

## ***User's Guide for the TriLED-1 Single Color LED "Eyes"***

Thank you for your purchase of the TriLED-1 Single Color LED Eyes from Animated Prop Systems. This LED controller is designed to be easy to use and this manual will describe how it works and how to connect it.

### **What does the TriLED-1 do?**

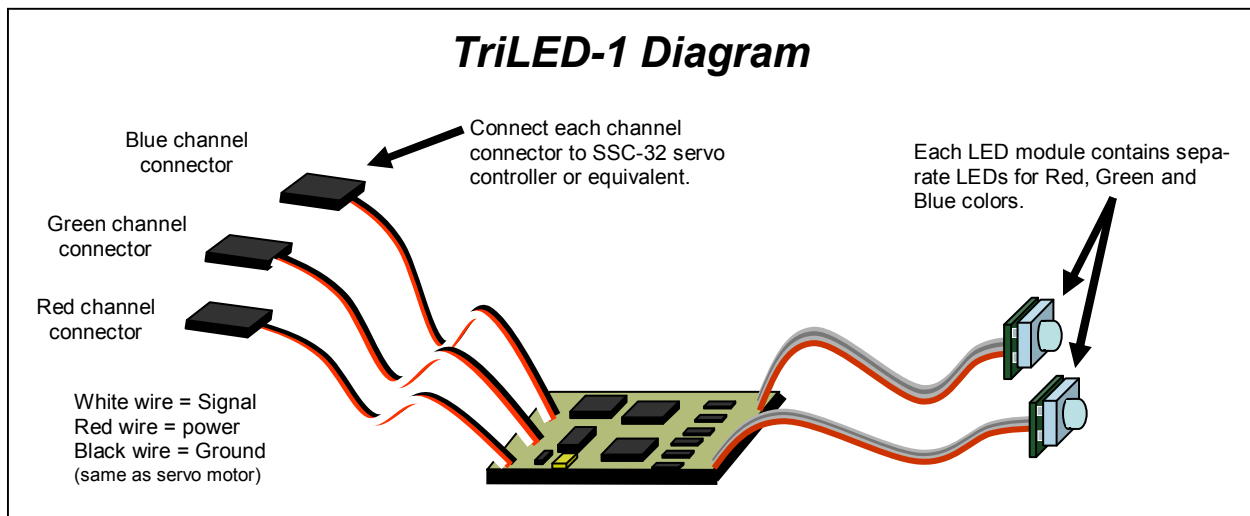
The TriLED-1 is a small PC board that allows you to control the color and brightness of two RGB LEDs by using a RC servo motor controller. The RGB LED modules have a red, green and blue LED in each unit. The two LEDs can be used to simulate "eyes" in theatrical type props as well as many other applications such as RC model headlights, running lights etc.

### **What else will I need to use the TriLED-1?**

In order for the TriLED-1 to operate, it must be connected to a controller of some kind that sends the signal to the TriLED-1 on how bright to set each color of the LEDs. There are essentially two ways you can do this:

