

EyeLink[®] 1000 Installation Guide

**Tower, Desktop, LCD Arm, Primate,
and Long Range Mounts**

**Remote, 2000 Hz and Fiber Optic
Camera Upgrades**

Version 1.5.0



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1. Introduction

This document provides hardware and software installation instructions for the EyeLink 1000 using the Tower, Desktop, Primate, LCD Arm or Long Range mounts.

There are two EyeLink 1000 cameras (the Standard camera and the Fiber Optic camera) and each is compatible with all of the different mount types with the exception that only the Fiber Optic camera works with the Long Range Mount. The cameras have identical technical specifications, though the Fiber Optic camera has a non-ferromagnetic optimized design to operate in electromagnetically sensitive environments such as is required for EEG, MEG or MRI.

Both EyeLink 1000 cameras can be upgraded to enable 2000 Hz recording, or to use the EyeLink 1000 as a Remote eye tracker that requires no head stabilization. While the 2000 Hz camera upgrade is compatible with all mount options, the EyeLink Remote upgrade works with only the Desktop and LCD Arm Mounts.

For the simplicity of presentation, these eye tracker configurations are collectively referred to as the EyeLink 1000 throughout this document, with important exceptions noted where necessary.

The basic steps in installing the EyeLink 1000 system are:

- 1) Unpack and Install the EyeLink 1000 Hardware.
- 2) If your system did not come with a preconfigured Host PC, install necessary Operating System and EyeLink 1000 Host Application software on the Host PC you have acquired.
- 3) Install and configure the EyeLink 1000 Windows Display Software (API and example experiments) on the Display PC.
- 4) Test the installation.

If you received a pre-configured Host PC with your eye tracker the installation process should take under an hour. If you are configuring your own Host PC, the installation process will take about two hours. Either way, budget this amount of time to dedicate to the process.

If you have questions or encounter a problem during the installation process, please contact SR Research through one of the contact channels listed in the contacts section of our website at <http://www.sr-research.com>

If you would like to ensure that a technical representative is available for direct phone support during your installation, please contact your SR Research representative to book a time for installation phone support. Please try to arrange an installation time with at least one week's notice.

1.1 Suggested Equipment Layout

The layout of the EyeLink 1000 equipment is important if participant setup is to be convenient, and lighting problems are to be avoided. Before setting up the equipment, check the arrangement of the room to be used against these suggestions. These will aid in the ease of acquiring good experimental data.

- Ideally, arrange the Host and Display PC monitors on tables in an 'L' shape, as in Figure 1-1. This configuration allows the experimenter to adjust the eye tracking device and set up the subject for the experiment while having access to both computer keyboards and monitors.

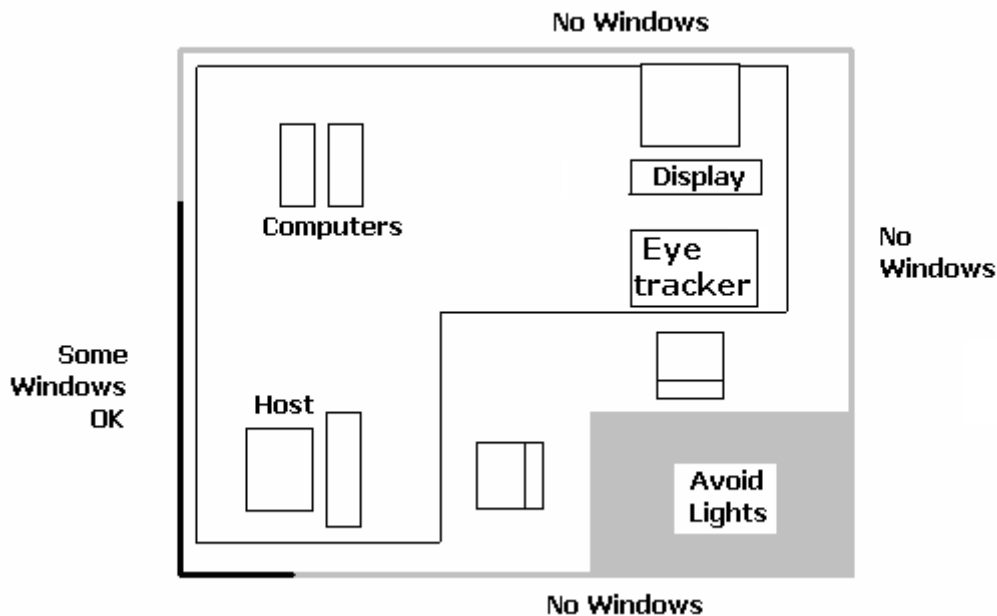


Figure 1-1: Suggested EyeLink 1000 System Layout

- If you are using the SR Research chinrest, please make sure you have a sturdy table available to clamp the chinrest to. This table must have a minimum thickness of 1.8 cm and a maximum thickness of 8.0 cm. The bottom edge of the table should have a depth of at least 6.0 cm to mount the integrated table clamp.
- Ideally, the table you select should be deep enough to accommodate both the monitor (especially for a CRT monitor) and eye tracker. For a 21" CRT monitor with a 30° viewing angle, the minimum table depth should be about 130 cm. A high table will ensure that even the tallest participants do not need to hunch over in order for their view to be aligned with the top of the Display computer's monitor.

- Avoid windows or other bright light sources that could cause reflections on the host and display monitors. The grey walls highlighted in Figure 1-1 are locations where bright light sources will cause reflections.
- Supply sufficient light in the room. The best way to light the room is with ceiling-mounted fluorescent lights, above and no more than two meters behind the computer monitors. Painting the walls light colors or white will maximize ambient light as well.
- Avoid environmental distractions. Be sure the room can be kept quiet, that no distracting items are viewable by the participant, and so on. It is a good idea to ensure that the participant cannot see the host monitor without turning their head (discourage this).
- Supply a comfortable, stable chair for the participants. It should not wobble or move when sat in, and the back should be firmly attached to the seat - springiness encourages some participants to rock forwards and back. A chair with a concave back also discourages shifting of the body, as does a high back. The top of the chair back should be just below the shoulders on an average participant. Finally, make sure participants can enter and leave the chair easily, as the chair will be close to the table with the Display PC monitor.

2. Installation and System Cabling

IMPORTANT:

1. Power off computers before connecting or disconnecting any cables! Ensure that all cabling is properly connected and connectors are properly secured to the Host PC and the EyeLink 1000 camera before use.
2. Ensure that the **RED** switch on the back of the Host PC power supply (near the on/off switch) matches your country's voltage! (e.g., 115 or 230 V)
3. Static Electricity Discharge may cause permanent damage to your system. In order to avoid possible static electricity discharge during installation, please discharge any static electricity accumulated in your body by touching a grounded metal surface or the computer case for a few seconds.

2.1 Unpacking

Unpack all of the items you have received from SR Research Ltd. If the system has been stored or transported at a temperature below 10°C, allow all parts to warm to room temperature before proceeding.

If you are unpacking the EyeLink 1000 Tower Mount, please be careful as it contains glass that may have been broken during shipping.

IMPORTANT: The EyeLink 1000 Tower assembly should be held by the vertical posts and should NEVER be held by the mirror or the components attached to the mirror.

2.2 Display PC Hardware Installation

Set up the Display PC (the computer to be used to deliver the experiment to the subject and to control EyeLink 1000 calibration) at the desired location (see Section and Figure 1-1 for a suggested layout). This includes connecting the keyboard and mouse to the computer, as well as the power supply and monitor cables.

The requirements for the Display PC depend greatly on the type of experimental paradigms for which the EyeLink 1000 will be used. For example, gaze contingent paradigms generally require more computing power than simple cognitive paradigms because the computer display needs to be updated as quickly as possible. Similarly, video and audio intensive experiments may need faster hard disks to support the transfer of large video file data to the computer in a timely manner. The following requirements are *suggestions* for a Display PC configuration that should be able to

handle most experimental requirements. Please contact a SR Research Ltd. representative if you have specific questions about your situation and would like our input.

- Pentium Core2Duo 2.6 GHz or higher; at minimum your processor should support Hyperthreading or have multiple cores
- 80 GB or larger hard disk with 7,200 or higher rpm
- 256 MB PCIx video card supporting vertical refresh rates of at least 100 Hz; for legacy technology AGP 8X or PCI video cards may suffice
- At least 2 GB RAM (more never hurts!)
- A DVD-ROM writer for software installation and data backup
- 32 bit Windows XP or Vista preferred; or MacOS X 10.2 or higher
- 17" or larger CRT monitor (for valid timing synchronization), that supports vertical refresh rates of ≥ 100 Hz (10 ms frames) and horizontal refresh rates of at least 100 kHz
- Ethernet port to connect Display PC to the EyeLink 1000 Host PC
- Optional Ethernet card for use on local network (a dedicated Ethernet port is ideal to connect to the EyeLink 1000 system)
- A keyboard and mouse or other pointing device
- Free USB ports (if EyeLink Data Viewer/SR Research Experiment Builder is purchased)

2.3 Setting up the Host PC

Most new acquisitions of the EyeLink 1000 include a preconfigured Host PC requiring simple setup and the attaching of cables.

Set up the Host PC as you would any computer, at the desired location (see Section and Figure 1-1 for a suggested layout). This includes connecting the keyboard and mouse to the computer, as well as the power supply and monitor cables.

IMPORTANT: Please be sure to use the PS/2 keyboard and mouse supplied with your Host PC.

**If your EyeLink 1000 has a preconfigured Host PC
continue on to section 2.4 to begin attaching cables.**

2.3.1 Rebuilding the Host PC

The PC that will host the EyeLink hardware and software must meet certain specifications due to the nature of the operating system that the EyeLink Host application runs under. As computer technology is rapidly changing, only systems tested and approved by SR Research Ltd. can be guaranteed to work.

In the interest of not instructing our customers to purchase computer equipment only to encounter difficulties with their installation, the reader is directed to consult the web page <http://www.sr-research.com/compatibleHostPCs.html> for a list of systems known to be compatible and accurate when running the EyeLink hardware and software.

If your EyeLink 1000 system did not come with a preconfigured Host PC, or if you are upgrading or replacing your original Host PC, you should have the following additional components on hand. These items were supplied with your original EyeLink purchase.

Please follow “Appendix A: Host PC Hardware Installation” to install these hardware components then continue with the software instructions below.

1. Frame Grabber PCI or PCIe card.
2. DLINK DFE538-TX Ethernet PCI card, or Agere ET131x Gigabit PCIe card.
3. Optional Analog card (if purchased).
4. “SR Research EyeLink CL” CD. Please note that each EyeLink 1000 system requires a camera-specific .SCD file and therefore, you should use the EyeLink 1000 Installation CD that comes with your system.
5. “ROM-DOS Boot CD”.

Depending on the operating system that is to be used on your Host PC’s non-EyeLink partition, you may require the following:

1. “System Commander Boot CD” – originally supplied for customers using Windows XP on their Host PCs; not required for Vista (see Appendix C).

To install the EyeLink Host software on a computer with Windows XP, follow the instructions in Appendix B. To install the Host software under Vista, follow the instructions in Appendix C. Note that for Vista, a clean installation of Vista is required.

2.4 Host PC Wiring

In all cases, connect all cables with the power off, and power up the system once all cabling is in place.



Figure 2-1: The Standard Camera (left) and Fiber Optic Camera Base Box and Camera Head (right)

The cable connections required depend upon whether you have the EyeLink 1000 Standard Camera or the Fiber Optic Camera. The Standard Camera is pictured in the left side of Figure 2-1, while the Fiber Optic Camera components appear in the right side of Figure 2-1.

If you have the Standard Camera, follow the instructions in the next section entitled “Standard Camera System Installation”. If you have the Fiber Optic Camera then skip to Section 2.4.2 entitled “Fiber Optic Camera System Installation”.

2.4.1 Standard Camera System Installation

2.4.1.1 Standard Camera Pre-installation Checklist

Ensure that you have the listed components available before you start installation:

1. EyeLink 1000 Standard Camera (pictured in the left side of Figure 2-1).
2. EyeLink 1000 Mount. Each type of Mount consists of an infrared illumination source and an apparatus for holding the EyeLink 1000 camera. Each Mount option has a separate chapter to be consulted regarding its installation. Mount types for the Standard Camera include the Desktop, Tower, LCD Arm and Primate Mounts.
3. 12V Power supply for the EyeLink 1000 Standard Camera.
4. CameraLink cable to connect EyeLink 1000 Standard Camera to High-Speed Frame Grabber card (may be integrated into the LCD Arm Mount).
5. USB Button Box (Microsoft Sidewinder game controller) to be attached to the Host PC and USB extension cord.
6. Crossover Ethernet cable to connect Host and Display PC together.
7. EyeLink Host PC – if your system did not come with a preconfigured Host PC, or if you wish to replace the Host PC, see section 2.3.1 for more information.

You will also need the following components:

1. A power strip with surge protection to ensure that your EyeLink receives consistent voltage and to make it easy to power the system on and off.

2. A Display PC that ideally meets the required specifications. These specifications are listed in section 1.3.2.
3. Some tools may be needed to adjust your mount or tighten cabling (usually a Phillips and/or slotted screwdriver will do).

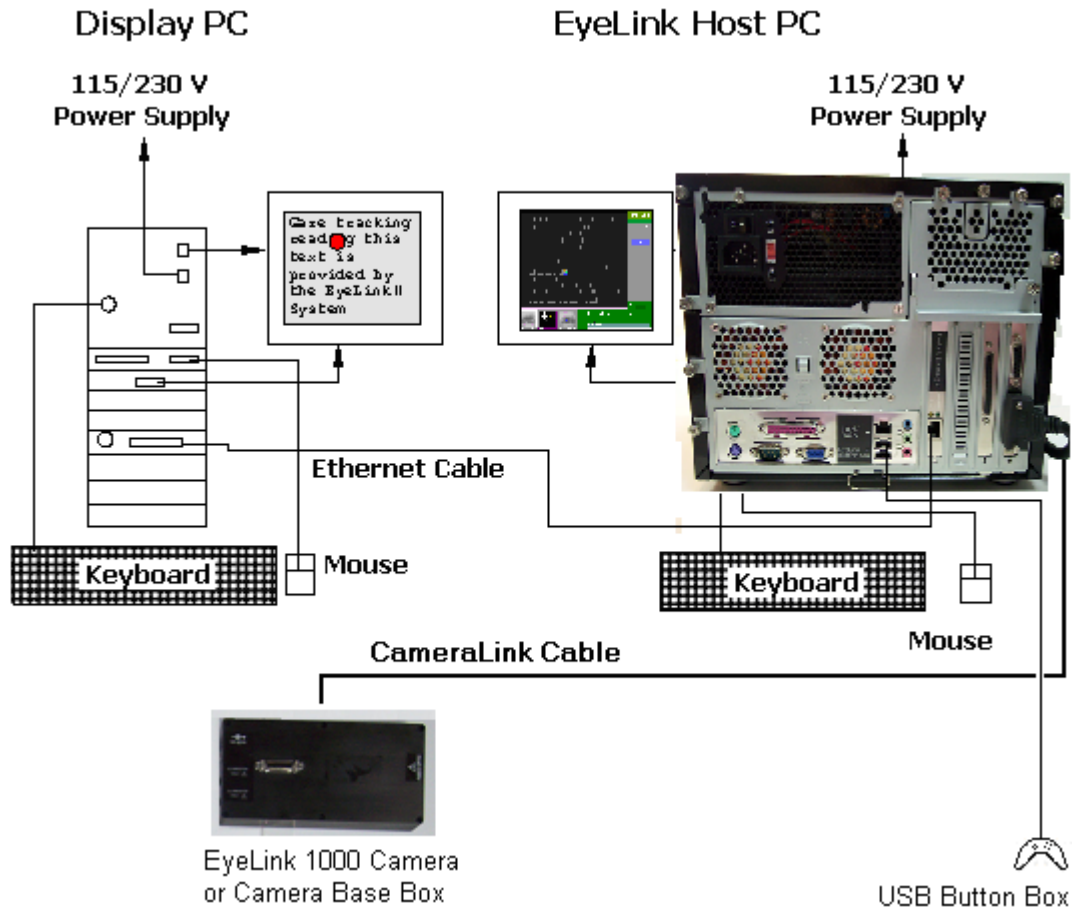


Figure 2-2: Host and Display PC Basic Cabling

2.4.1.2 Standard Camera System Wiring

Standard Camera cabling steps for the Host PC are (see Figure 2-2):

1. If not already completed, attach the keyboards, mouse, power cords, monitors etc. to the Host and Display PCs.
2. Connect one end of the Ethernet crossover cable provided with your system to the Ethernet card port on the Host PC marked with an “EyeLink Ethernet” label. Connect the other end of the cable to the Ethernet port on the Display PC that you will later configure for use with the EyeLink system. Ensure the cable is securely connected at both ends.

Do NOT connect the crossover cable to the Ethernet port on the Host PC marked “LAN/WAN”, which is on the motherboard. This port may be used to access the Internet when running Windows.

3. Connect one end of the CameraLink Cable provided with your system to the High-speed Frame Grabber card interface on the back of the Host PC. Ensure the CameraLink cable is firmly attached with the two thumb screws tightened to lock the cable in place. A slotted screwdriver may make this task easier.

The other end of the CameraLink Cable will be attached to the Standard Camera once it is placed in its Mount.

