EyeLink® Installation Guide

For EyeLink models:

EyeLink 1000
EyeLink 2000
EyeLink Remote

Version 1.3.0

Read instructions before use.

US

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Certified

Entela Safety Mark: Compliance of this product with UL 60950 3rd Edition, CSA C22.2 No 60950-00-CAN/CSA is certified by Entela, an independent testing body.

CLASS 1 LED DEVICE

IEC 60825-1 (Ed. 1.2:2001)

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CONTACT ADDRESS

1. Introduction

This document provides hardware and software installation instructions for the EyeLink 1000 and EyeLink 2000 system using either the Tower or Desktop mounts, and the EyeLink Remote. For the simplicity of presentation, these eye trackers are collectively referred to as the EyeLink 1000 throughout this document, with important exception noted where necessary.

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

The basic steps in installing the EyeLink 1000 system are:

1) Unpack and Install the EyeLink 1000 Hardware. This includes connecting the Host PC to the Display PC via an Ethernet link.

2) Install necessary Operating System and EyeLink 1000 Host Application software on the PC your have selected to act as your Host PC.

3) Install the EyeLink 1000 Windows Software (API and example experiments) on the Display PC.

4) Test the installation.

The installation process will take about 2 hours, so try and do it when you have 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 at:

http://www.sr-research.com/contact.php

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. We will ensure that a technical representative is available to speak on the phone with you if required during your installation if you inform us of your 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 equipment,

check the arrangement of the room to be used against these suggestions. These will aid in the production of good experimental data.

- Set up the host and display monitors and PCs on tables arranged in an 'L' shape, as in Figure 1-1. This configuration allows the experimenter to adjust the eye tracker device and set up the subject for the experiment while having access to both computer keyboards and monitors.
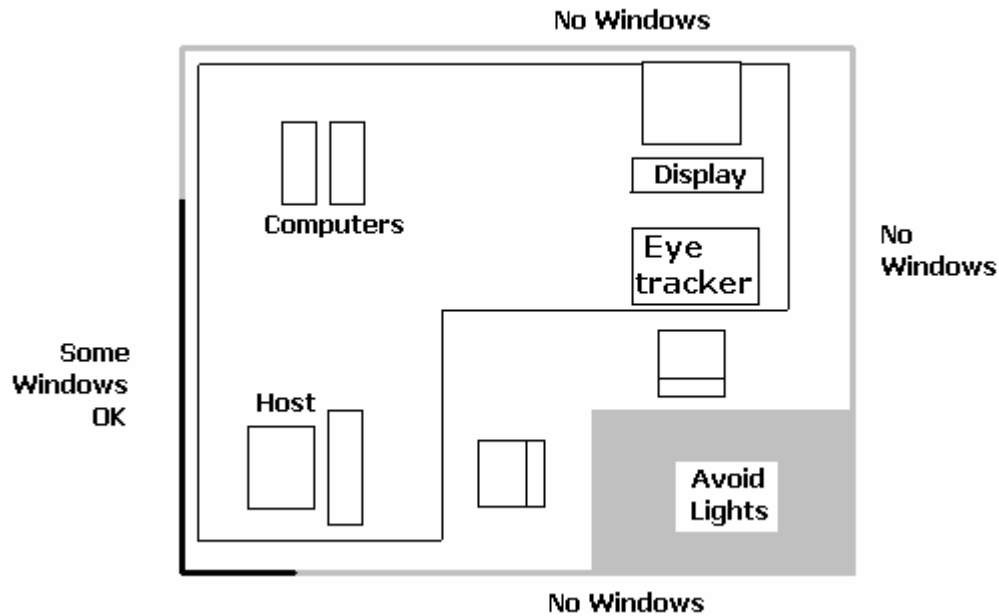
Figure 1-1 Suggested EyeLink 1000 System Layout

- If you are using the chinrest that comes with the eye tracker, please make sure you have a table available to mount the table clamp. 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. Please also ensure that the table is 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.

- 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 2 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 posters or other items are on the wall seen by the participant, and so on. It is also a good idea to make sure 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.

- Set up the Display PC monitor and chair so that the participant's eyes will be at a distance from the monitor of about twice the width of the display area of the Display monitor. This distance gives a display area of 28° by 22°. This is the ideal distance for both calibration accuracy and tracking range. This standard distance is assumed in all EyeLink 1000 documentation.

1.2 Pre-installation Checklist

Ensure that you have the following resources available before you start installation. These items have all been provided with your EyeLink 1000 system shipment:

1. EyeLink 1000 head support hardware (including IR mirror, built in IR illuminator, and chinrest tower)

   Or EyeLink 1000 Desktop Mount (including desktop stand, an integrated IR illuminator, and optional chin rest and forehead rest).

   Or EyeLink Remote (including desktop stand, an integrated IR illuminator, and a roll/sheet of targets).

2. EyeLink CL High Speed Infrared Camera

3. CameraLink frame grabber – PCI card

4. DLINK DFE538-TX Ethernet PCI card

5. Power supply for the EyeLink CL High Speed Infrared Camera.

6. CameraLink cable to connect EyeLink CL camera to PCI frame grabber card.

7. Ethernet cable to connect Host and Display PC together.

8. "EyeLink 1000 Software" CD. Please note that each EyeLink 1000 system loads a camera-specific .SCD file and therefore, you should use the EyeLink 1000 Installation CD that comes with your system.

9. One ROMDOS Boot floppy disk or CD labeled "ROMDOS Boot Disk / CD"

10. One System Commander Boot floppy disk or CD labeled "System Commander Boot CD"

11. USB Button Box to be attached to the host computer and USB extension cord.

You will also need the following components that may not have been provided with your EyeLink 1000 base system:

1. A Host PC that meets the minimum required specifications. These specifications are listed in section 2.1.1. The Host PC may have been purchased with your base system.

2. A Display PC that meets the minimum required specifications. These specifications are listed in section 2.1.2.

3. Any tools required for accessing your Host PC's case (usually a Phillips screwdriver will do).

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

1. Full length PCI Analog card

2. Analog breakout board

3. Cable to connect analog PCI card to breakout board.

2. Suggested Computer Specifications

2.1.1 Host PC

The PC that will host the EyeLink 1000 card must meet certain requirements. Please contact SR Research Ltd. for currently recommended computer systems.

- Pentium 4 2.8 GHz or faster CPU with full SSE3 instruction set support
- 80 GB hard disk with 7,200 rpm
- 128 MB Video card supporting 800 × 600 resolution, 256 color mode using the VESA 2.0 BIOS.
- A CD-ROM writer for software installation and data backup.
- 512 MB RAM
- 3.5 inch 1.44MB Floppy Drive (optional)
- At least two free PCI slots for two half-length PCI cards (3 free slots needed if using analog card option)
- Minimum 160 W power supply (200 W recommended), capable of supplying at least 0.2 A on the −12 V output. See the Specifications for the full power requirements of the EyeLink 1000 system.
- A PS/2 or USB mouse or other pointing device
- A PS/2 keyboard is suggested; a USB keyboard will work.
- Optional USB port for button box (UHCI-compatible only)
- Optional operating system: Windows2000/XP for use in data backup, maintenance and data analysis.
- Optional secondary Ethernet card for use on local network (the EyeLink 1000 system is provided with a specific Ethernet card that must be used for any direct connection to the display PC).
- A computer monitor

2.1.2 Display PC

The specifications for the PC that will be used for system calibration and experiment presentation depend greatly on the type of experimental paradigms that the EyeLink 1000 will be used for. For example, gaze contingent paradigms generally require more computing power than simple cognitive paradigms because the computer display needs to be updates as quickly as possible. 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.

- > 2.0 GHz or faster processor (Pentium 4 or AMD).
- 80 GB hard disk with 7,200 rpm
- Video card supporting vertical refresh rates of 100 Hz
- A CD-ROM writer for software installation and data backup.
- At least 512 MB RAM (1 GB recommended)
- 32 bits Windows 2000 or 32 bits Windows XP (service pack 2).
- 19" or larger monitor that supports vertical refresh rates of >= 100Hz and horizontal refresh rates > 100 kHz.
- Ethernet card to connect Display PC to the EyeLink 1000 Host PC.
- Optional Ethernet card for use on local network (a separate network card should be used to connect to the EyeLink 1000 system)
- A keyboard and mouse or other pointing device.

3. Hardware Installation

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 CL 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!

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.

3.1 Unpacking

Open the shipping case. **If you are unpacking the large shipping box that contains the EyeLink 1000 Tower Mount, please be careful as it contains glass that may have been broken during shipping.** If the system has been stored or transported at a temperature below 10°C, allow all parts to warm to room temperature before proceeding.

IMPORTANT: Save the shipping case and all packing material for storage or in case the unit needs to be returned for repair.

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.

3.2 Host PC Hardware Installation

3.2.1 Setting Up the Host PC Computer and Monitor

Unpack your Host PC as per the instructions provided with the computer by the computer manufacturer and set up the computer at the desired location. This includes connecting the keyboard and mouse to the computer, as well as the power supply and monitor cables.

If your EyeLink 1000 system was supplied with the hardware preinstalled into a supplied Host PC, please skip to section 3.6 "Attaching EyeLink 1000 System Cabling"; otherwise please follow these next steps to set up your Host PC for use with the

EyeLink 1000 system. You will be required to access the computer chassis to install two or three PCI cards so put the computer case in a position where you can easily access the computer's PCI slots.

> **IMPORTANT: Ensure the computers power cable is disconnected before opening the computer chassis to install any PCI card.**
>
> **IMPORTANT: Handle the cards only by their edges.**

3.2.2 Installing the Phoenix High Speed Frame Grabber - PCI card

Open the EyeLink 1000 host PC, and insert the Phoenix High Speed Frame Grabber card into a free PCI slot. Ensure the card's bracket is firmly attached to the PC.
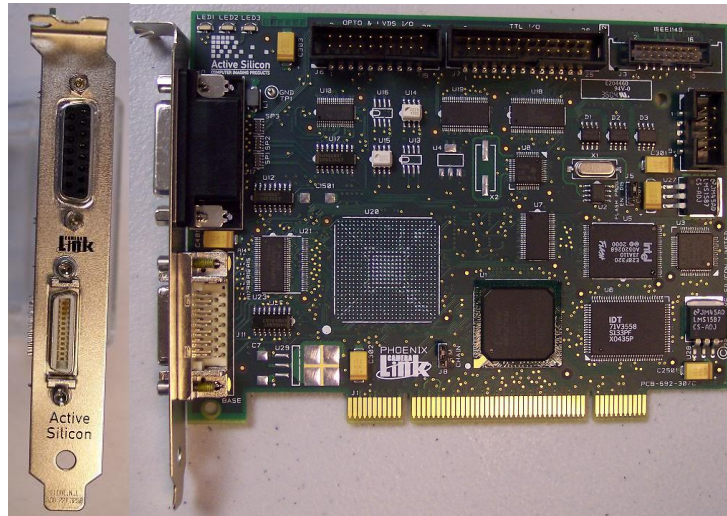
Figure 3-1 Phoenix High Speed Frame Grabber

3.2.3 Installing the DLINK DFE-538TX Ethernet Card

Insert the DLINK DFE-538TX Ethernet Card into a free PCI 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.
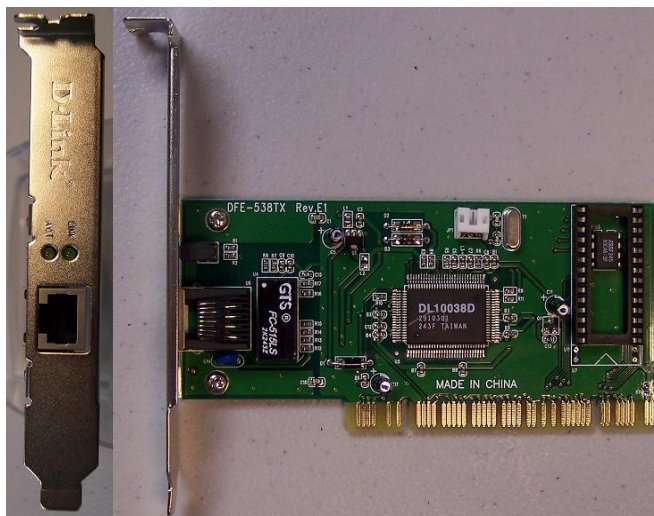
Figure 3-2 Ethernet Card

3.2.4 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.
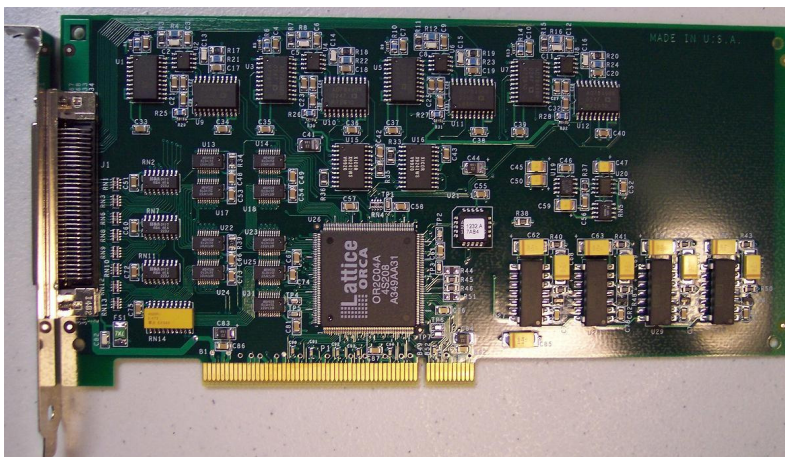
Figure 3-3 Analog Card

3.3 Display PC Hardware Installation

Unpack your Display PC as per the instructions provided with the computer by the computer manufacturer and set up the computer at the desired location of the Display

PC. This includes connecting the keyboard and mouse to the computer, as well as the power supply and monitor cables.

