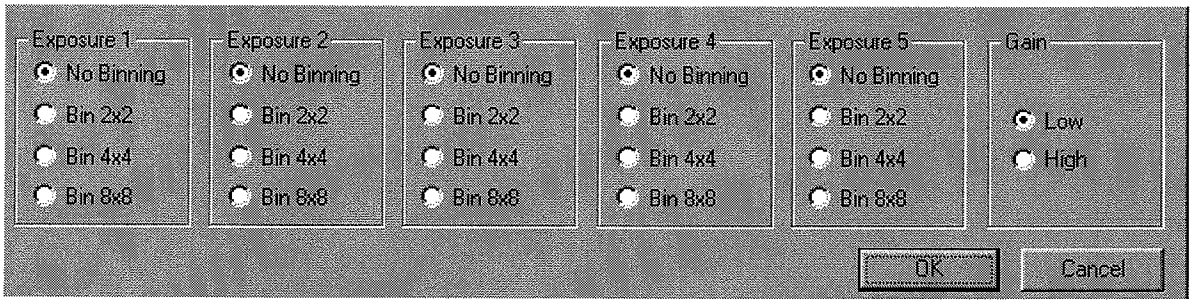


Figure 11 The Chemi Settings box allows you to set different binning for each exposure. It also allows the control of the camera gain for additional sensitivity

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

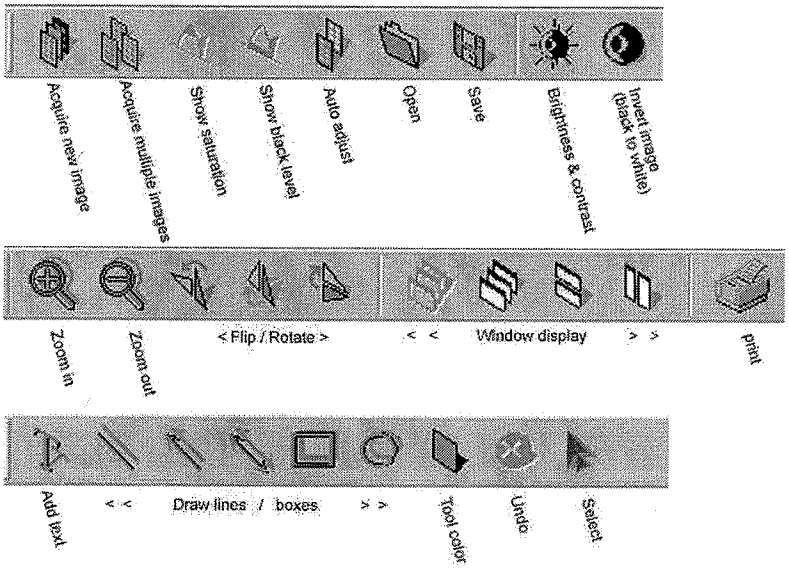


Figure 12 PC Image Tool Bar

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Additional Information

Helpful Hints
Obtaining the best possible print from your FOTO/Analyst Luminary- PC Electronic Documentation & Analysis System sometimes requires a bit of trial and error. Knowing how to analyze a print will usually help to change the proper parameters to improve upon it.

Exposure/Integration
Image exposure is determined by the size of the lens opening (aperture) and the length of time that light is stored on the CCD photoreceptor array before sending it to the computer(integration time).

The lightness or darkness of a gel image may be adjusted by changing these two parameters in your Luminary system. If a gel image is too light, either reduce the integration time (fewer frames) or make the lens aperture smaller. Conversely, if the image is too dark, the exposure should be increased by using a longer integration time (more frames) or a larger lens aperture.

Depth of Field
Blurry or hazy photographs can result from improper selection of exposure settings. This is especially true in low-light photography, such as that for ethidium bromide-stained DNA in agarose electrophoresis gels. These low-light situations require a lens aperture open very wide to allow as much light as possible into the camera. The large lens aperture results in a very shallow depth of focus. Because the 5mm or greater gel thickness often used in this application can exceed this depth of focus, some of the gel may lie outside the focal plane. To correct such a problem, it is necessary to close down the lens aperture. While this increases the depth of focus, the integration time must be lengthened to compensate for the reduction of light through the lens.