4. Plug the 12V power supply’s small, circular end into the standard EyeLink 1000 camera. Plug the other end of the power supply into a surge protected power source. The camera is powered as soon as it has an electrical supply, so a power supply with a switch provides a convenient way to turn the camera on and off.
5. Plug the supplied USB Button Box into a USB port on the back of the Host PC as indicated by the label “EyeLink Button Box”. Use the optional USB extender cable if the game pad needs to have a cord longer than one meter.

NOTE: The USB Button Box must be directly connected to a USB port on the Host PC and cannot be connected through a USB hub.

Continue on to Section 2.4.4 entitled “Analog Card Installation”

2.4.2 Fiber Optic Camera System Installation

In general, the Fiber Optic Camera Head should be powered before the Camera Base Box and the Host PC. Should the camera be unresponsive, power off the Camera Head and then re-power it so that Camera Head is powered before the Camera Base Box which in turn communicates with the Host PC software.

2.4.2.1 Fiber Optic Camera Pre-installation Checklist

Ensure that you have the following listed components before you start installation.

1. EyeLink 1000 Fiber Optic Camera components. The following items have been provided with your EyeLink 1000 Fiber Optic Camera (labeled in Figure 2-3, as listed below):
 - i. Camera Base Box
 - ii. Camera Adapter (for use with Desktop, Tower, Primate and LCD Arm Mount options)
 - iii. Camera Head
 - iv. Integrated Extension Cable (for use with Desktop, Tower, Primate and LCD Arm Mounts)
 - v. Fiber Optic Extension Cable
 - vi. Fiber Optic Camera 5V power supply with pressure-release connectors



Figure 2-3: Fiber Optic Camera Components.

2. EyeLink 1000 Mount. Each type of Mount consists of an infrared illumination source and an apparatus for holding the EyeLink 1000 camera. Each Mount option has a separate chapter to be consulted regarding its installation. Mount types for the Fiber Optic Camera include the Desktop, Tower, LCD Arm, Primate and Long Range Mounts.
3. 12V Power supply for the EyeLink 1000 Fiber Optic Camera Base Box.
4. CameraLink cable to connect Camera Base Box to High-Speed Frame Grabber card.
5. USB Button Box (Microsoft Sidewinder game controller) to be attached to the Host PC and USB extension cord.
6. Crossover Ethernet cable to connect Host and Display PC together.
7. EyeLink Host PC – if your system did not come with a preconfigured Host PC, or if you wish to replace the Host PC, see Section 2.2 for more information.

You will need the following components:

1. A power strip with surge protection to ensure that your EyeLink receives consistent voltage and to make it easy to power the system on and off.
2. A Display PC that ideally meets the required specifications. These specifications are listed in section 1.3.2.
3. Some tools may be needed to adjust your mount or tighten cabling (usually a Phillips and/or slotted screwdriver will do).

2.4.2.2 Fiber Optic Camera System Wiring

Fiber Optic Camera cabling steps are (see Figure 2-2):

1. If not already completed, attach the keyboards, mouse, power cords, monitors etc. to the Host and Display PCs.
2. Connect one end of the Ethernet crossover cable provided with your system to the Ethernet card port on the Host PC marked with an “EyeLink Ethernet” label. Connect the other end of the cable to the Ethernet port on the Display PC that you will later configure for use with the EyeLink system. Ensure the cable is securely connected at both ends.

Do NOT connect the crossover cable to the Ethernet port on the Host PC marked “LAN/WAN”, which is on the motherboard. This port may be used to access the Internet when running Windows.

3. Connect one end of the CameraLink Cable provided with your system to the High-Speed Frame Grabber card interface on the back of the Host PC. Attach the other end of the CameraLink cable to the Camera Base Box for the Fiber Optic

Camera. Affix the Camera Base Box to the Velcro strips on the rear left side of your Host PC as pictured in Figure 2-4.

Ensure both ends of the CameraLink cable are firmly attached, with the two thumb screws tightened to lock the cable in place. A slotted screwdriver may make this task easier.



Figure 2-4: Camera Base Box and Cabling affixed to the side of the Host PC

4. Plug the 12V power supply's small, circular end into the standard EyeLink Camera Base Box. Plug the other end of the power supply into a surge protected power source.
5. If you are using the Fiber Optic Camera with the Long Range Mount, plug one end of the Fiber Optic Extension Cable into the Fiber Optic receptacle on the Camera Base Box. This will be toward the Host PC's front as pictured in Figure 2-4.
6. If you are using the Fiber Optic Camera with the Desktop, Tower, Primate or LCD Arm Mount, then locate the Fiber Optic Integrated Extension Cable.
 - i. Plug the 3.5mm (1/8") mini-plugs (male, or plug ends) of the Integrated Extension Cable into the Camera Base Box (female, or socket ends) that should be affixed to the rear, left, side of the Host PC (see Figure 2-4). The mini-plugs are marked "R" and "L" and should be plugged into the corresponding marked sockets on the Camera Base Box, on the rear, beneath the power connector.
 - ii. Plug the fiber optic connector of the Integrated Extension Cable into the Fiber Optic receptacle on the Camera Base Box. This will be toward the Host PC's front as pictured in Figure 2-4.
 - iii. The other end of the Integrated Extension Cable will be connected to the fiber optic cable of the Camera Head and to the illuminator leads from your mount. Detailed instructions for these connections can be found in the descriptions for each type of Mount.

7. Plug the supplied USB Button Box into a USB port on the back of the Host PC as indicated by the label “EyeLink Button Box”. Use the optional USB extender cable if the game pad needs to have a cord longer than one meter.

NOTE: The USB Button Box must be directly connected to a USB port on the Host PC and cannot be connected through a USB hub.

2.4.3 The Fiber Optic Camera Adapter

To use the Fiber Optic Camera with the Desktop, Tower, Primate or LCD Arm Mount, the Camera Head needs to be inserted into a Camera Adapter (see the left side of Figure 2-5) that makes the Camera Head the same size as the Standard Camera (see the right side of Figure 2-5). The Camera Adapter can then be inserted in any type of mount in the place of the Standard Camera.

Follow these steps to insert the Camera Head into the Camera Adapter:

1. Remove the two thumbscrews and crosspiece from the Camera Adapter.
2. Place the Camera Head into the Camera Adapter, with its two attached cables emerging from the opening on the side of the bracket (see the right side of Figure 2-5).
3. Replace the crosspiece and fasten the thumbscrews.



Figure 2-5: The Camera Adapter (left) with Camera Head inserted (right)

Further instructions regarding the use of the Fiber Optic Camera in various types of mounts appear in later sections describing the installation steps to be taken for each type of mount.

2.4.4 Analog Card Installation

If an optional Data Translation analog card was purchased with your system it will require additional cabling steps.

2.4.4.1 Analog Card Pre-installation Checklist

If an analog card option was purchased, you should also have:

1. Full length PCI Analog card (already seated in the Host PC if your system comes preconfigured).
2. Analog breakout board.
3. Cable to connect the analog PCI card to the breakout board.

2.4.4.2 Analog Card Wiring

Connect one end of the supplied analog card cable to the Host PC. Connect the other end of the cable to the analog breakout board (a square circuit board with a large number of screw terminals). Ensure the cable is firmly attached at both ends and that the thumb screws have been tightened to lock the cable in place.

2.4.5 Camera Lens Selection

The EyeLink 1000 Mounts come with a number of different lenses to be used for unique eye tracking situations. Table 1 lists recommended lenses for a range of eye-to-camera distances as a function of the type of mount being used.

In all cases, eye-to-camera distance is listed in cm and measured from the surface that the lens screws into (on the Standard Camera or the Fiber Optic Camera Head) to the bridge of the participant's nose.

Lens Aperture Size	Tower/ Primate Mount	Desktop Mount or LCD Arm Mount		Desktop Mount	Long Range Mount
		Monocular with Head Support	Remote Mode	Binocular	Monocular/Binocular
16 mm (Short Handle or Small Wheel)	-	-	50-70 cm	-	-
25 mm (Long Handle or Large Wheel)	IDEAL	-	-	50-60 cm	-
35 mm	-	50-70 cm	-	60-70 cm	60-70 cm
50 mm	-	-	-	-	70-100 cm
75 mm	-	-	-	-	100-150 cm

Table 1. Lens Guide for Different Viewing Distances

Continue on to the section pertaining to the mounting option that you are installing:

Tower Mount – 3 “Tower Mount Installation”

Desktop Mount – 4 “Desktop Mount Installation”

LCD Arm Mount – 5 “LCD Arm Mount Installation”

Primate Mount – 6 “Primate Mount Installation”

Long Range Mount – 7 “Long Range Mount Installation”

3. Tower Mount Installation

Please follow the steps below to mount the EyeLink 1000 Tower onto the table and to install the camera. Figure 3-1 illustrates adjustable parts on the EyeLink 1000 Tower (a Standard Camera is used in this illustration).

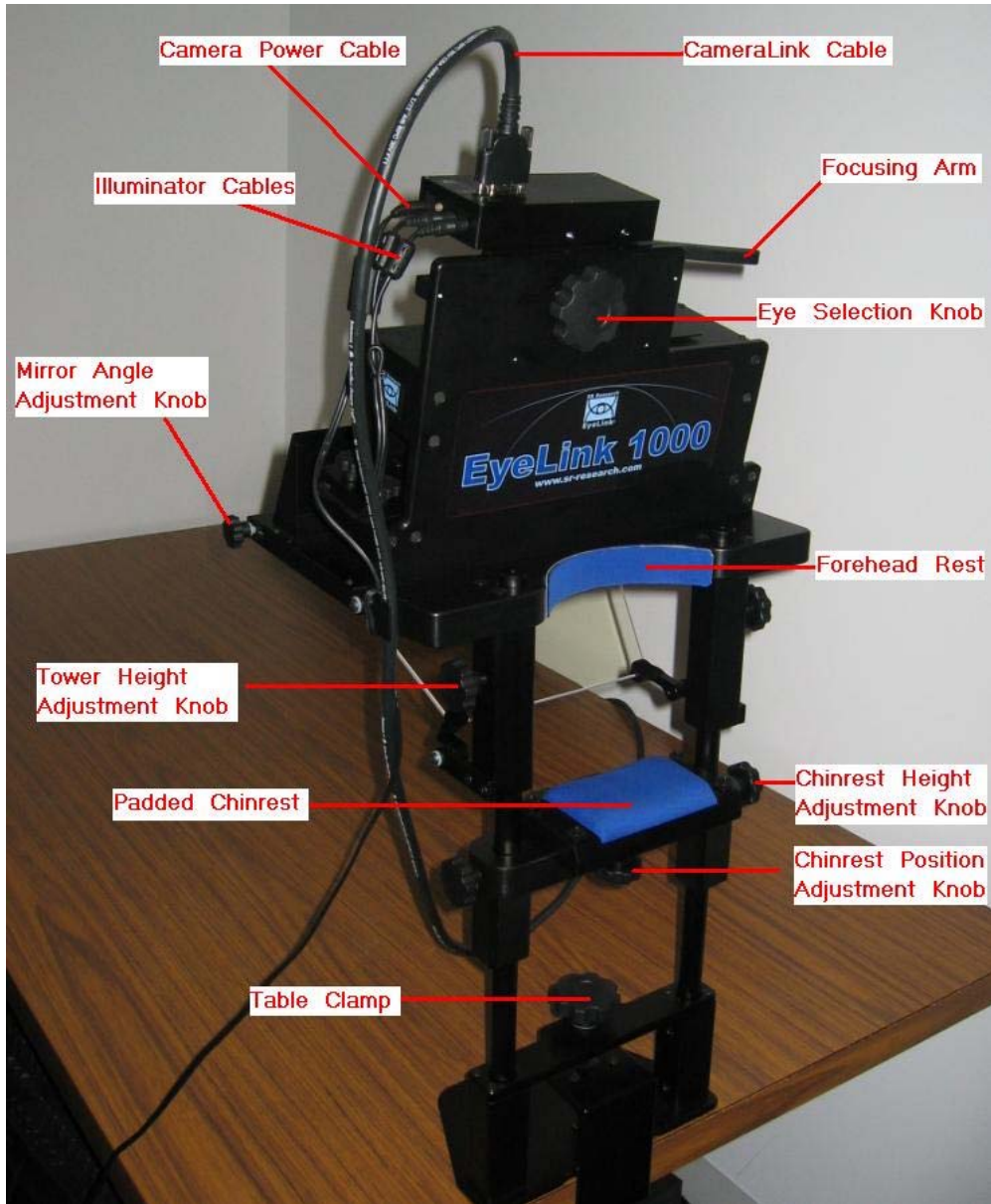


Figure 3-1: Components of EyeLink 1000 Tower

3.1 Mounting the Tower to a Table

Important: The head support Tower should only be held by the vertical posts and should NEVER be held by the mirror or the components attached to the mirror. We recommend you have somebody available to assist with mounting the head-support Tower onto the table to prevent damages to the IR mirror or other parts of the Tower.

Check whether the table is suitable for mounting the EyeLink 1000 Tower – the table used should have a minimum thickness of 1.8 cm and a maximum thickness of 8.0 cm.



Figure 3-2: Clamping Chinrest to Table

Loosen the table clamp by turning the knob counterclockwise, then place the table clamp fully onto the table, and then tighten it clockwise (see Figure 3-2). Check that it is firmly secured by gently attempting to rock the table clamp base free. If the table clamp base wobbles you will have to tighten it further.

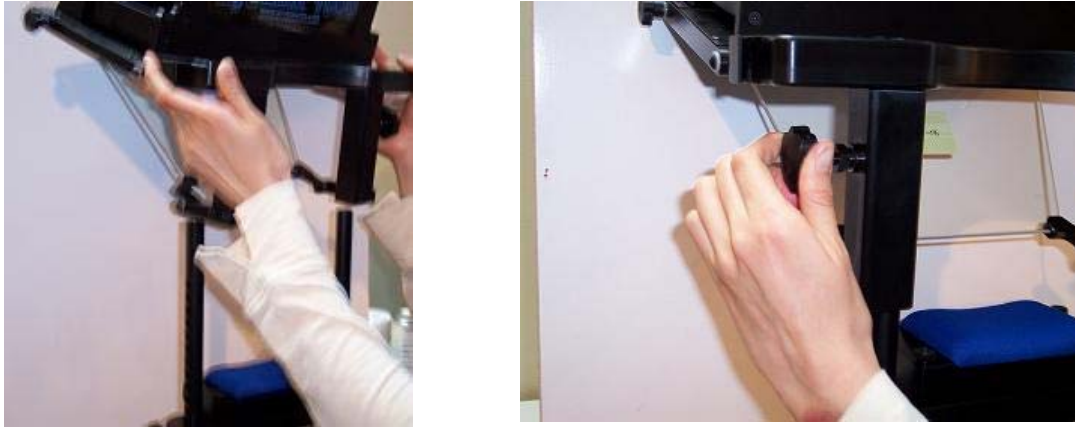


Figure 3-3: Placing and Adjusting Tower Mount

The camera mount is quite heavy and cumbersome to move. For safety purposes it is recommended that two people participate in setting up this piece of the equipment. One person can support the weight of the camera mount while the other lines the spring-loaded clamps with holes in the Tower poles. When released, the clamps secure a peg into the holes of the Tower poles, thereby supporting the weight of the camera mount.

Gently pick up the camera mount with the mirror on the side that is away from you. It is recommended that you hold the camera mount near the Tower height adjustment knobs as shown in the left side of Figure 3-3. Be careful not to scratch or touch the mirror. Now line the mount up with the vertical posts and gently lower it into position. The camera mounting should rest about $\frac{1}{2}$ inch into the hole.

Once the Tower Mount is placed onto the Tower poles you will need to adjust its height by simultaneously pulling the Tower height adjustment knobs away from the poles on both the left and right hand sides (see right side of Figure 3-3). Be careful as you still have to support the weight of the camera mounting unit. Make sure that the unit does not fall down the poles. If at any point the camera mounting unit does begin to fall, releasing the spring-loaded height adjustment will cause them to lock into one set of holes in the Tower poles, preventing the Tower from falling further.

Gently lower or raise the camera mount by pulling to release the height adjustment knobs and by raising or lowering the unit until the knobs are in line with the center of the display monitor (see Figure 3-4). This will produce an optimal viewing angle for participants. Once the Tower height is set for a normal operation, it does not need to be adjusted further. The experimenter should adjust the heights of the chair and/or chin rest on a participant-to-participant basis.

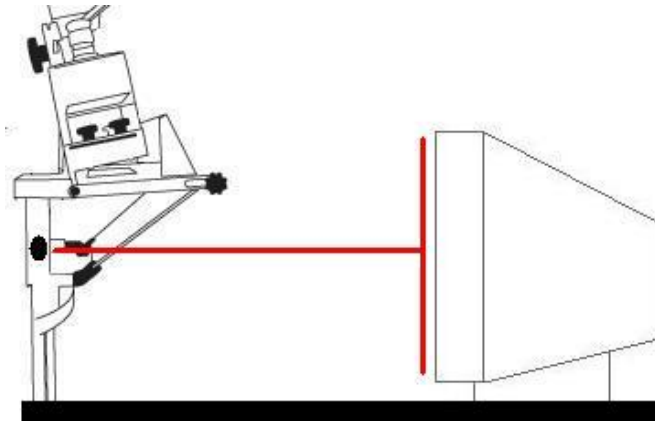


Figure 3-4: Adjust Height of Tower to Half the Screen Area of Monitor

3.2 Mounting the High-speed Camera and Cabling

The 25 mm lens should be used on the EyeLink 1000 Tower Mount. Remove the cap from the camera lens. Remove the protective cover plugged to the Camera Head as well. Turn the camera lens into the thread on the Camera Head. If the camera handle hits the Camera Adapter (for a Fiber Optic Camera), use a Philips screw driver to loosen the screw on the camera handle slightly (the screw shouldn't come off the handle completely) and pull the handle away from the bracket so that the lens is fully screwed into the Camera Head. Then retighten the lens handle screw.