> **If you are setting up the EyeLink 1000 Tower Mount, please continue with section 3.4 "EyeLink 1000 Head Support Tower and Camera Installation", otherwise, please read section 3.5 "EyeLink 1000 Desktop and EyeLink Remote Installation".**

3.4 EyeLink 1000 Head Support Tower and Camera Installation

Please follow the steps below to mount the EyeLink 1000 head-supported tower onto the table and to install the camera. The following picture illustrates parts on the EyeLink 1000 tower that might be adjusted.
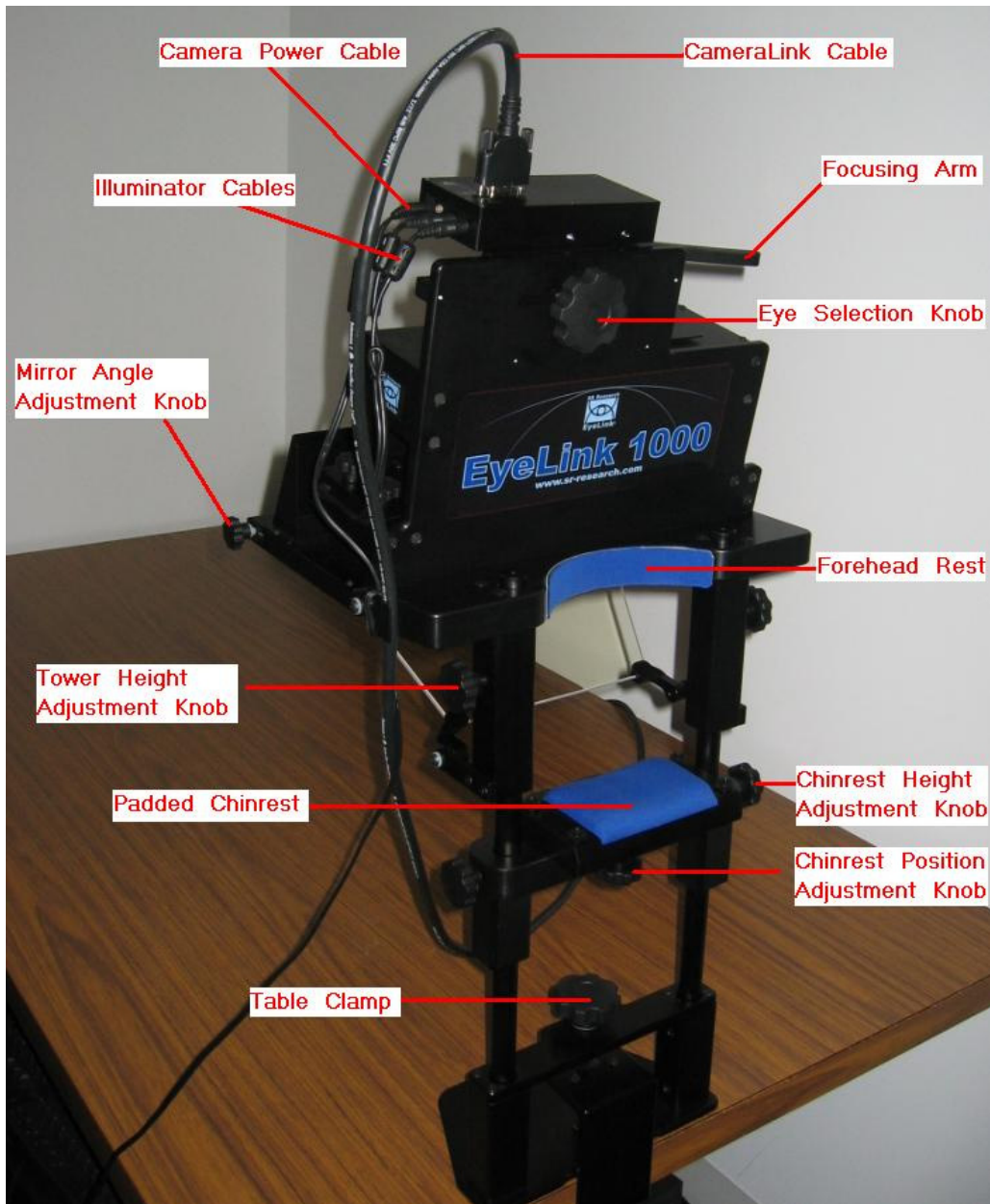
Figure 3-4 Components of EyeLink 1000 Tower

3.4.1 Mounting Head Support Tower To 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 you 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 3-5 Clamping to Table

Loosen the table clamp by turning the knob counterclockwise, place the table clamp fully onto the table, and then tighten it clockwise (see Figure 3-5). Check that it is firmly secured by gently attempting to rock the table clamp base free. If the table clamp base wobbles you shall have to proceed to tighten it further.

Figure 3-6 Camera Mounting Placed onto Tower Poles

The camera mounting is quite heavy and cumbersome to move, it is recommended that for safety two people handle the moving of this part of the equipment setup. One person should support the weight of the camera mounting while the other lines the posts up with the holes and handles the clamps. Gently pick up the camera mounting with the mirror facing away from you. It is recommended that you hold the camera mounting near the tower height adjustment knobs as shown in Figure 3-6. Be careful not to scratch or touch the mirror. Now line the mounting up with the vertical posts and gently lower it into position. The camera mounting should rest about ½ inch into the hole.

Figure 3-7 Tower Height Adjustment

Once the Tower Mount is placed onto the tower poles you will need to adjust its height by pulling simultaneously the tower height adjustment knobs away from the poles on both the left and right hand side (see Figure 3-7). Be careful as you shall still have to support the weight of the camera mounting unit. Make sure that the camera mounting does not fall down the poles. If at any point the camera mounting unit does begin to fall, if you release the tower height adjustment knob it should automatically click and lock into place, preventing the tower from falling further.
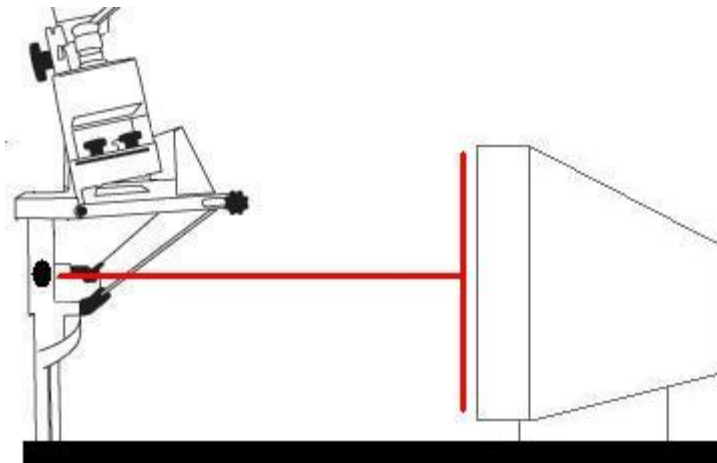
Figure 3-8 Adjust Height of Tower to Half the Screen Area of Monitor

Gently lower or raise the camera mounting unit by pulling to release the height adjustment knobs, until the same tower height adjustment knobs are in line with the center of the display monitor (see Figure 3-8). 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 just adjust the heights of the chair and/or chin rest on a participant to participant basis.

3.4.2 Mounting EyeLink CL High Speed Camera

The 25 mm lens should be used on the EyeLink 1000 Tower Mount. Hold the camera with the lens facing downwards and the focusing arm 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 dusted or scratched!
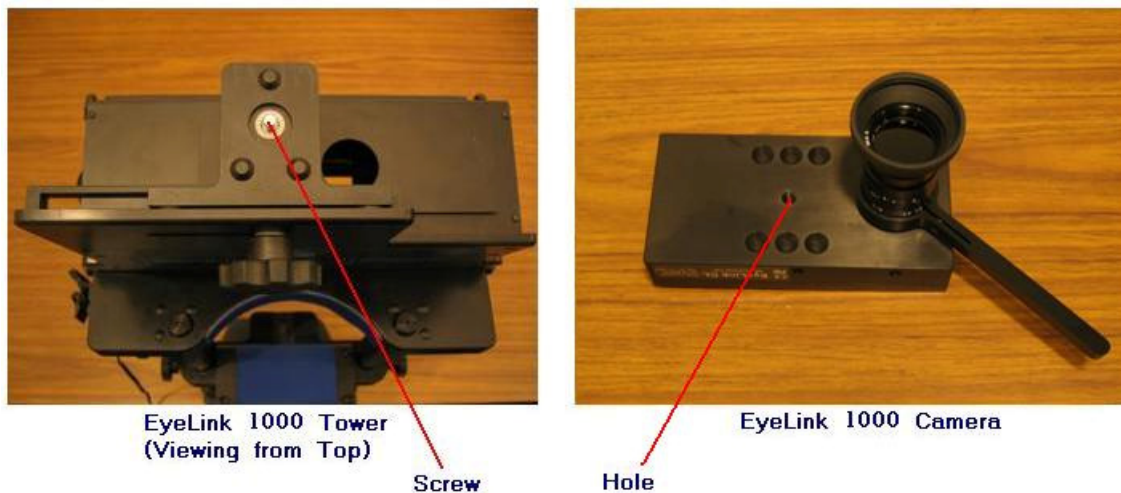
Figure 3-9 Views of the EyeLink 1000 Tower and Camera
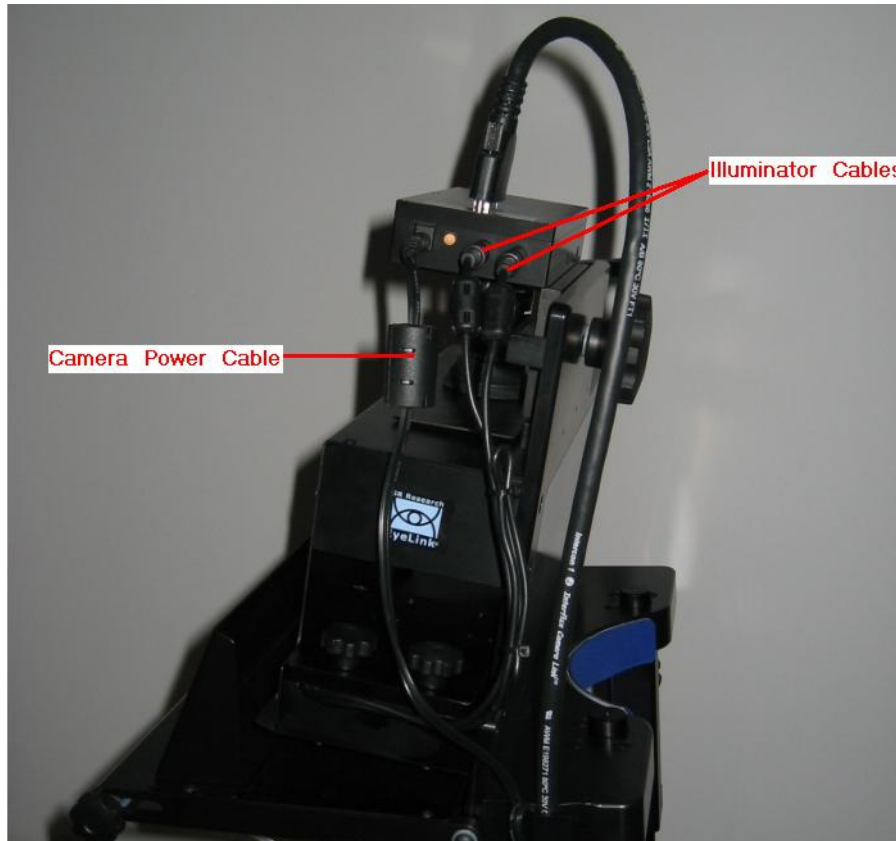
***Figure 3-10 Camera and Illuminator Cables on EyeLink 1000
Tower***

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

3.4.3 Adjusting Head Rest Components

The height of the forehead rest and chinrest can be adjusted by loosening the knobs on
both sides of the tower, sliding the tower and chinrest to the desired position, and then
re-tightening 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 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. Please follow Section 5 "Final Installation Steps" to modify the PHYSICAL.INI file settings.

