4KScope

Signal Analysis Software
Version 7

February 9, 2024

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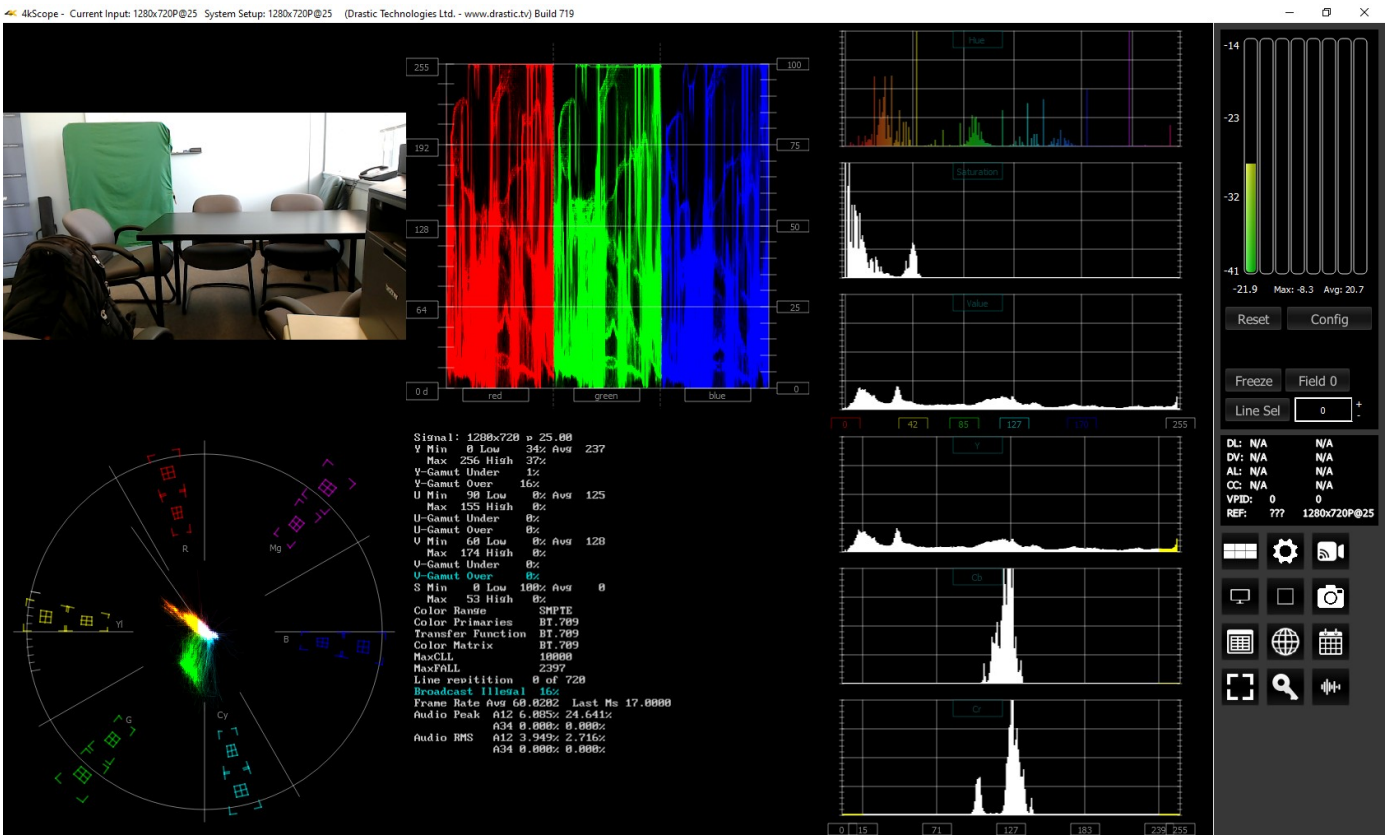
About 4KScope



4KScope is the world's most powerful 4K through SD software signal monitoring tool.

Designed to take advantage of BlueFish444, AJA, Matrox or Blackmagic's Quad HD, 2SI and 4K capture modes in both Rec.709 or BT.2020, 4KScope provides the most cost effective SD/HD/4K signal monitoring solution available. Available for Windows 10 or greater, CentOS/Red Hat 7.4-7.8, and Apple macOS 10.14: Mojave or greater. Blackmagic DeckLink/Intensity/UltraStudio cards are also supported. It provides the following signal analysis tools:

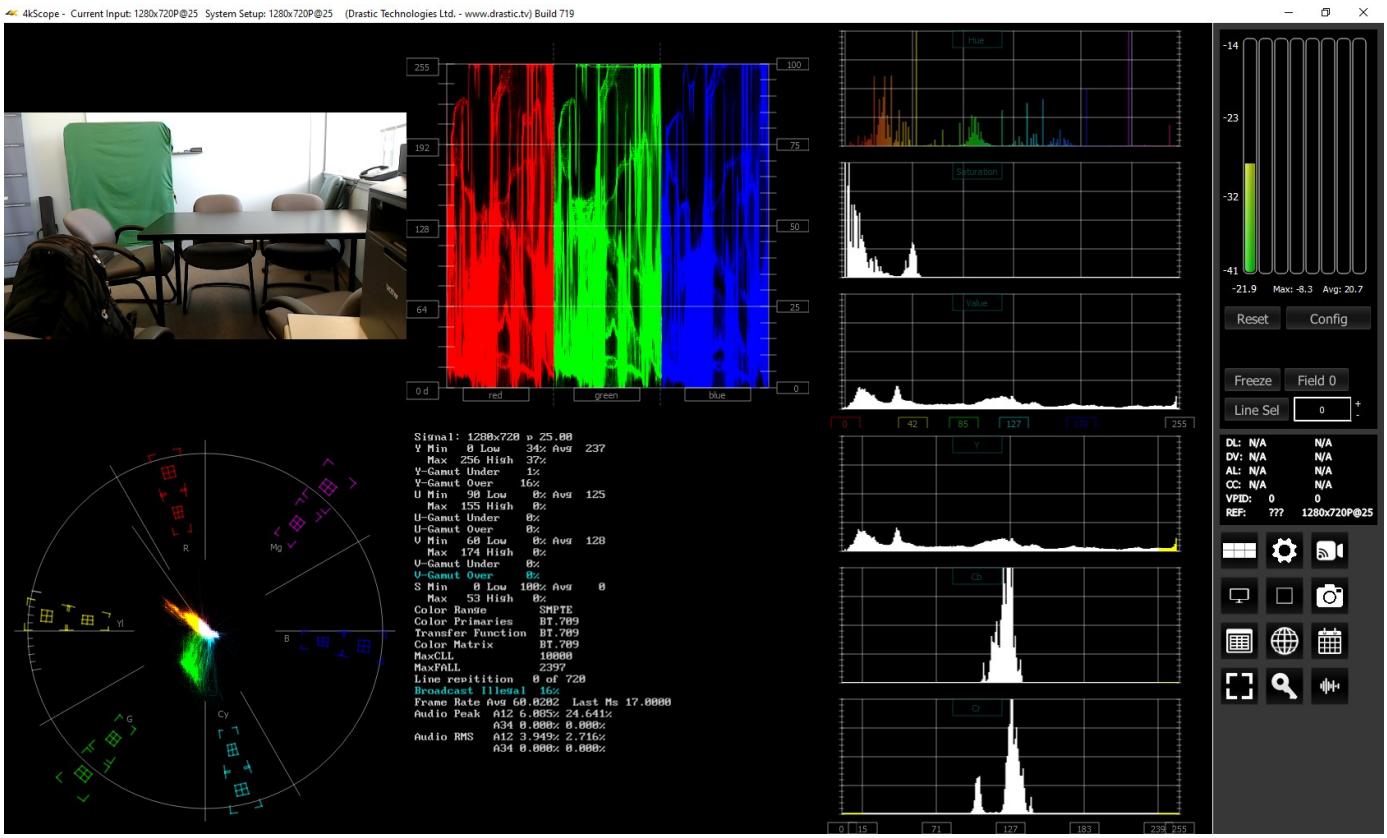
- Picture, with zoom and pan
- Closed caption detection, decode and displayed
- Multiple time code displayed
- Data View
- Vectorscope
- YCbCr Waveform Monitor
- Luma Waveform Monitor
- RGB Waveform Monitor
- RGB Histogram
- Luma Histogram
- H/S (hue/saturation) Scope
- Chromaticity
- Status, including MaxCLL and MaxFALL
- Audio Vectorscope
- Audio Phase
- Audio Histogram

- Audio Waveform Monitor
- Audio Metering (Loudness, RMS and Peak)
- Freeze and compare
- Save signal and scopes to image
- Standard desktop software with remote access

Reference

The reference section provides a detailed look at each of the elements in the **4KScope** graphical user interface.

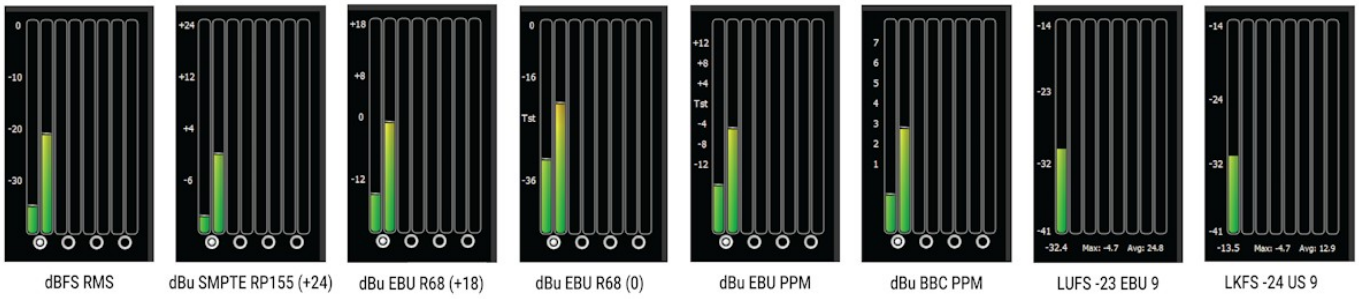
Main Interface Overview



Display section – to the left of the controls (the main portion of the GUI) is the screen where the various scopes, meters, or data will be displayed. 4KScope features four different layouts: single, side by side, four quadrants, and six up (three across, two down). These can be selected in the Scope Config window. The Data View can be selected by clicking the Data View button in the Controls section.

Controls section – The panel on the right with the audio controls, status display, and access buttons is the Controls section. Following are details for the Controls section.

Audio Controls and Displays

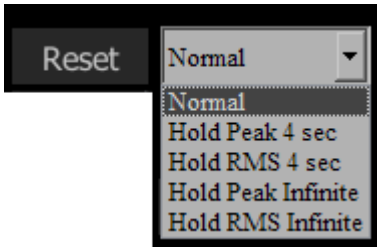


Audio display and pair selectors – At the top of the Controls section there are either 8 or 16 audio audio meters for loudness or Peak/RMS (Root Mean Square) display. The buttons just below the meters allow the user to select between audio pairs for monitoring. Various types of audio meters may be selected using the Audio Scale pulldown in the Configuration Settings window.

In the above spread, the types are all shown (L-R):

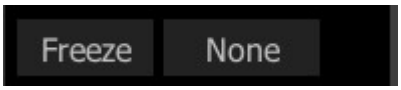
- dBFS RMS - decibels relative to Full Scale, root mean squared
- dBu SMPTE RP155 (+24) – decibel units, SMPTE RP155
- dBu EBU R68 (+18) - decibel units, EBU R68
- dBu EBU R68 (0) - decibel units, EBU R68
- dBu EBU PPM - decibel units, EBU peak programme meter
- dBu BBC PPM - decibel units, BBC peak programme meter
- LUFS -23 EBU 9 - Loudness Units relative to full scale, -23 EBU 9
- LKFS -24 US 9 - Loudness, K-weighted, relative to full scale, -24 US 9

Hold Peak/RMS – Just under the audio pair selector buttons there is a reset button and a pulldown menu for options to hold the peak audio level. The following options are available:

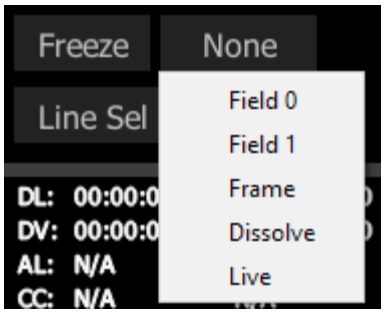


These values can be held for either 4 seconds, or frozen (Infinite Hold), or not held. A Reset button exists to clear any Peak/RMS values to refresh the display for a new measurement.

Freeze Field/Frame



Freeze section – the Freeze button saves an image of the current frame of video for closer inspection or comparison. The button to the right offers a popup menu for the type of image that is created.



Field/Frame/Live drop down – selects how a frozen frame will be displayed against the live video
Field 0 – show field 0 frozen, field 1 live
Field 1 – show field 1 frozen, field 0 live
Frame – show the frozen frame
Dissolve – show 50% of the frozen frame and 50% of the live frame
Live – show the live video (frozen frame is still saved)

Line Select

Line Select – when clicked, all the video scopes will analyze only the video line in the line selection box next to the button. This line will be highlighted on the in app video display.
Clicking the plus and minus buttons will increment the line up or down. Pressing the Line Sel button sets that line as the line to monitor. Note that vertical blanking lines (0 - 41)are not selectable since they are outside the image area. So, in HD for example, lines below line 42, and lines above line 1121 are not selectable.

Status Display

Status Display – the Status display shows time code and user bits (where present) for:
- RP-188 L SDI inputs

- RP-188 V SDI inputs
- Analog SMPTE time code input
- Closed captions presence and type
- VPID (Video Payload Identifier)
- Reference input presence and type

Scopes Layout and Setup

Scope Setup button **–** The Scope Setup button in the Controls section opens the Scope Config window, which allows the user to configure how many scopes are displayed, to switch between scopes, and to set up each particular scope.

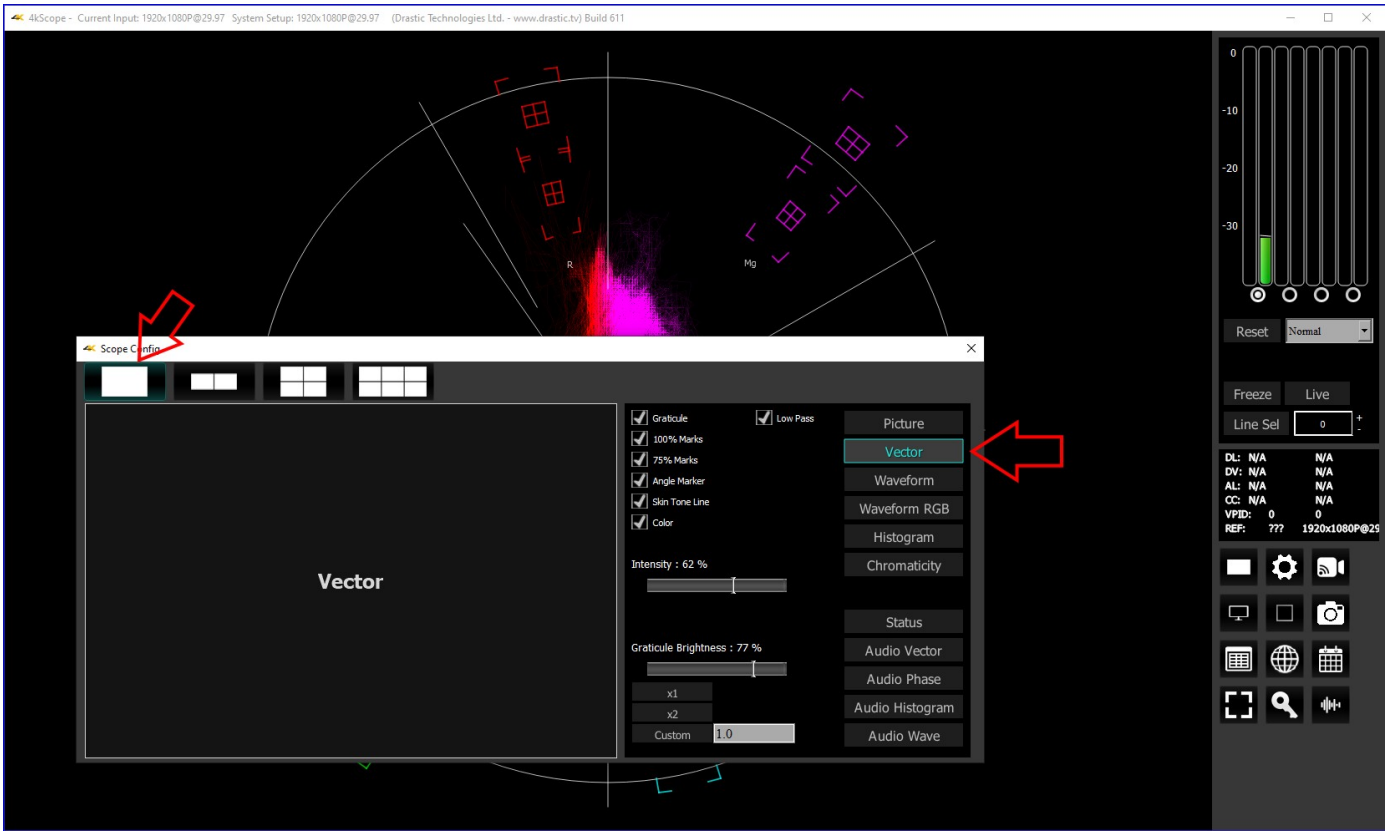
Layout Options

When you press the Setup button the Scopes config window opens up. At the top of the window there are four layout options. Select the layout that suits your workflow:

From left to right, the choices are: 1 scope (single), 2 scopes (side by side), 4 scopes (2 x 2 grid), or 6 scopes (two rows of three scopes).

Single Scope Layout

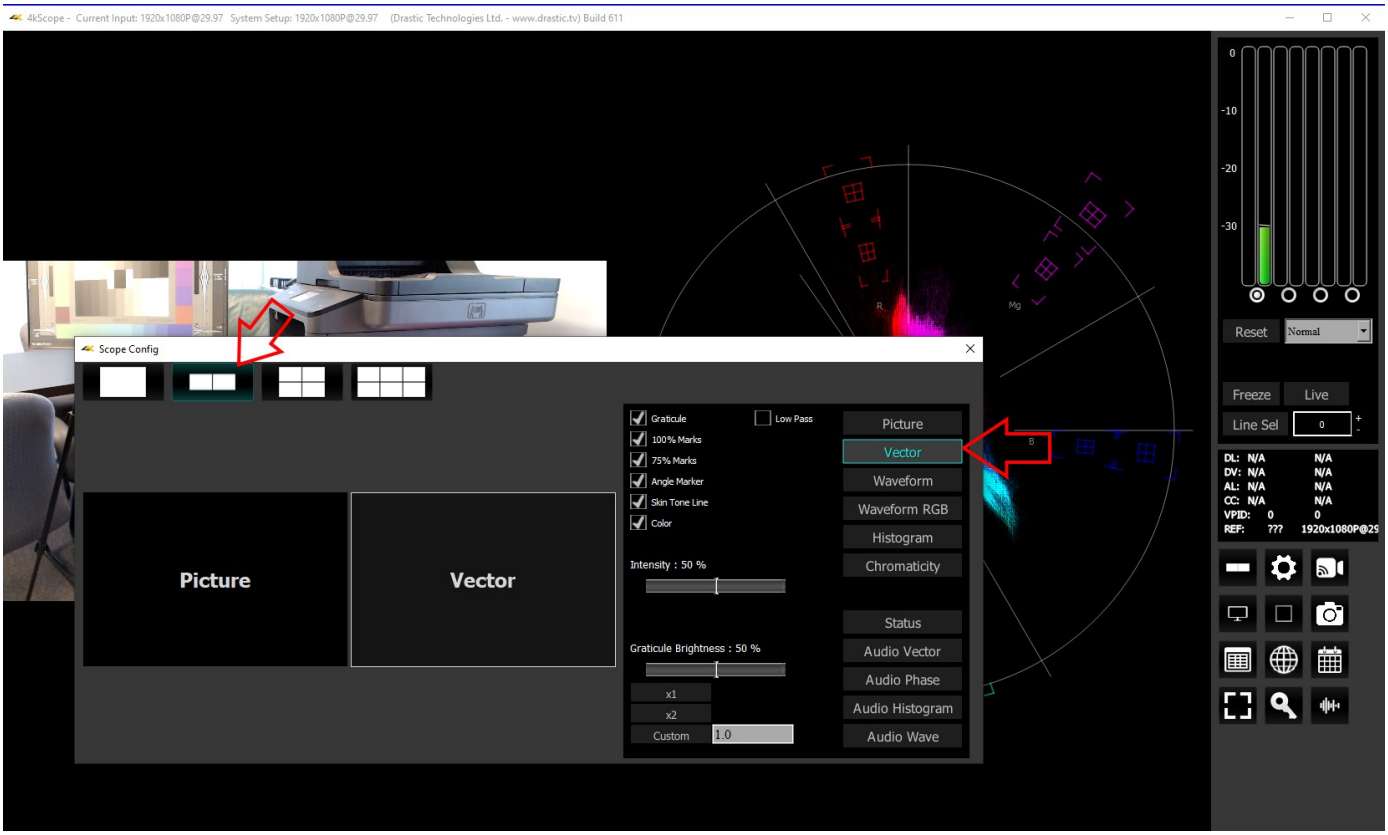
A single scope layout has been selected.



The arrow on the left shows the button used to select the single scope layout. The example shown displays the selection of a vectorscope. The arrow on the right shows the button used to select the vectorscope.

Two Scopes Layout

The two scopes layout has been selected.

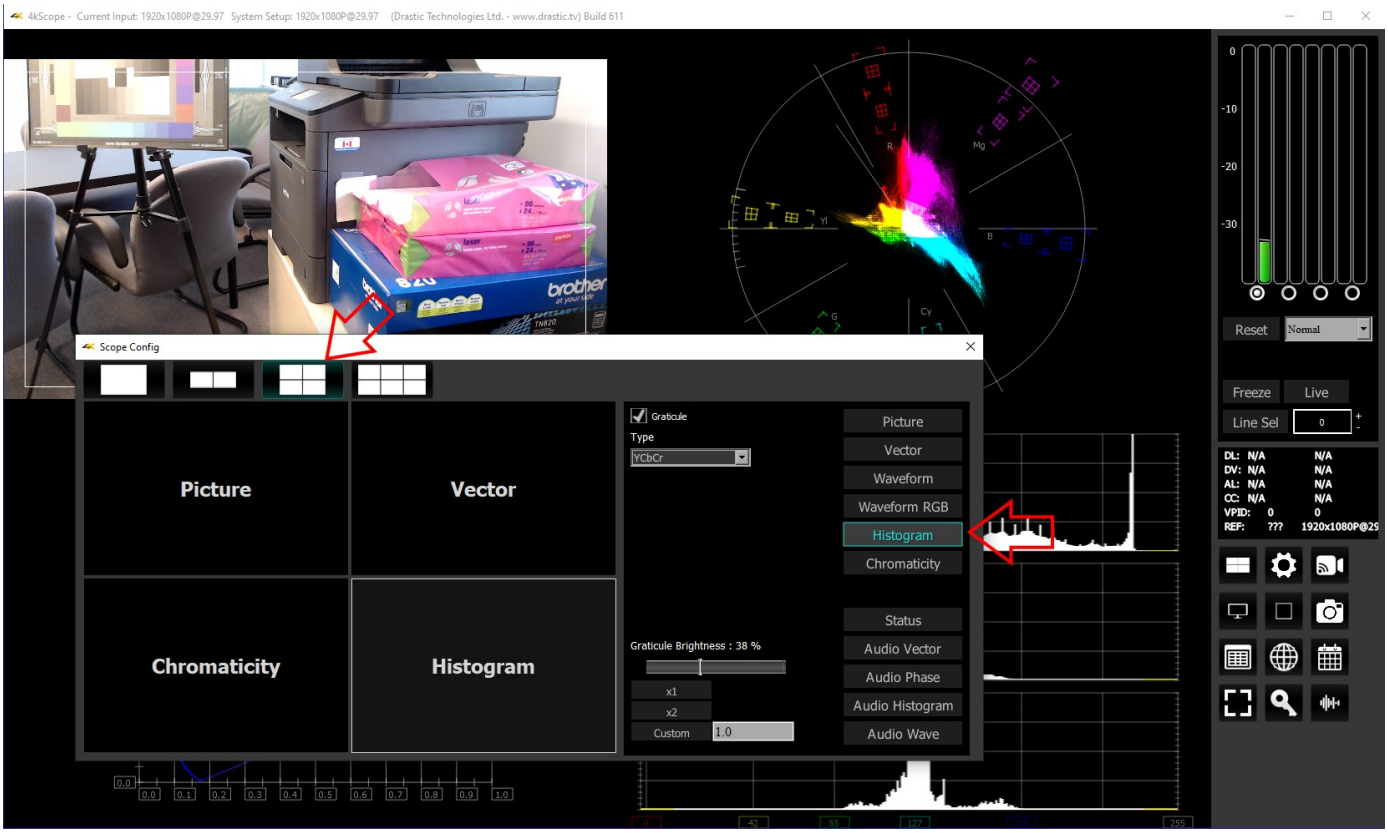


The arrow on the left shows the button used to select the two scopes layout. The example shown features the picture view and the vectorscope. The arrow on the right shows the button used to select the vectorscope.

To change which scope appears in a panel, click on it and use the selection buttons on the right to choose the scope. For example if you would like a waveform monitor on the left panel, you would click on the left panel, and click on the appropriate waveform button.

Four Scopes Layout

The four scopes layout has been selected.

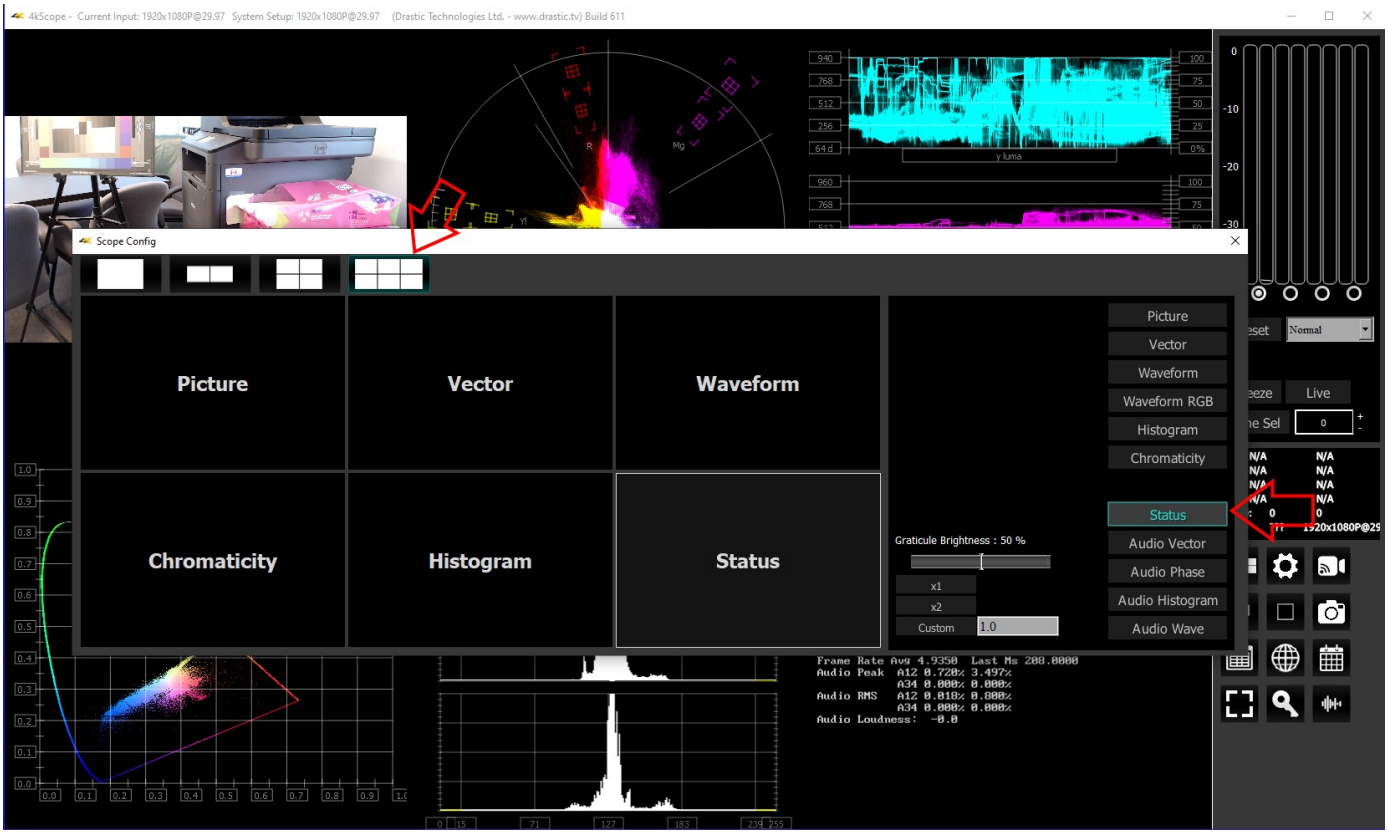


The arrow on the left shows the button used to select the four scopes layout. The example shown features the picture view, the vectorscope, the chromaticity, and the histogram. The arrow on the right shows the button being used to select the histogram.

To change which scope appears in a panel, click on it and use the selection buttons on the right to choose the scope. For example if you would like a waveform monitor on the lower left panel, you would click on the left panel, and click on the appropriate waveform button.

Six Scopes Layout

The six scopes layout has been selected.

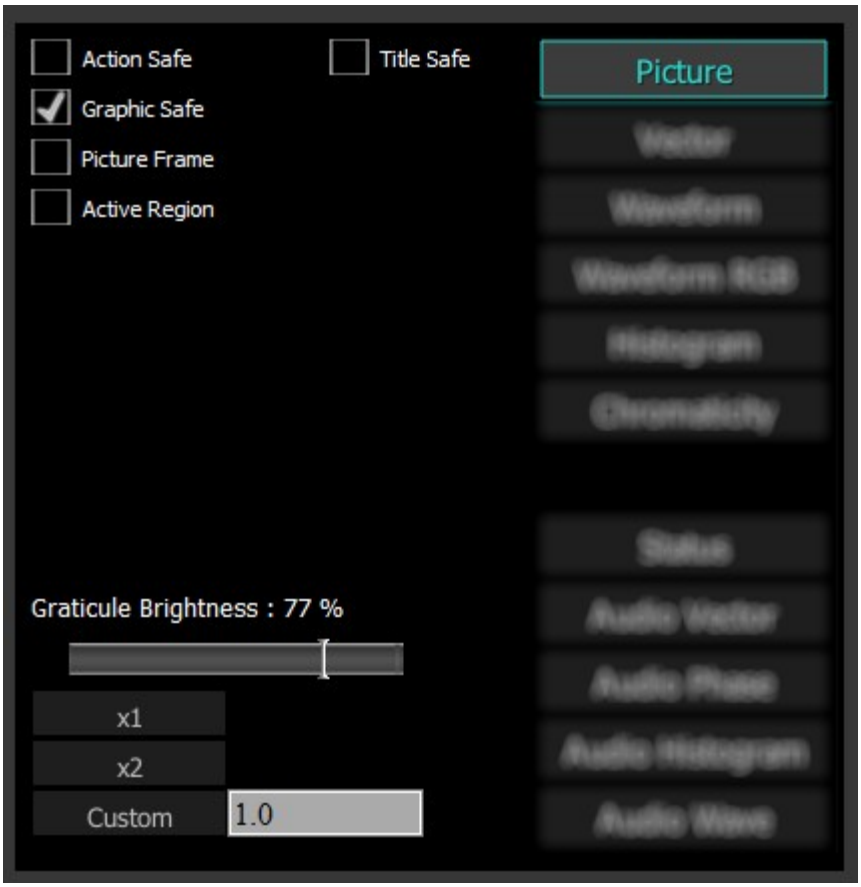


The arrow on the left shows the button used to select the six scopes layout. The example shown features the picture view, the vectorscope, the waveform, the chromaticity, the histogram, and the status display. The arrow on the right shows the button being used to select the status view.

To change which scope appears in a panel, click on it and use the selection buttons on the right to choose the scope. For example if you would like an audio waveform display on the lower left panel, you would click on the left panel, and click on the appropriate waveform button.

Picture View

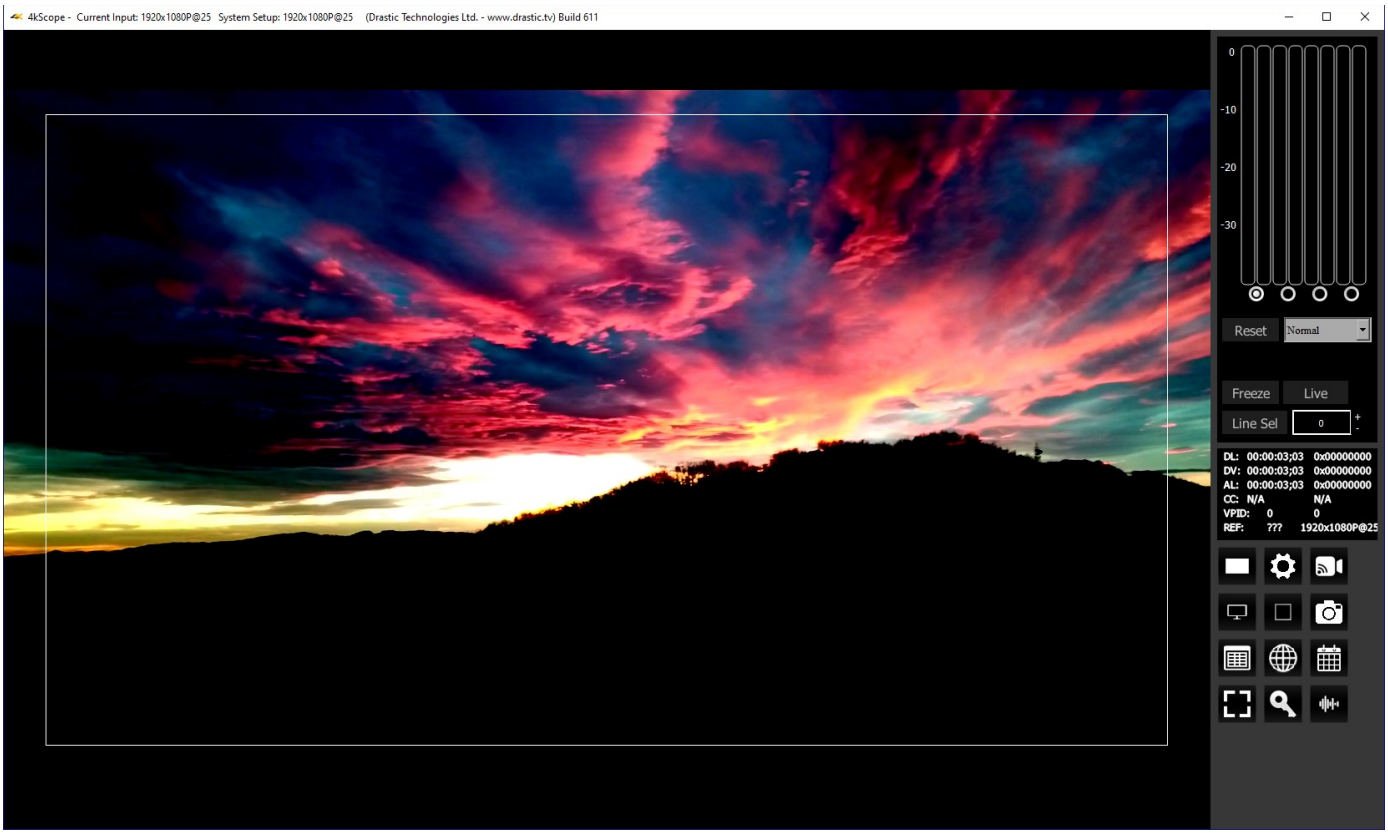
To set up the Picture view, press the **Scope Config** button. This opens the Scope Config window. Click on the **Picture** button on the right. There are a number of options to set up the picture view:



Action Safe checkbox - when selected, the Action Safe graticule is displayed over the video output.
Title Safe checkbox - when selected, the Title Safe graticule is displayed over the video output.
Graphic Safe checkbox - when selected, the Graphic Safe graticule is displayed over the video output.
Picture Frame checkbox - when selected, the Picture Frame graticule is displayed over the video output.
Active Region checkbox - when selected, the Active region graticule is displayed over the video output.
Graticule Brightness slider - Moving the Graticule Brightness slider adjusts the brightness of the graticule overlay, 0% providing no display and 100% being maximum brightness.
x1 button – clicking this button sets the display to standard size
x2 button – clicking this display zooms in to set the display at 200%, or 2x normal display. Pressing the x1 button sets the display back to normal.
Custom button and field – The user may enter a custom enlargement value in the field, and press the Custom button to zoom in and see details up close. Pressing the x1 button sets the display back to normal.

Pressing the x in the upper right corner will close the Scope Config window.

Here is the Picture view.

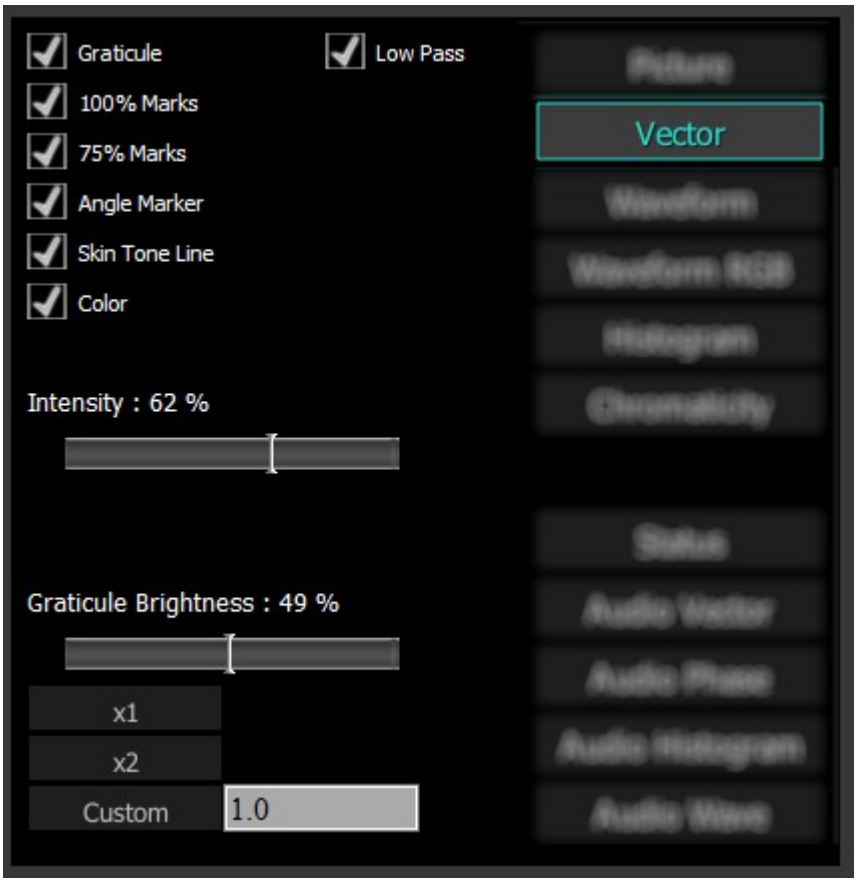


The Picture view shows the video signal, to confirm the source is correct. Action Safe, Title Safe, Graphic Safe, Picture Safe, and Active Region graticules may be optionally overlaid.

Vectorscope

Vectorscope Setup

To set up the vectorscope, press the **Scope Config** button. This opens the Scope Config window. Click on the **Vector** button on the right. There are a number of options to set up the vectorscope:



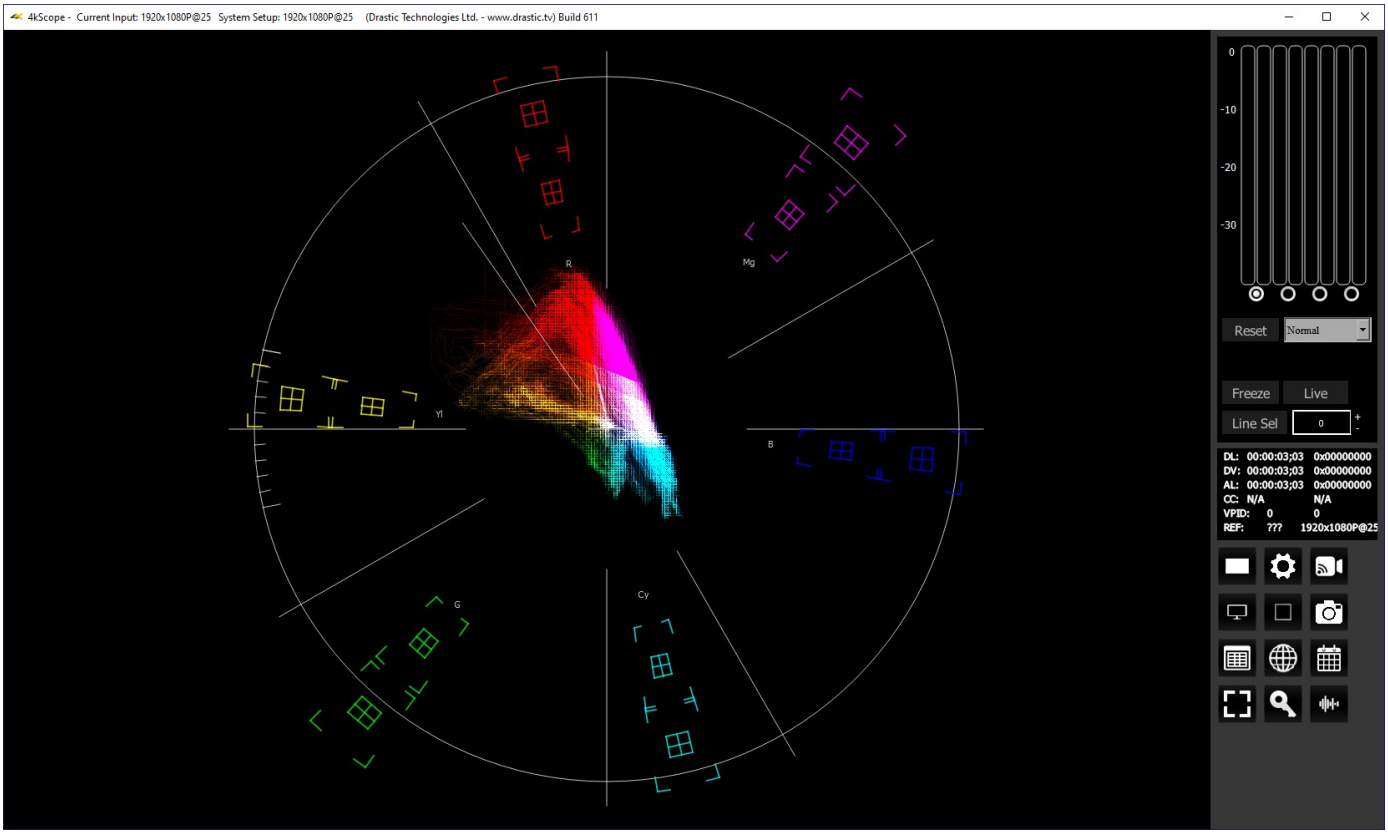
Graticule checkbox – when selected, the graticule is laid over the Vectorscope. The brightness of the Graticule may be adjusted using the **Graticule Brightness** slider described below.
Low Pass checkbox - when selected, smooth the scope with a 1/3 filter to remove single pixel anomalies.
100% Marks checkbox – when selected, the 100% Marks are displayed over the Vectorscope
75% Marks checkbox - when selected, the 75% Marks are displayed over the Vectorscope
Angle Marker checkbox - when selected, the Angle Marker is displayed over the Vectorscope
Skin Tone Line checkbox - when selected, the Skin Tone Line is displayed over the Vectorscope
Color checkbox – when selected, the lines, regions, and points of the signal in the vectorscope are drawn in their respective colors.
Intensity slider – Moving the Intensity slider brightens or dims the display of the trace through the Vectorscope. The current setting is displayed above the slider, as a percentage, 0% providing no display and 100% being maximum intensity.
Graticule Brightness slider - Moving the Graticule Brightness slider adjusts the brightness of the graticule overlay, 0% providing no display and 100% being maximum brightness.
x1 button – clicking this button sets the display to standard size
x2 button – clicking this display zooms in to set the display at 200%, or 2x normal display. Pressing the x1 button sets the display back to normal.

