



Thank you for purchasing Stanwax Laser four channel colour correction board. This board is based on the original DZ colour board developed with help from William Benner of Pangolin so it's a tried and tested design. Our version has taken the original design and compacted the P.C.B size using increased S.M.D. technology and we have added a forth channel giving greater flexibility. Each channel has four parameters that can be individually controlled. They are as follows.

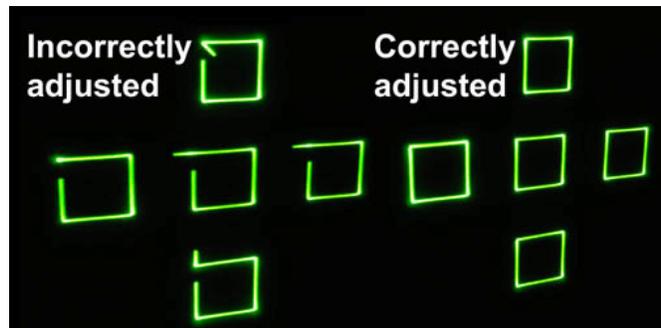
1. Gain – this allows restoration of the blanking signal after the delay component of the circuit and can be used to some degree to adjust the overall colour balance of a multi-colour laser projector.
2. Threshold or Offset – adjusts where the laser begins to turn on thus allowing some matching of lasers with differing modulation characteristics.
3. Rising edge delay – can slow down the start of the laser turn on signal
4. Falling edge delay – can slow down the laser off point stretching the turn off time

3 & 4 are used to match the characteristics of different laser types, for example a diode laser will turn on and off almost instantly where a DPSS laser will turn on more slowly and sometimes the output will lag after the modulation signal has disappeared. This creates unsightly coloured tails at the start and end of a the traces. This circuit will help to remove or minimise these tails.

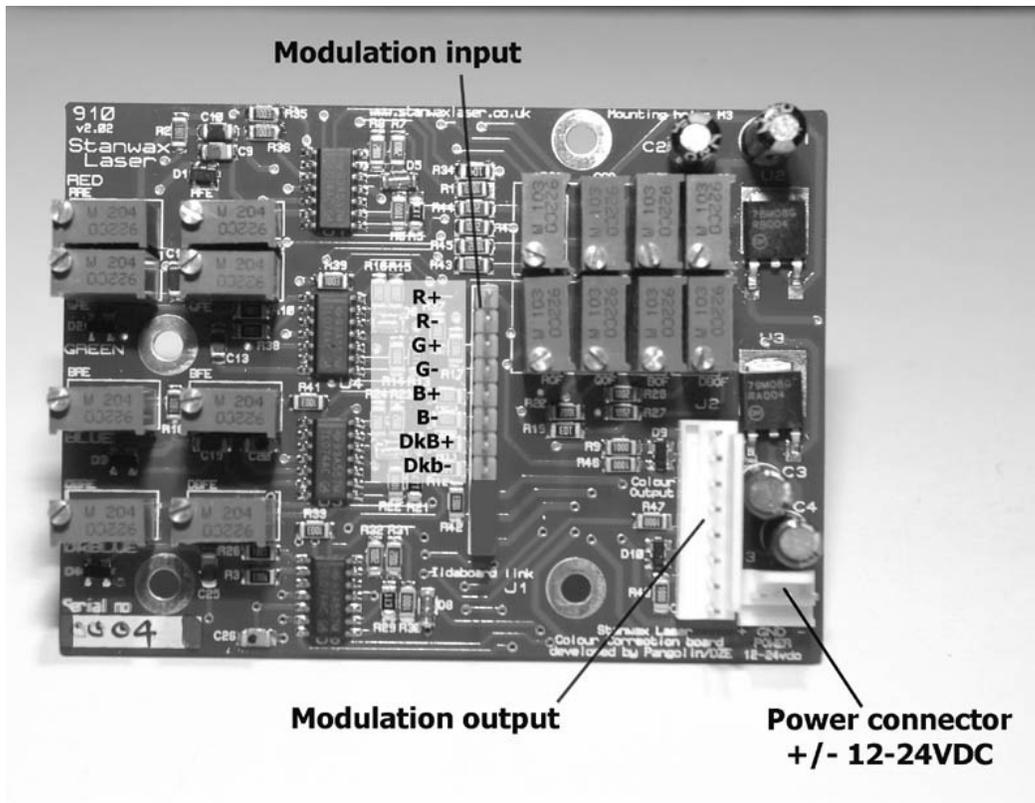
The board is available in two versions one as a stand-alone device and the second as an add-on daughter board for our ILDA interface boards. In stand-alone mode the board will need to be mounted on a panel within the projector and a drilling diagram is included at the end of this document.

**Before fitting read now!**

The blanking shift set-up in your software will affect the board settings so before installing you should adjust this parameter. Display a frame that exhibits blanking 'tails' see image (right) for an example. Adjust the blanking shift to minimise these tails. If the board is adjusted and the blank shift is changed the adjustment procedure will need to be repeated.



