



# How to blend projection images on a flat screen using 4 Corner Warp

version 2.5

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## Introduction

Use this guide as a non-technical introduction to blending projection images using any of the Calibre UK Blend and Warp scaler/ processors.

The guide describes how to blend two projection images accurately onto a flat, rectangular screen using the in-built functions of the processor.

All the warp and blend models use the same process.

## Note about good blending

To successfully blend two or more projectors use matched projectors.

- a. The projectors should be the same make and model
- b. The lamps should be the same age
- c. DLP colour wheels should be designed for video
- d. The 'dynamic gamma' and 'dynamic contrast' applications should be set to off

How to blend projection images on a flat screen using 4 corner warp

Align  
Optically

Set Scaler  
functions

Set Multiple  
Units Matrix

Set Blend  
Width

Set 4 Corner  
Warp

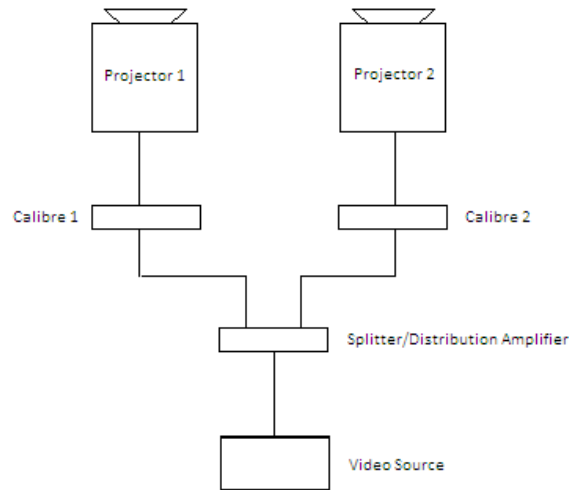
Set Blend  
Curve

Set Black Level  
Compensation

Set Picture  
Format

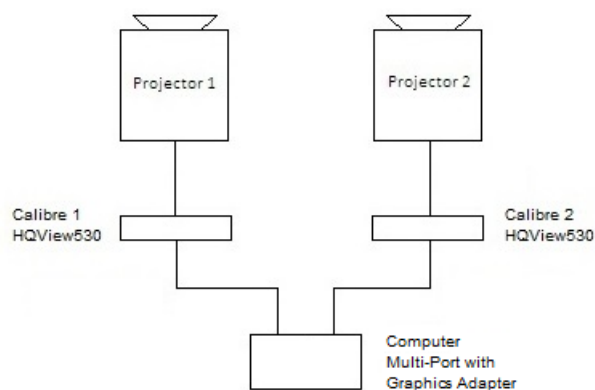
# Basic system

Basic System Configuration - 2 Projector Blend and/or Warp



1. You need to use one processor for each projector.
2. Shown above, the one video source is distributed to both Calibre processors.
3. The distribution amplifier or splitter is not supplied.

Multi-Port Computer System Configuration



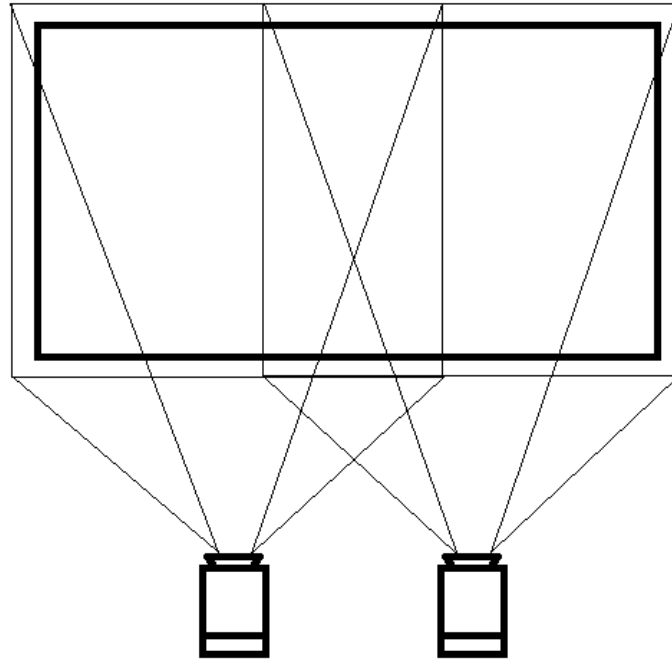
When using a multi-port graphics card in a computer [instead of a DA/splitter] please note:-

1. Auto Zoom will be turned 'OFF'
2. The outputs on each port need to be configured to provide the section of picture relevant to that part of the projection

**AND**

3. The outputs on each port need to be configured to provide the overlapping parts of the picture that will be used to blend the picture segments together.

