

EyeLink Portable Duo Installation Guide


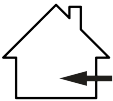




Version 1.0.2



Copyright ©2016-2017, SR Research Ltd.

EyeLink is a registered trademark of SR Research Ltd.,
Mississauga, Ontario, Canada

SAFETY MARKINGS

	Read instructions before use.
	For indoor use only.
	DC Power
	Class II Equipment, no protective earth required
	Separate electrical and electronic collection.
	Intertek Safety Mark: Compliance of this product with applicable standards is certified by Intertek, an independent testing agency.

SAFETY WARNINGS

WARNING: Do not open or modify the EyeLink Portable Duo in any way. This may render the unit unsafe, resulting in shock or burn hazards, and will void the warranty and safety certifications. No user-serviceable parts inside—contact SR Research Ltd. for all repairs.

WARNING: The EyeLink Portable Duo is not intended for use in an oxygen-rich environment, or in the presence of flammable anaesthetics.

WARNING: The Host PC, and all peripherals connected to it with cables, should be positioned out of reach of the participant (at least 120 cm away). Only devices included with the system and clearly identified as suitable for contact with the participant (such as a response device) should be within the participant's reach.

WARNING: The operator should avoid simultaneously contacting the participant and the computer, or any device connected with cables to the Host PC, such as a keyboard or mouse, that were not included with the system and clearly identified as suitable for contact with the participant.

WARNING: If the USB cable outer jacket is damaged, a shock hazard to the participant may exist. Remove the unit from service immediately if such damage is found.

WARNING: Do not place any objects on top of the eye tracker that could block air circulation around the unit. If the unit has been inadvertently covered during operation, it could be hot! Uncover it immediately, turn off its power source and let it cool, before touching it or allowing participants near it.

WARNING: This unit is drip-proof and spill-resistant; it is not watertight or waterproof. Any exposure to substantial quantities of fluids carries risk of danger to participants. Unit should be taken out of service IMMEDIATELY after immersion or substantial spill onto unit, and should be returned for inspection and repairs.

WARNING: After contact with any running or dripping liquid, disconnect the eye tracker from the Host PC IMMEDIATELY and let it dry thoroughly before allowing participants near it. If fluid has puddled in any area of the unit (such as below the optical window), clean and dry the unit and return it for repair and inspection.

WARNING: The EyeLink Portable Duo is always powered while the Host PC is connected and powered on. Therefore observe these precautions for participant safety:

- Before performing any cleaning other than wiping the optical window, power off the Host PC or disconnect both plugs of the USB cable of the eye tracker.
- Do not cover or place any items on top of the eye tracker while the Host PC is powered on, unless the USB cable is disconnected from both USB ports. Operating the unit while covered could cause it to overheat and possibly cause a burn hazard.
- If the EyeLink Portable Duo fails to operate properly, is running at a higher than normal temperature, or if the cable is damaged / the illuminator is not glowing, disconnect the USB cable or turn off the Host PC, until the operator can troubleshoot the system.

WARNING: Use of this equipment adjacent to or stacked with other equipment should be avoided because it could result in improper operation. If such an arrangement is unavoidable, please make sure to check the data from all equipment to ensure that it is operating normally.

WARNING: Changes or modifications not expressly approved by the manufacturer will void the warranty and authority to operate the equipment. This includes modification of cables or opening unit without express instructions from the manufacturer.

WARNING: Use of cables other than those specified or provided by the manufacturer of this equipment could result in increased electromagnetic emissions or decreased electromagnetic immunity of this equipment and improper operation.

WARNING: Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the EyeLink Portable Duo, including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result.

WARNING: This equipment was not tested for degradation of performance during immunity testing. If degradation of performance is observed that is unacceptable, check for sources of interference that may be responsible.

CONTACT ADDRESS

SR Research Ltd
35 Beaufort Drive
Ottawa, Ontario, K2L 2B9
Canada

Fax: (613) 482-4866
Phone: (613) 271-8686
Toll Free: 1-866-821-0731 (North America only)

Email: support@sr-research.com
Sales: <http://www.sr-research.com>
Support: <http://www.sr-support.com>

Table of Contents

1. Introduction.....	1
1.1 EyeLink Portable Duo Installation - Suggested Equipment Layout	1
2. Installation and System Cabling	3
2.1 Unpacking	3
2.2 Pre-Installation Checklist	3
2.3 Setting up the Host PC	4
2.4 System Wiring.....	4
3. Eye Tracker Installation Using a Tripod Mount	6
3.1 Mounting the Eye Tracker on the Tripod	6
3.2 Adjusting the Eye Tracker Setup	7
4. Eye Tracker Installation Using a Laptop Mount	8
4.1 Installing the Eye Tracker on the Laptop Mount	8
4.2 Adjusting the Eye Tracker Setup	10
5. Testing the Host PC Installation	12
5.1 Host Software Update.....	13
5.2 Troubleshooting Instructions	14
5.2.1 <i>No Frame Detected / frame rate or clock error -- restarting</i>	14
5.2.2 <i>ERROR: -67: Can't find SR Research USB Camera!</i>	15
5.3 EyeLink Data Storage.....	15
5.4 Customizing Screen Settings	15
5.4.1 <i>Screen Dimensions</i>	16
5.4.2 <i>Display Resolution</i>	16
5.4.3 <i>Eye-to-Screen Distance</i>	17
5.4.4 <i>Camera-to-Screen Distance</i>	18
5.4.5 <i>Optimal Target-to-Camera Distance</i>	19
6. Display PC Hardware and Software Installation	21
6.1 Display PC Hardware Installation	21
6.2 Windows Installation.....	22
6.2.1 <i>Installing the EyeLink Developers Kit for Windows</i>	22
6.2.2 <i>Installing the EyeLink Data Viewer and Experiment Builder Software</i>	22
6.2.3 <i>USB License Key Installation</i>	23
6.2.4 <i>Setting up the EyeLink Network Connection</i>	23
6.3 Mac OS X Installation	25

Figures

Figure 1-1: Suggested System Layout	2
Figure 2-1: Basic Host PC and Camera Cabling	5
Figure 2-2: Using the Powered USB 3.0 Extension Cable	5
Figure 3-1: EyeLink Portable Duo Eye Tracker Mounted on a Tripod.....	6
Figure 3-2: Install Camera onto the Tripod.....	6
Figure 4-1: EyeLink Portable Duo Eye Tracker Installed on a Laptop Mount	8
Figure 4-2 Parts of a Laptop Mount.....	8
Figure 4-3: Adjusting the Span of the Mounting Brackets (A –Screws Need to Be Loosened for Adjustments; B – Stopper on the Mounting Brackets Should be Seated in one of the Holes; C – Stopper not Properly Seated; D – Stopper Properly Seated).....	9
Figure 4-4: Installing Camera onto the Laptop Mount	10
Figure 5-1: Host Application Camera Setup Screen	13
Figure 5-2: Example Screen from Web UI Displaying File Manager	13
Figure 5-3: Updating Host Software through Web UI	14
Figure 5-4: Updating Screen Dimensions	16
Figure 5-5: Updating Display Resolution.....	17
Figure 5-6: Updating Eye-to-Screen Distance.....	18
Figure 5-7: Updating Camera-to-Screen Distance	19
Figure 5-8: Optimal Target-to-Camera Distance	19
Figure 6-1: Choose “Change Adapter Settings” Option	23
Figure 6-2: Configure IP Address on Windows 7	24
Figure 6-3: Configure IP Address on Mac OS X	26

1. Introduction

The EyeLink Portable Duo is a lightweight portable eye tracking system intended for eye- and gaze-tracking applications in medical environments or research settings. It has a compact unitary design, which makes it easier to carry around and simpler to set up compared to other EyeLink models. The EyeLink Portable Duo can be used either as an ultra-high resolution head-stabilized system or as a remote/head-free-to-move eye tracker that requires no head stabilization.

The first four chapters of this Installation Guide provide hardware and software installation instructions for the eye tracker when the camera is mounted on a Tripod or a Laptop Mount.

The basic steps in installing the EyeLink Portable Duo system are:

- 1) Unpacking and setting up the eye tracking hardware for your particular mount and stimulus presentation method,
- 2) Testing the installation and configuring the EyeLink Portable Duo software,
- 3) Installing and configuring the EyeLink Windows, Mac OS X or Linux Display Software (API and example experiments) on your Display computer.

A complete installation in a behavioral laboratory setting should take under an hour. If you have questions or encounter a problem during the installation process, please contact SR Research - sending an e-mail to support@sr-research.com is likely to get the fastest response, though feel free to post on our support forums (www.sr-support.com) or call our support phone line on the numbers listed in the manual.