Custom button and field – The user may enter a custom enlargement value in the field, and press the Custom button to zoom in and see details up close. Pressing the x1 button sets the display back to normal.

Pressing the x in the upper right corner will close the Scope Config window.

Vectorscope Window

Here is the Vectorscope.



The **Vectorscope** displays a traditional Cb by Cr X-Y display with overlaid reference graticule. Color accurate graticules automatically switch between SD and HD color spaces. The markers include color points (for standard bar checks) at 75% and 100% saturation. All the standard points are boxed; red, magenta, blue, cyan, green and yellow. A skin tone/flesh line is provided to allow for easy hue adjustment as well as standard diagonals.

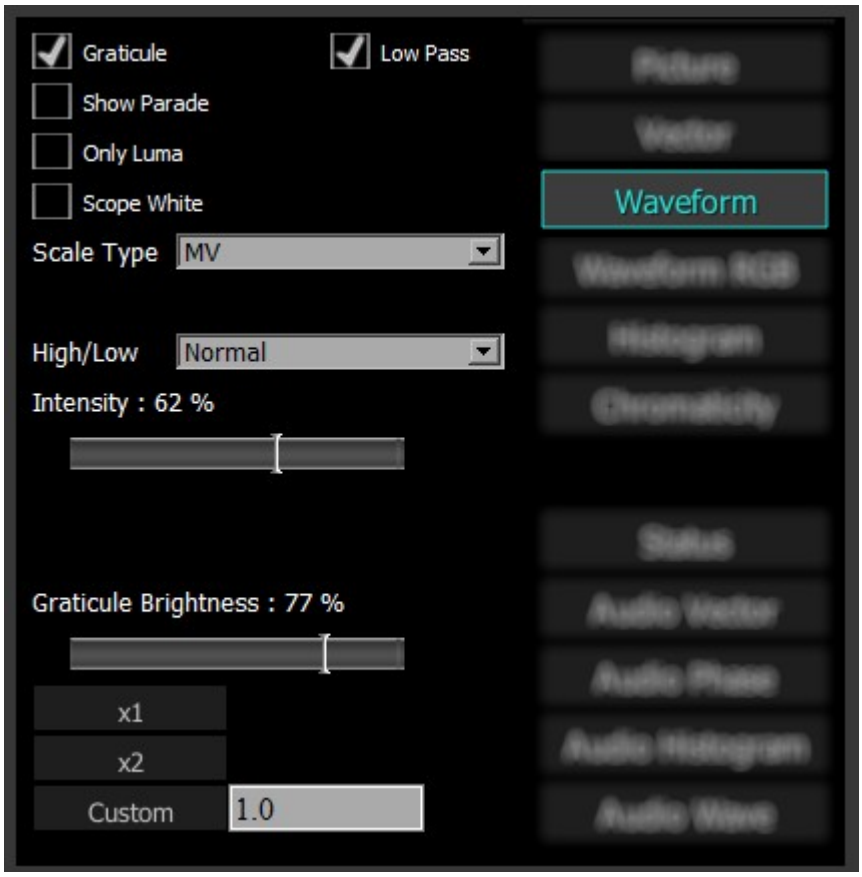
At all times a minimum and maximum value for each of the channels (Y, Cr and Cb) is displayed in 10 bit mode (0-1023). The color of the text for each channel indicates the following: in range (green), out of range but legal (yellow) and illegal/sync values (red).

For single link 8 and 10 bit YCbCr signals, there is no color processing involved. For dual link 4:4:4 RGB signals, the equivalent Cb and Cr are calculated to create the display.

Waveform YCbCr

Waveform YCbCr Setup

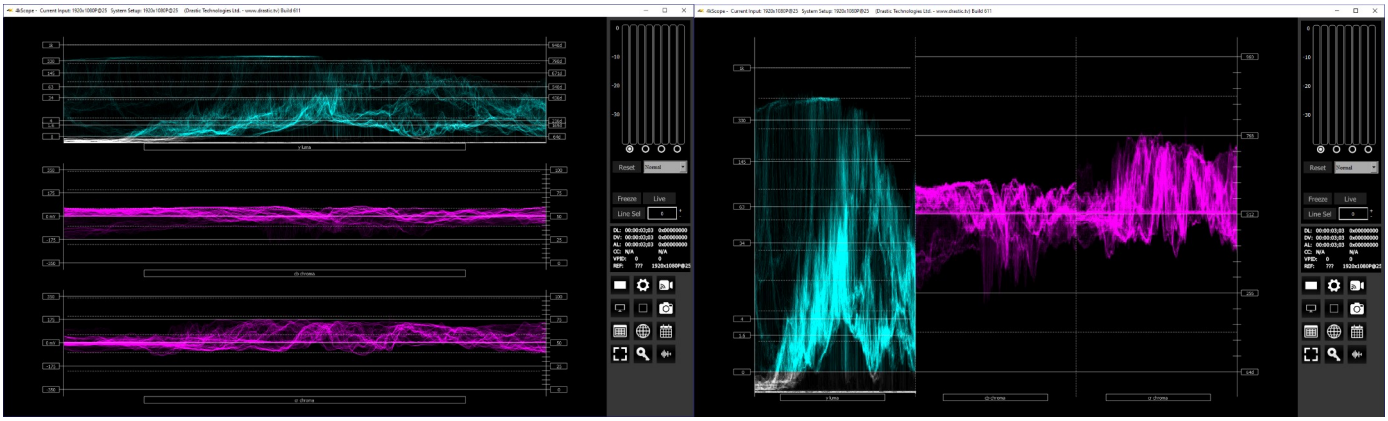
To set up the Waveform YCbCr, press the **Scope Config** button. This opens the Scope Config window. Click on the **Waveform** button on the right. There are a number of options to set up the waveform:



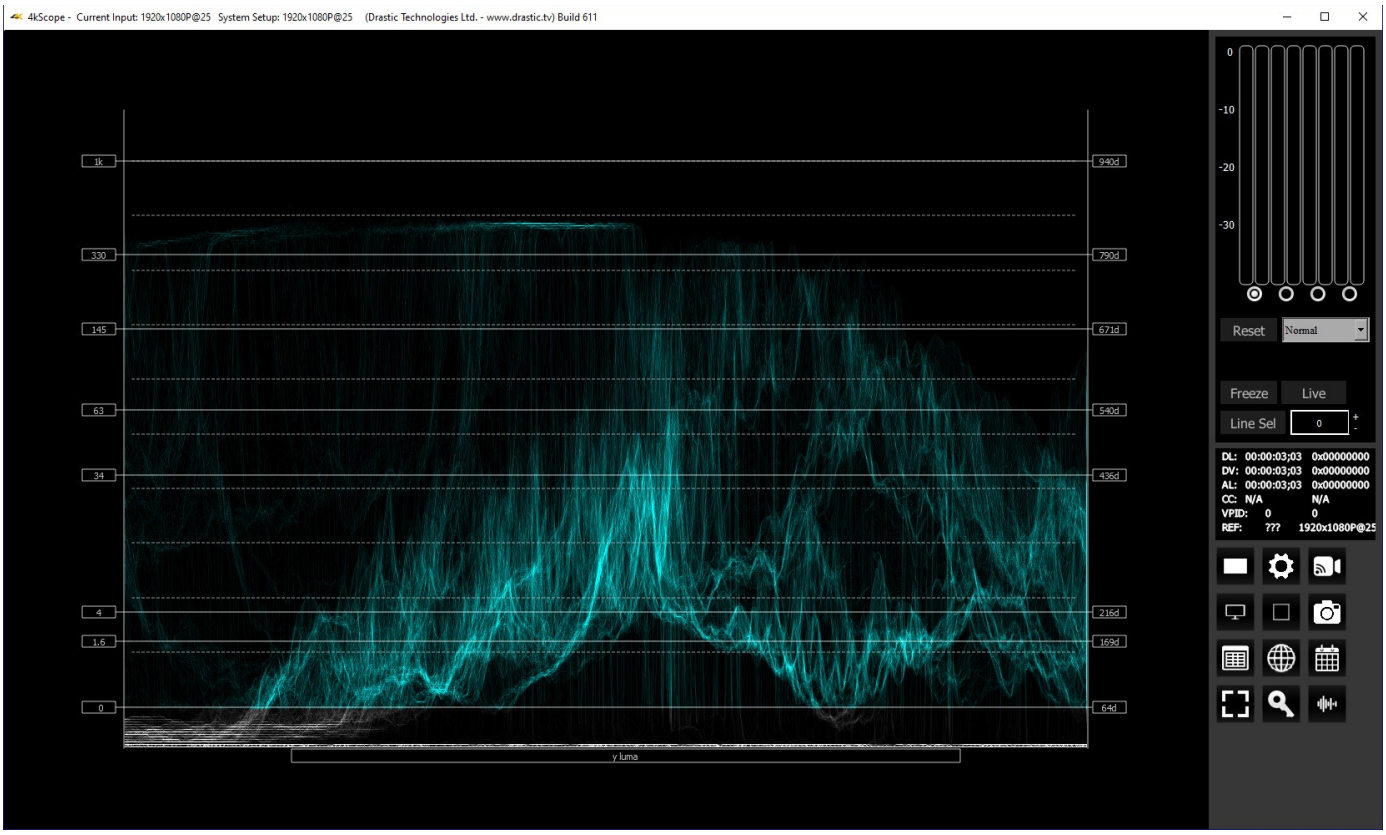
Graticule checkbox – when selected, the graticule is laid over the Waveform YCbCr display. The brightness of the Graticule may be adjusted using the **Graticule Brightness** slider described below.

Low Pass checkbox – when selected, smooth the scope with a 1/3 filter to remove single pixel anomalies.

Show Parade checkbox – when selected, the display is from left to right. When not selected, the display is stacked top to bottom.



Only Luma checkbox – when selected, displays only the luminance of the signal.



Scope White checkbox – turns the trace white.
Scale Type pulldown – set the type of scale used to draw the waveform. Choices include:

- **Digital** - the actual 0..255. 0..1023 or 0..4095 numeric values of the signal.
- **MV** - the equivalent millivolts value of the signal if it was converted to analog.
- **IRE** – Institute of Radio Engineers units, spanning 0..100.

High/Low pulldown – Show only the high and low portions of the signal, cutting out the middle. Choices include: Normal (off), 2x zoom, 3x zoom.

Intensity slider – Moving the Intensity slider brightens or dims the display of the video signal through the Vectorscope. The current setting is displayed above the slider, as a percentage, 0% providing no display and 100% being maximum intensity.

Graticule Brightness slider - Moving the Graticule Brightness slider adjusts the brightness of the graticule overlay, 0% providing no display and 100% being maximum brightness.

x1 button – clicking this button sets the display to standard size

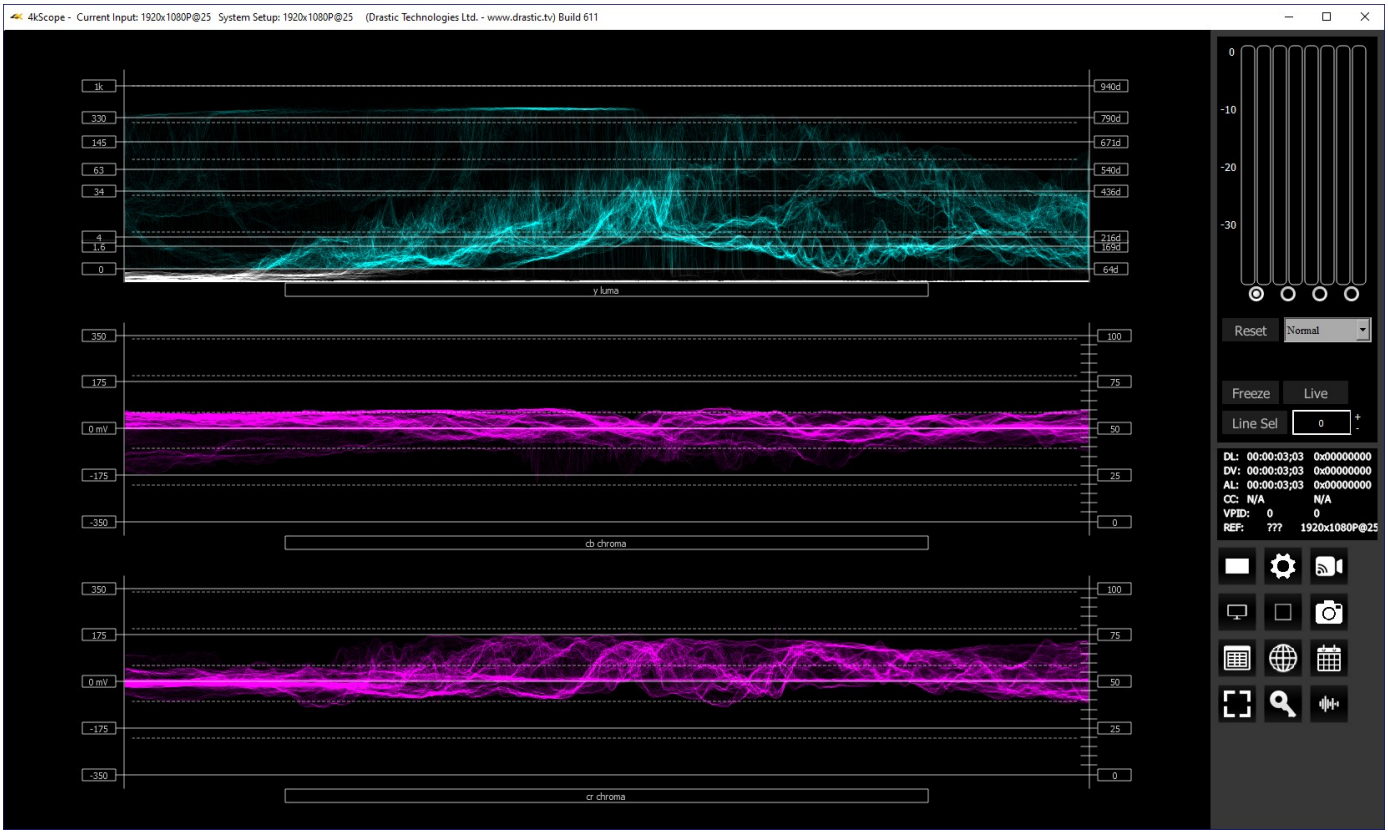
x2 button – clicking this display zooms in to set the display at 200%, or 2x normal display. Pressing the x1 button sets the display back to normal.

Custom button and field – The user may enter a custom enlargement value in the field, and press the Custom button to zoom in and see details up close. Pressing the x1 button sets the display back to normal.

Pressing the x in the upper right corner will close the Scope Config window.

Waveform YCbCr Window

Here is the Waveform YCbCr.



The YCbCr Waveform Monitor displays the levels of the Y, Cb and Cr from the left of the picture to the right of the picture with all the lines summed into one graph. The Y, or luma/luminance, graph provides accurate white and black level information, as well as the range in between. The Cb and Cr display the +/- 512 levels of chroma of both types. This provides a visual representation of the chroma range of the signal.

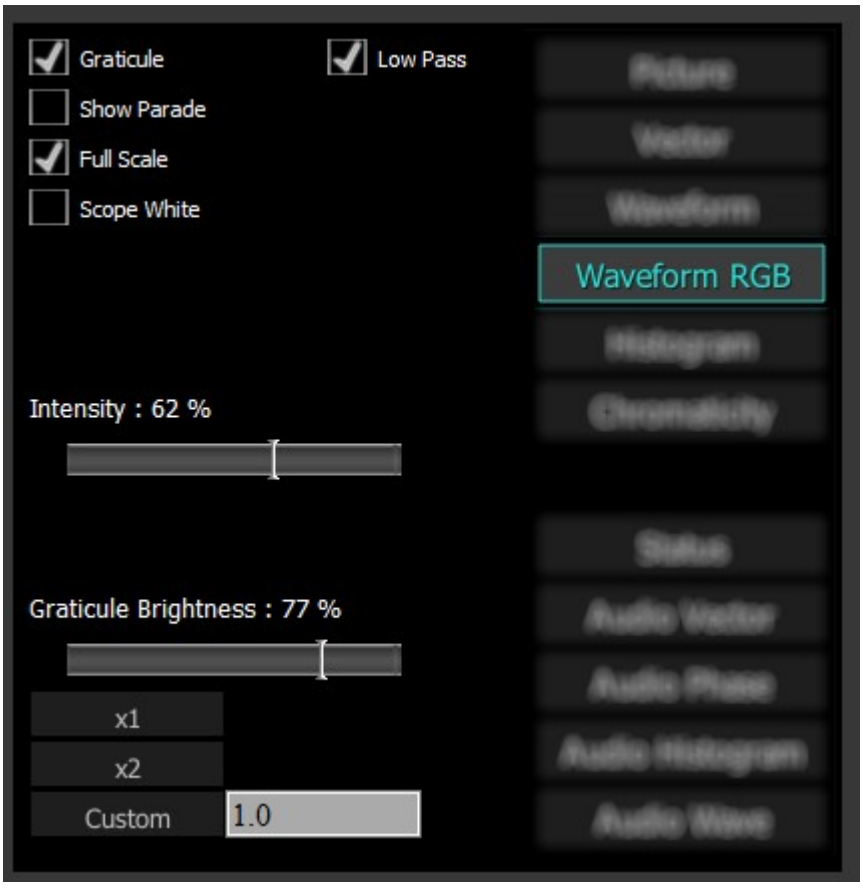
Critical for downstream color correction is the need to ensure proper luminance levels at the stage of initial capture, so any corrections will not muddy or wash out the signal information.

At all times a minimum and maximum value for each of the channels (Y, Cr and Cb) is displayed in 10 bit mode (0-1023). The color of the text for each channel indicates the following: in range (green), out of range but legal (yellow) and illegal/sync values (red).

Waveform RGB

Waveform RGB Setup

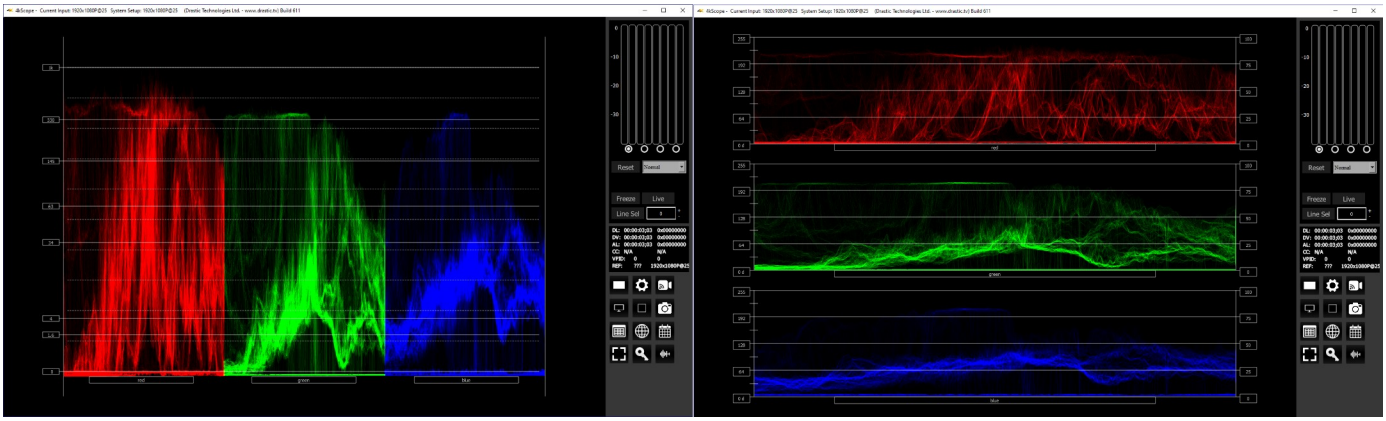
To set up the Waveform RGB press the **Scope Config** button. This opens the Scope Config window. Click on the **Waveform RGB** button on the right. There are a number of options to set up the Waveform RGB:



Graticule checkbox – when selected, the graticule is laid over the Waveform RGB display. The brightness of the Graticule may be adjusted using the **Graticule Brightness** slider described below.

Low Pass checkbox - Smooth the scope with a 1/3 filter to remove single pixel anomalies.

Show Parade checkbox – when selected, the display is from left to right. When not selected, the display is stacked top to bottom.



Full Scale checkbox – RGB, by default, will be sRGB. The range of each color will be from 16 to 240 (in 8 bit), so the scale will place white at 240 and black at 16 in normal scale. If in full scale, white will be placed at 255 and black at 0.

Scope White checkbox – turns the display white.

Intensity slider – Moving the Intensity slider brightens or dims the display of the video signal. The current setting is displayed above the slider, as a percentage, 0% providing no display and 100% being maximum intensity.

Graticule Brightness slider – moving the Graticule Brightness slider adjusts the brightness of the graticule overlay, 0% providing no display and 100% being maximum brightness.

x1 button – clicking this button sets the display to standard size

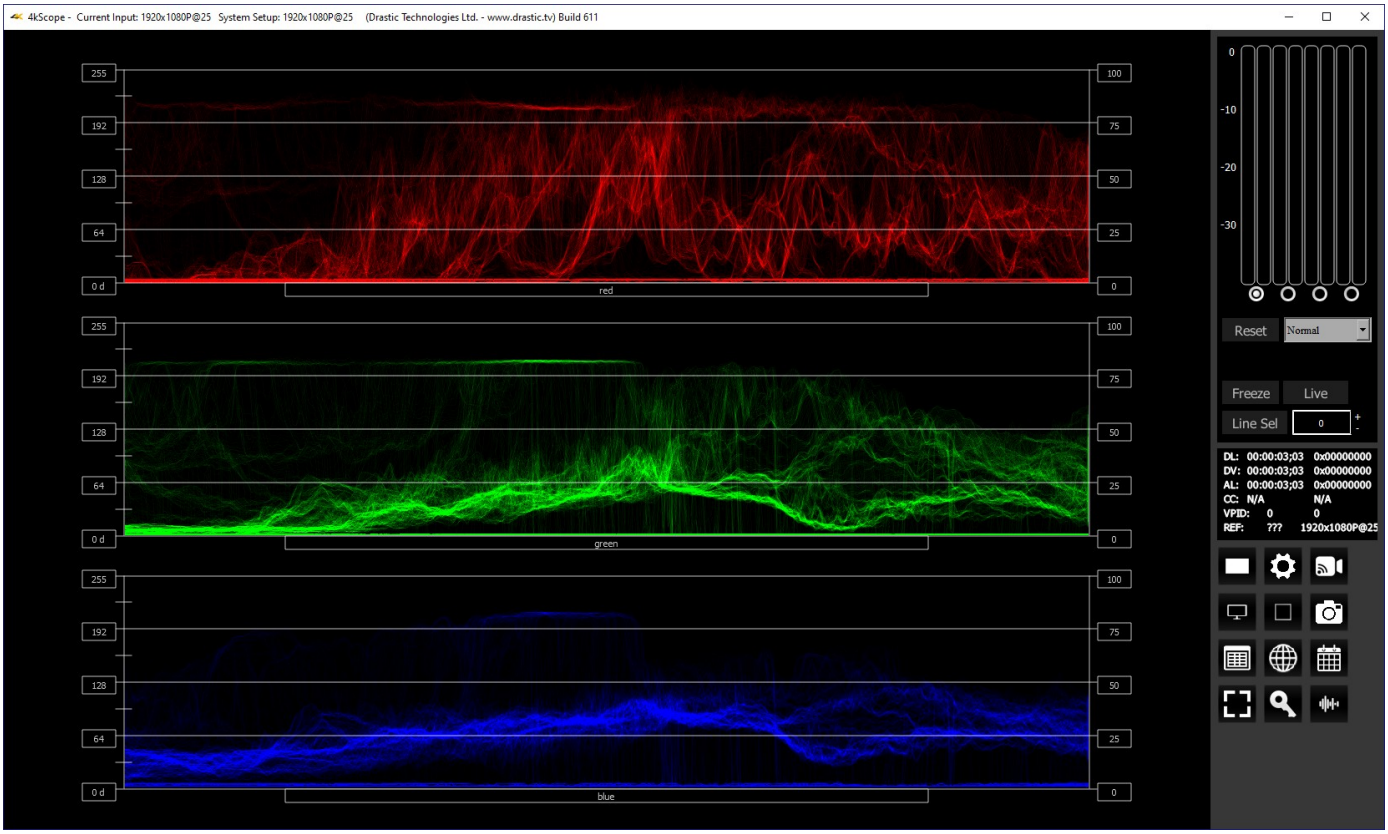
x2 button – clicking this display zooms in to set the display at 200%, or 2x normal display. Pressing the x1 button sets the display back to normal.

Custom button and field – The user may enter a custom enlargement value in the field, and press the Custom button to zoom in and see details up close. Pressing the x1 button sets the display back to normal.

Pressing the x in the upper right corner will close the Scope Config window.

Waveform RGB Window

Here is the Waveform RGB.



The RGB Waveform Monitor shows each of the red, green and blue signals as independent graphs, displaying the RGB, or chrominance/color values associated with the signal.

At all times a minimum and maximum value for each of the channels (R, G, B, and A) is displayed in 10 bit mode (0-1023).

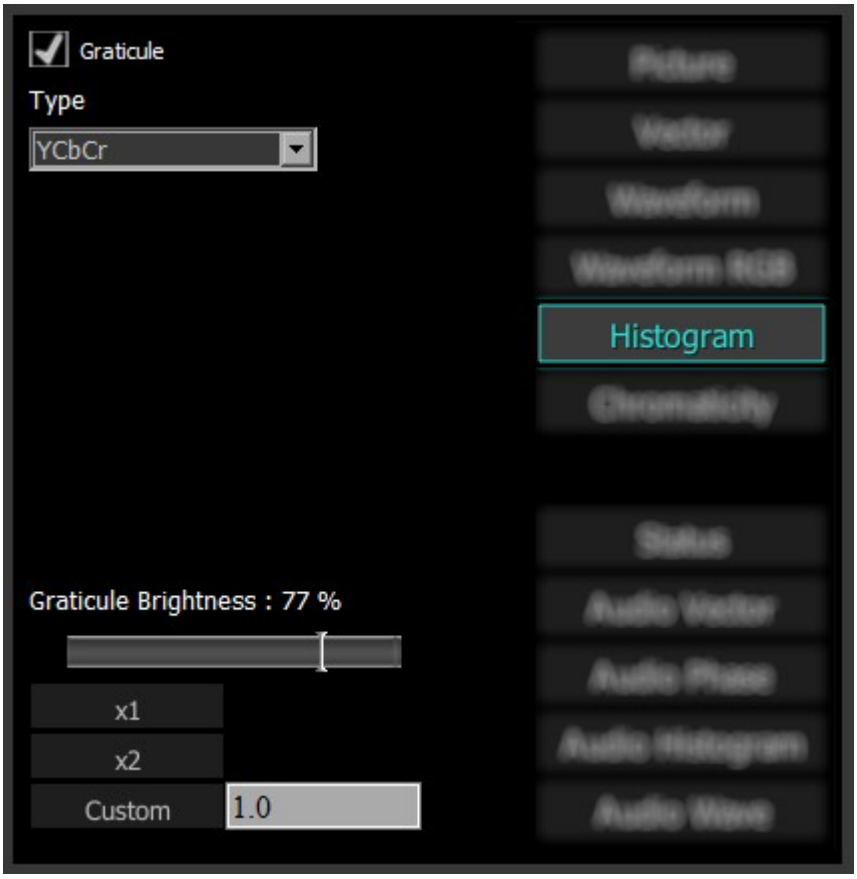
For dual link RGB signals, the original RGB 10 bit values are used unprocessed. For single link YCbCr signals, they are first converted to RGB before being analyzed and displayed.

YCbCr Histogram

YCbCr Histogram Setup

There are five Histograms available in the histogram panel: the YCbCr Histogram, RGB Histogram, HSV Histogram, Luma Histogram, and the H/S Scope.

To set up the YCbCr Histogram, press the **Scope Config** button. This opens the Scope Config window. Click on the **Histogram** button on the right. Then use the pulldown menu to select YCbCr. There are a number of options to set up the YCbCr Histogram:

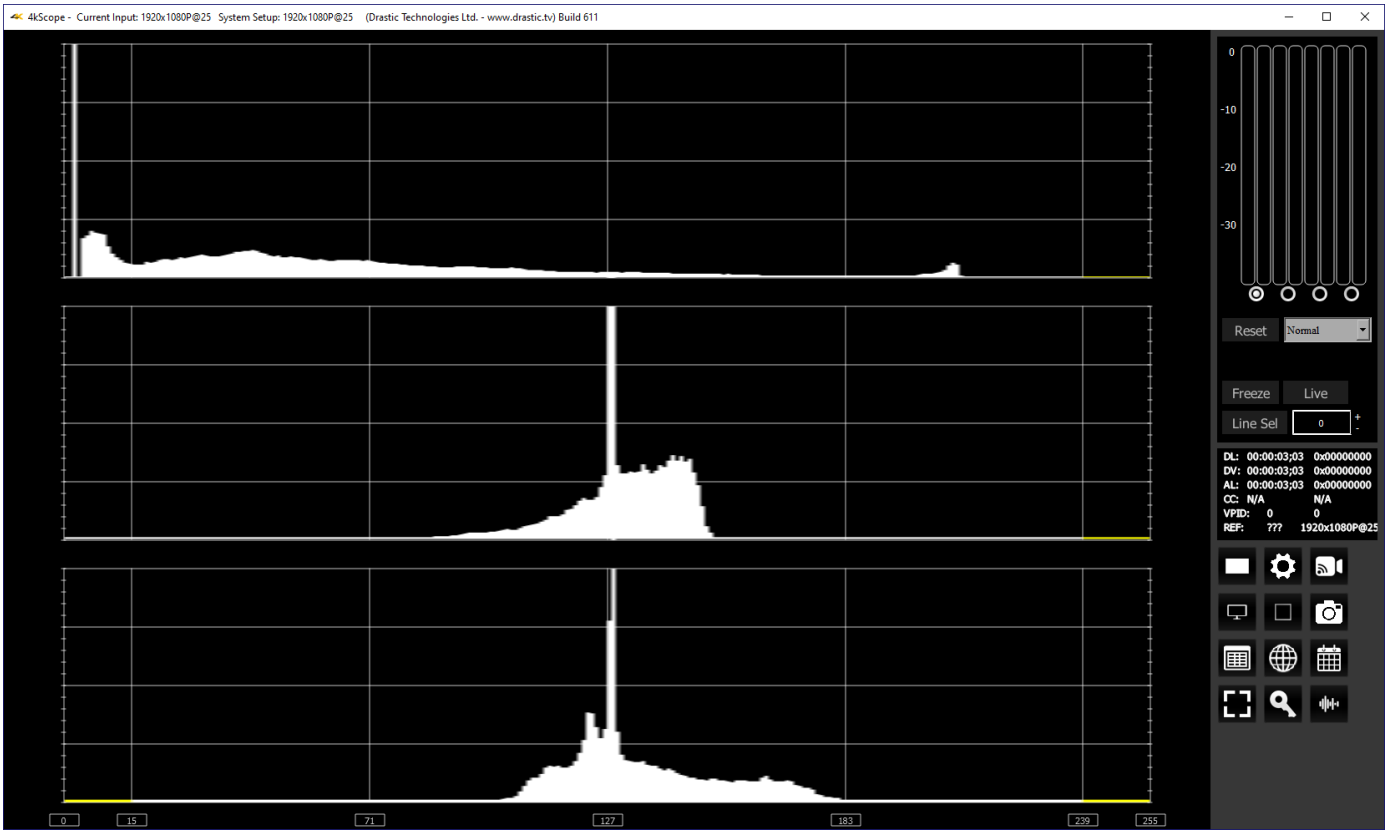


Graticule checkbox – when selected, the graticule is laid over the Histogram display. The brightness of the Graticule may be adjusted using the **Graticule Brightness** slider described below.
Graticule Brightness slider – moving the Graticule Brightness slider adjusts the brightness of the graticule overlay, 0% providing no display and 100% being maximum brightness.
x1 button – clicking this button sets the display to standard size
x2 button – clicking this display zooms in to set the display at 200%, or 2x normal display. Pressing the x1 button sets the display back to normal.
Custom button and field – The user may enter a custom enlargement value in the field, and press the Custom button to zoom in and see details up close. Pressing the x1 button sets the display back to normal.

Pressing the x in the upper right corner will close the Scope Config window.

YCbCr Histogram Window

Here is the YCbCr Histogram:



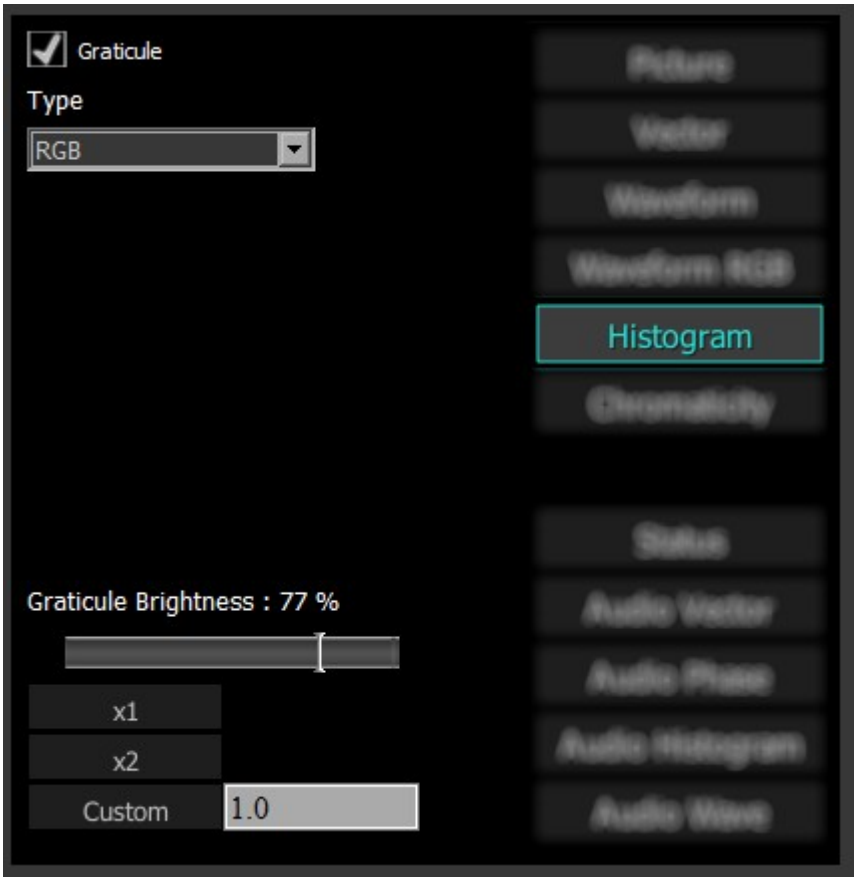
YCbCr Histogram - displays a YCbCr range. This histogram breaks up the signal in into luma and chroma components. The top histogram represents the luma power of the various levels in the signal. The Cb and Cr histograms that follow show the power distribution for those two components.

RGB Histogram

RGB Histogram Setup

There are five Histograms available in the histogram panel: the YCbCr Histogram, RGB Histogram, HSV Histogram, Luma Histogram, and the H/S Scope.

To set up the RGB Histogram press the Scope Config button. This opens the Scope Config window. Click on the Histogram button on the right. Then use the pulldown menu to select RGB. There are a number of options to set up the RGB Histogram:

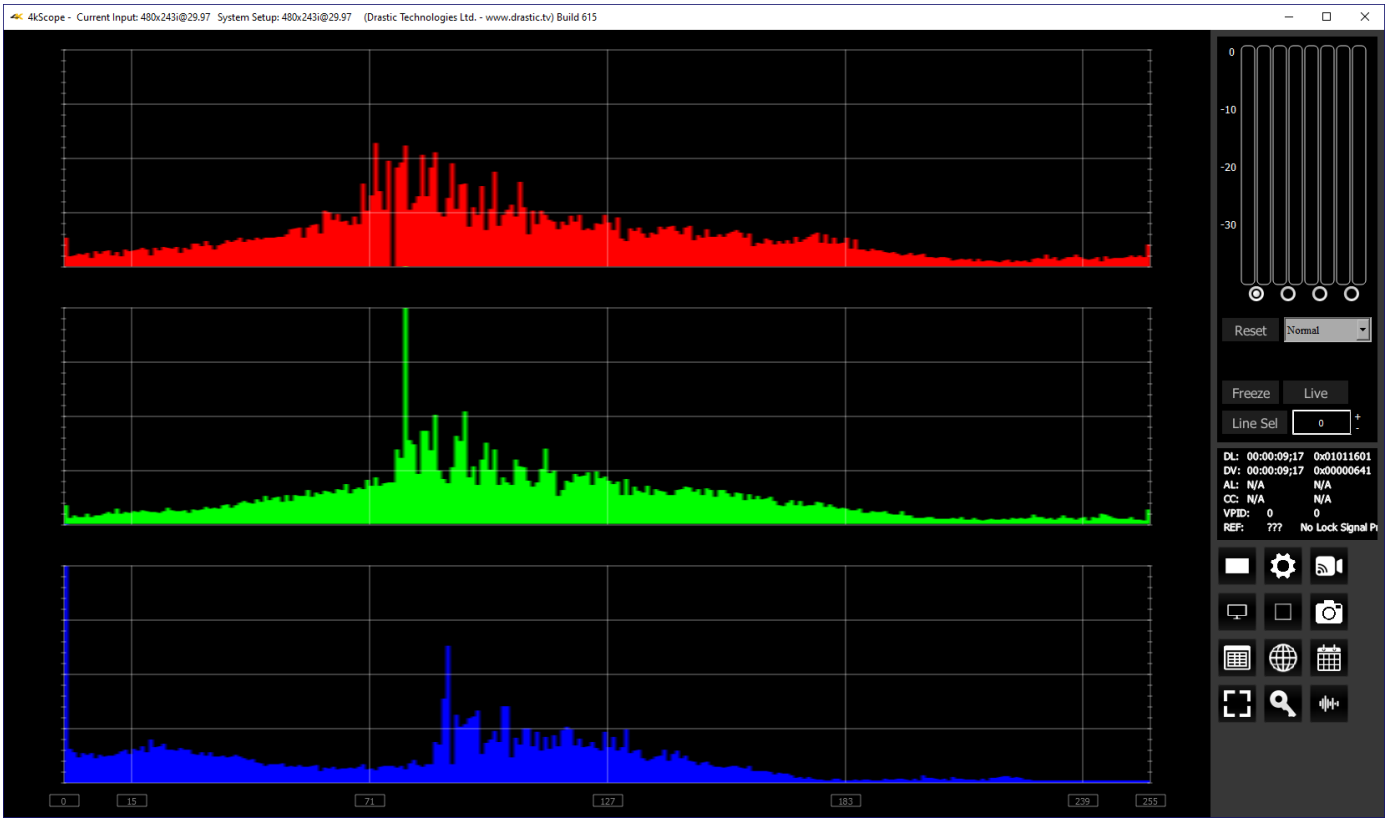


Graticule checkbox – when selected, the graticule is laid over the Histogram display. The brightness of the Graticule may be adjusted using the Graticule Brightness slider described below.
Graticule Brightness slider – moving the Graticule Brightness slider adjusts the brightness of the graticule overlay, 0% providing no display and 100% being maximum brightness.
x1 button – clicking this button sets the display to standard size
x2 button – clicking this display zooms in to set the display at 200%, or 2x normal display. Pressing the x1 button sets the display back to normal.
Custom button and field – The user may enter a custom enlargement value in the field, and press the Custom button to zoom in and see details up close. Pressing the x1 button sets the display back to normal.

Pressing the x in the upper right corner will close the Scope Config window.

RGB Histogram Window

Here is the RGB Histogram:

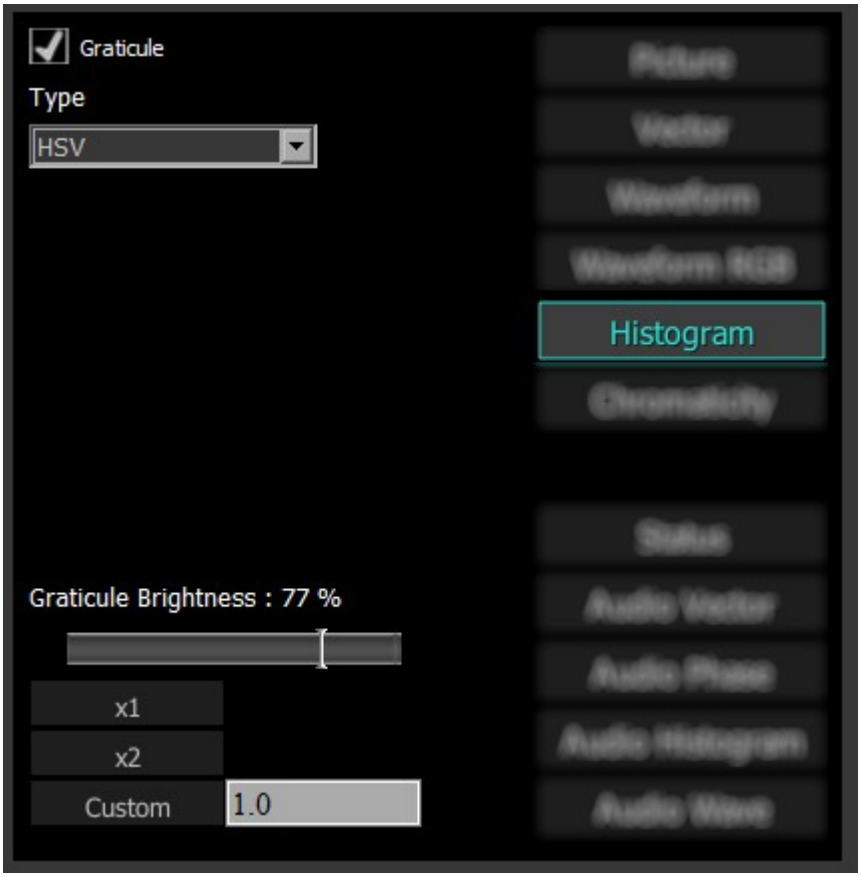


RGB – display an RGB range. Shows the distribution of red/green/blue within the signal as a series of discrete bars that make a continuous graph for each color. This display provides an overview of the tonal range of each color in the picture. Each bar is the count of the number of pixels for one of the 256/1024/4096 possible bins.

