

# EAN-Blending

2024-06-10

Exports: [Export Summary Sheet](#)

EULA: [End User License Agreement](#)

Web: [sightlineapplications.com](http://sightlineapplications.com)

Sales: [sales@sightlineapplications.com](mailto:sales@sightlineapplications.com)

Support: [support@sightlineapplications.com](mailto:support@sightlineapplications.com)

Phone: +1 (541) 716-5137

---

1	Overview .....	1	3	Blending Modes .....	8
1.1	Additional Support Documentation .....	1	4	Blending Modes Results .....	8
1.2	Hardware Compatibility .....	1	4.1	Frame Blend .....	9
1.3	SightLine Software Requirements .....	1	4.2	Thermal Blend .....	9
1.4	Application Bit Requirements .....	1	4.3	Night Blend .....	10
1.5	Hardware Setup Example .....	2	4.4	Color Blend .....	10
2	Blending IR and EO Images .....	2	5	Visible Color - Thermal Highlights Use Case .....	11
2.1	Configuring the Alignment .....	3	6	Improve Blending Performance .....	12
2.1.1	Parameter Alignment .....	4	7	Distributed Features and Camera Alignment .....	13
2.1.2	4-Point Alignment .....	5	8	Questions and Additional Support .....	14

 **CAUTION:** Alerts to a potential hazard that may result in personal injury, or an unsafe practice that causes damage to the equipment if not avoided.

 **IMPORTANT:** Identifies crucial information that is important to setup and configuration procedures.

 *Used to emphasize points or remind the user of something. Supplementary information aids in the use or understanding of the equipment or subject, which is not critical to system use.*



## 1 Overview

Video blending is a way to include features from one video stream into another. This document describes how to use some of the 3000-OEM, 4000-OEM and 4100-OEM blend features to combine elements from an Infrared (IR) camera and Visible (EO) camera.

In addition to selecting the type of algorithm used to control video mixing, one video may be manipulated relative to the other to compensate for misalignment between sensors.

Synchronizing two separate cameras so that the frames match at the entrance to the blending algorithm is outside the scope of the SightLine hardware and is left up to the integrator. This may be important with the high velocity movements of the cameras and/or the scenes.

### 1.1 Additional Support Documentation

The Panel Plus User Guide provides a complete overview of settings and dialog windows. It can be accessed from the Help menu of the [Panel Plus](#) application.

The Interface Command and Control ([IDD](#)) describes the native communications protocol used by the SightLine Applications product line. It is also available as a PDF from the [Software Downloads](#) page.

Additional Engineering Application Notes (EANs) and ICDs are available on the [Documentation](#) page.

### 1.2 Hardware Compatibility

**ⓘ IMPORTANT:** When blending two analog cameras on a 3000-OEM, analog inputs must be on two separate video inputs. Two SLA-3000-AB boards are needed for this application.

### 1.3 SightLine Software Requirements

**ⓘ IMPORTANT:** The Panel Plus software version should match the firmware version running on the OEM. Firmware and Panel Plus software versions are available on the [Software Download](#) page.

**Table 1: SightLine OEM Software Requirements**

OEM	Initial Software Release	Provisions
4100-OEM	3.7.x	
1750-OEM	3.6.x	Blending is not available. Dual channel processing is available in 3.7.x and above.
4000-OEM	3.00.xx	Blending requires 3.3.x and higher.
<b>Legacy OEMs</b>		
1500-OEM	2.20.xx	3000-OEM REV C requires 2.24.x and higher. Blending is not available on the 1500-OEM. Legacy OEMs are supported up to 3.5.x. Some features in 3.6.x and above may not be available on these platforms.
3000-OEM	2.22.xx	

### 1.4 Application Bit Requirements

The functions described in this EAN require Application Bits (app bits) purchased from SightLine. App bits are enabled with a license file provided by SightLine at initial unit purchase or during a license upgrade process. License files use a hardware ID that is applicable to a specific hardware serial number. For questions and upgrade support contact [Sales](#).

**Table 2: Application Bits Requirement Table**

Function	Initial Software Release	Required Application Bit(s) v7 License
Blending	2.22.xx	Blending 0x0000 0100. Optional: Enhancement 0x0000 0080



### 1.5 Hardware Setup Example

- 4000-OEM/4100-OEM
- 3000-HIT
- Hitachi DI-SC120R
- SLA-CABHC36: Connects to the 3000-HITACHI board and the DI-SC120R camera.
- Power and Ethernet

## 2 Blending IR and EO Images

This section explains how to use the alignment tools to match up the images.

Use the [EAN-Startup-Guide-4000-OEM](#) or [EAN-Startup-Guide-4100-OEM](#) or to setup the SightLine hardware and confirm that video and Ethernet communications are functioning.