Filtration
If transilluminator bulbs are visible in photographs, then the correct photographic filter is not being used or it is missing. For high quality photodocumentation, check to make sure that the filter is in place, that it is the correct filter and that it is in good condition .

Recommended Exposure Settings
To obtain the best images, the proper filter should be in place. For ethidium bromide, fluorescent green, or fluorescent gold-stained gels a band-pass (interference) filter should be used. For Coomassie blue stained gels, a cut-off filter should be in place. For the filtration needs of other stains, contact Technical Service at FOTODYNE, 1-800-362-3686. Refer to Table 1 on page 18 for recommended exposure settings for use with popular gel stains.

For Chemiliminescent samples, the close-up lens or blank filter frame should be used. Use of a band-pass or cut-off filter will reduce or eliminate a chemiluminescent signal.

For images such as autorads, blots, or petri plates, a neutral density filter (FOTODYNE Catalog Number 60-2032) may be added in order to achieve more control over exposure settings. The amount of light reaching the camera array through such a filter will be attenuated over the entire visible spectrum.

Print Options (File menu)
Images sent to the printer can be optimized to match the image on the screen by adjusting "Print Options". When you choose the Print Options command, you will be presented with a dialog box with the following image parameters. These settings only affect how the image appears when printed without affecting how the image is displayed on the monitor or saved to file. Click "Set" to save settings. These are saved and reused every time PC Image prints out an image. Click "Factory" to restore the factory settings.

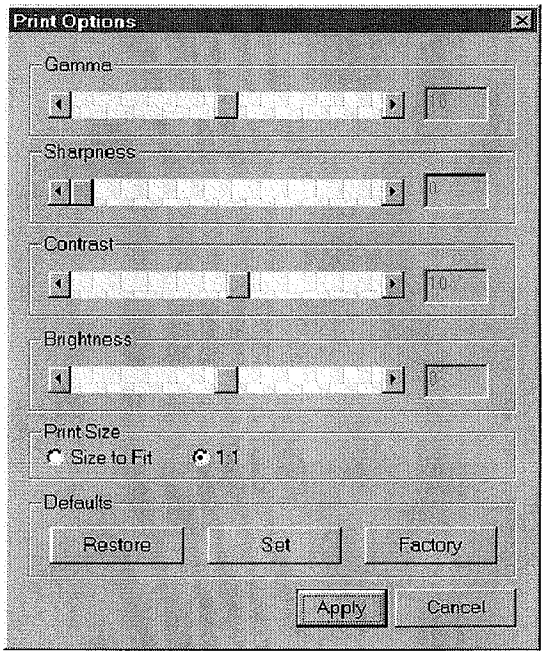


Figure 13
The Print Options Dialog Box allows you to adjust printing parameters.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Additional Information

Helpful Hints for Imaging Chemiluminescent Subjects

Obtaining the best possible image from a chemiluminescent sample sometimes requires a bit of trial and error. The following tips may help improve your imaging parameters.

- The FOTO/Luminary may be used with any chemiluminescent detection system. Chemiluminescent substrates generally emit 425-470 nm light when acted upon by enzyme-conjugated antibodies or probes. Extended duration substrates such as SuperSignal West Dura Extended Duration Substrate* yield long-lasting signals that work well for extended integration times.

- Membrane drying can reduce chemiluminescent signal. Placing the membrane between acetate sheets to prevent drying may improve results. *Plastic wrap may also be used to wrap the membrane, but can sometimes cause reflections. Therefore acetate sheets ("page protectors") are preferred.*

- The strength and duration of chemiluminescent signals can vary widely. Initial exposure times of 5000 and 10000 frames may not be sufficient to capture faint signals. If a signal is not detected initially, increase the exposure time. Exposure times can vary from as few as 100 frames to 40,000 frames.

- For maximum detection of chemiluminescent signals, the aperture (iris) should be fully open.