3.5 EyeLink 1000 Desktop Mount / EyeLink Remote Installation

Please follow the steps below to set up the EyeLink 1000 Desktop Mount. Figure 3-11 illustrates parts on the EyeLink 1000 Desktop Mount might be adjusted.

Figure 3-11 EyeLink 1000 Desktop Mount Components

3.5.1 Mounting EyeLink 1000 High Speed Camera

The EyeLink 1000 Desktop Mount can be configured to track eye movements up to 2000 Hz monocularly or 1000 Hz binocularly. The angle of the high-speed camera and the position of the camera screw should be adjusted differently depending on the

mount type you plan to use. Each mount type also require different camera lens (see table 1).

	Tower Mount	Desktop Mount – Camera Level	Desktop Mount – Camera Angled	EyeLink Remote – Camera Level
16 mm (Short Focus Arm)	No	No	No	Yes
25 mm (Long Focus Arm)	Yes	Possible – closer distance suggested	Yes	No
35 mm (No Focus Arm)	No	Yes	Possible – further distance suggested	No

Table 1. Recommended Lens for Each Mount Type.
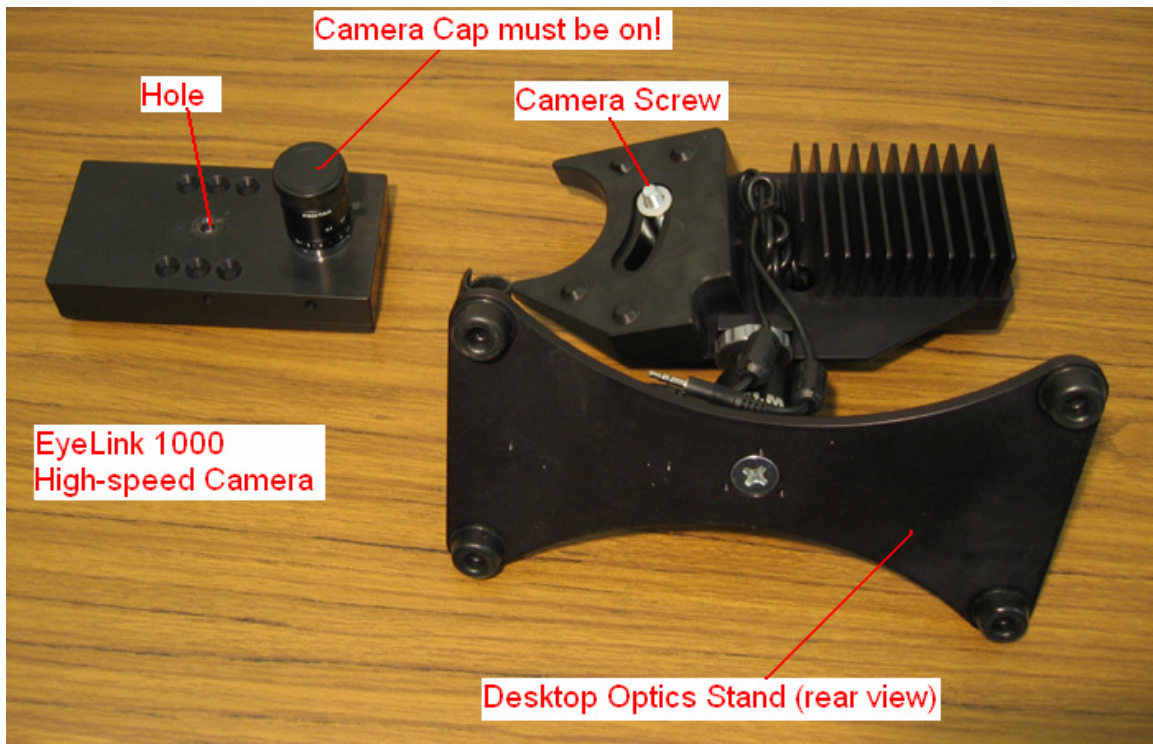
Figure 3-12 EyeLink 1000 Desktop Mount Stand and Camera

Follow the steps below to mount the high-speed camera for monocular tracking or EyeLink Remote (see Figure 3-13):

1. Place the Desktop Mount on the table. Please leave the camera lens cap on to ensure the lens is not dusted or scratched!

2. Move the camera screw to the top end of the slot.

3. Hold the camera with its elongation parallel to the table, align the hole on the camera to the camera screw on desktop stand, and then tighten the camera screw.
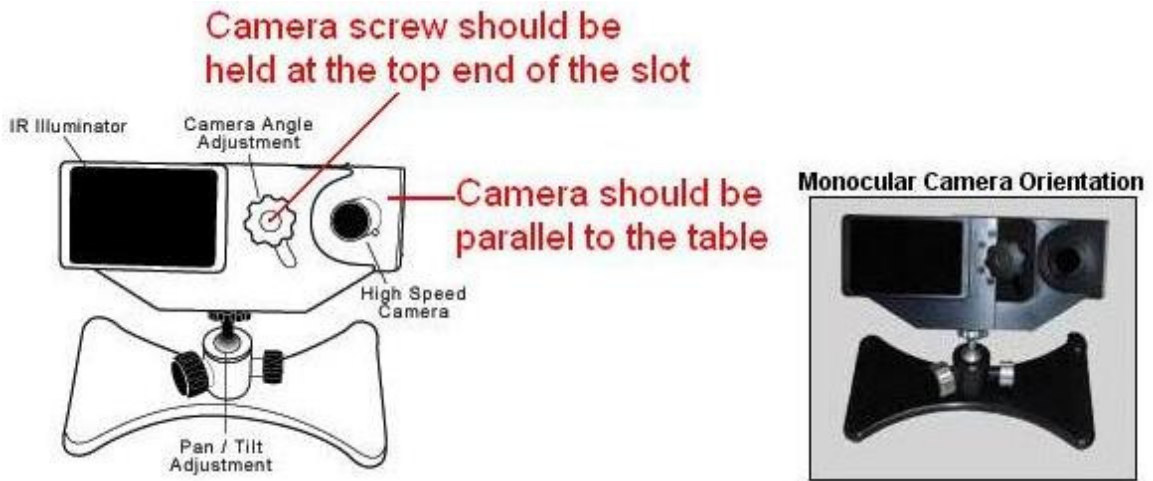
Figure 3-13 Camera Position and Angle for Desktop (Level)
and Remote (Level) Monocular Recording

Follow the steps below to mount the high-speed camera for binocular tracking (see Figure 3-14):

1. Place the Desktop Mount on the table. Please leave the camera lens cap on to ensure the lens is not dusted or scratched!

2. Move the camera screw to the bottom end of the slot.

3. Hold the camera with its elongation forming a 45-degree relative to the table, align the hole on the camera to the camera screw on desktop stand, and then tighten the camera screw.
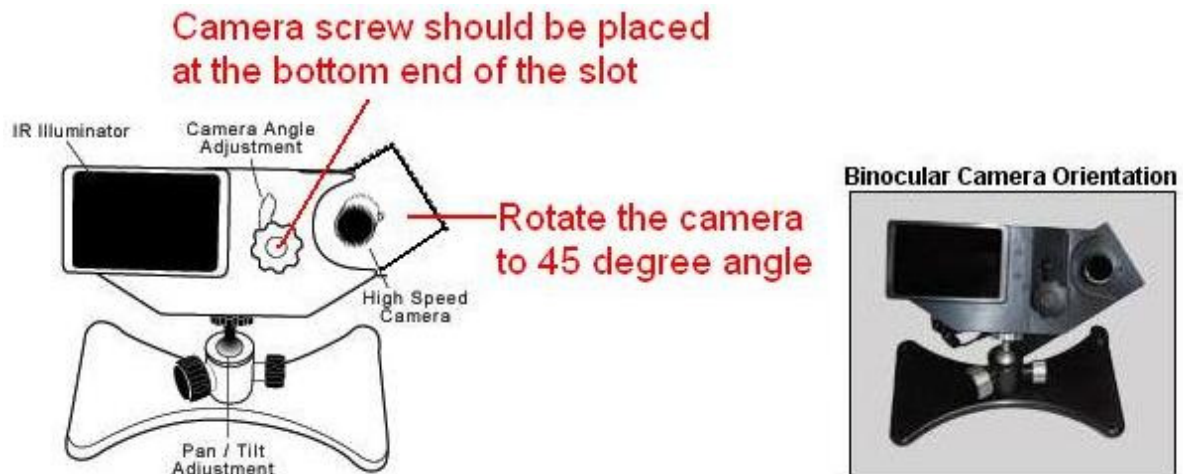
Figure 3-14 Desktop Mount Camera Position and Angle for Desktop (Angled)

After the camera is mounted onto the Desktop Mount, connect the EyeLink CL power supply that was provided with your system to the power connector on the left side of the camera (see Figure 3-15). Connect the two illuminator cables that come out of the Desktop Mount to the left side of the EyeLink CL high-speed camera.

Data Cable

Illuminator Cables

Camera Power Cable
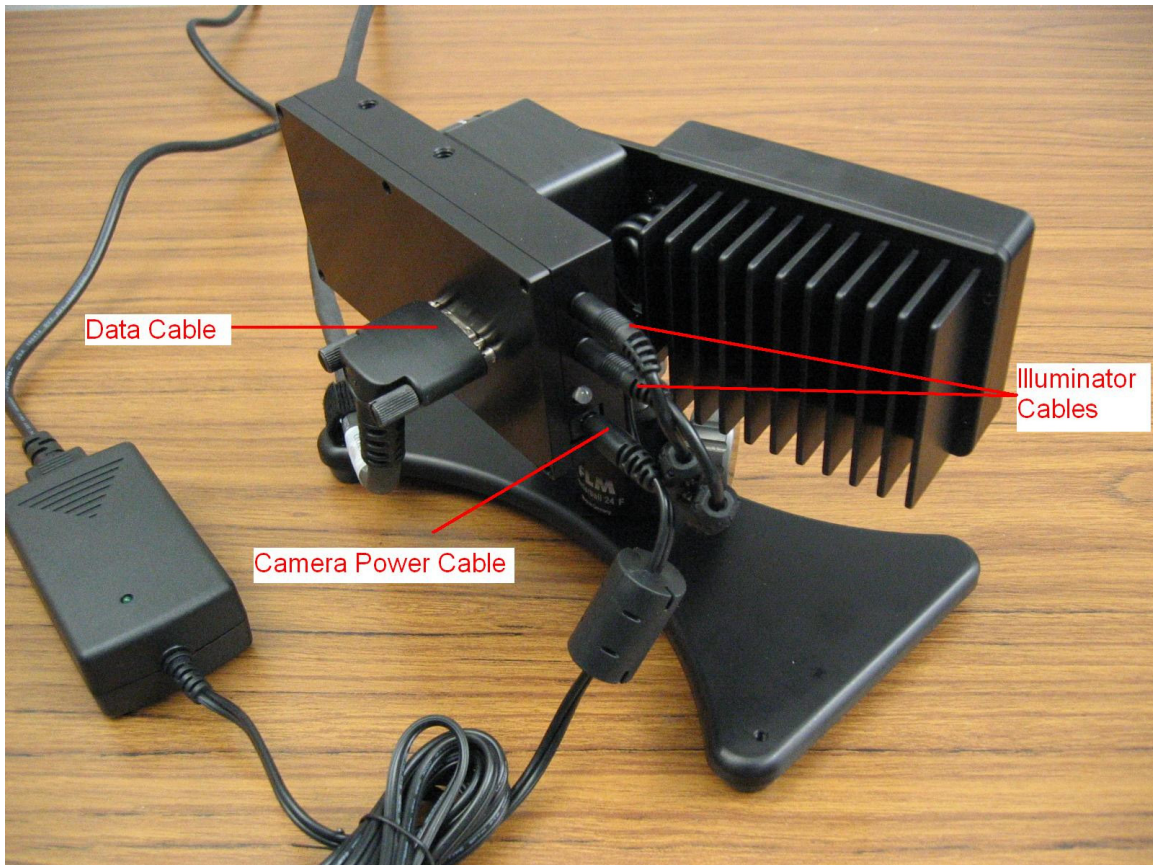
Figure 3-15 Camera and Illuminator Cables on EyeLink 1000 Desktop Mount

3.5.2 Adjusting EyeLink 1000 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 3-5). Check that it is firmly secured by gently attempting to rock the table clamp base free. If the table clamp base wobbles you shall have to proceed to tighten it further. Following this, mount the forehead rest to the chinrest and tighten the knobs.