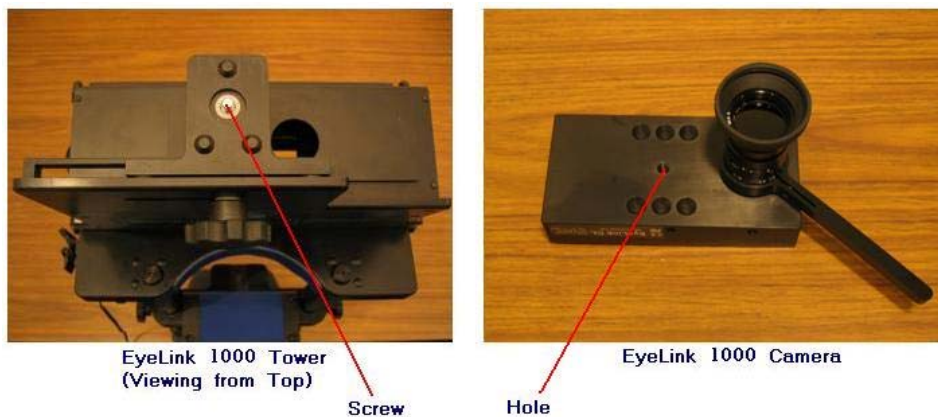


Figure 3-5: Views of the EyeLink 1000 Tower and Camera

Hold the camera with the lens facing down so that the focusing arm is on the right. Align the hole on the camera to the screw on the top of the Tower and tighten the screw knob from below. Please make sure the camera lens is not dusty or scratched! If you are using the Fiber Optic Camera, make sure the fiber optic cable is not twisted or bent.

3.2.1 Cabling for the Standard Camera

After the camera is mounted onto the Tower, connect the two illuminator cables that come out of the left side of the head support Tower to the left side of the EyeLink 1000 high-speed camera: plug the cable marked with “R” to the port marked with “R” and the one with “L” to the remaining port. Connect the CameraLink cable to the top of the EyeLink 1000 high-speed camera. Connect the EyeLink 1000 power supply that was provided with your system to the power connector on the left side of the EyeLink 1000 camera.



Figure 3-6: Camera and Illuminator Cables for a Standard Camera Used in the Tower Mount

3.2.2 Cabling for the Fiber Optic Camera

After the Camera Adapter with the Camera Head and lens is mounted onto the Tower, connect the two illuminator cables that come out of the left side of the Tower mount to the mini-plug sockets on the Integrated Extension cable – make sure the cable marked with “R” is connected to the socket marked with “R” and the one marked with “L” to the remaining socket.

If you haven’t already, connect the power supply to the Camera Head – note one of the pressure-release power connectors is unused. Connect the fiber optic cable of the Camera Head to the fiber optic connector of the Integrated Extension Cable. Now connect the EyeLink 1000 power supply that was provided with your system to the power connector on the Camera Base Box.



Figure 3-7: Fiber Optic Camera in the Tower Mount

3.3 Adjusting Head Rest Components

The height of the forehead and chinrest can be adjusted by loosening the knobs on both sides of the Tower. After sliding the chinrest to the desired position, re-tighten the knobs.

- Set up the monitor and chinrest so that the chinrest is centered on the monitor and the monitor is horizontally aligned with the chinrest (**HINT:** measure from the left and right knobs on the chinrest to the left and right sides of the top of the display area of the monitor, these should be equal).
- Adjust the tilt of the monitor and height of the forehead rest. Ideally these should be set so that the top of the display is at about the same height as the forehead rest, and the display is tilted up slightly. The tilt can be changed if there are any reflection issues. Please follow “Section 8.4 Customizing Your PHYSICAL.INI Settings” to modify the PHYSICAL.INI file settings.

Continue to Chapter 8 “Testing the Host PC Installation”

4. Desktop Mount / EyeLink Remote Installation

Please follow the steps below to set up the EyeLink 1000 Desktop Mount. Figure 4-1 illustrates adjustable parts of the EyeLink 1000 Desktop Mount, using a Standard Camera.



Figure 4-1: EyeLink 1000 Desktop Mount Components

4.1 Mounting the EyeLink 1000 High-Speed Camera and Cabling

The EyeLink 1000 Desktop and Long Range Mounts can be configured to track eye movements up to 2000 Hz monocularly or 1000 Hz binocularly (with the 2000 Hz camera upgrade). The angle of the camera should be adjusted differently depending on the mount type you plan to use. Each mount type works optimally with different camera lenses (see Table 1).

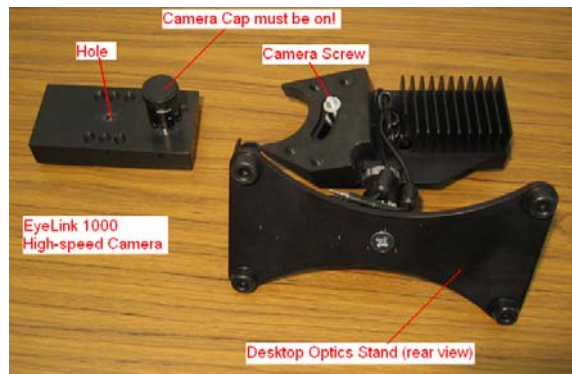


Figure 4-2: Desktop Mount Camera Adjustment

Follow the steps below to mount the high-speed camera for monocular tracking or to use the EyeLink Remote – in the Camera Level position (see Figure 4-3):

1. Place the Desktop Mount on the table. Turn the recommended camera lens into the thread on the Standard Camera or the Fiber Optic Camera Head. See Table 1 for recommended lens usage. The 35 mm lens is recommended for the Desktop Mount monocular setup whereas the 16 mm lens should be exclusively used for the Remote tracking.
2. Move the camera screw to the top end of the slot on the Desktop Mount.
3. Hold the camera with its elongation parallel to the table (and level with the top of the mount), align the hole on the camera to the camera screw on desktop mount, and then tighten the camera screw. Dimples in the camera align with protrusions on the mount to ensure the camera is in the right position. If you are using the Fiber Optic Camera, make sure the fiber optic cable is not twisted or bent.

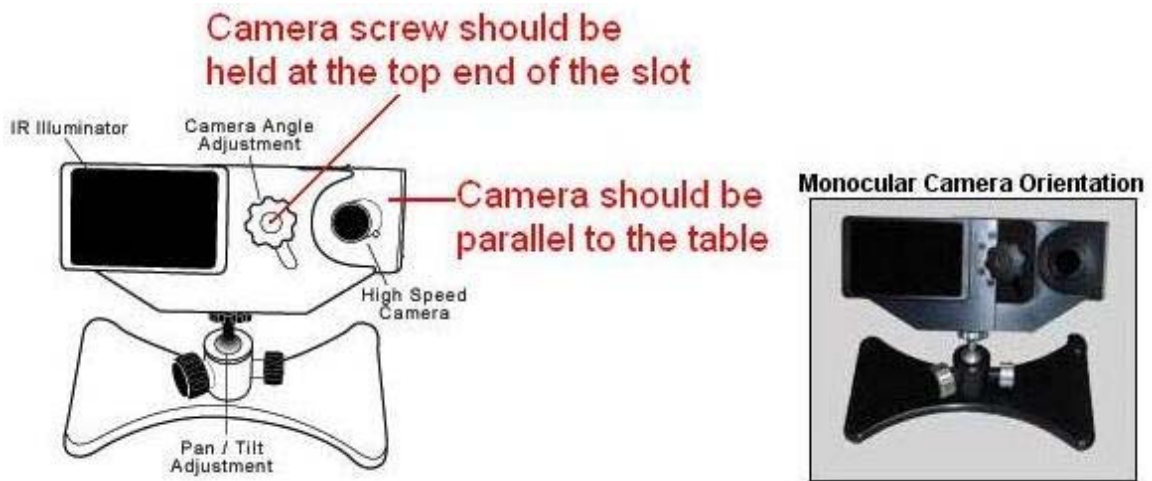
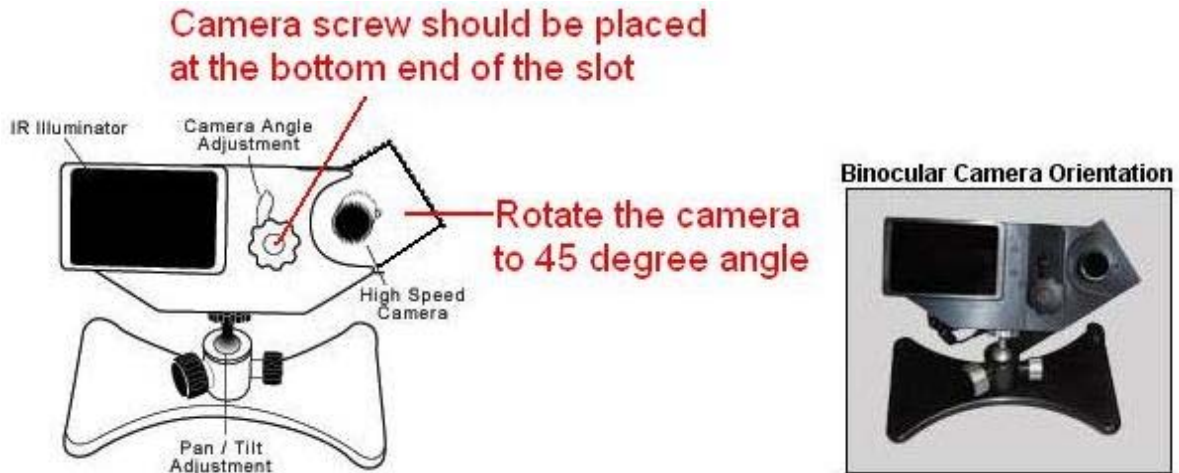


Figure 4-3: Camera Level Position for Remote and Stabilized Monocular Recording

For binocular tracking (see Figure 4-4):

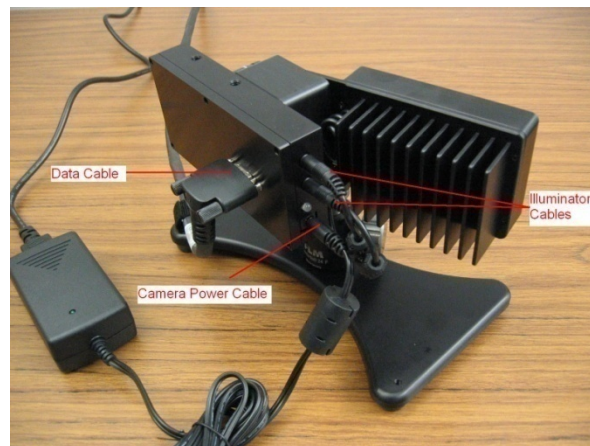
1. Place the Desktop Mount on the table. Turn the 25 mm camera lens into the thread on the Standard Camera or the Fiber Optic Camera Head. See Table 1 for recommended lens usage.
2. Move the camera screw to the bottom end of the slot on the Desktop Mount.
3. Hold the camera with its elongation forming a 45-degree angle relative to the table. Align the hole on the camera to the camera screw on desktop stand, and then tighten the camera screw. Dimples in the camera align with protrusions on the mount to ensure the camera is in the right position. If you are using the Fiber Optic Camera, make sure the fiber optic cable is not twisted or bent.



**Figure 4-4: Camera Angled Position for Stabilized
Binocular and Monocular Recording**

4.1.1 Cabling for the Standard Camera

After the camera is mounted onto the Desktop Mount, connect the two illuminator cables that come out of the Desktop mount to the left side of the EyeLink 1000 high-speed camera. Connect the EyeLink 1000 power supply that was provided with your system to the power connector on the left side of the camera (see Figure 4-5).



**Figure 4-5: Camera and Illuminator Cables from
Desktop Mount**

4.1.2 Cabling for the Fiber Optic Camera

After the Camera Adapter with the Camera Head and lens are mounted onto the Desktop Mount, connect the two illuminator plugs emerging from the mount into the 3.5 mm (1/8") mini-plug sockets of the Integrated Extension Cable.

If you haven't already, connect the 5V pressure-release power supply connectors to the Camera Head – note one of the power connectors is unused. Connect the fiber optic cable from the Integrated Extension Cable to the Camera Head. Now connect the EyeLink 1000 power supply that was provided with your system to the power connector on the Camera Base Box.



Figure 4-6: Fiber Optic Camera in the Desktop Mount viewed from the front (left) and rear (right)

4.2 Adjusting the Desktop Mount (Monocular, Binocular and Remote Recording)

Place the Desktop Mount on the table at a distance between 40 and 70 cm from the participant's eyes, with the illuminator and eye camera facing the participant; the recommended tracking distance is 50 to 55 cm. The camera screw of the Desktop Mount should be aligned to the center of the display PC monitor and the top of the illuminator should be as close to the lower edge of the visible part of the monitor to maximize the eye tracking range.

If you are using the chin rest supplied by SR Research Ltd., please check whether the table is suitable for mounting the chin rest – the table used should have a minimum thickness of 1.8 cm and a maximum thickness of 8.0 cm. Loosen the table clamp by turning the knob counterclockwise, place the table clamp fully onto the table, and then tighten it clockwise (see Figure 3-2). Check that it is firmly secured by gently attempting to rock the table clamp base free. If the table clamp base wobbles, tighten it further. Next, place the forehead rest over the chinrest poles and tighten the knobs at the desired height.

Please check that the chinrest is horizontally centered with the monitor. Adjust the tilt of the monitor so that the display is tilted up slightly. The tilt can be changed if there are any reflection issues. Please follow “Section 8.4 Customizing Your PHYSICAL.INI Settings” to modify the PHYSICAL.INI file settings.

4.3 EyeLink Remote Hardware Adjustment for the Desktop Mount

The default version of the EyeLink Remote uses the Desktop Mount and an EyeLink 1000 High-Speed Camera programmed for Remote viewing. Users who are exclusively interested in installing the EyeLink Remote should first follow installation instructions for the Desktop Mount, then continue below.

To use the EyeLink 1000 in remote mode, the viewer is ideally about 60-70 cm from the display surface. The height of the monitor should be set so that when the participant is seated and looking straight ahead, they are looking vertically at the middle to top 75% of the monitor. Once you have set up the system, make sure you have updated PHYSICAL.INI, which is located at C:\EL1000\EXE folder of the Host PC. Please follow “Section 8.4 Customizing Your PHYSICAL.INI Settings” to modify the PHYSICAL.INI file settings.

Check whether the camera is set to the Level position – the elongation of the camera should be parallel to the table (see section 4.1 “Mounting the EyeLink 1000 High-Speed Camera”). Place the eye tracker right in front of the monitor; the camera screw should be horizontally aligned to the center of the monitor. To maximize the eye tracking range, the eye tracker should be raised so that the top of the illuminator is as close as possible to the lower edge of the visible part of the monitor without blocking the subject’s view.

Internally, the eye tracker software was designed to perform based on this recommended setup. Variability by a couple of centimeters will not have an impact on the tracker accuracy while a larger deviation from the recommended settings may cause performance issues. Contact SR Research Ltd. For extra setup information if your experiment requires substantial deviation from the above guidelines.

Continue to Chapter 8 “Testing the Host PC Installation”

5. LCD Arm Mount Installation

Please follow the steps below to set up the EyeLink 1000 LCD Arm Mount. Figure 5-1 illustrates a typical LCD Arm Mount setup and Figure 5-2 illustrates parts of the EyeLink 1000 LCD Arm Mount as it ships from SR Research under its standard configuration. The mount first requires fixing the Arm Base to a sturdy tabletop, assembling the LCD Arm components, attaching the EyeLink High-Speed Camera and then attaching cables. The following instructions detail each of these procedures.

The contents of the Figure in clockwise direction, starting at the top, are: the Camera and LCD Assembly, three Velcro strips (rolled and piled), cabling emerging from the end of the LCD Arm (which runs diagonally throughout the photo), the Arm Base, two L-shaped Imperial Allen wrenches, 2.5" and 6" extender tubes, the LCD Arm, and two angled brackets. Not shown in the photo are pieces of the monitor that allow it to be used with a traditional monitor mount should the user ever wish to remove it from the LCD Arm Mount for conventional use, the monitor driver CD and instruction booklet, and extension cables (SVGA, audio and power).



Figure 5-1: Typical EyeLink 1000 LCD Arm Mount Installation



**Figure 5-2: EyeLink 1000 LCD Arm Mount
Components: LCD Arm Mount Base, Arm, Camera and
LCD Assembly**

5.1 Choosing a Table

Before mounting the LCD Arm, and the Camera and LCD Assembly, the Arm Base (see Figure 5-2 and Figure 5-3) must be affixed to a sturdy table. The Arm Base can accommodate tables with a thickness of up to 75 mm (7.5 cm, 2.5") at a depth of 18 mm to 65 mm (1.8-65 cm, 1.25"). The footprint of the Arm Base above the table is 160 mm wide x 140 mm deep (16 cm or 6 ¼" X 14 cm or 5 ½") and requires further clearance for the LCD Arm to swing in any direction.