## Align optically



**Figure 1**

Figure 1 shows an example of two 4:3 projectors being used to project a single 16:9 image

Note that the light projected needs to cover the whole of the screen area.

This is necessary, Calibre processors modify the shape of the signal sent to the projector. They do not change the display device in the projector or the projectors optics.

Align the position, zoom and focus of the projectors. You may find it helpful to use the test patterns provided in the Calibre processors for this operation.

## Set Scaler Functions

When your system is configured set up your scalers as covered in the first introductory guide “**How to use a Calibre HQView scaler processor**”

Set the ‘menu time out function’ to ‘infinite’ (time out function is disabled) to give more time to operate the processors and read these notes.

This can be done from the top menu select ‘System’ then select ‘Menu Settings’ then select ‘Menu Display Time’ and then select ‘Infinite’.

## Set Multiple Units Matrix

The process described below must be followed for both Calibre processors in the system



**Figure 2**

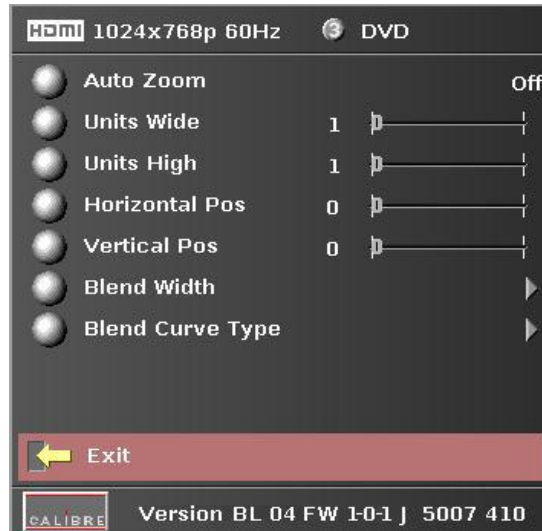
Figure two shows the menu system in the Calibre scaler.

1. In the top menu select ‘Input’ and then select ‘test pattern’ input
2. Then select horizontal grey bars test pattern  
You can do this by one of two methods described in the “**How to commission a Calibre HQView scaler**”
  - a. Navigate out of the menu system then use the up/down buttons to rotate around the available patterns
  - b. In the top menu select ‘System’ then item 3 ‘Input Configuration’ then item 4 ‘Test Pattern Setup’ then select ‘Test Pattern’ and select ‘Grey H Bars’.

## Set the position in the matrix

3. You must now tell each processor where it is in the system.

a. In the top menu shown above, select 'multiple unit'

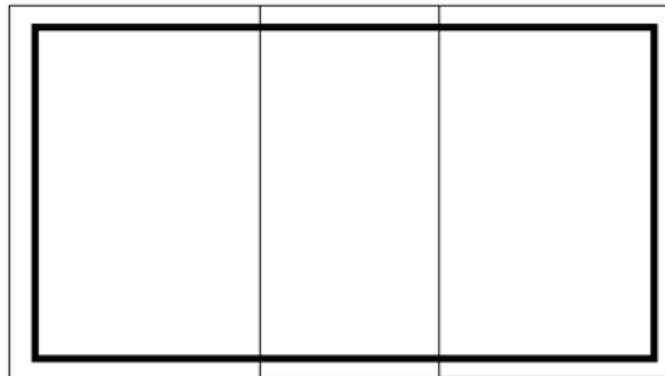


**Figure 3**

Figure three shows the 'multiple Unit' menu.

b. Tell the processors that there are 2 projectors in the system in a 2 x 1 matrix or side by side horizontally:-

Set 'units wide' to 2



**Figure 4**

Figure 4 shows the representation of two overlapping images on a screen.