In this example the camera acquisition settings have been previously setup. The image of interest shown in [Figure 1](#) and [Figure 2](#) is the same, but the field-of-view is different.



Figure 1: EO Image of Interest

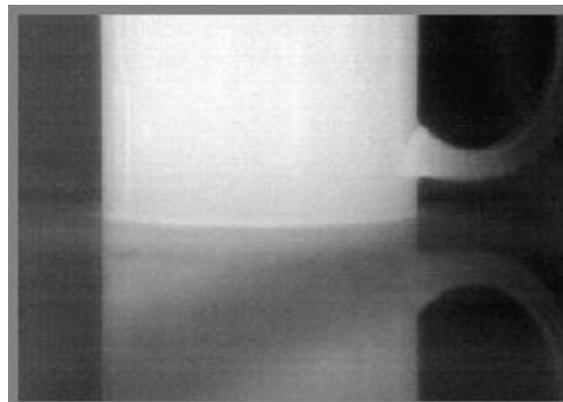


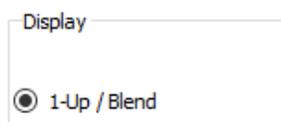
Figure 2: IR Image of Interest

1. Select the *Display* tab.
2. Set the *Video Source* for *Network Index 0* to *Blend*.

Network Index	Video Source	Network Display		Physical Display		Decode @ P+
		Enable	Resolution	HDMI	Resolution	
0	Blend	<input checked="" type="radio"/>	Out=In	<input type="radio"/>	720p60	<input checked="" type="radio"/>
1	None	<input type="radio"/>	Out=In	<input type="radio"/>	720p60	<input type="radio"/>

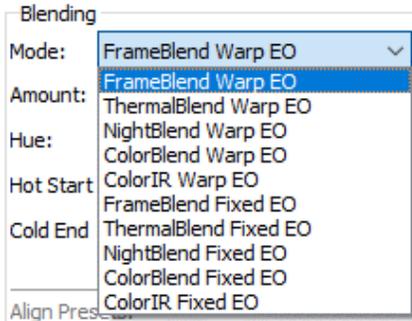
Separate Network/HDMI resolutions    LVDS N/A   

3. In the *Compress* tab in the *Output Properties* section, set the *Output Frame Size* resolution for *Network 0* to the size of the larger camera source (1280 x 720).
4. From the *Display* tab click *Send*.
5. Set the *Display* mode to *1-Up/Blend*.

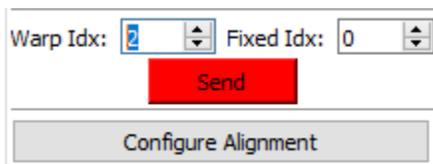




- Select the *Blending* algorithm.



- Set the camera indexes, and then click *Send*.



 *3000 only: If the blended cameras are 0 and 1, Warp Idx = 0 and Fixed Idx = 1 is not supported. Use Warp Idx = 1 and Fixed Idx = 0 and choose the appropriate Blending Algorithm or switch the physical camera connections.*

- Use the sliders and adjust the *Amount* setting to emphasize the IR. Adjust the *Amount* to change the % of the image being blended.



- Continue to the next section.

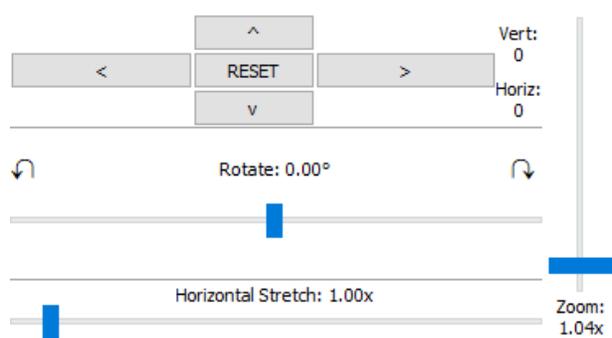
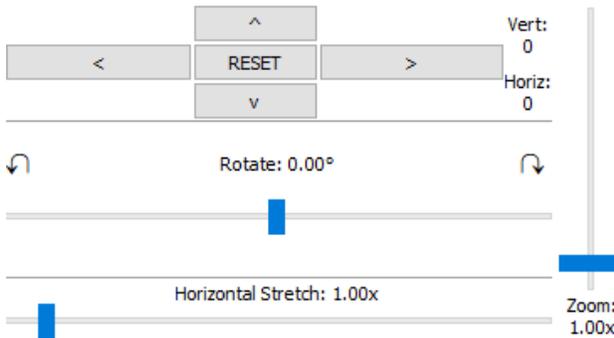
## 2.1 Configuring the Alignment

In software version 2.25.xx and above there are two ways to align the two cameras - Parameter Alignment (legacy) and 4-Point Alignment (new). Use either one of these methods to adjust how the images will line up.