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 EyeLink Portable Duo Installation - Suggested Equipment Layout

It is important to consider the layout of the EyeLink Portable Duo system in order to optimize participant setup, and to avoid lighting problems that might degrade tracking performance. Before setting up the equipment, check the arrangement of the room to be used against these suggestions. These will make acquiring good experimental data easier.

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

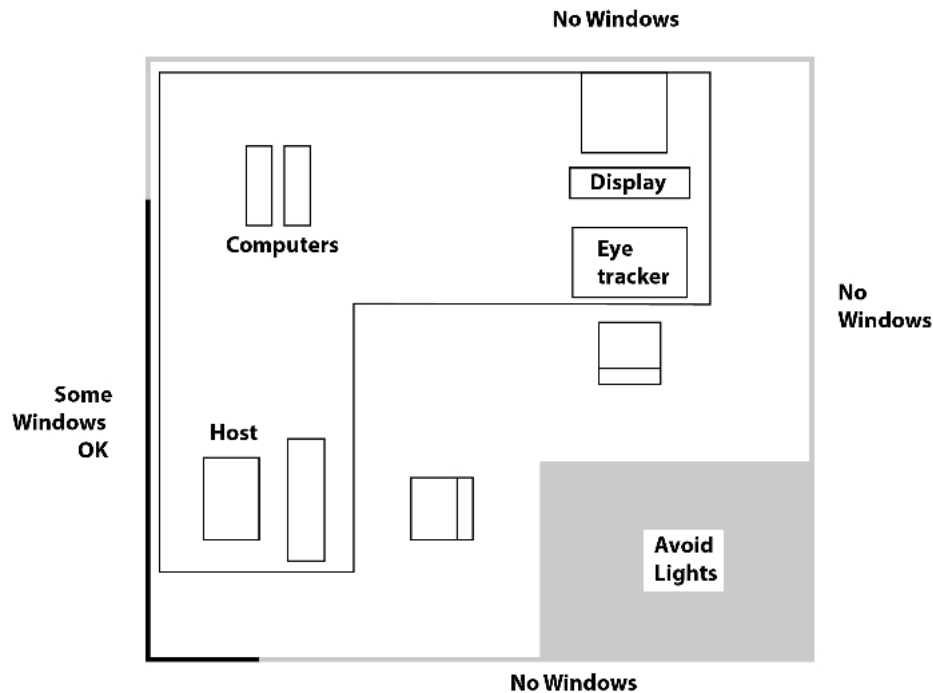


Figure 1-1: Suggested System Layout

- Ideally, the table you select should be deep enough to accommodate both the monitor and eye tracker. For a 24" monitor with a 32° horizontal viewing angle, the minimum table depth should be about 110 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 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 might 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, and that no distracting items are viewable by the participant. 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 sit on and stand from the chair easily, as the chair will be close to the table with the Display PC monitor.

2. Installation and System Cabling

Important: 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 before use.

Warning: 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 the system components, check them against the packing list for missing components, and inspect for any damage. If the equipment has been transported or stored for more than an hour at temperatures below 10°C, allow the eye tracker and other electronic equipment to warm to room temperature before setup (at least 1 hour per 10°C below 15°C).

Assemble the EyeLink Portable Duo with its mount according to the instructions included with the system.

2.2 Pre-Installation Checklist

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

1. EyeLink Portable Duo eye tracking unit.
2. The supplied tripod or Laptop Mount.
3. Ethernet cable to connect the Host and Display PCs to one another.
4. EyeLink Host PC (a Laptop PC or a Workstation PC with monitor) with power supply.
5. EyeLink Portable Duo Installation Guide, User Manual, and Quick Start Guide.
6. “EyeLink Portable Duo Software” USB drive.
7. A box of Remote Mode target stickers.
8. Rollup tape measure.

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 meets the required specifications listed in Section 6.1.

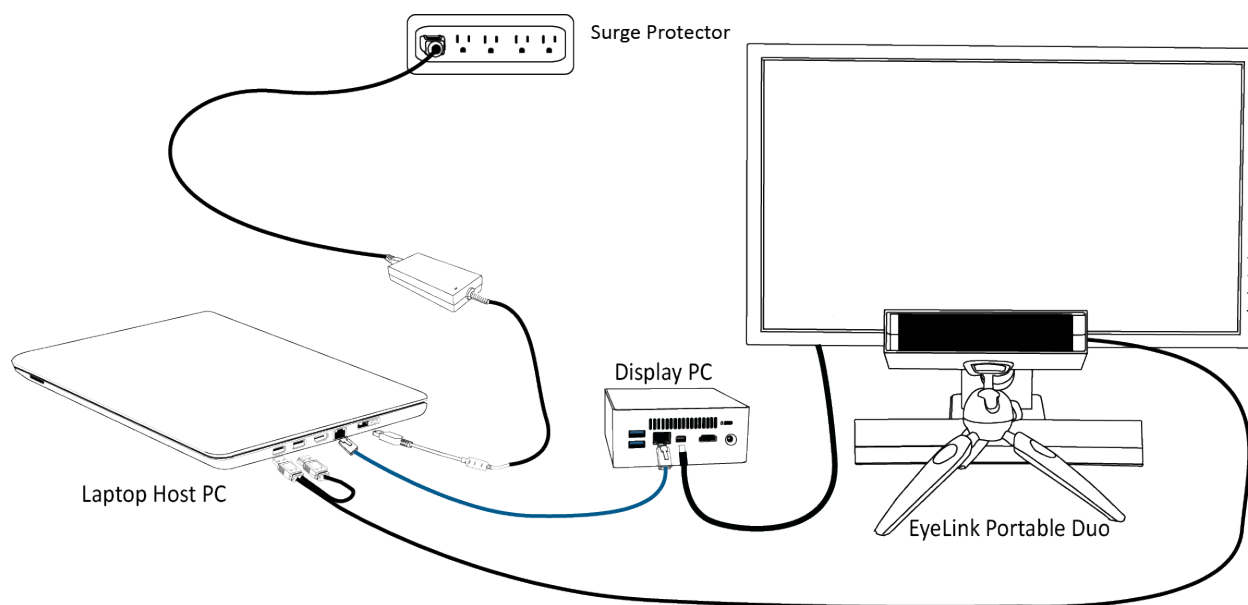
2.3 Setting up the Host PC

The EyeLink Portable Duo system comes with a pre-configured host computer (either a Laptop or a Workstation PC, depending on what was chosen at the time of the order), which requires simple setup and the attaching of cables. Set up the Host PC as you would any computer, at the desired location (see Section 1.1 for a suggested layout). In the case of a Workstation PC, this includes connecting the keyboard and mouse to the computer, as well as the power supply and monitor cables.

2.4 System Wiring

Typical cabling steps for the Host PC are as follows (see also Figure 2-1; the top panel for a setup using a tripod and the bottom panel for a setup using the laptop mount):

1. If not already completed, attach the keyboards, mouse, power cords, monitors etc. to the Host PC and your Display PC. It is recommended that users plug the power supply into a surge protected power source.
2. Plug both plugs of the eye tracker's cable into USB 3.0 ports on the Host PC (**please use USB 3.0 ports only**). If you need to use an extension cable for the camera, please use the powered USB 3.0 extension cable and power supply that come with the system and follow the connection steps illustrated in Figure 2-2.
3. If you use a Workstation Host PC, connect one end of the network cable provided with your system to the Ethernet port on the Host PC marked with a "Display PC Ethernet" label. If you are using the Laptop Host PC, the network cable should be plugged directly into the Ethernet port on the computer. 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.