Continue in the 'multiple unit' menu

Tell each processor which projector it is connected to:-

c. Choose horizontal position either 0 or 1 (0 for left hand projector and 1 for right hand projector)

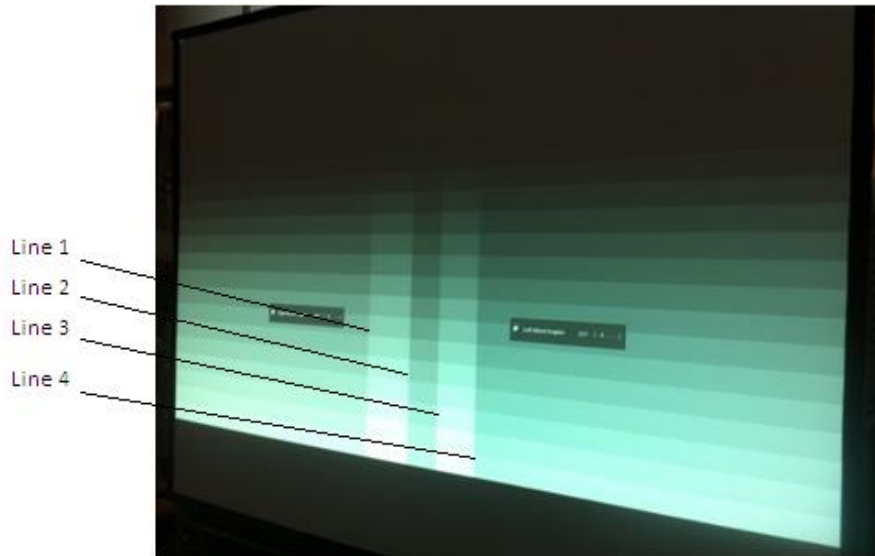
d. Tell each processor to cut out the correct half of the picture and blend region. We call this function 'Auto Zoom':-

Set 'Auto zoom' to ON

## Set Blend Width

Continue in the 'multiple unit' menu

e. Choose 'Blend Curve Type' menu item and select 'Align Pattern' – this turns on the blend width alignment tool



**Figure 5**

Figure 5 shows two projections sided by side displaying the horizontal bar test pattern. Continue in the 'multiple unit' menu

f. Choose 'Blend Width' menu item

The default blend width is 200 pixels, adjust to equal the optical overlap.

The two vertical lighter stripes near the centre of the screen are the blend width alignment tool.

This is a visible cursor which will move as the blend width is adjusted.

Line 1 is the left hand edge of the right hand projection

Line 2 is the right hand edge of the left projection blend region

Line 3 is the left hand edge of the right projection's blend region

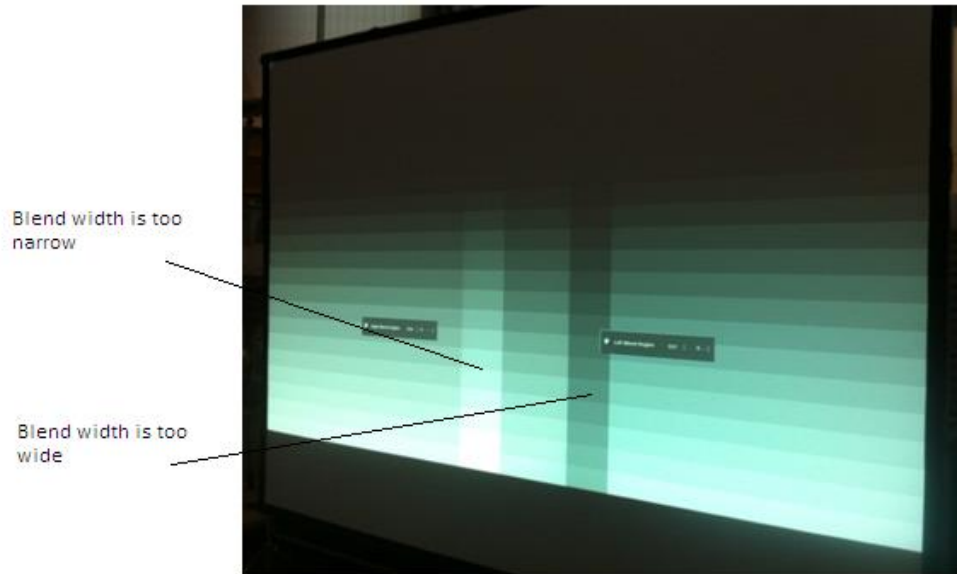
Line 4 is the right hand edge of the left hand projection