### 2.1.1 Parameter Alignment

1. Click the *Configure Alignment* button.
2. Select the *Parameter Alignment* tab in the *Advanced Alignment* dialog. Use the *Zoom* control to size the IR image as closely as possible with the EO image.

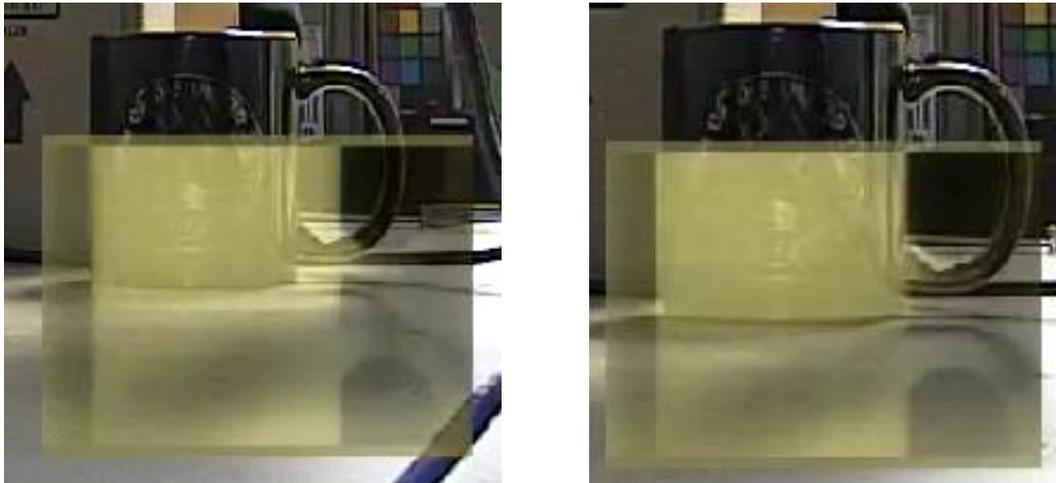


3. Use the arrow controls to match the position as closely as possible.





- Repeat the previous steps until the IR and EO images are aligned.



 The *Parameter Alignment* tab shows the number of pixels the warp image has translated before zoom and roll were applied.

Index:	Vertical:	Horizontal:	Zoom:	H.Stretch:	Roll:			
1 <input checked="" type="radio"/>	-128	-95	4256	1.04x	4096	1.00x	0	0.00°
2 <input type="radio"/>	0	0	4096	1.00x	4096	1.00x	0	0.00°
3 <input type="radio"/>	0	0	4096	1.00x	4096	1.00x	0	0.00°
4 <input type="radio"/>	0	0	4096	1.00x	4096	1.00x	0	0.00°
5 <input type="radio"/>	0	0	4096	1.00x	4096	1.00x	0	0.00°

Figure 3: Parameter Alignment Dialog

- Once the images are aligned, from the main menu go to *Parameters* » *Save to board*.

 **IMPORTANT:** Do not use [SetDisplayParameters \(0x16\)](#) to change *Pan/Tilt* or *Roll* while blending the same camera. Use [SetMultipleAlignment \(0x74\)](#) to move and rotate the cameras.

### 2.1.2 4-Point Alignment

The following section is a step-by-step process of how to use the 4-point alignment method.

 Make sure both cameras are configured correctly. For this example, camera 0 is an SD IR camera and camera 1 is a FHD EO camera. Both cameras can be streamed to Panel Plus over network 0.

- In the *Display* tab:
  - Set *Video Source* for *Network Index 0* to *Blend*.
  - Set the *Warp Idx* to 0.
  - Set the *Fixed Idx* to 1.
- From the *Display* tab click the *Configure Alignment* button to open the camera alignment dialog window. (From the Panel Pus main menu » *Configure* » *Camera Alignments*.)



3. Click the *4-Point Alignment* tab.
4. Click the *Show Snaps* button, a new dialog will appear. In this dialog, click the *Snap Both* button. Panel Plus will automatically execute a series of steps, resulting in a snapshot frame from the fixed camera (cam1 in the example) on the left and the warped camera on the right.  
 *Note that the bottom frames are full, and the top frames are the areas within the white rectangles on the bottom frames are magnified.*
5. Click anywhere in the white box on the bottom images as shown in the example below. Drag the box with the mouse around to control the upper images.
-  *The objective is to identify features that appear in both cameras, preferably towards the corners of the smaller FOV camera (in this example, the IR camera on the right). Corners are particularly suitable for this task since they can be precisely located.*
6. Click on the feature shown in the upper frames of one image. Choose a letter (A-D) from the overlay. Repeat this exact process with the identical feature present in the other image, selecting the same letter as before.