HSV Histogram Setup

There are five Histograms available in the histogram panel: the YCbCr Histogram, RGB Histogram, HSV Histogram, Luma Histogram, and the H/S Scope.

To set up the HSV Histogram press the Scope Config button. This opens the Scope Config window. Click on the Histogram button on the right. Then use the pulldown menu to select HSV. There are a number of options to set up the Histogram HSV:



Graticule checkbox – when selected, the graticule is laid over the Histogram display. The brightness of the Graticule may be adjusted using the Graticule Brightness slider described below.

Graticule Brightness slider – moving the Graticule Brightness slider adjusts the brightness of the graticule overlay, 0% providing no display and 100% being maximum brightness.

x1 button – clicking this button sets the display to standard size

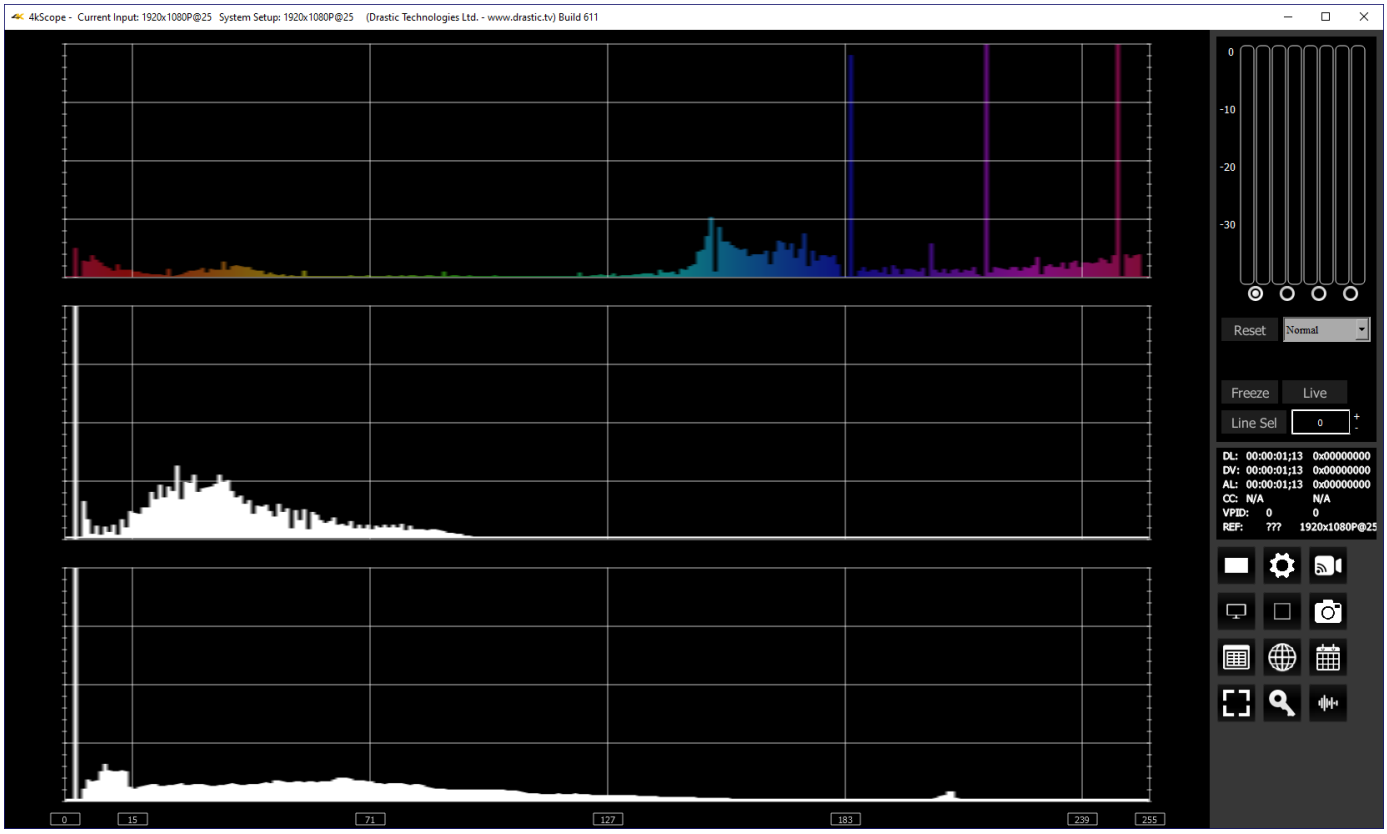
x2 button – clicking this display zooms in to set the display at 200%, or 2x normal display. Pressing the x1 button sets the display back to normal.

Custom button and field – The user may enter a custom enlargement value in the field, and press the Custom button to zoom in and see details up close. Pressing the x1 button sets the display back to normal.

Pressing the x in the upper right corner will close the Scope Config window.

HSV Histogram Window

Here is the HSV Histogram:



HSV – display Hue, Saturation, and Value levels. The top range shows the strength of each hue, the middle section displays the saturation levels of the hues, and the lower section displays the value, or darkness/lightness levels.

Luma Histogram

Luma Histogram Setup

There are five Histograms available in the histogram panel: the YCbCr Histogram, RGB Histogram, HSV Histogram, Luma Histogram, and the H/S Scope.

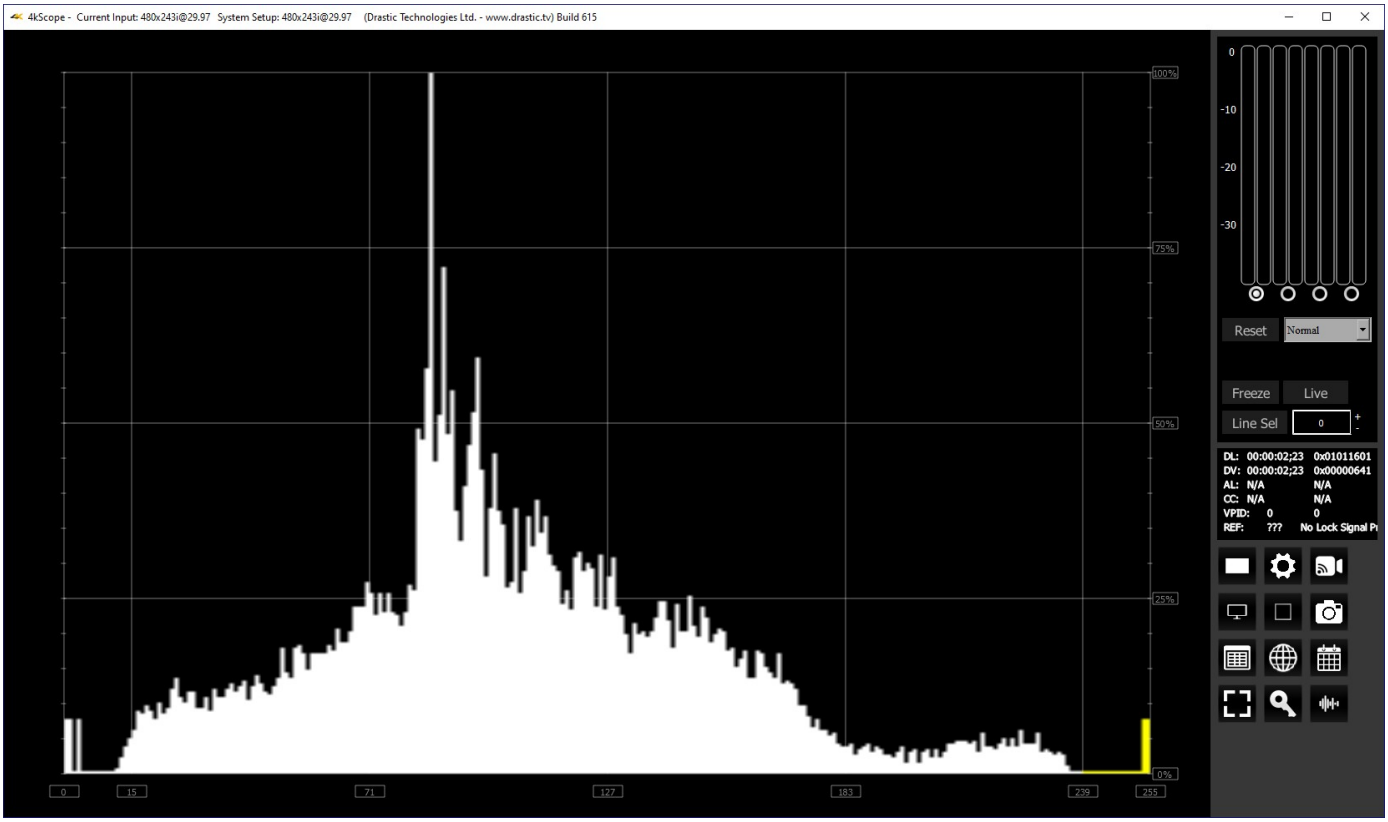
To set up the Luma Histogram press the Scope Config button. This opens the Scope Config window. Click on the Histogram button on the right. Then use the pulldown menu to select Luma. There are a number of options to set up the Histogram Luma:

Graticule checkbox – when selected, the graticule is laid over the Histogram display. The brightness of the Graticule may be adjusted using the Graticule Brightness slider described below.
Graticule Brightness slider – moving the Graticule Brightness slider adjusts the brightness of the graticule overlay, 0% providing no display and 100% being maximum brightness.
x1 button – clicking this button sets the display to standard size
x2 button – clicking this display zooms in to set the display at 200%, or 2x normal display. Pressing the x1 button sets the display back to normal.
Custom button and field – The user may enter a custom enlargement value in the field, and press the Custom button to zoom in and see details up close. Pressing the x1 button sets the display back to normal.

Pressing the x in the upper right corner will close the Scope Config window.

Luma Histogram Window

Here is the Luma Histogram:



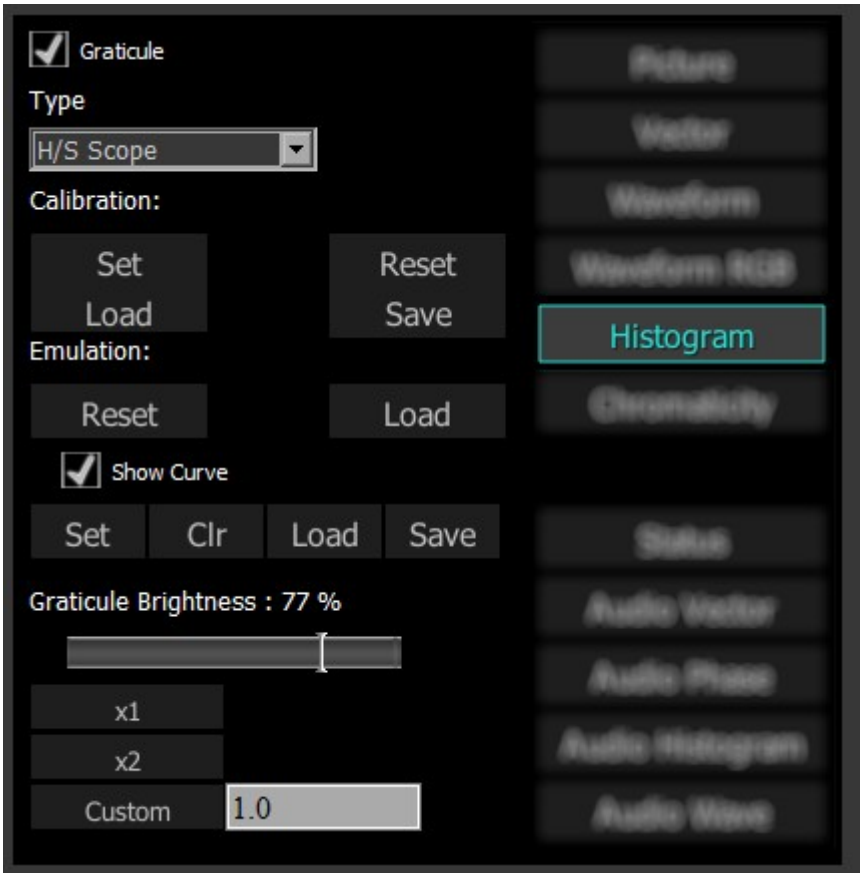
Luma – display only the luma in the signal

H/S Scope

H/S Scope Setup

There are five Histograms available in the histogram panel: the YCbCr Histogram, RGB Histogram, HSV Histogram, Luma Histogram, and the H/S Scope.

To set up the H/S Scope press the Scope Config button. This opens the Scope Config window. Click on the Histogram button on the right. Then use the pulldown menu to select H/S Scope There are a number of options to set up the H/S Scope:



Graticule checkbox – when selected, the graticule is laid over the Histogram display. The brightness of the Graticule may be adjusted using the Graticule Brightness slider described below.

Calibration section – choices include:

- **Set –** given a camera and a DSC ChromaDuMonde color chart, click to calibrate the input so the hue and saturation levels are even across the spectrum. Creates a calibration settings file that may be saved into memory.
- **Load –** opens a browser which allows the user to browse to and load a saved calibration file.
- **Reset –** remove any calibration and display the signal unaltered, to show what the camera or device is seeing.
- **Save –** opens a save as window which allows the user to select a location and save the current calibration settings as a file.

Emulation section – choices include:

- **Reset** – reset the emulation values back to default.

- **Load –** load a calibration file, for a new camera to emulate the camera used to create the calibration file.

Show Curve section – choices include:

- **Set** – click to set the current curve into memory. With Show Curve selected, displays the curve as a white line at the top of the signal, for levels comparison. With the curve set, the user can then test other lights to see how the peaks and valleys of the curve line up with the signal.
- **Clear** – clear the current curve and return to default settings.
- **Load** – opens a browser which allows the user to browse for and select a saved curve file to display in the H/S Scope.
- **Save** - opens a save as window which allows the user to select a location and save the current curve settings as a file.

Graticule Brightness slider – moving the Graticule Brightness slider adjusts the brightness of the graticule overlay, 0% providing no display and 100% being maximum brightness.

x1 button – clicking this button sets the display to standard size

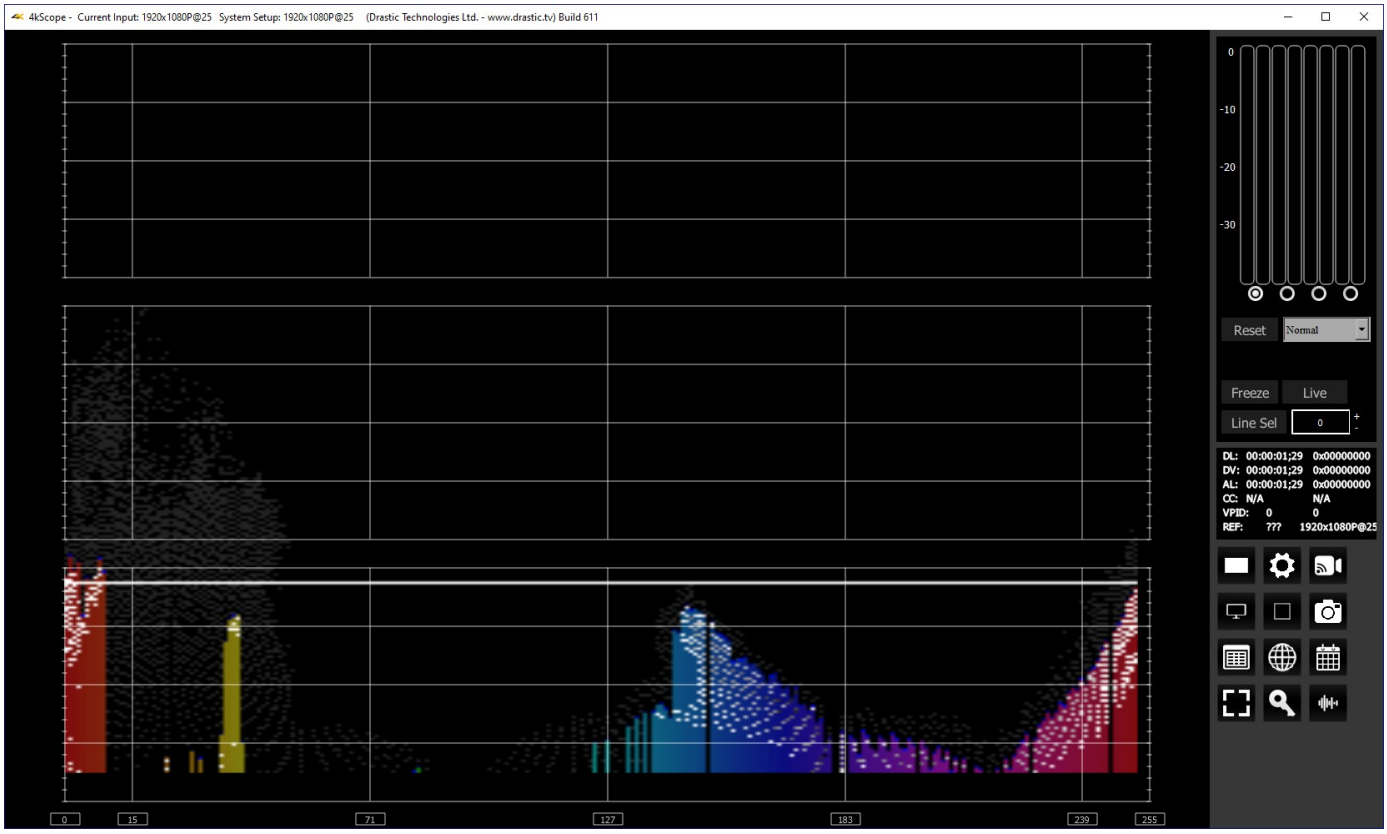
x2 button – clicking this display zooms in to set the display at 200%, or 2x normal display. Pressing the x1 button sets the display back to normal.

Custom button and field – The user may enter a custom enlargement value in the field, and press the Custom button to zoom in and see details up close. Pressing the x1 button sets the display back to normal.

Pressing the x in the upper right corner will close the Scope Config window.

H/S Scope Window

Here is the H/S Scope:



H/S Scope – Designed for calibration of lighting or camera to a standard DSC ChromaDumonde chart. The target color level or saturation is calibrated to a single horizontal line in the chart. The color hue component is mapped horizontally, with standard 601, 709 or 2020 targets as vertical lines.

The H/S (Hue/Saturation) Scope is designed to assist in calibrating lighting between cameras, or between different lighting setups. There is an instructional video located here:

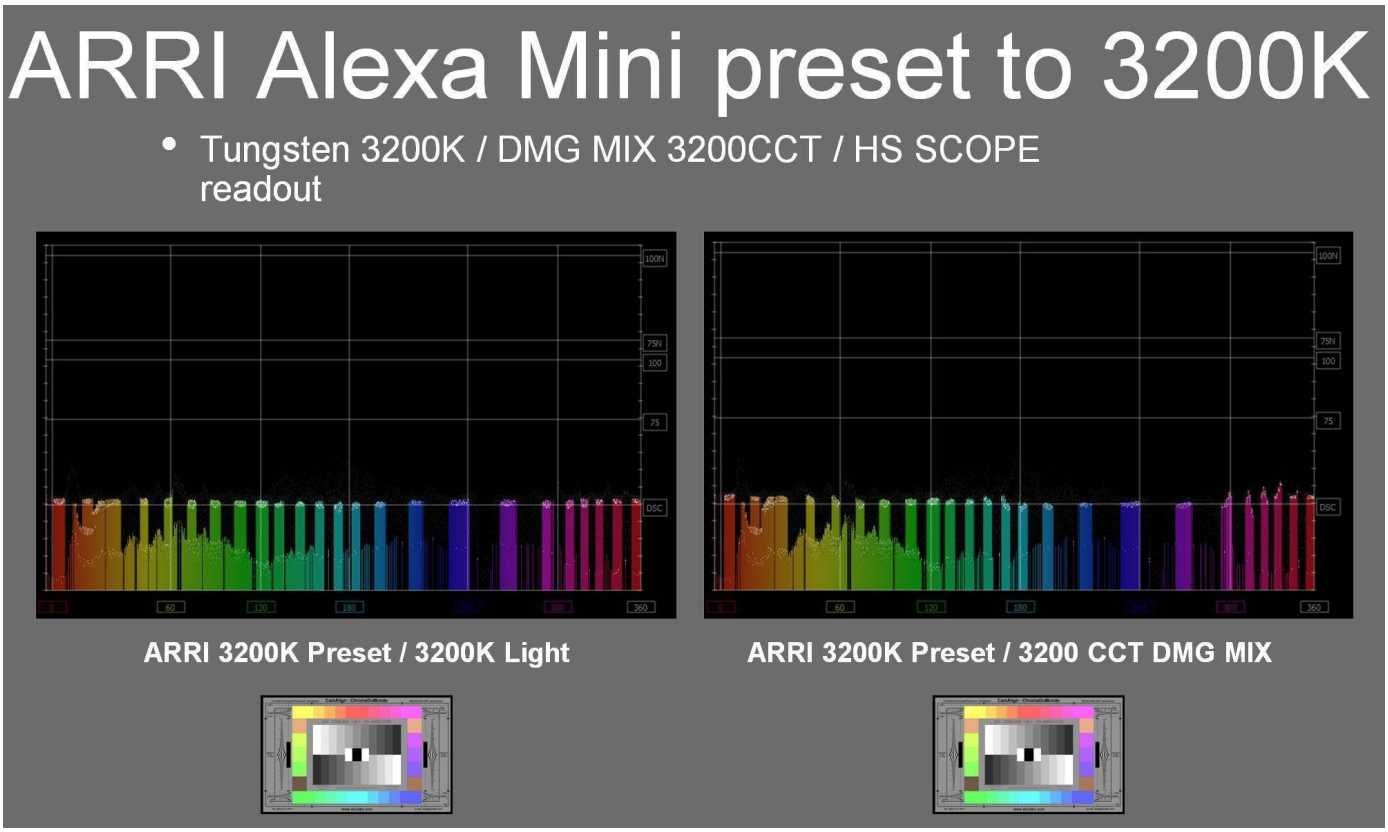
https://www.youtube.com/watch?v=or835LLlqVU

and a similar one here:

https://www.youtube.com/watch?v=nHg-_yCxooU

H/S Scope Example

Here is an example where the H/S Scope reads the chroma signal response from a camera, to evaluate the Rosco DMG MIX LED fixture.



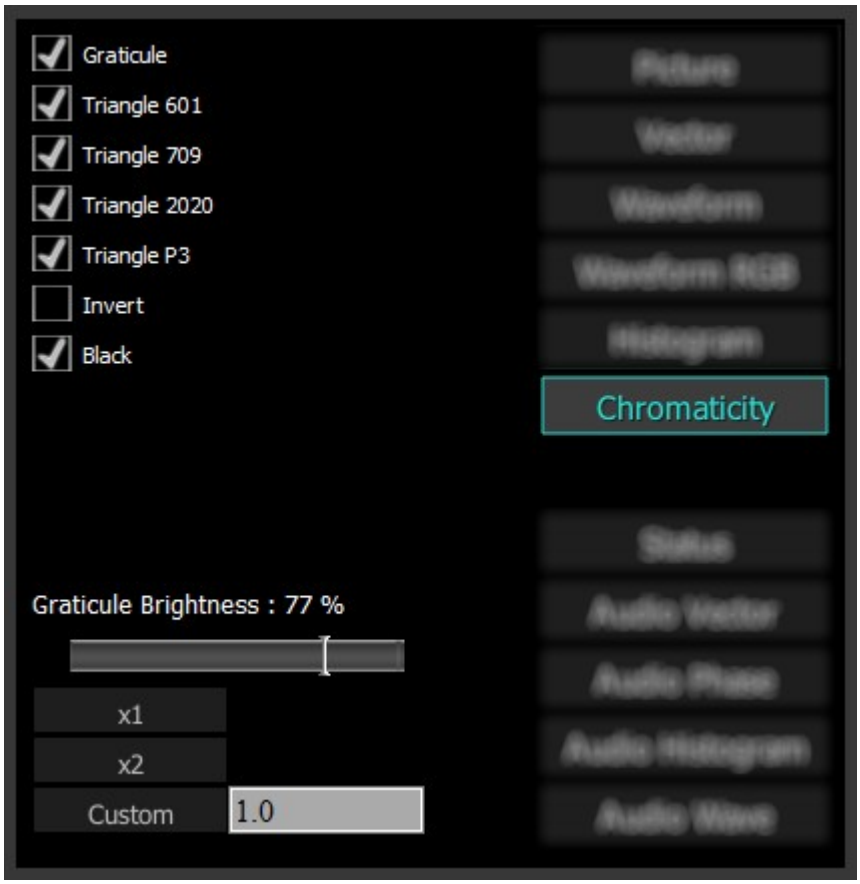
We used an ARRI and RED camera, preset to 3200K rec 709, for our tests, shooting a DSC ChromaDuMonde 24 + 4R chart. A Tungsten light source was the target reference for the Rosco DMG MIX to match on camera. This allowed the team to quantify their calibration work on the MIX. The results were encouraging as both on the RED and ARRI the on-camera chroma differences between the actual tungsten source and the MIX were very slight, based on the multiple points of the DSC chart. The H/S Scope is a good tool for evaluation and calibration for an LED source for on-camera use. Should adjustments to the spectrum be needed they can be adjusted in real time using the H/S Scope reference, thus getting camera accurate results.

Each color has its own graph. The color's levels are represented from left to right, with the absolute left being 0 and the absolute right being 1024. The scale is presented as a percentage to allow for extremely bright or dark pictures to be analyzed without truncating.

Chromaticity

Chromaticity Setup

To set up the Chromaticity press the **Scope Config** button. This opens the Scope Config window. Click on the **Chromaticity** button on the right. There are a number of options to set up the Chromaticity display:



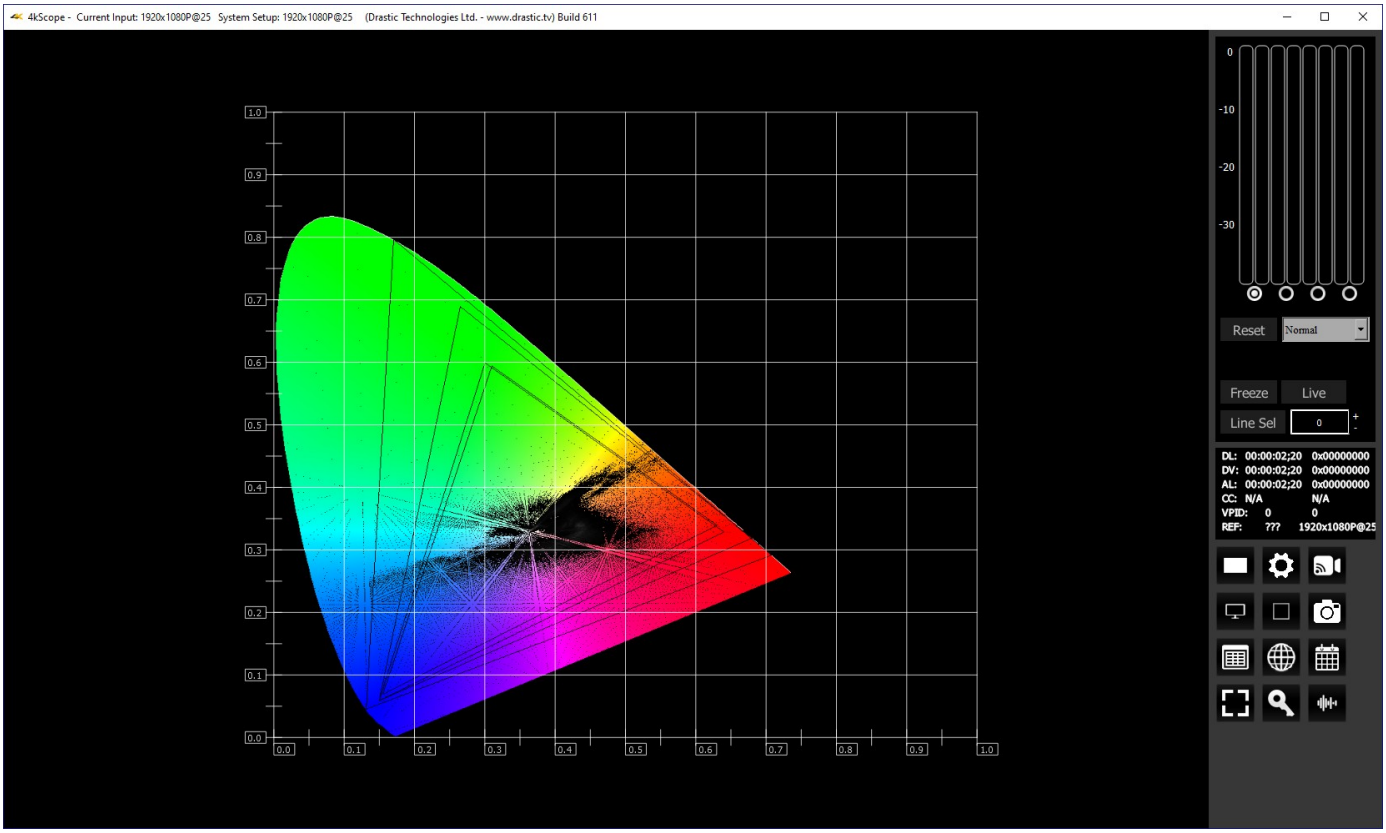
Graticule checkbox – when selected, the graticule is laid over the Histogram display. The brightness of the Graticule may be adjusted using the **Graticule Brightness** slider described below.
Triangle 601 checkbox – when selected, displays the CCIR-601 (Rec. 601 or BT.601) triangle.
Triangle 709 checkbox – when selected, displays the Rec.709 (BT.709 or ITU 709) triangle.
Triangle 2020 checkbox – when selected, displays the BT.2020 (or Rec. 2020) triangle.
Triangle P3 checkbox – when selected, displays the P3 (DCI-P3 or DCI/P3) triangle.
Invert checkbox – when selected, displays the video signal over a black background instead of the Chromaticity hued background.
Black checkbox – when selected, displays the video as black. If unselected, the video will be displayed as white.
Graticule Brightness slider – moving the Graticule Brightness slider adjusts the brightness of the graticule overlay, 0% providing no display and 100% being maximum brightness.
x1 button – clicking this button sets the display to standard size
x2 button – clicking this display zooms in to set the display at 200%, or 2x normal display. Pressing the x1 button sets the display back to normal.

Custom button and field – The user may enter a custom enlargement value in the field, and press the Custom button to zoom in and see details up close. Pressing the x1 button sets the display back to normal.

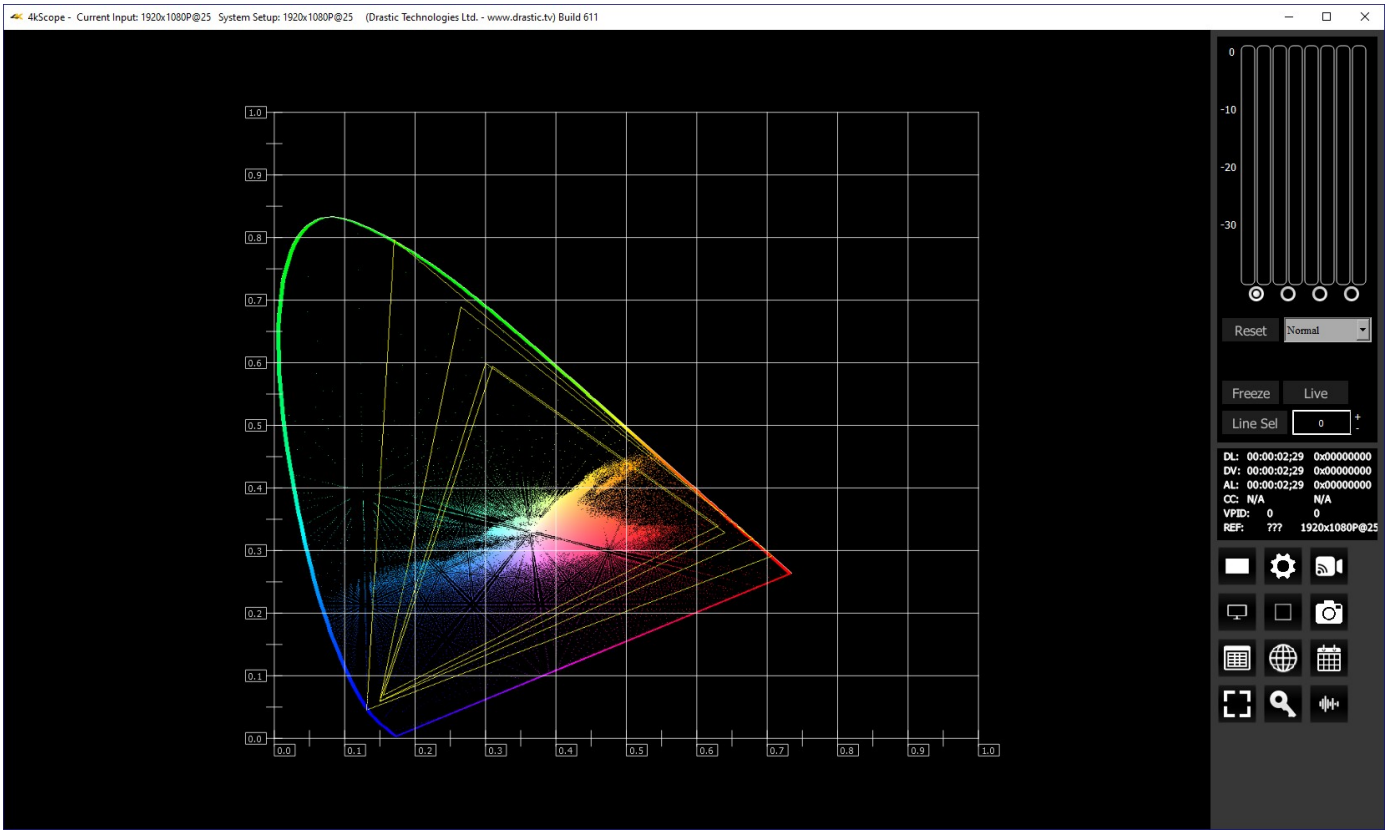
Pressing the x in the upper right corner will close the Scope Config window.

Chromaticity Window

Here is the Chromaticity window.



The Chromaticity scope provides a visual representation of the color in a video across all the colors of visible light. For a particular YCbCr range (BT.2020, P3, Rec.709, CCIR-601) a triangle can be superimposed. This will delineate the colors that fall within the acceptable range and those that are outside it. The color of the video within the CIE 1931 color display can be white, black, or the chromaticity hued background.

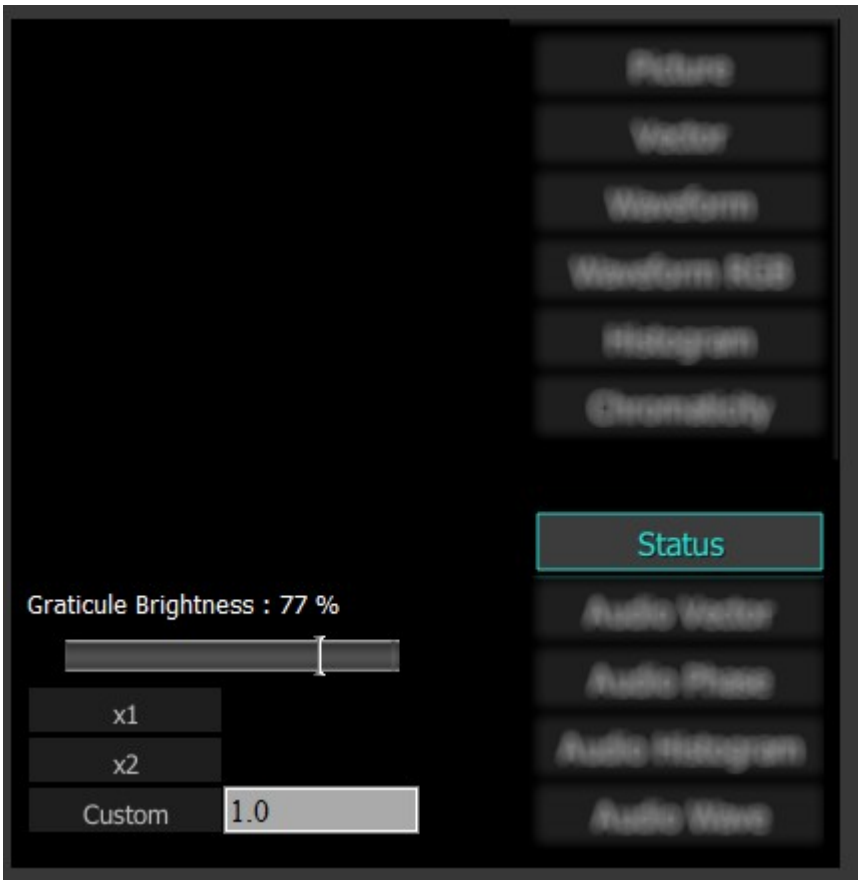


The display can also be inverted to use black as the background, and the colors to show the trace.

Status Window

Status Setup

To set up the Status press the **Scope Config** button. This opens the Scope Config window. Click on the **Status** button on the right. There are a number of options to set up the Status display:



Graticule Brightness slider – this slider is present in all of the scopes. In the Status window there is no graticule, so this slider has no effect.
x1 button – clicking this button sets the display to standard size
x2 button – clicking this display zooms in to set the display at 200%, or 2x normal display. Pressing the x1 button sets the display back to normal.
Custom button and field – The user may enter a custom enlargement value in the field, and press the Custom button to zoom in and see details up close. Pressing the x1 button sets the display back to normal.

Pressing the x in the upper right corner will close the Scope Config window.

Status Window

Here is the Status window.

