

## Tri-linear Sensor

EtherLynx 2000+ cameras have a “Tri-linear” sensor fitted as standard on color and black and white cameras. This technology offers almost 4,000 light sensitive cells in the camera. As a result, the camera is highly light-sensitive and can be used in lower light conditions than before. The new sensor configuration means that special care needs to be taken during the alignment process.

When using the Tri-linear sensor, it is important to ensure that the competitors in the image are correctly proportioned. If the competitors appear too tall and thin or too short and round, then color fringing will be visible around areas of solid color.

Color fringing will also appear if the camera **Image Orientation** is incorrectly set. To check this setting, open the **Camera Settings Dialog** by clicking on the camera name at the top of the **Hardware Control** window to highlight it in white, then click on the blue “i” information icon. Choose the **Setup** tab and adjust the **Image Orientation** value to reflect the camera location related to the athletes as they are running.

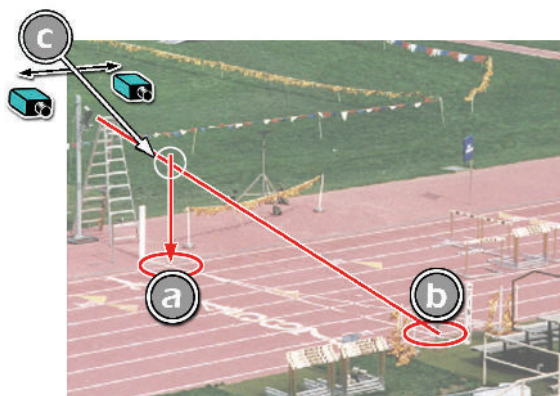
Figure 1 Camera Information Icon



## Step 1. Establish a camera position

We suggest that the camera is **at least 7 feet back** from the edge of the track, and at least 7 feet high. As much as possible, it should be same distance above the ground as it is back from the edge of the track – 7 feet back – 7 feet up; 10 feet back - 10 feet up; etc..

**The camera MUST be positioned PRECISELY in the Plane of the Finish line.**



- Set up the camera on the tripod or camera-pole in the APPROXIMATE position.
- Connect a long length of string to the camera securing screw (under the camera) and take the other end to the CENTER OF THE FINISHLINE ON THE FAR SIDE of

the track as shown. Have a volunteer hold the string taut at point **b**.

This is the **SIGHT LINE**.

- On the NEAR SIDE of the track have a volunteer hold the plumb bob so that it is suspended DIRECTLY ABOVE THE MIDDLE OF THE FINISH LINE at point **a**. This is the **PLUMB LINE**.
- Carefully move the tripod/pole either to the left or to the right until the two strings touch at point **c**.
- The Camera is now in the PLANE OF THE FINISHLINE. If the camera is level and pointing directly across the track (you may need to carefully pan the camera from side to side) you will be correctly aligned.

## Step 2. Connect the System Components.

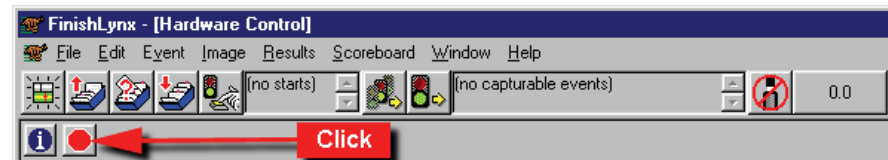
See the **Setup: Quick Start Guide**

## Step 3. Start the FinishLynx software by clicking on the FinishLynx Icon

## Step 4. Put the camera into Align mode

Click on the red icon in the top left hand corner of the screen. The location of the icon is shown in Figure 2 Camera Alignment Icon

Figure 2 Camera Alignment Icon



Check that Image appears. The red icon will switch to green, and you should see image appear on the screen.

If the image that appears is totally black, make sure you have remembered to remove the lens cap, and that the aperture of the lens is not shut all the way down (high *f* number).