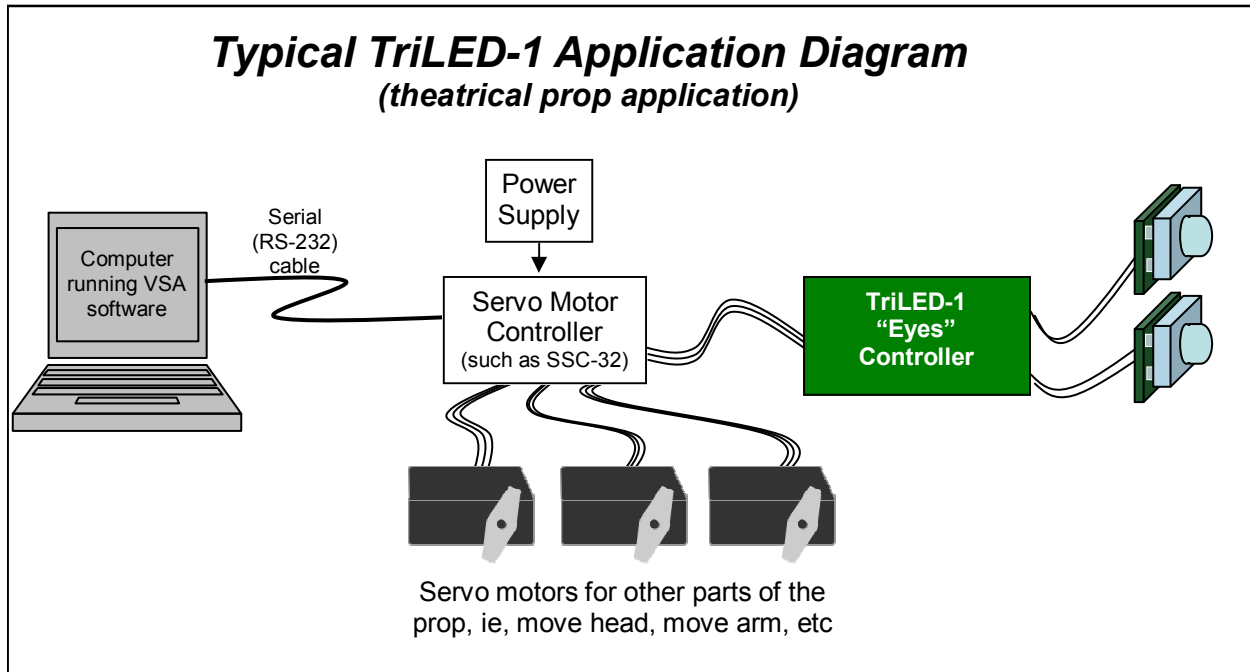
1) By far the easiest method of controlling the TriLED-1 is to use a RC style servo motor controller that connects to your PC and is designed to control the type of servo motors that are used in RC planes and cars. The TriLED-1 was specifically designed to work with this type of controller and instead of turning the shaft of a motor it will adjust the brightness of the LEDs. One choice for this type of controller is the SSC-32 by LynxMotion ([www.lynxmotion.com](http://www.lynxmotion.com)) which costs about \$40USD and connects to your PC via a serial (RS-232) cable. It has the capability to control up to 32 devices. If you choose this method you will also need some kind of software to send commands from your PC to the servo controller board. For this element, many people choose to use a program called Visual Show Automation (or VSA) by Brookshire Software ([www.brookshiresoftware.com](http://www.brookshiresoftware.com)). There is more information on using the TriLED-1 in this configuration in subsequent sections of this guide.

2) For more advanced users, you can also choose to control the TriLED-1 with a microcontroller of some kind that sends the pulse signal to determine the brightness level of each color LED. There is more information on this method at the end of this document.



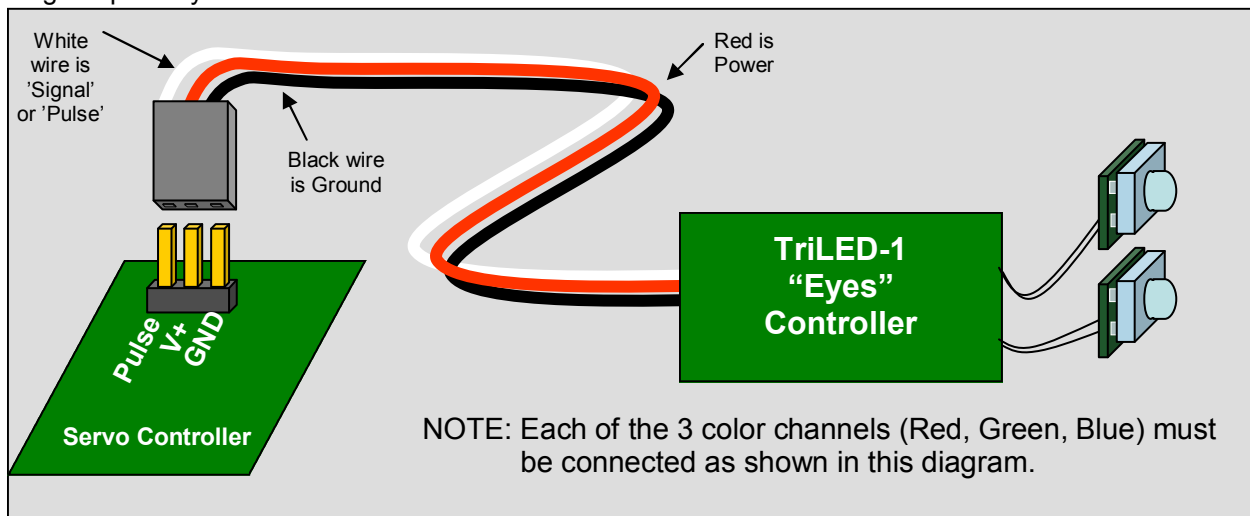
**Where does the TriLED-1 fit into a prop system?**