The Status window displays:

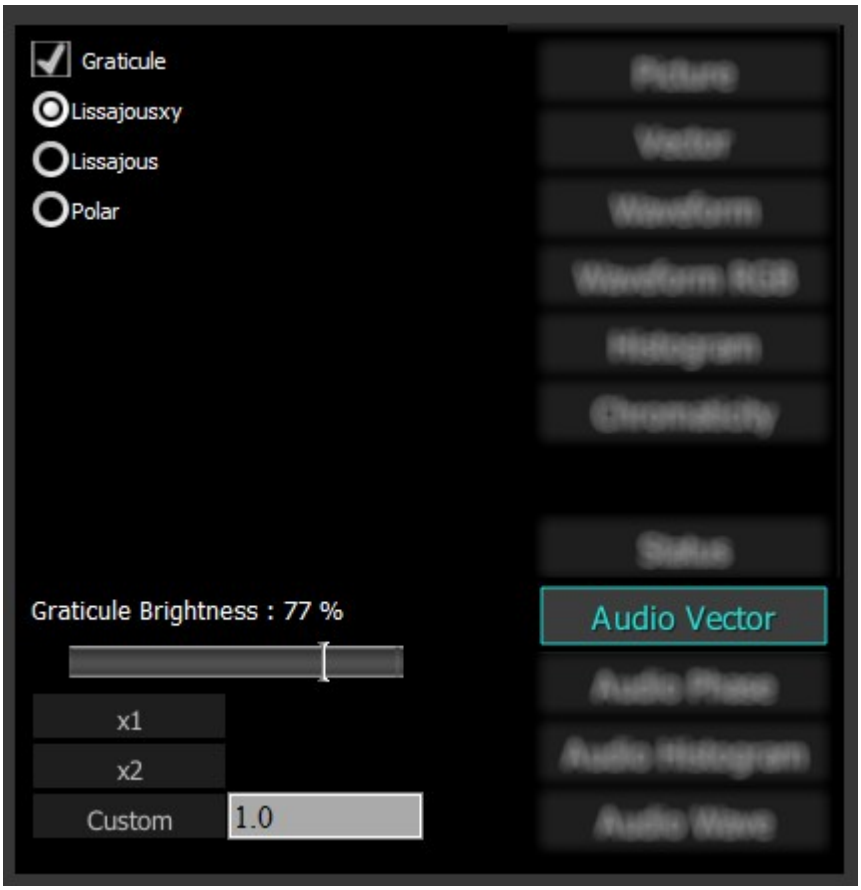
Signal: displays the current signal type
Y: The Y component. Displays Minimum and Maximum, Low and High, Average, Gamut Under, and Gamut Over values
U: The U component. Displays Minimum and Maximum, Low and High, Average, Gamut Under, and Gamut Over values
V: The V component. Displays Minimum and Maximum, Low and High, Average, Gamut Under, and Gamut Over values
S: Saturation. Displays Minimum and Maximum, Low and High, Average, Gamut Under, and Gamut Over values
Color Range: Full or SMPTE (Limited)
Color Primaries: BT 709 (HD), BT 470BG (PAL), SMPTE 170M (NTSC), BT 2020 (WCG)

Transfer Function: BT 709 (HD), SMPTE 170M (PAL/NTSC), SMPTE 2084 (HDR10/PQ), ARIB B67 (HLG)
Color Matrix: BT 709 (HD), BT 479BG (PAL), BT 601 (NTSC), BT 2020 (WCG)
MaxCLL: In HDR10 mode, Maximum Content Light Level
MaxFALL: In HDR10 mode, Maximum Frame – Average Light Level
Line repetition in number of lines over total possible lines
Broadcast illegal in percentage
Frame Rate: Displays Average, and Last Ms.
Audio Peak per channel pair
Audio RMS per channel pair

Audio Vector

Audio Vector Setup

To set up the Audio Vectorscope press the **Scope Config** button. This opens the Scope Config window. Click on the **Audio Vector** button on the right. There are a number of options to set up the Audio Vectorscope display:



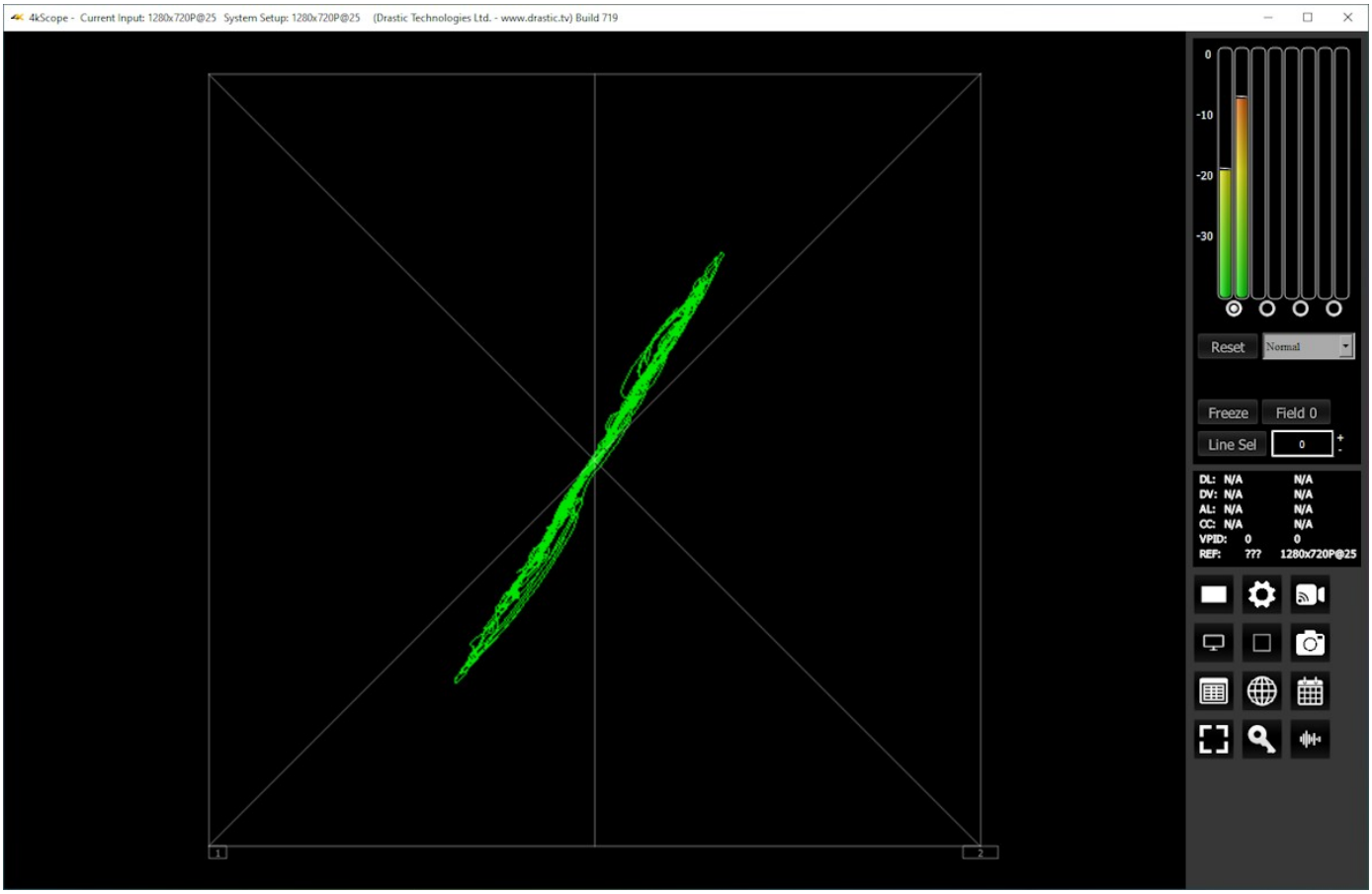
Graticule checkbox – when selected, the graticule is laid over the Histogram display. The brightness of the Graticule may be adjusted using the **Graticule Brightness** slider described below.
Lissajousxy checkbox – when selected, displays the relative phase of the selected audio pair in Lissajous XY mode.
Lissajous checkbox – when selected, displays the relative phase of the selected audio pair in Lissajous mode.
Polar checkbox – when selected, displays the relative phase of the selected audio pair in Polar mode.
Graticule Brightness slider – moving the Graticule Brightness slider adjusts the brightness of the graticule overlay, 0% providing no display and 100% being maximum brightness.
x1 button – clicking this button sets the display to standard size
x2 button – clicking this display zooms in to set the display at 200%, or 2x normal display. Pressing the x1 button sets the display back to normal.
Custom button and field – The user may enter a custom enlargement value in the field, and press the Custom button to zoom in and see details up close. Pressing the x1 button sets the display back to normal.

Pressing the x in the upper right corner will close the Scope Config window.

Audio Vector Window

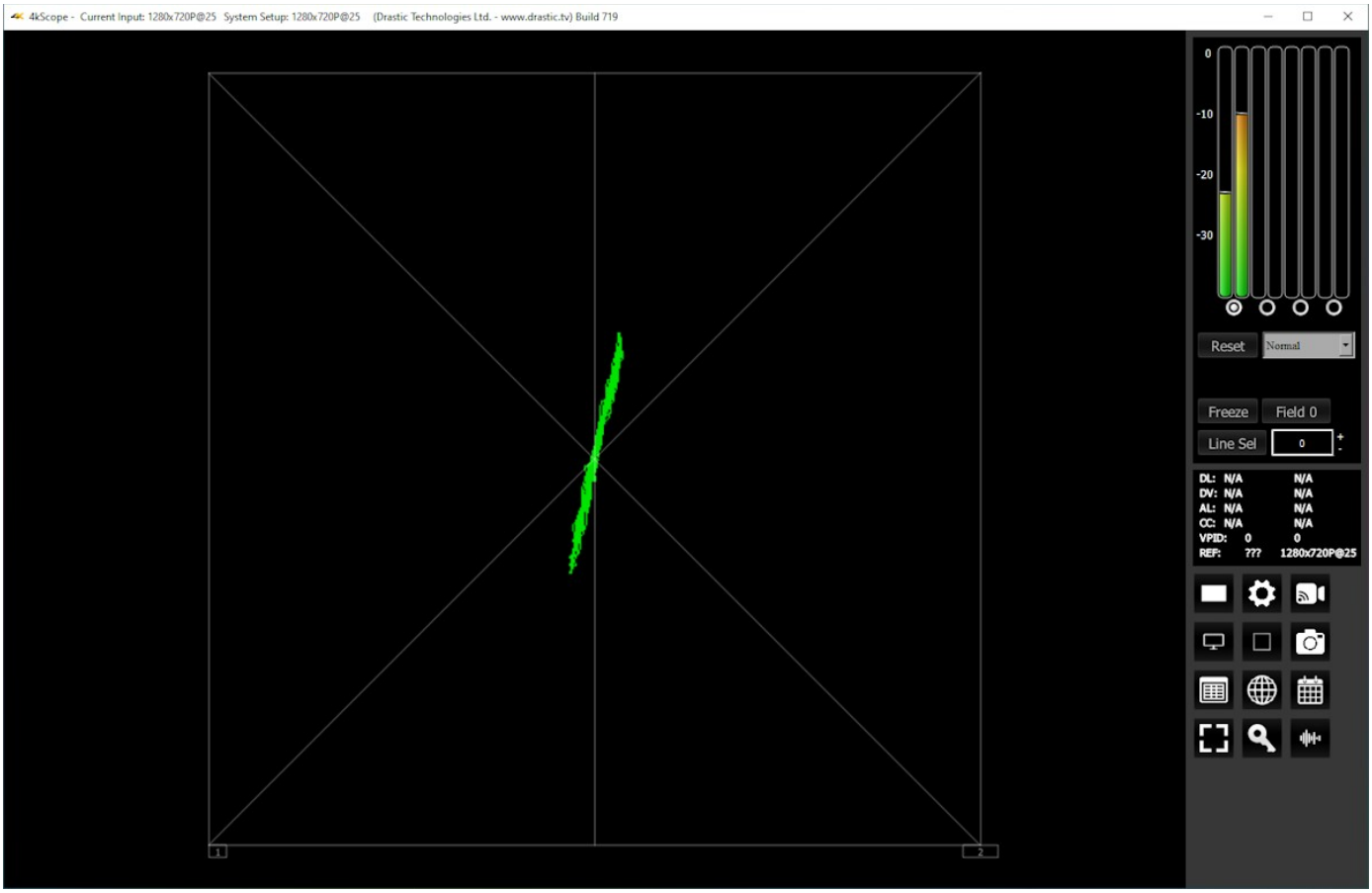
There are 3 types of audio vectorscope displays available.

Lissajous XY mode



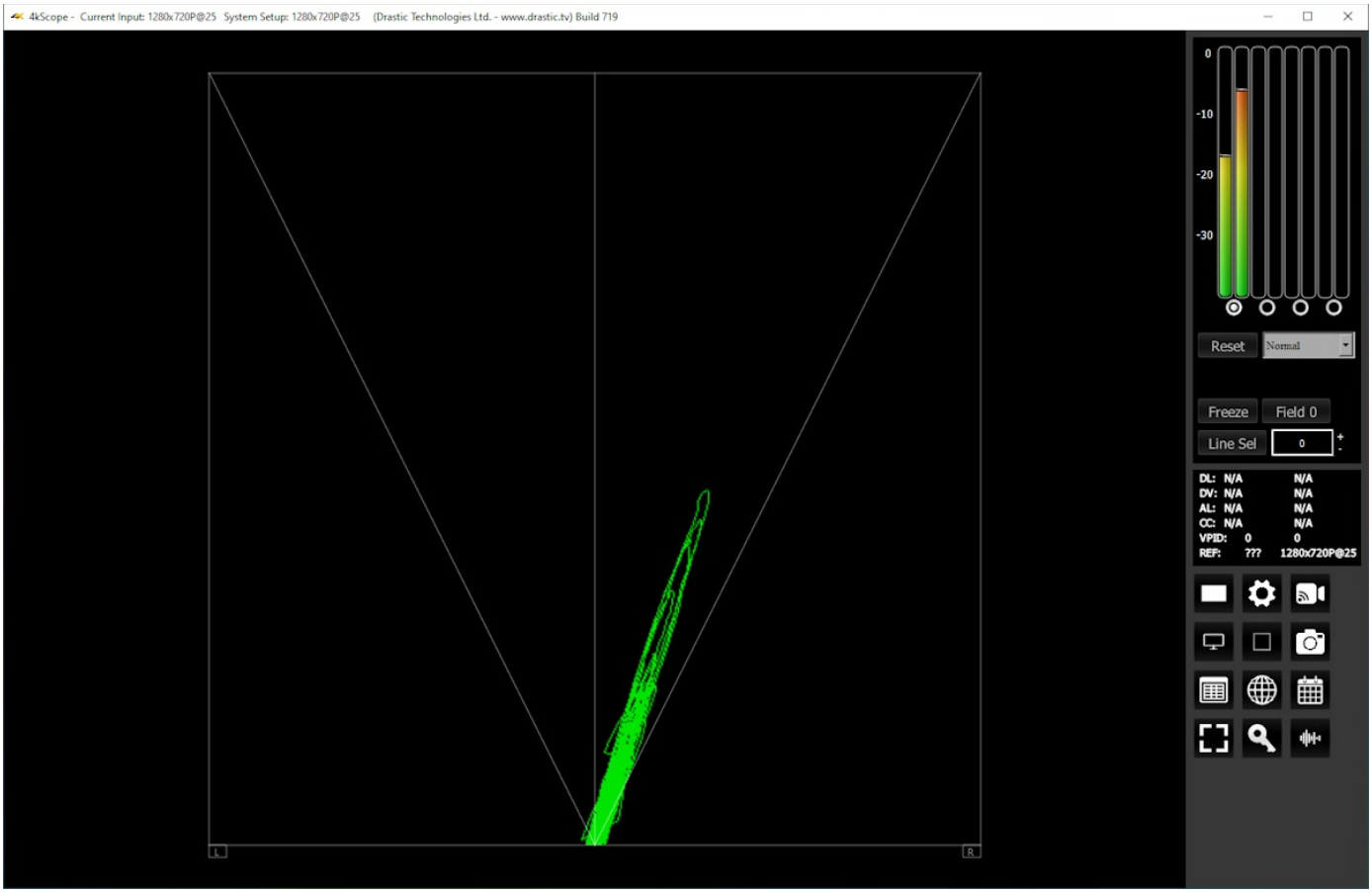
Lissajous XY mode centers the two audio channels along the X-Y axis (from the lower left corner to the upper right corner), and shows any difference between the channels as moving closer to vertical (left channel has more signal) or closer to horizontal (right channel has more signal).

Lissajous mode



Lissajous mode centers the two audio channels along the vertical axis, and shows any difference between the channels as either angled to the left (left channel has more signal) or angled to the right (right channel has more signal).

Polar mode



Polar mode centers the two audio channels along the vertical axis starting at the bottom center, and shows any difference between the channels as either angled to the left (left channel has more signal) or angled to the right (right channel has more signal).

The audio vectorscope measures the difference between channels of a stereo pair. One channel drives the horizontal and the other the vertical deflection. This will show the relative phase of the two channels. This can be shown in Lissajous XY, Lissajous or Polar modes. The pair being monitored can be changed using the radio buttons under the audio meters at the top right.

Audio Phase

Audio Phase Setup

To set up the Audio Phase press the **Scope Config** button. This opens the Scope Config window. Click on the **Audio Phase** button on the right. There are a number of options to set up the Audio Phase display:

Graticule checkbox – when selected, the graticule is laid over the Histogram display. The brightness of the Graticule may be adjusted using the **Graticule Brightness** slider described below.

Graticule Brightness slider – moving the Graticule Brightness slider adjusts the brightness of the graticule overlay, 0% providing no display and 100% being maximum brightness.

x1 button – clicking this button sets the display to standard size

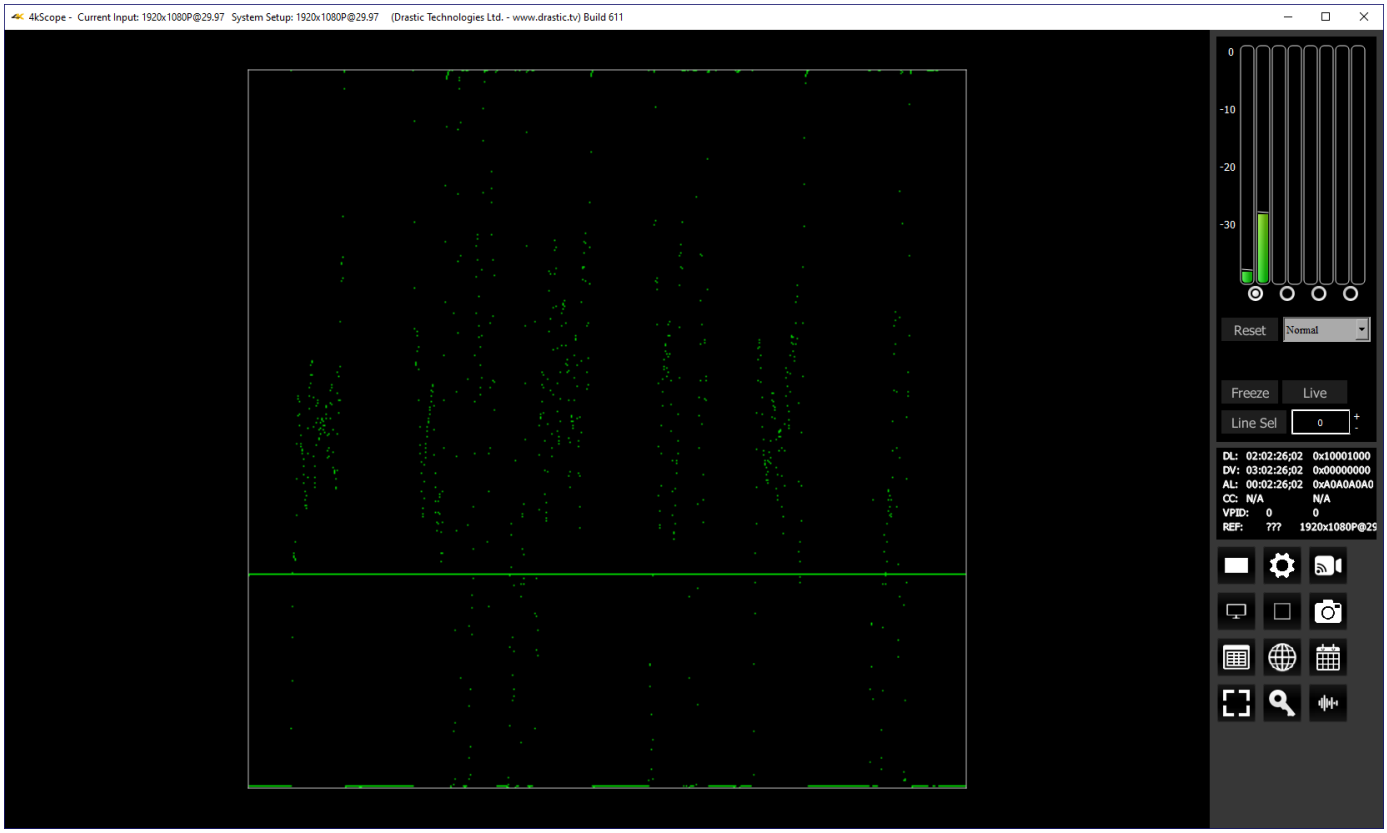
x2 button – clicking this display zooms in to set the display at 200%, or 2x normal display. Pressing the x1 button sets the display back to normal.

Custom button and field – The user may enter a custom enlargement value in the field, and press the Custom button to zoom in and see details up close. Pressing the x1 button sets the display back to normal.

Pressing the x in the upper right corner will close the Scope Config window.

Audio Phase Window

Here is the Audio Phase window.

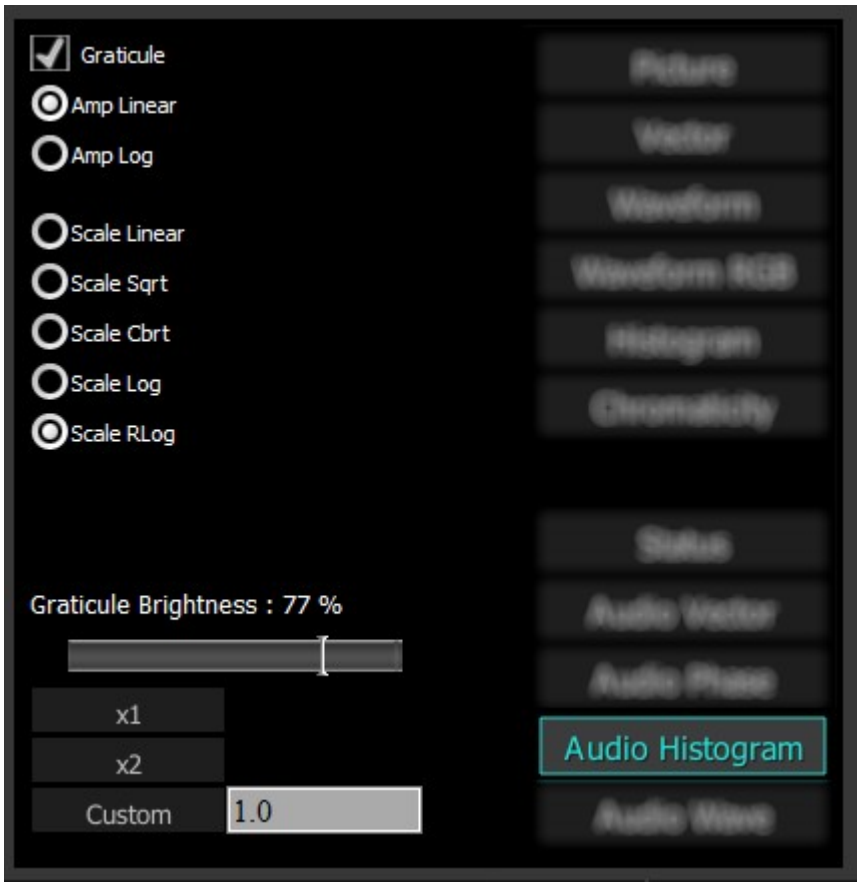


The audio phase meter shows the relative density of two audio channels and the relative loudness as a line moving towards the louder channel.

Audio Histogram

Audio Histogram Setup

To set up the Audio Histogram press the **Scope Config** button. This opens the Scope Config window. Click on the **Audio Histogram** button on the right. There are a number of options to set up the Audio Histogram display:



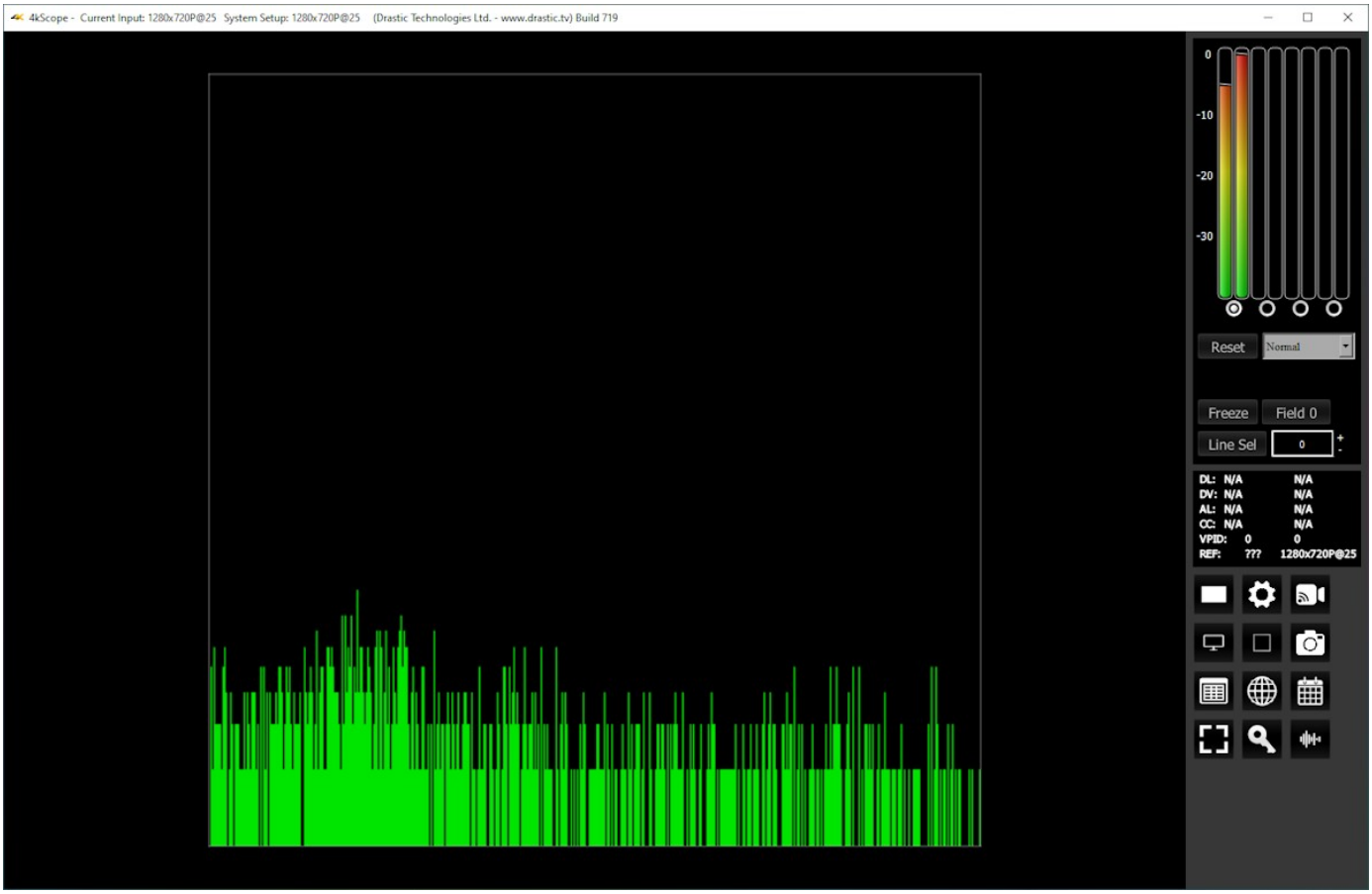
Graticule checkbox – when selected, the graticule is laid over the Audio Histogram display. The brightness of the Graticule may be adjusted using the **Graticule Brightness** slider described below.
Amp Linear selector – clicking in the Amp Linear checkbox sets the Amp to linear
Amp Log selector – clicking in the Amp Log checkbox sets the Amp to logarithmic
Scale Linear – clicking in the Scale Linear checkbox sets the scale to linear.
Scale Sqrt – clicking in the Scale Sqrt checkbox sets the scale to sqrt (square root).
Scale Cbrt – clicking in the Scale Cbrt checkbox sets the scale to cbrt (cubed root).
Scale Log – clicking in the Scale Log checkbox sets the scale to logarithmic.
Scale RLog – clicking in the Scale Rlog checkbox sets the scale to R logarithmic (reverse logarithmic).
Graticule Brightness slider – moving the Graticule Brightness slider adjusts the brightness of the graticule overlay, 0% providing no display and 100% being maximum brightness.
x1 button – clicking this button sets the display to standard size
x2 button – clicking this display zooms in to set the display at 200%, or 2x normal display. Pressing the x1 button sets the display back to normal.

Custom button and field – The user may enter a custom enlargement value in the field, and press the Custom button to zoom in and see details up close. Pressing the x1 button sets the display back to normal.

Pressing the x in the upper right corner will close the Scope Config window.

Audio Histogram Window

Here is the Audio Histogram window.

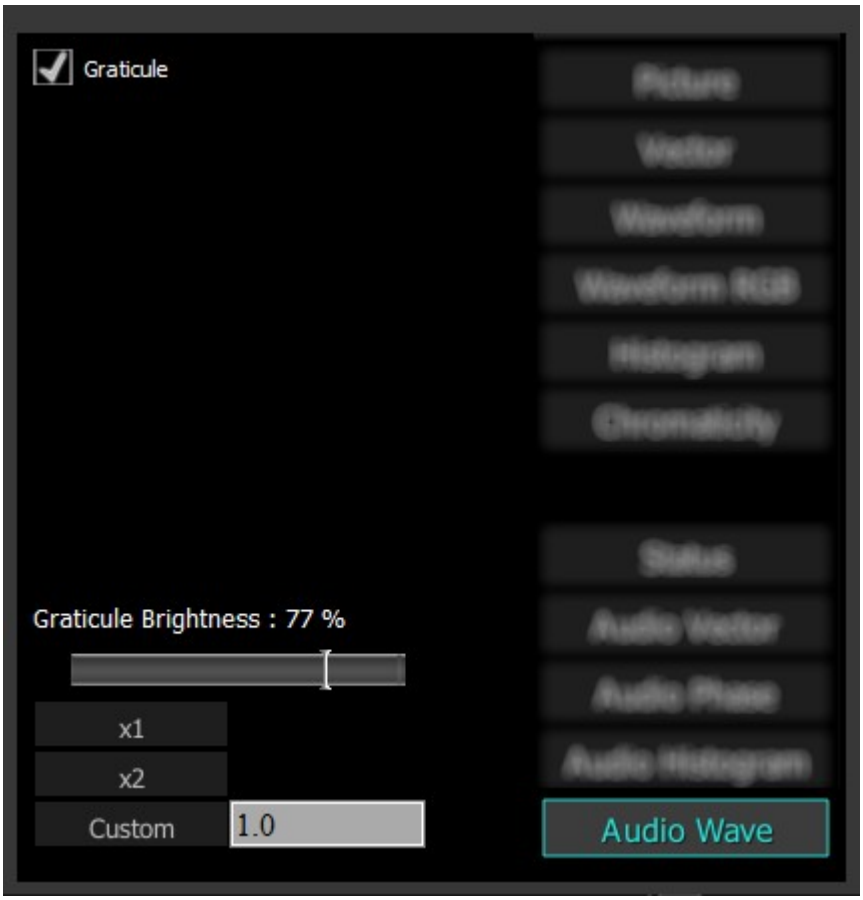


The audio histogram displays a bar chart of the levels of the components of an audio signal. This can be displayed as linear or logarithmic. The scale can be set as linear, square root, cube root, log or reverse log. Any pair may be selected using the buttons under the audio meters.

Audio Wave

Audio Wave Setup

To set up the Audio Wave press the **Scope Config** button. This opens the Scope Config window. Click on the **Audio Wave** button on the right. There are a number of options to set up the Audio Wave display:



Graticule checkbox – when selected, the graticule is laid over the Histogram display. The brightness of the Graticule may be adjusted using the **Graticule Brightness** slider described below.

Graticule Brightness slider – moving the Graticule Brightness slider adjusts the brightness of the graticule overlay, 0% providing no display and 100% being maximum brightness.

x1 button – clicking this button sets the display to standard size

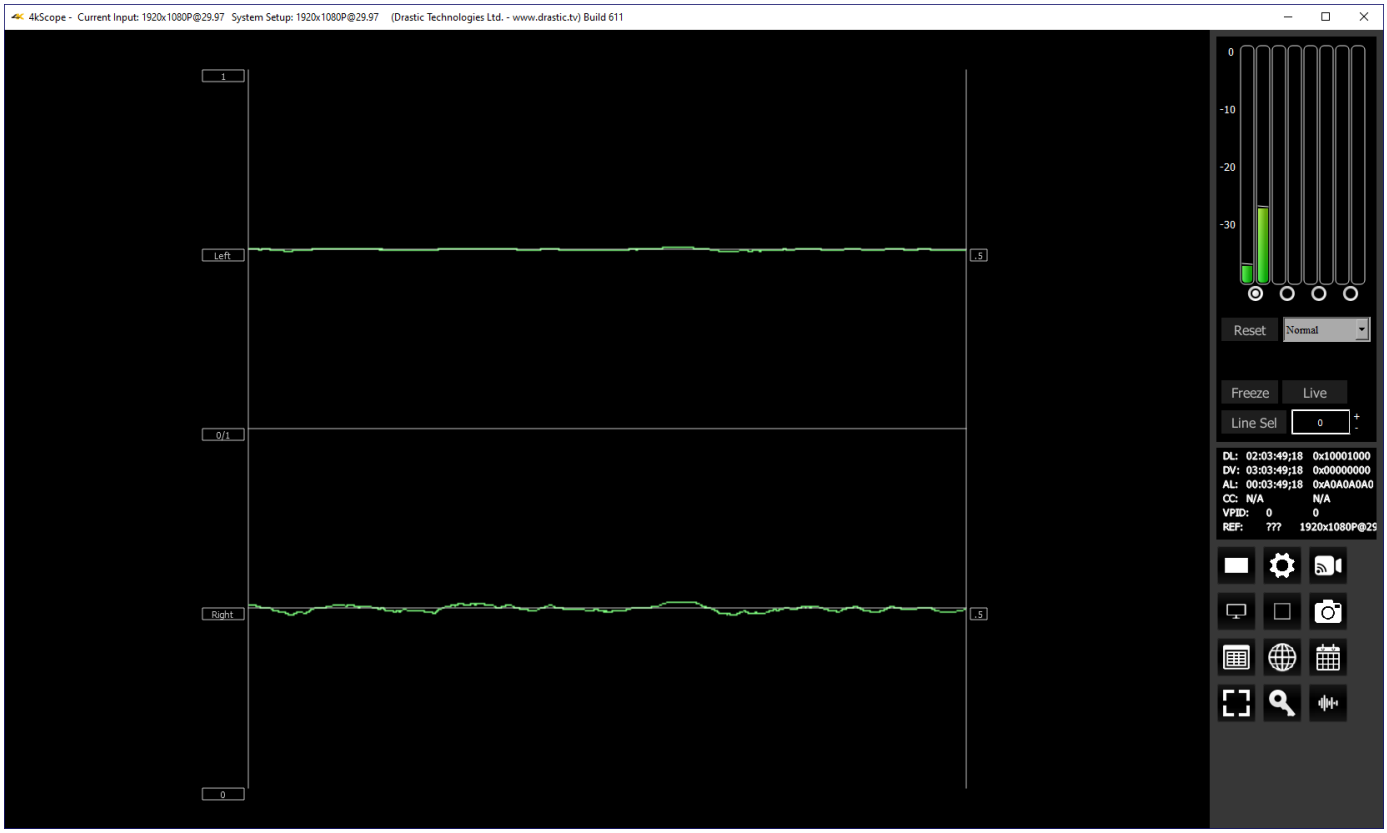
x2 button – clicking this display zooms in to set the display at 200%, or 2x normal display. Pressing the x1 button sets the display back to normal.

Custom button and field – The user may enter a custom enlargement value in the field, and press the Custom button to zoom in and see details up close. Pressing the x1 button sets the display back to normal.

Pressing the x in the upper right corner will close the Scope Config window.

Audio Wave Window

Here is the Audio Wave window.

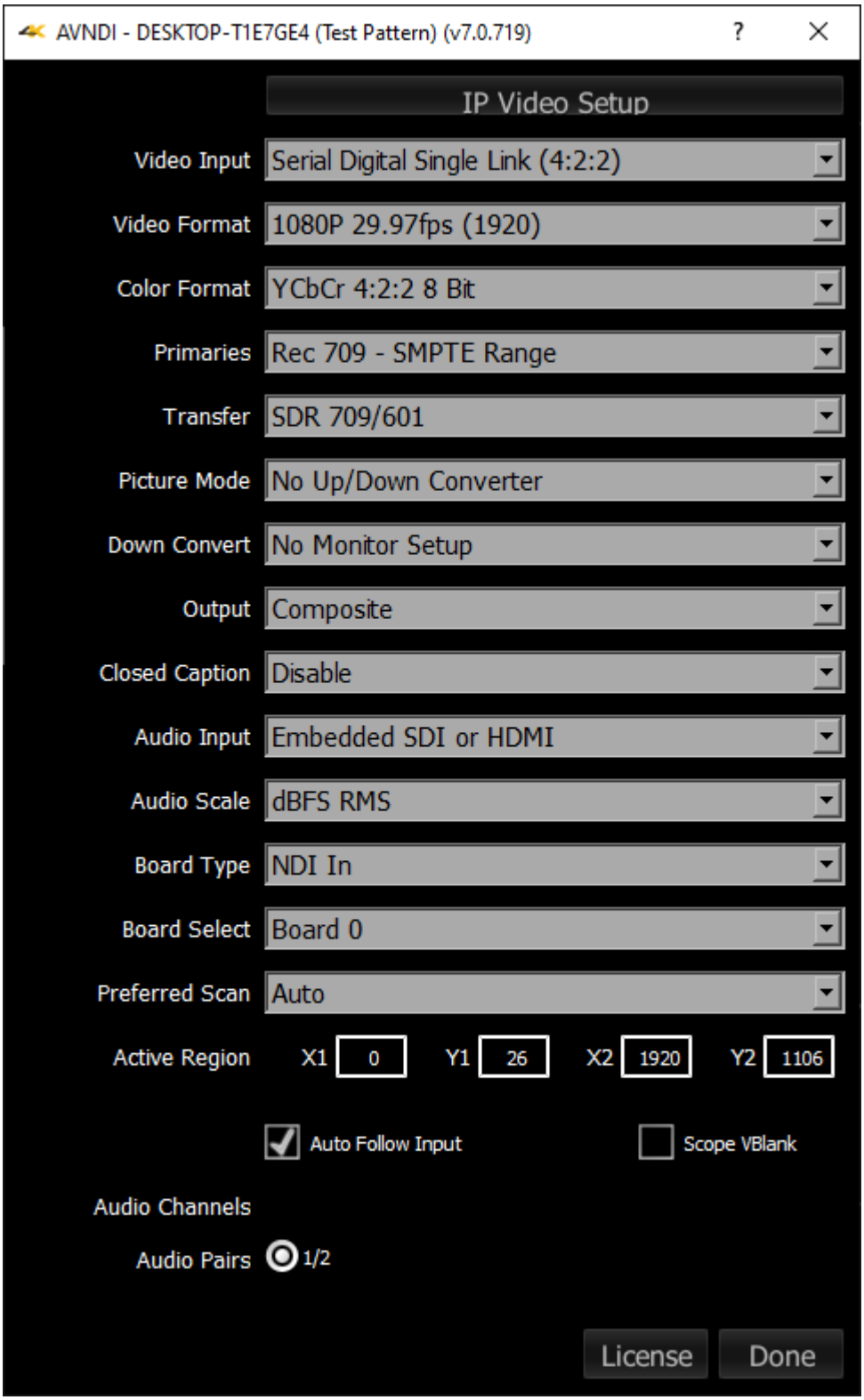


The audio waveform of any pair of channels can be displayed.

System Configuration button – Opens the System Configuration window, which allows the user to adjust settings for the video and audio I/O type, and to license the software.

System Configuration Window

Here is a look at the options in the System Configuration window.

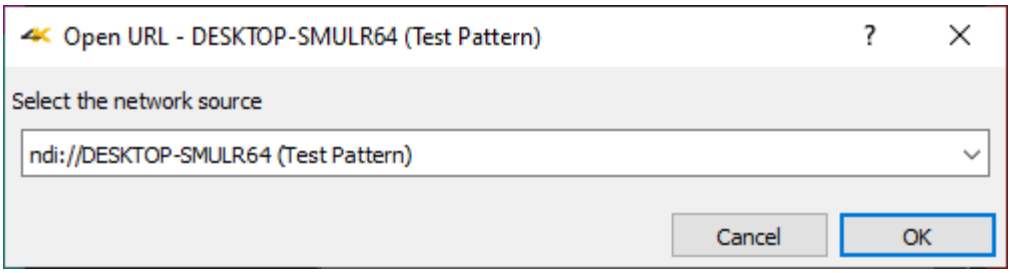


The Settings window is designed to sense and reflect the capabilities of the board or stream the system is set up to view.

In this view, when set to an NDI input, the first button at the top is the IP Video setup. When set to another source, this button is removed.

IP Video Setup

IP Video Setup – opens the Open URL window, which allows the user to select between available IP sources. The list will be populated with the most recent sources that have been selected.



Video Input

Video Input pulldown menu - allows the user to select between the HD-SDI, HDMI or analog inputs. In the case of dual link, 2 inputs are used. In the case of quad HD (3840 x 2160) and 4K (4096 x 2160), all four I/O ports of the board are in use, so the downconvert is HDMI and analog only. The user may be presented with a list similar to this:

- Serial Digital Single Link (4:2:2)
- Serial Quad Link 4K Y'Cb'Cr SQD
- Serial Quad Link 4K RGB SQD
- Serial Dual Link 4K Y'Cb'Cr SQD

12G Type

12G Type pulldown menu – displays the current setting, and allows the user to select between Square Division (SQD), or 2SI (two sample interleave) on some hardware. This pulldown may not be available if HDRScope is set to an NDI video input.

Video Format

Video Format pulldown menu - displays the current setting, and allows the user to select between the signal formats supported by the I/O hardware. 4KScope supports a wide range of signal formats from NTSC CCIR-601 to 4K [4096x2160] 60fps.

Color Format

Color Format pulldown menu - allows the user to select the processing mode. In the case of single link, this can be 8 or 10 bit YCbCr or RGBA 8. For dual link it is normally YCbCr 10 or RGB 10. There user will be presented with a list similar to this:

- YCbCr 4:2:2 10 bit
- YCbCr 4:2:2 8 bit
- YCbCr Alternate
- RGBA 4:4:4:X 8 bit
- RGB 4:4:4 10 bit
- RGB 4:4:4 8 bit

Primaries

Primaries – the user will be presented with a list similar to this:

- Auto 2020 709 601
- CCIR 601 - SMPTE Range
- Rec 709 - SMPTE Range
- BT 2020 - SMPTE Range
- CCIR 601 - Full RGB
- Rec 709 - Full RGB
- BT 2020 - Full RGB
- DCI P3 (in 2020)
- Display P3 (in 2020)

Transfer

Transfer – adjust the Transfer Gamma setting. The user will be presented with a list similar to this:

- SDR 709/601
- PQ/HDR10
- HLG

Picture Mode

Picture Mode pulldown menu - allows the user to select how up/down conversion is done. All standard modes for up and down conversion are supported. Requires an up/down converter.

Down Convert

Down Convert pulldown menu - allows the user to select the output signal type. The output can match the input or be converted to another up or down signal format. Requires a Monitor setup.

Output

Output pulldown menu - allows the user to select between available analog output formats. In SD this can be Composite, S-video or Component. For HD, only component is supported. The user will be presented with a list similar to this:

- Composite - single wire output
- Component RGB – three wire RGB output
- Component YUV - Sony VTR three wire output
- Component YUV MII – Panasonic VTR three wire output
- Component YUV SMPTE – Standard SMPTE three wire output

Closed Caption

Closed Caption pulldown menu - allows the user to select which closed caption format is to be displayed, or to not display closed captions. The user will be presented with a list similar to this:

- Disable
- CC1/Subtitle (608)
- CC2 (608)
- CC3 (608)
- CC4 (608)
- Service1 (708)
- Service2 (708)
- Service3 (708)
- Service4 (708)
- OP-47

Audio Input

Audio Input pulldown menu – (hardware dependent) allows the user to select between the embedded audio tracks (HD-SDI or HDMI depending on input), or the AES/EBU audio inputs. On some hardware, analog audio inputs are also available.

Audio Scale

Audio Scale – change the audio meter modes between RMS, Loudness 9 and Loudness 18 modes. The user will be presented with a list similar to this:

- dBFS RMS
- dBu SMPTE RP155 (+24)
- dBu EBU R86 (+18)
- dBu EBU R86 (0)
- dBu EBU PPM
- dBu BBC PPM
- LUFS -23 EBU 9
- LKFS -24 US 9

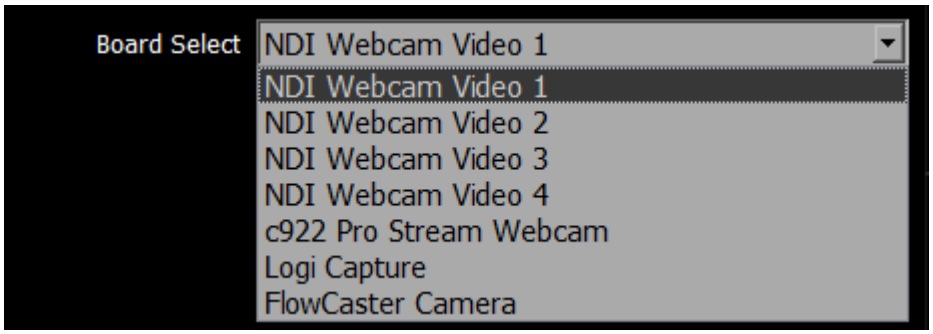
Board Type

Board Type – select the type of board to use. The user may be presented with a list similar to this:

- Auto Select
- Aja
- Aja Shared
- BlueFish
- BlackMagic
- UltraScope
- Matrox
- DirectShow/UVC
- NDI In
- Desktop
- Adobe ScopeDirect
- Avid ScopeDirect
- OpenFX ScopeDirect
- Assimilate ScopeDirect

Board Select

Board Select – llows the user to select which board or screen to use. Sometimes if there is more than one board in the system, the application may be looking at the wrong one. In fact, certain types of devices may appear to be out of order, depending on whether different boards have been used in the system. Clicking between boards can reset the selected board. 4KScope will take a look at how the device identifies itself and populate the list with any devices seen in the system. Here is an example:



Preferred Scan

Preferred Scan – Select between available scan settings. The user may be presented with a list similar to this:

- Auto
- Interlaced (i)
- Segmented (psf)

Active Region

Active Region fields – shows the active region of the video signal. X1 sets the upper left pixel location, Y1 sets the lower left pixel location, X2 sets the upper right pixel location, Y2 sets the lower right pixel location.