Referring to Figure 4 above –

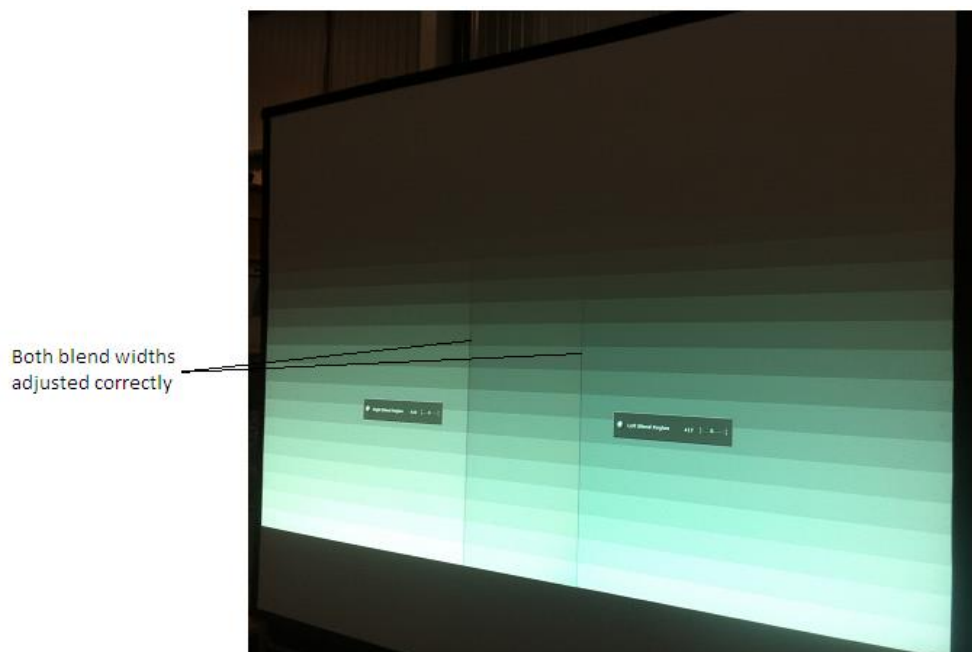
Adjust line 3 to meet line 1 and adjust line 2 to meet line 4

This adjusts the blend width of each projector so that the shadowed alignment area is equal to the optical overlap





**Figure 6**  
Figure 6 shows a darker vertical strip where the blend with has been adjusted past the overlap



**Figure 7**  
Figure 7 shows the view when the blend widths on both scalers are adjusted correctly.

Set the number of pixels to the same number for both processors, even if the lines do not quite align - if the lines do not quite match the overlap for one projector this indicates that the optical zoom of the projectors is not matched, but the blend will still work.

## Set 4 Corner Warp

4. The images from both processors/projectors must be geometrically corrected to fit the screen and the overlapped regions must be set to align accurately. This is achieved by warping (changing the shape) the image.

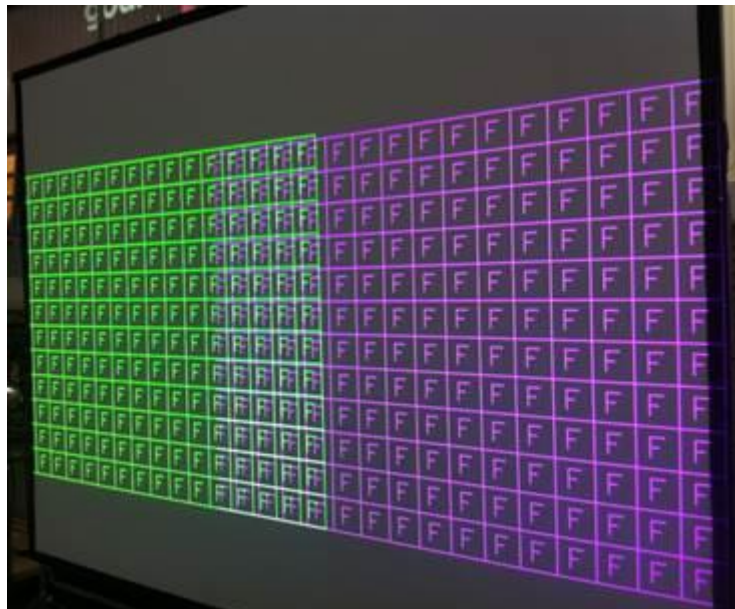
a. Select 'cross hatch' test pattern

Note the left hand pattern is green, the right hand pattern is magenta, this is intentional.

The colour is set automatically when the position information is entered.

The alternating colours help in two ways

- i. to clearly see each projection separately
- ii. when geometry adjustment is complete the parts of the pattern in the overlapping blend region will be super-imposed and will appear white.