The diagram below shows what a typical application might look like for a theatrical type of prop. The computer is running the VSA software and is connected to a SSC-32 servo controller via a serial cable. The SSC-32 is controlling the brightness of the TriLED-1 “Eyes” as well as multiple servo motors that move other parts of the prop.



**How do I connect the TriLED-1 to my servo controller?**

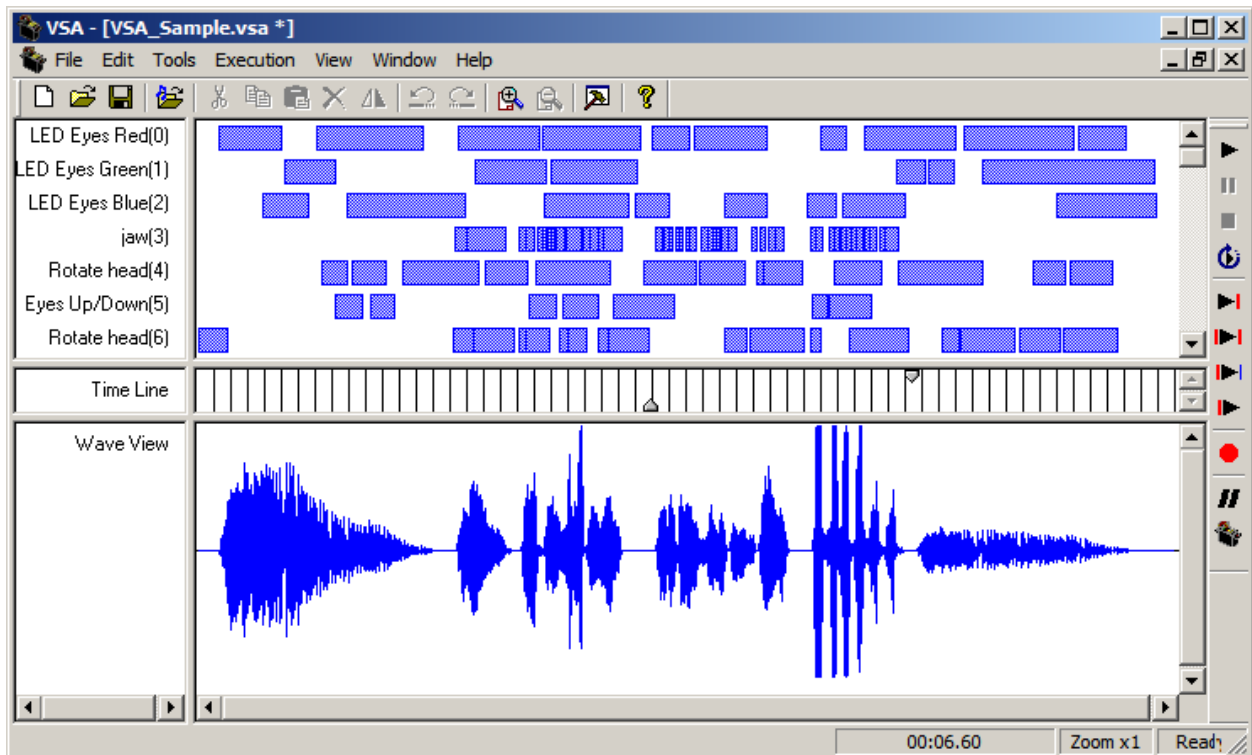
Each color “channel” (ie, red-green-blue) on the TriLED-1 is connected to your servo controller using the 3 position female connector. This is the same connector used on standard RC style servo motors. Most servo controller boards follow a standard connection scheme as shown in the diagram. Make sure each connector from the TriLED-1 is oriented correctly as shown with the black wire connected to the ground (GND) connection on the servo controller board and the white wire connected to the “pulse” or “signal” pin on your controller board.