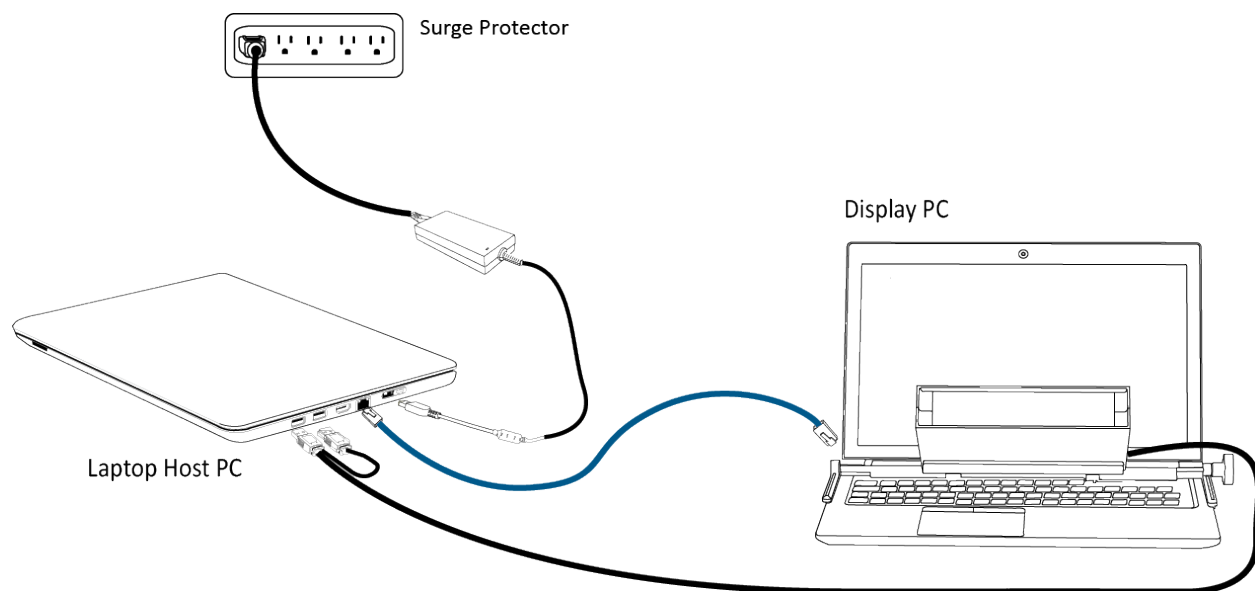


Figure 2-1: Basic Host PC and Camera Cabling

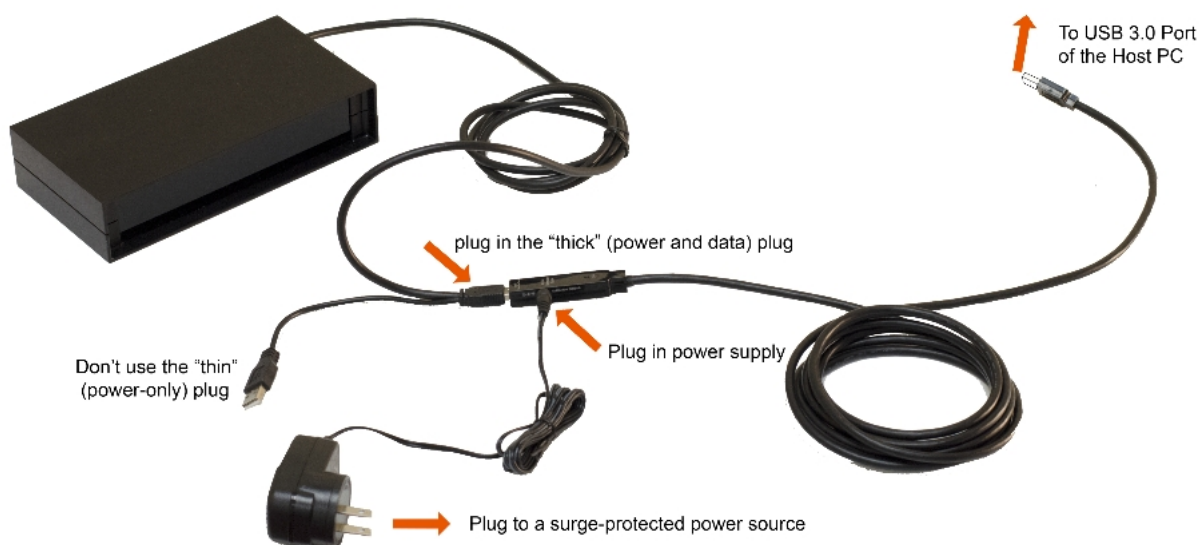


Figure 2-2: Using the Powered USB 3.0 Extension Cable

3. Eye Tracker Installation Using a Tripod Mount

The EyeLink Portable Duo eye tracker can be mounted on a tripod and placed just below the Display monitor that the participant is looking at. Please follow the steps below to set up the eye tracker on a tripod.



Figure 3-1: EyeLink Portable Duo Eye Tracker Mounted on a Tripod

3.1 Mounting the Eye Tracker on the Tripod

If the camera hasn't been mounted on the supplied tripod yet, hold the camera and place it on top of the tripod. Align the tripod screw with the $\frac{1}{4}$ " mounting hole on the camera (see Figure 3-2). Now turn the rotating wheel on the tripod until the tripod is firmly attached to the camera.

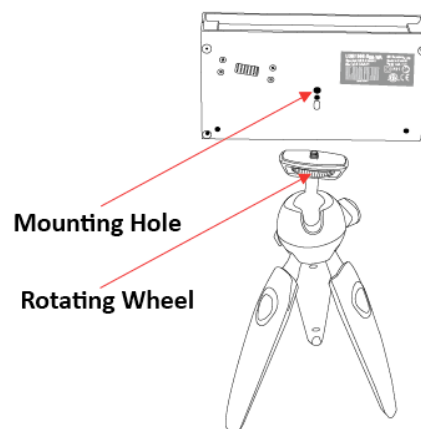


Figure 3-2: Install Camera onto the Tripod

3.2 *Adjusting the Eye Tracker Setup*

Follow the steps below to adjust the eye tracking unit, monitor, and head support (if operating the eye tracker in the head-stabilized mode).

- 1) The Display PC monitor should be set such that when participants are seated and looking straight ahead, their eyes are level with the top quarter of the monitor.
- 2) If you are operating the eye tracker in head-stabilized mode, please use the chinrest. Please check that the chinrest is horizontally centered with the monitor (**HINT:** measure from the head support to the left and right sides of the top of the display area of the monitor, these should be equal).
- 3) Adjust the eye-to-screen distance so that the maximum viewing angle of the Display screen is within 32-degrees horizontally and 25-degrees vertically. As a rule of thumb, the monitor needs to be placed at a distance of at least 1.75 times its width away from the participant.
- 4) The eye tracker should be placed at a distance of about 45 cm if measuring from the front of the unit to the participant's eyes. The camera is recessed about 7 cm behind the front of the enclosure, and the ideal eye-to-camera distance is about 52 cm. This means that if you are using a larger monitor, it will be necessary to move the monitor back while keeping the tripod and camera at its optimal distance from the participant, so as to increase the distance between the participant and the screen while still ensuring that the eye tracker can track the participants properly (the maximum viewing angle of the display should be within 32° horizontally and 25° vertically).
- 5) For maximum eye tracking range, the tripod should be aligned to the center of the monitor. The height of the tripod should also be raised (using the buttons on the legs) so that the top of the eye-tracking unit is as close as possible to the lower edge of the visible part of the monitor without blocking the participant's view.
- 6) Adjust the tilt of the monitor if there are any reflection issues.
- 7) **Please follow “Section 5.4 Customizing Screen Settings” to update tracker configuration.**

4. Eye Tracker Installation Using a Laptop Mount

Another option for mounting the camera of the EyeLink Portable Duo eye tracker is to use a laptop mount, if users are going to use the screen of a 15" or 17" laptop computer to present stimuli to the participants. The camera will be placed over the laptop keyboard area in front of the screen (see Figure 4-1).



Figure 4-1: EyeLink Portable Duo Eye Tracker Installed on a Laptop Mount

4.1 Installing the Eye Tracker on the Laptop Mount

The following picture (Figure 4-2) illustrates the parts on a laptop mount. It will be easier if you first adjust the mounting brackets on the intended laptop before attaching the camera to the mount. Note that this process only needs to be done once for each Display laptop computer.