**Figure 8**

Figure 7 shows the view of the coloured cross hatch pattern in a 2x1 matrix

b. In the main menu select Multiple Unit

Select Blend Curve Type

Switch Blend Curve Type to OFF to give a clear image of all the test pattern

5. Adjustment of warp alignment can be achieved in several ways

- i. using the internal '4 Corner' warp function
- ii. using the external Calibre PC application 'warp generator'
- iii. using an automatic camera assisted system

In this paper you will use the built-in '4 Corner' warp function

a. In the top menu select Geometry



**Figure 9**

Figure 9 shows the 'Geometry' menu.

- b. Select the last item on this page 'Warp'



**Figure 10**

Figure ten shows the 'Warp' menu.

- c. Select the top line, 'Application'
- Select '4-Corner'

d. Select the last line, 'Enhanced'



**Figure 11**

Figure 11 shows the 'Enhanced Warp' menu.

e. The 'Enhanced' menu allows you to adjust the position of the X and Y co-ordinates of the corners of the projected image.

Align the test pattern on the screen by selecting each co-ordinate in turn and moving the corner of the projected image.

Continue this process until the cross hatch pattern fits the screen and the central area of overlapping pattern is accurately superimposed and the pattern in this area is white.

Note that in '4 Corner' warp alignment the screen must be flat and rectangular. This is important as linearity is automatically maintained between the corners and accurate alignment in the central area is only possible when the shape produced is a rectangle.

You can check if your alignment is correct by changing both processor test patterns to the 'Aspect Test' pattern

## Set Blend Curve

8. When you are happy that the alignment is complete and accurate exit the geometry menu
  - a. In the main menu select Multiple Unit
  - b. Select Blend Curve Type and switch Blend Curve to S-Curve to give soft edge blend



**Figure 12**

Figure 12 shows a correctly aligned cross hatch pattern with 'S curve' blend

# Set Black Level Compensation

9. Projectors output a small amount of light even when the image signal is black.

To help explain we will call this leakage 'L'. On areas of the screen where only one projector is showing its image you will have 1 x L, where two projectors over-lap you will have 2 x L. In a dark room showing dark pictures on the screen you will be able to see the patch-work effect.

If you are using the HQView325, HQView510, HQView520 or HQView530 you have the additional facilities to correct for the difference in light leakage black level between over-lapped and non-overlapped areas on the screen.

Select the Aspect Test pattern to clearly see the back image

In the top menu select 'Multiple Unit'



**Figure 13**

Figure 13 shows the 'Multiple Unit' menu of the HQView510 or 520.

Note that in the 325 and 500 series processors there are two extra menu items

- i. Black Level Uplift
- ii. Reduce Black Level Uplift Width

Select 'Black Level Uplift'



**Figure 14**

Figure 14 shows the 'Black Level Uplift' menu of the HQView510 or 520.

In this example of a 2 x 1 matrix most of the list shown above will be greyed out.

Select 'Non Blend Region'

This allows the black level in the non overlapped area to be raised to a dark grey. Adjust this level on both processors to match the level of grey in the over-lapped area.

You may find you are left with a strip down each side of the centre area

Go back to the previous menu and select 'Reduce Black Level Uplift Width'



**Figure 15**

Figure 15 shows the 'Reduce Black Level Uplift Width' menu of the HQView510 or 520.

The operation of this feature is similar to the 4Corner warp used earlier. You can adjust separately the top and bottom position of the edge of the correction area to bring it in line with the edge of the visual over lapped area.

When this operation is complete, exit the menu

10. Select the input channel that has your picture



**Figure 16**

Figure 16 shows the finished blended picture.

## Set Picture Format

11. In main menu Geometry select Picture Format

Picture Format allows a user to select the displayed aspect ratio where the signal input is different to the display's natural aspect ratio.

Choose between Standard, Full Screen, Crop or Anamorphic

- a. **Standard** preserves the size and aspect ratio of the incoming image. Areas of the display that are un-used are displayed black (letterboxed).
- b. **Full Screen** scales the image to the size of the display without preservation of the aspect ratio. Please note that some signals have black borders which will be displayed as black.
- c. **Crop** preserves the aspect ratio of the image and scales the image to fill the screen. The smaller axis of the image will fill the space available. The result is that either the top/bottom or right/left areas of the image are cropped.
- d. **Anamorphic** scales the input image to display the whole picture in a 16:9 aspect ratio. Areas of the display that are un-used are displayed black (letterboxed).

**E&OE**