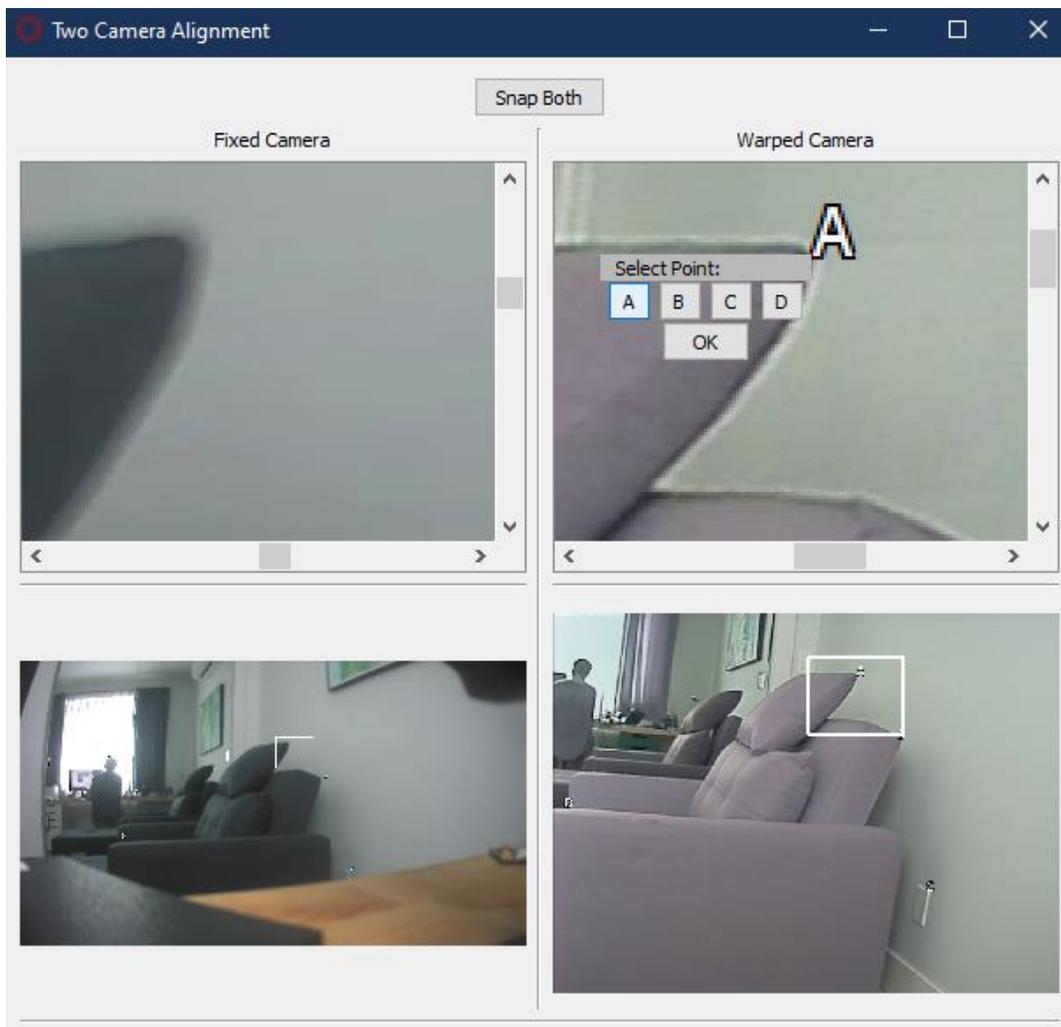


Figure 4: Two Camera Alignment Dialog Window



7. Repeat the above step for the rest of the letters using different features. For the best result use four features that are close as possible to the corners of the smaller resolution frame.
8. When complete click the *OK* button in the overlay.
9. From the *Display* tab make sure to select the correct radio button in the *Align Presets* section in the *4-Points* row.
10. Set the other blending parameters.

- In this example, the blending mode was set to *FrameBlend Fixed EO*.
- Improvements to the alignment can be made by adjusting the coordinates from the 4-point Alignment tab in the *Camera Alignments* dialog window.
- To clear an alignment, all points must be reset to 0.
- Windows display scaling may cause issues. For more information see the *Windows 10 Display Scaling Options* section in the *Panel Plus User Guide*.