The minimum depth for mounting on the table underside with which the system can work is an 18 mm ledge (in which case the maximum table thickness is 60 mm – 6 cm or 2 3/8").

The LCD Arm Mount can displace the Camera and Monitor Assembly from 11 cm below the surface level of the table to which it is mounted, to 23 cm above it. This places the bottom of the monitor from 2 cm below the table surface to 32 cm above it. Two LCD

Arm extender units are shipped with the mount that can displace these measurements upwards by a further 6, 15 or together 21 cm (for a dynamic range of -11 to 44 cm, or considering the bottom of the display -2 cm to 53 cm). The LCD Arm can extend a distance of 75 cm from the base in any direction, with a minimal extension of 48 cm.

The desired viewing level of the participant should be combined with the above values when considering the table on which to mount the Arm Base. If the participant viewing-level is greatly below the tabletop surface then a lower table to mount the Arm Base may be required.

5.2 Affixing the Arm Base to a Tabletop

There are two different configurations of the Arm Base, illustrated in Figure 5-3. On the left of Figure 5-3 is the configuration of the base for a table that can accept the shim at a deep position under its surface. This may be required if there is a lip at the table's edge, and is the default configuration that the system generally ships with. The bolt is fully tightened when the unit is shipped and places pressure against a shiny steel shim that abuts against the underside of the table.

Be careful while handling the Arm Base's shim as it may have sharp edges around its centermost hole.

The Arm Base configuration on the right of Figure 5-3 works with tables that have only a narrow ledge on the underside (as small as 18 mm, accommodating tabletop heights of 60 mm – 6 cm or 2 3/8”). This configuration is created by removing the long bolt that presses against the shim, loosening the screw at the bottom of the base, reorienting the L-shaped bracket so that the short portion is now perpendicular to the base, and screwing the bracket back to the base. The bolt must now be turned through the short portion of the L-shaped bracket in order to meet and apply pressure to the shim on the underside of the table. Some light viscosity oil may make the turning of the bolt go more smoothly, but keep in mind that oil will result in discoloration of the paint on the LCD Arm. Turn the bolt through without using oil if possible.

To install the Arm Base, use the large supplied L-shaped Allen wrench to unscrew the black bolt that has a hexagonal opening in its end. It will have to be unscrewed enough to allow the shim perched on its end to fit under the table edge, as the shim will eventually be the point of contact between the bottom side of the Arm Base and the underside of the table. The large underside of the Arm Base will be the point of contact with the Table's top. Place the base in position, covering the biggest surface area of the table as possible and with the shim as deeply under the table as possible. With the center hole of the shim on top of the bolt, begin to tighten the bolt while holding the shim so that it does not fall off of the bolt. Pressure will eventually hold the shim in place. Tighten as securely as possible.



Figure 5-3: Two Configurations of the LCD Arm Mount Base

5.3 Assembling the LCD Arm Components

Once the Arm Base has been secured to a sturdy tabletop, it is time to insert the LCD Arm into the Arm Base. At this point you may wish to add one or both of the Arm Extenders that were included with the system (2.5" and 6" extenders – 6 cm and 15 cm) as these raise the overall height of the LCD Arm Mount. Note that using an extender will also raise the lowest point that the LCD Arm Mount's monitor can reach as they simply displace the entire unit vertically. The extender shaft simply fits into the silver cup of the Arm Base or into the cup of another extender.

Pick up the LCD Arm with one hand on each of the components to minimize its components from swinging. The round silver shaft at the bottom of the arm fits into the silver cup at the top of the Arm Base (or one of the optional extenders already inserted into the Arm Base) – simply lower the LCD Arm straight into the cup, with cabling off to the side of the base that is closest to the Display or Host PC to which the cabling will eventually be attached. Several pieces of double-side Velcro ship with the LCD Arm Mount in order to assist users who may wish to wrap the Velcro around the arm components to secure it before lifting. This can prevent the arm from swinging while it is being moved.

The EyeLink 1000 LCD Arm Mount's Camera and LCD Assembly holds an LCD computer monitor, the EyeLink 1000 high-speed camera in the level position, and an infrared illuminator light source. These are affixed as a single unit that can be easily lifted using handles that are attached to each side of the LCD monitor. Facing the back of the monitor, grip the handles and guide the shaft of the tilter mechanism into the hole at the top end of the arm. Gently wiggle the assembly until the shaft is fully inserted into the arm.

Some configurations of the LCD Arm may require weights at the end of the table opposite the Arm Base, to offset the weight of the LCD Arm apparatus.

The LCD Arm is fairly heavy, with the entire apparatus weighing in at approximately 11 kg (or 25 lbs). Some possible configurations of the LCD Arm extend the monitor over empty space away from the table's edge, placing the weight of the Camera and Monitor Assembly away from the support of the table. To prevent tipping, the table needs to be large, heavy and sturdy, or weighted at the end opposite from which the LCD Arm will extend. Caution should be used when first testing the range of the LCD Arm in case the table is not strong enough to properly distribute the weight of the apparatus. If the table begins to tip while extending the LCD Arm out into space away from the table, place the Arm apparatus back above the table surface and add weight (e.g., the Display computer?) to the table surface opposite where the Arm is extending. Repeat this procedure until it is clear that the apparatus is stable.

5.4 Mounting the EyeLink 1000 High-Speed Camera

The EyeLink 1000 LCD Arm Mount requires that the EyeLink 1000 Camera be attached. It may have already shipped this way, or you may have to attach a camera that was part of a different mounting system.

The Standard EyeLink 1000 Camera. To affix the Standard EyeLink 1000 camera, first remove the cover that obscures the camera and illuminator from the bottom front of the Camera and LCD Assembly. Two thumbscrews on the underside of the assembly hold the cover in place – simply loosen the thumbscrews and the cover will slide off in the forward direction.

Although not essential, it may be convenient to attach the CameraLink cable that emerges from the LCD Arm to the back of the camera before attaching the camera. This is an opportune point to attach this cable because once the camera is attached there is not a lot of space between the cable interface on the back of the camera and the bracket holding the camera (see top of Figure 5-4). The CameraLink cable is a D shaped cable

that can only go in one orientation, and requires thumbscrews to be tightened to assure a good connection. The thumbscrews are also slotted so that a slotted screwdriver can be used to tighten the screws if your thumbs are not strong enough to do the job.

The Fiber Optic Camera. Put the Camera Head into the Camera Adaptor. Plug the fiber optic extension cable (either a single cable or part of the Integrated Extension Cable) into the Camera Head along with the 5V pressure-sensitive power connector. Plug the illuminator 3.5 mm (1/8") mini-plugs that emerge from the LCD Arm's illuminator (male) into the sockets emerging from the LCD Arm or from the Integrated Extension Cable (female). The other end of the fiber optic cable and illuminator mini-plugs will plug into the Camera Base Box.

All EyeLink 1000 Cameras. Mount the camera on the LCD assembly. On the front of the camera is a threaded hole that the camera screw from the LCD Arm Mount will go into. This will secure the camera. A knob is attached to the opposite side of the camera screw so that it is easy to turn the screw into the camera hole. If there is not enough room for the camera between the monitor and the camera assembly then more space can be gained by moving the assembly further from the monitor. Undo the hex bolts holding the bracket with the camera assembly to the monitor and move this forward (1 or 2 sets of holes) until there is enough room for the camera to slip in between the monitor and the camera assembly. Retighten the hex bolts and then proceed to attach the camera to the LCD assembly.

Dimples on the camera fit into protrusions on the mount in order to ensure the right positioning of the camera, which should be aligned level with the top surface of the part of the mount holding the camera screw. Tighten the knob until the camera is secured. Next replace the cover by sliding the slots on the cover's bottom around the thumbscrews on the underside of the assembly. Tighten the thumbscrews and adjust the cover so that it is minimally obscuring the IR illuminator and the camera.



Figure 5-4: Rearview of the LCD Arm Mount's Camera (top) and LCD Monitor (bottom)

5.5 Attaching the Cables

Integrated into the LCD Arm Mount is the cabling required for the EyeLink 1000 system and the computer monitor (camera and LCD monitor power cables, monitor audio cable, SVGA video cable, and the CameraLink cable). After assembling the LCD Arm Mount components, inserting the LCD Arm into the Arm Base, and attaching the camera, all of the cables need to be connected.

For all cables emerging from the LCD Arm, location descriptions assume a view of the Camera and LCD Assembly from the back underside of the monitor (see Figure 5-4, bottom). Guide the cables to the side of the camera and illuminator support bracket to which the cable will eventually be attached – this will prevent the cable from binding against the bracket when the LCD Arm is twisted in various directions. Follow these steps:

1. First, let's deal with cables attached to the high-speed camera (Figure 5-4 top).
 - If not already connected before affixing the camera, connect the CameraLink cable to the interface on the back of the camera that is housed within the Camera and LCD Assembly. Tighten the screws by thumb or use a slotted screwdriver to tighten. Attaching this cable before attaching the camera to the assembly may be easier for some users.
 - Insert the round EyeLink 1000 power supply cable to the power connector on the right side of the camera.
 - Ensure that the two illuminator cables are plugged into the side of the EyeLink 1000 high-speed camera – placement is not important. These cables are present on the Camera and LCD Assembly and do not emerge from the LCD Arm.
2. The remaining cables emerging from the LCD Arm connect to the LCD monitor as follows (Figure 5-4 bottom):
 - Insert the phono plug connector into the audio input jack on the bottom centre of the LCD monitor of the Camera and LCD Assembly.
 - Connect the SVGA cable to the SVGA input on the right of the LCD monitor. Tighten the screws by thumb or use a slotted screwdriver.
 - Connect the three-prong power cable into the LCD monitor power input on the left side of the monitor.

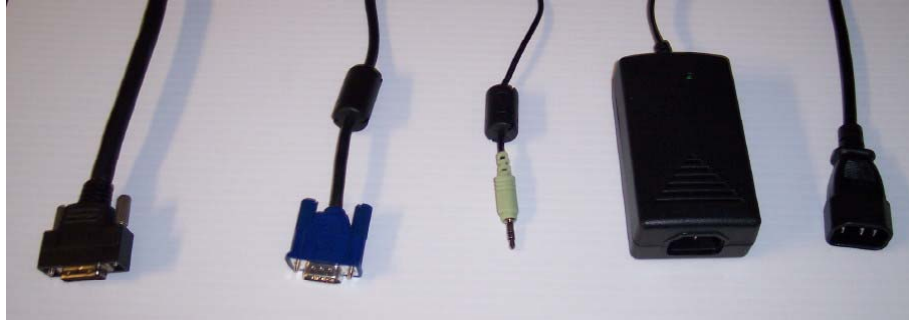


Figure 5-5: Cables Emerging from the Bottom of the LCD Arm

3. The following cables coming out of the bottom of the LCD Arm (shown left-to-right in Figure 5-5) are to be connected as described below. Extension cables are supplied as indicated in the text above. The first cable is the camera high-speed data cable and goes to the Host PC, the next two cables go to outputs on the Display PC, and the final two go to a power source.
 - Connect the thick CameraLink cable emerging from the bottom of the LCD Arm to the EyeLink card on the Host PC. Be sure to tighten the thumbscrew connectors or use a slotted screwdriver to make a tight connection.
 - Connect the supplied SVGA extension cable to the SVGA cable coming out of the bottom of the LCD Arm Mount. The female end of the cable coming from the LCD Arm attaches to a male connector on the extension. The extension's female end attaches to the Display PC video card output port.
 - Connect the supplied audio cable extension (female end) to the 3.5 mm (1/8") mini-plug on the audio cable emerging from the bottom of the LCD Arm. Insert the male end into the audio output jack on the Display PC.
 - Connect the supplied three-prong power cable (female end) to the camera power supply (male end) that is attached to a cable coming from the bottom of the LCD Arm. The male end plugs into a power source.
 - Connect the supplied three-prong power extension cable to the LCD monitor's power input and plug the male end into a power source. The power supply in the monitor is 110/220 Hz so an adapter may be used (supplied) for countries outside of North America and Japan if the appropriate extension is not included.
4. One final cable needs to be attached. Connect one end of the Ethernet crossover cable provided with your system to the Ethernet card port on the Host PC (make sure it is connected to the EyeLink Ethernet port and not the Ethernet port that

is built into the motherboard). Connect the other end of the Ethernet cable to the Ethernet port on the Display PC that you will later configure for use with the EyeLink system. Ensure the cable is securely connected at both ends.

5.6 *Adjusting the Tension Points on the LCD Arm*

Occasionally through use of the LCD Arm some of the joints may loosen. Each joint can have the tension adjusted so as to require more or less force to move. Loosening a joint too much may make it so that it does not stay in the desired position, so tighter tension is generally preferred. Tension adjustment points are indicated by hexagonal screws on the LCD Arm and can be adjusted using the Allen wrenches supplied. Recall that all hexagonal screws on the LCD Arm are in Imperial units.

5.7 *LCD Arm Mount Adjustments for Monocular and Remote Recording*

The EyeLink 1000 LCD Arm Mount can be used for highly accurate monocular recording with head stabilization (in which case the LCD Arm Mount is merely an alternative to the desktop or Tower Mount options) or in Remote mode without head stabilization. In either case the EyeLink 1000 requires that some information about the physical setup be pre-configured in an initialization file, PHYSICAL.INI. Regardless of the mode of recording, PHYSICAL.INI setup for the LCD Arm Mount is identical to the Desktop Mount and is covered in “Section 8.4 Customizing Your PHYSICAL.INI Settings”. Keep in mind when using the LCD Arm Mount however, that for highest accuracy, the viewing distance specified in PHYSICAL.INI should be used with the LCD Arm Mount even though the LCD Arm may be dynamically adjusted on a per-user basis.

LCD Arm Mount users should proceed to Section 8: Software Installation

5.8 *Disassembling and Transporting the LCD Arm Mount*

The EyeLink 1000 LCD Arm Mount ships with three 60 cm double-sided Velcro straps to aid in securing the Arm for lifting and disassembly. A recommended method of securing the LCD Arm using the Velcro straps is presented in Figure 5-6. It is recommended that two people participate in this task as the unit can be awkward to handle and does contain some delicate equipment.

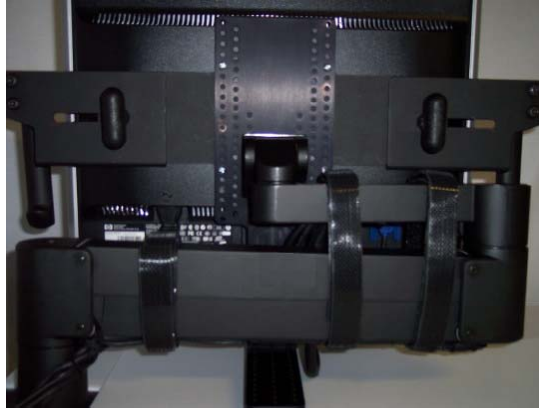


Figure 5-6: Securing the LCD Arm for Disassembling and Transporting

The weight of the LCD Arm with the Camera and LCD Assembly (approximately 11 kg, or 25 lbs) can cause shaft and cup holder points to become tight due to the pressures that the LCD Arm makes while moving the apparatus into various positions. Such pressures make what on assembly amounts to merely lowering a shaft into a cup holder not as easily reversed. On reversal the pieces need to be gently rocked back and forth to wiggle them free. As the LCD Arm is fully loaded this requires the rocking of large portions of the entire unit. To minimize the potential for damage, as many pieces as possible may be removed before attempting to remove the Camera and LCD Assembly from the LCD Arm, or the LCD Arm from the Arm Base. For instance, removing the camera cover and camera is advised.

To disassemble the unit, one option is to lift the LCD Arm and Assembly together from the Arm Base. A second option is to remove the Camera and LCD Assembly from the LCD Arm first, and then to remove the LCD Arm itself from the Arm Base. In either case, double-sided Velcro strapping can assist in securing parts of the LCD Arm to make disassembly more manageable.

Once the LCD Arm has been removed from the Arm Base, removal of the Arm Base involves loosening the bolt from applying pressure to the shim until the Arm Base can slide freely off of the table. Be careful when handling the shim, as it may have sharp edges created around the center hole from the pressure applied to it.

Important: It is recommended that two people participate in disassembling the LCD Arm Mount.

Read these instructions through and prepare a place to put the disassembled pieces before attempting disassembly.

5.8.1 Option 1: Remove LCD Arm and Camera Assembly as a Unit

First fold the LCD Arm as pictured in Figure 5-6. The Camera and LCD Assembly can be lowered so that the camera bracket is beneath the bottom limb of the LCD Arm. Raising it slightly can put pressure on the cable cover which may mark the cover, so some packing material may be inserted between these to prevent marking if desired.

Wrap Velcro (soft side against the LCD Arm is recommended) around the LCD Arm so that it will not extend when lifted (see Figure 5-6). Although full LCD Arm extension is prevented by the camera bracket pressing against the cable cover, the possibility exists for body parts to become pinched.

The entire LCD Arm, with intact Monitor Assembly, can now be lifted from the Arm Base. One person may need to apply downward pressure to the table while the other does the lifting, so that the table is not merely lifted off the floor. Some wiggling of the LCD Arm and its shaft may be required to make it come free from the Arm Base's holder cup. Once free the unit may feel top heavy, so be sure to have a strong grip. Gently lower the unit onto an awaiting soft foam surface, such as the inside of a hard shell case molded for transport and storage of the LCD Arm Mount.