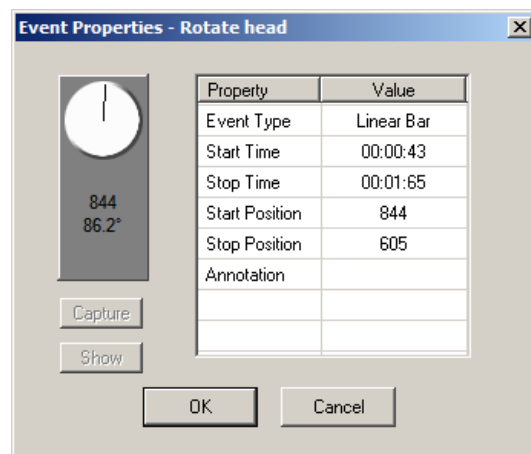
**Using the TriLED-1 with VSA (Visual Show Automation)**

As mentioned earlier in this document, the easiest method of controlling the TriLED-1 is by using a servo controller in conjunction with control software such as Visual Show Automation (VSA) by Brookshire Software ([www.brookshiresoftware.com](http://www.brookshiresoftware.com)) which costs about \$60 USD. Programs like VSA allow the user to synchronize sound to the actions of a prop (such as moving parts of the prop or blinking lights etc.) If you have ever been to an amusement park like Disneyland and been on a ride like "Pirates of the Caribbean" then you have seen human-like figures that talk and move. Controlling such a figure can be done with a program such as VSA.

The screen shot from VSA below shows what a typical 'routine' might look like with the audio file in the bottom part of the window and in the top part you see the movements of the prop synchronized to the audio.



Each of the blue 'bars' in the screen shot above represents an action of some kind such as rotating a servo motor or adjusting the brightness of LEDs. Each of these actions is set by adjusting the 'Event Properties' as shown in the screen shot to the right. This one shows the movement of a servo motor from position 844 (start position) to position 605 (stop position). The speed of this movement is determined by the length of the bar in the upper screen shot.



**Configuring VSA for using the TriLED-1**

When using VSA, each 'track' has to be configured to indicate what type of device is being used (ie., servo motor, LED brightness controller, relay etc) and the min and max movements have to be set for each device.

For the TriLED-1 you will need to configure 3 tracks - one for each color on the controller (ie., red, green and blue). For each of the three colors, you should configure the 'Type' as SSC-32 servo and set the min value as 1000 and the max value of 2000. When setting your actions for each of the color channels, a value of 2000 will get you the maximum brightness of the that color LED and the setting the value to 1000 will turn that color LED off.

Configure 3 separate channels (one for each color)

Set 'Type' for each color to SSC-32 Servo

Set max value for each color to 2000 for max LED brightness

Set min value for each color to 1000 (LEDs off)

Track	Name	Type	Port	Addr	+Value	-Value	Default
<input checked="" type="checkbox"/>	LED Eyes Red	SSC32 Servo	COM1	0	2000	1000	1500
<input checked="" type="checkbox"/>	LED Eyes Green	SSC32 Servo	COM1	1	2000	1000	2000
<input checked="" type="checkbox"/>	LED Eyes Blue	SSC32 Servo	COM1	2	2000	1000	1000
<input checked="" type="checkbox"/>	jaw	SSC32 Servo	COM1	3	1337	915	915
<input checked="" type="checkbox"/>	Rotate head	SSC32 Servo	COM1	4	1820	1125	1405