Please check that the chinrest is horizontally centered on 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 5 "Final Installation Steps" to modify the PHYSICAL.INI file settings.

3.5.3 EyeLink Remote Hardware Adjustment

Place the monitor at a distance about 60-70 cm from the subject's eye. 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:\ELCL\EXE folder of the host computer. Please check out section "5. Final Installation Steps" of the EyeLink 1000 Installation Guide.

Check whether the camera is set to the horizontal position – the elongation of the camera should be parallel to the table (see section 3.5.1 "Mounting 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. For maximum 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 was designed to perform base on these assumptions. 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. if you cannot set up your experiment according the above recommendations.

3.6 Attaching EyeLink 1000 System Cabling

For system cabling, please follow the wiring diagram in Figure 3-16.
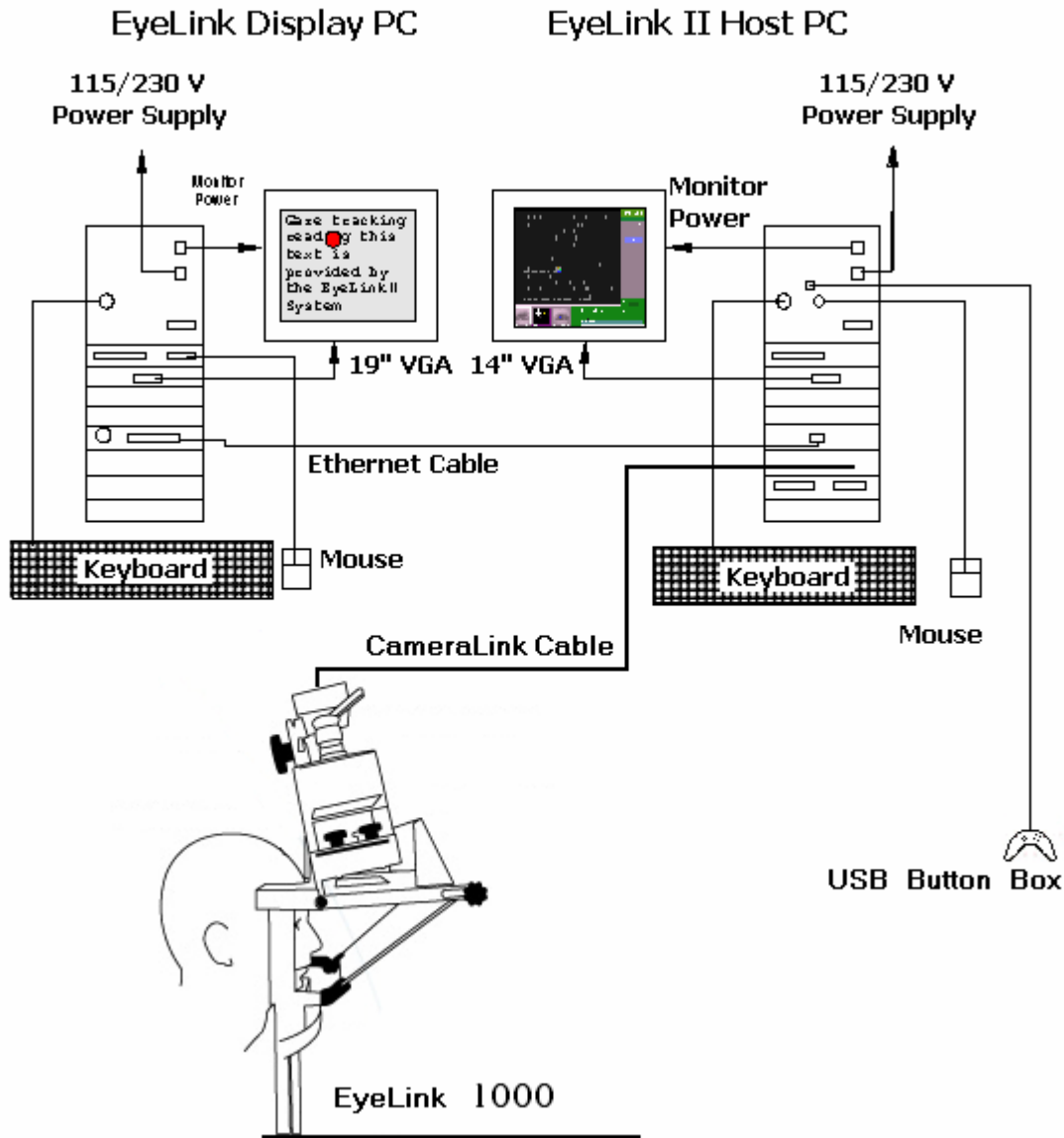
Figure 3-16 System Set-up and Cabling.

The basic cabling steps are:

1. If not already done, 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 DLINK Ethernet card port on the Host PC. 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.

3. Connect one end of the CameraLink Cable provided with your system to the Phoenix High Speed Frame Grabber card in the Host PC. Connect the other end of the cable to the top of the EyeLink CL high-speed camera. Ensure the cable is firmly attached at both ends, with the two thumb screws tightened to lock the cable in place. Please note that if you have purchased both the Tower Mount and Desktop Mount, you will receive two CameraLink cables. The cable that has a right angle connector should be used on the Desktop Mount.

4. Ensure that the two illuminator cables that come out of the head support tower or Desktop Mount have been connected to the left side of the EyeLink CL high-speed camera.

5. Connect the EyeLink CL power supply that was provided with your system to the power connector on the left side of the EyeLink CL camera. After the power supply has been connected to the camera, connect the power plug to a power surge protector.

Important: Do not use any other power supply with the EyeLink CL camera other than the one provided with your system.

6. Plug the supplied USB game pad into a USB port on the Host PC. Use the optional USB extender cable if the game pad needs to have a cord longer than one meter.

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

7. If an analog card was installed in your Host PC, connect one end of the supplied analog card cable to the analog card connector on the Host PC. Connect the other end of the cable to the analog breakout board that was provided with the Analog card option. Ensure the cable is firmly attached at both ends and that the thumb screws have been tightened to lock the cable in place.

4. Software Installation

Both the Host PC and Display PC need to be configured for use with the EyeLink 1000 system.

4.1 Host PC

4.1.1 Operating System Installation

The first step in preparing your Host PC for the EyeLink 1000 is to install the ROMDOS operating system that the EyeLink 1000 system runs on.

4.1.2 Installing on a Computer Running Windows 2000/XP.

The host PC runs the EyeLink eye tracker from the ROMDOS operating system. This allows you to perform subject setup, monitor performance, record data, and control experiments running on the subject 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 partition on your hard drive using System Commander that will host the ROMDOS 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.

4.1.2.1 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. Insert the "EyeLink 1000 Software" CD into your CD drive

2. 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 menu 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. You are only licensed for 1 copy of this software for use on the EyeLink 1000 Host PC.

Figure 4-1 License Code Entry

> **Important:**
>
> Create the System Commander rescue disks when prompted during installation. We have included 2 blank floppy disks with your system for this purpose.
>
> Do not register your System Commander. Your license is registered through SR Research Ltd.

4. Restart your computer, which will start the System Commander application.

5. There may be some information messages that appear, simply close them by clicking the 'X' in the top right corner.

4.1.2.2 Resize existing disk partition

Resize existing partition to make space for a 5GB EyeLink Host Application partition.

1. Insert the System Commander Boot CD into the Host PC CD Rom drive.

2. Either reboot your Host PC, or selected the "Boot from CD" icon in the System Commander 'OS Selection' window. **Note:** You may need to press F12 upon the computer restart to change the boot sequence.

3. Once the Host PC has rebooted using the System Commander Boot CD, click the 'Partitioning' button from the 'OS Selection' window and follow the instructions to the 'Partition Wizard' dialog box.

Figure 4-2 Creating Partition

4. Select 'Manual partitioning' and click 'Next' to bring up the 'Partitioning' window as illustrated in Figure 4-3.
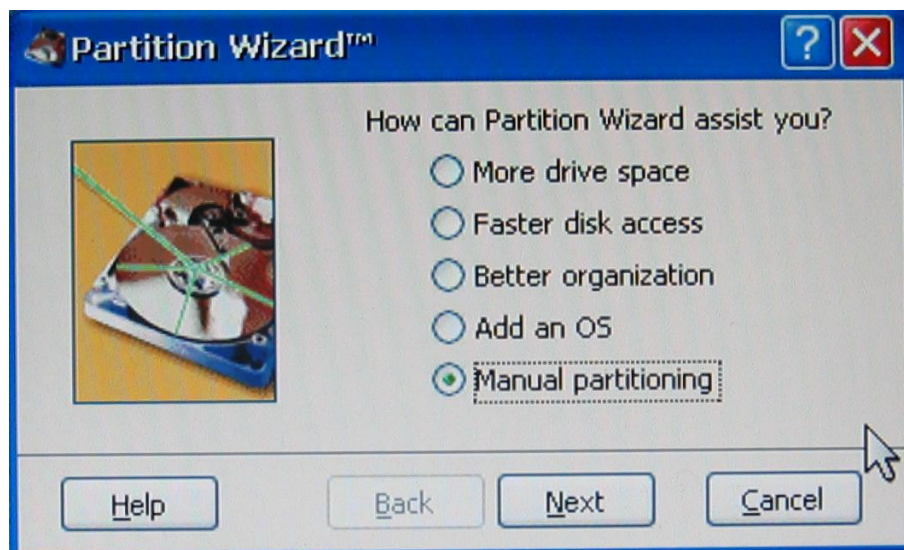
Figure 4-3 Manual Partitioning

5. From the 'Partitioning' window 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 Figure 4-4.
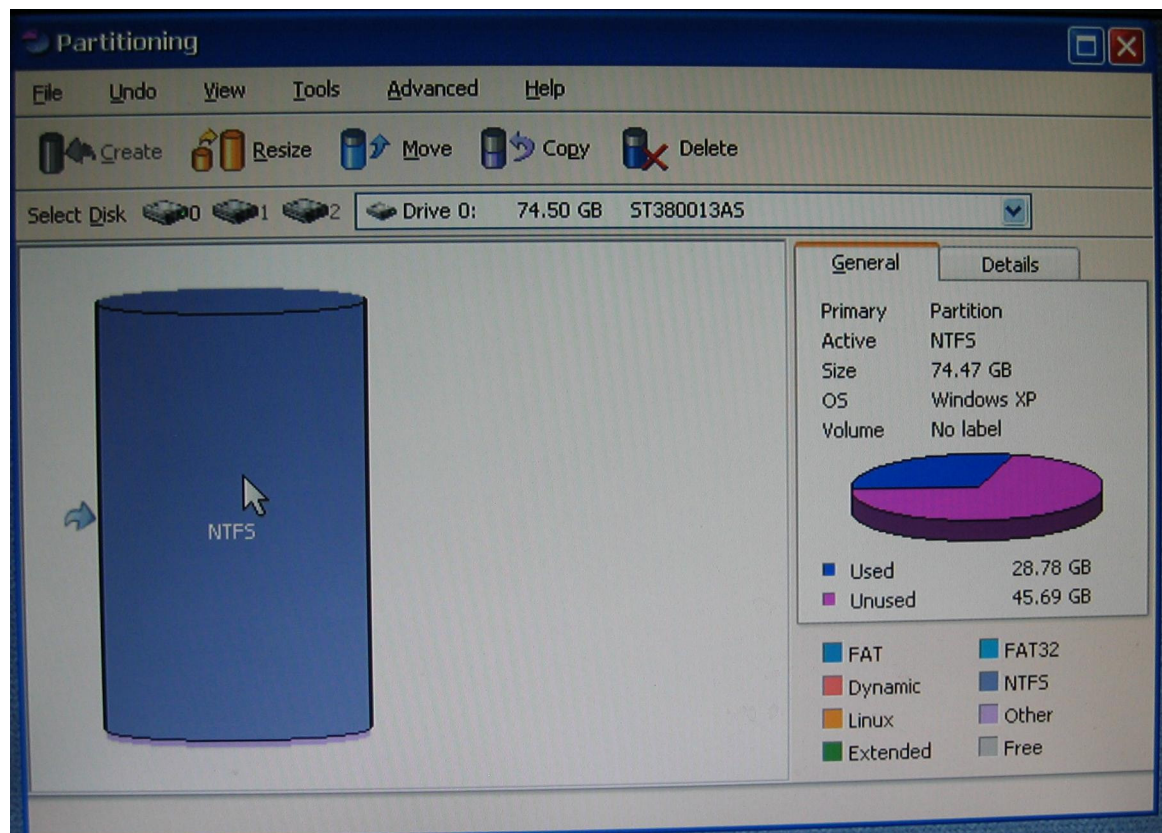
Figure 4-4 Partition Section