5.8.2 Option 2: Remove Camera Assembly then Remove the LCD Arm

Fully extend the LCD Arm and ensure there is nothing preventing the upwards lifting of the Camera and LCD Assembly. One person will have to steady the LCD Arm and put downwards pressure on the top of the LCD Arm while the other person grabs onto the monitor handles and lifts upwards. Some rocking of the Monitor Assembly back and forth to dislodge it may be necessary.

Once free of the cup holder, the Camera and LCD Assembly can be placed on a hard surface with the bracket making contact with the table. At this point the LCD Arm can be removed from the Arm Base with one person applying downward pressure on the table while the other person lifts up on and wiggles the LCD Arm free of the Arm Base.

Continue to Chapter 8 "Testing the Host PC Installation"

6. Primate Mount Installation

The EyeLink 1000 Primate Mount is a metal bracket that contains an illuminator for use with the EyeLink 1000 camera. The camera is affixed to the top of the mount pointing downwards and the researcher supplies an apparatus that will reflect a view of the eyes up into the camera barrel while reflecting the infrared illumination onto the face of the subject being tracked (see Figure 6-1). Typically this would involve the researcher fixing a 'hot mirror' (a piece of glass that reflects infrared light while allowing other wavelengths to pass through it) in front of the subject's eyes. The subject can thereby see visual stimuli being shown by looking through the hot mirror, while the camera has a good view of the eyes. Typically the distance between the camera and where the eye would be for monocular recording would be identical to the Tower mount – 380 mm.

While the Primate Mount uses a similar set of metrics to the Tower Mount, it is intended to be flexible and ready to install in a wide range of situations where a means of head stabilization exists but the Tower or Desktop mounts are inappropriate. This frequently occurs when research on eye movements is being performed on primates with their head fixed, for instance by means of a Primate Chair. If the head is fixed extremely solidly, pupil only tracking may be possible. Otherwise, as with the other EyeLink 1000 mounting options, Pupil-CR mode is recommended.

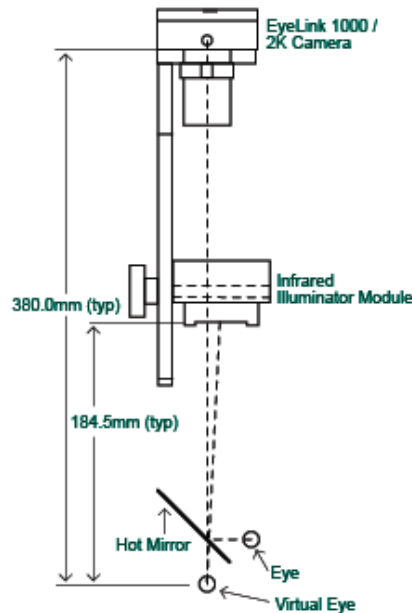


Figure 6-1: Typical EyeLink 1000 Primate Mount Installation

6.1 Primate Mount Hardware Considerations

As experimental setups using this mount vary widely, following something akin to Figure 6-1 is recommended, but other configurations are possible. The configuration depicted assumes use of the 25 mm lens, but other lenses can be used for different viewing distances. As with the Tower mount, but not with the other systems, there is lots of room for movements of the hand in front of the body using the Primate Mount.

All system and optical components can be seen in the overall rear and side view drawings. The optical axis is represented in Figure 6-1 by the thin dotted line. The camera is placed above a 45° hot mirror which reflects IR light but is transparent to visible light. The reflection of the IR light provides an image of the eye to the camera. The subject views the stimulus source (such as a computer monitor) through the mirror. The illuminator module is mounted and angled so as to illuminate the eye via the mirror as well (the path from illuminator to eye is represented by the heavy broken line).

The illuminator should be angled to maximize illumination of the eye while minimizing bright spots and shadows on the face. For human subjects, this may require placing the illuminator to the temporal side of the tracked eye to reduce nose and forehead bright spots and shadows on the temporal side of the eye socket. The illuminator is normally located significantly closer to the eye than in the Tower mount (typically ~180mm from front of illuminator to eye). This distance results in an eye illumination level of ~1.0 mW/cm² at the eye (which is comfortable for extended viewing) with a reasonably-sized corneal reflection.

The EyeLink 1000 illuminator bracket is designed to provide a rigid connection between the illuminator module and the camera. This is essential for pupil-CR difference tracking mode, as any motion of the illuminator relative to the camera will appear as eye rotation artifacts. This is also true to a lesser extent for the pupil-only eye tracking mode if the CR is positioned within the pupil itself. The camera attaches to the bracket with a clamp knob and 3 indexing bumps for positive alignment. The camera may also be attached to the bracket so that it is rotated by 180° to change the side of the bracket the lens is on. The illuminator block attaches to the bracket with a single clamp knob in a slot, allowing the distance from the illuminator to the eye to be changed to control brightness and CR reflection size, and allowing the illuminator to be rotated to maximize illumination. The LEDs used in the illuminator were selected for even illumination, so angling the illuminator is not critical.

The illuminator consists of an array of 24 infrared LEDs mounted in a heatsink block. The block also allows for a mounting of the assembly via an M8 thread in each side. It is important that the illuminator be mounted to a substantial piece of metal to help cool the illuminator as this will enhance light output. The IR LEDs emit at 910 nm, which was selected for reduced visibility in dark-adapted conditions compared to typical 890 nm LEDs. The LED array is safe for viewing by humans at any distance (it passes the

IEC 60825-1 standards by a factor of 3) at any distance. However distances of >160mm from the eye (resulting in irradiance of $1.2\text{mW}/\text{cm}^2$) are recommended for long-term viewing comfort.

The camera (either the Standard EyeLink 1000 Camera or the Fiber Optic Camera) mounts to the top of the bracket using a clamp knob (M8 thread) and a set of dimples on its front. This ensures that the camera cannot vibrate independently of the illuminator. The camera also has 5 mounting holes on its sides: 2 near the center of the camera's sides, and 3 aligned with the optical center of the lens and sensor. These holes take a standard 1/4"-20 screw (used on tripod and camera mounts). However, the hole at the lens end of the camera may not be robust enough to mount the camera with the illuminator bracket attached, especially if vibration is present.

It is recommended that the illuminator bracket be mounted to the head restraint assembly using the 3 holes supplied near the camera mount. The long side of the bracket should be oriented away from the subject to maximize head clearance. Once the bracket is mounted, the illuminator and camera may be attached and re-oriented as required. The camera may be installed with the lens on the left or right side of the bracket, and the illuminator fitted as required to place the connector on the side opposite the camera lens. The EyeLink configuration files may be modified to flip the camera image as required to match any mirrors or orientation of the camera.

While the camera will accept most C-mount lenses, the performance of most lenses is rather poor in infrared, with blurry or dark images resulting from lens coatings or non-optimal design. The Standard Camera configuration uses a 25 mm focal length lens, selected for high resolution and excellent IR performance. A similar 16 mm focal length lens is available which will allow the camera to function properly when closer to the eye.

As with other EyeLink 1000 mounting options, the camera requires 12V power, and a supplied 60 mm (24") cable is connected from the camera to power the illuminator module. A supplied ferrite choke on this cable must be on the end near the camera. Finally, a high-speed camera cable is connected from the back of the camera to the tracker Host PC.

To summarize the above points, when installing the primate system please keep the following points in mind:

- The camera should not be too close to the eye, as the pupil and corneal reflection must be contained within the tracking window.
- Bringing the illuminator closer to the eye will reduce noise but may cause discomfort and increase pupil erosion by the corneal reflection.
- Placing the illuminator too far from the eye will result in a dark image and noisy data.

- The line from the illuminator to the eye should be at least 10° off axis from the camera lens for proper imaging.
- The illuminator should be attached to a robust metal support, as should the camera. Preventing separate motion of the camera and illuminator due to vibration is critical to prevent extraneous noise in the data. The metal will also help to keep the illuminator cool, increasing its light output.
- While it is possible to rotate the camera by 90°, this will swap X and Y pupil position data. Contact SR Research for information about operating in this configuration.
- It is possible that an extra bright reflection may appear above the pupil in the eye image, as the illuminator may directly light the eye as well as through the mirror. A small baffle may be required to control this.

Continue to Chapter 8 “Testing the Host PC Installation”

7. Long Range Mount Installation

The Long Range Mount consists of a Mounting Bar for the Camera Head and a focusable Long Range Illuminator. These are affixed to the Mounting Bar using circular clips that tighten onto the bar. The Camera Head and its mounting bracket attach to the Camera Head clip at either a level or angled orientation, while the Long Range Illuminator attaches to its clip in a flexible manner so that the illumination can be adjusted to fit the tracking situation.

The Mounting Bar can in turn be fixed to a Base (pictured), a tripod (via a Tripod Adapter), or some similarly stable source. The camera can be parallel with the top of the Mounting Bar (the Level position) for monocular recording, or it can be rotated (the Angled position) for monocular or binocular recording. The Illuminator can be tilted up or down and swiveled around its vertical axis to assist in positioning. The entire Mounting Bar can be positioned using the Base or tripod to which it is affixed. Figure 7-1 depicts the Long Range Mount with the Mounting Bar attached to a Base. The Camera Head is on the left and the Long Range Illuminator is on the right. The Mount comes with a Long Range Illuminator, three lenses (75, 50 and 35 mm) and a tripod adapter (see Figure 7-1 right).



Figure 7-1: EyeLink 1000 Long Range Mount with Camera Head (left) and as shipped (right)

The Camera Head and Illuminator are located at opposite ends of the Mounting Bar, and each is secured to the bar using a round clip (see Figure 7-2) surrounding the Mounting Bar that is tightened by turning a knob located on the back. When loosened, the clips can slide along the Mounting Bar allowing the position of the Camera Head or illuminator to be adjusted.



Figure 7-2: Mounting Bar and Clips-note Guide Pins on the Camera Head clip (left)

The typical position for the Camera Head will be on the left side of the Mounting Bar with the illuminator on the right side (when facing the Camera Head and Illuminator, such as in Figure 7-1), though the mount is designed so that the illuminator could be on the left and the Camera Head on the right. With the Camera Head on the left side of the Mounting Bar, the cabling coming from it and the illuminator are directed toward the center of the mount where they can be secured and exit.

7.1 Mounting the EyeLink 1000 Fiber Optic Camera Head

The Fiber Optic Camera Head first attaches to a bracket that has several guide holes oriented at a right angle to the camera (rightmost image of Figure 7-3). The holes interface with guide pins on the Camera Head Clip, pictured at the left of Figure 7-2. The left image of Figure 7-3 shows the Camera Head by itself, the center image shows the Camera Head attached to the bracket with small brass thumbscrews, and on the right, another view of the Camera Head attached to the bracket which will determine its position on the mount.



Figure 7-3: Fiber Optic Camera Head with lens (left), attached to the Bracket (center), Guide Holes in the Bracket accept Guide Pins from Camera Head Clip (right)

Guide pins on the Camera Head Clip slide into guide holes on the Camera Head Bracket to determine its orientation (pictured right side of Figure 7-3). When the pins are in the

center set of holes the camera will be horizontally oriented and parallel with the Mounting Bar (the Camera Level position). When the holes are aligned diagonally with the guide pins, the camera will be oriented as required for binocular recording (the Camera Angled position).

The top part of Figure 7-4 shows the bracket attached to the Mounting Bar without the camera, in the horizontal or Level position for monocular recording (left) and Angled for binocular recording (right). The bottom of Figure 7-4 shows the Camera Head attached to the bracket and the bracket attached to the Camera Head clip on the Mounting Bar.

With the lens cap on to avoid dirtying the lens, turn a 35, 50 or 75 mm camera lens into the thread on the Camera Head. See Table 1 of the current manual, for recommendations on which lens to use for the eye to camera distance that you desire. In general, the larger the lens, the greater the magnification and the longer the eye to camera distance that can be used.

To mount the Camera Head, first attach the Camera Head Bracket to the bottom of the Camera Head as in Figure 7-3 (right) using the brass thumbscrews. Next align the holes on the bracket with the pins on the Mounting Bar's Camera clip in either the Level or Angled position. Note that the cables should emerge from the right side of the Camera Head as shown in Figure 7-4. If not, you'll need to attach the Bracket to the other side of the Camera Head. Turn the knob on the back of the clip so that it threads into the Bracket. As the knob is tightened the Camera Head will become immobile.

The Camera Head is fixed in its position and its clip does not rotate around the bar.



Figure 7-4: Bracket in the Level Position (left) and Angled (right) – without the Camera Head (top) and with the Camera Head (bottom)

7.2 Mounting the Illuminator

Hold the illuminator with the power cable leading from the left. Place one brass thumbscrew under the middle hole on the illuminator through the Illuminator Mounting Clip (right side of Figure 7-2) and tighten it from underneath. Figure 7-5, left, shows the view from beneath. Note there are black thumbscrews holding the illuminator cover on – these are not involved in mounting the illuminator but will be used at a later step.

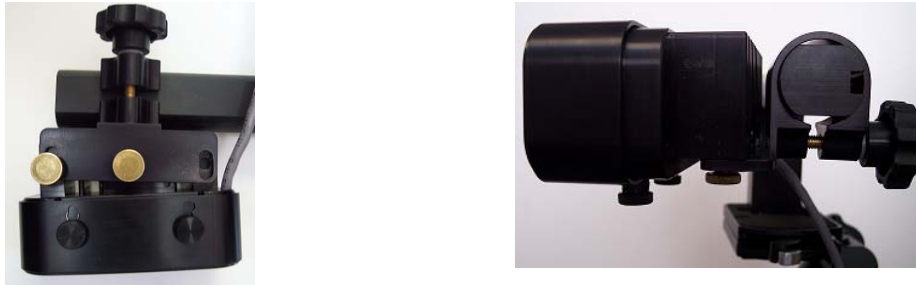


Figure 7-5: Illuminator attached using two brass thumbscrews (left), rotates around the Mounting Bar when the knob is released (right)



Figure 7-6: Tripod Adapter (left), Base (middle) and Mounting Bar attached to the Tripod Adapter using Two Brass Bolts (right)

The illuminator can swivel around its middle screw on the vertical axis, allowing it to point at a number of different angles to the left or right of center. A second brass thumbscrew is used to hold the illuminator in place and can be threaded into either of the remaining holes. The most peripheral hole is easiest to access and so is recommended, though the hole that is more interior allows more acute angling of the illuminator. Thread the second thumbscrew in place, but do not completely tighten it as it will need adjusting momentarily.

7.3 Affixing the Long Range Mount's Mounting Bar

The Mounting Bar is intended to be fixed to the supplied Base, or to a tripod (using the supplied Tripod Adapter), or some other solid source supplied by the user. The Tripod Adapter and Base are shown in Figure 7-6. The Mounting Bar itself attaches to the Base or the Adapter using two brass bolts (Figure 7-6, right) that can be found beneath small plastic covers. Simply pry the plastic covers free with fingernails to avoid scratching them or the mount, and use a flat, slotted screwdriver to remove the Mounting Bar. The Tripod Adapter has a standard ¼ inch thread in the bottom (Figure 7-6, left) for use with standard tripods. The Adapter's top has two holes to bolt the Mounting Bar to.

7.4 Cabling for Long Range Mount

Connect the 5V pressure-release power connector to the Camera Head. The other pressure-release power connector should be connected to the illuminator. If not already completed, connect the fiber optic cable to the fiber optic extension cable through the connector. The other end of the fiber optic cable goes to the Camera Base Box which should be affixed to the back, left side of your Host PC. Ensure that the 12V EyeLink 1000 power supply is connected to the power connector on the Camera Base Box.

7.5 Long Range Mount Camera Setup

Follow these steps to set up the camera and the Long Range Mount for monocular tracking. The first few steps require knowing the eye to camera distance, which is measured from the surface of the Camera Head to the bridge of the participant's nose in centimeters.

- 1) *Place the Mount at an intended distance and position.* The Long Range mount should ideally be placed at a distance between 50 and 150 cm from the participant's eyes, with the illuminator and camera facing the participant. The mount should be aligned to the center of the display, and raised as high as possible to maximize the eye tracking range without blocking the subject's view of the bottom part of the display.
- 2) *Determine which lens is most appropriate.* Based on the eye to camera distance, use the Lens Guide (Table 1) to determine the lens to use. Screw the small end of the lens into the threaded Camera Head. Please follow "Section 8.4 Customizing Your PHYSICAL.INI Settings" to update the distance and the dimensions of the tracked area in the physical.ini file (note that all of the measurements in the file are done in millimeters).

- 3) *Check the Camera Head and Illuminator Separation.* The further away the mount is from the eye, the greater the ideal separation of the camera and illuminator. On the top of the mount are markings that indicate the appropriate locations on the Mounting Bar for the inner edges of the Camera Head and Illuminator, based on different eye to camera distances. Loosen the knobs holding the Camera Head and illuminator Clips to the Mounting Bar, adjust the clip positions so the inner edges align with the appropriate distance and then tighten the knobs.
- 4) *Focus the Illuminator.* The illuminator has a lens on it that will focus the infrared light at different distances. Without removing the black thumbscrews (see Figure 7-7 left) on the underside of the illuminator – loosen them so that the illuminator cover will slide back and forth to reveal an illuminator distance scale. Sliding the cover forward will reveal markings on the scale from 60 cm at the closest eye to camera distance to 150 cm at the furthest (see sticker in Figure 7-7 right). Adjust the cover so that its edge aligns with the marking that approximates your eye to camera distance and then tighten the black thumbscrews.