Auto Follow Input

Auto Follow Input – if this checkbox is selected, whenever the input type is changed, the settings for 4KScope are changed as well. If not checked, switching the input signal will not switch the settings.

Scope Vblank

Scope Vblank – by default, the waveform/vectorscopes do not use the vertical blanking area. If this is set, the vertical blank lines will be treated as active picture

Audio Channels

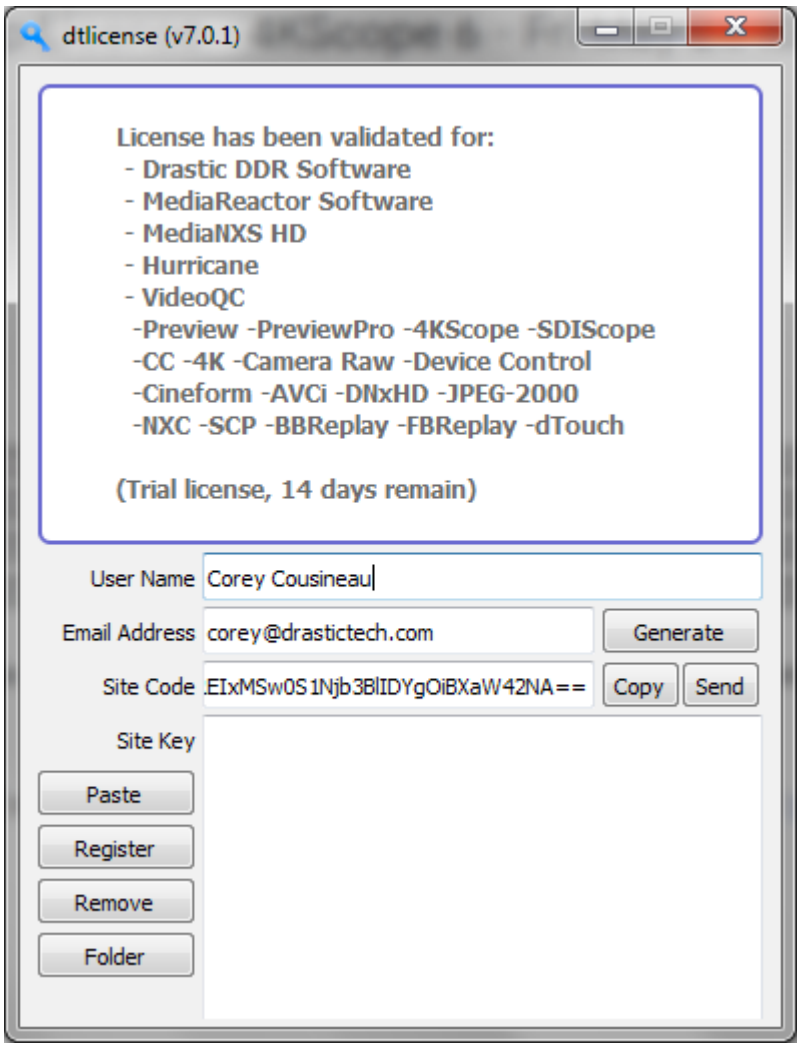
Audio Channels – (hardware dependent) In systems that support 16 channel audio, the user would be able to select between 8 and 16 channel audio.

Audio Pairs

Audio Pairs – (hardware dependent) buttons allow the user to select the audio pair that will be monitored.

License

License button - Press the **License** button to open the licensing dialog.



The top field displays the current status of the license.

The **User Name** field allows the user to type in a first and last name during the licensing process.

The **Email Address** field allows the user to type in the email at which they would like to receive the site key for their license.

Once the name and address fields have been filled out, pressing the **Generate** button populates the **Site Code** field with a string of alphanumeric characters. This string is the Site Code.

The **Site Code** field is where the site code displayed during the licensing process. The user may select the site code and use Ctrl+C to copy it to the clipboard, or use the **Copy** button. The user will need to send the site code to Drastic Authorization to get a Site Key to enable the license.

If the system has been set up with email, pressing the **Send** button will open a new email to Drastic Authorization, with the site code in the body of the email.

Once a reply email containing the **Site Key** has been returned by Drastic Authorization, copy it, then paste it into the Site Key field either using the **Paste** button or Ctrl+V.

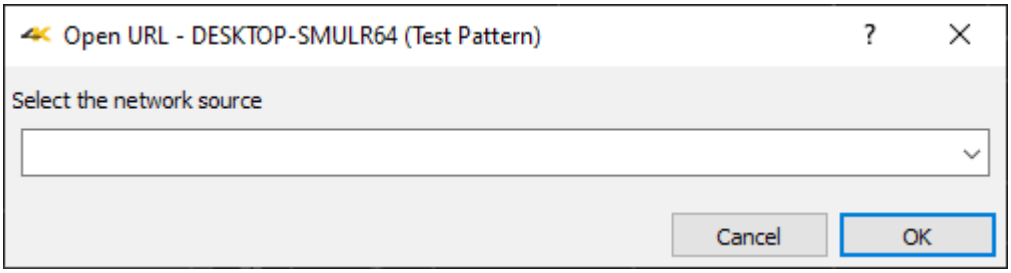
Once the Site Key has been pasted into the **Site Key** field, pressing the **Register** button registers the license. The system may need to be restarted for the change in license status to be updated. Pressing the x in the upper right corner will close the **License** window.

Press the **Done** button to enable any changes, and close the **Settings** window.

Done button. Pressing the Done button in the System Configuration window closes the window and enables any changes that have been made.

IP Setup

IP Setup button – opens the Open URL window, which allows the user to select between available IP sources. The list will be populated with the most recent sources that have been selected.



Display Modes

Display Mode button – opens the Monitor Settings window, which allows the user to select between available display modes.

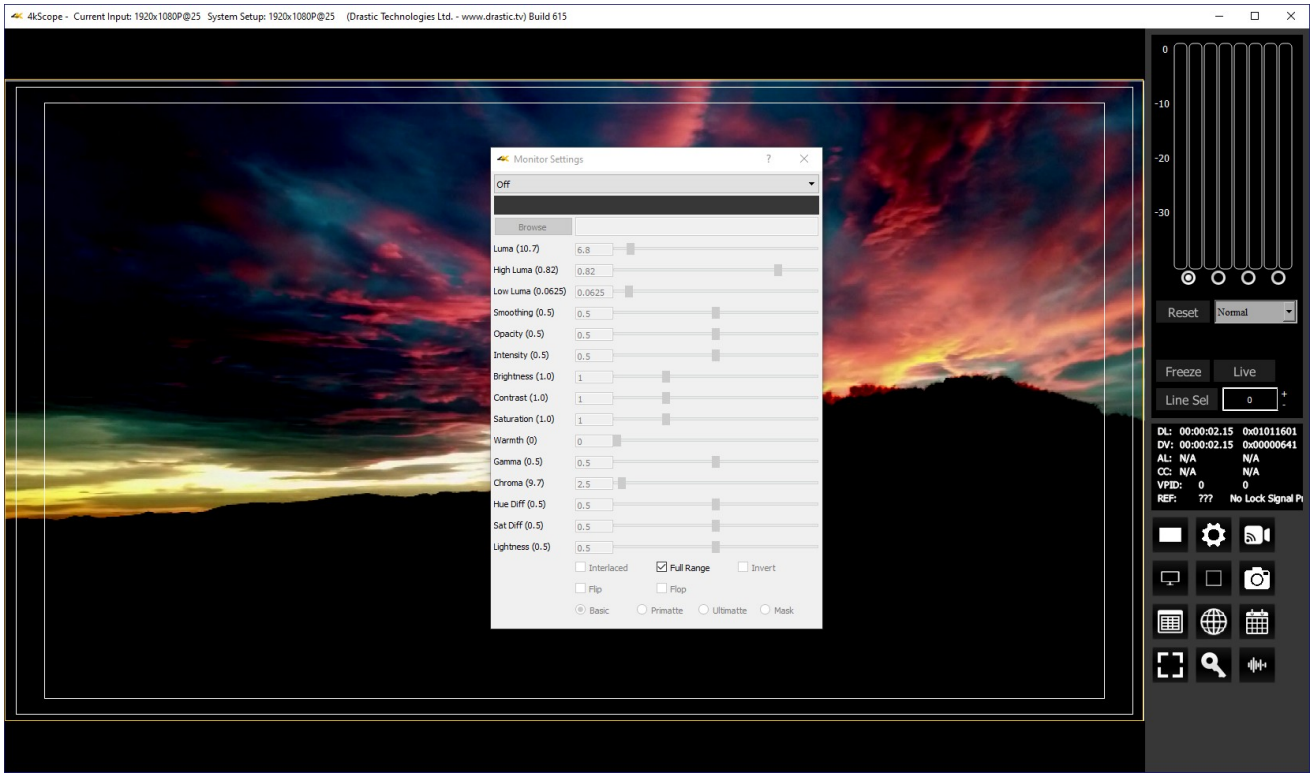
Monitor Settings window

The pulldown menu at the top allows the user to select between various display modes.

Display modes include:

Off

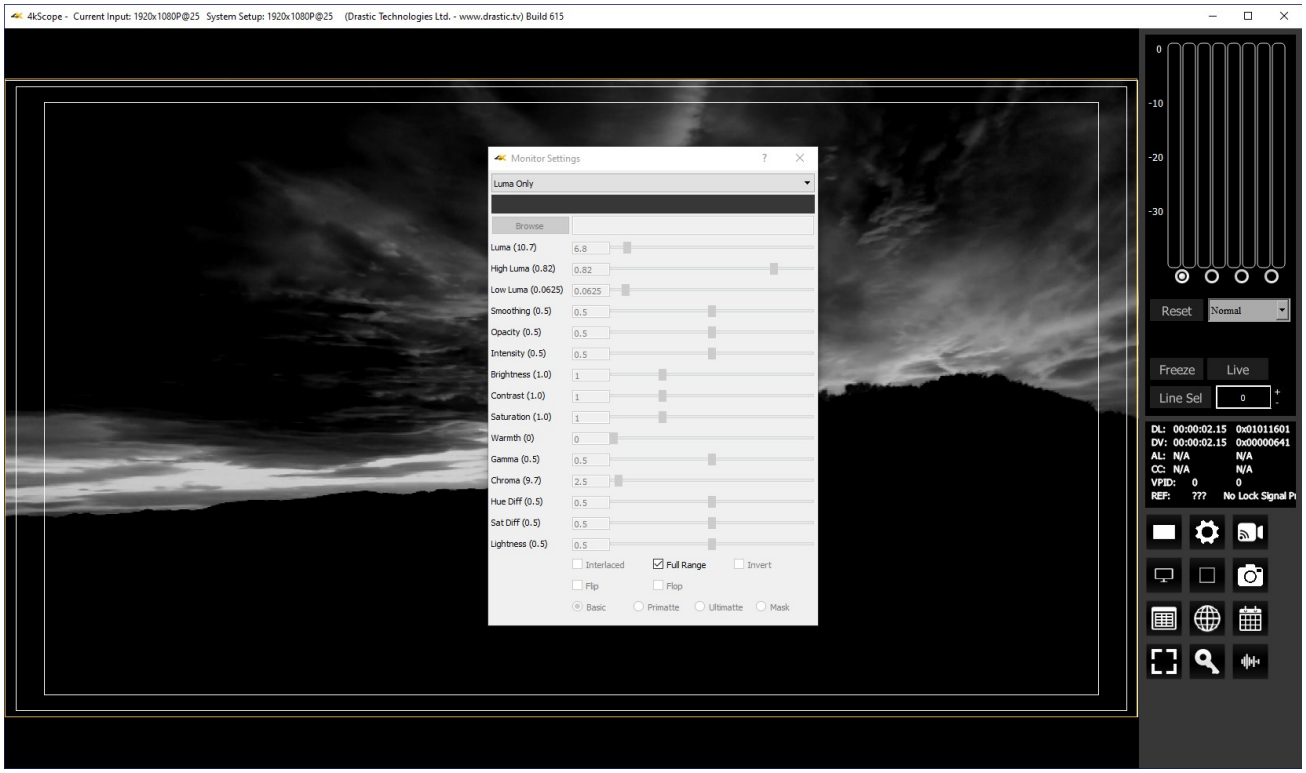
Display the signal normally. This is the default picture view.



The **Full Range** checkbox may be checked (use Full video range) or unchecked (use the standard SMPTE range).

Luma Only

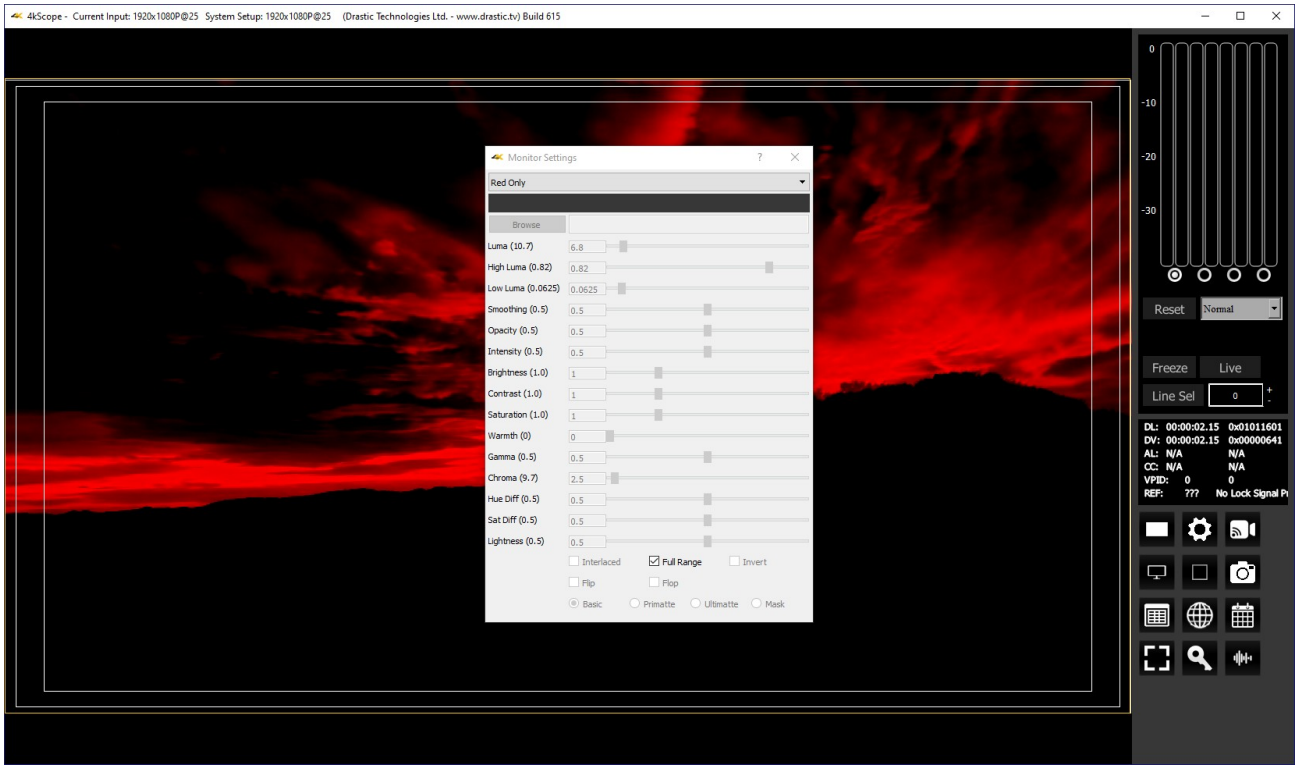
Show only the Y or brightness of the picture. This display setting produces a black and white image, with no chroma.



The **Full Range** checkbox may be checked (use Full video range) or unchecked (use the standard SMPTE range). Full Range lets you adjust how the signal is processed to the display and does not affect any of the graticules.

Red Only

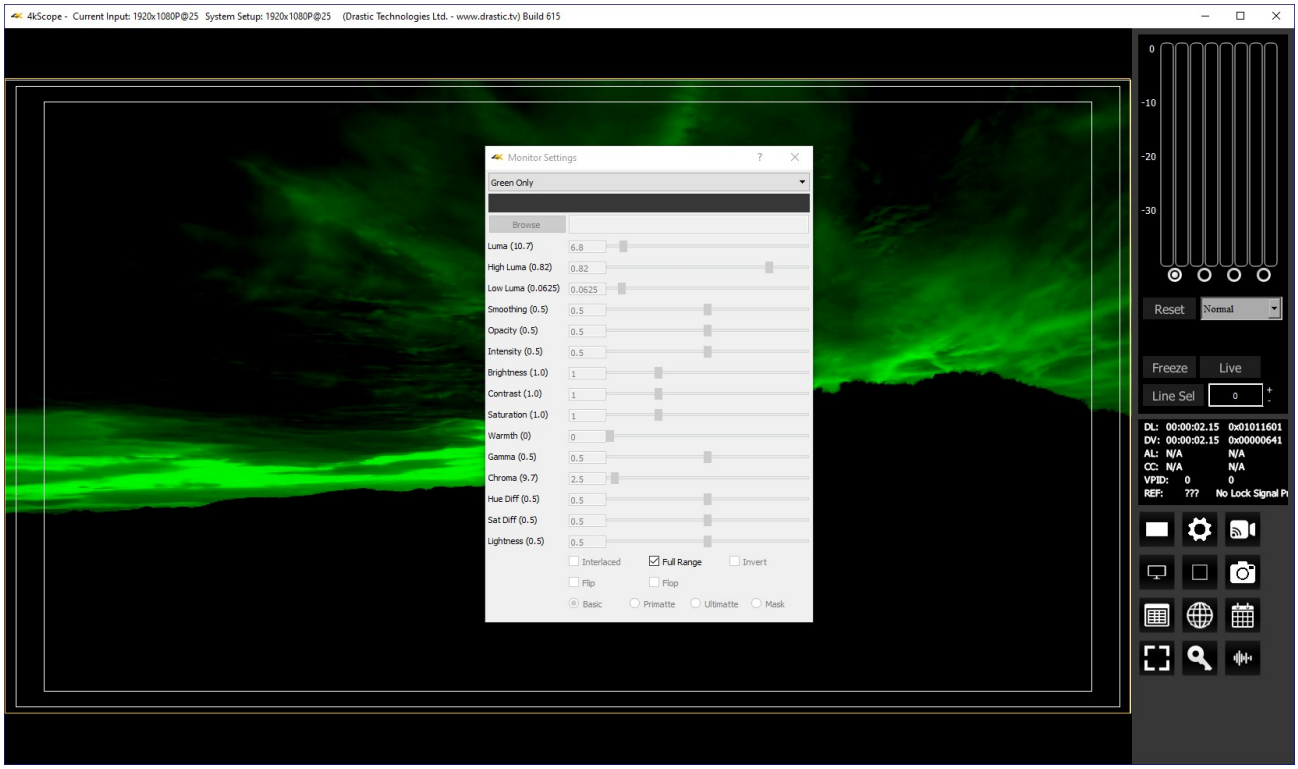
Show only the red channel.



The **Full Range** checkbox may be checked (use Full video range) or unchecked (use the standard SMPTE range). Full Range lets you adjust how the signal is processed to the display and does not affect any of the graticules.

Green Only

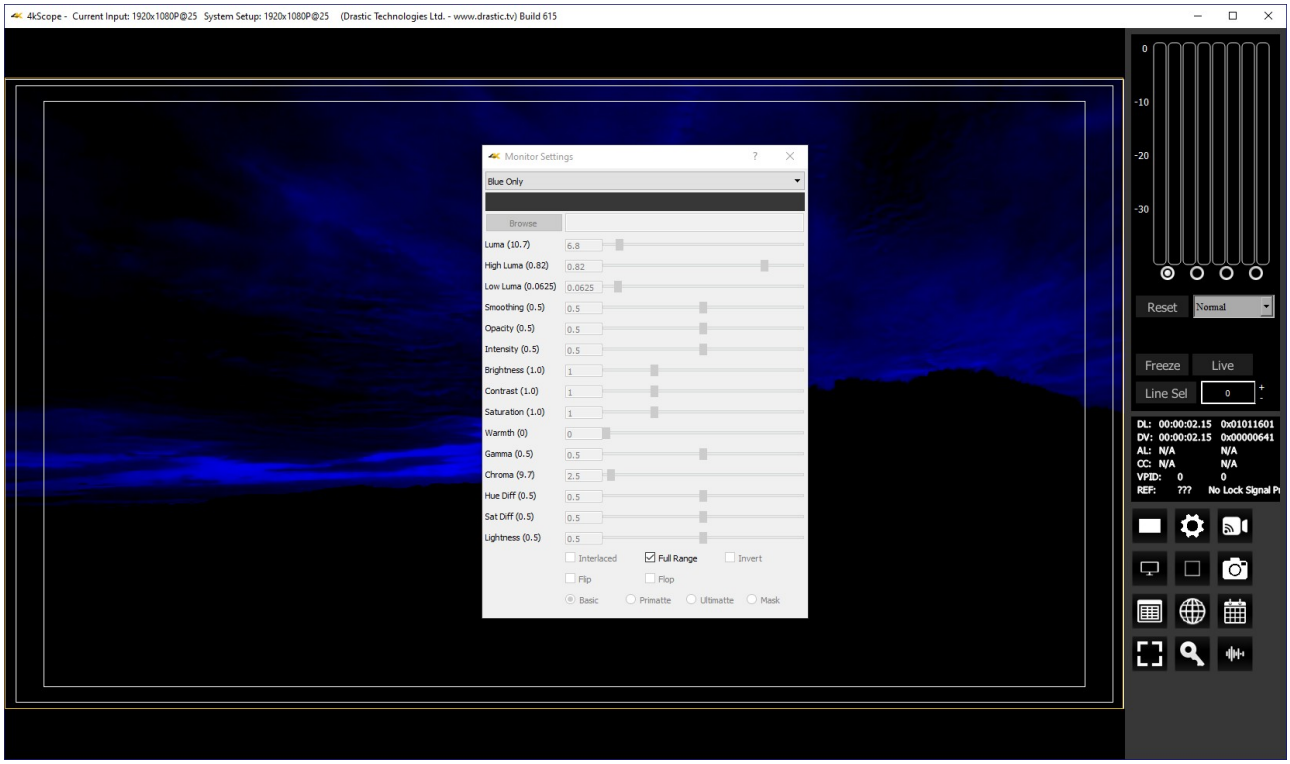
Show only the green channel.



The **Full Range** checkbox may be checked (use Full video range) or unchecked (use the standard SMPTE range). Full Range lets you adjust how the signal is processed to the display and does not affect any of the graticules.

Blue Only

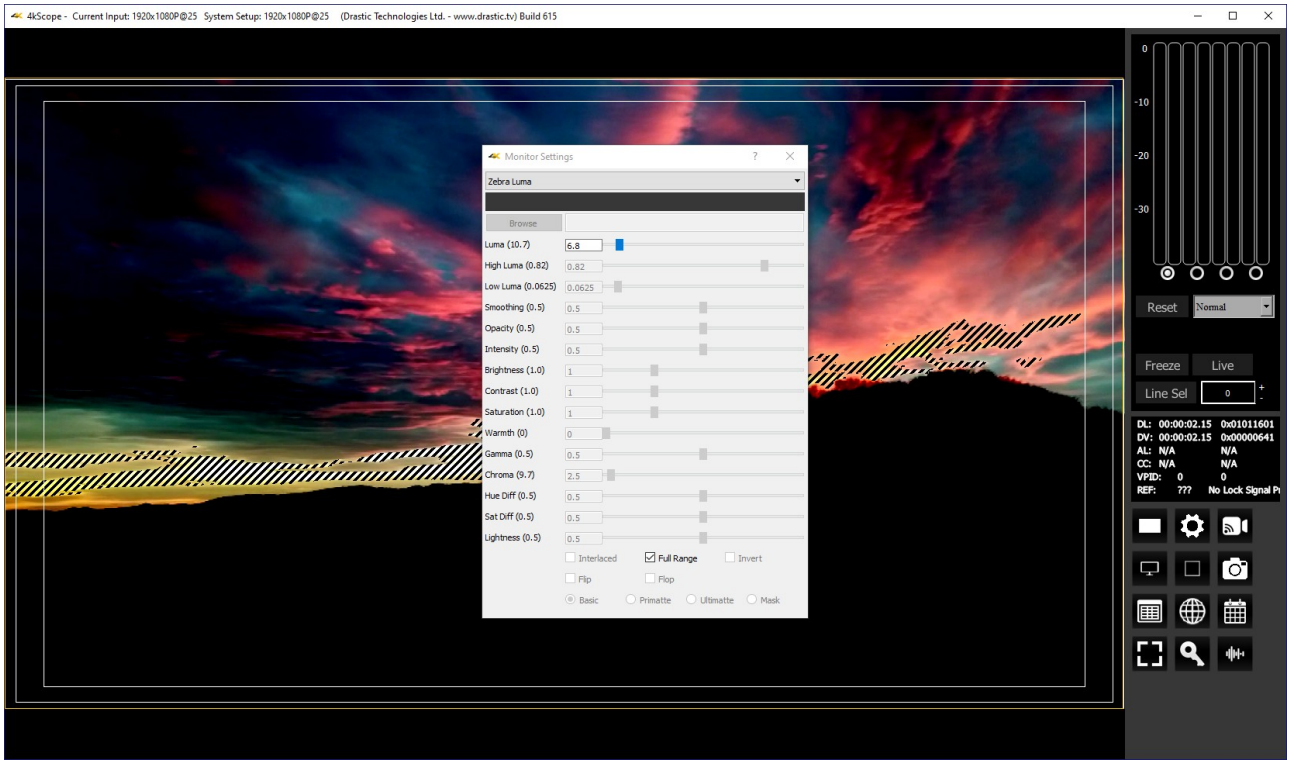
Show only the blue channel.



The **Full Range** checkbox may be checked (use Full video range) or unchecked (use the standard SMPTE range). Full Range lets you adjust how the signal is processed to the display and does not affect any of the graticules.

Zebra Luma

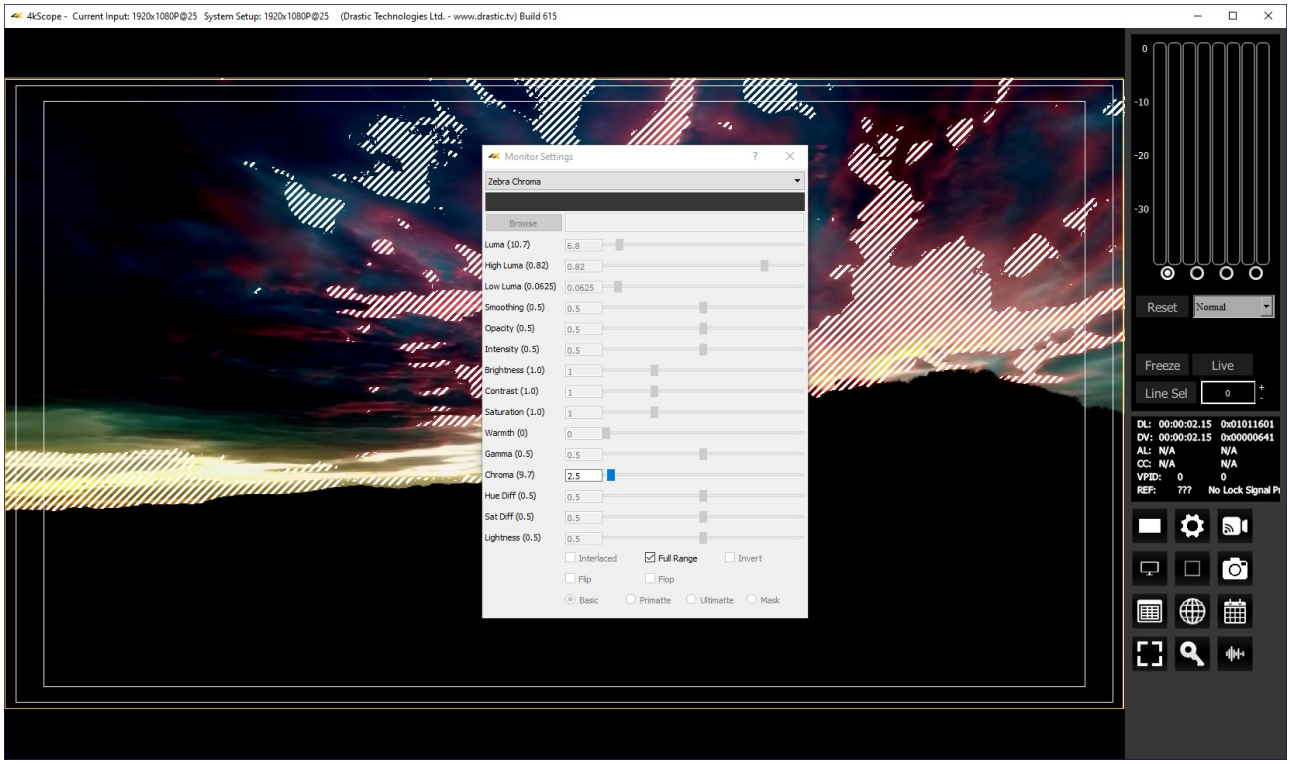
Draw zebra bars where the luma is too high or too low.



Activates the **Luma** slider, which allows the user to adjust the luma setting. When active, Luma can be adjusted by pulling the slider with the mouse, or using the left and right arrow buttons, in tenths. Click on the slider and use the < and > keys.
The **Full Range** checkbox may be checked (use Full video range) or unchecked (use the standard SMPTE range). Full Range lets you adjust how the signal is processed to the display and does not affect any of the graticules.

Zebra Chroma

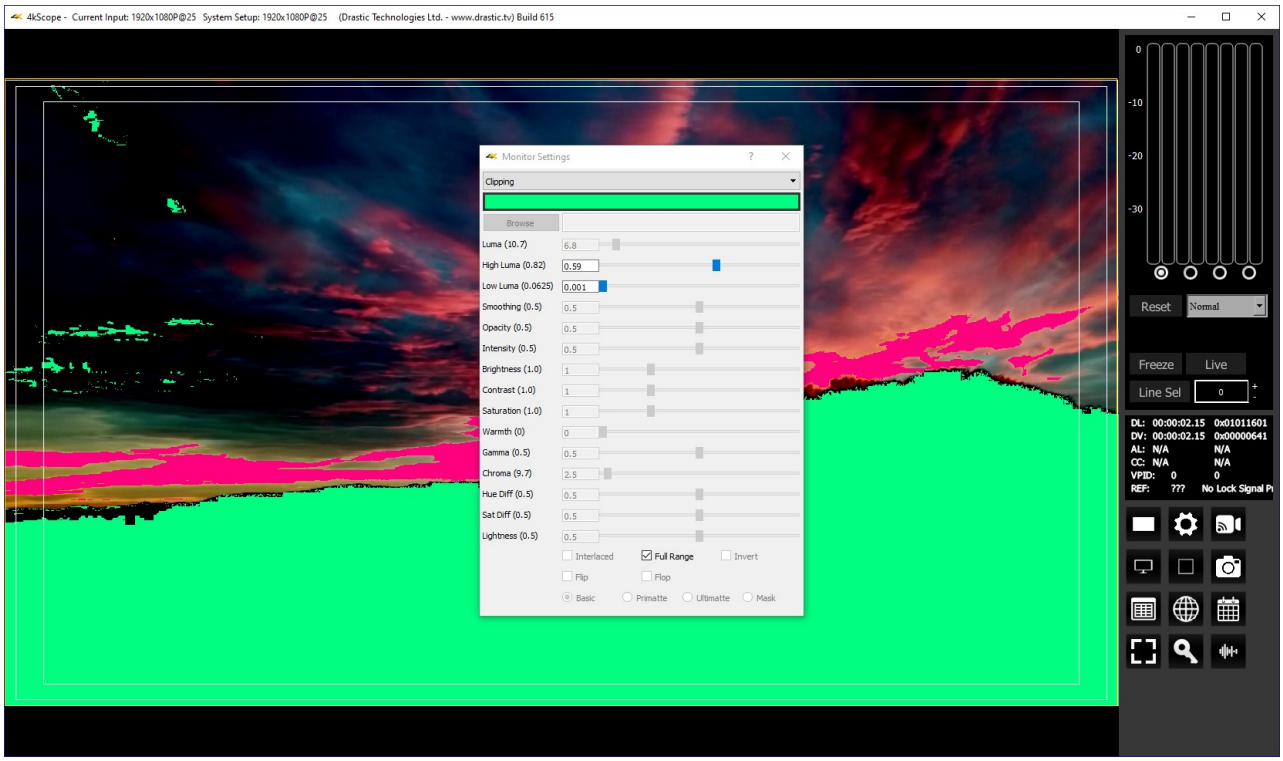
Draw zebra bars where the chroma is out of range.



Activates the **Chroma** slider, which allows the user to adjust the chroma setting. When active, Chroma can be adjusted by pulling the slider with the mouse, or using the left and right arrow buttons, in tenths. Click on the slider and use the < and > keys.
The **Full Range** checkbox may be checked (use Full video range) or unchecked (use the standard SMPTE range). Full Range lets you adjust how the signal is processed to the display and does not affect any of the graticules.

Clipping

Draw green anywhere the signal is too low, or red anywhere it is too high. If a signal is too low, the blacks will become muddy and lose detail. If it is too high, the whites will bleach out and lose detail.



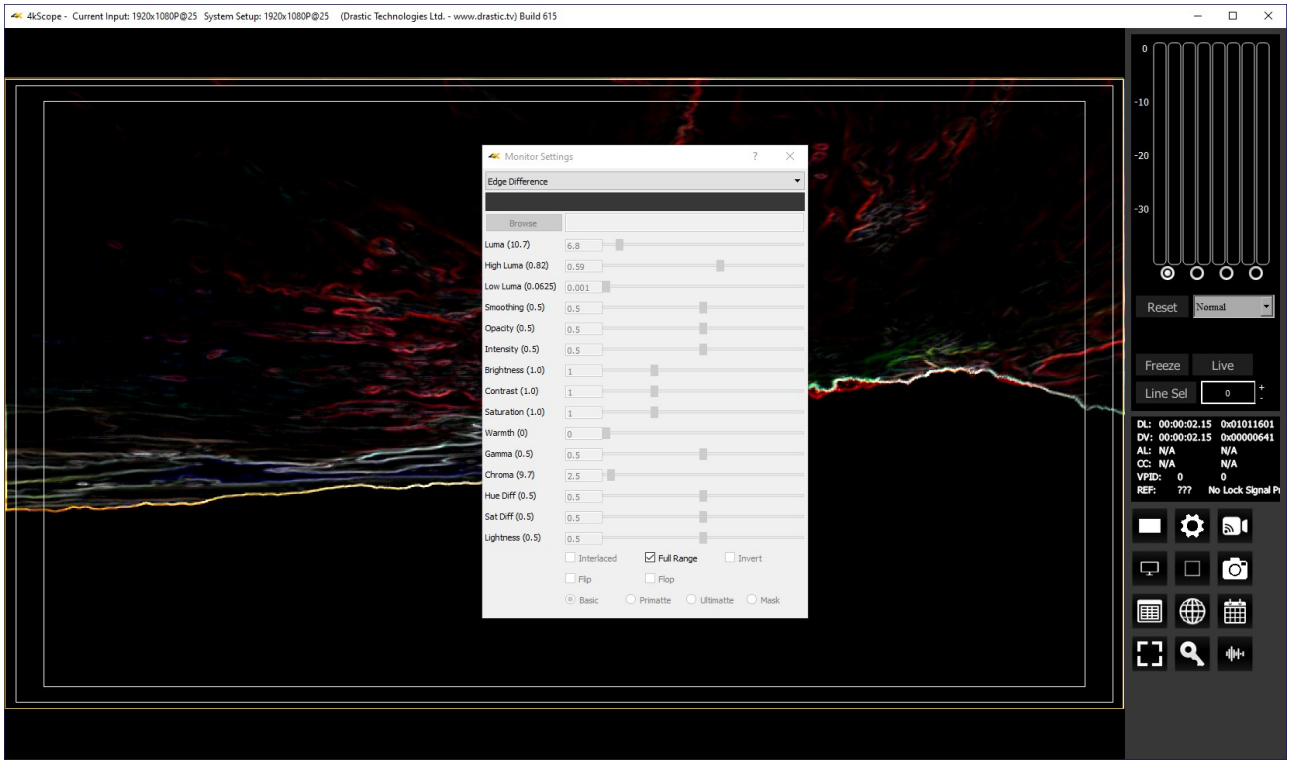
Activates the **Color Picker** (the bar just below the display mode pulldown menu), so the user can choose a primary (too low) color other than green. The secondary (too high) color is automatically generated to be a contrasting color to the primary color. To open the color picker, click on the bar, or press <ENTER>.

Activates the **High Luma** slider and the **Low Luma** slider, allowing the user to adjust these settings. When active, High Luma and Low Luma can be adjusted by pulling the slider with the mouse, or using the left and right arrow buttons, in tenths, but displays whole integers only. Click on the slider and use the < and > keys.

The **Full Range** checkbox may be checked (use Full video range) or unchecked (use the standard SMPTE range). Full Range lets you adjust how the signal is processed to the display and does not affect any of the graticules.

Edge Difference

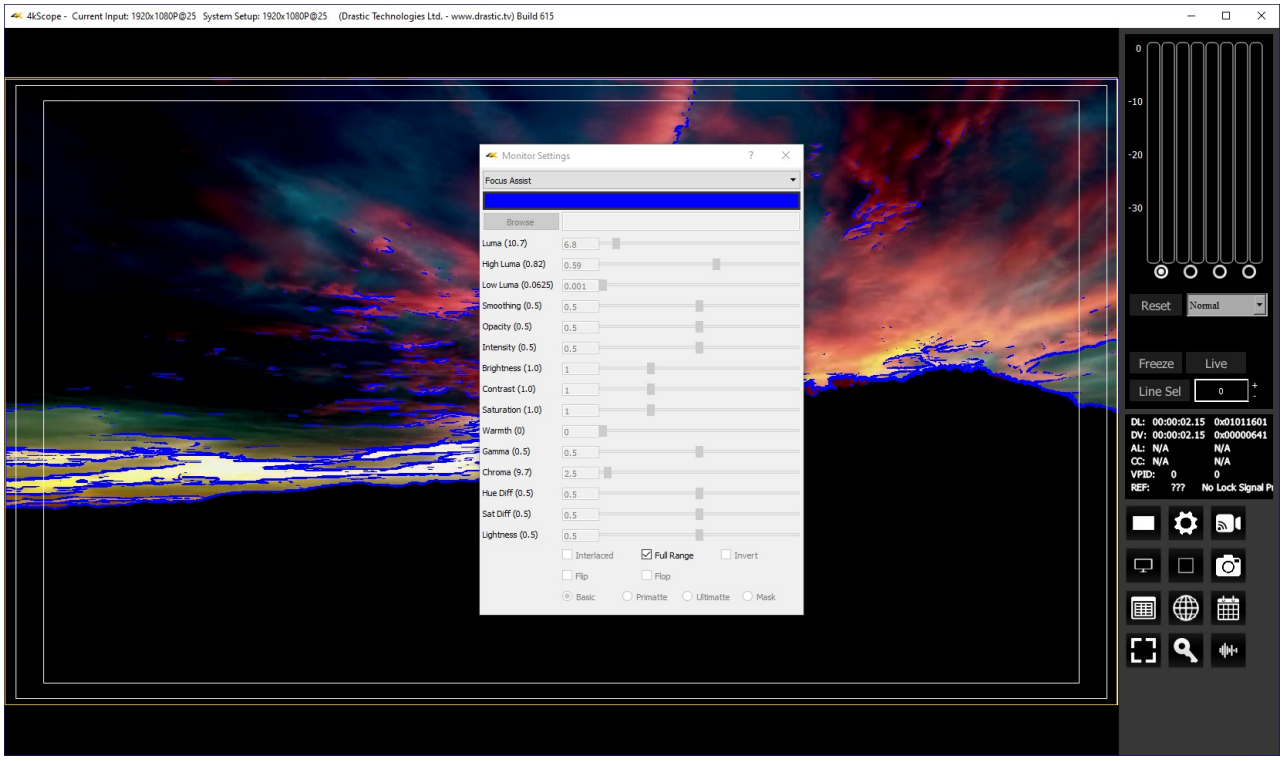
Highlight every edge in the picture, and turn the rest of the picture black.



The **Full Range** checkbox may be checked (use Full video range) or unchecked (use the standard SMPTE range). Full Range lets you adjust how the signal is processed to the display and does not affect any of the graticules.

Focus Assist

Paint areas of the image that are in focus with the selected color. This setting allows fine tuning of camera focus settings by making the in-focus areas obvious.