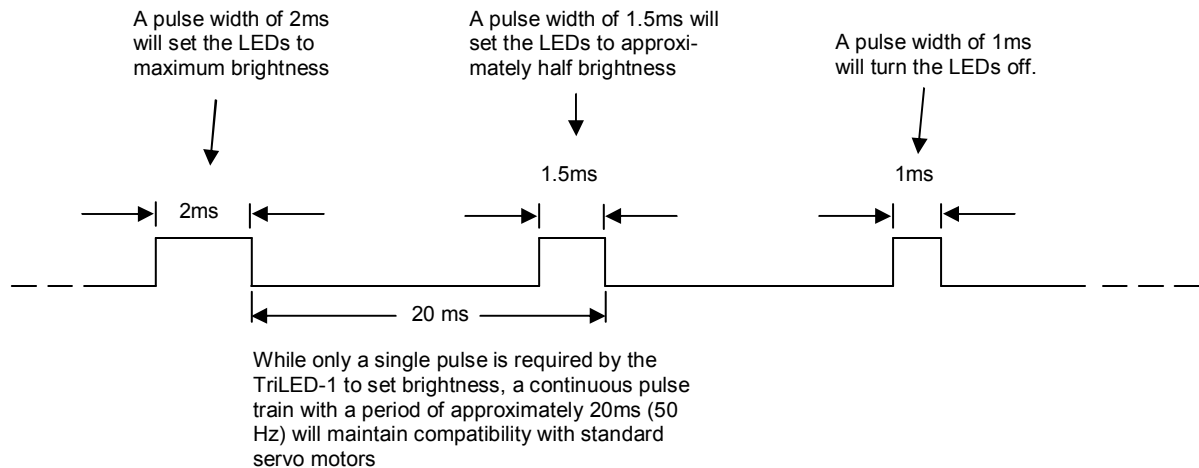
**Example - Event Properties for LED channel**

In the screen shot at right, we see an example of an Event Property within VSA for controlling one of the LED colors for the TriLED-1. In this example the start position is set at 1000 (LED off) and ramps to position 2000 (LED at full intensity). The start time for this event is 0.07 seconds into the routine and ends at 0.96 seconds into the routine. So this event will ramp the LED from 'off' to full intensity in .89 seconds.

Property	Value
Event Type	Linear Bar
Start Time	00:00:07
Stop Time	00:00:96
Start Position	1000
Stop Position	2000
Annotation	

**Advanced topics - controlling the TriLED-1 with a microcontroller**

In addition to controlling the TriLED-1 using a servo motor controller, it can also be controlled by a pulse signal from another device such as a microcontroller provided that connections for power and ground are also made. The power is regulated down to 3.3V on the board and accepts an input voltage range of between 4.7V and 12V. The pulse signal itself should not be more than 5.5V. The width of the pulse will determine the brightness of the LEDs. A pulse width of 1ms will turn the LEDs completely off and a pulse width of 2ms will set the LEDs to maximum brightness. Any pulse in-between will set the brightness accordingly. Pulses less than 1ms or pulses greater than 2ms will be ignored. Only a single pulse is required to set the brightness, but to maintain compatibility with how servo motors work, you may want to send continuous pulse train with a frequency of about 50Hz. This is a standard frequency and most RC servo motors will respond to this frequency and pulse width.



**Additional Resources**

**Sources for servo motor controllers**

Lynxmotion [www.lynxmotion.com](http://www.lynxmotion.com)  
Parallax [www.parallax.com](http://www.parallax.com)  
Polulu [www.pololu.com](http://www.pololu.com)

**Sources for servo motors**

Servo City [www.servocity.com](http://www.servocity.com)  
Tower Hobbies [www.towerhobbies.com](http://www.towerhobbies.com)

**Sources for controller software**

Brookshire Software [www.brookshiresoftware.com](http://www.brookshiresoftware.com)