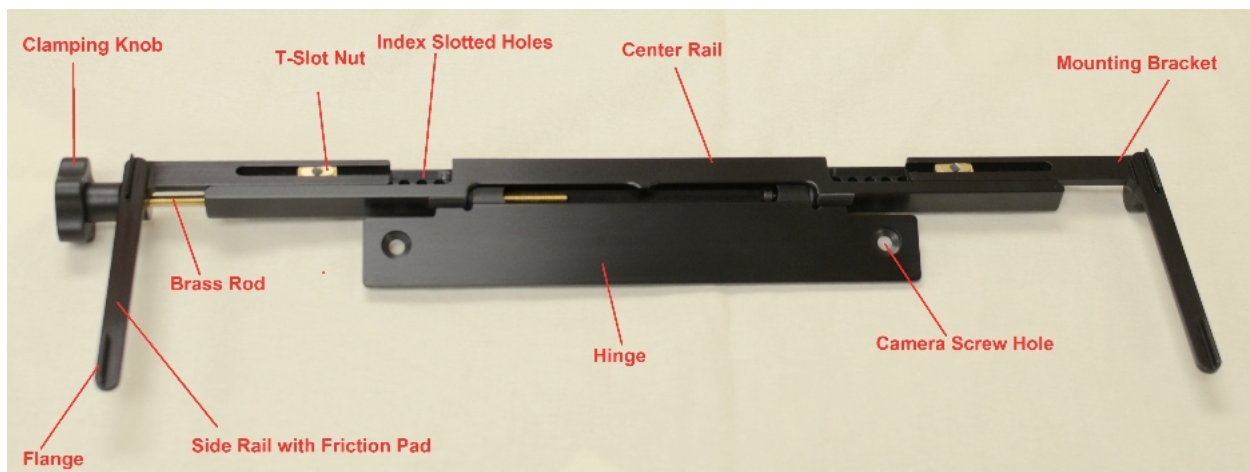
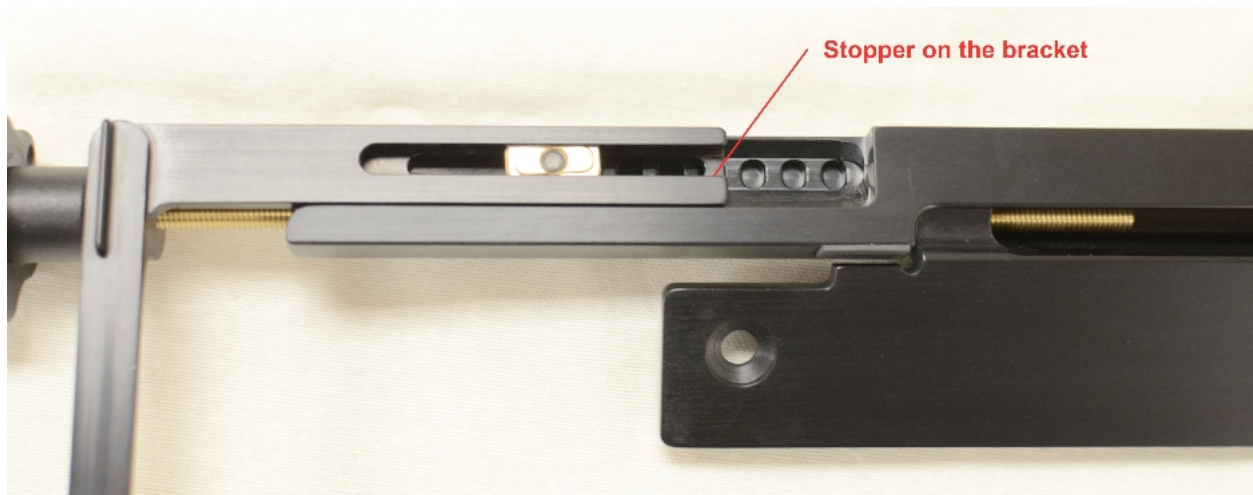


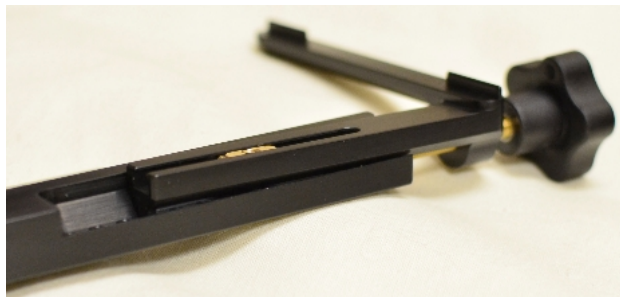
Figure 4-2 Parts of a Laptop Mount



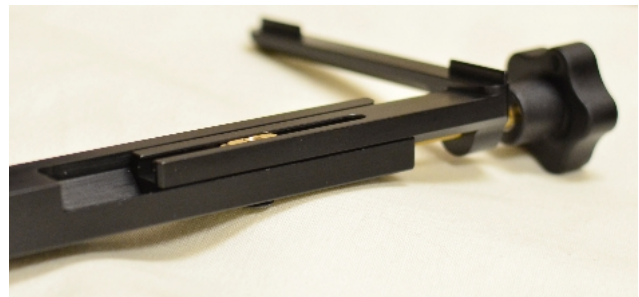
A



B



C



D

Figure 4-3: Adjusting the Span of the Mounting Brackets (A – Screws Need to Be Loosened for Adjustments; B – Stopper on the Mounting Brackets Should be Seated in one of the Holes; C – Stopper not Properly Seated; D – Stopper Properly Seated)

Place the laptop mount on top of the keyboard area of the laptop, with the clamping knob on the right side (see panel A of Figure 4-3). If the two side rails of the mounting brackets are not resting on the edges of the laptop, then the span of the mounting brackets needs to be adjusted. Use the supplied screwdriver to loosen the two screws on the top of the center rail. Pull out or push in the side rails as required. You may want to do this one side at a time until the desired span is reached (so that the friction pads on the side rails sit on the left and right edges of the laptop). For the right side of the mount, you may need to loosen the clamping knob so that the side rail can be pulled out. Please note that the stopper on the side rail (see Panel B) is seated in one of the holes, so you will need to loosen the screw quite a bit so that the stopper can be re-seated into another hole. Before tightening the two screws, please check the side rail on the right – the stopper on the side rail should be firmly seated in one of the index slotted holes (panel C shows the stopper on the side rail is not seated in the hole; the side rail should be fully contacting the center rail as in Panel D).

If the camera is currently mounted on a tripod, first remove the camera by rotating the wheel on the tripod. Now place the camera on a desk with the screw holes facing up. Place the laptop mount (the side with two brass T-slot nuts facing up) on the camera, and install the two camera screws with the supplied screwdriver (see the left panel of Figure 4-4). Now flip the mount and place it on the laptop with the illuminator and the camera facing toward you (see the right Panel).

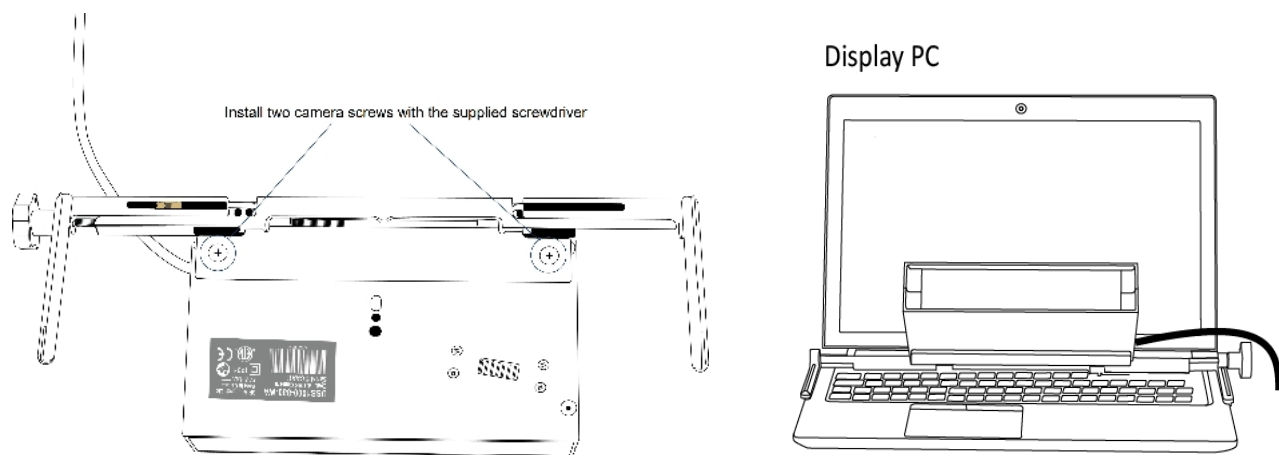


Figure 4-4: Installing Camera onto the Laptop Mount

4.2 Adjusting the Eye Tracker Setup

Follow the steps below to use the laptop mount to track eye movements on a 15" or 17" laptop screen. If you are using an external monitor, you should mount the eye tracker on a tripod – please follow the instructions provided in Chapter 3 “Eye Tracker Installation Using a Tripod” of this guide.