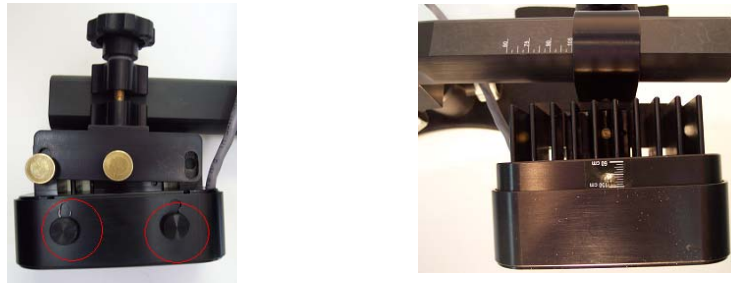


Figure 7-7: Focusing the Illuminator

- 5) *Check that the Camera Head is Horizontal.* The elongation of the camera should be parallel to Mounting Bar for a monocular recording. If not, please loosen the knob holding the camera to the Mounting bar and align the small brass pins that protrude from the mount so that they fit into the middle two holes on the Camera Head. Tighten the knob securely and the camera is now in the 'Level' position.
- 6) *Check Host Software Configuration.* Start the EyeLink Host PC application and click "Set Options" button. Check that the "Configuration" is set to "Long Range Mount (Monocular)". Then navigate to the "Camera Setup" screen. You may also wish to start a program on the Display PC (e.g., the sample program TRACK.EXE in the SR Research directory) and transfer the camera image during this stage if it provides a convenient view of the global camera image.

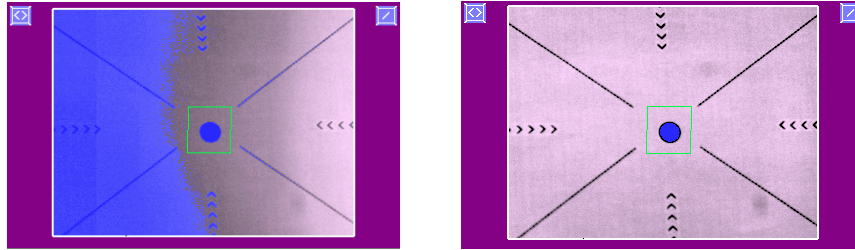




Figure 7-8: Pointing the Camera-visible illumination boundary (left) and fully illuminated target (right)

- 7) *Point the Camera and Roughly Focus the Lens.* A Target Screen was supplied with your system to provide you with a target to locate. This will provide a target to find with the camera and will assist in determining that the eyes are properly illuminated by providing a screen to project the illumination onto. Place the circular target at the location where the subject's real eye(s) will be. With the EyeLink 1000 Host application running, point the Camera Head at the Target and locate it by monitoring the global view on the Host PC's "Camera Setup" screen (e.g., the left image of Figure 7-8), or a transferred global image on the Display PC. The Camera Head itself is immobile, but the entire Mounting Bar can be moved by adjusting the Base or Tripod. While watching the global image, turn the lens wheel so that the image becomes clearer – it does not have to be perfect at this stage.

Note that when monocularly tracking the eye of an actual subject, the camera should ideally have only the image of the eye to be tracked in its view, with the non-tracked eye off the camera image. If this is not the case, there is a risk that the eye tracker will switch the eye being tracked. This can be prevented by turning search limits on (the USE SEARCH LIMITS button on the Host PC), but initial camera placement with only one eye visible will guarantee that inadvertent switching of the tracked eye will not occur.

- 8) *Check the Orientation of the Camera Image.* If the camera image is vertically flipped, this can be corrected by pressing the  button to the right of the global camera view. If the camera image is horizontally flipped, this can be corrected by pressing the  button on the left to rotate the camera image 90° and then click on the vertical flip button.
- 9) *Align the Illuminator and Camera.* The next step is to ensure that the center of the infrared illuminated area is roughly in the center of the camera's field of view. The illuminator can be angled on the horizontal plane (axial plane, or transverse plane) depending upon where it is placed when two brass thumbscrews holding it to the mount are tightened. The illuminator can also

be tilted up and down by finely adjusting rotation of the clip that holds it to the Mounting Bar.

- As humans do not see infrared, a good approach is to shine the illuminator at the Target Screen at the distance where the participant's eye(s) will be and to check the bounds of the illuminated area by watching the global view that the camera has of the area. The boundaries of the illumination will show with distinctly different threshold coloring in the illuminated versus non-illuminated locations. The amount of thresholding displayed on the global view can be adjusted up or down by pressing the + or – keys on either the Host or Display PC keyboards.
 - While monitoring the global camera view, adjust the illuminator up and down by rotating the clip around the Mounting Bar so that the Target Screen is brightly illuminated and the bulk of the illumination appears in the center of the Screen on the vertical – tighten the knob holding the illuminator to the Mounting Bar to secure the position. The brightly illuminated region will be grayscale, while the region in the infrared dark will be threshold colored. The left side of Figure 7-8 illustrates the boundary of illumination in the global camera view – the illuminator would need to be shifted in this case so that the entire target is illuminated as in the right side of Figure 7-8.
 - By swiveling the illuminator around the center thumbscrew, adjust the angle of the illuminator on the horizontal plane so that the Targets are brightly illuminated. There is a range of positions in which the outermost thumbscrew can be tightened. First tighten the center thumbscrew so that it still allows some movement when the outermost thumbscrew is loose. After centering the illumination in the camera field of view, tighten the outermost thumbscrew and then securely tighten the center thumbscrew.
- 10) *Select the Eye to Track and Adjust Thresholds.* In the global camera view move the Host PC mouse cursor on top of the pupil position and double click on the left mouse button. The camera image for the eye should now be displayed in the zoomed view. If the pupil is detected, a green box and the cross will also be drawn on the pupil. Use the left or right cursor key to select the zoomed camera view. Adjust the camera focusing by turning the focusing ring at the front of the lens. You may do the adjustment from the side opposite to the illuminator to prevent the camera image or the illumination to the eye from being blocked. Look closely at the eye image on the zoomed view while turning the focusing ring until the eye image is clear. If a colored circle (CR signal) appears near the pupil, the best focus will minimize the size of this circle.

Camera Setup for binocular tracking is essentially the same as described above except that:

- 1) The “Configuration” in the Set Options screen should be set to “Long Range Mount (Binoc/Monoc)”;
- 2) The Camera Head orientation on the mount should be angled (see the right panels in Figure 7-4);
- 3) When pointing the camera at the subject, both eyes should appear in the global camera image – the dotted line in the global view should be aligned with the bridge of the nose.

Please follow “Section 8.4 Customizing Your PHYSICAL.INI Settings” to modify the PHYSICAL.INI file settings.

The system is now ready to test. Please see the tutorial in the User Manual, though you may wish to skim the contents of Chapter 8 first.

8. Testing the Host PC Installation

If your system comes with a standard pre-installed Host PC, it should already have two partitions installed: “EyeLink” and “Windows”. The EyeLink partition, which runs on a DOS operating system, is for the operation of the eye tracker. This allows you to perform subject setup, monitor performance, record data, and control experiments running on the Display PC. The existing Windows operating system is still accessible so that you can update the host software and back up data.

If you are preparing your own Host PC, please follow "Appendix B: Host PC Software Installation Under Windows 2000/XP" or "Appendix C: Host PC Software Installation Under Windows Vista" to create the EyeLink partition and install the Host software.

8.1 Running the EyeLink Host Program

Turn on the Host PC. If your system shows the “Windows Boot Manager” interface, select the default “EyeLink” partition (see left side of Figure 8-1). The Host program will start automatically. If you see a System Commander OS Selection screen, choose the EyeLink partition by clicking on the OS icon (see right side of Figure 8-1). You should see a C:\> prompt at the command line.

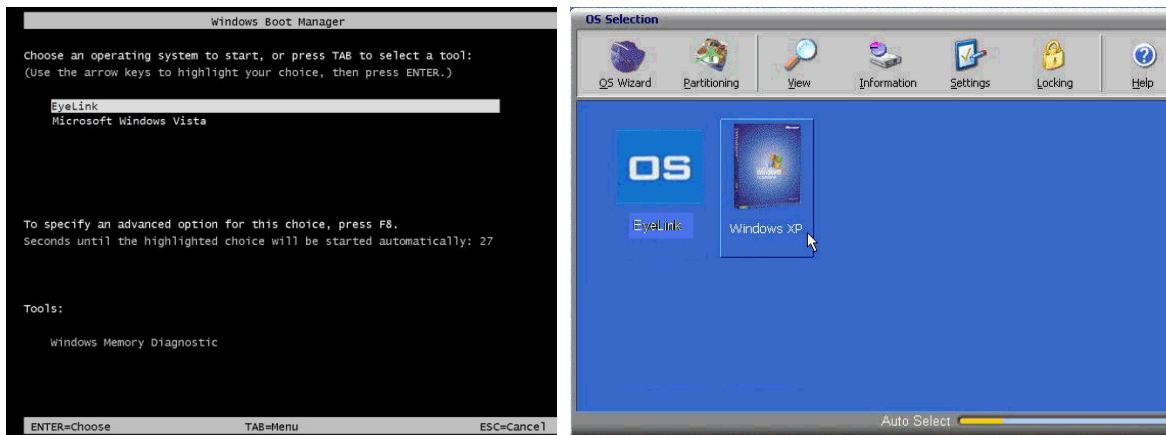


Figure 8-1: Booting into the EyeLink Partition

If the EyeLink 1000 Host application doesn’t start automatically, type the following in the command prompt:

```
T ↵
```

The EyeLink 1000 Host PC application should start and you should see the EyeLink 1000 Host application screen illustrated in Figure 8-2. Please make sure that you are using the latest version of the EyeLink 1000 Host application; the latest host software can be downloaded from the SR Research support website <http://www.sr-support.com>.

Click on the “Set Options” button and ensure that the “Mouse Simulation” button is deselected as in Figure 8-3 (the button will not be solid in color). Next click on the button marked “Setup Cameras” and if all is working well, you should see that the camera is transmitting images to the Host application.

A screenshot of the large field of view of the EyeLink 1000 camera (Tower Mount) is illustrated in Figure 8-2.

Please consult Chapter 3 “An EyeLink 1000 Tutorial: Running an Experiment” of the EyeLink 1000 User Manual for tutorials on setting up the camera, calibration and validation. But first, proceed with the Display PC setup in the following chapter.

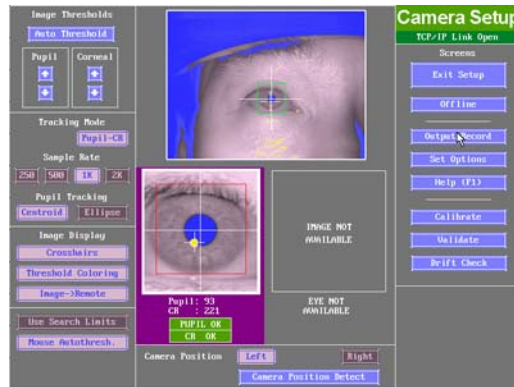


Figure 8-2: Host Application Camera Setup Screen



Figure 8-3: Host PC Set Options Screen

8.2 Trouble Shooting Instructions

This section lists some of the error messages you may see when starting the host software.

8.2.1 *SCD file does not exist*

Each EyeLink 1000 system loads a camera-specific .SCD file. If you see the following error when starting up the tracker, please ensure that “*****.SCD” file is contained in the ELCL\EXE directory.

```
ERROR: Camera data file 'c:/ELCL/EXE/*****.SCD' does not exist
```

You can find the camera-specific .SCD file in the Host Partition \ ELCL \ EXE directory of the EyeLink 1000 Software CD that came with your system. If you cannot locate this file, please contact support@sr-research.com.

8.2.2 *“No Hardware” error*

The eye tracker reports the current network status between the Host PC and display computer. If you see a “No Hardware” at the top-left corner of the Host Program, please check whether the Ethernet card is properly seated.

8.2.3 *EyeLink CL camera not found*

Sometimes, the eye tracker will not start and the following “EyeLink CL camera not found” error will be displayed in the command prompt.

```
EyeLink CL camera not found.
```

```
ERROR: EyeLink CL mode selected but hardware not operational:
```

```
Use the -x option to run in simulation mode.
```

This error could be caused by the following possibilities:

- 1) The power to the Standard Camera or Camera Base Box is not powered. Please check the power cables and ensure the power light is glowing.
- 2) The camera link data cable is not properly connected to the framegrabber card or to the camera, or the connection is loose. Try re-attaching the cable and using the thumbscrews to fasten the connection.
- 3) The EyeLink 1000 framegrabber card is not fully seated in the card slot. Try removing the card and plugging it back to the same slot or a different one.

8.2.4 *ERROR: no sync found*

The “no sync found!” error is typically caused by a loose data cable connection. Try reattaching the cable and using the thumb screws to fasten the connection.

```
AQ_Start Error: Unable to detect frames
```

```
ERROR: no sync found!
```

```
AQ_STOP: Aborting acquisition
```

8.2.5 Error: No Optilink head found.

The following error is only seen when a fiber optic camera is used.

```
Found Optilink CL base, serial number CL1-*****  
ERROR: No Optilink head found: check link or power  
ERROR: EyeLink 1000 mode selected but hardware not operational:  
Use the -x option to run in simulation mode.
```

Check the power for the Fiber Optic Camera Head and ensure all fiber optic cable connections are secure.

8.3 EyeLink Data Storage

All EDF files that are created during the recording phase of each experiment will be saved to C:\ELCL\DATA. This is the default directory into which EyeLink recording files (.EDF) are stored. If the DATA drive cannot be found, all EyeLink data files will be saved into the C:\ELCL\EXE directory. It is recommended to periodically boot into the Windows operating system to back up your data.

8.4 Customizing Your PHYSICAL.INI Settings

The EyeLink 1000 PHYSICAL.INI file at C:\ELCL\EXE directory contains settings that tell the system about physical characteristics of your setup that are important for proper visual angle and eye velocity calculations. Any time you change your physical configuration (for example a new monitor is used, the eye-to-screen viewing distance is changed, etc.) you should verify that the PHYSICAL.INI still accurately reflects your setup.

The parameters in the PHYSICAL.INI file that change depending on the physical setup of your system are:

screen_phys_coords – specifies the physical distance of the four edges of the presentation surface to the center of the screen. The order of these measurements is left, top, right, bottom and are specified in millimeters. For the default case of a 19” monitor this parameter will read.

```
screen_phys_coords = -188.0, 146.0, 188.0, -146.0
```

screen_pixel_coords – specifies the resolution of the display surface. Normally the EyeLink 1000 API at the start of an experiment programmatically adjusts this so you do not need to manually change this setting. If the EyeLink 1000 programming API or Experiment Builder is not being used, then the default value for this parameter will apply. The default value reads.

screen_pixel_coords = 0.0, 0.0, 1024.0, 768.0

screen_distance – specifies the distance to the top and bottom of the display surface from the participant’s eye, respectively. This setting is not applicable to EyeLink remote tracker. The default values read as following:

screen_distance = 600 660

8.4.1 Measuring screen_phys_coords

All screen physical coordinate measurements are in millimeters. It is recommended that a straight ruler be used. Turn on both the EyeLink 1000 Host and Display PC and run track.exe on the Display PC. Type in “TEST” for the saved EDF file name and click the OK box. Press “Enter” on either keyboard twice.

On the Host PC go to “Set Options” on the screen and select “mouse simulation” mode. This will now let you use the Host PC mouse to simulate eye movements. Check that the Calibration Type is set to a nine-point pattern. Press “Previous Screen” button to return to the Camera Setup screen.

Now press “C” or the calibration button. A calibration dot should appear on the middle of the display monitor. Use this dot as the central reference point for all horizontal and vertical PHYSICAL.INI measurements.

In the screen_phys_coords, measure the distance from the center of the dot to the end of the active part of the monitor screen. Start on the left side (S1) and follow round to the top (S2), right (S3) and bottom (S4). This is illustrated in Figure 8-4.

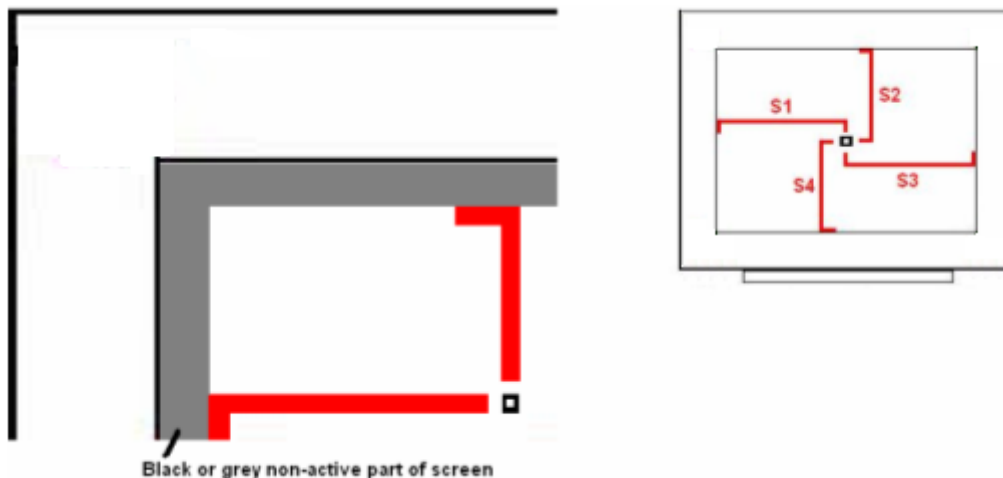


Figure 8-4: Measuring screen_phys_coords

The new settings for the screen_phys_coords in the PHYSICAL.INI file are determined by screen_phys_coords = -1, 2, 3, -4

8.4.2 Measuring screen_distance

Please follow the steps below to measure the “screen_distance” values. For EyeLink Remote eye tracker, keep the default “screen_distance” value.