Network Index	Video Source	Network Display		Physical Display		Decode @ P+
		Enable	Resolution	HDMI	Resolution	
0	Blend	<input checked="" type="radio"/>	Out=In	<input type="radio"/>	720p60	<input checked="" type="radio"/>
1	None	<input type="radio"/>	Out=In	<input type="radio"/>	720p60	<input type="radio"/>

Separate Network/HDMI resolutions    LVDS N/A    Send

**Display**

1-Up / Blend

2 Up

Picture in Picture

**Blending**

Mode: FrameBlend Fixed EO

Amount:

Hue:

Hot Start:

Cold End:

Histogram Equalize IR     Color Hue

**Align Presets:**

Params: 1  2  3  4  5

4-Points: 1  2  3  4  5

Warp Idx: 0    Fixed Idx: 1

Send

Configure Alignment

**Picture in Picture**

PiP Size:

1/4                      3/8                      1/2

PiP Position:

Top  
Left

Top  
Right

Bottom  
Left

Bottom  
Right

Picture In Picture: Picture In Picture

Frame color: Default

PiP Label: Track Index

Multi-PiP Zoom: Default

---

Main index camera: 0

PiP index camera: 0

Swap

Figure 5: 4-Point Alignment Configuration - Display Tab



Once the alignment has been set and saved to the OEM the alignment presets can be used to specify their index.

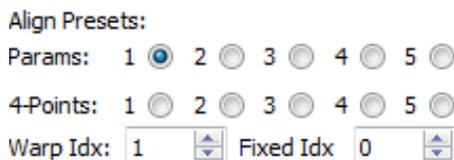


Figure 6: Alignment Presets

### 3 Blending Modes

Controls the method used to blend the EO/IR images. Assumes that user has set *Warp Idx* and *Fixed Idx* to correspond with the EO and IR camera for the specified mode.

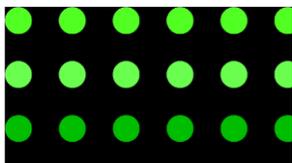
Table 3: Blending Mode Descriptions

Mode	Description
Frame Blend Warp EO	Alpha blend the luminance of the EO and IR images. Use the <i>Amount</i> parameter to control the blend percentage. 0 corresponds to all IR image, 255 corresponds to all EO image, 128 is an even mix of the EO and IR images.
Frame Blend Fixed EO	
Thermal Blend Warp EO	Typically used to highlight hot areas in a daytime EO image. Blends the EO/IR luminance with false coloring derived from IR. Red corresponds to very hot IR and blue corresponds to very cold IR. To control the color mapping, adjust <i>Hot Start</i> for the yellow/red hot regions and <i>Cold End</i> for the blue cold regions.
Thermal Blend Fixed EO	
Night Blend Warp EO	Typically used to highlight bright lights in a nighttime IR image. IR luminance is blended with portions of the EO image that contain visible data. Blends bright areas from the EO camera (modify color with <i>Hue</i> ) with the IR image.
Night Blend Fixed EO	
Color Blend Warp EO	Similar to Frame Blend but retains the color information from the EO camera. Percentage (controlled by <i>Amount</i> ) blending of the EO and IR images like Frame Blend, but the color from the EO image is also passed to the output (controlled by <i>Amount</i> or <i>Hue</i> depending on <i>Color Hue</i> checkbox).
Color Blend Fixed EO	
Color IR Blend Fixed EO	Percentage (controlled by <i>Amount</i> ) blending of the EO and the user palette colored IR image like Frame Blend, with the color from the EO and user palette colored IR also blended (controlled by <i>Amount</i> or <i>Hue</i> depending on <i>Color Hue</i> checkbox). Make sure the user palette exists on the board, but not selected as the palette for the video stream.
Color IR Blend Warped EO	
Dual Color Blend	Alpha blend two color images. Percentage (controlled by <i>Amount</i> ) blend of the warped and fixed luminance like Frame Blend plus percentage blend of the color from both images, controlled by <i>Amount</i> or <i>Hue</i> depending on <i>Color Hue</i> checkbox.

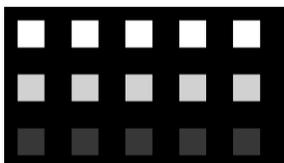
Some modes have access to IR Histogram Equalization, but this setting is only available when VideoTrack is run using CPU. IR Histogram Equalization will no longer supported in software version 3.7.x and above.

### 4 Blending Modes Results

Camera 0



Camera 2





### 4.1 Frame Blend

Pure frame alpha blend. Use the *Amount* parameter to control blend amount. 0 corresponds to all IR. 255 (100%) corresponds to all EO. Results shown in a grayscale image.

Warp Idx:  Fixed Idx:

Amount	Hue	Blend:
0	NA	
128	NA	
255	NA	

### 4.2 Thermal Blend

Blend of EO/IR luminance with false coloring derived from IR. Red corresponds to fully saturated IR. Blue corresponds to no IR. Blends hot pixels from the fixed camera (shown in red) with the EO image. Typically used to highlight hot areas in a daytime EO image.

Warp Idx:  Fixed Idx:

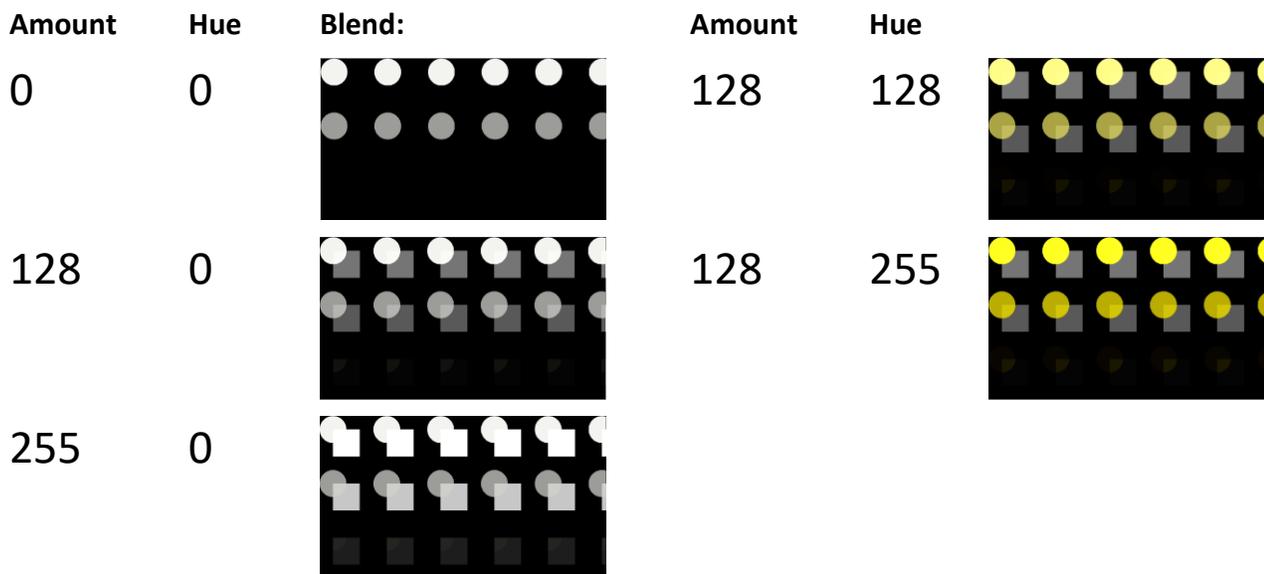
Amount	Hue	Blend:
0	NA	
128	NA	
255	NA	



### 4.3 Night Blend

Meant for night use. IR luminance blended with portions of the EO image that contain visible data. Blends bright areas from the EO camera (modify color with hue) with the IR image. Typically used to highlight bright lights in an IR image at night.

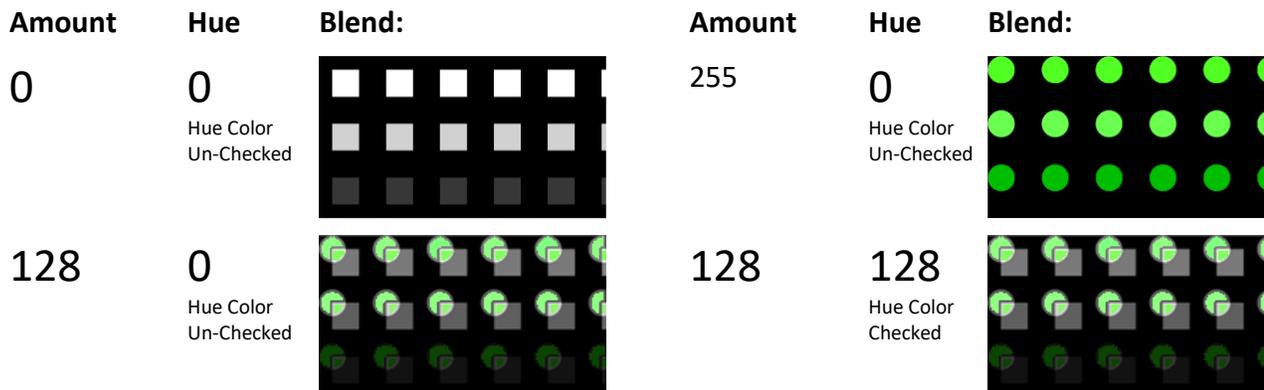
Warp Idx:  Fixed Idx:



### 4.4 Color Blend

Similar to

Frame Blend. Percentage (controlled by *Amount*) of blending the EO and IR images. The color from the EO image is also passed to the output (controlled by *Amount* if *Hue Color* is un-checked, controlled by *Hue* if *Hue Color* is checked).