- 1) Please make sure you use a height-adjustable chair so that you can raise/lower the participant to the appropriate height. When the subject is seated, tilt the screen of the laptop so that it is perpendicular to the participant's line of sight.
- 2) Place the laptop mount over the keyboard area of the laptop, with the two side rails resting on the edges of the laptop. You can slide the mount forward if the camera is blocking the participant's view at the bottom of the screen; otherwise, the camera should be placed as close to the screen as possible without blocking the participant's view. Adjust the position of the laptop so that the eye tracker is placed at a distance of about 45 cm if measuring from the front of the unit to the participant's eyes. The camera is recessed about 7 cm behind the front of the enclosure, and the ideal eye-to-camera distance is about 52 cm.
- 3) After the subject is seated, check the camera image displayed on the Host PC. If the participant's eyes are not displayed in the vertical center of the camera view, adjust the camera angle by holding the camera with your left hand and tilting it to the intended angle, and then tightening the clamping knob on the right side of the mount to keep the camera at the intended position. Adjust the angle of the laptop if the participant's eyes are not displayed in the horizontal center of the camera view.
- 4) **Please follow “Section 5.4 Customizing Screen Settings” to update tracker configuration.**

5. Testing the Host PC Installation

WARNING: Do not cover the eye tracker at any time when the unit is connected to the Host PC and the Host PC is turned on. Do not place any object on top of the unit that could block air circulation. If the unit has been inadvertently covered during operation, it could become hot enough to be a burn hazard. Turn off the Host PC or remove the eye tracker USB cable, uncover the unit, and let it cool before touching it or allowing participants in the area.

Make sure you have connected both plugs of the USB cable to USB 3.0 ports on the Host PC. Now turn on the computer. The EyeLink Portable Duo Host application will start automatically. You will first see an EyeLink Portable Duo splash screen, followed by the Setup screen of the Host Application. The version of the Host software that is being used is displayed on the splash screen as well as in the lower-left corner of the Setup screen. Please make sure that you are using the latest version of the Host software, which can be downloaded from the SR Research support website <http://www.sr-support.com> and can be installed using the System Update tool (see section 5.1). Please try to stay up to date with the current Host software as we periodically release updates that improve the software.

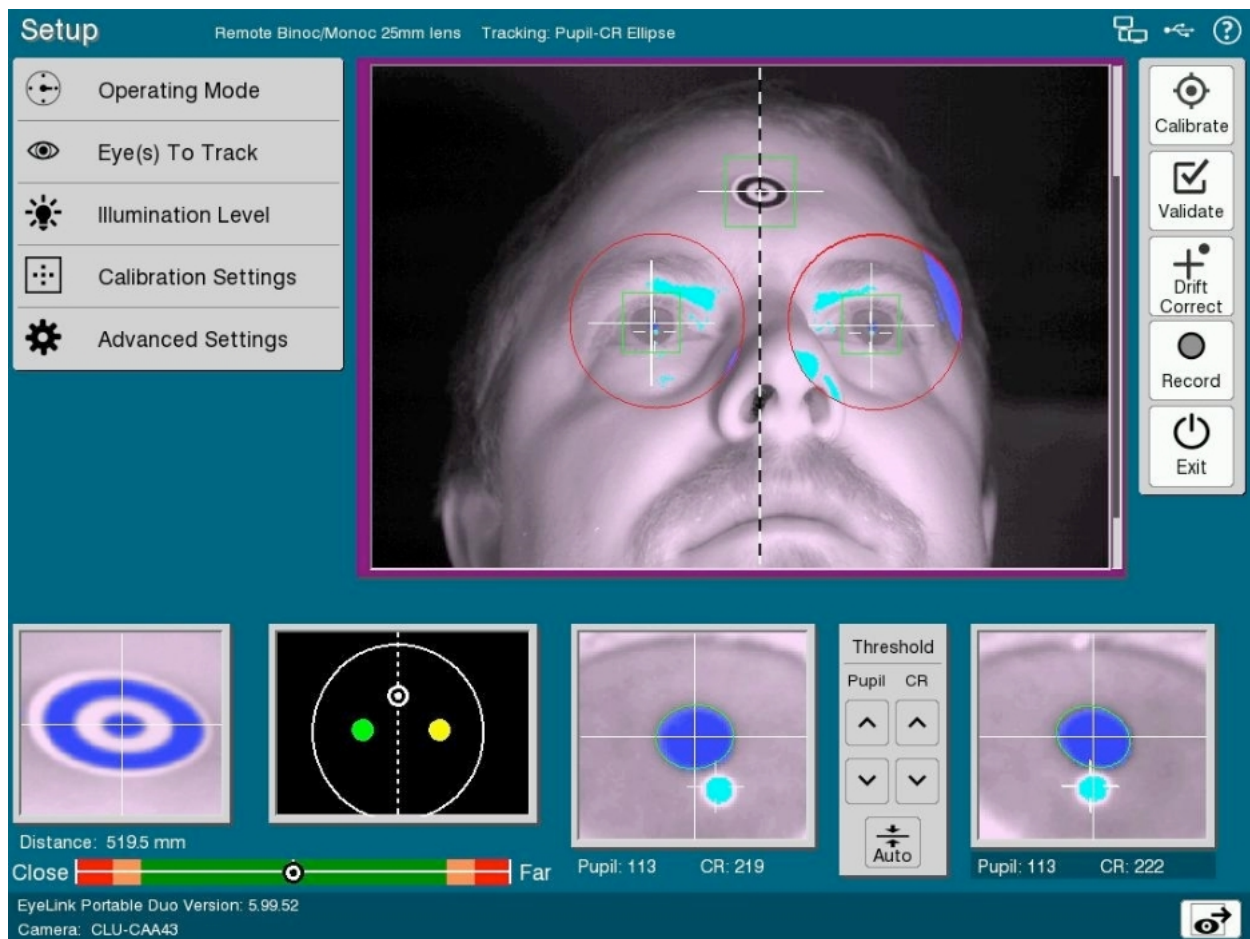


Figure 5-1: Host Application Camera Setup Screen

A screenshot of the large field of view of the EyeLink Portable Duo camera (remote, head free-to-move mode) is illustrated in Figure 5-1. Please consult Chapter 3 of the EyeLink Portable Duo User Manual for a tutorial related to setting up the camera, calibration, and validation. For proper data collection, you will also need to review the following sections of this installation guide: section 5.4 “Customizing Screen Settings” and Chapter 6 “Display PC Hardware and Software Installation”.

At any time, you can close/exit the Host Application by pressing Ctrl+Alt+Q (press all three keys together) on the Host PC keyboard or by clicking on the “Exit” button on the Setup screen. This will bring you to the Web User Interface (Web UI). Figure 5-2 is a screenshot of the Web UI with File Manager running (a detailed description of this interface can be found in section 2.1 “Web User Interface” of the EyeLink Portable Duo User Manual). From the Web UI, the Host Application can be started by clicking on the tracker icon (👁️) on the toolbar. To turn off the Host PC, click the "Shutdown" button (🔌).

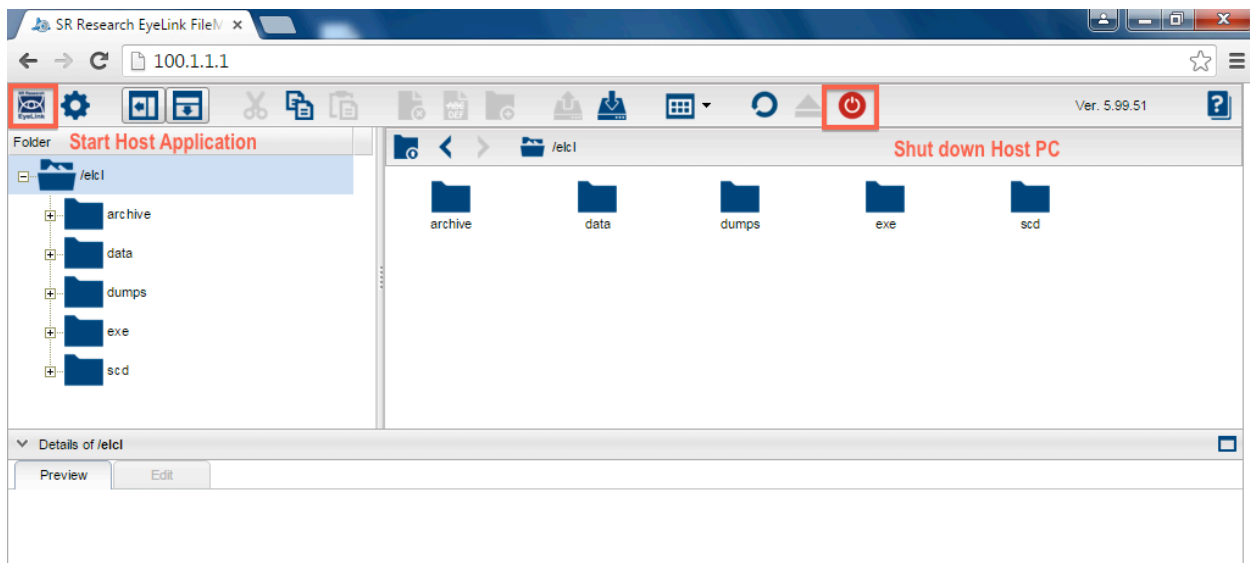



Figure 5-2: Example Screen from Web UI Displaying File Manager

5.1 Host Software Update

The EyeLink Portable Duo Host Application installed on the eye tracker can be updated through the Web UI, which can be accessed from the Display PC as well as the Host PC. To do so, first download the latest version of the Host Application from our support website <http://www.sr-support.com> (go to "Downloads -> EyeLink Host Software -> EyeLink Portable Duo Host software"). Copy the file to the Host PC or Display PC that runs the Web UI. Click on the “Configuration” icon (⚙️) on the File Manager toolbar, and then select “System Update”

(). Now choose the “Update” tab (see Figure 5-3) and click on the "Browse ..." button to locate the intended Host Application update file and then click "Update". Wait until the Host Application is updated - please be patient as this process may take a few minutes to complete. The Host Application will restart when the update process completes. In some rare cases, you may want to revert back to an earlier version of the Host software. The System Update tool has a "Rollback" tab that allows you to choose a particular version of the Host Application to revert to.