6. Click the 'Resize' button from the menu which will bring up a 'Resize Partition' window.

7. In the "New size (MB)" field, 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 (see Figure 4-5).
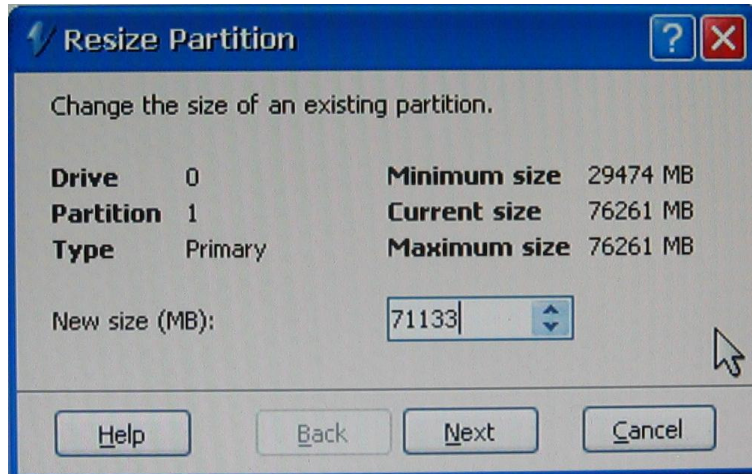
Figure 4-5 Resize Partition

8. Press 'Next' to do the resizing of the drive.

NOTE: System Commander will adjust the partition size you entered slightly. This is expected and is not an issue.

4.1.2.3 Create the EyeLink 1000 Host Application partition

1. From the 'Partitioning' window select the newly formed unpartitioned space (highlighted in gray) which will appear on the top of the cylindrical drive diagram as illustrated in Figure 4-6.
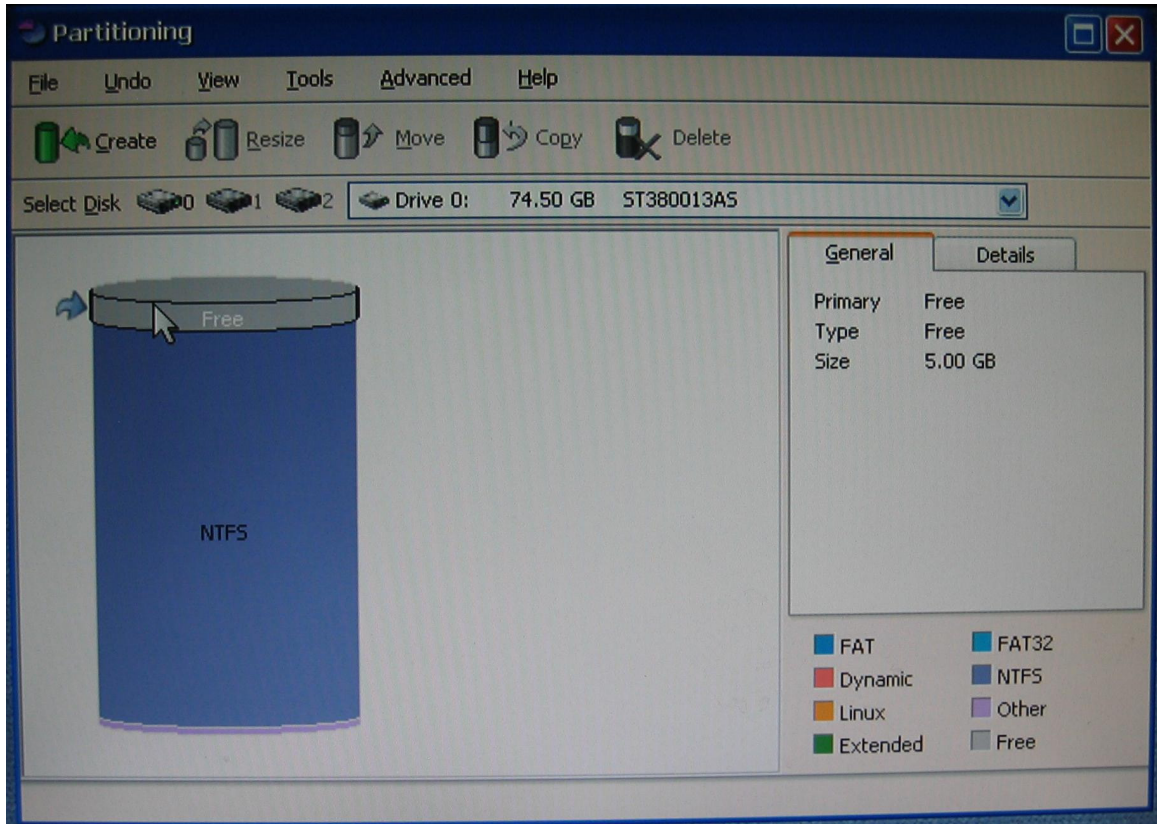
Figure 4-6 Partition Selection

2. Click the 'Create' button which will bring up the 'Create Partition' window.

3. Select 'Primary' and click 'Next' which will bring up the 'Create Primary Partition' window as illustrated in Figure 4-7.
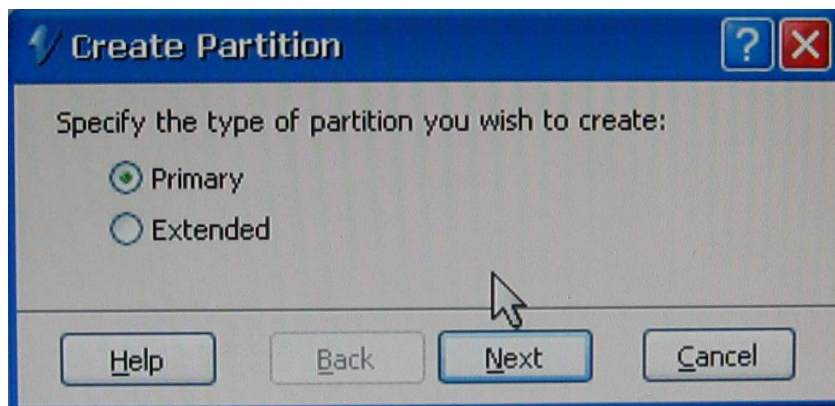
Figure 4-7 Primary Partition labeling

4. 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 4-8.
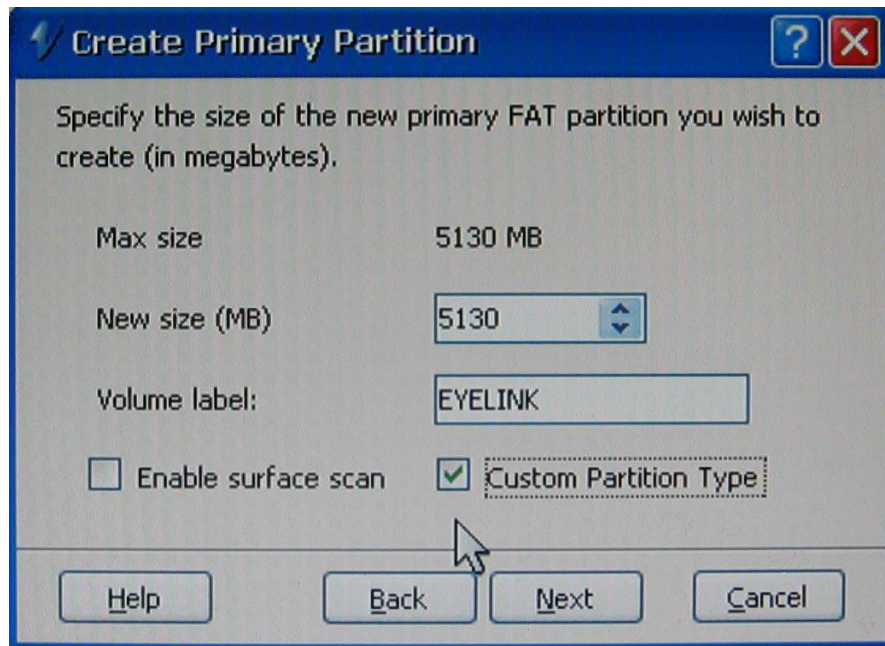
Figure 4-8 Custom Partition Type

5. Select 'FAT-32' and click 'Next' (see Figure 4-9). In the following 'Warning!' window, click 'Proceed'.
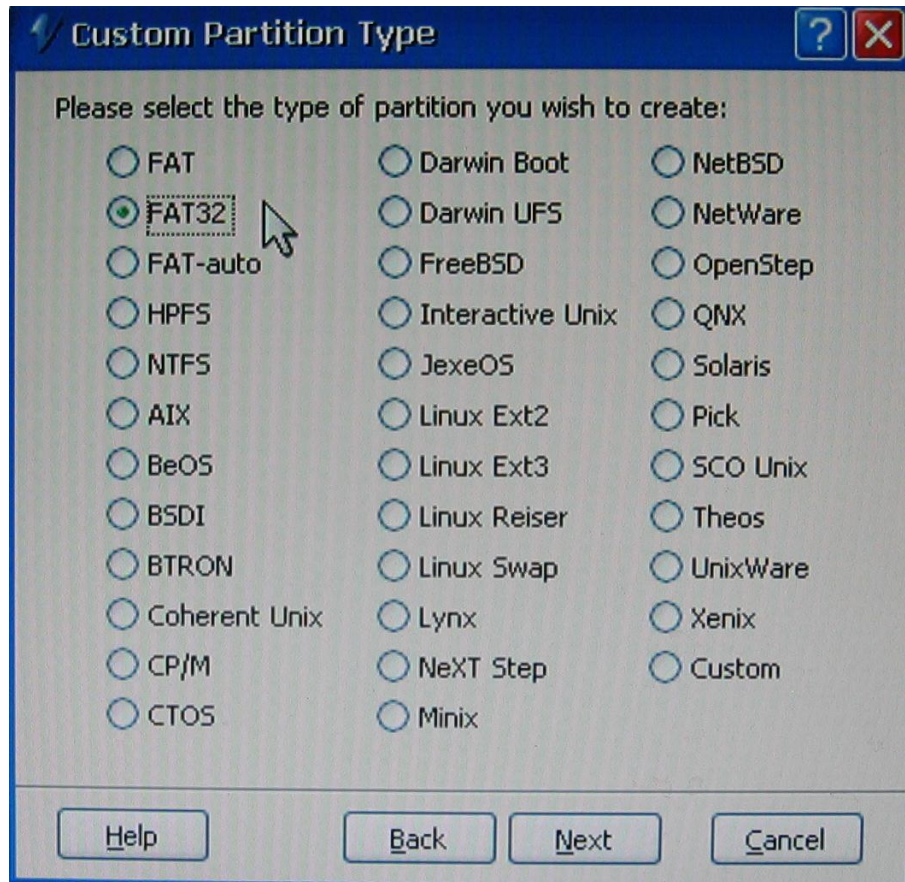
Figure 4-9 Fat32 Selection