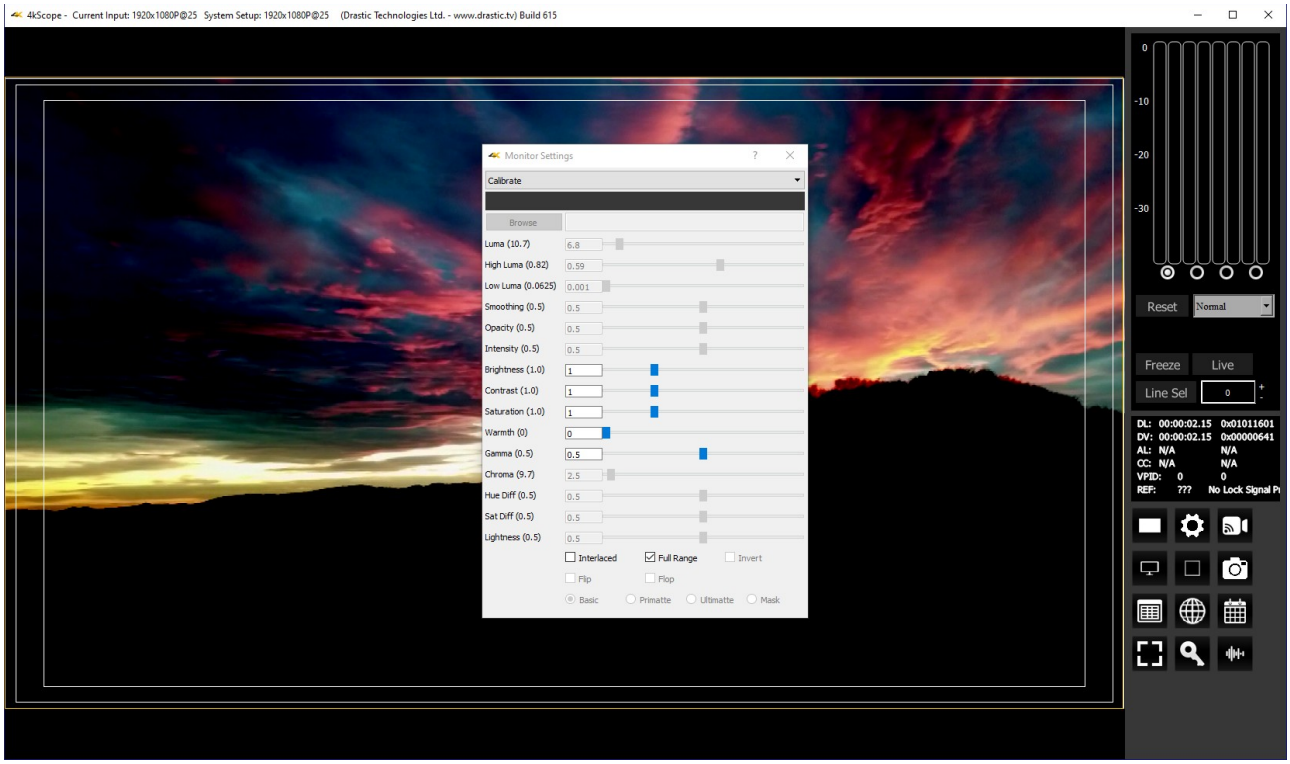


Activates the **Color Picker** (the bar just below the display mode pulldown menu), so the user can choose an appropriate color to contrast from the general hue of the picture. To open the color picker, click on the bar, or press <ENTER>.

The **Full Range** checkbox may be checked (use Full video range) or unchecked (use the standard SMPTE range). Full Range lets you adjust how the signal is processed to the display and does not affect any of the graticules.

Calibrate

Allows the user to calibrate the display settings. Initially this will show the normal picture view. However, as you move the individual sliders, you can adjust the way the image is displayed to accommodate the capabilities of your monitor setup.



Activates the **Brightness**, **Contrast**, **Saturation**, **Warmth**, and **Gamma** sliders, allowing the user to adjust these settings. When active, Brightness, Contrast, Saturation, Warmth, and Gamma can be adjusted by pulling the sliders with the mouse, or using the left and right arrow buttons, in thousandths. Click on the slider and use the < and > keys.

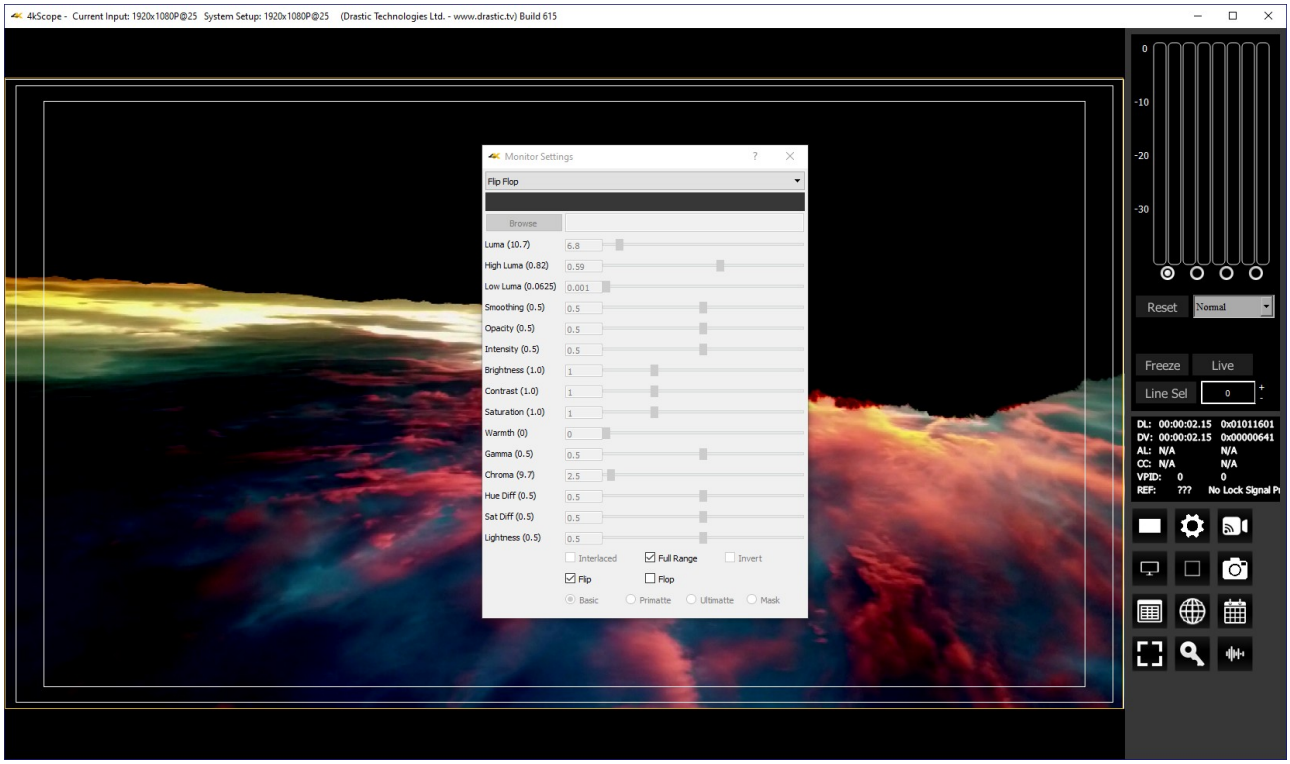
Activates the **Interlaced** checkbox, which allows the user to specify interlaced (checked) or progressive (unchecked) standards to display.

The **Full Range** checkbox may be checked (use Full video range) or unchecked (use the standard SMPTE range). Full Range lets you adjust how the signal is processed to the display and does not affect any of the graticules.

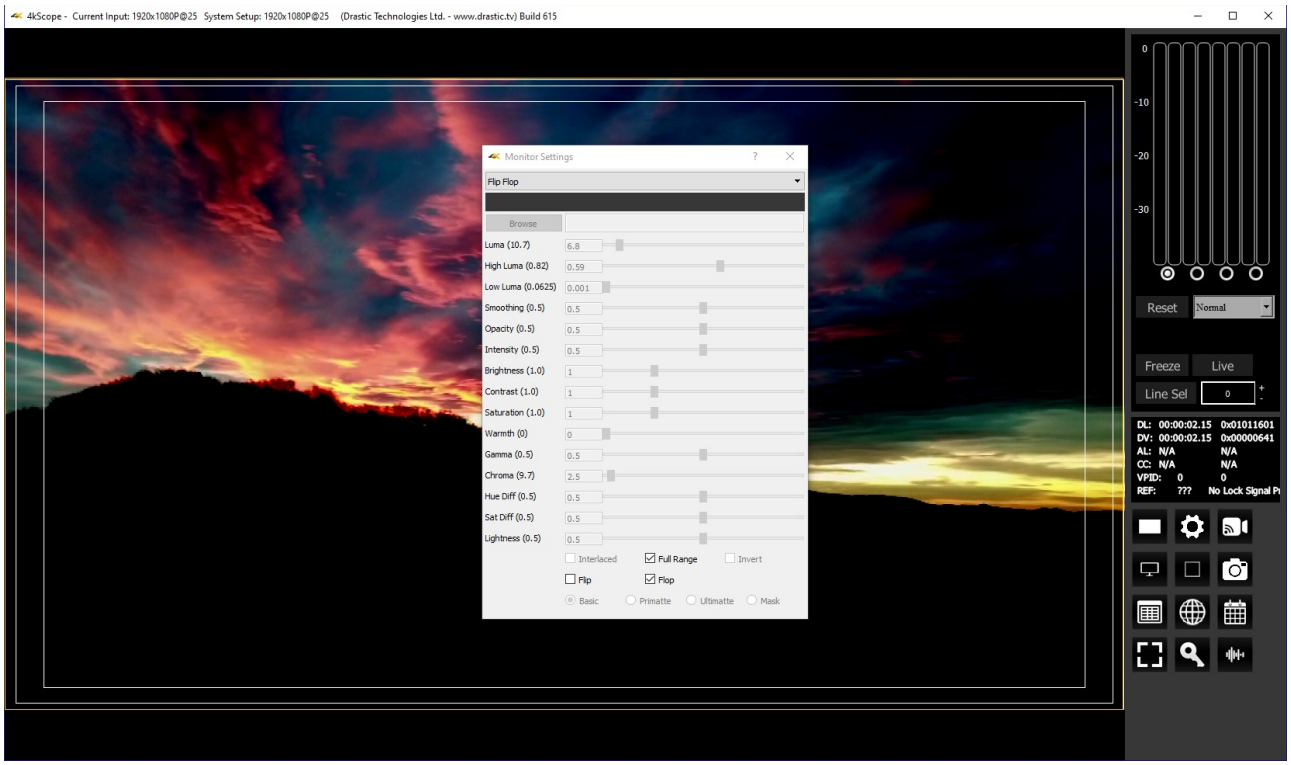
Flip Flop

Reverse the picture horizontally or vertically.

Activates the **Flip** checkbox, which allows the user to reverse the image top to bottom.



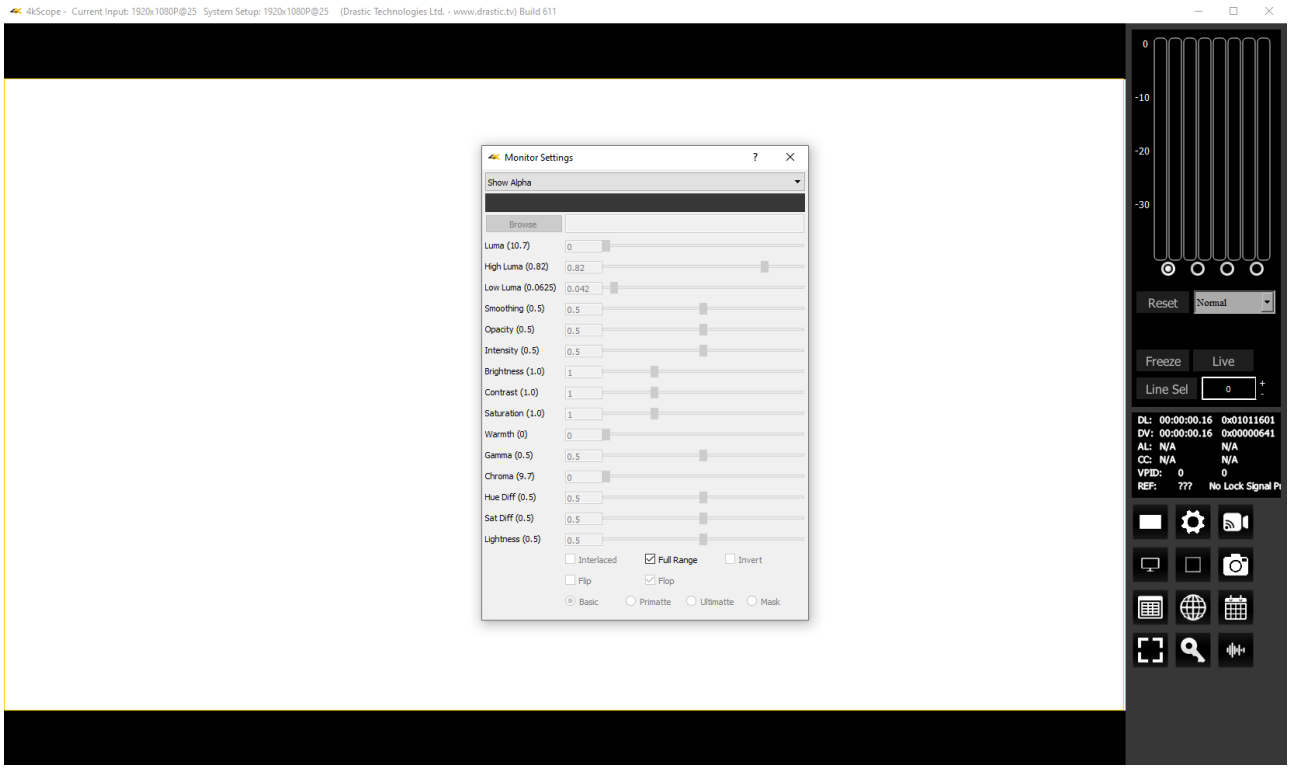
Activates the **Flop** checkbox, which allows the user to reverse the image left to right.



The **Full Range** checkbox may be checked (use Full video range) or unchecked (use the standard SMPTE range). Full Range lets you adjust how the signal is processed to the display and does not affect any of the graticules.

Show Alpha

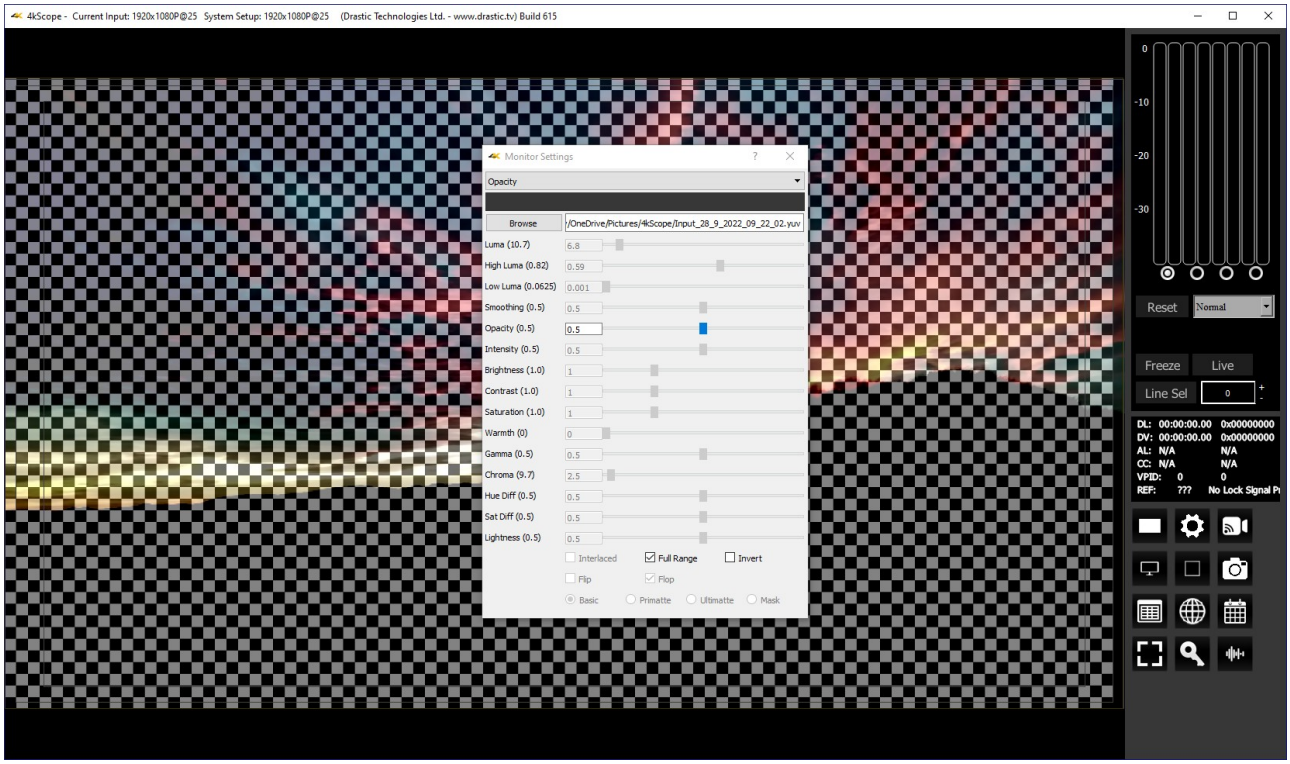
Show the alpha component of an RGBA or YCbCr+A signal.



The **Full Range** checkbox may be checked (use Full video range) or unchecked (use the standard SMPTE range). Full Range lets you adjust how the signal is processed to the display and does not affect any of the graticules.

Opacity

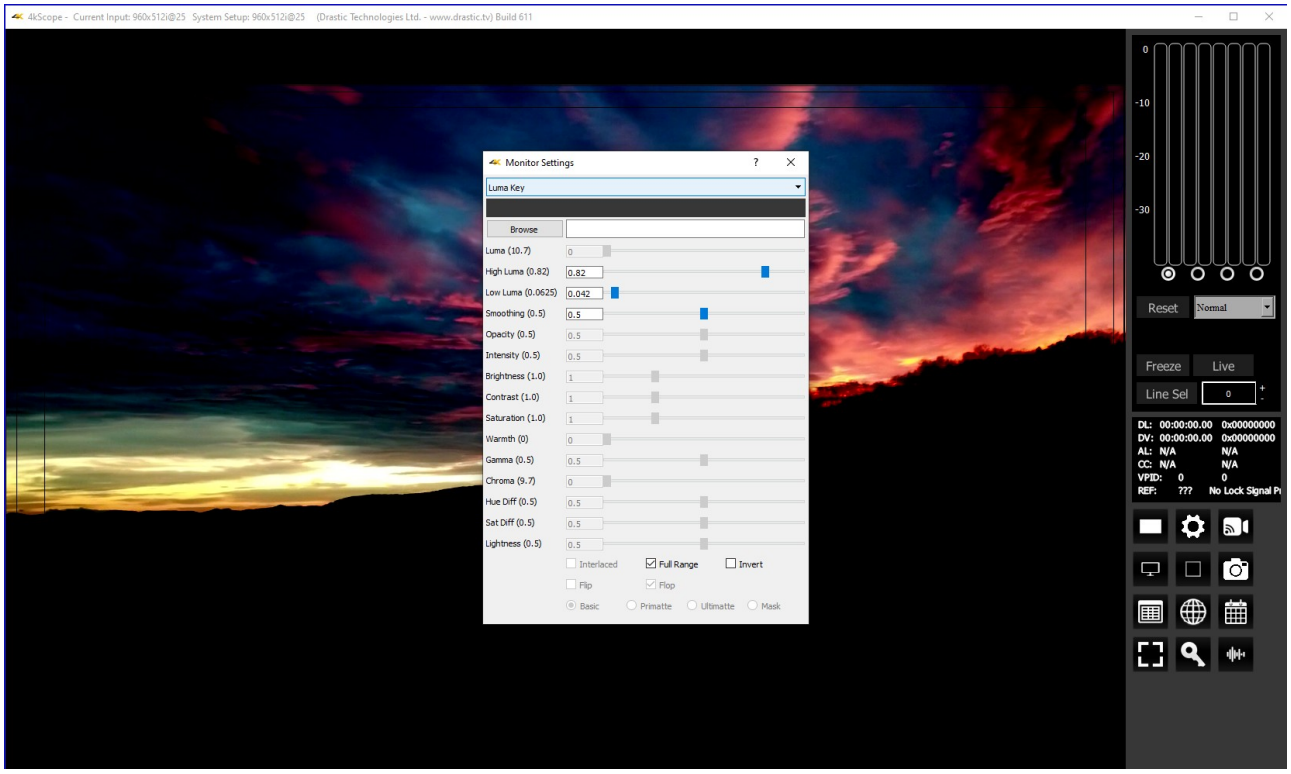
Mix the signal with a loaded still image for reference, using a checkerboard mix. This setting can be used to compare two images to match a camera position from an existing shot with a new camera, where additional shots are needed for a scene and a new camera needs to match its position.



Activates the **Browse** button. This opens a standard browser, which allows the user to load a TGA/PNG/BMP/JPG/v210/YUV to use as the background to compare live video to the existing image.
Activates the **Opacity** slider, and the **Invert** checkbox, which allows the user to set the opacity level, and Invert the display.
The **Full Range** checkbox may be checked (use Full video range) or unchecked (use the standard SMPTE range). Full Range lets you adjust how the signal is processed to the display and does not affect any of the graticules.

Luma Key

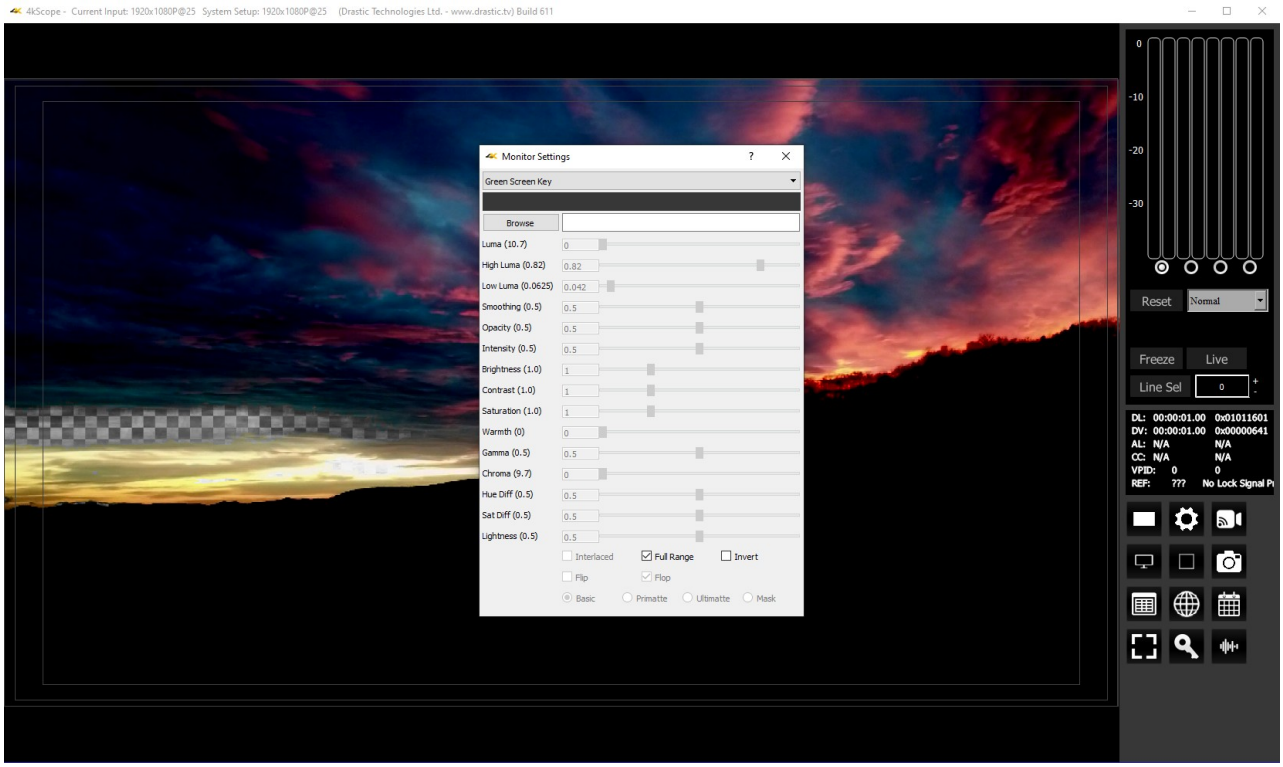
Show the video luma keyed over a checkerboard or image.



Activates the **Browse** button. This opens a standard browser, which allows the user to load a TGA/PNG/BMP/JPG/v210/YUV to use as the background for the luma key, instead of the checkerboard.
Activates the **High Luma** slider, so the user can adjust the high luma settings. When active, can be adjusted by pulling the slider, or using the left and right arrow buttons, in thousandths. Click on the slider and use the < and > keys.
Activates the **Low Luma** slider, so the user can adjust the low luma settings. When active, can be adjusted by pulling the slider, or using the left and right arrow buttons, in thousandths. Click on the slider and use the < and > keys.
Activates the **Smoothing** slider, so the user can adjust the smoothing settings. When active, can be adjusted by pulling the slider, or using the left and right arrow buttons, in thousandths. Click on the slider and use the < and > keys.
Activates the **Invert** checkbox. The user can check this box to Invert the key.
The **Full Range** checkbox may be checked (use Full video range) or unchecked (use the standard SMPTE range). Full Range lets you adjust how the signal is processed to the display and does not affect any of the graticules.

Green Screen Key

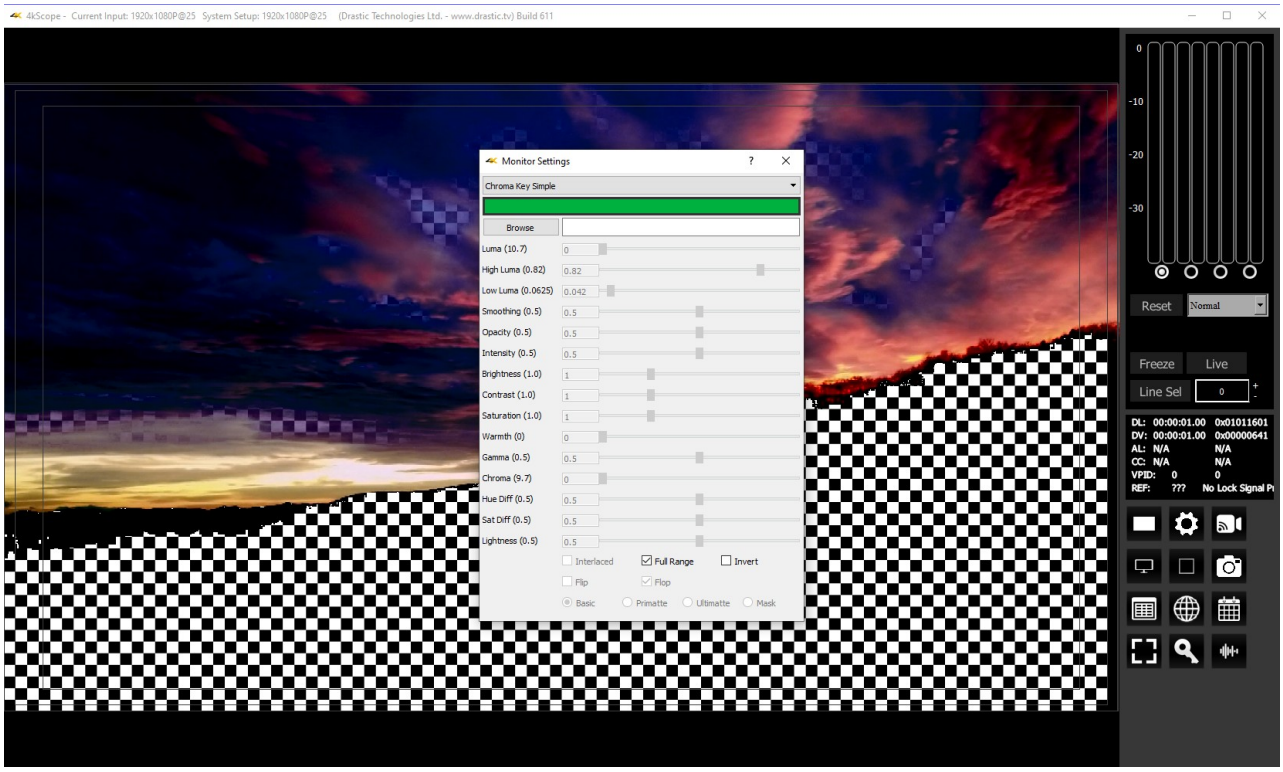
Show the image green screen keyed over a checkerboard.



Activates the **Browse** button. This opens a standard browser, which allows the user to load a TGA/PNG/BMP/JPG/v210/YUV to use as the background for the green screen key, instead of the checkerboard.
Activates the **Invert** checkbox. The user can check this box to Invert the key.
The **Full Range** checkbox may be checked (use Full video range) or unchecked (use the standard SMPTE range). Full Range lets you adjust how the signal is processed to the display and does not affect any of the graticules.

Chroma Key Simple

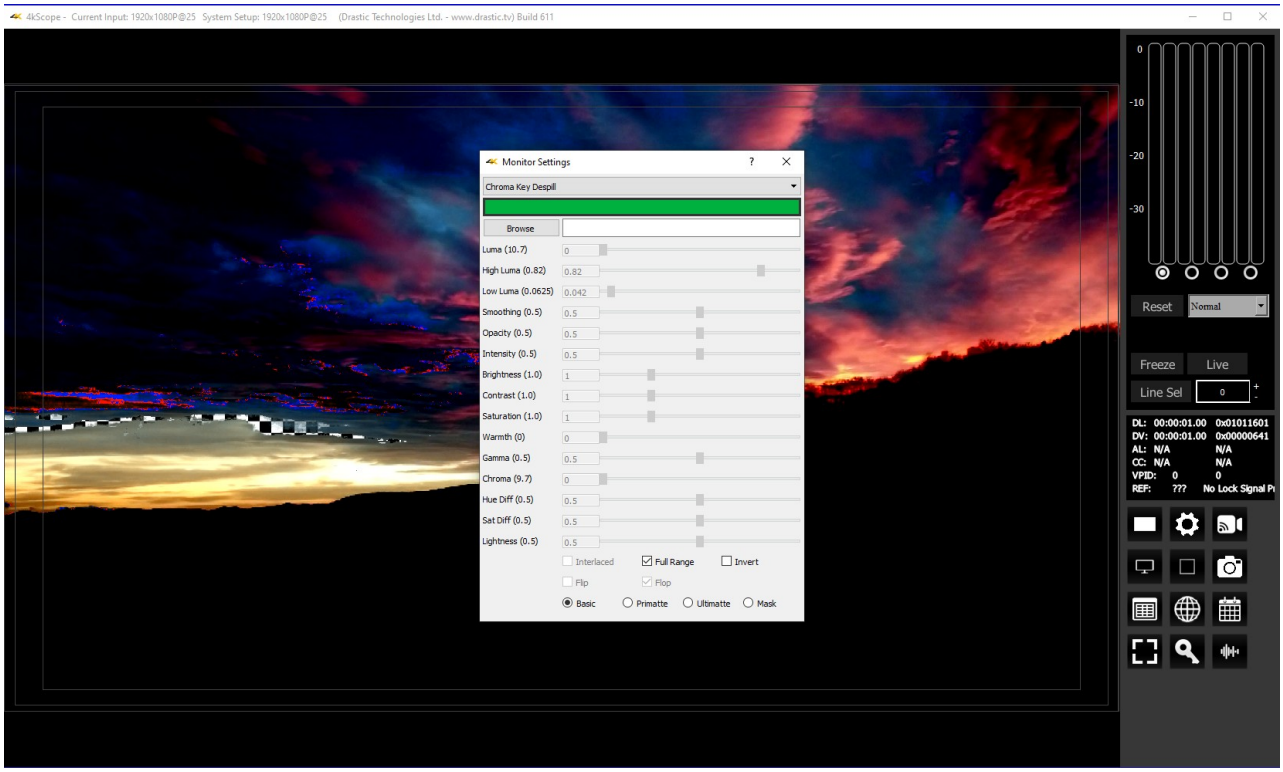
Show the image green screened over a checkerboard or image. Chroma Keys are applied to pass through background for a particular color. Green screen and blue screen are specific chroma keys. The Simple looks at each pixel.



Activates the **Color Picker** (the bar just below the display mode pulldown menu), so the user can choose a primary (too low) color other than green. The secondary (too high) color is automatically generated to be a contrasting color to the primary color. To open the color picker, click on the bar, or press <ENTER>.
Activates the **Color Picker** (the bar just below the display mode pulldown menu), so the user can fine tune the green, or any color used for the chroma key.
Activates the **Browse** button. This opens a standard browser, which allows the user to navigate to…
The **Full Range** checkbox may be checked (use Full video range) or unchecked (use the standard SMPTE range). Full Range lets you adjust how the signal is processed to the display and does not affect any of the graticules.
Activates the **Invert** checkbox. The user can check this box to Invert the key.

Chroma Key Despill

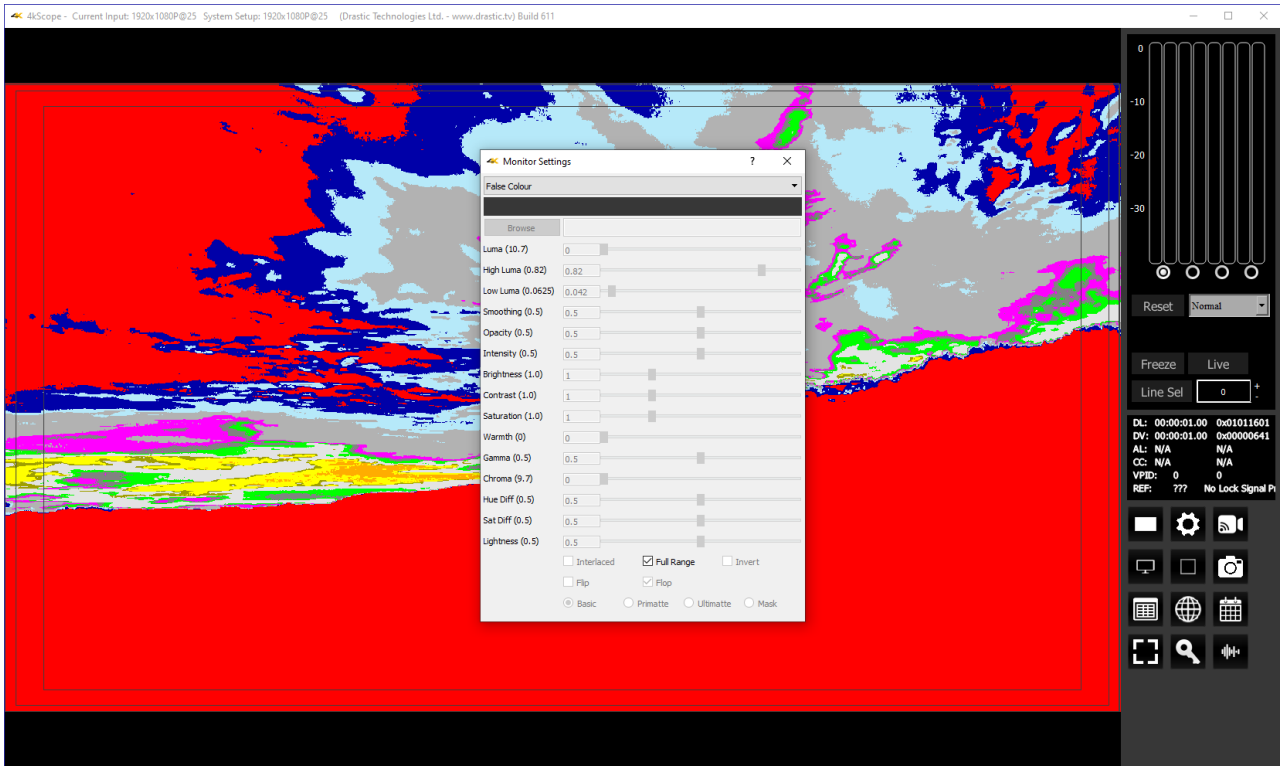
Chroma Keys are applied to pass through background for a particular color. Green screen and blue screen are specific chroma keys. The Despill applies a mix to the pixels at the edge of the color and any objects in the scene.



Activates the **Color Picker** (the bar just below the display mode pulldown menu), so the user can fine tune the green, or any color used for the chroma key. To open the color picker, click on the bar, or press <ENTER>.
Activates the **Browse** button. This opens a standard browser, which allows the user to load a TGA/PNG/BMP/JPG/v210/YUV to use as the background for the chroma key despill, instead of the checkerboard.
The **Full Range** checkbox may be checked (use Full video range) or unchecked (use the standard SMPTE range). Full Range lets you adjust how the signal is processed to the display and does not affect any of the graticules.
Activates the **Invert** checkbox. The user can check this box to Invert the key.
Activates the **Basic**/**Primatte**/**Ultimatte**/**Mask** radio buttons, which are chroma key despill types/settings. The user may select between these 4 settings using the radio buttons – when one is selected, the rest are automatically deselected.

False Colour

Show each exposure level as a color. Here is an example:



The **Full Range** checkbox may be checked (use Full video range) or unchecked (use the standard SMPTE range). Full Range lets you adjust how the signal is processed to the display and does not affect any of the graticules.

Here are the IRE Breakpoints in False Colour display mode:

0 to 1.65	Red	Too low
1.65 to 10	Blue	Underexposed
10 to 20	Light Blue	
20 to 42	Dark Grey	
42 to 48	Bright Purple	
48 to 52	Medium Grey	
52 to 58	Green	
58 to 78	Light Grey	Skin Tones
78 to 84	Dark Yellow	
84 to 94	Dark Yellow	
94 to 92	Orange	Overexposed
92 to 100	Red	Too High

The following controls on the **Monitor Settings** window are reserved for future development:

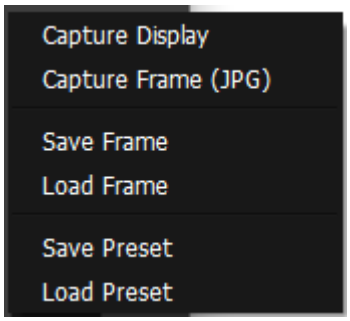
Intensity slider – reserved for future development.
Hue Diff slider – reserved for future development.
Sat Diff slider – reserved for future development.
Lightness slider – reserved for future development.

Manual

Manual button – opens up this manual for quick reference.

Capture Frame

Capture Frame button – provides options for capturing a frame of video for reference. Images are saved in C:\Users\username\OneDrive\Pictures\4kScope. Opens the following dialog:



Capture Display – calls up a save as window [to C:\Users\username\OneDrive\Pictures], set to bmp; the user will need to fill in a filename. You can also save as a .png from this dialog.

Capture Frame JPG - by selecting this option or using <CTRL>-1, a JPG image can be captured to your C:\Users\username\OneDrive\Pictures\4KScope directory, using the filename structure: [Input_DD_M_YYYY_HH_MM_SS.jpg] in 8 bit YCbCr mode for easy reading and documentation. 10% and 50% JPG scaled versions can also be captured with <CTR>-5 and <CTRL>-9.

Save Frame - The incoming image can be captured as a raw image in full, bit perfect images based on the current system settings. examples include:

YCbCr 8 bit - .yuv
YCbCr 10 bit - .v210
BGRA 8 bit - .bgra
RGB10 – rgb30

They are saved to your C:\Users\username\OneDrive\Pictures\4KScope directory by selecting this option or by pressing <CTRL>-0. These files are saved using the [Input_DD_M_YYYY_HH_MM_SS.filetype] filename structure. They can be read with videoQC or converted with MediaReactor, or loaded into 4KScope.

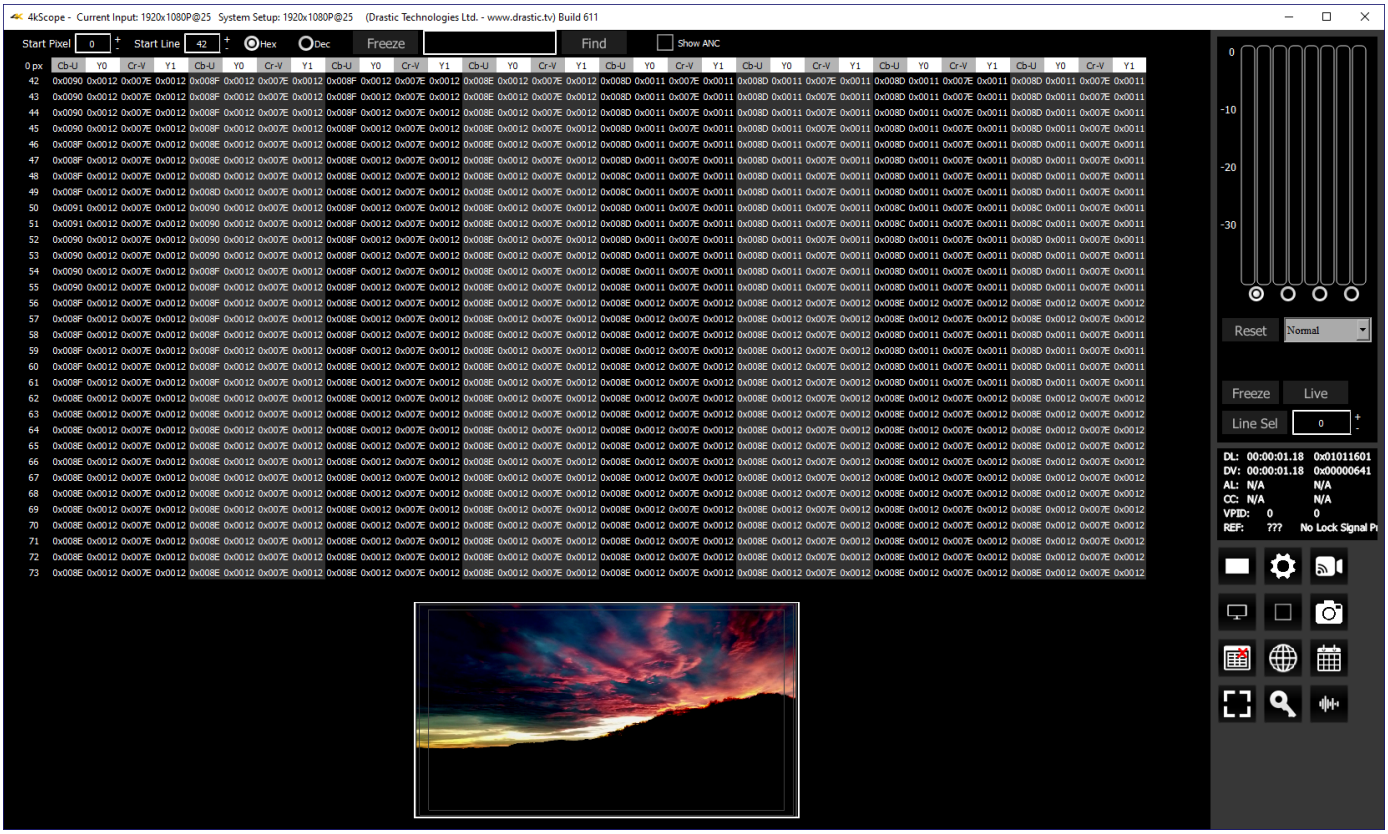
Load Frame – opens a browser pointed at your C:\Users\username\OneDrive\Pictures\4KScope directory so you can load a frame you have saved. The file type pulldown lets you filter to only look for .yuv, or only .v210, or to view all uncompressed files.

Save Preset – opens a save as dialog, for the user to save their current configuration as a *.ini file, as a preset for similar workflows.

Load Preset – opens a browser, which allows the user to locate and load existing presets.

Data View

Data View button – populates the Display section with the Data view.



Start Pixel field – displays the current start pixel. The user can enter a new start pixel, or use the + / - buttons to increment the value up or down.

Start Line field – displays the current start line. The user can enter a new start line, or use the + / - buttons to increment the value up or down.