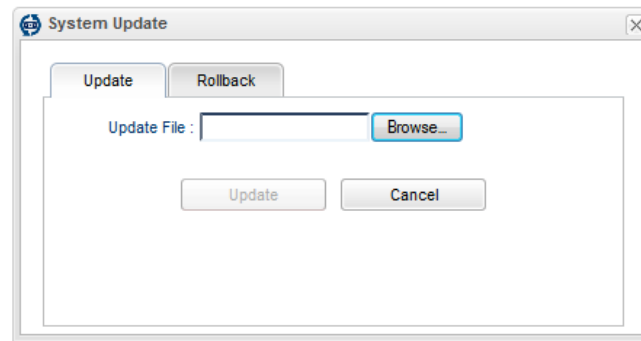


Figure 5-3: Updating Host Software through Web UI

5.2 Troubleshooting Instructions

If the EyeLink Portable Duo Host Application fails to start, please watch closely for the error message displayed on the Host screen. The complete error message is saved to the eye.log file in the “\elcl\data” folder and is retrievable through the File Manager. Try clicking on the tracker icon in the file manager to restart the Host Application. If the problem persists, please contact us (support@sr-research.com).

This section lists some of the error messages you may see when starting the Host Application.

5.2.1 No Frame Detected / frame rate or clock error -- restarting

Sometimes, the Host Application will not start, with the following error displayed in the Web UI.

```
ERROR: NO FRAMES DETECTED!
```

```
ERROR: frame rate or clock error - restarting
```

Please click on the “File Manager” link on the top. This will bring you to the File Manager interface. Click on the shutdown button to power off the Host PC. Try unplugging the USB cable and then plugging both plugs of the cable back to the USB 3.0 ports on the Host PC. Now turn on the Host PC. If the problem is not resolved, contact us (support@sr-research.com).

5.2.2 **ERROR: -67: Can't find SR Research USB Camera!**

If you are seeing the following error displayed in the Web UI when trying to start the Host Application,

ERROR: -67: Can't find SR Research USB Camera! USB3 Cable to the Camera is unplugged please do the following:



- 1) Click on the “File Manager” button at the top of the screen. This will bring you to the File Manager interface.
- 2) First check whether both plugs of the USB cable are attached to the USB 3.0 ports of the computer. If not, please attach the cable and click on the “Start Tracker” button.
- 3) If the problem remains, try unplugging the USB cable when the File Manager is running on the Host PC, plugging both connectors of the cable back to the USB 3.0 ports on the Host PC, and then clicking on Shutdown button in the File Manager to power cycle the camera. Now restart the Host PC. Repeat this procedure a few times if the problem persists.

5.3 **EyeLink Data Storage**

All eye tracker recording data files (.EDF), log files (.LOG), and screen captures (.JPG) that are created during an eye tracking session will be saved to the “\ELCL\DATA” folder on the Host PC. You can download the files to the Display PC (if accessing the Web UI via a web browser on the Display PC) or save them to a USB flash drive using the File Manager (see section 2.1.1 “File Manager” of the EyeLink Portable Duo User Manual).

5.4 **Customizing Screen Settings**

To correctly compute visual angles, saccade amplitudes, and eye velocities, the EyeLink Portable Duo eye tracker needs to know the physical characteristics of your setup. Any time you change your physical configuration (for example, if a new monitor is used, the position of the existing monitor is changed, or if using the head-stabilized mode and the eye-to-screen distance needs to be updated), you should use the Screen Settings tool to verify whether the parameters accurately reflect your current setup. Alternatively, you can pass the relevant parameters to the Host PC via your stimulus display software.

The Screen Settings tool can be accessed by clicking on the “Configuration” icon () on the File Manager toolbar, and then selecting the “Screen Settings” icon (). The first three parameters of the Screen Settings interface (“Screen Dimensions”, “Display Resolution”, and “Eye-to-Screen Distance”) are important for all setups whereas the last two parameters “Camera-to-Screen Distance” and “Optimal Target-to-Camera Distance” are important only for Remote Mode use.

5.4.1 Screen Dimensions

The "Screen Dimensions" section of the Screen Settings tool lets the eye tracker know the size of the Display PC monitor that is being used in the experiments. All screen physical coordinate measurements are in millimeters. Turn on both the EyeLink Host PC and Display PC. Run your intended experiment (if you don't have one, use the Track example supplied). When the experiment starts up, measure the currently lit-up/viewable portion of the monitor. Please note that the monitor may adjust the lit-up portion depending on the refresh rate and screen resolution used. For example, some wide-screen monitors may have black edges/margins when running experiments at non-native resolutions; the screen width and height should be measured as the lit-up portion of the display, excluding the black edges/margins. Take down the measurements you have in millimeters and enter them in the following dialog box. Click "Save" and then click the "Next" button. The following screen capture illustrates a display setup with width of 400 mm and height of 300 mm.

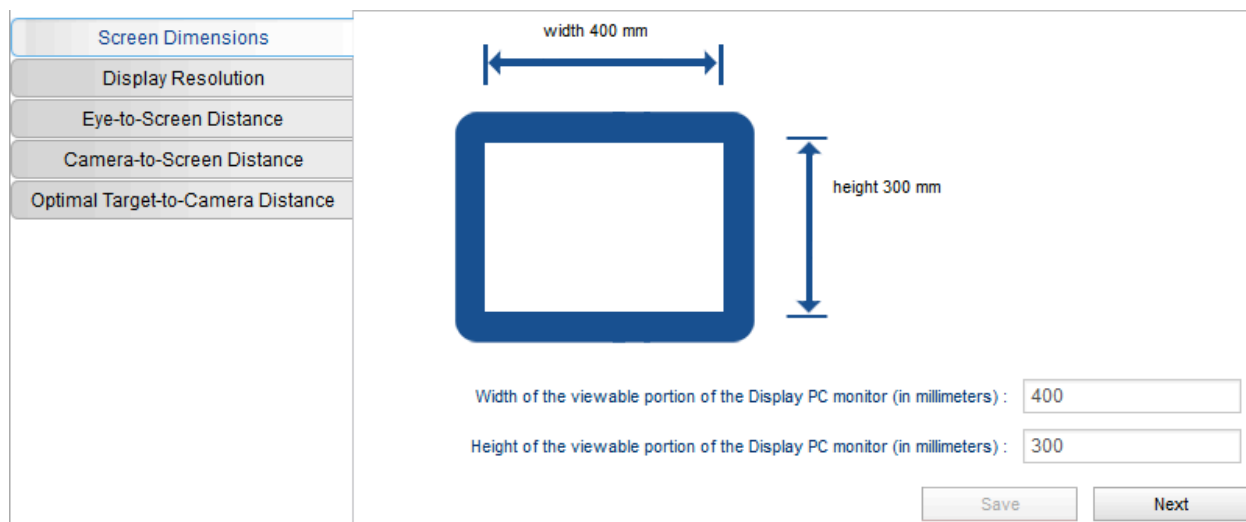


Figure 5-4: Updating Screen Dimensions

Use the "screen_phys_coords" command if you choose to pass the screen dimensions to the Host PC via your stimulus presentation software - see the PHYSICAL.INI file in the "/ELCL/EXE" folder for detailed instructions.