Connections for the stand-alone version are shown below



The modulation output connector has the same signal designations for the colour lines as the input connector on the stand-alone board the lowest 3 pins of J1 are not used and therefore will not be fitted.

To attach the add-on daughter board version to the ILDA interface board you will need to remove the connector for the colour output signals and the power connector. With the ILDA board in place fit the 4 post extensions to the thread protruding through the soldered nuts. Then push the board into place and fit nuts to the screws as they protrude through the mounting holes. Now refit the modulation connector to the modulation output connector on the colour board. Check that the power lead has +/- 24V present and if so connect this to the power connector. If the ILDA board has been used with a single ended supply then an extra feed for the -24v will need to be added before the board will work.

### Setting up

Once installed and wired up the board will need to be adjusted to match your lasers. To adjust the board use a frame with some white lines and coloured content we recommend using the ILDA test pattern. Connect up your projector to your laser hardware and output the test frame. Don't worry if it does not look right we will adjust it so it looks correct.

First of all we will go over the naming convention of the pots on the board. All begin with the colour so R for red G for green B for blue and DB for dark blue (this is the fourth channel and as such may be assigned a different colour in your software)

The second part of the pot name is the function these are listed below

GA – Gain

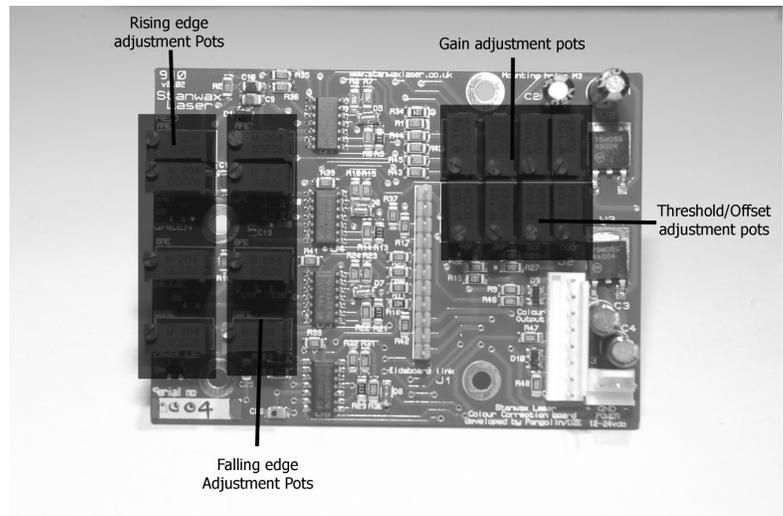
OF – Offset (or threshold)

RE – Rising edge

FE – Falling edge

Therefore following this convention RFE is Red Rising edge and DKOF is Dark Blue Offset.

The pots are in groups as indicated by the image (right)



The first step is to turn all the gain pots down to zero (anticlockwise) the output of some or all colours may disappear completely – don't worry this is normal!

Next we set the threshold, if a colour can be seen after turning the gain adjustment down, then the threshold pot for it will need to be turned anticlockwise but if the colour cannot be seen, then turn the pot clockwise. You need to set the level so the colour being adjusted just appears then back the pot off (anticlockwise) until it just goes out.

After completing this procedure turn all the gain pots fully clockwise – remember they are multi turn pots so keep going until you hear a soft clicking from the pot – this is the end stop. As you turn the pots up each of the colours will gain in intensity until they are showing full brightness.

Now we move on to the proper set up of the board, adjusting the rise and fall times of the lasers – this can be daunting but we have a quick and dirty method to make it an easy task.

While still outputting the ILDA test pattern set the whole scan to output in one colour only – let's start with red.

We are interested in the ends of lines so we will concentrate on the three lines above the central circle/square combo. These three horizontal lines are two short and one long and are all we need to concentrate on.

Turn RRE and RFE pots to make these lines as well defined as possible at both ends – turning the pots clockwise will reduce the faded end of the trace and make it more defined as it starts and stops. One pot will act on one end of the line the other on the opposite end.

Once you are happy that the line begins and ends with the least amount of 'feather' then move on to green. Colour the whole of the output to green only and adjust the 'look' of the same lines but using the GRE & GFE pots.

Next move on to the blue channel and repeat the procedure outputting just blue, and finally if your projector has a fourth colour, output to this channel only and make the adjustments for the DkB channel.

Once complete return the test pattern to normal full colour output and observe the ends of the lines we have been using all along and you should see now that they are crisp and white from start to finish with no colouring of the ends.

If there is still a little bit of a colour tail then go back and repeat the adjustments concentrating on getting the lines as sharp as possible at both ends in each of the colours. This should resolve the tails to give you a clean trace.

If all is well then you have done it!

### Specification

Number of channels	4
Adjustable parameters	Gain Threshold Signal Rise time Signal Fall time
Rise/fall time delay	>300uS
Adjustment	by 20 turn pot
Power supply	+/- 12-24VDC
Current required	50mA per line
Board Dimensions	58mm x 80mm
Board height (stand-alone)	20mm
Board height (with ILDA board)	38mm (from panel)
Output Protection	Present (series resistor+ diode clamp and zener over voltage protection)

Drilling diagram for standalone board