## 5 Visible Color - Thermal Highlights Use Case

This use case involves utilizing a full-color visible video feed along with thermal imaging to intelligently highlight objects, to optimize surveillance efforts.

This example assumes that an electro-optical (EO) input and a grayscale input are both fed into the SightLine hardware.



Figure 7: Highlighted Objects Configured with Custom User Palette

1. From within the *Display* tab in the Panel Plus:
  - a. Select the appropriate *Network Index* and set the *Video Source* to *Blend* as shown in the [Blending IR and EO Images](#) section.
  - b. Set *Warp Idx* to 1 (Cam1).
  - c. Set *Fixed Idx* to 0 (Cam0).

*Cam1 and Cam0 are both configured to TestPatterns Multi Car as specified in Camera Type in the Acquisition Settings window.*

2. In the *Blending* section select the *ColorIR WarpEO* in the *Mode* drop-down menu.
3. Adjust the *Amount* and *Hue* slides to a midrange position.
4. In the *Blending* section make sure the *Color Hue* option is checked.

Network Index	Video Source	Network Display		Physical Display		Decode @ P+
		Enable	Resolution	HDMI	Resolution	
0	Blend	<input checked="" type="radio"/>	1280x720	<input type="radio"/>	720p60	<input checked="" type="radio"/>
1	None	<input type="radio"/>	Out=In	<input type="radio"/>	720p60	<input type="radio"/>

Separate Network/HDMI resolutions    LVDS N/A   

**Display**

1-Up / Blend

2 Up

Picture in Picture

---

**Blending**

Mode: ColorIR Warp EO

Amount:

Hue:

Hot Start:

Cold End:

Histogram Equalize IR     Color Hue

Align Presets:

Params: 1  2  3  4  5

4-Points: 1  2  3  4  5

Warp Idx: 1    Fixed Idx: 0

**Picture in Picture**

PIP Size:

PIP Position:

Picture In Picture:

Frame color: Default

PIP Label: Track Index

Multi-PIP Zoom: Default

---

Main index camera: 0

PIP index camera: 0

Figure 8: Display Tab Setting



5. From the Panel Plus main menu go to *Configure » User Palette*.
6. In the *Edit User Palette* dialog establish a spectrum range from 0 to 255 to represent the color red.
7. Set the gradient black and white transition from 0 to 200.

 See the *Custom Color User Palette* section in [EAN-Enhancement](#) for more information on how to configure the custom color user palette.

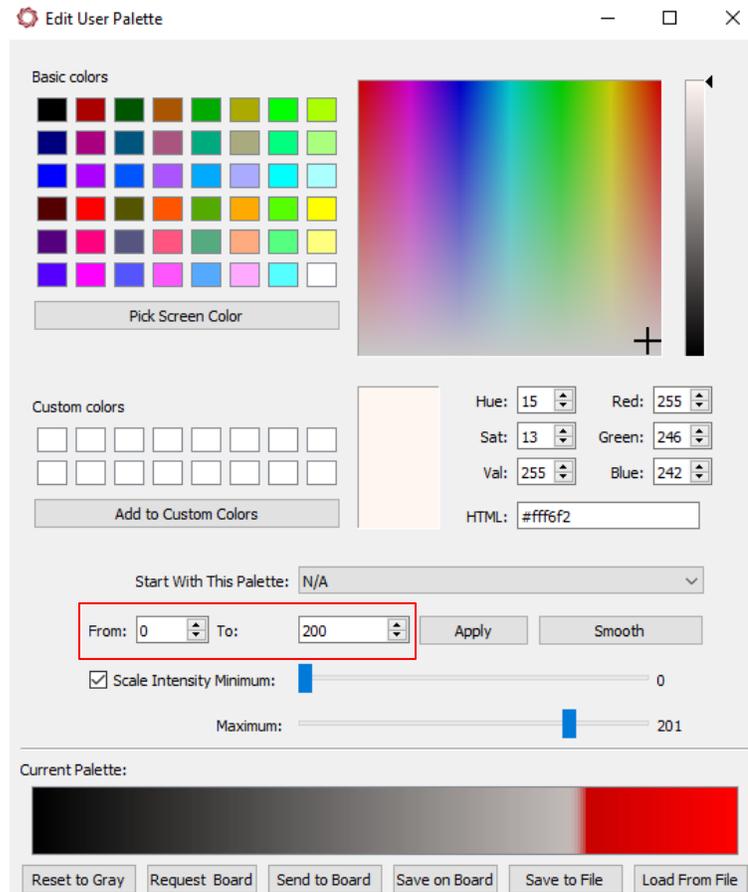


Figure 9: Custom Color User Palette Settings

## 6 Improve Blending Performance

When blending two cameras adjusting the *Stabilization and Registration* parameters to reduce the amount of stabilization allowed can lead to improved performance.

