Quick Guide to Fitting and Calibrating
the ASL Model 501 Eye Tracker
(with Eye-Head Integration)

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Software Startup

1. Turn on the Model 6000 interface and the Windows-based control computer.

2. Toggle the Headtracker switch from STANDBY to the FLY position.

3. Turn on the scene camera monitor and the eye camera monitor. Confirm that Monitor A/B switches are set to the “A” position.

4. Start the **Eye-Trac 6 GUI** program (click the *Eye Trac 6 GUI* icon).

5. Enable the **HT**, **EHI** and **SSC** interface buttons (in that order).

![ASL Eye-Trac 6.6 Net User Interface](image_url)

**Figure 1.**
Eye-Trac 6 GUI screen.
Prepare Head-Mounted Optics

6. While the head gear is still on the mannequin:
   a. swing visor "up" and out of the way.
   b. expand headband to maximum diameter

7. Set head gear on subject's head such that:
   a. the cross-strap rests on top of the head
   b. the hat band is about one inch above the eye brows
   c. the scene camera is centered on the nasion and out-of-the-way
   d. Attach the "tension relief clip" to the subject's shirt/collar.

8. Gently tighten the headband (too loose is better than too tight).

9. Check Illuminator Power checkbox on Eye Trac6 GUI software interface console (This turns on the IR eye camera illumination source) (see Figure 2 below). Keep the Auto Discrimination feature unchecked for now.

10. Move the Illuminator Level slide switch to about 1/2 of full scale.

11. Turn the Pupil Threshold and CR Threshold slide switches to their minimums.

Figure 2.
Illuminator and Pupil/CR Discriminator Interface.
12. Move the visor "down" into the subject's line of sight.

13. Position the visor angle to approximately 45 degrees (Close to - but not touching - the nose).

14. Point the eye camera slightly toward the visor and slightly toward the subject's face.

15. While viewing the eye camera monitor:
   
   a. Have the subject gaze at the central fixation point.
   b. Adjust the angle of the visor until the pupil is *vertically centered* in the eye camera’s monitor.
   c. Focus the eye camera by sliding the focusing tube up or down (see Fig 4).
   d. Slide the eye camera module laterally until the pupil is horizontally centered (see Figure 5).
Figure 4.
Telescoping eye camera focusing tube; fully retracted on the left and fully extended on the right.

Figure 5.
Lateral translation of eye camera optics module needed to horizontally center the image of the pupil.
16. The CR landmark should be near the center of the pupil in the eye camera monitor (if not, repeat steps 15 a-d).

Troubleshooting Hint:
The most likely reason for serious problems positioning the CR stem from a poorly positioned eye camera. If you can't seem to get the CR into the lower half of the pupil, return to step 14 and align the eye camera module so that it points more toward the subject's face. Note: Repositioning the eye camera will necessitate a readjustment of the visor position (see Figure 6).

Figure 6. Rotation of the eye camera and visor needed to center the CR in the lower half of the pupil image. Usually, the eye camera needs to point toward the subject's face. It is pointing away from the subject's face in the figure above.
Setting the Discriminator Thresholds

Now that you have the pupil centered in the eye camera and the CR located somewhere near the center of the pupil, you can begin the processes of interactively setting the Pupil and CR discrimination thresholds.

17. Adjust the **Illumination Level** slide switch so that the pupil is brighter than the surrounding iris but NOT so bright that the CR is difficult to see when superimposed upon the pupil. Try to use as little IR illumination as you can in order to avoid spurious corneal reflections (Usually 1/3 full scale works best).

18. Check the **Auto Discrimination** box to instruct the Eye Trac 6 software to automatically select the pupil and CR thresholds that its algorithms estimate as optimal. This will establish a “ballpark” estimate. Once this estimate has been achieved you should “uncheck” the **Auto Discrimination** box to return to full manual adjustment mode.

19. While viewing the eye camera monitor:
   Adjust the **CR Threshold** slide switch until the CR is fully outlined by the circular graphics overlay. Adjust the level up and down several times to find the point where "speckle" noise" is minimized. Make sure that the BLACK cross hairs indicating CR position are stable.

20. While viewing the eye camera monitor:
   Adjust the **Pupil Threshold** slide switch until the pupil is fully outlined by the circular graphics overlay. Adjust the level up and down several times to find the point where "speckle noise" is minimized. Again, look for stable WHITE cross hairs.

**Note:** The circular graphic overlays of both the pupil and CR landmarks are "shifted" slightly to the right. This is normal (resulting from the slight time lag between the computation and the video monitor's horizontal raster scan sequence generator).

**Keyboard Shortcuts:**

- **Page Up** Illuminator Level Increase
- **Page Down** Illuminator Level Decrease
- **Arrow Up** Pupil Threshold Increase
- **Arrow Down** Pupil Threshold Decrease
- **Arrow Right** CR Threshold Increase
- **Arrow Left** CR Threshold Decrease
Eye Tracker Calibration.

Now that the pupil and CR are centered in the eye camera and the ASL software is reliably discriminating their relative locations, you are ready to calibrate the eye tracker.

21. Enter the standard calibration mode via the Calibrate|Standard Calibration menu. The Eye Tracker Calibration dialog box shown in Figure 7 will appear.

![Eye Tracker Calibration dialog box](image)

Figure 7.
Interface used for calibration of the subject.

22. Tell the subject to look at calibration point #1. While the subject is looking at the Specified point, inspect the eye camera monitor to verify that the CR is being properly discriminated. Next, click the Save Current Point button to register the calibration information. The interface dialog will automatically increment the calibration stimulus to the next number. Repeat this process until ALL 9 points have been calibrated.

Note: The SPACEBAR can be used as a keyboard shortcut (see Figure 7).

23. The new calibration will take effect as soon as you click the Calibrate and Exit button.

You are now ready to collect eye tracking data. Use the File Menu to open a new file for saving your data.