6. Close the 'Partitioning' window by selecting the red "X" in the top right corner as illustrated in Figure 4-10. Exit System Commander by clicking "Start" at the bottom-left corner of the screen and then select the "Exit" option as illustrated in Figure 4-11.
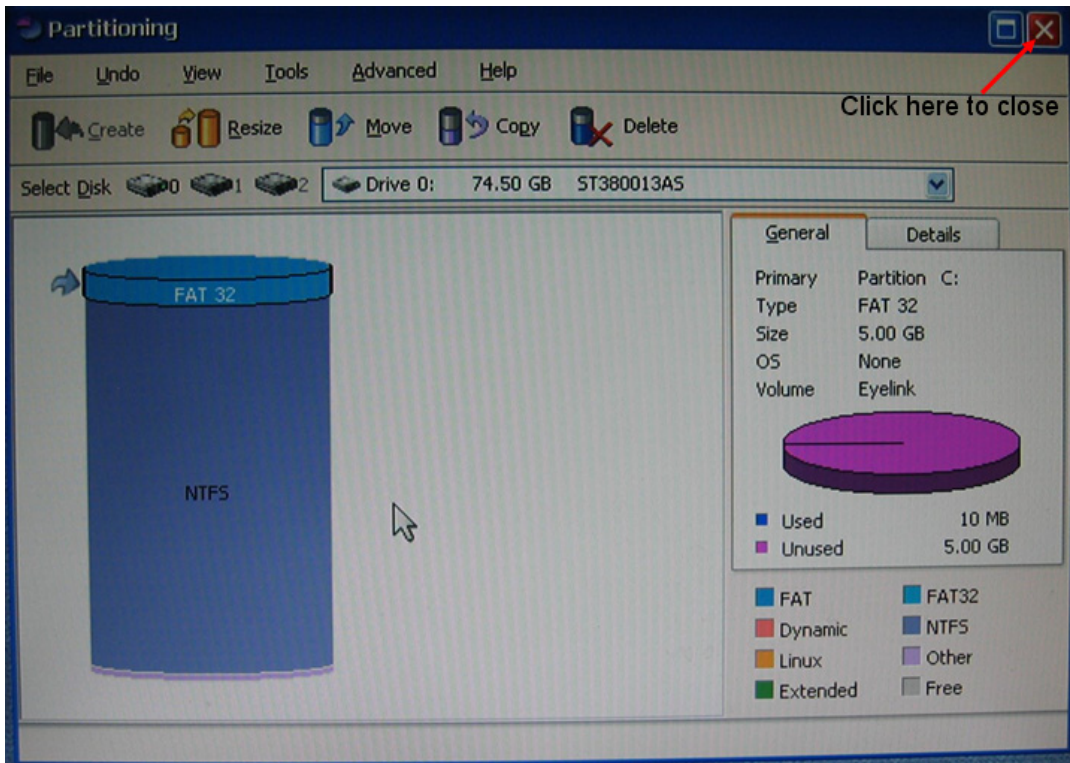
Figure 4-10 Close Partitioning
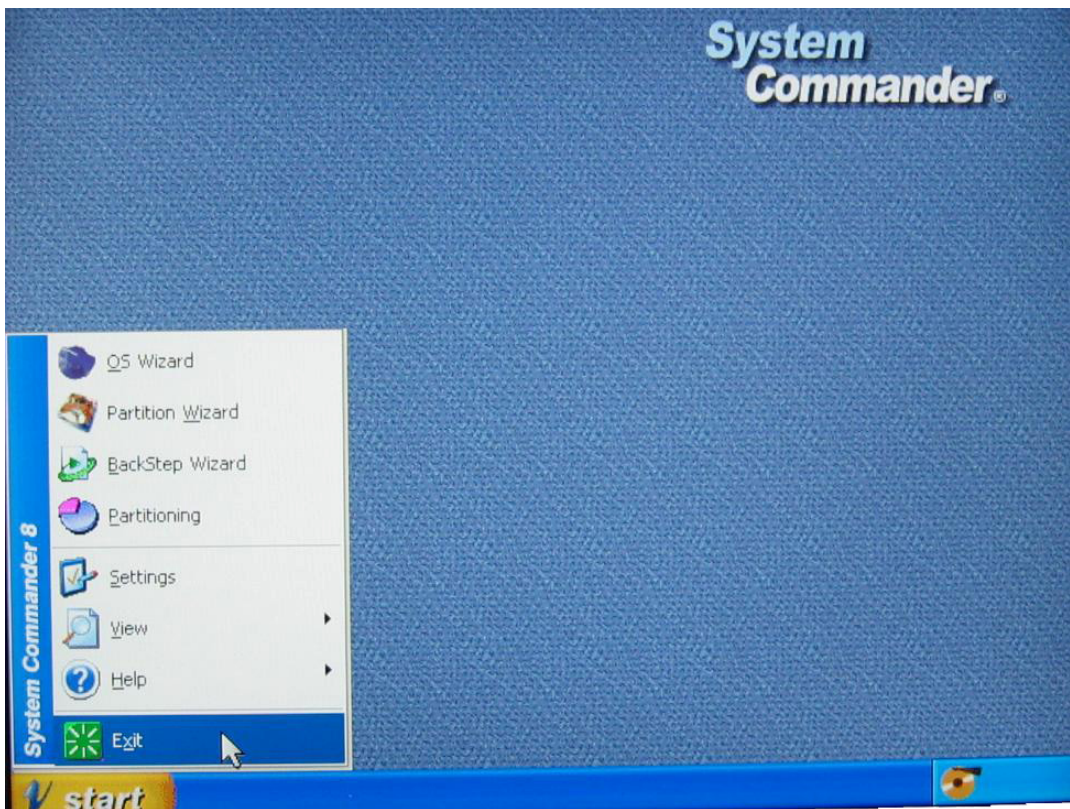
Figure 4-11   Exit

7. Remove the System Commander Boot CD from the Host PC CD-ROM drive.

8. Upon restart the computer will automatically run the System Commander application (this will happen every time the computer is powered up). The new EyeLink partition will appear as the icon with the two question marks and will be labeled 'FAT-32 OS' as illustrated in Figure 4-12.

Figure 4-12   FAT-32 OS Selection

9. Select this icon to ensure the computer will boot into it. (NOTE: since an OS has not yet been installed on this partition, the computer will just hang after selecting the EyeLink 1000 partition. Ignore the message *"Non-system disk or disk error; Insert DOS diskette and press any key"* printed on the screen).

10. Restart the computer again and select the Windows XP partition (**NOTE on the initial boot into Windows XP, the system will perform a number of system checks. This is expected and should not be interrupted**).

4.1.2.4 Clean-up System Commander 'OS Selection Menu'

1. Restart the computer after the Windows finishes performing the system checks.

2. From 'OS Selection Menu' window, click 'Settings'.

3. From the 'Settings' window, select 'Descriptions and Icons' as illustrated in Figure 4-13.
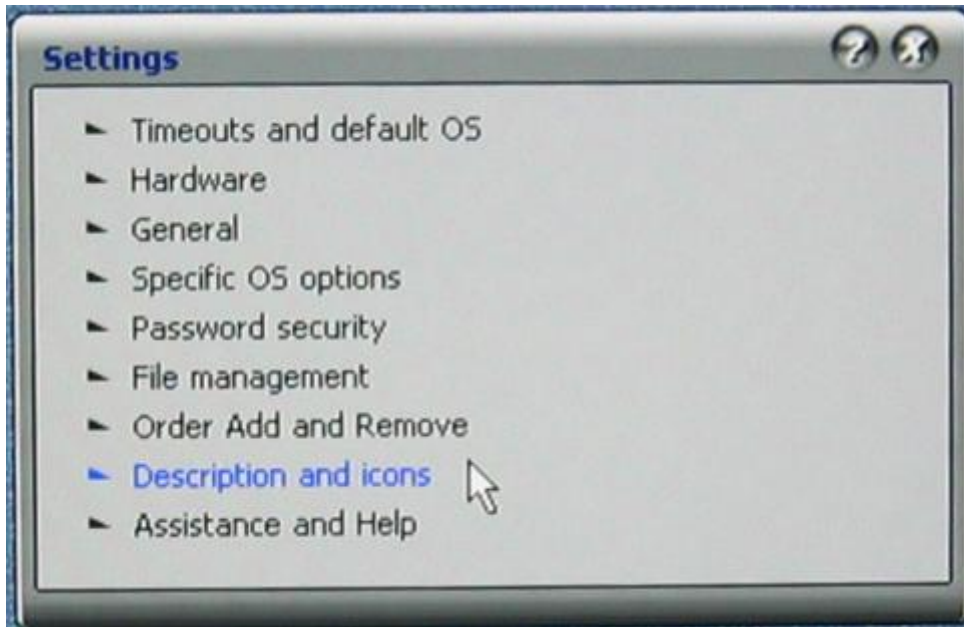
Figure 4-13   Description and Icons

4. In the 'Current Selection box, pick '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'. These steps are illustrated in Figure 4-14.

Figure 4-14   Description and Icons Editing

5. Click 'OK' to finish.

6. From the 'Settings' window, select 'Order Add and Remove' as illustrated in Figure 4-15.
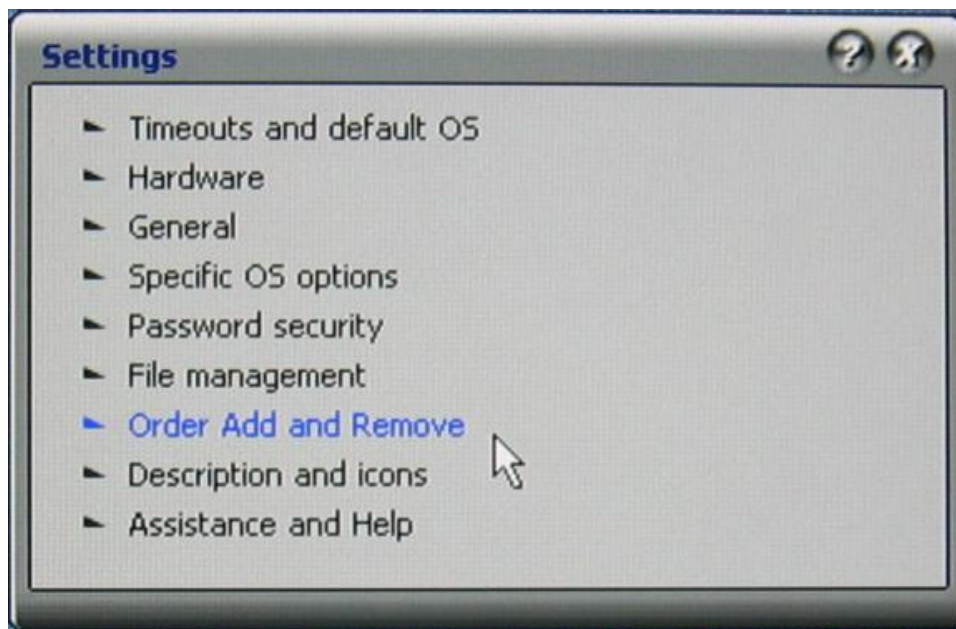
Figure 4-15   Order Add and Remove

7. 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 illustrated in Figure 4-16.
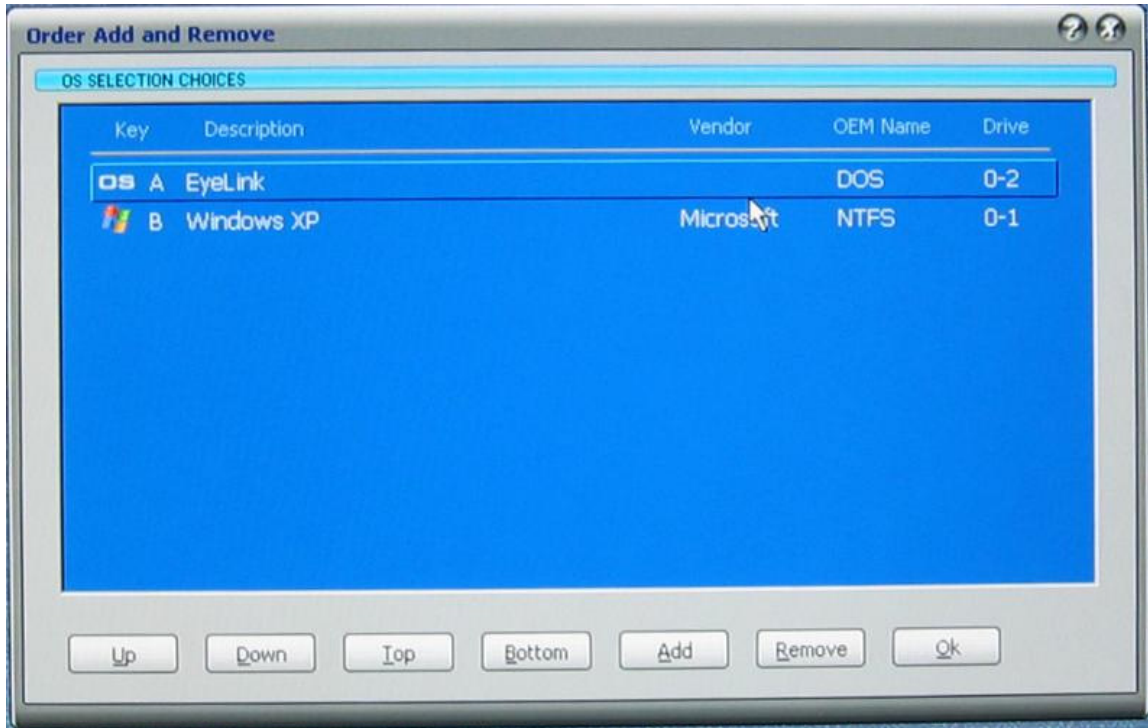
Figure 4-16   Remove Items

8. From the 'Order Add and Remove' window, highlight the EyeLink OS and click the 'Top' button to make EyeLink the default partition.