1. Set up the monitor and chinrest so that the chinrest is centered on the monitor and the monitor is horizontally aligned with the chinrest (**HINT:** measure from the left and right knobs on the chinrest to the left and right sides of the top of the display area of the monitor, these should be equal).
2. Adjust the height and tilt of the monitor. Ideally this should have the top of the display at about the same height as the forehead rest, and the display tilted up slightly. The tilt can be changed if there are any reflection issues. Small amounts of horizontal misalignment (turning of the monitor) may be tolerated if required to reduce screen reflections, but this may reduce the accuracy of angular measures.
3. Now measure from the front of the forehead rest/Tower height adjustment knob (or the subject’s eye position if using your own chin rest) to the point on the monitor directly in front of the knob (lay the measuring tape across the top of the shaft of the knob, and read distance from the front of the column). Measure from the knob to the top of the visible part of the display area, then from the knob to the bottom of the display area. These two values (in millimeters) should be your new “screen_distance” command values.

8.4.3 Entering Values into PHYSICAL.INI

The newly acquired values for “screen_phys_coords” and “screen_distance” must now be entered into the PHYSICAL.INI located on the Host PC. This can be done either from the Windows partition or from the EyeLink partition.

8.4.3.1 Windows Partition

Boot into the Windows partition, find the EyeLink drive. Go to the “ELCL\EXE” directory and select the PHYSICAL.INI file. Uncheck the "read-only" property of the file. Modify the file and save the change.

8.4.3.2 EyeLink Partition

Reboot the Host PC into the EyeLink partition. Do not press “T” when in the DOS prompt. If the host software is already running, closing the host software will automatically bring you to “C:\ELCL\EXE” directory.

From the command prompt type the following

```
CD C:\ELCL\EXE  
ATTRIB -R PHYSICAL.INI  
EDIT PHYSICAL.INI
```

To enter the new values, follow these steps

1. Go to the screen_distance parameter
2. Remove the default values for this command.
3. Enter new values
4. Repeat steps 1-3 for screen_phys_coords
5. Save changes and exit the file

Finish by typing the following at the command type

```
ATTRIB +R PHYSICAL.INI
```

9. Display PC Software Installation

The Display PC is used to run experiment application software for control of the EyeLink 1000 tracker and stimulus presentation through the EyeLink Display Software. This API is available on Windows, MacOS and Linux platforms. The latest version of the display software can be downloaded from SR Research support website <http://www.sr-support.com>. The Display PC installation process should not take more than 15 minutes. Installation instructions for the Windows platform are detailed below.

9.1 Windows Installation

To use a Windows Display computer with the EyeLink 1000 system, various EyeLink software components should be installed. The installation process consists of the following basic steps:

- Install the EyeLink Experiment Programming Kit.
- Install the supplied IO Port Access Driver if planning to use TTL.
- Install the EyeLink Data Viewer and / or Experiment Builder software (if purchased).
- Install the USB Key drivers for EyeLink Data Viewer and / or Experiment Builder software (if purchased).
- Configure the network connection to the EyeLink 1000 Host PC.

9.1.1 Installing the EyeLink 1000 Experiment Programming Kit

The Windows toolkit (API and example files) is available on the “EyeLink 1000 Software” CD in the “Display PC Installation” directory. To install the toolkit:

1. Insert the “EyeLink 1000 Software” CD.
2. Open the “Display PC Installation → Windows” folder.
3. Run the EyeLinkDevKit_*.exe program by double clicking the icon.
4. Follow the instructions from the InstallShield Wizard to install the display software.
5. Wait for the InstallShield Wizard to finish, and click FINISH to complete installation.

9.1.2 Installing the IO Port Access Driver

For proper access to IO ports (i.e. for TTL signaling) on the Display PC, an access driver must be installed. Note that this PORT95NT installer doesn't run on any 64-bit versions of Windows XP or Vista.

1. To install the driver, click Start → Programs → SR Research → EyeLink → Utilities → PORT95NT.
2. Follow the on screen instructions.
3. Reboot your computer when prompted.

9.1.3 Installing the EyeLink Data Viewer and Experiment Builder Software

The EyeLink Data Viewer and Experiment Builder software are optional Windows applications for the EyeLink eye tracker. If you did not purchase these options this section may be skipped, or you may install the software for evaluation in demo mode.

1. Insert the “EyeLink 1000 Software” CD.
2. Open the “Display PC Installation → Windows-> EyeLink Data Viewer” folder.
3. Run the EyeLinkDV_*.exe program by double clicking the icon.
4. Follow the instructions from the InstallShield Wizard to install the software.
5. Wait for the InstallShield Wizard to finish, and click FINISH to complete installation.
6. Open the “Display PC Installation → Windows-> SR Research Experiment Builder” folder
7. Run the SREB_*.exe program by double clicking the icon.
8. Follow the instructions from the InstallShield Wizard to install the software.
9. Wait for the InstallShield Wizard to finish, and click FINISH to complete installation.

9.1.4 USB License Key Installation

If you purchased either the Data Viewer or Experiment Builder software, you will have been provided with a USB license key with your order. To install the software driver for the USB license key follow these steps:

1. From the Windows Start menu select “Start->All Programs -> SR Research -> Install HASP Driver”. You may also try running both “HASPUserSetup.exe” and “hdd32.exe” installers contained in the “C:\Program Files\SR Research\Common” folder of the display computer.
2. Follow the instructions from the InstallShield Wizard to install the software.
3. Wait for the InstallShield Wizard to finish, and click FINISH to complete installation.

4. Insert the USB Key into an available USB port on the Display computer. The USB key should start to glow red, indicating that the key has been recognized by the system.

9.1.5 Setting up EyeLink 1000 Network Connection

You must have an Ethernet port in your Display Computer. Allow Windows to install drivers for it (if it is new hardware), then follow these instructions to install and configure the TCP/IP network protocol. These instructions are based on Windows XP; other Windows operating systems may vary slightly.

1. From the Start menu select the Control Panel.
2. Click on the Network and Internet Connections icon, and then select the Network Connections icon. Check the list of installed components to make sure a network card is installed. If not, install a driver for the card.
3. Double click on the network card icon that represents the network card that will be connected to the EyeLink 1000 Host PC.
4. Select the properties button.
5. Check that "TCP/IP" is displayed in the list of components and that it is checked. If not, press the checkmark beside the option.
6. Select the "TCP/IP" component for the Ethernet card connected to the eye tracker PC, then click on the "Properties" button.
7. Select the "Use the following IP address" radio button. Enter the IP address of "100.1.1.2". The last digit of the IP address can increase for other computers on the EyeLink network. Enter the subnet mask of "255.255.255.0". Leave the default gateway and other settings blank.
8. Click on "OK" to return to the Properties dialog. Click "OK" again to save your changes. Click "Close" to exit from the network card dialog.

If connectivity error messages appear ensure the supplied Ethernet crossover cable connects the configured Ethernet port of the Display PC to the supplied network card of the Host PC. Alternatively, you may need to reinstall the network card drivers. To be safe, open the Network dialog and remove all components, restart Windows, then install the network card driver and the TCP/IP protocol again.

To test the network, start the EyeLink 1000 tracker and start the "Track" application from "Start -> Programs -> SR Research -> EyeLink -> Track". The link should connect, and the screen will display instructions. This application allows you to practice participant setup and test the system, as described in the EyeLink 1000 Installation Guide. If the message "Cannot initialize link" appears, the TCP/IP protocol or crossover cable is/are not properly configured. If the connection times out, it is probably due to the network card being improperly configured or because the network cable is not

connected to both PCs. On the Host PC, the Ethernet cable should be connected to the Ethernet card we supplied (not to any other Ethernet ports!). The display of a "NO HARDWARE" message in the "Camera Setup" screen indicates that tracker did not reliably detect the Ethernet card. If you see this message, try re-seating the Ethernet card or plugging it to a different slot.

9.1.6 System and Programming Tools Required

The C experiment templates in Windows Display Software package were developed using Microsoft Visual C 6.0. Other 32-bit C and C++ compilers may be used, but you will have to translate the included make files to rebuild the experiments. This release of the Windows Display Software does not supply examples for C++ programming.

9.2 Mac OSX Installation

To use Mac OSX as a Display computer with the EyeLink 1000 system, various EyeLink software components should be installed on the computer. The installation process consists of the following basic steps:

- Install the "Mac OSX Display Software". The installer disk image is located in the "Display PC Installation/Mac OSX" folder of the "EyeLink 1000 Software" CD – the latest version of the software can be downloaded from SR Research Support website (<https://www.sr-support.com/forums/showthread.php?t=15>).

Mount and open the disk image under MacOS, then click on the installer and follow the instructions, using the default settings as prompted. The EyeLink libraries, documentation and source code examples are installed in the Applications:EyeLink folder.

- Install the EyeLink Data Viewer. The installer disk image is located in the "Display PC Installation/Mac OSX" folder of the "EyeLink 1000 Software" CD – the latest version of the software can be downloaded from SR Research Support website (<https://www.sr-support.com/forums/showthread.php?t=10>).

Mount and open the disk image under MacOS, then click on the installer and follow the instructions, using the default settings as prompted. Data Viewer is installed in the Applications:EyeLink DataViewer directory.

- Install the USB HASP Key driver for EyeLink Data Viewer. Mount the "Hdd_MacOSX.dmg" disk image to get access to the HASP driver installer. Double click on the installer made available by the disk image and follow the instructions, using the default settings as prompted.

- Configure the network connection to the EyeLink 1000 Host PC. Set the IP address to 100.1.1.2 and subnet mask to 255.255.255.0. You can do this by opening the System Preferences (Apple menu item, then select 'System Preferences...') and click on the Network Icon. Next go to your computer's Built-In Ethernet device, select Manually on the Configure pop-up menu, and enter the above IP address and subnet mask. Click Apply to apply these new settings.

If you plan to program your experiments in MatLab, install the latest version of the PsychToolBox and reboot the computer. Some demo examples can be found in the Psychtoolbox directory which is in the Applications folder at: "Applications/Psychtoolbox/PsychHardware/EyelinkeToolbox/EyelinkeDemos/GazeContingentDemos".

10. Appendix A: Host PC Hardware Installation

To set up your Host PC for use with the EyeLink 1000 system, you will be required to open the computer chassis to install two or three PCI cards. Therefore, put the computer case in a position where you can easily access the computer's PCI slots.

IMPORTANT: Switch off the computers before installing any PCI cards or connecting or disconnecting any cables! Ensure that all cabling is properly connected and connectors are properly secured to the Host PC and the EyeLink 1000 camera before use.

IMPORTANT: Ensure that the power supply setting on the back of the PC (Near the power jack) matches your local supply voltage!

IMPORTANT: Ensure the computer's power cable is disconnected before opening the computer chassis to install any PCI card.

WARNING: Static Electricity Discharge may cause permanent damages to your system. In order to avoid possible static electricity discharge during installation, please discharge any static electricity accumulated in your body by touching a grounded metal surface or the computer case for a few seconds.

IMPORTANT: Handle the cards only by their edges.

10.1 Installing the High-Speed Frame Grabber - PCI card

Open the EyeLink 1000 Host PC, and insert the High-Speed Frame Grabber card into a free PCI slot. Ensure the card's bracket is firmly attached to the PC.

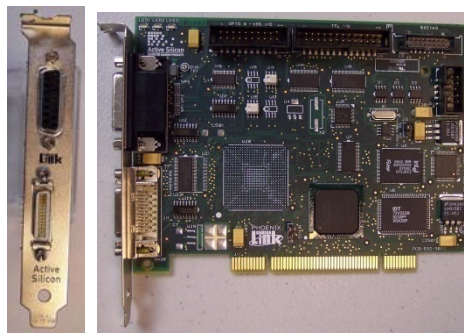


Figure 10-1: High-Speed Frame Grabber

10.2 Installing the Ethernet Card

Insert the DLINK DFE-538TX Ethernet Card (illustrated) into a free PCI slot, or the Agere ET131x Gigabit PCIe Ethernet Card into a free PCIe slot. Ensure the card's

bracket is firmly attached to the PC. If the analog card option was not purchased with your system, you may now close the computer chassis and reconnect the power supply to the computer.

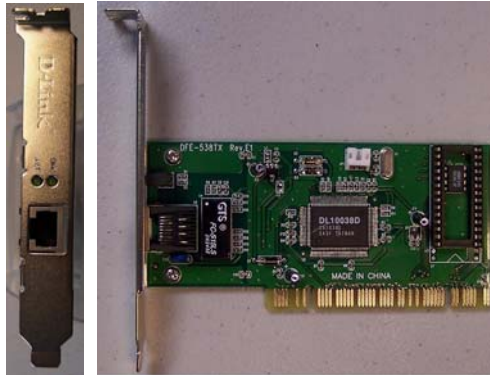


Figure 10-2: D-Link Ethernet Card

10.3 Installing the Data Translation Analog Card (Optional)

If the analog output option was purchased with your system, then insert the Data Translation Analog output card into a free PCI slot. Ensure the card's bracket is firmly attached to the PC. Close the computer chassis and reconnect the power supply to the computer.

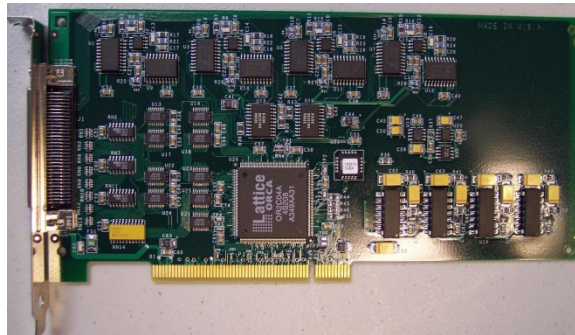


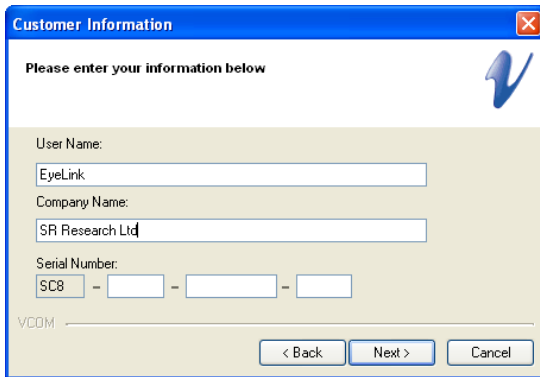
Figure 10-3: Analog Card

11. Appendix B: Host PC Software Installation Under Windows 2000/XP

Please follow the instructions here to install or reinstall the host software.

IMPORTANT: Before proceeding with the EyeLink 1000 Host software installation ensure you have backed up all important data on your Host PC.

The first step in preparing your Host PC for the EyeLink 1000 is to install the ROM-DOS operating system that the EyeLink 1000 system runs on. This allows you to perform subject setup, monitor performance, record data, and control experiments running on the Display PC. At the same time, you will want to keep your existing operating system accessible so that you can access your CDRW drive etc. when required. To achieve this, you will create a FAT32 partition on your hard drive using System Commander that will host the ROM-DOS OS provided with your EyeLink 1000 system. System Commander will also be used to allow you to choose which operating system you wish to launch when you start the Host PC.



Important: If you have a floppy disk drive, create the System Commander rescue disks when prompted during installation. These may help you recover the drive partitions in the future, in the event of file system corruption on the drive.

Your System Commander license is registered through SR Research Ltd.

Figure 11-1: License Code Entry

11.1 Install System Commander

Install the System Commander application that came with your EyeLink 1000. This application allows the user to manage multiple Operating Systems on one computer.

1. Boot into Windows as normal. Insert the “EyeLink 1000 Software” CD into your CD drive.
2. Access the CD-ROM contents by double-clicking on “My Computer” and selecting the CD-ROM drive. Open the ‘Host PC Installation\Utilities’ folder and run the SystemCommander811.exe file to install the System Commander software.
3. Click the INSTALL button on the opening screen and follow the instructions to install the System Commander software. The license number will be on the front

of the EyeLink 1000 Software CD case – enter it when you see the screen illustrated in Figure 11-1. You are only licensed for 1 copy of this software for use on the EyeLink 1000 Host PC. The installer will prompt you to create ‘Rescue Disks’, to register, to check for updates from the web, etc. None of these steps is critical, so they may be skipped.

4. After installation, run the System Commander program by going to the Windows “Start Menu” and selecting the “System Commander” entry.
5. A “Utility Wizard” dialog box will automatically be displayed (see Figure 11-2) select the “Enable System Commander” entry, click on “Next”, exit the System Commander program and restart the computer, booting from the System Commander Boot CD supplied.

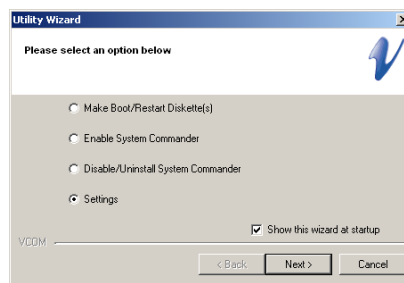


Figure 11-2: Enable System Commander

11.2 Resize Existing Disk Partition

The next step is to resize the existing partition to make space for a 5GB EyeLink Host Application partition.