Hex and **Dec** radio buttons – select one or the other button to set the values display to either decimal or hexadecimal.

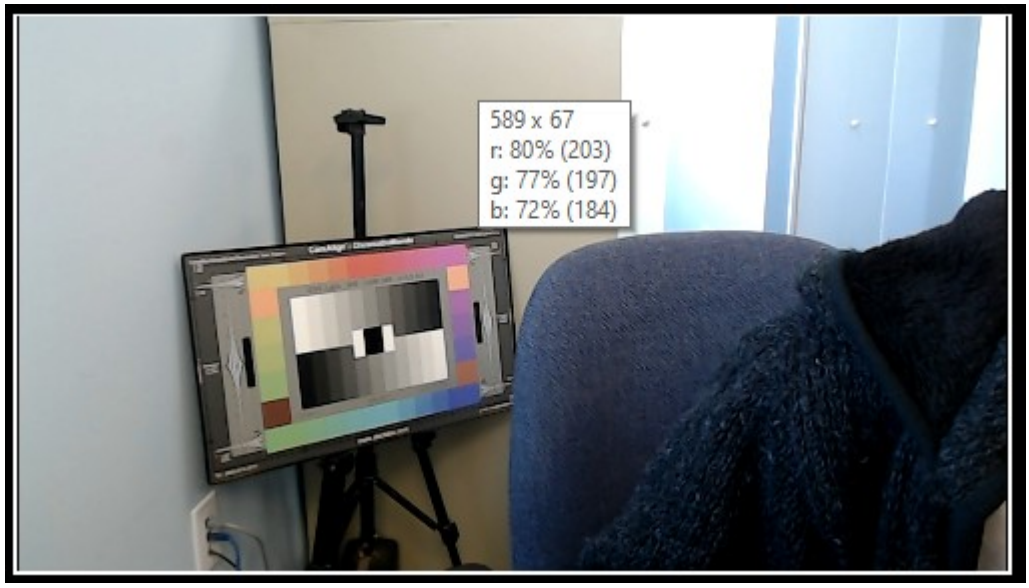
Freeze button – freezes the current frame of video for closer inspection

Find button – to find a specific hexadecimal value, enter it into the field, then press the find button.

Show ANC checkbox – when selected, displays any valid, decoded ANC it can find.

The Data view allows access to the raw pixel values being monitored on the HDMI or SDI input. Raw values are captured and displayed with no manipulation by the software. This mode is perfect for checking vertical blank signaling and metadata, as well as picture issues like inner line sync markers or out of range colors. Pixel starts can be selected, along with lines, in the edit boxes above the data area.

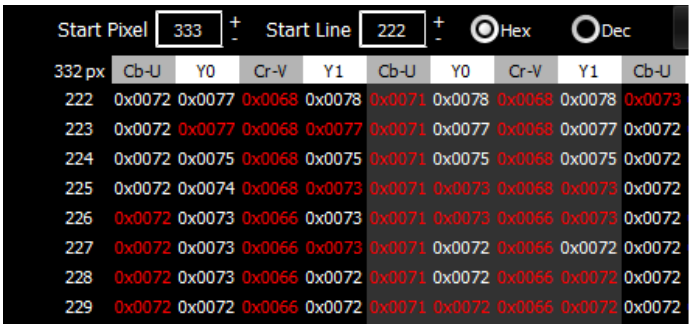
The Data View picture inset also provides real time per pixel data when you hover over any area of the image with the mouse. It displays the specific pixel you are looking at, and shows the RGB values.



The pixels data view analyzes can be set by the user by clicking the **Start Pixel**, or the **Start Line** checkbox, and changing the value. Note, if set to an area outside the signal (such as start pixel 0, start line 0), you will not see any useful information about the video.

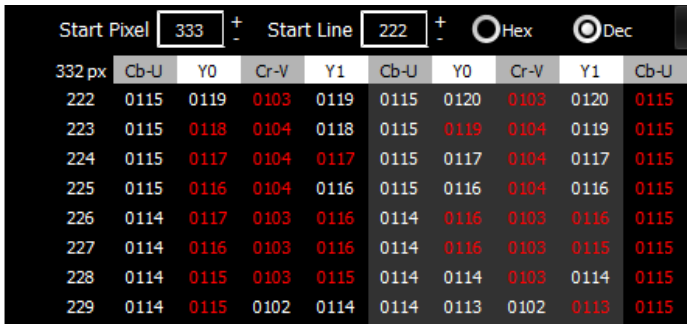
624 px	Cb-U	Y0	Cr-V	Y1	Cb-U	Y0
222	0x0083	0x00A3	0x007D	0x00A3	0x0083	0x00
223	0x0083	0x00A3	0x007D	0x00A3	0x0083	0x00
224	0x0083	0x00A3	0x007D	0x00A3	0x0083	0x00
225	0x0083	0x00A3	0x007D	0x00A3	0x0083	0x00
226	0x0083	0x00A2	0x007D	0x00A2	0x0083	0x00
227	0x0083	0x00A2	0x007D	0x00A2	0x0083	0x00
228	0x0083	0x00A2	0x007D	0x00A2	0x0083	0x00
229	0x0083	0x00A2	0x007D	0x00A2	0x0083	0x00
230	0x0083	0x00A2	0x007D	0x00A2	0x0083	0x00
231	0x0083	0x00A2	0x007D	0x00A2	0x0083	0x00

The Data View can be set to display either hexadecimal, or decimal values for each pixel:



Start Pixel 333 Start Line 222 Hex Dec

332 px	Cb-U	Y0	Cr-V	Y1	Cb-U	Y0	Cr-V	Y1	Cb-U
222	0x0072	0x0077	0x0068	0x0078	0x0071	0x0078	0x0068	0x0078	0x0073
223	0x0072	0x0077	0x0068	0x0077	0x0071	0x0077	0x0068	0x0077	0x0072
224	0x0072	0x0075	0x0068	0x0075	0x0071	0x0075	0x0068	0x0075	0x0072
225	0x0072	0x0074	0x0068	0x0073	0x0071	0x0073	0x0068	0x0073	0x0072
226	0x0072	0x0073	0x0066	0x0073	0x0071	0x0073	0x0066	0x0073	0x0072
227	0x0072	0x0073	0x0066	0x0073	0x0071	0x0072	0x0066	0x0072	0x0072
228	0x0072	0x0073	0x0066	0x0072	0x0071	0x0072	0x0066	0x0072	0x0072
229	0x0072	0x0072	0x0066	0x0072	0x0071	0x0072	0x0066	0x0072	0x0072



Start Pixel 333 Start Line 222 Hex Dec

332 px	Cb-U	Y0	Cr-V	Y1	Cb-U	Y0	Cr-V	Y1	Cb-U
222	0115	0119	0103	0119	0115	0120	0103	0120	0115
223	0115	0118	0104	0118	0115	0119	0104	0119	0115
224	0115	0117	0104	0117	0115	0117	0104	0117	0115
225	0115	0116	0104	0116	0115	0116	0104	0116	0115
226	0114	0117	0103	0116	0114	0116	0103	0116	0115
227	0114	0116	0103	0116	0114	0116	0103	0115	0115
228	0114	0115	0103	0115	0114	0114	0103	0114	0115
229	0114	0115	0102	0114	0114	0113	0102	0113	0115

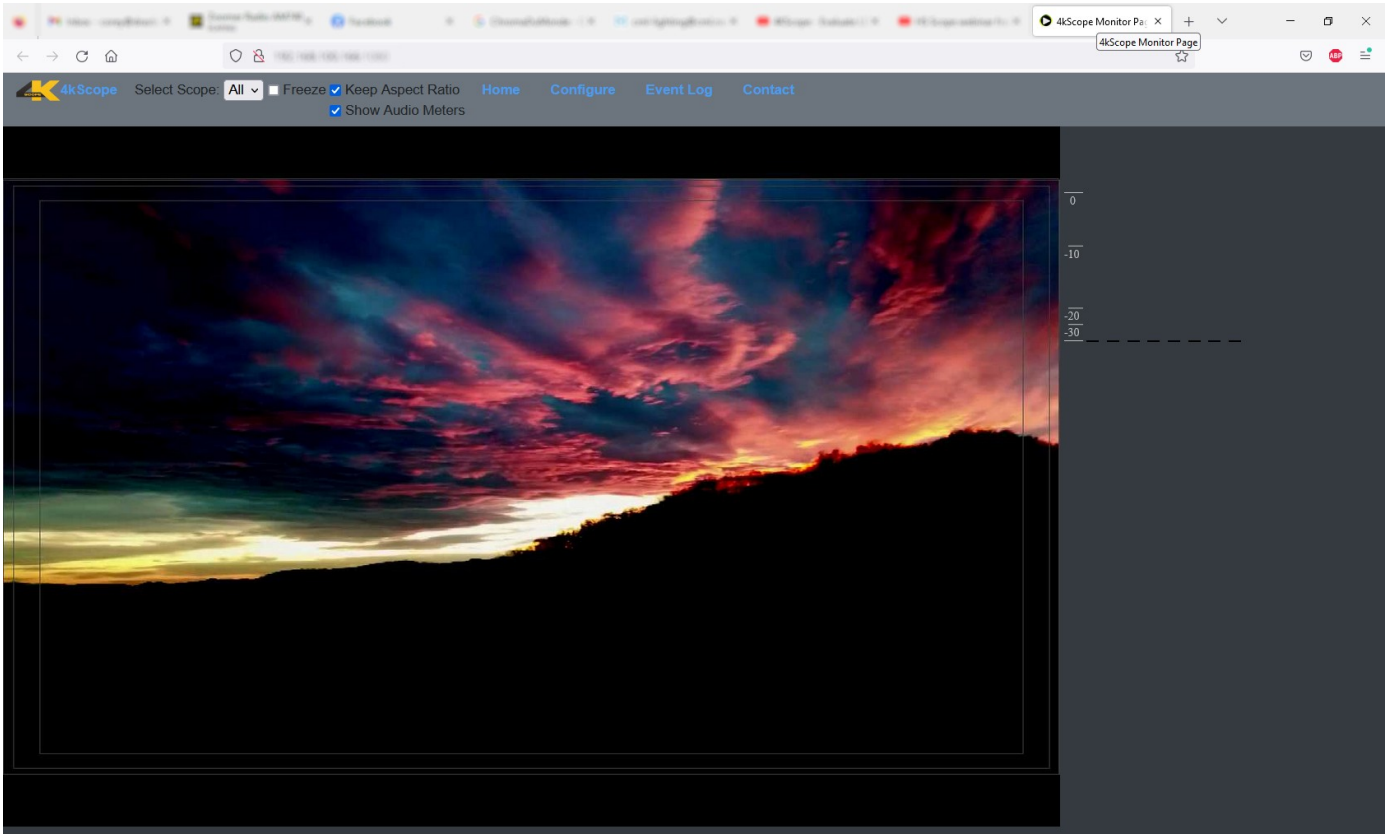
Hexadecimal values are shown above on the left, and the decimal values on the right.

Web Page

Globe button – opens up the web page for 4KScope. This feature requires UwAmp Wamp Server be installed. There is more information, including download links, here: https://www.uwamp.com/en/?page=download

4KScope Web Interface

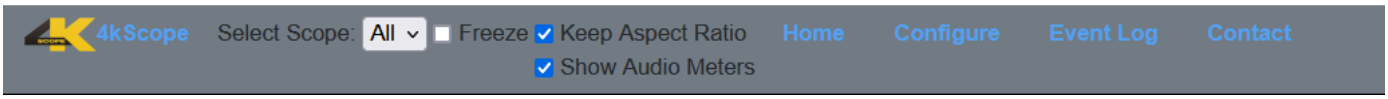
4KScope version 7 and greater software features a web interface, so the user can remotely set up the scopes and view their signal through the scopes on a web page.



The user can set:

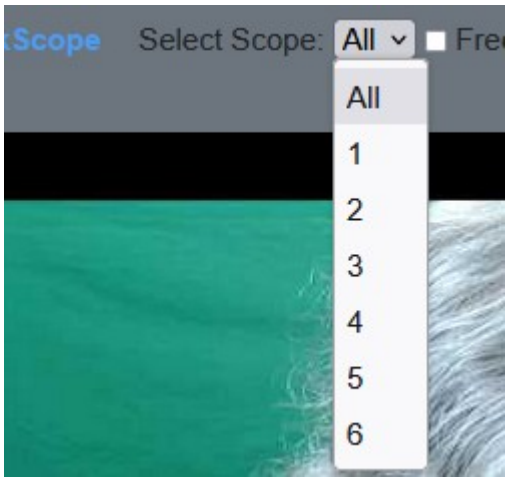
- How many scopes are displayed (1, 2, 4, or 6)
- Where each scope is placed in a multiple scope layout
- How the scope is displayed
- Which overlays are displayed

The main menu offers the following options:



4KScope Logo - displays the scopes as they have been set up.
Freeze checkbox – freezes the current frame of video for closer inspection

Select Scope



Use the pulldown menu to only view one of the scopes within the current layout. It is similar to the 'solo' option in many audio software products. Selecting a scope using this pulldown menu closes all the other scopes and enlarges the selected scope for closer inspection.

In a single scope layout, this control will have no effect.

In a two scope layout, the user will be able to select either scope 1 or scope 2 to display. To return to the two scope layout, use the pulldown menu to select All.

In a four scope layout, the user will be able to select scope 1, 2, 3, or 4 to display. To return to the four scope layout, use the pulldown menu to select All.

In a six scope layout, the user will be able to select scope 1, 2, 3, 4, 5, or 6 to display. To return to the six scope layout, use the pulldown menu to select All.

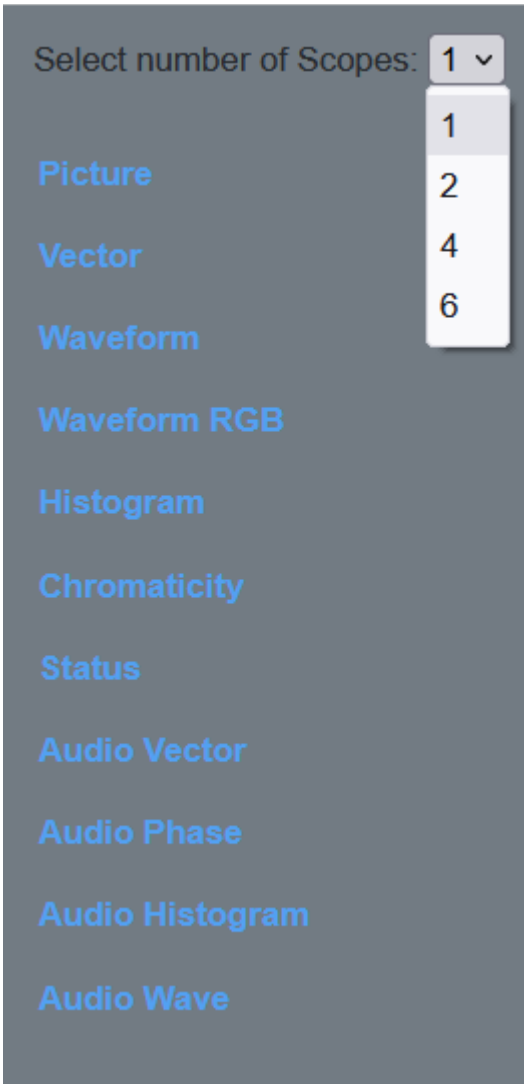
Keep Aspect Ratio checkbox – select to constrain any image scaling to maintain the aspect ratio of the input signal
Show Audio Meters checkbox – select to display audio levels in the audio meters to the right of the scopes
Home – displays the scopes as they have been set up.

Configure

Pressing the Configure button opens the configuration page, where the user can set up how many scopes are displayed, and how they are displayed.

At the top there is a pulldown menu to select which layout to use. The options are:

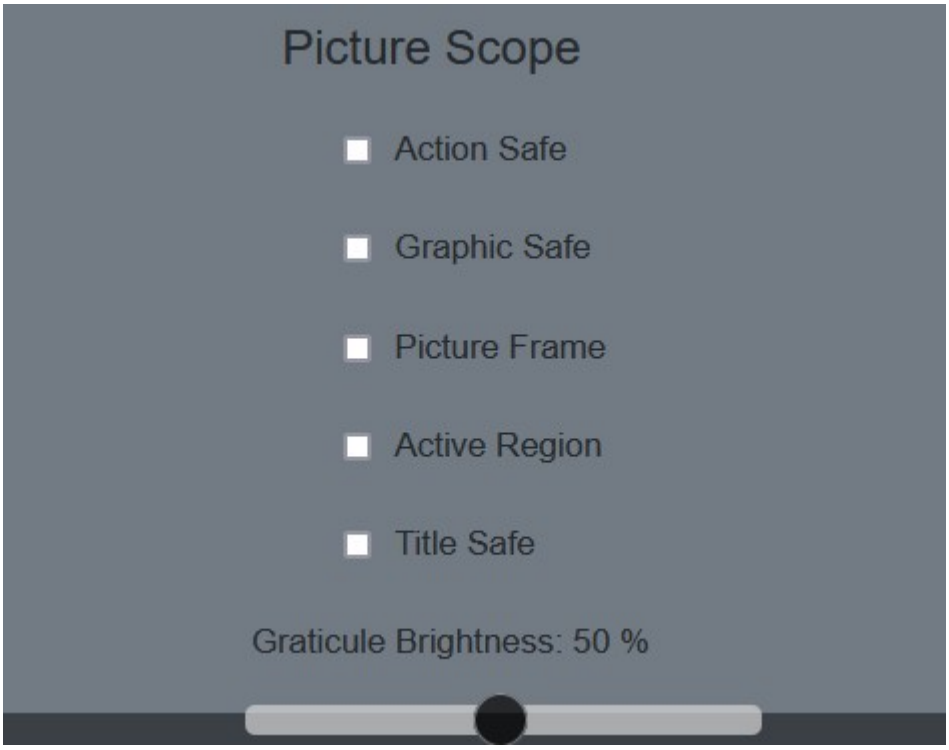
1 - Use a single scope
2 – Two scopes, side by side
4 – 4 scopes in a 2 x 2 grid
6 – Two rows of three scopes



Below the layout selector there are buttons to select between the available scopes for display. Currently this selection includes Picture, Vectorscope, Waveform YCbCr, Waveform RGB, Histogram, Chromaticity, Status, Audio Vector, Audio Phase, Audio Histogram, and Audio Wave.

Picture

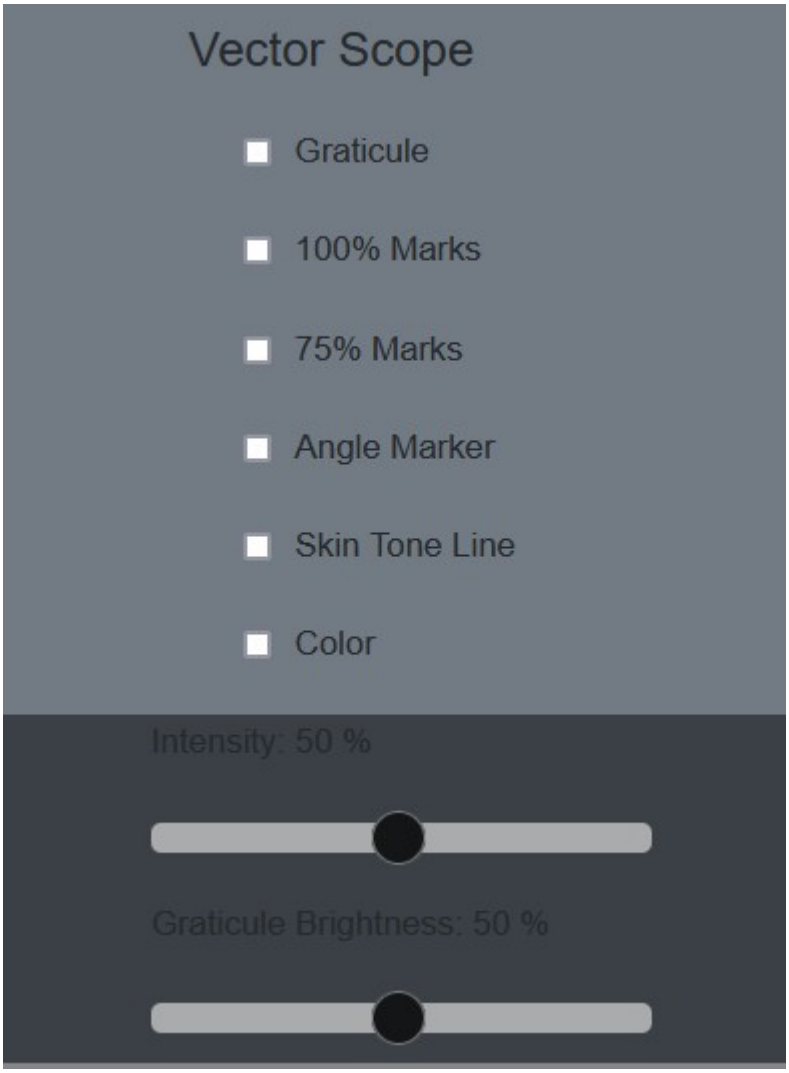
Setting a scope to display the Picture view provides the following options:



Action Safe checkbox – select to display the Action Safe rectangle over the picture
Graphic Safe checkbox – select to display the Graphic Safe rectangle over the picture
Picture Frame checkbox – select to display the Picture Frame rectangle over the picture
Active Region checkbox – select to display the Active Region rectangle over the picture
Title Safe checkbox – select to display the Title Safe rectangle over the picture
Graticule Brightness slider – adjust the brightness of the graticule overlay by using the slider. Pull to the left makes the graticule dimmer, and pull to the right makes it brighter.

Vector

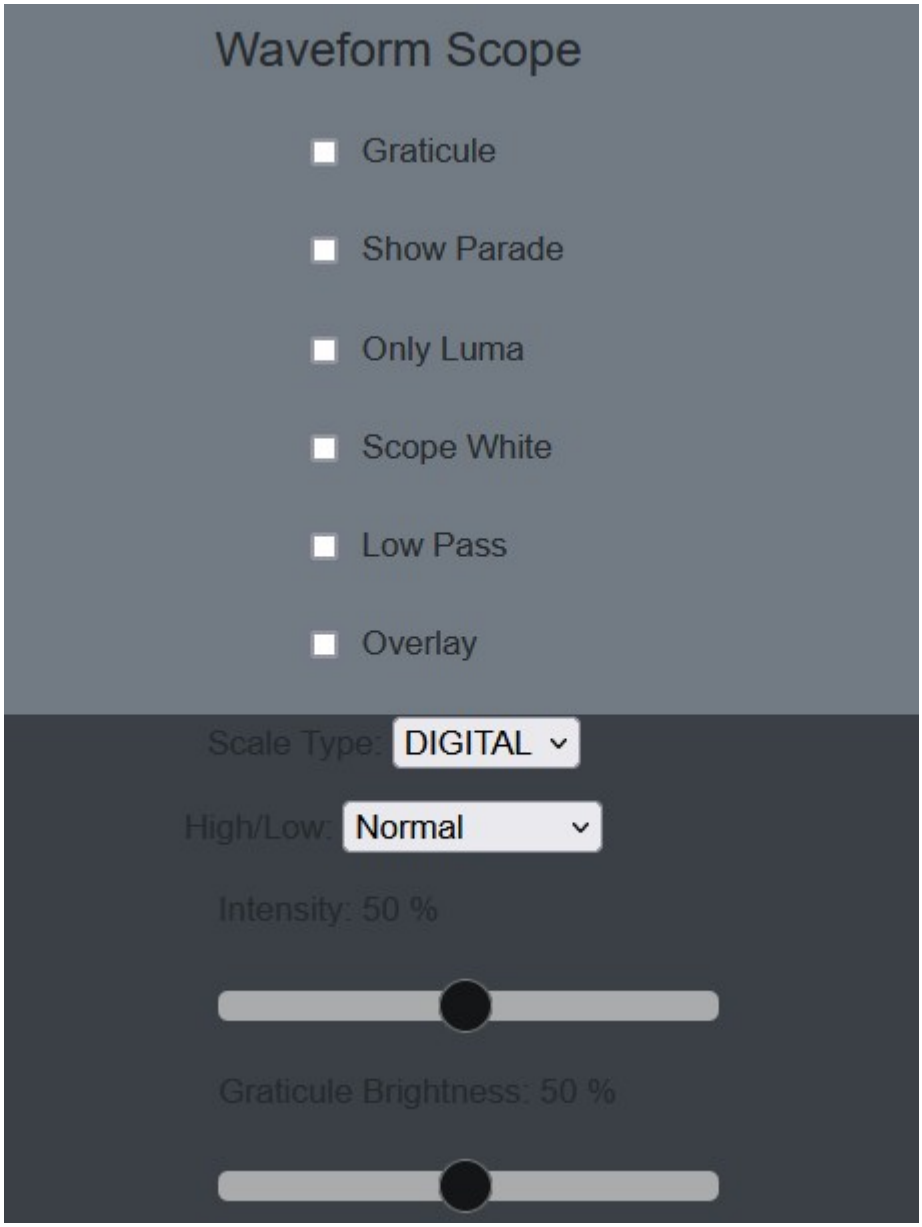
Setting a scope to display the Vector view provides the following options:



Graticule checkbox – select to display the graticule over the vectorscope
100% Marks checkbox – select to display the 100% Marks
75% Marks checkbox – select to display the 75% Marks
Angle Marker checkbox – select to display the Angle Marker
Skin Tone Line checkbox – select to display the Skin Tone Line
Color checkbox – select to display the signal in color
Intensity slider – use the slider to adjust how intense the vector display will be. Pull to the left reduces the intensity, and pull to the right makes it more intense.
Graticule Brightness slider – adjust the brightness of the graticule overlay by using the slider. Pull to the left makes the graticule dimmer, and pull to the right makes it brighter.

Waveform YCbCr

Setting a scope to display the Waveform YCbCr view provides the following options:



Graticule checkbox – select to display the graticule over the vectorscope
Show Parade checkbox – select to display the Y, Cb, and Cr from left to right. When not selected, the display is stacked top to bottom.
Only Luma checkbox – select to display only the luminance in the signal
Scope White checkbox – select to display the signal in white
Low Pass checkbox – select to smooth the scope with a 1/3 filter to remove single pixel anomalies.
Overlay checkbox – select to display the overlay, or composite scope (only available in HDRScope and Network Video Analyzer)
Scale Type pulldown – select between available scale types. Choices include Digital, MV, and IRE.
High/Low pulldown – displays only the highs and lows of the signal so the user can more closely

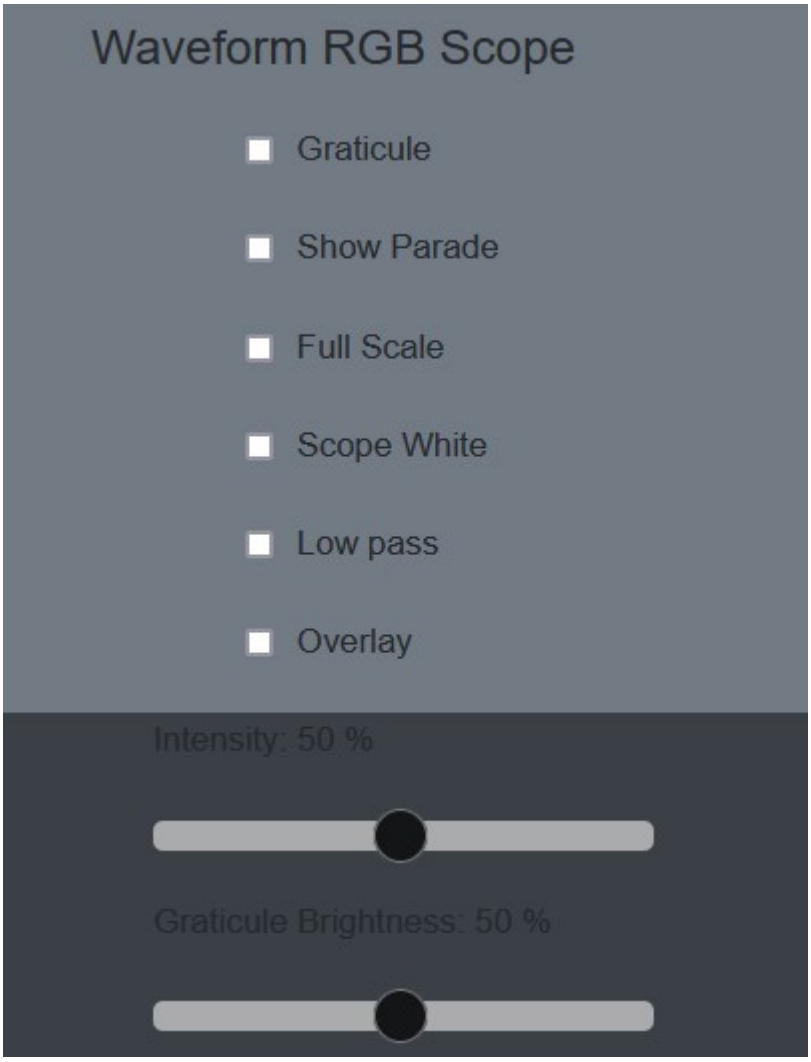
examine whites and blacks. 2X and 3x zooms are available.

Intensity slider – use the slider to adjust how intense the vector display will be. Pull to the left reduces the intensity, and pull to the right makes it more intense.

Graticule Brightness slider – adjust the brightness of the graticule overlay by using the slider. Pull to the left makes the graticule dimmer, and pull to the right makes it brighter.

Waveform RGB

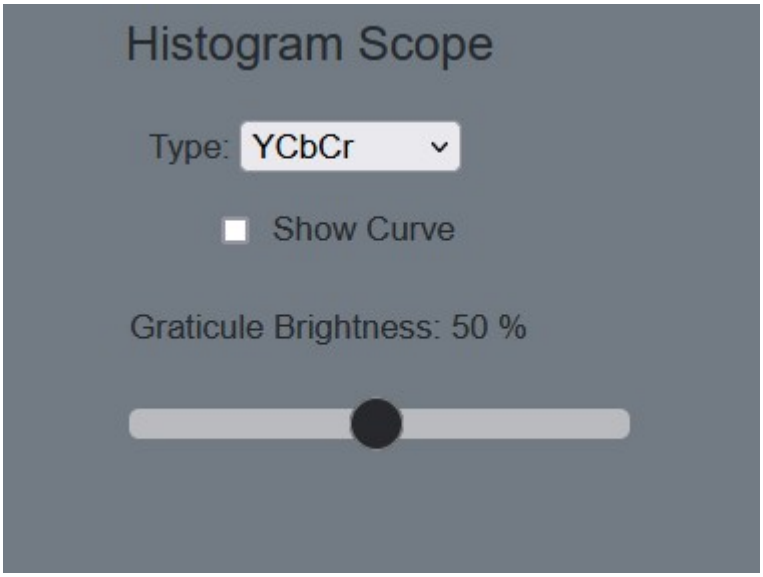
Setting a scope to display the Waveform RGB view provides the following options:



Graticule checkbox – select to display the graticule over the vectorscope
Show Parade checkbox – select to display the R, G, and B from left to right. When not selected, the display is stacked top to bottom.
Full Scale checkbox – when selected, use the full luminance range. RGB, by default, will be sRGB. The range of each color will be from 16 to 240 (in 8 bit), so the scale will place white at 240 and black at 16 in normal scale. If in full scale, white will be placed at 255 and black at 0.
Scope White checkbox – select to display the signal in white
Low Pass checkbox – select to smooth the scope with a 1/3 filter to remove single pixel anomalies.
Overlay checkbox – select to display the overlay, or composite scope (only available in HDRScope and Network Video Analyzer)
Intensity slider – use the slider to adjust how intense the vector display will be. Pull to the left reduces the intensity, and pull to the right makes it more intense.
Graticule Brightness slider – adjust the brightness of the graticule overlay by using the slider. Pull to the left makes the graticule dimmer, and pull to the right makes it brighter.

Histogram

Setting a scope to display the Histogram view provides the following options:



Type pulldown – select between available histogram types.

There are five Histograms available in the histogram panel: the YCbCr Histogram, RGB Histogram, HSV Histogram, Luma Histogram, and the H/S Scope.

Histogram YCbCr

With the YCbCr Histogram selected in the pulldown menu, the following controls are available:

Show Curve checkbox – only used in the H/S Scope
Graticule Brightness slider – adjust the brightness of the graticule overlay by using the slider. Pull to the left makes the graticule dimmer, and pull to the right makes it brighter.

Histogram RGB

With the RGB Histogram selected in the pulldown menu, the following controls are available:

Show Curve checkbox – only used in the H/S Scope
Graticule Brightness slider – adjust the brightness of the graticule overlay by using the slider. Pull to the left makes the graticule dimmer, and pull to the right makes it brighter.

Histogram HSV

With the HSV Histogram selected in the pulldown menu, the following controls are available:

Show Curve checkbox – only used in the H/S Scope
Graticule Brightness slider – adjust the brightness of the graticule overlay by using the slider. Pull to the left makes the graticule dimmer, and pull to the right makes it brighter.

Histogram Luma

With the Luma Histogram selected in the pulldown menu, the following controls are available:

Show Curve checkbox – only used in the H/S Scope
Graticule Brightness slider – adjust the brightness of the graticule overlay by using the slider. Pull to the left makes the graticule dimmer, and pull to the right makes it brighter.

Histogram H/S Scope

With the H/S Scope Histogram selected in the pulldown menu, the following controls are available:

Show Curve checkbox – select to show the curve
Graticule Brightness slider – adjust the brightness of the graticule overlay by using the slider. Pull to the left makes the graticule dimmer, and pull to the right makes it brighter.

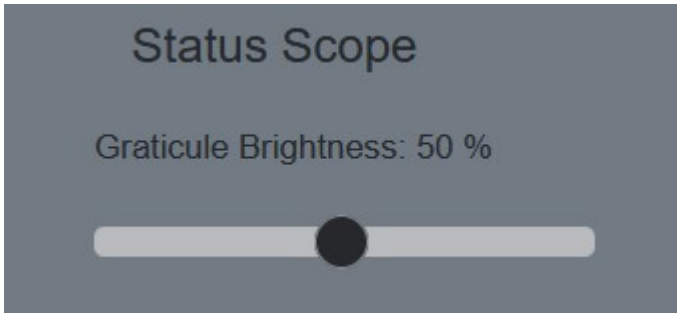
Chromaticity

Setting a scope to display the Chromaticity view provides the following options:

Graticule checkbox – select to display the graticule over the chromaticity scope
Triangle 601 checkbox – select to display the 601 triangle
Triangle 709 checkbox – select to display the 709 triangle
Triangle 2020 checkbox – select to display the 2020 triangle
Triangle P3 checkbox – select to display the P3 triangle
Invert checkbox – select to display the signal in color, and the chromaticity triangle in black
Black checkbox – select to display the signal in black
Graticule Brightness slider – adjust the brightness of the graticule overlay by using the slider. Pull to the left makes the graticule dimmer, and pull to the right makes it brighter.

Status

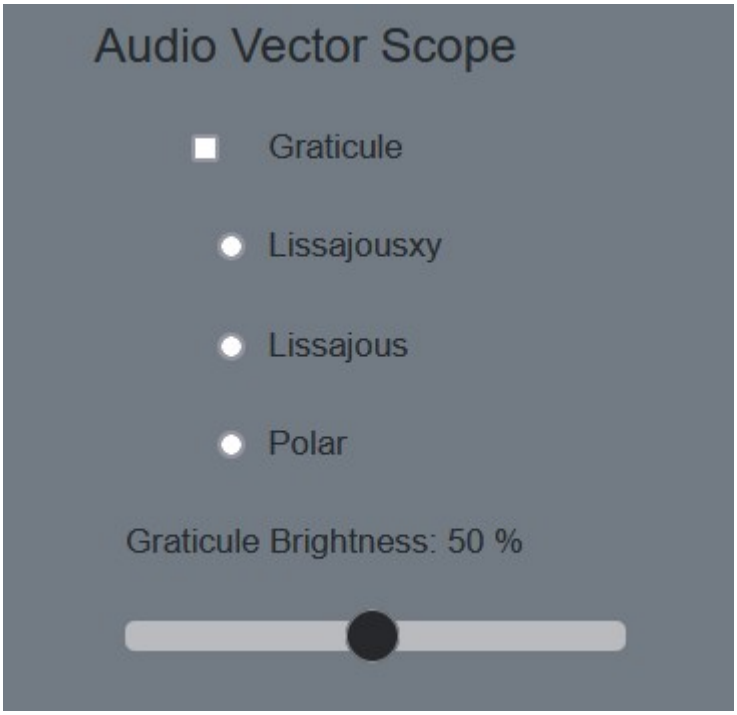
Setting a scope to display the Status view provides the following options:



Graticule Brightness slider – adjust the brightness of the graticule overlay by using the slider. Pull to the left makes the graticule dimmer, and pull to the right makes it brighter.

Audio Vector Scope

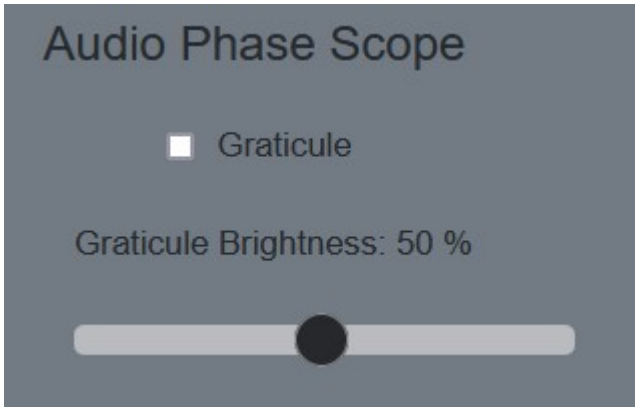
Setting a scope to display the Audio Vector Scope view provides the following options:



Graticule checkbox – select to display the graticule over the audio vectorscope
Lissajousxy checkbox – select to set the audio vectorscope to Lissajousxy mode
Lissajous checkbox – select to set the audio vectorscope to Lissajous mode
Polar checkbox – select to set the audio vectorscope to Polar mode
Graticule Brightness slider – adjust the brightness of the graticule overlay by using the slider. Pull to the left makes the graticule dimmer, and pull to the right makes it brighter.

Audio Phase Scope

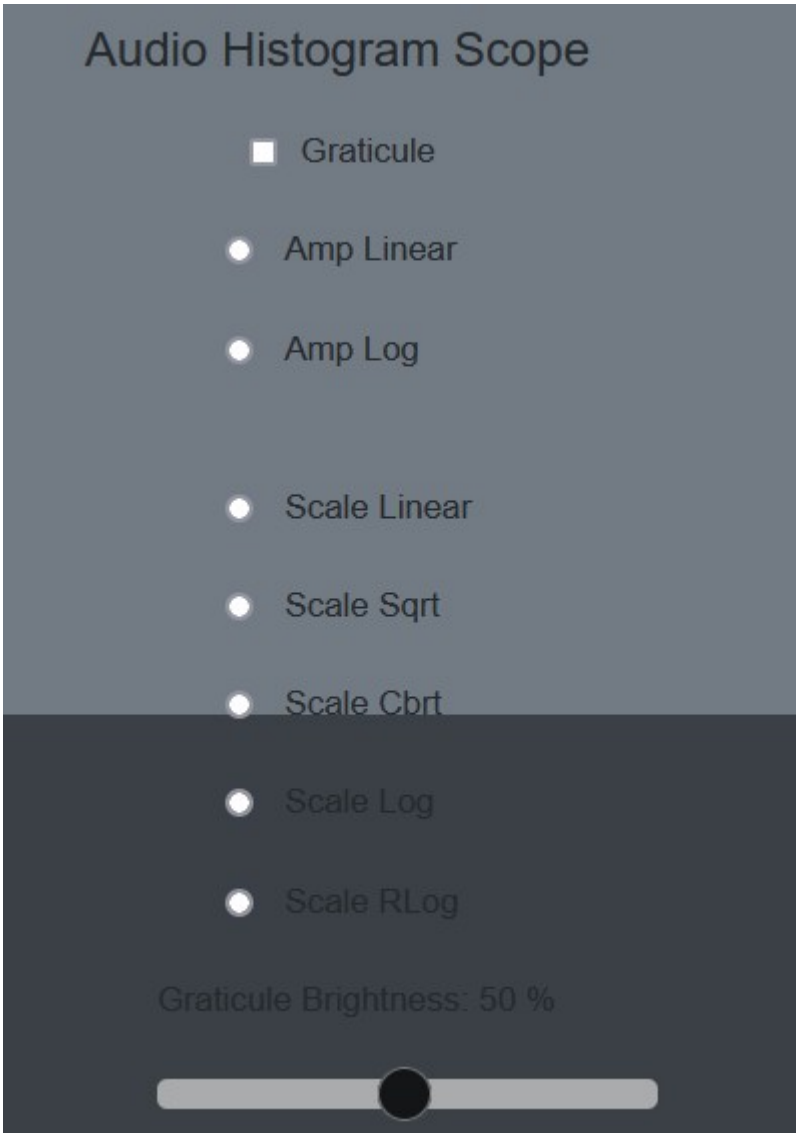
Setting a scope to display the Audio Phase Scope view provides the following options:



Graticule checkbox – select to display the graticule over the audio phase scope
Graticule Brightness slider – adjust the brightness of the graticule overlay by using the slider. Pull to the left makes the graticule dimmer, and pull to the right makes it brighter.

Audio Histogram Scope

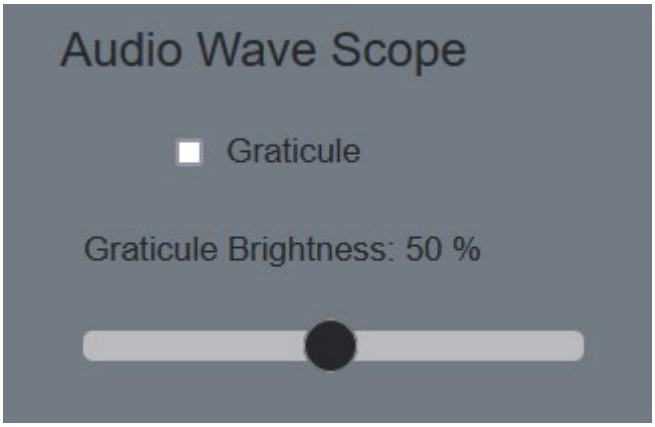
Setting a scope to display the Audio Histogram Scope view provides the following options:



Graticule checkbox – select to display the graticule over the audio histogram scope
Amp linear checkbox – select to set the display to Amp Linear
Amp Log checkbox – select to set the display to Amp Logarithmic
Scale Linear checkbox – select to set the display to Scale Linear
Scale Sqrt checkbox – select to set the display to Scale Square Root
Scale Cbrt checkbox – select to set the display to Square Cube Root
Scale Log checkbox – select to set the display to Scale Logarithmic
Scale RLog checkbox – select to set the display to Scale R Logarithmic
Graticule Brightness slider – adjust the brightness of the graticule overlay by using the slider. Pull to the left makes the graticule dimmer, and pull to the right makes it brighter.