- Be sure to use The Blank Filter or the Close-up Adapter with chemiluminescent subjects to maximize detection and to prevent entry of stray light. *Chemiluminescent signals are blocked by filters used with other applications (i.e. Ethidium Bromide and Coomassie Blue.)*

- Be sure all interior lights are OFF during chemiluminescent imaging. This includes epi illumination, focus light and transilluminator.

- The white light sidelights in the FOTO/Luminary enclosure should NOT be used to frame and focus chemiluminescent samples. The fluorescent bulbs can emit a faint glow for several minutes after they are turned off, which can reduce detection of chemiluminescent signals.

- The electroluminescent white light panel of the FOTO/Convertible transilluminator should be raised fully when imaging chemiluminescent samples.

- Chemiluminescent samples larger than 12.7 x 9.5 cm should be placed on the purple UV filter glass. The empty filter frame should be positioned in the slot of the FOTO/Luminary darkroom just below the zoom lens.

- The slide-out Lumi/Tray should be used with chemiluminescent samples measuring 12.7 x 9.5 cm and smaller. The Close-Up adapter should be positioned in the slot of the FOTO/Luminary darkroom just below the zoom lens.

- For further assistance with chemiluminescent imaging, contact FOTODYNE Technical Service at 800-362-3686.

*SuperSignal West Dura is a registered trademark of Pierce Biotechnology.

Recomended Exposure Settings

Stain	Transillumination	# Frames	Filter Catalog #
Ethidium Bromide	Ultraviolet	100	60-2052
Fluorescent Green	Ultraviolet	100	60-2056
Coomassie Blue	White Light	1(Live)	60-2053
Coomassie Blue	White Light	20	60-2053
Chemiluminescence	None	5,000-40,000	none

Table 1 The above settings represent suggested starting points for standard gels using proper filtration. A variety of factors (gel thickness, stain concentration, staining time, destaining, etc.) may cause your gel to require different settings for optimal documentation.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Servicing Information

Direct Lighting Bulb Replacement

With the exception of the bulbs for direct lighting, the FOTO/Luminary® Benchtop Darkroom has no user serviceable parts. If the unit fails to operate as instructed, or if there are any questions regarding its correct use, please contact FOTODYNE Incorporated for technical assistance at 1-800-362-3686.

CAUTION: Before opening the FOTO/Luminary® Benchtop Darkroom for service or repairs, unplug the power cord from the rear of the FOTO/Luminary®. Do this even when checking or replacing bulbs, etc. This insures that power to the instrument is off, avoiding ignition of the bulbs and the possibility of shock hazard while servicing. Always wear protective UV blocking eyeglasses.

WARNING: Broken fluorescent bulbs present a hazard of skin laceration and exposure to toxic mercury vapor. Wear protective gloves when removing bulbs. Do not breathe the mercury vapor or touch the mercury droplets if the bulb should break.

1. **Unplug FOTO/Luminary®.** Turn off the power switch on the front of the enclosure. Unplug the power cable from the back of the FOTO/Eclipse enclosure.

3. **Remove the Bulb Covers. (UV bulbs only)** Open the front access door of the FOTO/Luminary® fully. Using a screw driver, remove the 6 screws holding the glass frame around the purple glass. Be carfull not to drop the glass out of the frame. The glass is not attached to the frame.

2. **Replace Bulbs.** Reach inside the enclosure and grasp one of the 8 watt fluorescent bulbs by the metal collars on each end of the bulb with the thumb and first finger. Gently rotate the bulb and pull it out of its socket. Do not force the bulb. Do not use excessive pressure, and do not hold the bulb in the center. Replace the old bulb with a new one in the reverse order. Repeat the procedure with the other bulb.

3. **Reconnect Power.** Connect the power cable to its connector on the back of the FOTO/Eclipse® Benchtop Darkroom. Make sure the power cord to the Controller is plugged into a properly grounded three-conductor outlet.

   NOTE: This is a three wire ground style cord and should not be used with a conversion plug inserted into a two wire receptacle.