Insert the supplied “System Commander Boot CD” into the CD drive and restart the computer, booting from the CD. You may need to configure your BIOS boot order so that the CD is first in the Boot Priority. On Dell PCs, Press F12 to get the Boot Menu and the select Internal CD as the boot device.

Once you have booted from the CD, select “Partition Commander or Restart”, and then select ‘Manual Partitioning’ as illustrated in Figure 11-3.

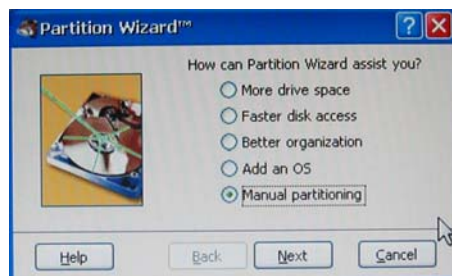


Figure 11-3: Select Partitioning then Manual Partitioning

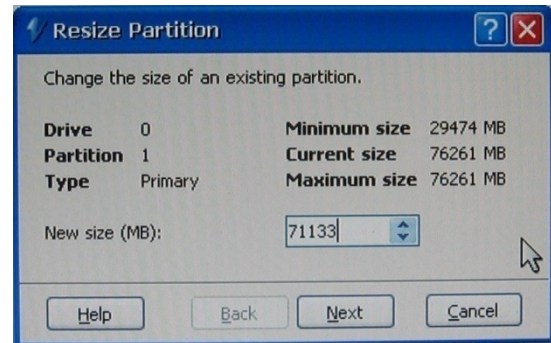
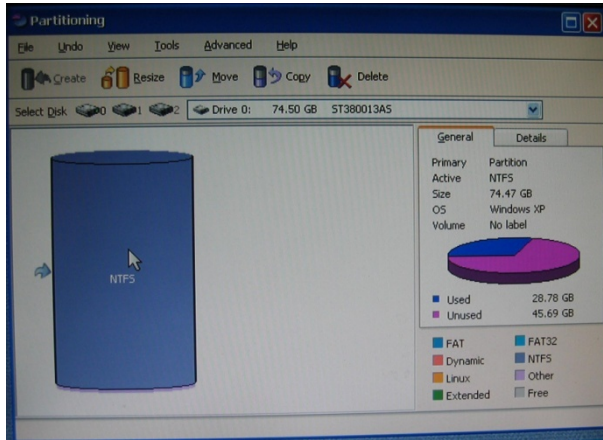


Figure 11-4: Partition Selection and Resizing

1. From the 'Partitioning' window (left side of Figure 11-4) select the disk and the partition to resize. In System Commander, each disk is represented as a cylinder. Within these cylinders are differently colored partitions. The partition (typically, this will be in the primary disk) that should be resized to make a new partition will normally be the largest chunk within the selected disk. Highlight this partition as illustrated in left, and then click on the "Resize" icon.
2. In the "New size (MB)" field of the Resize Partition dialog box (Figure 11-4 right), enter a value that is 5120MB less than the indicated 'Current Size'. For example, if the original disk size is 76253 MB, you should put 71133 MB in the new size field.
3. Press 'Next' to do the resizing of the drive. System Commander may adjust the partition size you entered slightly. This is expected and is not an issue.

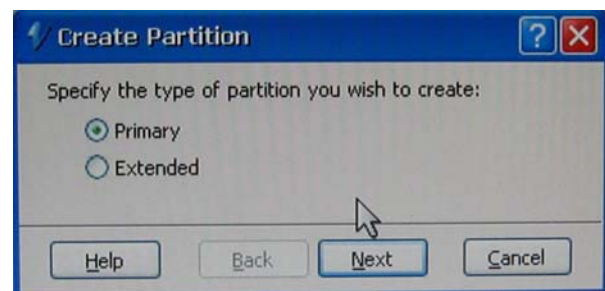
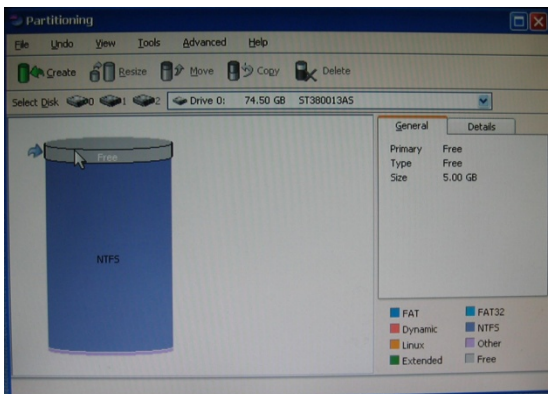


Figure 11-5: Partition and Partition Type Selection

11.3 Create the EyeLink 1000 Host Application partition

1. From the 'Partitioning' window select the newly formed 'Free' space (highlighted in gray) which will appear on the top of the cylindrical drive diagram as illustrated in the left side of Figure 11-5. Click the 'Create' icon which will bring up the 'Create Partition' window.
2. Select 'Primary' and click 'Next' which will bring up the 'Create Primary Partition' window as illustrated in the left side of Figure 11-6. In the 'Volume label' field type EYELINK and **ensure that the 'Custom Partition Type' box is checked.** Click 'Next' to bring up the 'Custom Partition Type' window as illustrated in Figure 11-6, right, and select 'FAT-32' then click 'Next'. In the following 'Warning!' window, click 'Proceed'.

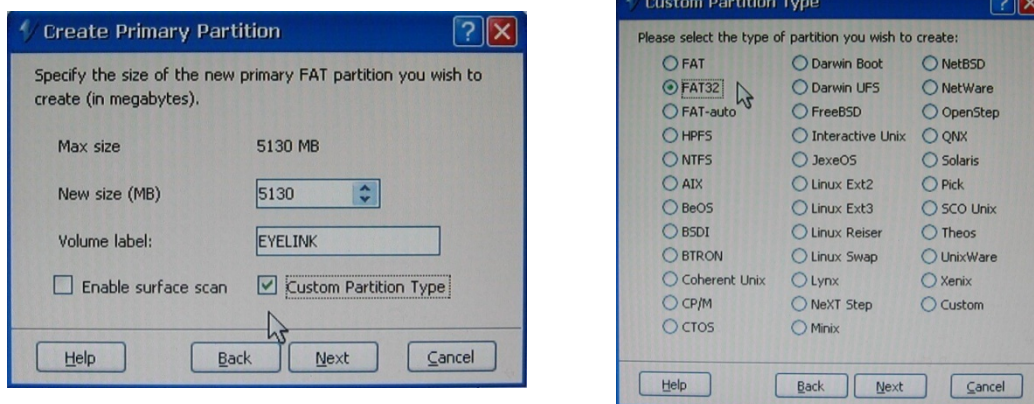


Figure 11-6: Create a Custom FAT 32 Partition

3. Close the 'Partitioning' window by selecting the red "X" in the top right corner of the window and exit System Commander by clicking "Start" at the bottom-left corner of the screen selecting the "Exit" option. Eject the CD before the computer reboots.
4. Upon restart the computer will once again run the System Commander application. The new EyeLink partition will appear as the icon with two question marks and will be labeled 'FAT-32 OS' as illustrated in Figure 11-8. We will return to deal with this later. For now, we wish to boot into Windows once again.
5. Select the Windows XP partition. **Windows XP should immediately determine that the disk partitioning has changed and perform a number of system tests to validate the hard drive. This is expected and should not be interrupted.**
6. Windows will reboot once its validation checks have been performed. From the System commander menu select Windows XP a second time and boot into the Windows operating system.

11.4 Copy the Host Application files to the New Partition

The next required step is to copy the Host PC application files from the supplied “EyeLink 1000 Software” CD onto the newly created EyeLink partition.

1. From Windows, start Windows Explorer. If you have removed the “EyeLink 1000 Software” CD from your CD drive, reinsert it. Navigate to the “Host PC Installation \ Host Partition” folder.
2. Copy all of the files in this folder to the top level of the newly created EyeLink FAT-32 drive (often E:\). The EyeLink CD has copy of all the files required for the Host partition, including a required camera-specific .SCD file. Hence the CD is required, and it is a good idea to keep the EyeLink 1000 Installation CD in a safe place.

In some cases, Windows may hide certain operating system files (i.e., files ending in .INI or .BAT). If you do not see a .BAT file when you view the contents of the Host Partition folder, you can set Windows to ‘see’ these files using the following steps:

- i. Select the Tools → Folder Options... menu in Windows Explorer.
- ii. Select the View tab.
- iii. Select the “Show hidden files and folders” option under Hidden files and folders.
- iv. Ensure “Hide extensions for known file types” is not selected.
- v. Uncheck the “Hide protected Operating system files....” as illustrated in Figure 11-7.

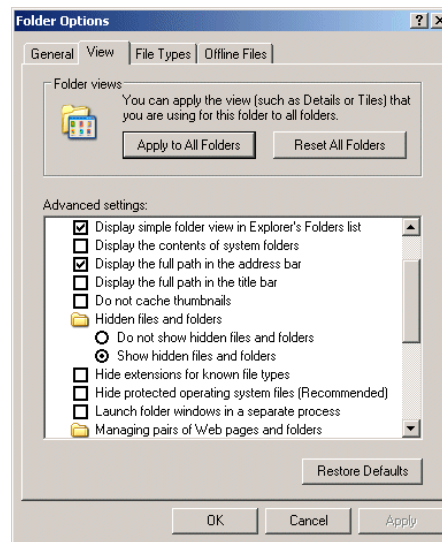


Figure 11-7: Windows Explorer Tools Folder Options Dialog

- vi. Press OK.
 - vii. Select all files in the “Host Partition” folder of the CD.
 - viii. Copy these files to the root directory of the EyeLink 1000 drive on your computer.
3. To return Windows so that it hides operating system files complete the following steps:
 - i. Select the Tools → Folder Options... menu in Windows Explorer.
 - ii. Select the View tab.
 - iii. Deselect the “Show hidden files and folders” option under Hidden files and folders.
 - iv. Check the “Hide protected Operating system files....”
 4. If you have a PS/2 keyboard please continue to section “11.6, Transfer the System to make the EyeLink Partition Bootable”

11.5 Configuring the Keyboard

The PS/2 keyboard is the default driver setup within the EyeLink Host directory, and is the only keyboard hardware recommended for the latest versions of the Host Application.

11.6 Transfer the System to make the EyeLink Partition Bootable

1. Insert the CD labeled “ROM-DOS Boot Disk” that came with the EyeLink 1000 system, and restart the system as you normally would via Windows. The next step is to boot off of the CD. You may need to press F12 before System Commander is run to boot off of the CD-ROM device. With some newer types of hardware choosing to boot from the CD-ROM from within System Commander does not work as desired.
2. You will know that you have successfully booted from the CD-ROM if you are given a ROM-DOS command prompt.

IMPORTANT: The following step requires you to determine the correct drive letter (c:, d:, etc) for the EyeLink 1000 partition you created above after booting with the ROM-DOS Boot Disk. Determine this by using the `dir` command (e.g. `dir c:`) for each drive to find the EyeLink drive label and substitute that drive letter (c:, d:, etc) in place of {EYELINK DRIVE} below. It is likely that the drive letter will be either c: or d:

3. At the command prompt 'A:\>' type the following command:

```
sys {EYELINK DRIVE} [ENTER]
```

For example if your EyeLink partition is drive c: you will enter:

```
sys c:
```

and then press the enter key.

4. Reboot the computer. Once System Commander runs, you should see something like the screen pictured in Figure 11-8 with ?? and FAT-32 describing the EyeLink Host partition.



Figure 11-8: Select Partition to Rename

11.7 Organize System Commander's 'OS Selection Menu'

1. When System Commander starts up, you will see a screen similar to Figure 11-8. Click on the 'Settings' icon.
2. From the 'Settings' window, select 'Descriptions and Icons' as illustrated in the left side of Figure 11-9.
3. From the screen in the right side of Figure 11-9, click on the arrow buttons of the 'Current Selection' box to select the 'FAT-32 OS'. In the 'EDIT DESCRIPTION' box type *EyeLink*. Under 'SELECT ICONS', use the '+' and '-' buttons to change both large and small icons to 'OS'.
4. Click 'OK' to finish. Then from the 'Settings' window, select 'Order Add and Remove' as illustrated in Figure 11-10.
5. From the 'Order Add and Remove' window, remove all icons except for the Windows XP and EyeLink by highlighting each one and clicking the 'Remove' button as in the right side of Figure 11-10.
6. Highlight the EyeLink OS and click the 'Top' button to make EyeLink the default partition.
7. Click 'OK' to finish and close the 'Order and Remove' window.



Figure 11-9: Select Description and Icons



Figure 11-10: Order Add and Remove

11.8 Automated boot into the EyeLink 1000 Operating System

1. If you would like System Commander to automatically boot into the EyeLink partition, click on 'Timeouts and default OS' from the 'Settings' window.
2. Check the box beside 'Auto-select timeout' and set the number of seconds for System Commander to wait before booting the default operating system. Indicate the default OS in the 'Default OS selection'. If you followed the earlier instruction, EyeLink will be the first OS and can be selected by choosing 'A'.
3. Once you have completed this step, close the windows by clicking the X in the top right corner. You will be returned to the main System Commander window and are now ready to test the installation.

12. Appendix C: Host PC Software Installation Under Windows Vista

Please follow the instructions here to install the Host software in conjunction with Windows Vista.

IMPORTANT: Before proceeding with the EyeLink 1000 Host software installation ensure you have backed up all important data on your Host PC.

A new Windows Vista installation is required and this WILL erase everything on the hard drive. We do not have the ability to separately create the Host partition with an already existing Vista installation.

WARNING: ALL DATA ON THE DISK WILL BE ERASED

Due to the nature of Windows Vista's boot loader, a full installation of Windows Vista must be performed. This means that the hard drive will be formatted and any information on the hard drive will be erased.

We will first format the hard drive using ROM-DOS and create a FAT32 partition for the EyeLink Host software. Next, Windows Vista will be installed on the unused portion of the drive. Finally, under Vista, we will configure the boot loader so that the system can be booted into either ROM-DOS or Windows Vista.

You will require:

- a ROM-DOS Boot CD (supplied with your EyeLink or disk image available via support@sr-research.com)
- a copy of your EyeLink 1000 CD-ROM (or "EyeLink CL" CD-ROM) containing the Host PC application software and your .SCD file (supplied with your EyeLink)
- a copy of your Vista installation disk and Vista License

12.1 Formatting the Hard Drive under ROM-DOS

The first step in preparing your Host PC for the EyeLink 1000 and Vista is to format your hard drive using the ROM-DOS operating system, and creating a partition for the EyeLink Host software.

1. Boot the computer with the ROM-DOS Boot CD. If you are using a Dell computer, place the CD in the CD-ROM drive and press F12 for booting options, and boot from the Internal or USB CD-ROM drive. For other motherboards and systems, you may need to enter the BIOS and change the Boot Priority of the different drive components, in order to make the CD-ROM have the highest boot priority.
2. At the command line prompt type "FDISK" without quotes.
3. While running FDISK:
 - i. type 'A' and delete all partitions

- ii. type 'M' and write the Master Boot Record
 - iii. Create a DOS partition that is about 10 GB
 - iv. Save and exit
4. Reboot the computer with the ROM-DOS CD.
 5. At the command line prompt type "FORMAT C:" to format the disk, and label the disk "EyeLink" if asked.
 6. At the command line prompt type "SYS C:" to install the ROM-DOS system files and make the partition bootable.
 7. Eject the CD from the CD-ROM drive and reboot the computer. If all goes well, the system should boot from the hard disk and present a ROM-DOS command line prompt.

The next step is to install Windows Vista on the remainder of the hard drive, and then to configure the Boot Loader so that Vista will give the option to boot from the ROM-DOS partition or Vista when you start your computer. We will also copy the Host PC directory and software to the EyeLink partition.

8. Reboot the computer from the Vista install DVD.
9. Install Vista on the second partition or if no second partition is shown, on the remainder of the drive.
10. Enter User Names and Passwords as desired and once the Vista installation is complete, reboot into the Vista operating system.
11. Go to the Start / All Programs -> Accessories -> Cmd.exe menu and right click on the Cmd.exe icon and select the "Run as Administrator" contextual menu item. Issue the following commands from the command prompt:
 - i. `bcdedit /copy {legacy} /d "EyeLink"`

This will return a "<GUID>" – a string of characters that looks something like {xxxxxxxxxxxxxxxxxxxxx...xxxx}. Select all of the text in the CMD window and copy it to the clipboard by going to the Edit menu and selecting "Copy" – open Notepad in Windows which is a simple text editor located at Start /All Programs -> Accessories -> Notepad, and paste the text from CMD into the empty document. You can now highlight and copy just the <GUID> text so that it can be easily pasted in the following steps, wherever <GUID> appears.

- ii. `bcdedit /set <GUID> device partition=D:`
- iii. `bcdedit /set <GUID> path \bootsect.bak`
- iv. `bcdedit /displayorder <GUID> /addfirst`
- v. `bcdedit /default <guid>`

12. Reboot the computer and select "Eyelink" on the menu to go into the EyeLink partition or select Windows Vista to boot into Vista. You can now copy the EyeLink Host Partition files from your EyeLink 1000 (or EyeLink CL) distribution disk to put the host software on the EyeLink partition. See Section 11.4 "Copy the Host Application files to the New Partition" for instructions.