5.4.2 Display Resolution

Now you will see a screen that allows you to specify the resolution of the Display PC monitor that is used when you run your experiments. If you are using SR Research Experiment Builder to program/run your experiments, then it will adjust this automatically at the start of an experiment (based on the resolution settings of the Experiment Builder project itself), so you do not need to manually change these resolution settings. If you are using other experimental programming environments on the Display PC (e.g., Psychtoolbox, E-Prime, Presentation), it is recommended that you configure the display resolution setting by sending the "screen_pixel_coords" command to the eye tracker in your experiment code (please see the

examples that come with the EyeLink Developers Kit for an illustration of how this can be done). If the EyeLink Developers Kit/API is not being used (e.g., you are doing a stand-alone recording, or your own experimental programming software doesn't send out the "screen_pixel_coords" command), then the value specified for this parameter will apply. In this case, please enter the resolution that your monitor will be using during your experiment (e.g., 1024 × 768 into the cells; see Figure 5-5) and save the changes.

Figure 5-5: Updating Display Resolution

Use the "screen_pixel_coords" command if you choose to pass the display resolution to the Host PC via your stimulus presentation software - see the PHYSICAL.INI file in the "/ELCL/EXE" folder for detailed instructions.

5.4.3 Eye-to-Screen Distance

Please follow the steps below to enter measurements that inform the eye tracker of the eye-to-screen viewing distance.

- 1) For users of the Head-Stabilized Mode of the eye tracker, set up the monitor and chinrest so that the chinrest is horizontally aligned with the monitor (**HINT**: measure from 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 such that when the participants are seated and looking straight ahead, their eyes are level with the top quarter of the monitor. The monitor can be tilted up slightly if you prefer. Now measure from the participant's eye to the top of the visible part of the display area, then from the eye to the bottom of the

display area. Enter these two values (in millimeters) in the Eye-to-Screen Distance screen (see the figure below) and click the "Save" button.

Screen Dimensions

Display Resolution

Eye-to-Screen Distance

Camera-to-Screen Distance

Optimal Target-to-Camera Distance

distance to top 700 mm

distance to bottom 760 mm

Distance from eye to the top of the viewable portion of the Display PC monitor (in millimeters): 700

Distance from eye to the bottom of the viewable portion of the Display PC monitor (in millimeters): 760

Save Back Next

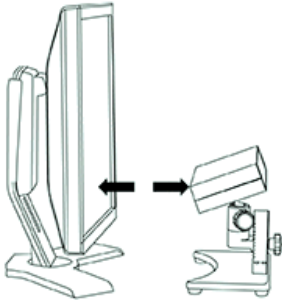
Figure 5-6: Updating Eye-to-Screen Distance

Use the "screen_distance" command if you choose to pass the eye-to-screen distance to the Host PC via your stimulus presentation software - see the PHYSICAL.INI file in the "/ELCL/EXE" folder for detailed instructions.

5.4.4 Camera-to-Screen Distance

When setting up the EyeLink Portable Duo eye tracker, the camera may be placed at various distances relative to the Display PC monitor. In some setups, the camera might be placed right in front of the Display monitor with no extra space between the eye tracker and the monitor. In other setups (especially when a large Display monitor is used), it is often necessary to move the monitor back while keeping the camera at its optimal distance from the participant, so as to increase the distance between the participant and the screen while still ensuring that the eye tracker can track the participants properly. For the proper calculation of the eye-to-screen distance in the Remote Mode, the eye tracker needs to know the camera-to-screen distance. Measure the closest distance (in millimeters) from the back of the camera to the Display monitor. Enter the measured value in the following screen and click on the "Save" button.

Screen Dimensions
Display Resolution
Eye-to-Screen Distance
Camera-to-Screen Distance
Optimal Target-to-Camera Distance



Camera-to-Screen distance 40 mm

Measure the closest distance between the camera (from the back of the camera case) and display monitor (in millimeters) :

Note: This setting is only applicable Remote mode (head-free-to-move tracking with a target sticker). If you are using the head-supported mode (with a chin rest), you can ignore this field and use the default settings.

Figure 5-7: Updating Camera-to-Screen Distance

Use the “remote_camera_position” command if you choose to pass the camera-to-screen distance to the Host PC via your stimulus presentation software - see the PDUORBTABLEU.INI file in the “/ELCL/EXE” folder for detailed instructions (please add 50 mm to the measured distance because the camera is recessed about 50 mm from the back of the enclosure).

5.4.5 Optimal Target-to-Camera Distance

The Remote Mode of the EyeLink Portable Duo eye tracker provides head distance estimation via the use of a small target sticker placed on the participant’s forehead. The optimal operation distance of the target sticker relative to the camera is about 520 mm. The following edit box specifies the mid-point/optimal distance reported in the distance scale provided in the Setup screen. Given the operating range of the Portable Duo, this value should not be less than 470 or more than 600. We recommend you leave the default value of 520 unless there are some specific circumstances that require you to routinely place participants slightly closer or further away.

Screen Dimensions
Display Resolution
Eye-to-Screen Distance
Camera-to-Screen Distance
Optimal Target-to-Camera Distance

Distance mid point (in millimeters) :

Note: The optimal operation distance of the target sticker relative to the camera is about 520 mm. The above edit box specifies the mid-point/optimal distance reported in the distance scale provided in the Setup screen. Given the operating range of the Portable Duo, this value should not be less than 470 or more than 600. We strongly recommend you leave the default value of 520 unless there are some specific circumstances that require you to routinely place participants slightly closer or further away.

Figure 5-8: Optimal Target-to-Camera Distance

Use the “remote_distance_warn_range” command if you choose to pass the optimal target-to-camera distance to the Host PC via your stimulus presentation software - see the PDUORBTABLEU.INI file in the “/ELCL/EXE” folder for detailed instructions.

6. Display PC Hardware and Software Installation

The Display PC is used to run the experimental presentation software and to control the EyeLink Portable Duo eye tracker and stimulus presentation through the EyeLink Developers Kit/API. This API is available on Windows, Mac OS X and Linux platforms. The latest version of the Developers Kit can be downloaded from the 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 provided below.

6.1 Display PC Hardware Installation

The requirements for the Display PC vary greatly depending upon what experimental paradigms 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 generally need a faster hard drive to support the transfer of large video files and display them on the monitor in a timely manner. The following requirements are *recommendations* for Display PC specifications that should be able to handle most experimental requirements. Please contact an SR Research Ltd. representative if you have specific questions about your situation and would like our input.

- Recent Intel CPUs with duo-core/multi-core processor
- 250 GB or larger hard disk with 7,200 or higher RPM, or solid-state hard drive
- A recent video card with at least 1.0 GB of memory that supports a vertical refresh rate of at least 100 Hz
- At least 4 GB RAM
- 32-bit or 64-bit Windows XP, Vista, 7, 8, or 10; or Mac OS X 10.6.8 or higher
- A CRT or LCD monitor with high refresh rates and low response times
- A dedicated Ethernet port to connect the Display PC to the EyeLink Host PC
- Optional Ethernet card for use on local network or internet access
- A keyboard and mouse
- Free USB ports (if an EyeLink Data Viewer/SR Research Experiment Builder license key is to be used).

Set up the Display PC at the desired location (see Section 1-1 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.

6.2 Windows Installation

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

- Install the EyeLink Developers Kit for Windows.
- Install EyeLink Data Viewer and/or Experiment Builder software (if these will be used).
- Install the USB Key driver for EyeLink Data Viewer and/or Experiment Builder software (if these will be used).
- Configure the network connection to the EyeLink Host PC.

6.2.1 Installing the EyeLink Developers Kit for Windows

The EyeLink Developers Kit for Windows (including the EyeLink API and example files) is available in the “Display PC Installation” directory of the “EyeLink Portable Duo Software” USB drive. To update or install the most recent copy of the EyeLink Developers Kit for Windows, please visit <https://www.sr-support.com/showthread.php?6>. To install the Developers Kit:

1. Insert the “EyeLink Portable Duo Software” USB drive into the Display PC.
2. Open the “Display PC Installation -> Windows -> EyeLink Development Kit” folder.
3. Copy the EyeLinkDevKit_*.exe to the computer desktop. Run the installer 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.

6.2.2 Installing the EyeLink Data Viewer and Experiment Builder Software

EyeLink Data Viewer and SR Research Experiment Builder are optional applications for the EyeLink eye tracker. If you do not plan on using these software packages this section may be skipped. To update or install the most recent copy of EyeLink Data Viewer, please visit <https://www.sr-support.com/showthread.php?4434-EyeLink-Data-Viewer>. To update or install the most recent copy of SR Research Experiment Builder, please visit <https://www.sr-support.com/showthread.php?9>.

1. Insert the “EyeLink Portable Duo Software” USB drive to the Display PC.
2. Open the “Display PC Installation -> Windows -> EyeLink Data Viewer” folder.
3. Copy the EyeLinkDV_*.exe to the computer desktop. Run the program by double clicking on 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 the installation.

