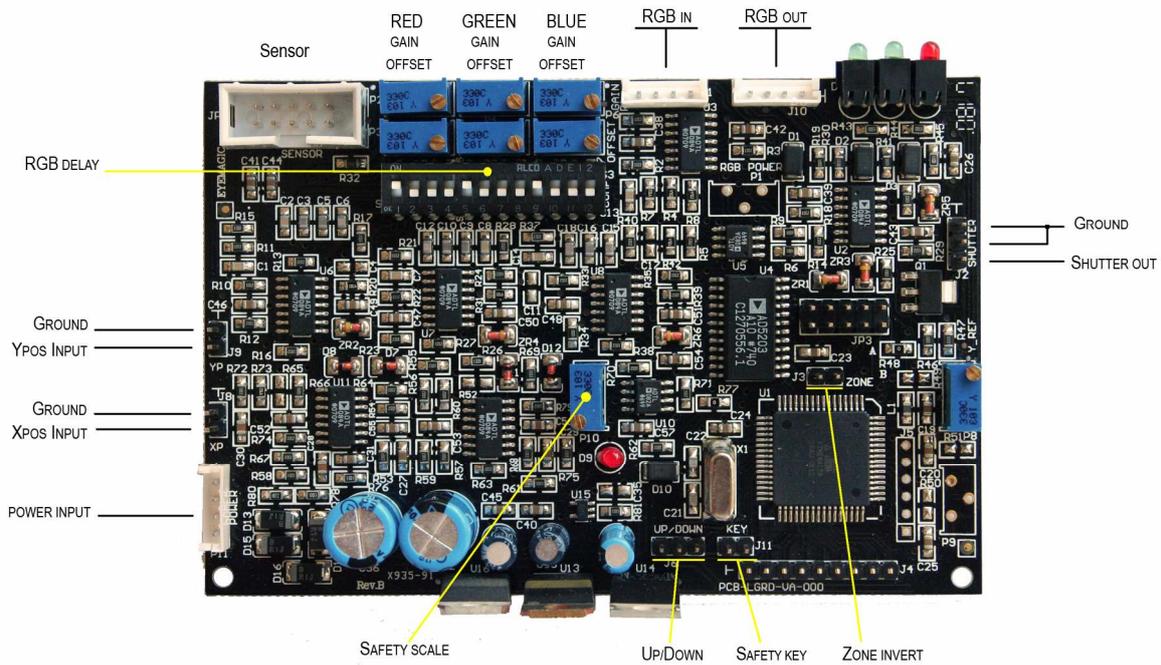


# Iris *ColorSafe*

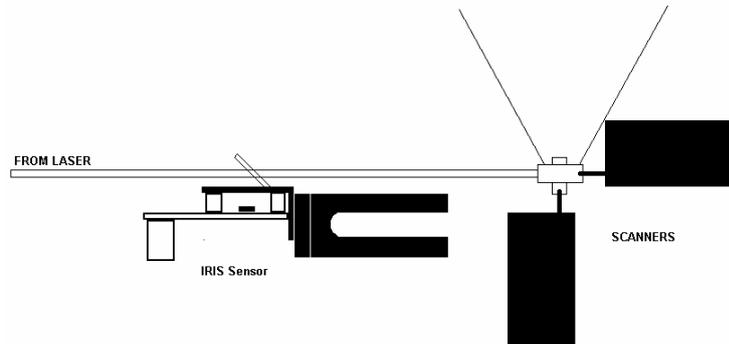
## Users Manual



1. **Power Input.** Connect the supplied red/green/black 4-pin connector cable. Red is positive, green is ground, black is negative. The system is designed to be powered from the scanners' power supply and accepts voltages from +/-18V to +/-30V.
2. **Xpos Input.** Connect the Xposition signal coming from the X servo card. Range is +/-10V.
3. **Ypos Input.** Connect the Yposition signal coming from the Y servo card. Range is +/-10V.
4. **RGB In.** Connect the supplied red/green/blue/yellow 4-pin connector cable. R,G and B are for the three colors, yellow is ground. Here you connect the modulation signals coming from your computer. The input range is 0-5 Volts.
5. **RGB Out.** Connect the supplied red/green/blue/yellow 4-pin connector cable. R,G and B are for the three colors, yellow is ground. Here you connect the modulation signals going to the lasers. The output range is 0-5 Volts.
6. **Up/Down.** Connect two momentary push-buttons for safety zone adjustment. Button 1 connects to pins 1 & 2, and button 2 connects to pins 2 & 3. (pin 2 is common).
7. **Safety Key.** Connect a key locked on/off switch. When this switch is closed, the Up/Down and Zone Inversion adjustments are permitted. When the key is removed (open) then the settings are stored in memory and no further adjustments are possible.
8. **Zone Invert.** Connect an On/Off switch for zone inversion. *Up/Down push buttons, Safety Key and Zone Invert switches can be found on local electronics stores.*
9. **Shutter Out.** Connect a safety shutter. This is an open collector out, 1.5A max, and should be protected from coil flyback using a fast diode in inverse parallel to the shutter coil.