Turning off FOTO/Luminary® Audio Warning Feature

Warning: The audio warning feature has been included in the FOTO/Luminary® Benchtop Darkroom to prevent the operator from accidentally leaving the transilluminator and/or internal lights on. Because the FOTO/Luminary® is completely closed and light-tight, the operator may not be aware that the transiluminator is on if the Audio Warning feature is turned off. Prolonged exposure to ultraviolet light may result in photo-nicking and photobleaching of sensitive samples. *Leaving the transilluminator and/or the interior lights on will shorten the useful life of the WL bulbs and the transilluminator.*

1. **Disconnect FOTO/Luminary® Power.** Turn off the power-switch on the FOTO/Luminary®. Unplug the electrical power cord from the back of the Luminary.

2. **Set DIP Switches.** On the back side of the Enclosure, you will see a pair of DIP switches. (just above the zoom lens power connector) To disengage the audio warning feature, simply flip both DIP switches to the up (OFF) position. To energize the audio warning feature, flip both DIP switches to the down (ON) position.

2. **Reconnect Power.** Connect the power cord to its receptacle on the back of the FOTO/Eclipse® Controller Module. Plug the other end of the power cord into a properlyground-ed three-conductor outlet.

   NOTE: This is a three wire ground style cord and should not be used with a conversion plug inserted into a two-wire receptacle.

BYPASSING THE SAFETY INTERLOCK FEATURE

It is possible to bypass the safety interlock features of the FOTO/Luminary Benchtop Darkroom. With the front access door open, press the BYPASS button, then press the TRANS button. The transilluminator will remain on until you press the TRANS button again.

CAUTION: Always wear personal protective equipment (i.e. safety glasses, faceshield, gloves) when working with UV-illumination.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Troubleshooting

Symptom	Possible Problem	Remedy
Image of chemiluminescent sample looks "bleached" out".	FOTO/Luminary darkroom interior lights are on.	Turn off all interior lights, including Focus, Epi, and transillumination for chemiluminescent imaging.
	Epi white lights used to frame and focus sample.	Use only ambient light or Focus light to frame and focus chemiluminescent sample(s).
	FOTO/Convertible white light panel positioned incorrectly.	WL panel should be in the upright position during chemiluminescent imaging.
Faint or no signal detected from chemiluminescent sample.	Incorrect filter in filter holder.	Select either the Blank filter frame or the Close-Up Adapter for chemiluminescent imaging.
	Motorized zoom lens iris not fully open.	Iris should be fully open for chemiluminescent imaging.
No signal detected from fluorescent gel or opaque sample.	Lumi/Tray is in place.	Store Lumi/Tray inside darkroom door when not in use.
FOTO/Luminary membrane panel does not control darkroom functions	Membrane panel is inactivated when PC Image software is running	Control darkroom functions from PC Image software OR close PC Image and control darkroom functions with the membrane panel.
PC Image is giving an error of "Camera Not Found" when opened	Camera controller is switched off	Close PC Image and turn on the camera controller. Reopen PC Image.

If your FOTO/Analyst® Luminary fails to operate as instructed, or if there are any questions regarding its correct usage, please contact FOTODYNE Incorporated at 800-362-3686.

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Ordering Information / Technical Assistance

ORDERING INFORMATION

Call or Fax Toll-Free:

Educational Products Division
Technical Service: 262-369-7000
Phone Orders: 1-800-362-4657
Fax Orders: 1-800-362-3642

Research Products Division
Technical Service: 262-369-7000
Phone Orders: 1-800-DNA-FOTO
1-800-362-3686
Fax Orders: 1-800-362-3642

Mail to:

FOTODYNE® INCORPORATED
950 Walnut Ridge Drive
Hartland, WI 53029-9388
USA

Web-site: www.fotodyne.com • E-mail: info@fotodyne.com

TECHNICAL ASSISTANCE

Technical questions regarding the operation and safe use of this instrument should be directed to FOTODYNE Incorporated.
Call 1-262-369-7000.

02/07

Artisan Scientific - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisan-scientific.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP