



# Installation and Operation Manual



## Molecular Imaging Systems



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## Section 1 - General Information

### 1.1 Introduction

Thank you for choosing UltraLum for your imaging instrument needs. We strive to build quality and reliability into each and every product we manufacture. We all hope that the system you have purchased meets and exceeds your expectations. Please feel free to contact us with any questions or visit our website for updates and additional information. Our knowledgeable Sales, Applications, Customer Service and Technical Support staff are available to answer any questions or provide troubleshooting or training. We can be contacted at the following location:

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The Discovery Molecular Imaging System is completely light tight and is supplied with a scientific grade CCD camera. The Discovery is installed with overhead white light for focusing and not quantitative visible light imaging. The Discovery 10gD, intended for basic gel documentation applications, is provided with a manual zoom lens, ethidium bromide (or SYBR Green) filter, close-up diopter and threaded housing seal. The Discovery 12iC, a dedicated system for chemiluminescence detection, includes a fixed focal length lens, adapters and threaded housing seal.

### 1.2 Unpacking and Inspection

The Discovery will arrive wrapped in sealed plastic with all components bubbled-wrapped inside the housing, which is encased in thick padded foam insulation inside a cardboard box.

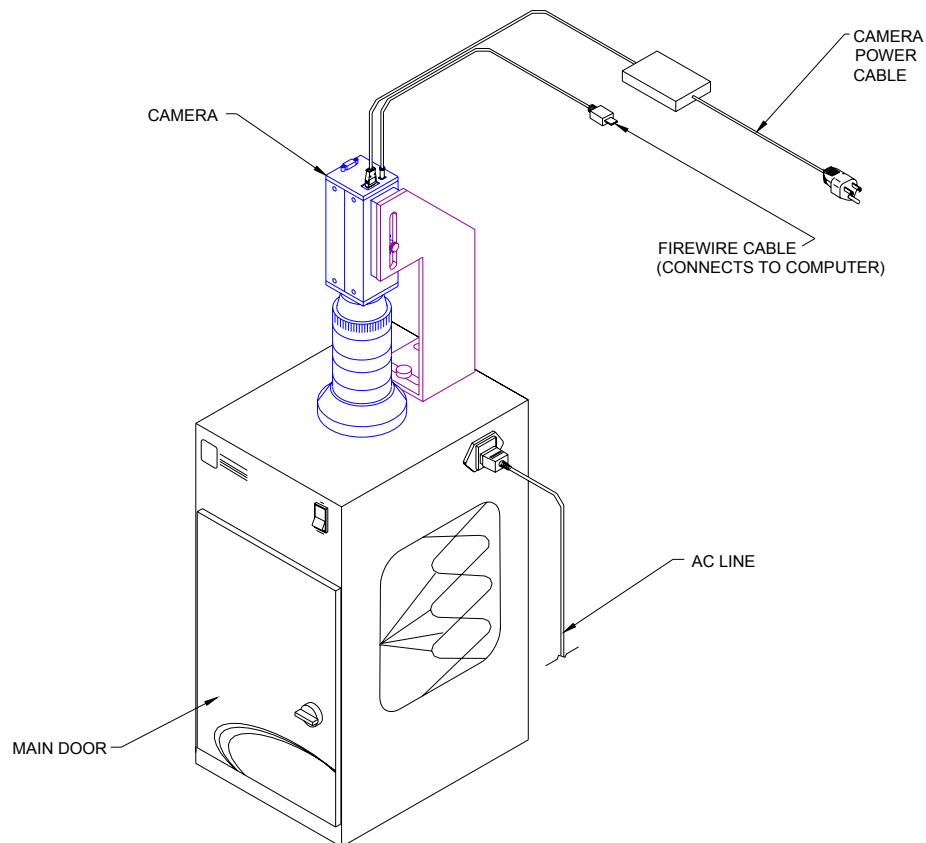
Camera Mounting Bracket .....	20-0002-60
Adjustable Sample Tray .....	20-0002-59
FireWire Cable .....	58-0001-08
120 VAC Line Cord .....	58-0004-01
240 VAC Line cord .....	58-0006-01
Camera Mounting Thumb Screws, 1/4-20, quantity 3 .....	60-7000-04
FireWire Cable .....	58-0001-08
FireWire card .....	990-0640-01
10-bit CCD Camera, Power Supply & Cable (10gD only) ..	990-0712-04
12-bit Cooled CCD Camera (12iC only) .....	990-0712-06
Camera Power Supply and Cable (12iC only) .....	990-0750-01
1/2" F1.0 Manual Zoom Lens (10gD only) .....	990-0802-01
2/3" F0.95 Fixed Focal Length Lens (12iC only) .....	990-0803-06
+1 Close-Up Diopter (10gD only) .....	990-0803-01
600nm Ethidium Bromide Filter (10gD only) .....	990-0804-01
Step-Up Adapter Ring, 46-52 mm.....	990-0806-01
Rubber Lens Housing Seal .....	990-0807-01

## Section 2 – Installation

### 2.1 System Location

The Discovery should be located on a sturdy, level table, desk or lab bench. The computer and monitor should be positioned (if possible) on the right side of the Discovery to facilitate easy viewing of the monitor while opening the door on the Discovery to adjust samples under live preview. If you have purchased a Discovery 10gD, lay the enclosure on a flat surface and remove the bottom plate, so that the Discovery can be mounted atop a mid-size UV transilluminator. Leave the bottom plate if you have purchased a Discovery 12iC.

- A. Install the mount on top of the Discovery with the two thumb screws, but do not tighten.
- B. Thread the lens onto the camera insuring that the glass surfaces are clean.
- C. Hand-tighten the lens adapter(s) onto the end of the lens.
- D. Thread the close-up diopter and filter (Discovery 10gD only) onto the end of the adapters.
- E. Hand-tighten the rubber housing seal onto the end of the camera-lens assembly.
- F. Position the camera-lens assembly over the opening in the Discovery housing.
- G. Align the camera mount opening with the threaded tripod connection on the camera.
- H. Hand-tighten the thumb screw to secure the camera-lens assembly on the mount.
- I. Move the zoom on the lens all the way in to maximize the length of the assembly.
- J. Seat the housing seal to where it just touches the Discovery housing inside the lip.
- K. Tighten all thumb screws securely.
- L. Install the camera cable from the power supply to the camera.
- M. Install the Firewire cable from the camera to the PC Firewire connection.



## 2.2 Computer Requirements

The faster the processor and the more RAM memory the better, but 512MB of RAM is the recommended minimum requirement. Pentium processor technology is also recommended over other processors. UltraQuant Image Acquisition & Analysis Software is Windows 2000 or XP compatible and requires only 200MB of hard drive space. The PC should also have at least one PCI slot for installation of a full size IEEE 1394 FireWire card, unless the PC is already equipped with a FireWire connection.

## 2.3 IEEE 1394 FireWire Card

**Note: If a PC was ordered and shipped with the Omega System, please skip the rest of the paragraphs in Section 2, and proceed to Section 3 – Operation, as the FireWire card and all required software are already loaded.**

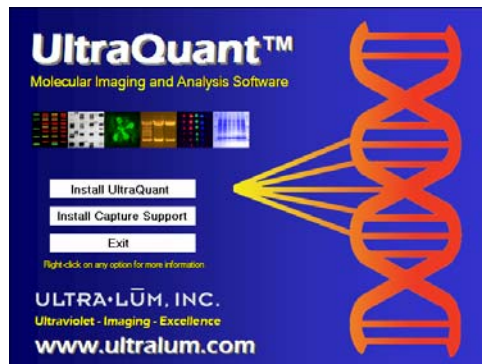
- A. Turn off the computer, and all peripherals, and remove the cover from the computer.
- B. Discharge any static electricity by touching the nearest piece of grounded metal.
- C. Find an open PCI expansion slot and remove the metal plate that corresponds to the slot.
- D. Insert the FireWire card's striped connector into the PCI expansion slot.
- E. Secure the card with the screw from the metal plate and replace the cover.
- F. Turn on the PC and allow Windows to automatically find and install the FireWire card.
- G. Refer to Section 4 - Troubleshooting if Windows does not auto-install the card.

## 2.4 UltraQuant Software

Install the USB Security Key that came with the system into a USB slot on the back of the PC. It is recommended to register your software, write the serial number down in a safe place and secure the USB key to the PC with a zip tie or small lock to deter theft. Insert the UltraQuant CD into the CD/DVD player/recorder on the PC. UltraQuant should auto-run, but if it does not, go to "Start", "Run", "Browse" and locate the "Start.exe" file on the CD to initiate UltraQuant installation.



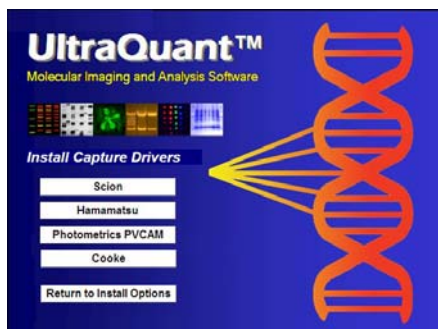
When the Start-Up screen appears, click on "Install UltraQuant".



UltraQuant will ask if you want to install, modify, or remove the selected program. This screen will not appear if you are installing UltraQuant 6.0 for the first time. Accept the License Agreement, select "Typical" from the installation options, and UltraQuant will auto-install through the Windows "Set-Up Wizard". It is best to use all of the default program, folder and file names.

## 2.5 Camera Drivers

After successful installation of UltraQuant, the Start-Up screen will reappear. Click on "Install Capture Support" to load the camera drivers. This will direct you to another screen asking you which camera support to install.



For the Discovery 10gD, install the "Scion" driver.  
For the Discovery 12iC, install the "Hamamatsu" driver.

Next, browse the UltraQuant CD and locate the "FireWire Drivers" folder and the subfolder specific to the camera and Discovery System you have purchased. Install the appropriate driver and reboot the computer.

**Note: If the auto-install does not auto-load the drivers, the following are alternate manual instructions for loading capture drivers in UltraQuant.**

### Scion 10gD

1. Click on the "Install Capture Support" button on the UltraQuant Start-Up screen.
2. Browse the UltraQuant CD, open the "Capture Drivers-Alternate" folder and open the "10gD-Scion" folder.
3. Double click on the "Scion FireWire Driver" icon to install the Scion IEEE 1394 driver into the default location.
4. After successful installation, double click on the "Scion UQ Driver" icon to install the Scion CFW-1310 camera driver. Make sure to change the default location for installation of this driver from "c:\ipwin4" to "c:\Ultraquant".
5. Restart the computer.
6. Turn the camera power supply "ON" and plug in the FireWire cable from the back of the Omega to the PC.

7. When Windows recognizes the camera and asks for the driver, click "Search Automatically". Windows will find the correct driver from the CD and install it in UltraQuant.
8. Proceed to Section 3.3 of this manual for camera operating instructions.

#### Hamamatsu 12iC

1. Click on the "Install Capture Support" button on the UltraQuant Start-Up screen.
2. Browse the UltraQuant CD, open the "Capture Drivers-Alternate" folder and open the "12iC-Hamamatsu" folder.
3. Double click on the "Hamamatsu DCAM FireWire" folder and double click on the "Setup.exe" file to install the Hamamatsu OHCI IEEE 1394 driver into the default location.
4. After successful installation, double click on the "Hamamatsu UQ Capture Driver" icon to install the Hamamatsu 8484-03G camera driver.
5. Restart the computer.
6. Turn the camera power supply "ON" and plug in the FireWire cable from the back of the Omega to the PC.
7. When Windows recognizes the camera and asks for the driver, click "Search Automatically". Windows will find the correct driver from the CD and install it in UltraQuant.
8. Proceed to Section 3.3 of this manual for camera operating instructions.

#### 2.6 Network Multi-User Security Key

**Note: If you purchased an Discovery System with a single user license copy of UltraQuant, please skip to Section 2.7.**

Setting up a multi-user network license is a two-step process. First, the License Server software must be installed and configured on the Server computer (usually the PC operating the Discovery System). Next, the License Client software must be installed on every computer that will actually run UltraQuant (including the Server, if it will be used to run UltraQuant).

**Note: You MUST be logged on as an Administrator when installing the network key License Server and Client under Windows NT4, 2000 and XP.**

##### Installing the License Server Software

Note: It is strongly recommended that the License Server be configured with a Static IP Address. If the License Server is using a Dynamic IP Address (i.e. DHCP) you need to reconfigure each UltraQuant client machine every time the License Server's IP Address changes (e.g. when it is rebooted). If you are not sure whether the License Server is using a Static or Dynamic IP Address, please contact your System Administrator.

1. Determine the PC's IP address by clicking on "Start", "Programs", "Accessories", "Command" and type in "ipconfig" at the C:\ prompt, or click on "Start", "Control Panel", "Network Connections" and highlight the LAN connection. The IP address will appear in the "Details" window at the bottom left. Write this down for future installation reference.

2. Explore the UltraQuant CD and locate the "Setup.exe" in the "NetHasp" folder.
3. Double click on this icon to start the installation.
4. Select the "Server" installation and install the software as a "service" so that UltraQuant can be used on any "client" PC.
5. Install the License Server software into the default directory.

Installing the License Client Software (on any PC that will need UltraQuant for quantitative analysis)

1. Insure that a typical, full installation of UltraQuant is already installed on the Client PC.
2. Explore the UltraQuant CD and locate the "Setup.exe" in the "NetHasp" folder.
3. Double click on this icon to start the installation.
4. Select the "Client" installation and select UltraQuant as the application that will be using the NetHasp licensing.
5. Install the License Client software into the default directory.
6. Type in the IP address of the License Server PC.
7. Finish the installation and reboot the PC.

Open UltraQuant on the License Server PC and make sure no "security key errors" occur. If you experience any errors, please refer to Section 4 – Troubleshooting for tips on how to resolve any problems.

## 2.7 Printer Drivers

If you purchased a Digital Thermal Printer or other printer, install the software that shipped with the printer and insure that it is properly installed in "Printer" folder of "Control Panel" in Windows.

## 2.8 Cable Connections

Attach the IEEE 1394 FireWire cable to the matching socket on the FireWire card on the back of the computer. Connect the other end of the cable to the matching socket on the camera. Plug the camera power supply AC line into a sufficiently rated suppression device (5 joule minimum rating).

**Note: It is strongly recommended to plug all components and accessories associated with the Discovery System to be plugged into a sufficiently rated suppression device to minimize problems from spikes in the electrical supply to the instrument.**

The Discovery accepts only 100, 115, or 230  $\pm$ 10% VAC, at 50 or 60 Hz. Refer to the ratings label, located near the Input AC line power entry module located on the rear panel of the Omega. This will define the appropriate AC line voltage and current requirements that will allow the system to operate properly.

Electrical Ratings:

AC Input Voltage	100VAC, 115VAC, or 230VAC
AC Line Frequency	50 or 60Hz
Dual Fuse Rating	1A 250VAC, T (Time Delay), 5x20mm



## Section 3 - Operation


### 3.1 System Features

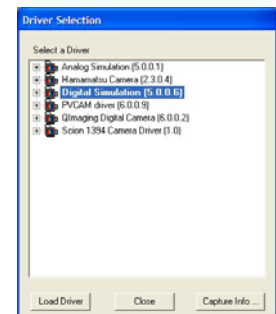
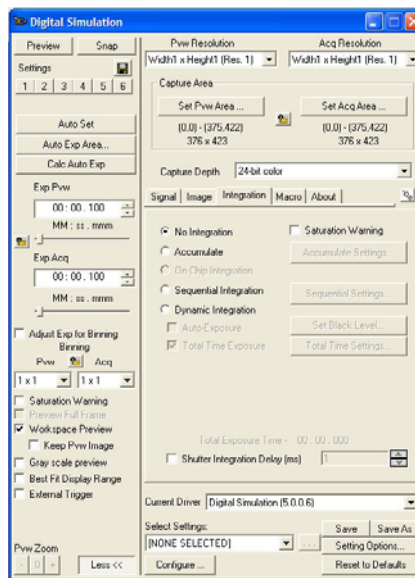
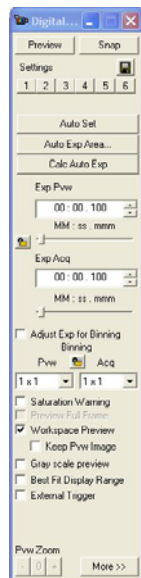
Everything on the Discovery System is manually controlled except the camera which is controlled by software. The lens has an iris, or aperture control, a zoom and fine focus. To properly adjust the lens, zoom all the way into the sample and focus. Now the zoom lens is parfocal and will always be in focus at every zoom level.

### 3.2 Instructions

1. Make sure all cables are properly connected.
2. Turn the camera power supply "ON".
3. Ensure that the UltraQuant security key is inserted in an available USB port and turn on the PC.
4. Double click on the UltraQuant desktop icon to open the application. If UltraQuant opened without any errors you are ready to acquire images in the next paragraph.

### 3.3 Camera Settings


1. Click on the camera icon  on the main toolbar.
2. UltraQuant will either ask you which camera you want to use or you will have to select the camera from the Capture Dialogue window or Driver Selection window.



3. Click on the "More" button of the Capture Dialogue window to open the full dialogue.

4. Click on the “down arrow” of the Current Driver and select the camera that corresponds to the camera your Discovery System uses.
5. When the Driver Selection window opens, highlight the appropriate camera and click on “Load Driver”. The acquisition features in UltraQuant that are specific to this camera will load.
6. Check “Workspace Preview”, and enter either 250ms (Scion, Discovery 10gD) or 100ms (Hamamatsu, Discovery 12iC) in the “Exp Pvw” dialogue box and click on the “Preview” button. A live preview from the camera should appear. You can check on this by varying the iris on the lens, turning on the overhead white light switch “ON” and “OFF” or simply by waving your hand inside of the Discovery.

**Note: If a live preview does not appear, please refer to Section 4 – Troubleshooting, reinstall the capture driver from the UltraQuant CD or call Technical Support at (800) 809-6559.**

7. The camera dialogue defaults the preview and acquisition resolution to 1000 x 1000 pixels. Reset these values to full frame by clicking on the “Set Pvw Area ...” and “Set Acq Area ...” buttons in the “Capture Area” of the “More” dialogue window.
8. Click on the “Lock Pvw and Exp Times” button  in the “Less” camera dialogue to acquire images at the same exposure time as the live preview.
9. Now you are ready to preview and acquire images in UltraQuant. Please reference Sections 3.4 through 3.7 for information and settings for specific applications.

### 3.4 UV Transillumination Applications (Discovery 10gD only)

Use the following procedure to acquire images of stained DNA, RNA or protein gels that fluoresce when 300nm UV is used to transmit light through the gel (e.g. ethidium bromide, SYBR Green, SYPRO Red and Orange, etc). This generally requires that the gel or sample to be transparent or semi-transparent, as opposed to opaque.

1. Open the Discovery door and center the gel in the middle of the transilluminator, well side farthest from the door.
2. Turn “ON” the overhead white light.
3. Click on the camera icon in UltraQuant and click the “Preview” button.
4. Manually “zoom” the lens until the gel fills the entire preview area. This will maximize the resolution of the resulting image. Adjust the location of the gel on the transilluminator if necessary.
5. Close the door, lock the handle and turn on the transilluminator and turn “OFF” the overhead white light.
6. Consult Section 6 – Appendices for the proper filter to use and select it from the touch panel on the Discovery (e.g. 600nm for ethidium bromide and 525nm for SYBR green).
7. Adjust the iris on the lens, or the intensity of transilluminator, or the integration time in UltraQuant to see the bands in the gel. You can check for saturation, and image linearity, by checking the “Saturation Warning” on the camera dialogue window of UltraQuant. Red colored pixels are saturated and blue colored pixels are underexposed.

8. In the bands look blurry, adjust the fine focus on the lens.
9. Click “Stop”, to stop the preview, and click “Snap” to acquire an image.
10. You can now save, enhance or analyze this image in UltraQuant.

**Note: For additional information on how to save, enhance or analyze images in UltraQuant, consult the Quick Start Guide manual on the UltraQuant CD or use the “Help” and “Index” feature in UltraQuant to search for a specific procedure, or go to the Application Notes on the Technical page on the website at [www.ultralum.com](http://www.ultralum.com).**

### 3.5 White Light Transillumination Applications (Discovery 10gD or 12iC)

Use the following procedure to acquire images of visible or colorimetric stained DNA, RNA or protein gels, colony plates, microplates or autoradiograph film that require white light to transmit through the sample (e.g. Coomassie Blue, silver stain, etc). This generally requires that the gel or sample to be transparent or semi-transparent, as opposed to opaque.

1. Open the Discovery door and place the white light pad on top of the transilluminator. Make sure that the AC power connection faces the back right of the system. Plug the power cord from the Discovery into the white light pad.
2. Place the gel in the middle of the white light pad, well side farthest from the door.
3. Click on the camera icon in UltraQuant and click the “Preview” button.
4. Insure that the filter wheel is selected for the “Open” position.
5. Manually “zoom” the lens until the gel fills the entire preview area. This will maximize the resolution of the resulting image. Adjust the location of the gel on the transilluminator if necessary.
6. Close the door and lock the handle.
7. Adjust the iris on the lens or the integration time in UltraQuant to see the bands in the gel. You can check for saturation, and image linearity, by checking the “Saturation Warning” on the camera dialogue window of UltraQuant. Red colored pixels are saturated and blue colored pixels are underexposed.
8. In the bands look blurry, adjust the fine focus on the lens.
9. Click “Stop”, to stop the preview, and click “Snap” to acquire an image.
10. You can now save, enhance or analyze this image in UltraQuant.

**Note: For additional information on how to save, enhance or analyze images in UltraQuant, consult the Quick Start Guide manual on the UltraQuant CD or use the “Help” and “Index” feature in UltraQuant to search for a specific procedure, or go to the Application Notes on the Technical page on the website at [www.ultralum.com](http://www.ultralum.com).**

### 3.6 No-Light Chemiluminescence Applications (Discovery 12iC only)

Use the following procedure to acquire images of samples, especially membranes, that require no light for excitation, but that produce light either by chemical reaction (e.g. chemiluminescent western, northern and southern blots, etc). These applications cannot be adequately performed by the Omega 10gD as the camera is not cooled and will produce noisy images with high background in long term exposures.

**Note: For the best results write the date, your initials or some text in one corner of the blot to enable focusing before image capture.**

1. Open the Discovery door and center the membrane in the middle of the sample platform and facing left. It is best to place the membrane in a sheet protector slightly larger than the membrane to keep the blot moist for imaging. Dry membranes produce high background.
2. Turn "ON" the overhead white light.
3. Click on the camera icon in UltraQuant, change the "Binning Pvw and Acq" selections to 2x2 and click the "Preview" button.
4. Manually "zoom" the lens until the sample fills the entire preview area. This will maximize the resolution of the resulting image. Adjust the location of the sample on the platform if necessary.
5. Close the door and lock the handle.
6. Adjust the iris on the lens to a non-saturated light condition that enables fine focus of the text in the corner of the membrane.
7. Click "Stop", to stop the preview, and click "Snap" to acquire an image of the blot with its visible light marker. If a marker or standard is not present, or not used, skip this step.
8. Click on "Preview" again and adjust the iris, or open the aperture completely, until the light on the image does not get any brighter. This maximizes sensitivity of the lens and system.
9. Turn "OFF" the overhead white light.
10. Unlock the "Exp Pvw" and "Exp Acq" buttons in the capture dialogue of UltraQuant and type in the exposure time it normally takes the blot or substrate to expose to film.
11. Click "Stop" to stop the preview and click "Snap" to acquire an image of the blot.
12. Wait until the exposure is complete and the image appears. More than likely you will see a blank, black screen. The blot is there and the bands will be present if the blot has been prepared properly, but the blot has not filled the full dynamic range of the camera.
13. Go to "Enhance" and "Display Range" and open the image histogram. This is a graphical representation of the number of pixels (vertical axis) at each gray scale value (horizontal axis).
14. Grab the extent on the right side of the histogram (the thin green line) with a left mouse click, and drag it to the left until the bands appear.
15. Now grab the extent on the left and drag it to the right until it is just past the large peak. This is the noise ceiling, or background inherent to the camera. This will blacken the background completely.

16. If white spots appear throughout the image, this is evidence of “hot pixels” which is inherent to all CCD chips and becomes apparent during long term exposures. These “hot pixels” can be removed by going to the “Process” menu in UltraQuant and clicking on “Starfield Subtraction” tool.
17. You can now save, enhance or analyze both of these images in UltraQuant and even merge them into one image so the visible marker is embedded onto the chemiluminescent blot to enable quantitation of bands.

**Note: For additional information on how to save, enhance or analyze images in UltraQuant, as well as many other methods to acquire chemiluminescence images that eliminate the “trial and error” process, consult the Quick Start Guide manual on the UltraQuant CD or use the “Help” and “Index” feature in UltraQuant to search for a specific procedure, or go to the Application Notes on the Technical page on the website at [www.ultralum.com](http://www.ultralum.com).**

## Section 4 – Troubleshooting

### 4.1 System

Problem: Unit does not turn on.

1. Insure that there is power to the AC outlet, surge suppression device and that the cord is plugged in securely to the Discovery System.
2. Unplug the unit from the AC power and check the fuse. Replace if necessary referring to the Fuse Replacement section of this manual (Section 5.2) for further instructions.

### 4.2 Camera

Problem: The camera is not recognized in UltraQuant.

1. Insure that the correct driver is loaded and selected in the “Driver Selection” window of the “More” portion of the Capture Dialogue window. If it is not present, it must be reloaded per Section 2.5.
2. Go to “Control Panel”, “System” and “Device Manager” and see if the camera is listed under “Imaging Devices”. If it is not present, the PC has detected it through the FireWire connection. Check to insure that the connections are good, the main power switch to the Omega is “ON” and no other conflicts exist in “Device Manager”.

### 4.3 Software

Problem: The NetHasp software for the network security key is installed properly, but UltraQuant still does not recognize the dongle.

1. On PC systems using Windows XP Professional SP2, a port is sometimes closed that is needed by NetHasp to operate properly. Browse the UltraQuant CD and open the “Aladdin HASP License Manager Update-WinXP SP2”. “Run” the “nhsrvw32.exe” file to install this patch to open up the port.

## Section 5 – Maintenance

### 5.1 System Care

Once the Discovery is installed, it should not be moved around frequently. Excessive movement, especially sudden jarring or contact can potentially damage the internal electronics.

The transilluminator surface (Discovery 10gD only) should be cleaned with tap water, deionized water or a low concentration mix of alcohol and water with a non-abrasive cloth or chem-wipe. Avoid using strong household cleaners, especially those with ammonia, and abrasive cloths, tissues or paper towels.

Avoid sharp objects (e.g. razor blades, knives, etc) and cutting bands directly on top of the transilluminator. A separate, UV Transmitting Surface is supplied with every Discovery System to eliminate the need to cut bands on top of the transilluminator. This surface is a special filtered glass that is very expensive to replace.

It may be necessary to clean dust or particulate build-up off the filter. This happens over time from the door being opened closed. This may become apparent on images, especially images acquired with white light transillumination. This white background enables evidence of dirty lens to become apparent. The best method to remove dust from the filters is compressed air, or canisters of compressed air used to clean computer keyboards. Open the Discovery door and position the nozzle of compressed air over the top of the filter wheel. Blow dust off each filter by rotating the filter wheel through each position on the touch pad.

### 5.2 Replacement Parts

<u>Part Number</u>	<u>Description</u>
56-2010-10	Fuse 1A 250VAC T 5x20mm
58-0001-08	IEEE 1394 FireWire Cable (6')
990-0640-01	IEEE 1394 FireWire Card
58-0004-01	120 VAC Line Cord
58-0006-01	240 VAC Line Cord
990-1060-04	Epi White Light 6 Watt Lamp
990-1080-02	Transilluminator UV (300nm) 8 Watt Lamp (standard)
990-1080-01	Transilluminator UV (254nm) 8 Watt Lamp (optional)
990-1080-03	Transilluminator UV (365nm) 8 Watt Lamp (optional)
990-0210-03	UltraGlo Red UV to Visible Light Converter Plate (8"x10.5")
990-0210-04	UltraGlo Blue UV to Visible Light Converter Plate (8"x10.5")
990-0214-14	White Light Pad (8"x12")
990-0202-02	UV Transmitting Surface (9"x11")
990-1102-01	Thermal Paper, Standard Gloss (single roll)
990-1102-05	Thermal Paper, Standard Gloss (case of 5 rolls)
990-1102-10	Thermal Paper, Standard Gloss (case of 10 rolls)
990-1103-01	Thermal Paper, High Gloss (single roll)
990-1103-05	Thermal Paper, High Gloss (case of 5 rolls)
990-1103-10	Thermal Paper, High Gloss (case of 10 rolls)

### 5.3 Service

#### Fuse Replacement

1. Remove the AC line cord from the back of Omega.
2. Remove the fuse drawer from the input AC module.
3. Remove the fuses and visually inspect for blackening or an internally open fuse link.
4. If the fuses look good, check continuity of the fuse by measuring its resistance using an Ohmmeter. The resistance should be less than 1 ohm.
5. If the fuses fail to pass these visual or electrical tests, replace them with sufficiently rated fuses.
6. Replace the fuse drawer and plug the AC line cord into the input AC line module.

#### Transilluminator Lamp Replacement (Discovery 10gD only)

1. Loosen the two screws on the front of the transilluminator.
2. Slide the cover forward until it stops.
3. Remove each lamp that needs to be replaced one at a time from the fixture. It is recommended, but not required, to change all of the lamps at the same time.
4. Rotate each lamp in its socket holders until the slot at each socket is visible (in a vertical position) then lift up and remove the lamp from the fixture.
5. Install the replacement lamps in the reverse order that they were removed.
6. Insure that the slot in the lamp sockets is in a horizontal position and they are secure.
7. Close the cover and tighten the screws to secure the cover to the inner chassis.

**Note: For all other service related issues, please contact UltraLum Technical Support at (800) 809-6559, (909) 399-3694 or [tech@ultralum.com](mailto:tech@ultralum.com).**

## Section 6 – Appendices

### 6.1 Specifications

System	Discovery 10gD	Discovery 12iC
<b>Applications</b>	Gel Documentation	Chemiluminescence
<b>CCD Sensor</b>	Sony ICX-205	Hamamatsu ER2
<b>CCD Type</b>	Progressive Scan Interline	Progressive Scan Interline
<b>Pixel Size</b>	4.65 x 4.65 $\mu\text{m}^2$	6.45 x 6.45 $\mu\text{m}^2$
<b>Resolution</b>	1360 x 1024	1344 x 1024
<b>Megapixels</b>	1.40	1.40
<b>Full Well</b>	9,700 e <sup>-</sup>	15,000 e <sup>-</sup>
<b>Readout Noise</b>	15 e <sup>-</sup> rms	6 e <sup>-</sup> rms
<b>SNR</b>	650:1	2500:1
<b>Dynamic Range</b>	9.4 bits	11.3 bits
<b>A/D</b>	10 bits	12 bits
<b>Peltier Cooling</b>	N/A	-35 C
<b>QE @ 400nm</b>	27%	52%
<b>QE @ 500nm</b>	45%	70%
<b>QE @ 600nm</b>	30%	63%
<b>Interface</b>	IEEE-1394 FireWire™	IEEE-1394 FireWire™
<b>Motorized Lens</b>	F1.2, 12.5x75mm	F1.2, 12.5x75mm

### 6.2 Excitation/Emission Table

Transillumination Applications (Discovery 10gD only)

<b><u>DYE/STAIN</u></b>	<b><u>EXCITATION</u></b>	<b><u>TRANSILLUMINATION</u></b>	<b><u>EMISSION</u></b>	<b><u>FILTER</u></b>
Pro-Q Emerald 300	280nm	<b>UV (300nm)</b>	530nm	<b>Green (525nm)</b>
SYPRO Ruby	280nm	<b>UV (300nm)</b>	610nm	<b>Orange (600nm)</b>
GelRed	285nm	<b>UV (300nm)</b>	595nm	<b>Orange (600nm)</b>
Ethidium Bromide	295nm	<b>UV (300nm)</b>	605nm	<b>Orange (600nm)</b>
SYPRO Orange	300nm	<b>UV (300nm)</b>	570nm	<b>Orange (600nm)</b>
SYPRO Red	300nm	<b>UV (300nm)</b>	630nm	<b>Red (635nm)</b>
SYBR Green	300nm	<b>UV (300nm)</b>	505nm	<b>Green (525nm)</b>
SYBR Gold	300nm	<b>UV (300nm)</b>	540nm	<b>Green (525nm)</b>
SYBR Safe	300nm	<b>UV (300nm)</b>	524nm	<b>Green (525nm)</b>

### 6.3 Warranty

Products are guaranteed to be free of defects in materials, workmanship, and manufacture for a period of two (2) years from the date of shipment. Consumable and disposable products including but not limited to ultraviolet lamps are guaranteed to be free from defects in materials and manufacture for a period of ninety (90) days from the date of shipment. If a product failure should occur during the warranty periods listed below, UltraLum will examine the inoperative product and have the option of repairing or replacing any parts which in the judgment of UltraLum were originally defective or became so under conditions of normal usage and service.

No warranty shall apply to any product or part thereof that has been subjected to accident, negligence, alteration, abuse, or misuse by the end-user. However, UltraLum makes no warranties, whatsoever, with respect to parts not supplied by UltraLum or that have been installed, used or serviced, other than in strict compliance with the instructions appearing in the operating manual supplied by UltraLum.

In no event shall UltraLum be responsible to the end user for any incidental, or consequential damages, whether foreseeable or not. Including but not limited to property damage, inability to use equipment, lost business, lost profits, or inconvenience arising out of, or connected with the use of products supplied by UltraLum. Nor is UltraLum liable for or responsible for any personal injuries occurring as a result of the use, installation, or servicing of products.

Electronics	2 Year Limited Warranty
Lamps	90 Days
Camera & Lens	Covered by Manufacturer's Standard Warranty
PC (if supplied)	Covered by Manufacturer's Standard Warranty
Monitor (if supplied)	Covered by Manufacturer's Standard Warranty
Printer (if supplied)	Covered by Manufacturer's Standard Warranty

# CE DECLARATION OF CONFORMITY

Application of Council Directive: 89/336/EEC and 73-23-EEC

Standards to which Conformity is Declared:	EN6010-1: 2001 EN61326: 1998 EN55011 Class A Group 1 EN61000-4-2 EN61000-4-3 EN61000-4-4 EN61000-4-5 EN61000-4-6 EN61000-4-11 EN61000-3-2: 2001 EN61000-3-3: 2000
Manufacturer's Name:	Ultra-Lum Inc.
Manufacturer's Address:	1480 N. Claremont Blvd. Claremont, CA 91711 Tel 909-399-3694
Equipment Description:	Discovery Imaging Systems
Equipment Class:	Laboratory, Measurement, and Process Control Equipment.
Part Numbers:	Inclusive of all 910-30XX-XX Series

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s).

1480 Claremont Blvd, Claremont, California

Place



11/09/2006

Signature and Date

Steven G Boland, COO

Full Name & Title



6.5 Contact Information

**UltraLum**  
**1480 North Claremont Boulevard**  
**Claremont, California 91711**

Phone (909) 399-3694  
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