9. Click 'OK' to finish and close the 'Settings' window.

4.1.2.5   Automated boot into EyeLink 1000 Operating System

1. Start the computer and select the Windows Operating System.

2. Select the Start Menu and click on System Commander.

3. Click on Select settings.
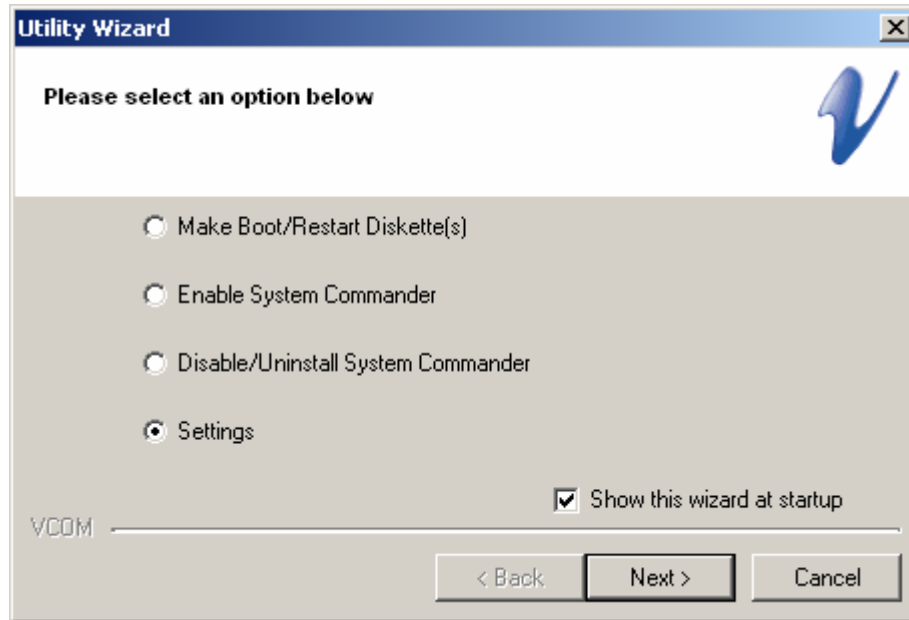
Figure 4-17   Settings Selection in Windows

4. Select System Commander General Settings.
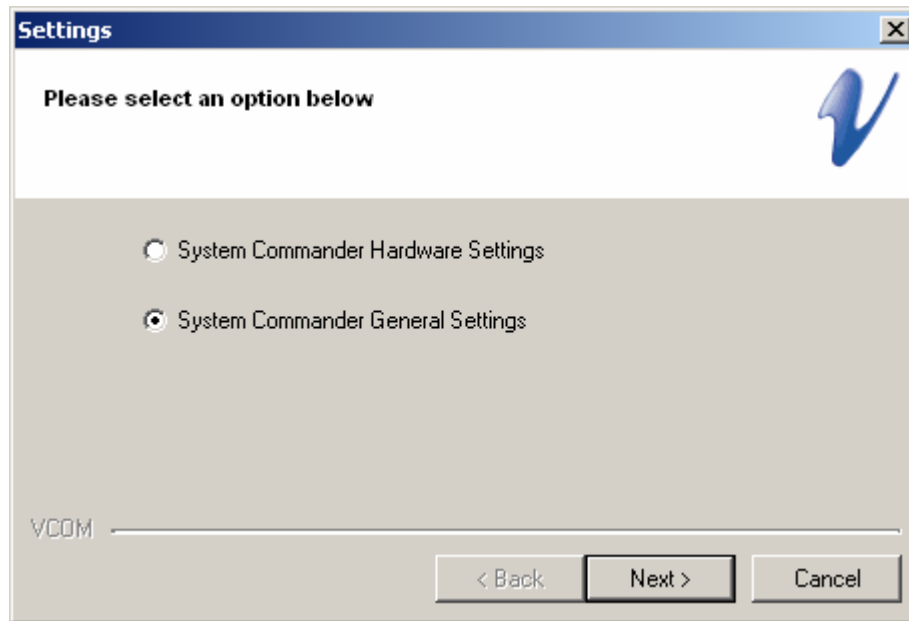
Figure 4-18   System Commander General Settings

5. In 'Default OS Selection' select the EyeLink operating system.
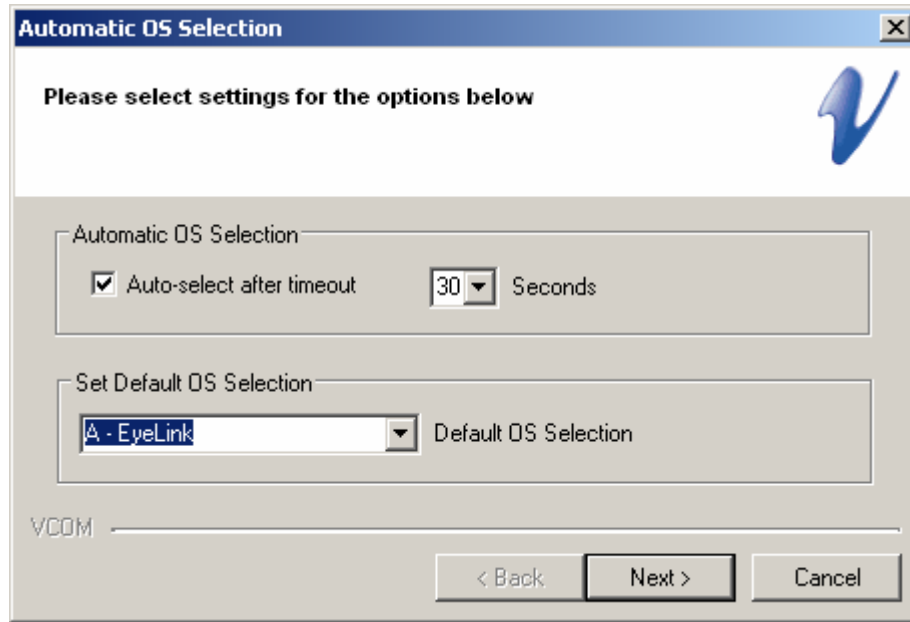
Figure 4-19   Automatic OS Selection

6. Click on "Auto-Select after time out".

7. Select the time out for 30 seconds and click on the "Next Button".

8. Exit System Commander and restart the computer.

4.1.2.6 Install the EyeLink 1000 Operating System and Program Files.

1. Insert the floppy disk or CD labeled "ROMDOS Boot Disk" that came with the EyeLink 1000 system.

2. Restart the computer. If you are using the boot CD, you may need to press F12 to change the boot sequence.

> 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 ROMDOS 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. Remove the floppy disk from the floppy drive or the boot CD from the CD Rom.

5. Reboot the computer and select the EyeLink 1000 partition to boot at the System Comander dialog. You should see a c:\> prompt at the command line. If you do not, the EyeLink 1000 partition is not bootable and you should repeat the steps in this section from the point of booting from the ROMDOS Boot disk.

6. Reboot your computer and start your original 2000 / XP partition.

7. Start Windows Explorer. You should see a drive representing the EyeLink 1000 partition.

8. Copy the EyeLink 1000 OS files to the EyeLink 1000 drive. Your EyeLink 1000 system came with a copy of all the files required for the EyeLink 1000 OS partition. Please note that each EyeLink 1000 loads a camera-specific .SCD file and therefore, you should always use the EyeLink 1000 Installation CD that comes with your system.

    i. Insert the "EyeLink 1000 Installation Software" CD into your CD drive

    ii. Open the "Host PC Installation → Host Partition" folder.

    iii. Select the Tools → Folder Options… menu in Windows Explorer.

    iv. Select the View tab.

    v. Select the "Show hidden files and folders" option under Hidden files and folders.

    vi. Ensure "Hide extensions for known file types" is not selected.

    vii. Uncheck the "Hide protected Operating system files…." as illustrated in Figure 4-20.
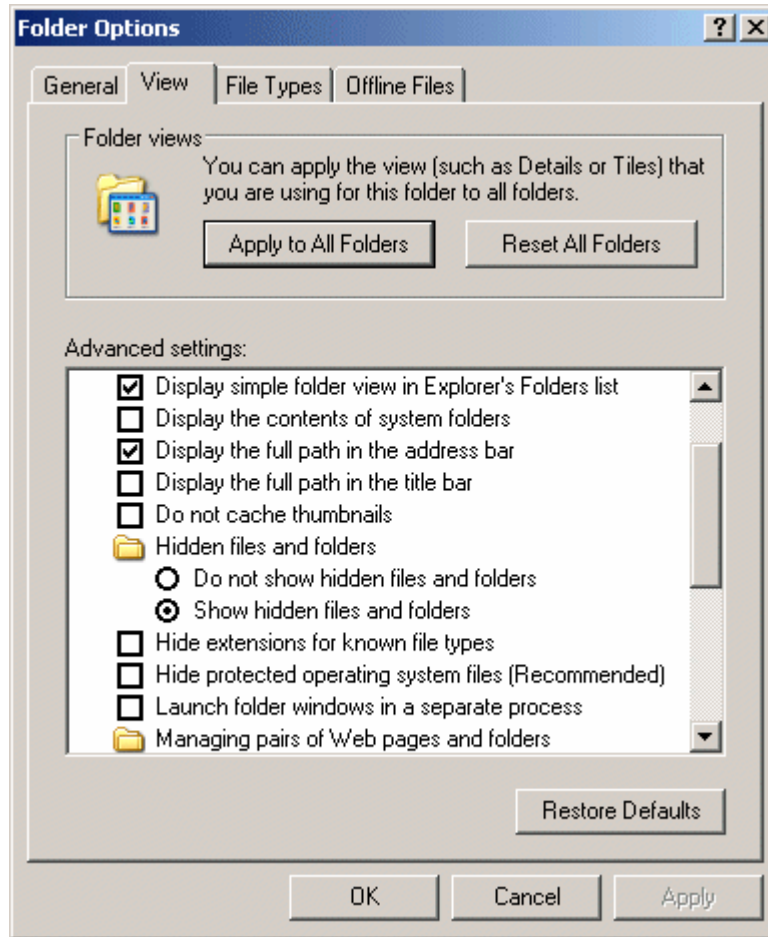
*Figure 4-20 Windows Explorer Tools → Folder Options…
Dialog.*

viii. Press OK.

ix. Select all files in the "Host Partition" folder of the CD.

x. Copy these files to the root directory of the EyeLink 1000 drive on your computer.

xi. Select the Tools → Folder Options… menu in Windows Explorer.

xii. Select the View tab.

xiii. Deselect the "Show hidden files and folders" option under Hidden files and folders.

xiv. Check the "Hide protected Operating system files…."

xv. If your host PC uses a USB keyboard please proceed to section *4.1.2.7* "*Create USB Keyboard setup.*"

xvi. If you have a PS/2 keyboard please restart your computer. You should be able to select the EyeLink 1000 drive and boot into the EyeLink 1000 OS. If this is successful, a command prompt will be displayed. Please continue to section *4.1.3 "Testing the Host PC Installation"*

4.1.2.7 Configuring the USB Keyboard

The PS/2 keyboard is the default driver setup within the EyeLink Host directory. If you are using a USB keyboard you shall have to rename the file to activate the USB keyboard driver.

1. Locate the "ELCL.INI" file in the "ELCL\EXE" directory of the host partition. Rename it to "ELCL.PS2".

2. Rename the "ELCL.USB" file to "ELCL.INI".

3. Restart your computer. You should be able to select the EyeLink 1000 drive and boot into the EyeLink 1000 OS. If this is successful, a command prompt will be displayed.

4.1.3 Testing the Host PC Installation

The Host PC is now ready to test. Start the EyeLink 1000 Tracker application by typing

```
CD C:\ [Enter]
T [Enter]
```

The EyeLink 1000 Host PC application should start and you should see the EyeLink 1000 Host application screen illustrated in Figure 4-21. Please make sure that you are using version 4.0 or later of the EyeLink 1000 host application; the latest host software can be downloaded from SR Research support website http://www.sr-support.com.
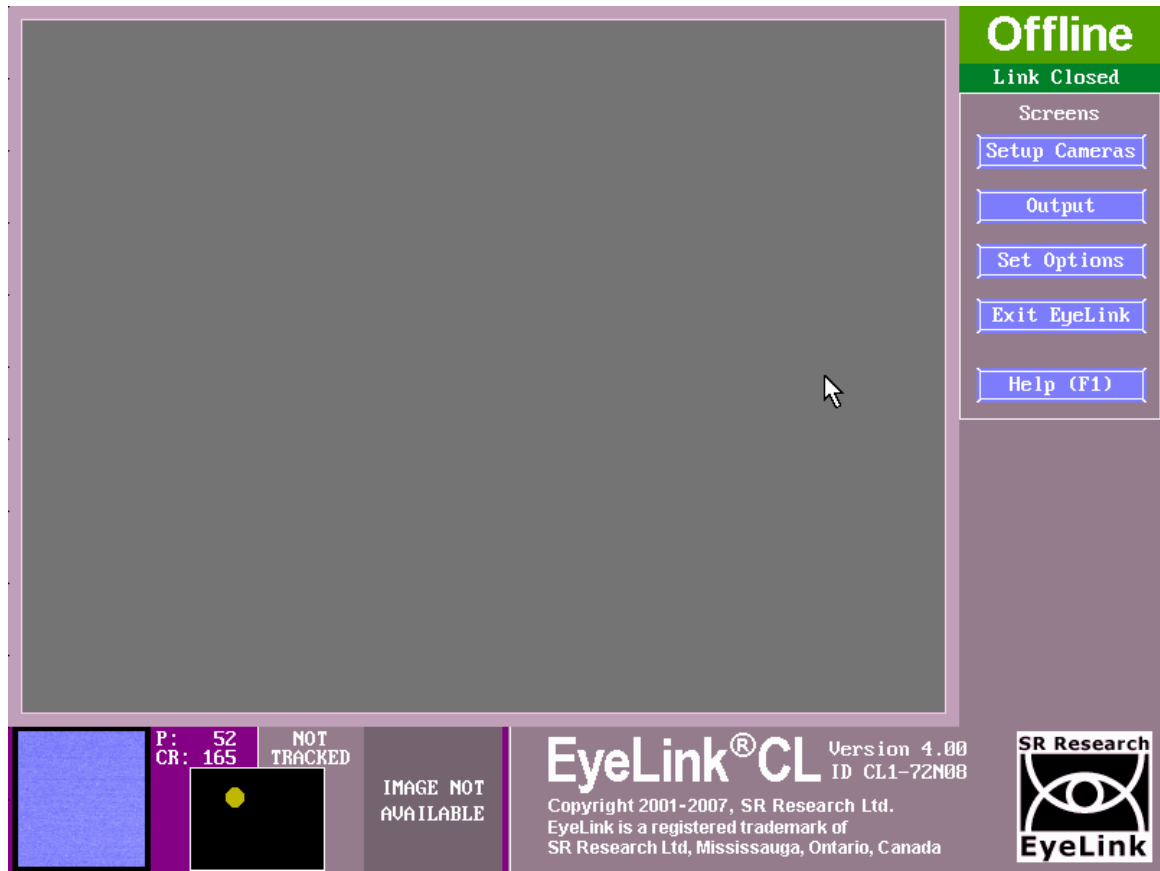
*Figure 4-21 EyeLink 1000 Tracker Application in Offline
Mode at Startup*

IMPORTANT: 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 from the EyeLink 1000 software CD that comes with your system. If you cannot locate this file, please contact SR Research Ltd.

Click on the "Set Options" button to check for the ELCL configuration used (see Figure 4-22). For the EyeLink 1000 Tower Mount, make sure that the ELCL configuration is set to "Tower". If you are using a Desktop Mount, please make sure that ELCL configuration matches the position and angle of the camera used (see section 3.5" EyeLink 1000 Desktop Mount Installation"). If you are EyeLink Remote, please select "Remote (Level)".

Figure 4-22. Set Options Screen for ELCL Configuration.

Press [Enter] and you should be taken to the Camera Setup screen where you can see the EyeLink 1000 camera image.

- If you are using an EyeLink 1000 Tower, ask the subject to rest his/her head on the chinrest and forehead rest against the forehead rest. You should see part of the person's face, although it may be very blurry. You can focus the camera by gently and slowly moving the focus arm that extends out to the right from the camera lens.

- If you are using an EyeLink 1000 Desktop Mount, remove the lens cap from the eye camera by pulling it outwards while holding the camera. Loosen both the Lock knob and the Friction knob, adjust the tilt of the camera so that the intended eye image appear at the proper location of in the global view of the camera image. For monocular recording, the tracked eye should appear in the center of the camera image (see Figure 4-23). For binocular recording, the tracked eye(s) should appear in the center of the respective camera hemifield(s) divided by the dotted line. Tighten both knobs once the vertical position of the eye is in the intended camera image. The eye camera should be focused by rotating the lens holder.

A screenshot of the large field of view of the EyeLink 1000 camera (tower Mount) is illustrated in Figure 4-23.
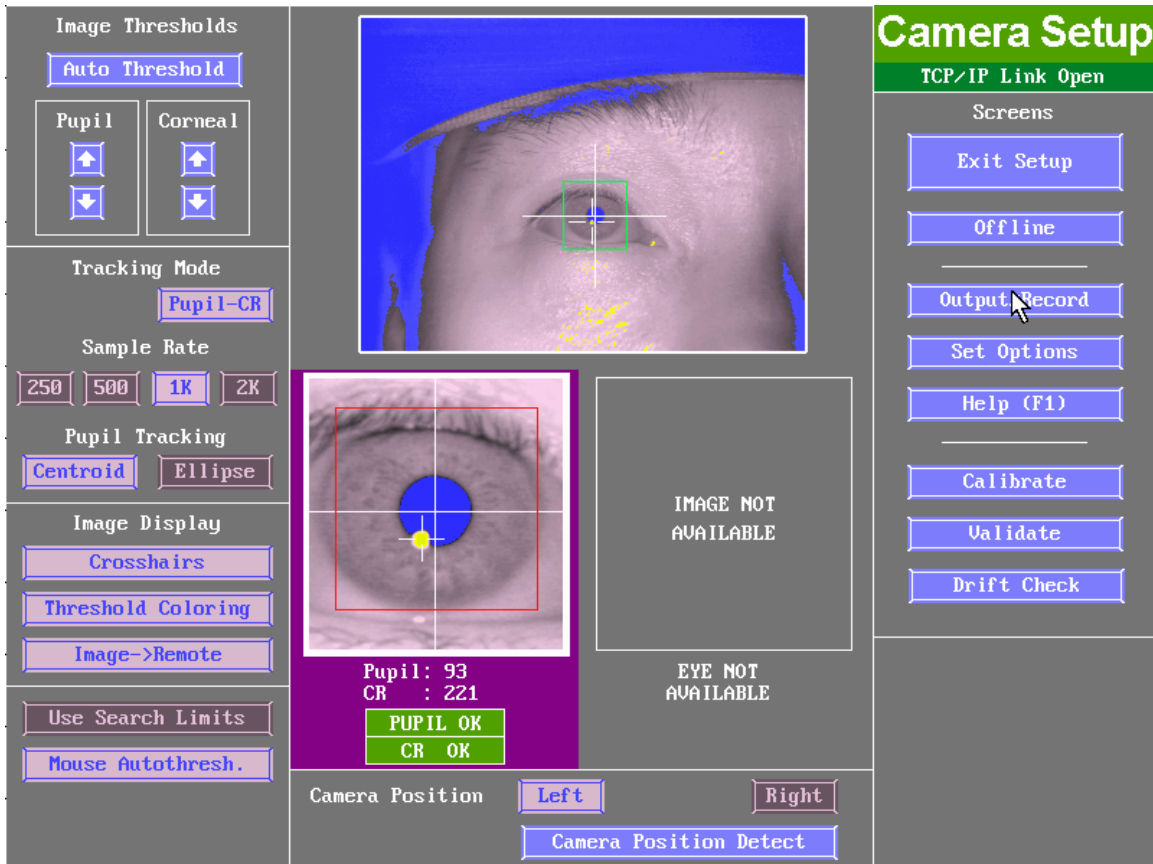
Figure 4-23 EyeLink 1000 Tracker Application Camera Setup screen.

Please follow Chapter 3 "An EyeLink 1000 Tutorial: Running an Experiment" of the EyeLink 1000 for further operation instructions.

4.2 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 2000/XP operating system to back up your data. Editing the parameters in the 'Data.ini' file can change the path into which the data is stored.

4.3 Display PC

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 Display PC installation process is much less complicated than the Host PC installation and should not take more than 15 minutes. Installation instructions for the Windows platform are detailed below.

4.4 Windows Installation

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

- Install the EyeLink Experiment Programming Kit.

- Install the supplied IO Port Access Driver.

- Install the EyeLink Data Viewer and / or Experiment Builder software (if purchased).

- Install the USB Key for EyeLink Data Viewer and / or Experiment Builder software (if purchased).

- Configure the network connection to the EyeLink 1000 Host PC.

4.4.1 Installing the EyeLink 1000 Experiment Programming Kit

The Windows toolkit (API and example files) is available on the "EyeLink 1000 Installation" CD in the "Display PC Installation" directory. To install the toolkit, follow these instructions.

1. Insert CD marked "EyeLink 1000 Installation".

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.

4.4.2 Installing the IO Port Access Driver

For proper access to IO ports on the Display PC, an access driver must be installed. The EyeLink 1000 Windows API relies on this driver for IO port access so installation is mandatory.

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.

4.4.3 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. If you did not purchase these options and would still like to evaluate the software in demo mode you may do so.

1. Insert CD marked EyeLink 1000 Installation Software.

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.

4.4.4 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"

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 a free USB port on the Display computer. The USB key should start to glow a reddish – purple color, indicating that the key has been recognized by the system.

4.4.5 Setting up EyeLink 1000 Network Connection

You must have an Ethernet card installed in your Display Computer. Allow Windows to install drivers for it (if it is a new card), 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 setting 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.

You should now restart Windows. If error messages appear at startup, 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 is 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.

4.4.6 System and Programming Tools Required

The experiment templates in this 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.

5. Final Installation Steps

This section lists the final installation steps to fine tune your EyeLink 1000 installation.

5.1 Customizing Your PHYSICICAL.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 you should verify that the PHYSICAL.INI still accurately reflects your setup.

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

screen_phys_coord – 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 = -178.0, 135.0, 178.0, -135.0

screen_pixel_coord – 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. This setting is not applicable to EyeLink remote tracker. The default values read as following:

screen_distance = 600 660

5.1.1 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_coors, 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 5-1.
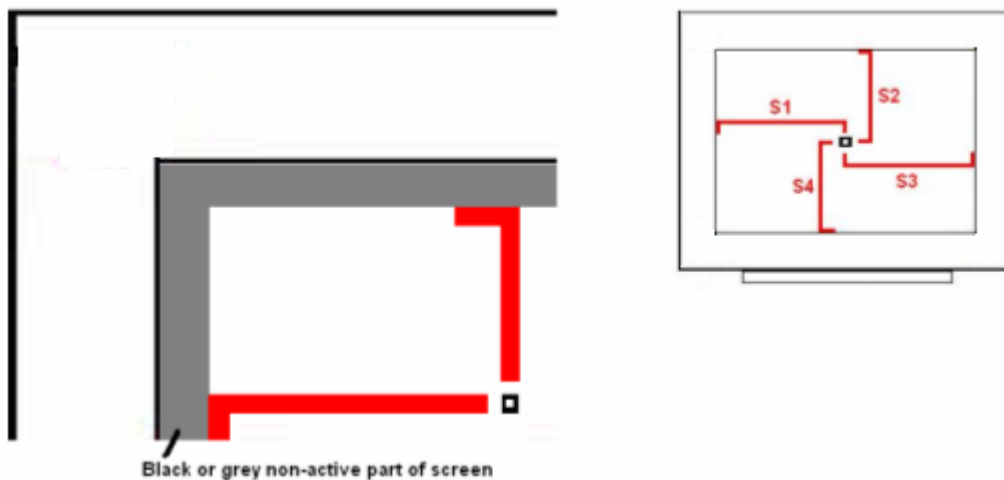

Figure 5-1 Measuring screen_phys_cords

The new settings for the screen_phys_coords in the PHYSICAL.INI file are determined by

screen_phys_coords = -1, 2, 3, -4

5.1.2 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 will 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.

5.1.3 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.

5.1.3.1 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.

5.1.3.2 EyeLink Partition

Reboot the Host PC into the EyeLink partition. Do not press "T" when in the DOS prompt before running the EyeLink 1000 GUI.

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
```