6. Open the “Display PC Installation -> Windows -> SR Research Experiment Builder” folder.
7. Copy the SREB_*.exe to the computer desktop. Run the program by double clicking the icon and follow the instructions from the InstallShield Wizard.

6.2.3 USB License Key Installation

If you purchased either the EyeLink Data Viewer or SR Research 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 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.

6.2.4 Setting up the EyeLink Network Connection

You must have an Ethernet port in your Display Computer in order to make the connection to the EyeLink Host PC. Allow Windows to install drivers for that Ethernet port (if it is new hardware), then follow these instructions to configure the TCP/IP network protocol. These instructions are based on Windows 7; instructions for other Windows operating systems may vary slightly.

1. From the Start menu select “Control Panel”.
2. Click on the “Network and Internet Connections” icon, and then select the “Network and Sharing Center” icon. In the following Screen, choose “Change adapter settings” icon on the left side panel (see Figure 6-1).

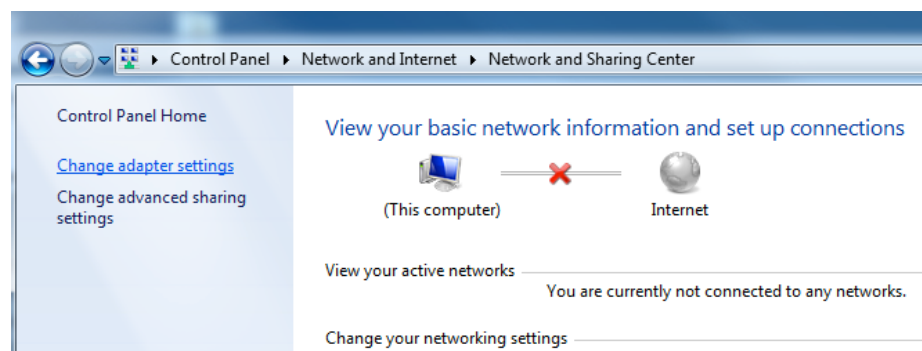


Figure 6-1: Choose “Change Adapter Settings” Option

3. Check the list of installed components to make sure a network card is detected. If not, install the driver for the network card.
4. Double click on the network card icon that represents the network card that will be connected to the EyeLink Host PC.
5. Select the “Properties” button.
6. Select the “Internet Protocol Version 4 (TCP/IPv4)” and then click on the “Properties” button (see Figure 6-2).
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 (see Figure 6-2).

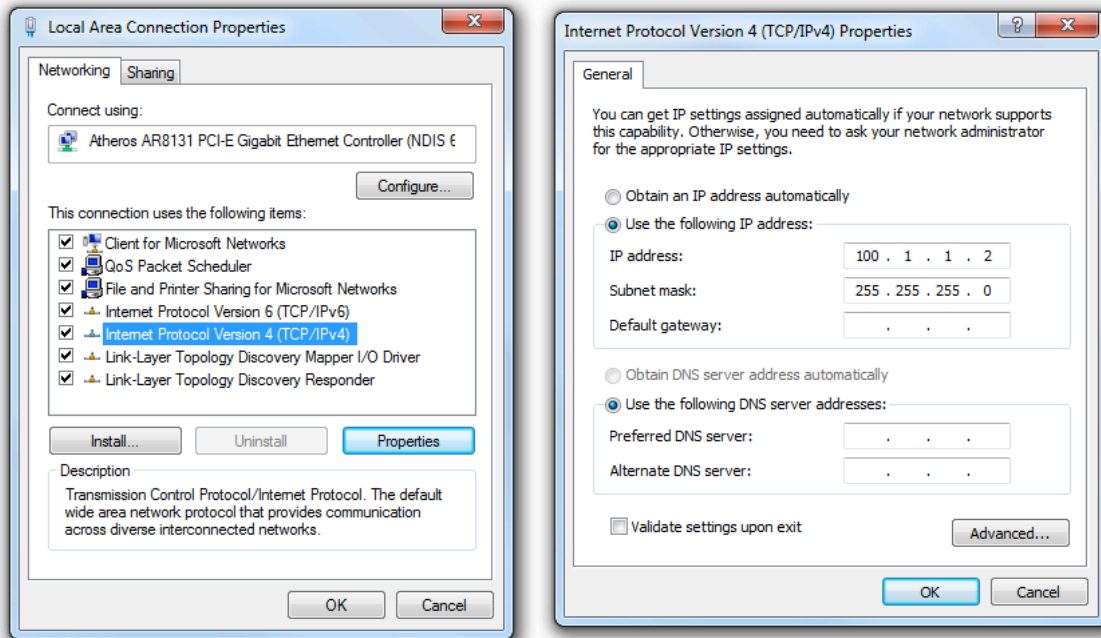


Figure 6-2: Configure IP Address on Windows 7

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.

To test the network connection, start the EyeLink Portable Duo eye tracker and start the “Track” application from “Start -> All Programs -> SR Research -> Track”. The link should connect, and the screen will display instructions. This application allows you to practice participant setup and test the system. If the message “Cannot initialize link” appears, the TCP/IP protocol or network cable 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. On the Workstation Host PC, the network cable should be

connected to the Ethernet port with the “Display PC Ethernet” label on it. On the Laptop Host PC, the network cable should be plugged to that computer’s only Ethernet port.

6.3 **Mac OS X Installation**

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

- Install the “Mac OS X Display Software”. The installer disk image is located in the “Display PC Installation/Mac” folder of the “EyeLink Portable Duo Software” USB drive – 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 Mac OS X, 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 EyeLink Data Viewer, if you plan to use this software. The installer disk image is located in the “Display PC Installation/Mac” folder of the “EyeLink Portable Duo Software” USB drive – the latest version of the software can be downloaded from SR Research Support website (<https://www.sr-support.com/showthread.php?4434>).

Mount and open the disk image under Mac OS X, then click on the installer and follow the instructions, using the default settings as prompted. Data Viewer will be installed in the “Applications -> EyeLink DataViewer 2.x” directory.

- Install the USB HASP Key driver for EyeLink Data Viewer. Mount the “HASP Key Driver.dmg” disk image in the “Applications -> EyeLink DataViewer 2.x” directory 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.
- Install SR Research Experiment Builder, if you plan to use this software. The installer disk image is located in the “Display PC Installation/Mac” folder of the “EyeLink Portable Duo Software” USB drive – the latest version of the software can be downloaded from SR Research Support website (<https://www.sr-support.com/forums/showthread.php?t=9>).

Mount and open the disk image under Mac OS X, then click on the installer and follow the instructions, using the default settings as prompted. Experiment Builder is installed in the “Applications -> ExperimentBuilder” directory.

- Configure the network connection to the EyeLink 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 IPv4 drop-down list, and enter the above IP address and subnet mask (see Figure 6-3).

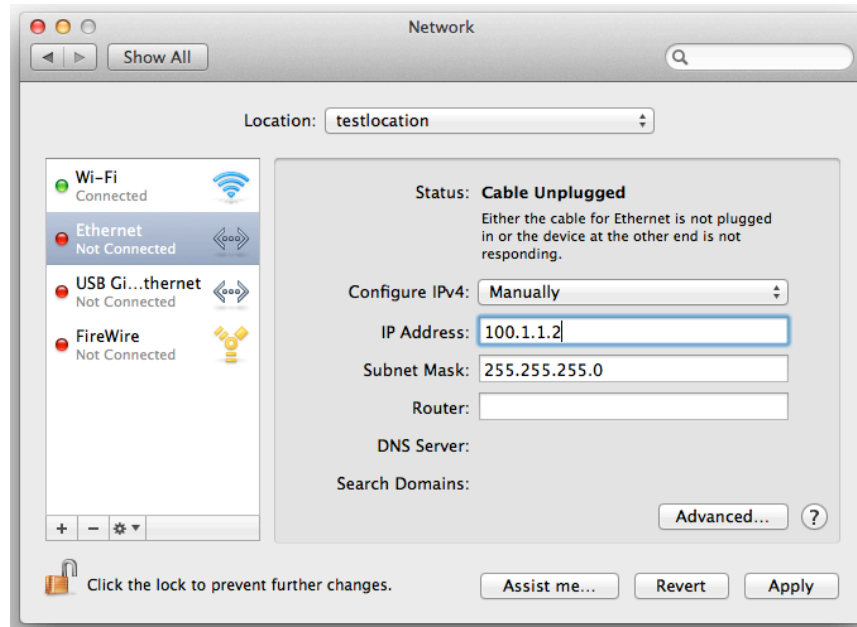


Figure 6-3: Configure IP Address on Mac OS X

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/EyelinkToolbox/EyelinkDemos/GazeContingentDemos".