**Note: The image on your screen will not look like a "regular" photo. A FinishLynx camera only scans, so an object must be in motion to appear similar to a photograph. To see something that looks like a "regular" photo, either have someone run in front of the camera, or pan the camera from side to side.**

## Step 5. Adjust Gain and Aperture for light conditions.

If Gain is near a value of 150, open the lens aperture (move the ring so the *f* number gets smaller). If the Gain is near a value of 1, close the lens aperture (move the ring so the *f* number gets larger). A value of 60 to 80 will allow for adjustment in either direction.

After your initial values have been set, switch the gain from **AGC** to **Manual**. To do this, open the **Camera Settings Dialog** by clicking the camera name at the top of the **Hardware Control** window, then click on the blue “i” information icon. Choose the **Parameters** tab and change the **Gain** setting from **AGC** (Automatic Gain Control) to **Manual**.

If the **Gain** is left on **AGC**, when the camera moves from the dark background off the finishline, to the white background when it is correctly aligned, the camera will endeavor to adjust the exposure and the image will suddenly darken.

When your camera is correctly aligned, return **Gain** setting to **AGC** for outdoor, daytime, events.

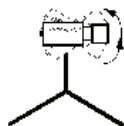
**Note: Under certain light conditions it may not be possible to adjust the aperture and the Gain setting will have to be left near the extremes.**

## Step 6. Adjust Tilt, Zoom and Mode to cover all lanes

Set the **Mode** value to **Zoom 100%**.

Aim the camera at a point approximately 2/3 of the way up the track.

Adjust the Tilt until the lane closest to the camera is right at the bottom of the screen and an area comprised of the track plus another couple of lanes-worth beyond is centered on the screen. You may need to adjust the Zoom on the lens, or change the **Mode** setting in the FinishLynx software.

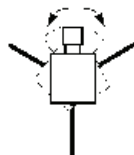


Make sure that the whole torso of a competitor in both the inside and outside lanes is fully visible. Simply have someone run through the finish line in the near and far lanes and see how they appear on the screen.

## Step 7. Adjust Pan and Swivel

Pan is the left-to-right rotational adjustment of the camera.

When the camera is slowly panned from one side and crossing the finish line to the opposite side, the operator will see the finishline appear on the screen as a vertical white stripe. The slower the camera is panned through the line, the wider the finishline will appear.

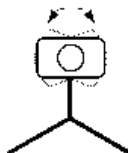


If the camera is panned in ever-smaller arcs the operator will end up with a predominantly white image on the screen when the sensor is aiming directly at the finishline.

Adjust the **Pan** until the track surface in the lanes appears white and the lane lines appear black across the screen as shown in Table 1 Camera Alignment. If you have a color camera, you can use the colors shown in the table to speed up camera alignment.

Sometimes, if the back of the camera is not perfectly horizontal (level) the image sensor will be rotated to one side or the other.

The symptom of this is a picture which shows perfect alignment (white background/black lines) in some lanes and misalignment (black background/white lanes) in others; this only occurs if the camera is fairly close to being in line.



Swivel can be adjusted in one of three ways: change the swivel adjustment on the tripod geared head; Extend the tripod legs to give the effect of rotating the whole camera. Shim one edge of the camera body relative to the platform on which it sits.

**Table 1 Camera Alignment**

Shown below - Camera Panning from left to right towards the finish line				
Arrows indicate direction camera needs to be moved to be on the finishline.				
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## Step 8. Adjust the Focus

Turn the outermost ring on the lens so that competitors in all lanes are clear and sharp.

## Step 9. Suggested Camera Settings

The system starts up in a default configuration for alignment; that is, **rate = 500** lines per second, **height = 500**, **mode = Zoom 100%**, and a **gain = AGC**.

Figure 3 Sample Camera Listing

Camera	Capture	Rate	Height	Mode	Gain	Orientation
Camera 1	Yes	500 (max 1000)	500 (max 500)	Zoom 100%	150	Left

If you are using two or more cameras, the camera that is highlighted in white in the camera listing on the **Hardware Control** window is the one that is currently being adjusted. To change cameras, simply click on one of the other cameras in this listing. To change a value, click on it, type the new value, and press the Enter key.

	Rate	Height	Mode
Sprint Races	800	500	Zoom 100% (if lens and camera position require, try Wide 50%)
Distance Races	600	500	Zoom 100% (if lens and camera position require, try Wide 50%)