When video stabilization is applied to each camera, the alignment of the images can drift if there is high frequency jitter.

Angle jitter can be eliminated while preventing excessive rotation by lowering the *Maximum Angle* to 1. If the angle and jitter are minimal, set it to 0.

Setting a *Max Stab Offset* will keep the solution stable when panning. If the cameras have different resolutions, this value may need to be larger for the higher resolution EO.

Reducing the search area for frame-to-frame matches in *Registration* may be beneficial, especially with IR where unsuitable matches are often found. The *Maximum Translation* setting for IR can be decreased if jitters are minimal.

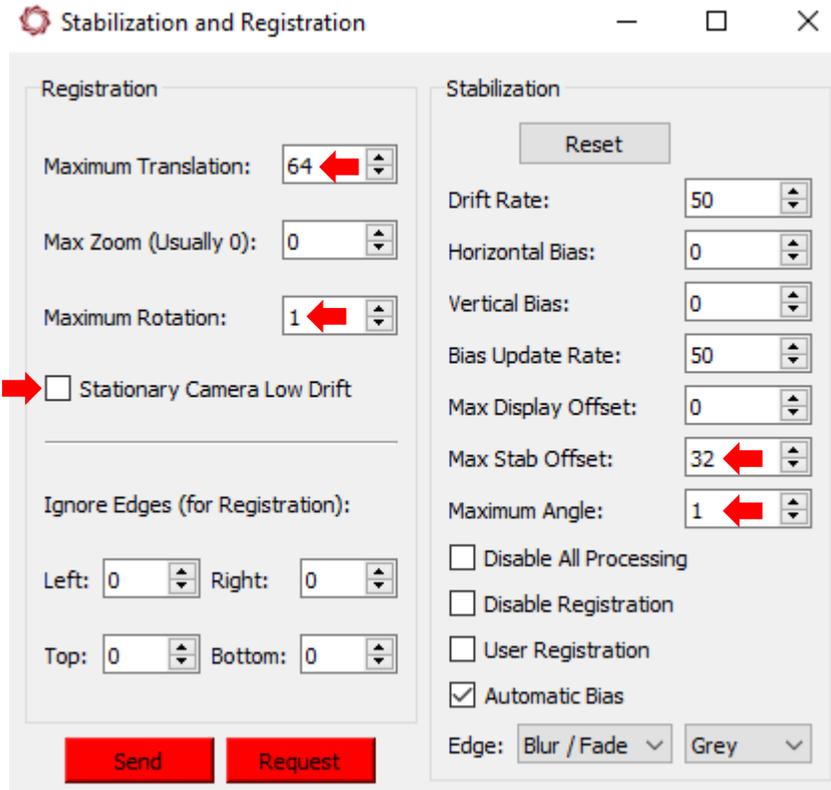


Figure 10: Improving Blending Performance

## 7 Distributed Features and Camera Alignment



Figure 11: Two Camera Alignment Example - Both Cameras Same FOV

In this example, both the EO camera (left) and the IR camera (right) share the same field of view (FOV), although this is not always the case. The scenery they are directed at is mostly considered to be at infinity, although this is also not always the case. In this example aligning the two images should be a straightforward task.

However, situations arise where the camera system focuses on a scene much closer to the sensors than the alignment scenario, or a scene featuring both nearby and distant regions. In such cases, achieving optimal alignment becomes challenging due to changing parallax.



When the system is used in scenarios where the scenery exhibits varying distances from the sensors across the frame, the 4-point alignment method might yield better results. This approach accommodates uneven warping throughout the frame. At times, it might be necessary to accept misalignment in regions of the scene that are nearby.

In instances involving scenes with significant depth-of-field variations, such as when the entire scenery is close to the sensors, achieving alignment across the entire frame might not be possible.

For the 4-point alignment method, it is advisable to select the four points (A–D) explained in the [4-Point Alignment](#) section, in the extreme regions of the frame. In cases where the IR camera has a smaller FOV, these points would appear as shown in [Figure 12](#), color-coded to indicate their respective positions.



**Figure 12: Two Camera Alignment Example - IR Camera Smaller FOV**

A more effective approach would have involved directing both cameras towards a scene with distributed features. Additionally, opting for 4 points positioned at an equal distance from the sensor or within a practical infinity range would lessen parallax issues.

Upon completing the 4-point alignment process, it becomes possible to fine-tune their coordinates using the graphical widget using the up and down arrows. The changes in point positions and alignment are immediately visible on the snapshot screen and within the blended image, updated in real time.

## 8 Questions and Additional Support

For questions and additional support, please contact [SightLine Support](#). Additional support documentation and Engineering Application Notes (EANs) can be found on the [Documentation](#) page of the SightLine Applications website.