## 1. Sensor Setup

Place the sensor as shown in the following schematic :



Adjust the height / position of the sensor so the reflection of the beam enters the sensor aperture. *Take great care with high power lasers !* The sensor aperture is 6mm in diameter. If the beam is wider than 6mm, make sure that most of the beam enters the aperture and no one of the three colors is left out completely. Secure the sensor on the laser table.

Connect the sensor to the main board using the supplied flat cable.

## 2. Main Board Setup

Perform all connections on the main board. Connect :

Sensor	(flat cable coming from sensor)
RGB In	(RGB signals coming from computer)
RGB Out	(RGB signals going to the modulation inputs of each laser)
XP	(X position out from X scanner amplifier)
YP	(Y position out from Y scanner amplifier)
Up/Down	(Safety zone placement up/down push buttons)
Zone	(Safety zone invert on/off switch)
Key	(keylock on/off switch)
Power	(power from the scanners' power supply)

Place the main board on a non-conductive surface in order to perform the necessary adjustments.

Connect the computer to the laser system, run your software and power on the laser system.

### 3. APC (color) adjustment

First, we must adjust the Automatic Power Control stage.

a) Display a blank frame

b) Adjust the **Red Offset trimmer** CCW till you get a very dim beam coming out of the red laser. Adjust in the opposite direction till this beam extinguishes. Offset adjustment is not absolutely necessary, but it helps the servo stage to easily overcome the large threshold voltage that many lasers have before they turn on.

Repeat for **green** and **blue**.

c) If you have a power meter, display a **red** colored pattern in approx 20% size with few or no blank points if possible. For example, display a circle with many points.

*Press the Up/Down push buttons to check the safety zone position (the safety key must be on). The system is shipped with the safety zone adjusted in the center, so you may have to adjust it to be outside your projected image. (you can also move the image outside the safety zone using your software controls.) The 3 leds must be off. If any of the leds are on, or blinking even slightly, then you have parts of the image inside the safety zone.*

Place the power meter in front of the scanners (or in front of the beam entering the scanners).

Adjust the **Red Gain trimmer** CCW slowly till the power on the meter stops increasing. If the power does not increase at all, adjust in the opposite direction till the power starts decreasing.

Repeat for **green** and **blue**.

d) If you do not have a power meter, display two circles of equal size, one next to the other, having 70% white and 100% white color respectively.

*Check safety zone position. See above.*

Switch off the green and blue lasers (or block their beams) and adjust the **Red Gain trimmer** CCW till the two circles have the same brightness, then go back a little till one is a little dimmer.

Repeat for **green** and **blue**.

e) The human eye has a logarithmic response. In order to see colors accurately we need to fix the gamma curve of the projection. For the Pangolin we have prepared a special palette (log.sp1) that you can download from our site. If you use another software that supports elastic curves for color control, you can easily create the required gamma by dragging the 50% point of the curve down to 18%. (meaning that for 50% monitor brightness the laser output is 18%). Do the same for all three colors. If your software accepts arithmetic values you can use the following :

Monitor :	100	90	80	70	60	50	40	30	20	10	0
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Laser :	100	77	57	41	28	18	11	5	2	1	0

#### 4. Safety Adjustment

- a) Create a frame with two beams, one on the left of the screen, the other on the right. The beams should be at least 50 points each. *(for example you can create a mid-sized circle and then resize it to zero, then copy-paste it to create the second beam. Consult your software on how-to do it)*
- b) If you have a shutter installed, remove it from the beam path as it will close and block the beam.
- c) Display this frame at 50% size (approx 25-30deg) outside the safety zone.
- d) Adjust the scan rate till the beams are round and the blanking tails disappear.
- e) Move the projection into the safety zone *(use your software or move the safety zone with the up/down buttons)*
- f) Now we have two dim beams. (In Pangolin one beam could be completely off, depending on the "blanked points at start and end of each track" and "Minimum number of points" settings, found in Projector Settings). We focus on the brighter beam.
- g) Adjust the **Safety Scale trimmer** till this beam is around 5mW (or approximately the brightness of a laser pointer). The scale is set.
- h) Display a full size frame with a slow scan rate (for example a circle with many points). Press the Up/Down keys to adjust the safety zone position to the required height. Toggle the "Zone Invert" switch to adjust correct zone orientation.
- h) Remove the safety key. The settings are stored in memory and will be there next time you turn on the system.

**Attention : NO system can absolutely guarantee 100% safety. Use common sense in designing your laser shows. Avoid purposely sending direct beams to the audience, even if the IRIS will attenuate them. Prevention is always better than cure.**

#### 5. Color Delay Adjustment

You can adjust (in some extend) the turn-on / turn-off delay of the three laser sources using the dip-switches. The switches are assigned as follows :

switches 2-3-4	Red delay
switches 6-7-8	Green delay
switches 10-11-12	blue delay

Switches 1,5 and 9 are pre-adjusted and should not be changed.

Before making any delay adjustments, make sure that the three colors overlap perfectly onto the screen, otherwise you could confuse misalignment as delay.

- a) Display two white parallel lines, no soft-ending.
- b) If the lines begin (for example) with red color, turn switch 2 to on. If more delay is needed, turn sw.2 to off and turn sw.3 to on. The sequence is : 2, 3, 2+3, 4, 4+2, 4+3, 4+2+3 (binary format). Make sure that you do not use much delay as this will introduce turn-off tails.