Audio Wave Scope

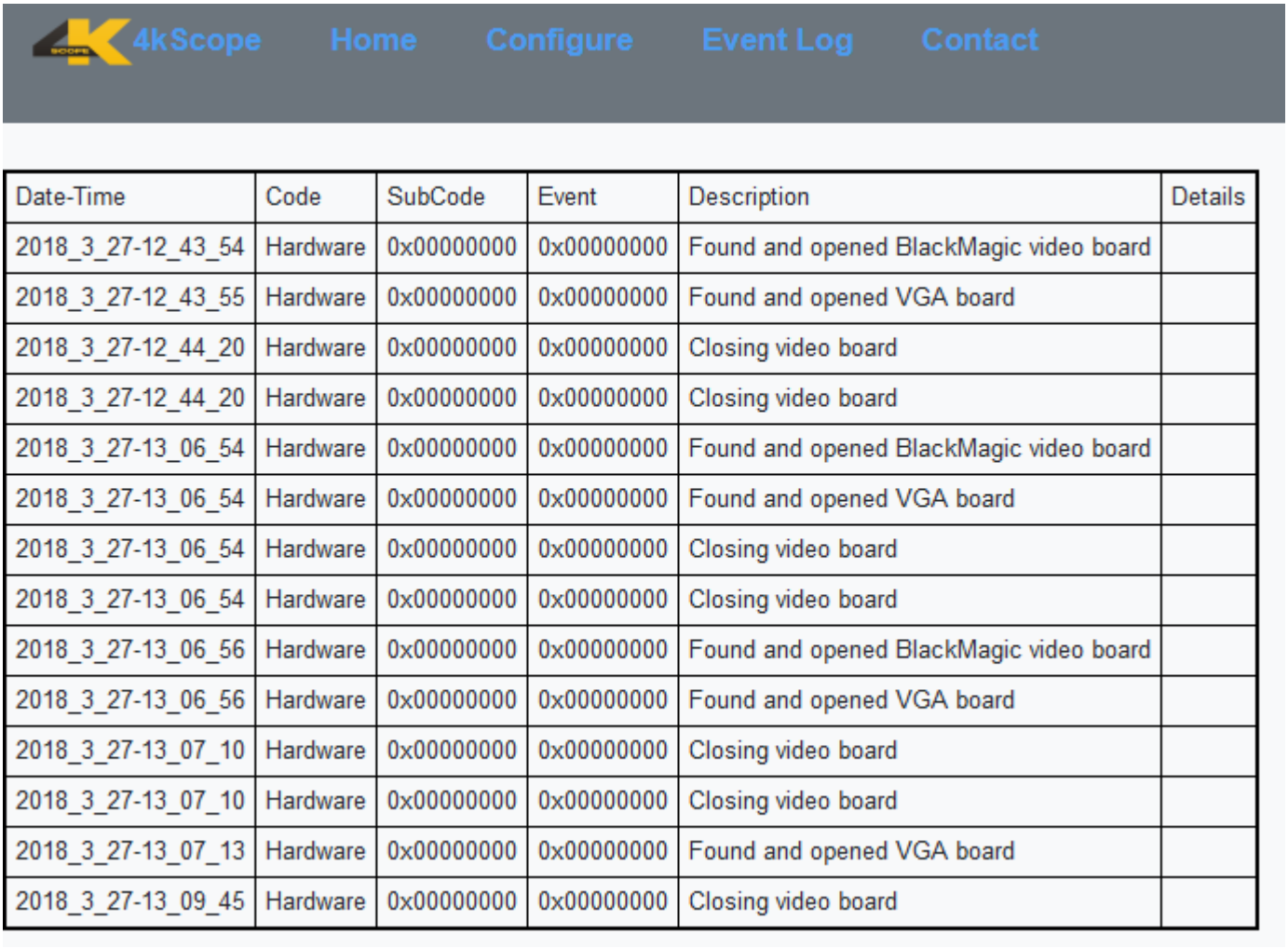
Setting a scope to display the Audio Wave Scope view provides the following options:



Graticule checkbox – select to display the graticule over the audio phase scope
Graticule Brightness slider – adjust the brightness of the graticule overlay by using the slider. Pull to the left makes the graticule dimmer, and pull to the right makes it brighter.

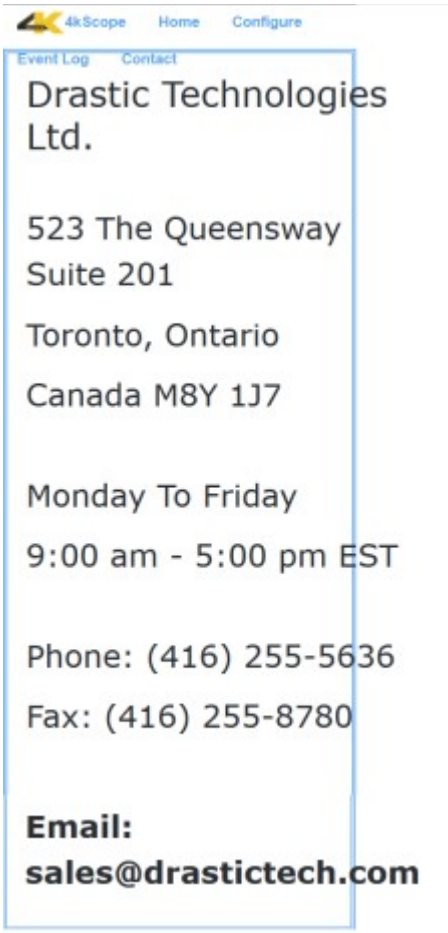
Web Event Log

Pressing the Event Log button opens a page which shows the Event Log, for remote troubleshooting



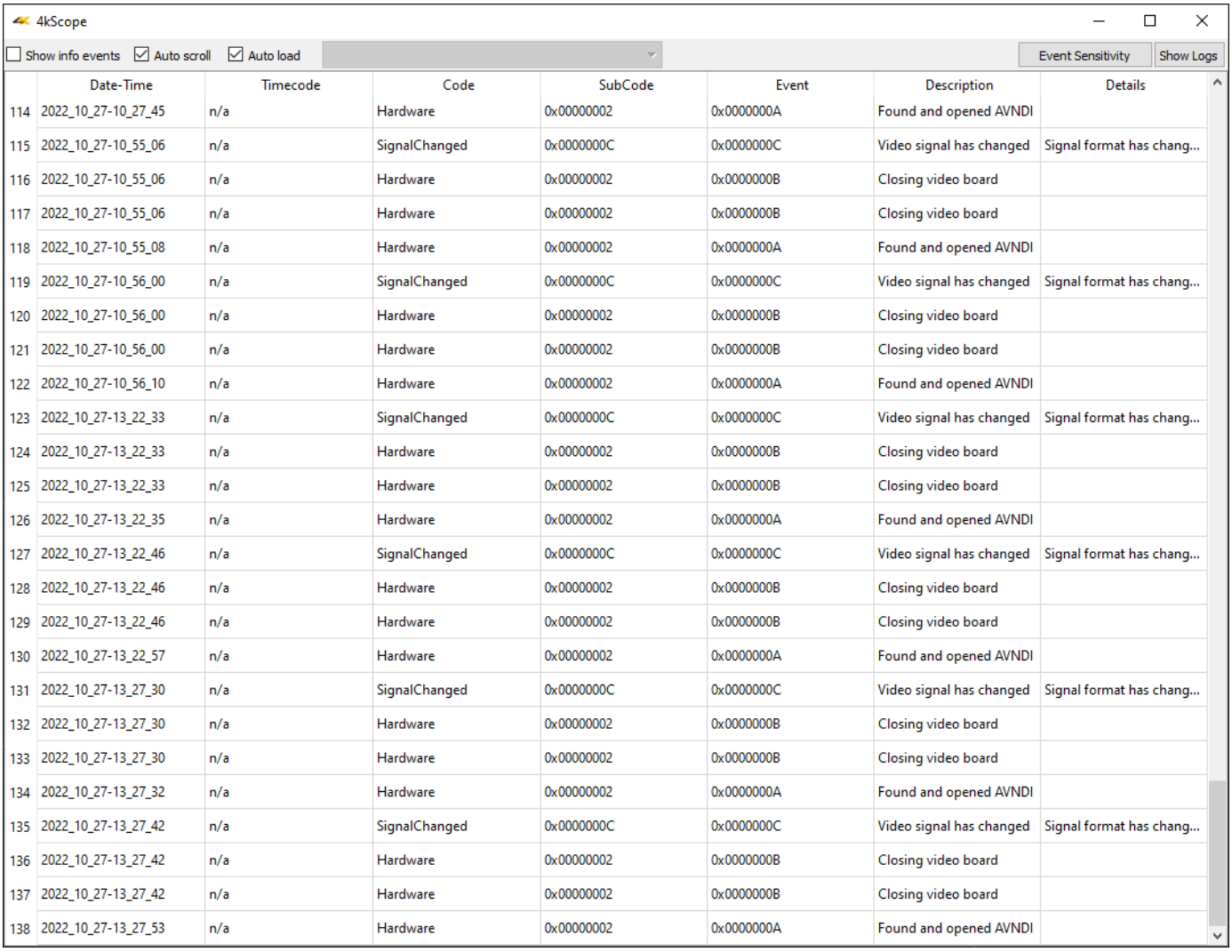
Date-Time	Code	SubCode	Event	Description	Details
2018_3_27-12_43_54	Hardware	0x00000000	0x00000000	Found and opened BlackMagic video board	
2018_3_27-12_43_55	Hardware	0x00000000	0x00000000	Found and opened VGA board	
2018_3_27-12_44_20	Hardware	0x00000000	0x00000000	Closing video board	
2018_3_27-12_44_20	Hardware	0x00000000	0x00000000	Closing video board	
2018_3_27-13_06_54	Hardware	0x00000000	0x00000000	Found and opened BlackMagic video board	
2018_3_27-13_06_54	Hardware	0x00000000	0x00000000	Found and opened VGA board	
2018_3_27-13_06_54	Hardware	0x00000000	0x00000000	Closing video board	
2018_3_27-13_06_54	Hardware	0x00000000	0x00000000	Closing video board	
2018_3_27-13_06_56	Hardware	0x00000000	0x00000000	Found and opened BlackMagic video board	
2018_3_27-13_06_56	Hardware	0x00000000	0x00000000	Found and opened VGA board	
2018_3_27-13_07_10	Hardware	0x00000000	0x00000000	Closing video board	
2018_3_27-13_07_10	Hardware	0x00000000	0x00000000	Closing video board	
2018_3_27-13_07_13	Hardware	0x00000000	0x00000000	Found and opened VGA board	
2018_3_27-13_09_45	Hardware	0x00000000	0x00000000	Closing video board	

Contact - displays contact information for Drastic Technologies



Event Log

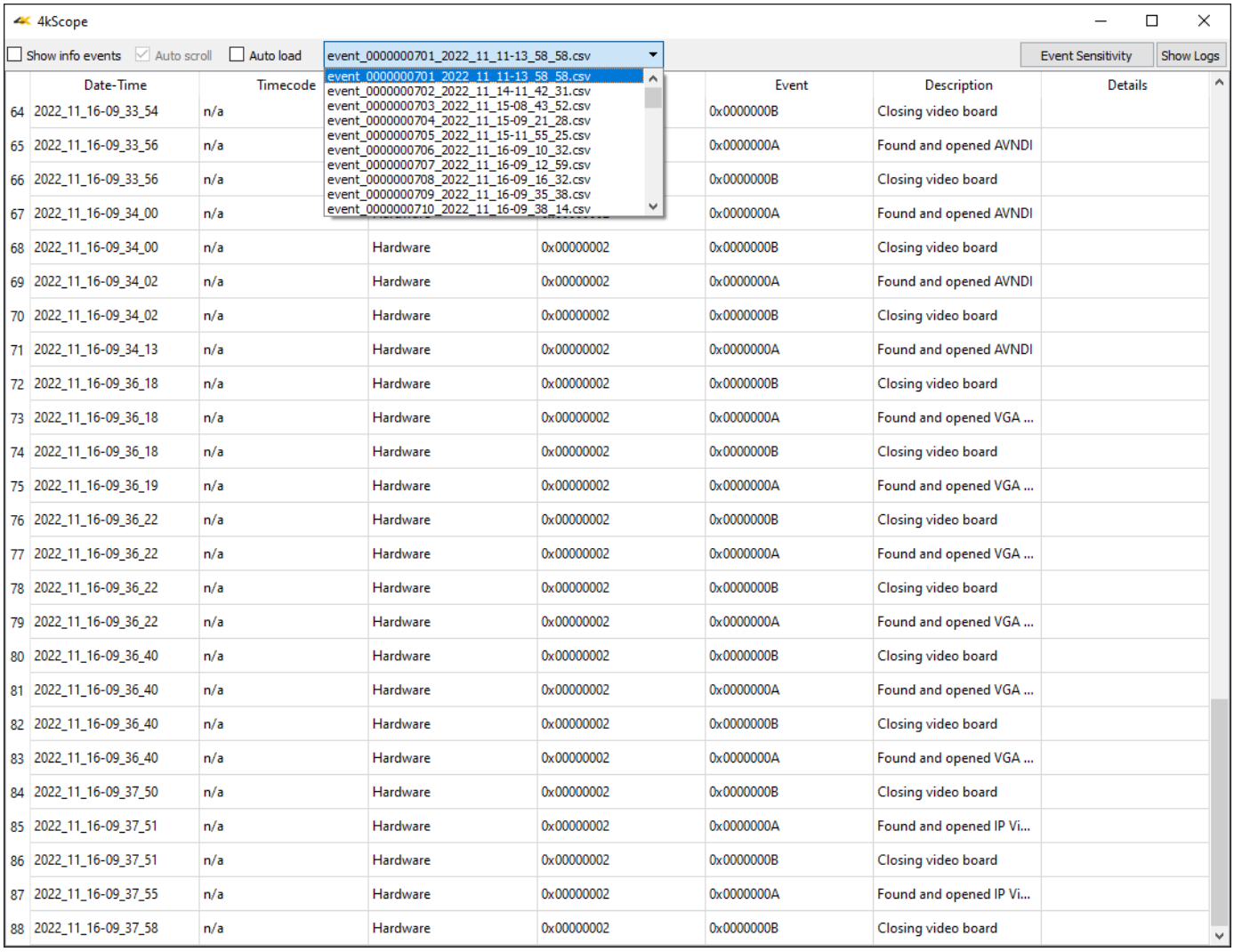
Log button – opens up the Event Log, which allows the user to review specific types of events, useful for troubleshooting errors or other issues.



	Date-Time	Timecode	Code	SubCode	Event	Description	Details
114	2022_10_27-10_27_45	n/a	Hardware	0x00000002	0x0000000A	Found and opened AVNDI	
115	2022_10_27-10_55_06	n/a	SignalChanged	0x0000000C	0x0000000C	Video signal has changed	Signal format has chang...
116	2022_10_27-10_55_06	n/a	Hardware	0x00000002	0x0000000B	Closing video board	
117	2022_10_27-10_55_06	n/a	Hardware	0x00000002	0x0000000B	Closing video board	
118	2022_10_27-10_55_08	n/a	Hardware	0x00000002	0x0000000A	Found and opened AVNDI	
119	2022_10_27-10_56_00	n/a	SignalChanged	0x0000000C	0x0000000C	Video signal has changed	Signal format has chang...
120	2022_10_27-10_56_00	n/a	Hardware	0x00000002	0x0000000B	Closing video board	
121	2022_10_27-10_56_00	n/a	Hardware	0x00000002	0x0000000B	Closing video board	
122	2022_10_27-10_56_10	n/a	Hardware	0x00000002	0x0000000A	Found and opened AVNDI	
123	2022_10_27-13_22_33	n/a	SignalChanged	0x0000000C	0x0000000C	Video signal has changed	Signal format has chang...
124	2022_10_27-13_22_33	n/a	Hardware	0x00000002	0x0000000B	Closing video board	
125	2022_10_27-13_22_33	n/a	Hardware	0x00000002	0x0000000B	Closing video board	
126	2022_10_27-13_22_35	n/a	Hardware	0x00000002	0x0000000A	Found and opened AVNDI	
127	2022_10_27-13_22_46	n/a	SignalChanged	0x0000000C	0x0000000C	Video signal has changed	Signal format has chang...
128	2022_10_27-13_22_46	n/a	Hardware	0x00000002	0x0000000B	Closing video board	
129	2022_10_27-13_22_46	n/a	Hardware	0x00000002	0x0000000B	Closing video board	
130	2022_10_27-13_22_57	n/a	Hardware	0x00000002	0x0000000A	Found and opened AVNDI	
131	2022_10_27-13_27_30	n/a	SignalChanged	0x0000000C	0x0000000C	Video signal has changed	Signal format has chang...
132	2022_10_27-13_27_30	n/a	Hardware	0x00000002	0x0000000B	Closing video board	
133	2022_10_27-13_27_30	n/a	Hardware	0x00000002	0x0000000B	Closing video board	
134	2022_10_27-13_27_32	n/a	Hardware	0x00000002	0x0000000A	Found and opened AVNDI	
135	2022_10_27-13_27_42	n/a	SignalChanged	0x0000000C	0x0000000C	Video signal has changed	Signal format has chang...
136	2022_10_27-13_27_42	n/a	Hardware	0x00000002	0x0000000B	Closing video board	
137	2022_10_27-13_27_42	n/a	Hardware	0x00000002	0x0000000B	Closing video board	
138	2022_10_27-13_27_53	n/a	Hardware	0x00000002	0x0000000A	Found and opened AVNDI	

The following controls are available:

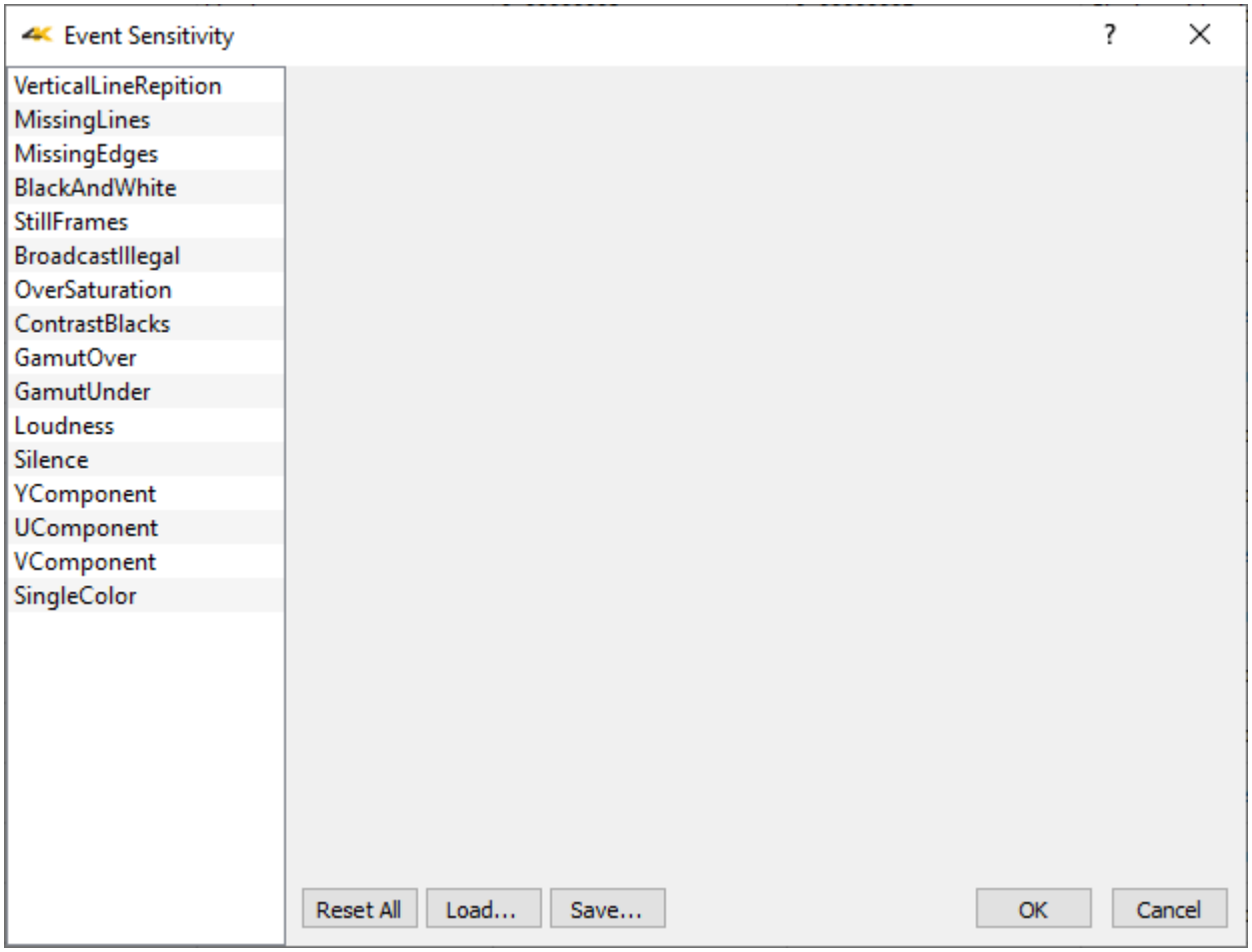
Show Info Events checkbox – click to show or hide the events listed in the log.
Auto Scroll checkbox -
Auto Load checkbox – when selected, each time the Log button is pressed, the Event Log will open with the most recent event log displayed. When this checkbox is deselected, the log pulldown menu to the right becomes active, so the user can load other saved event logs.



	Date-Time	Timecode			Event	Description	Details
64	2022_11_16-09_33_54	n/a			0x0000000B	Closing video board	
65	2022_11_16-09_33_56	n/a			0x0000000A	Found and opened AVNDI	
66	2022_11_16-09_33_56	n/a			0x0000000B	Closing video board	
67	2022_11_16-09_34_00	n/a			0x0000000A	Found and opened AVNDI	
68	2022_11_16-09_34_00	n/a	Hardware	0x00000002	0x0000000B	Closing video board	
69	2022_11_16-09_34_02	n/a	Hardware	0x00000002	0x0000000A	Found and opened AVNDI	
70	2022_11_16-09_34_02	n/a	Hardware	0x00000002	0x0000000B	Closing video board	
71	2022_11_16-09_34_13	n/a	Hardware	0x00000002	0x0000000A	Found and opened AVNDI	
72	2022_11_16-09_36_18	n/a	Hardware	0x00000002	0x0000000B	Closing video board	
73	2022_11_16-09_36_18	n/a	Hardware	0x00000002	0x0000000A	Found and opened VGA ...	
74	2022_11_16-09_36_18	n/a	Hardware	0x00000002	0x0000000B	Closing video board	
75	2022_11_16-09_36_19	n/a	Hardware	0x00000002	0x0000000A	Found and opened VGA ...	
76	2022_11_16-09_36_22	n/a	Hardware	0x00000002	0x0000000B	Closing video board	
77	2022_11_16-09_36_22	n/a	Hardware	0x00000002	0x0000000A	Found and opened VGA ...	
78	2022_11_16-09_36_22	n/a	Hardware	0x00000002	0x0000000B	Closing video board	
79	2022_11_16-09_36_22	n/a	Hardware	0x00000002	0x0000000A	Found and opened VGA ...	
80	2022_11_16-09_36_40	n/a	Hardware	0x00000002	0x0000000B	Closing video board	
81	2022_11_16-09_36_40	n/a	Hardware	0x00000002	0x0000000A	Found and opened VGA ...	
82	2022_11_16-09_36_40	n/a	Hardware	0x00000002	0x0000000B	Closing video board	
83	2022_11_16-09_36_40	n/a	Hardware	0x00000002	0x0000000A	Found and opened VGA ...	
84	2022_11_16-09_37_50	n/a	Hardware	0x00000002	0x0000000B	Closing video board	
85	2022_11_16-09_37_51	n/a	Hardware	0x00000002	0x0000000A	Found and opened IP Vi...	
86	2022_11_16-09_37_51	n/a	Hardware	0x00000002	0x0000000B	Closing video board	
87	2022_11_16-09_37_55	n/a	Hardware	0x00000002	0x0000000A	Found and opened IP Vi...	
88	2022_11_16-09_37_58	n/a	Hardware	0x00000002	0x0000000B	Closing video board	

Selecting an event log from this list lets the user view less recent event logs.

Event Sensitivity button – opens the Event Sensitivity window



Each category of event can be adjusted to suit the requirements of the user's workflow. The default value is displayed, and the user can adjust a parameter by using the sliders provided.

Vertical Line Repetition – provides sliders for: Number of lines, and Frame Duration.
Missing Lines – provides sliders for: Number of lines, and Frame Duration.
Missing Edges – provides sliders for: Top, Top Maximum, Top Frame Duration, Bottom, Bottom Frame Duration, Left, Left Maximum, Left Frame Duration, Right, Right Maximum, and Right Frame Duration.
Black and White – provides sliders for: Chroma Maximum, and Frame Duration.
Still Frames – provides sliders for: Limit, Difference Maximum, PSNR Check Y, and Frame Duration.
Broadcast Illegal – provides sliders for: Broadcast Illegal, and Frame Duration.
Oversaturation – provides sliders for: Maximum, and Frame Duration.
Contrast Blacks – provides sliders for: Minimum, and Frame Duration.
Gamut Over – provides sliders for: Maximum, and Frame Duration.
Gamut Under – provides sliders for: Maximum, and Frame Duration.
Loudness – provides a slider for: LKFS
Silence – provides sliders for: Limit, and Frame Duration.
Y Component – provides sliders for: Maximum, Maximum Frame Duration, Minimum, and Minimum Frame Duration.
U Component – provides sliders for: Maximum, Maximum Frame Duration, Minimum, and Min-

imum Frame Duration.

V Component – provides sliders for: Maximum, Maximum Frame Duration, Minimum, and Minimum Frame Duration.

Single Color – provides sliders for: Black Frame Maximum, Black Frame Duration, White Frame Y Minimum, White Frame Duration, Single Color Range, Single Color Frame Duration.

Reset All – clicking Reset All returns all values to their default settings.

Load – opens a browser so you can load a saved event sensitivity file.

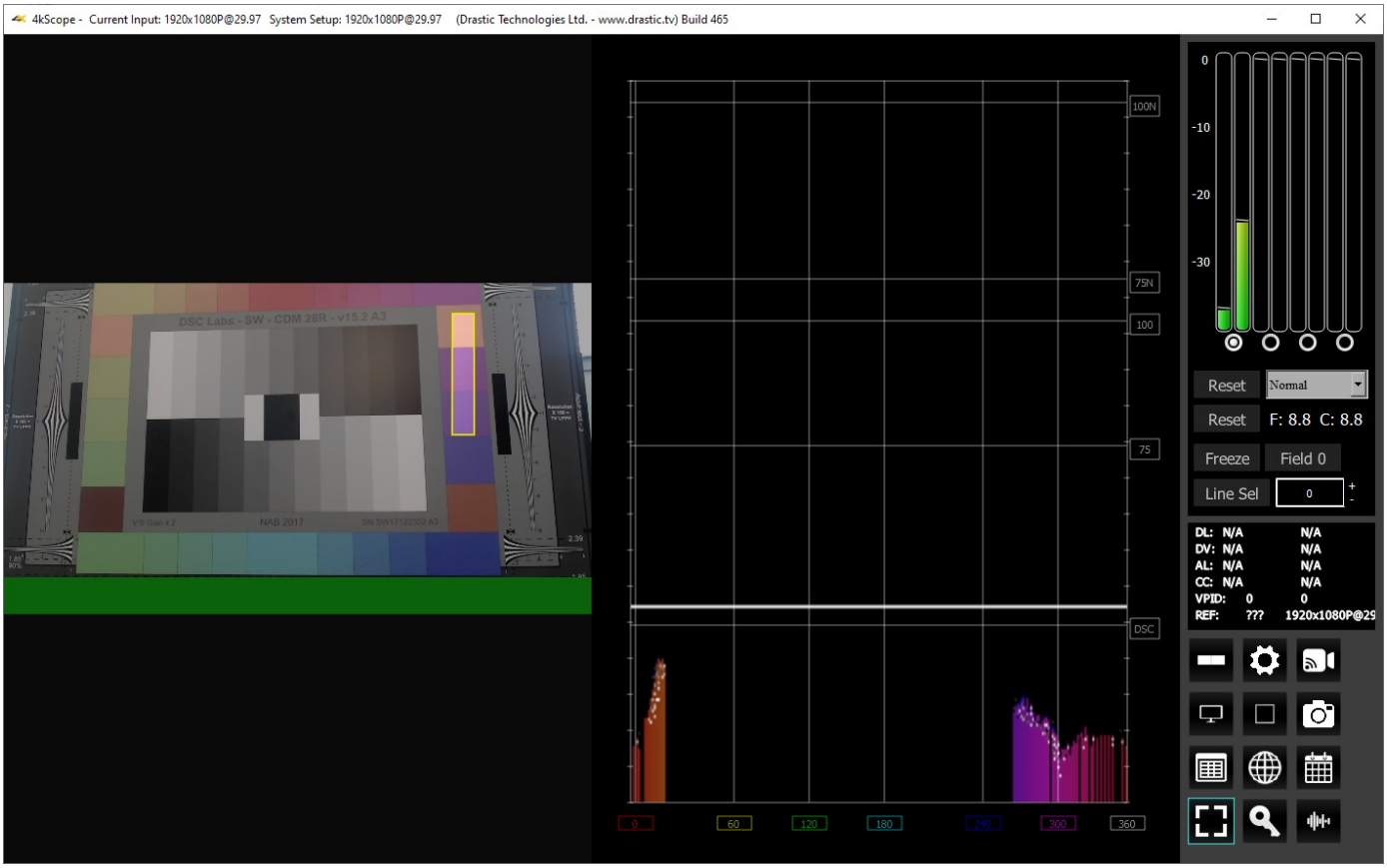
Save – opens a standard Save As window, so you can save the event sensitivity values to a file for later retrieval.

OK – press OK to enable any changes you have made, and close the Event Sensitivity window.

Cancel – press Cancel to exit the Event Sensitivity window without enabling any of the changes you have made.

Area Select

Pressing the Area Select button allows the user to select an area of the signal and view it through any of the scopes. With the button pressed (it will be outlined), click to drag a rectangle across the picture display.



The rest of the screen will be darkened, and the selected area will be highlighted. In the above example, the selected area of the color chart features orange, red, and magenta color chips. With the H/S scope selected, only these areas of the spectrum are seen by the scope.

Note: Vectorscope, Chromaticity, and Histogram displays will respect the boundaries of the rectangle you have selected.

However, the Waveform Monitors (YCbCr and RGB) only respect the top and bottom, and have no way to constrain the left and right boundaries. So, when you select an area in a Waveform monitor, it will 'see' a band across the screen bounded by the top and bottom of the rectangle you have drawn.

Advanced

Zoom and Pan

4KScope supports zooming the waveform monitors and vectorscope for a closer look at low saturation signals, or the luma elements of the waveform. The live picture can also be zoomed in or out, and panned with the mouse.

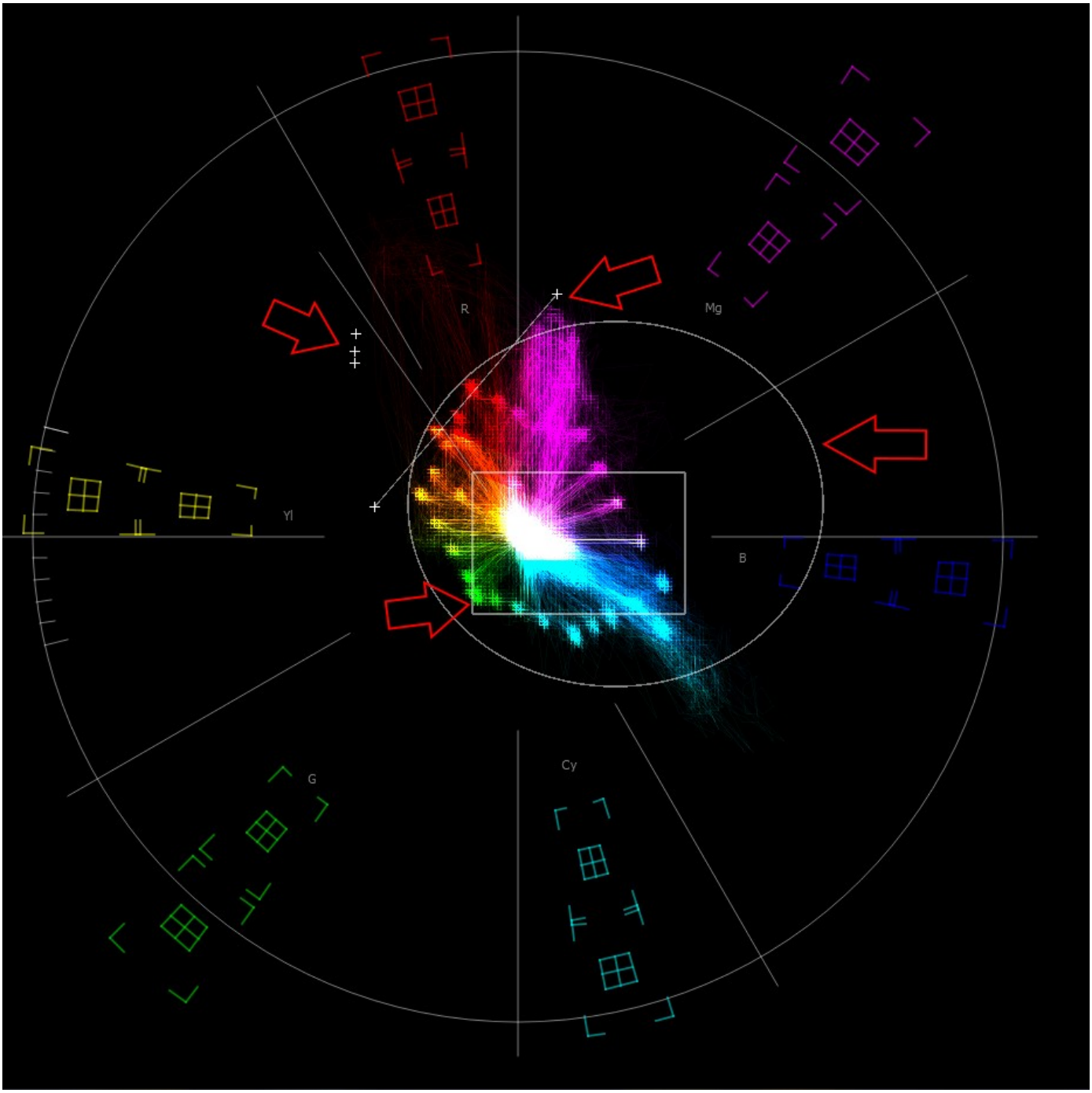
To zoom, place the mouse over the picture or scope, and roll the mouse wheel.
To pan the picture, click on it and drag it until the area of interest is visible.
To reset to normal zoom, right click the mouse.

Mouse Control

4KScope features extended mouse controls. These include:

<MouseWheel> - zoom in and out symmetrical
<MouseWheel><Alt> - zoom X axis
<MouseWheel><Ctrl> - zoom Y axis
<RightClick> - reset zoom to view all
<LeftClick>Drag - pan and scan the video image in the app
<MiddleClick> - zoom 1:1
<DoubleLeftClick> - enter and exit full screen mode
<T> - enable or disable time code display in full screen

Making Marks/Guides (cross, line and box)



<SHIFT><LeftClick> - Make a point/cross
<SHIFT><ALT><LeftClick> - Undo last
<SHIFT><CTRL><LeftClick> - Drag to make a line
<SHIFT><CTRL><ALT><LeftClick> - Drag to make a box
<CTRL><ALT><LeftClick> - Drag to make an ellipse
<CTRL><ALT><LeftClick> - Drag to make a circle
<SHIFT><RightClick> - Clear all markers/guides

Setup

Install the Software

Install **4KScope** software on the system. Regardless of the delivery method, the software will be available at some level as an (executable) installable file. Double-click on the file, or right click and select **Open** from the context menu. Follow the prompts to set where the software should be installed and make other installation-specific decisions.

To take full advantage of the hardware based features of **4KScope**, the system should contain one of the supported AJA, Blackmagic, Matrox or Bluefish444 boards. There are also a number of low cost alternatives for various SD and HD workflows. The board's manufacturers will have the most up to date information for system specifications and recommended drivers.

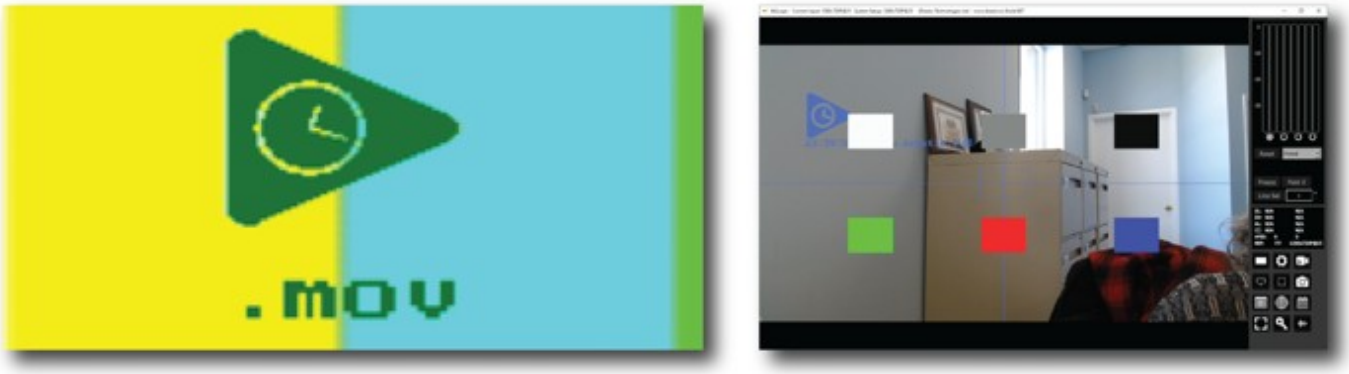
- Bluefish444: Epoch Supernova, Epoch Neutron, KRONOS
- AJA: KONA LHe/plus, KONA LHi, KONA 3G, KONA 4, KONA IP, KONA 5, KONA HDMI, Io-XT, Io-4K, OEM2K, Corvid Series, U-TAP
- Blackmagic (version 11/12 drivers required): UltraStudio, DeckLink, Intensity Pro, Intensity, Mini Recorder, UltraScope, HyperDeck, Ursa, BMPCC
- NewTek: NDI®
- Inogeni: 4K, 3G, DVI, VGA/CVBS
- Magewell: HDMI and SDI USB-3 devices
- Logitech: HDMI Screen Share
- Elgato: Game device capture devices
- Mokose: HDMI/SDI USB-3
- Epiphan: AV.io HDMI/SDI/4K
- Digitnow: HDMI USB Capture
- Rybozen: HDMI USB Capture
- Microsoft: USB Cameras
- UVC: Most UVC (USB Video Class) compliant video devices

There are versions of 4KScope for Windows, Linux, and macOS.

License the Software

How Do I Remove the Watermarks?

If you run Drastic software without a license, many of the features will be unavailable. Also, there will be watermarks you cannot remove (image below), 10 second media duration, length of run limitations, no hardware support, nag screen, auto-shutoff, and other significant limitations. To remove these limitations, you will need a valid license.



Sample watermarks

In order to license 4KScope, open 4KScope and navigate to the Settings ("Gear" icon at the bottom right of the application). Next click on the "License" button at the bottom of the Settings menu box and then follow the steps at the following location: http://license.drastictech.com/

Run the Software

Run the software. If the default installation path is used, you can open it at: **Start|Programs|Drastic 4KScope|4KScope**. The software will then need to be set up.

Setup

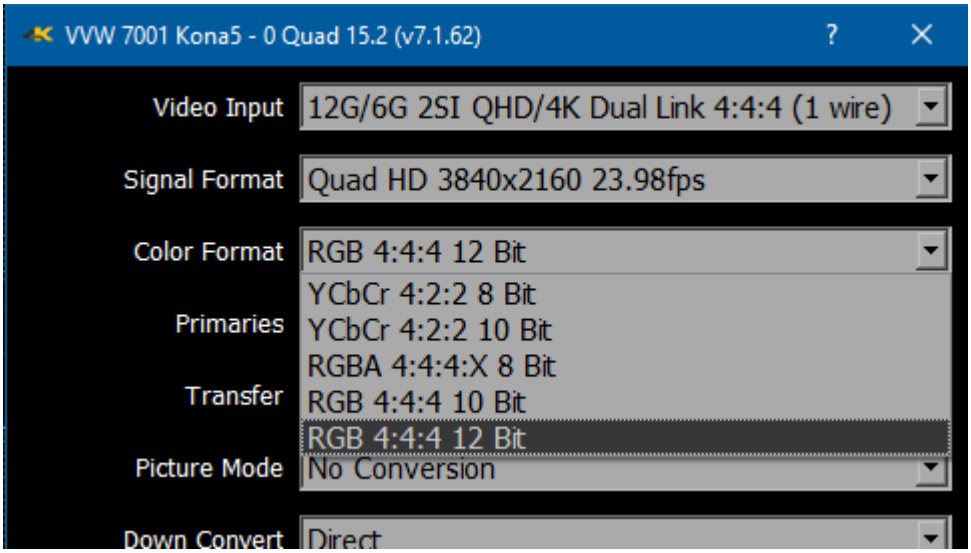
Confirm that the signal you wish to monitor is connected to the correct input(s) of the video board. Click on the **Setup** button to confirm or adjust any settings for the type of signal format being used. Once the system is correctly set up, pressing the **Done** button closes the **Setup** window.

Color Space and HDR/HLG in 4KScope

4KScope supports 8, 10, and 12 bit color in both YCbCr 4:2:2 and RGB 4:4:4 modes. Correct measurement of signals require the correct setup.

Input Color - YCbCr (YUV) and RGB

Once the signal format is set, the next most important is the overall color format. 4KScope supports YCbCr (broadcast) at 8 and 10 bits, and RGB (post production) at 8, 10 and 12 bit (depending on hardware). For most SDI and HDMI signals you will want to be in YCbCr 10 bit, as this is by far the most common format. Even if the signal source is 8 bit, it will still work in 10 bit and vice versa. If you are monitoring a high end post system (Nucoda, Assimilate, Autodesk, Resolve, etc) then the input may be a 4:4:4 RGB, also known as dual link, input. In this case, it will be either a 10 bit or 12 bit signal. As 10 bit will work for both 10 and 12 source, if the image is incorrect in 12 but correct in 10, then it is likely a 10 bit source. Correct measurement of signals require the correct setup of the bit depth, color format, primaries and transfer mode of the signal you are measuring within 4KScope.



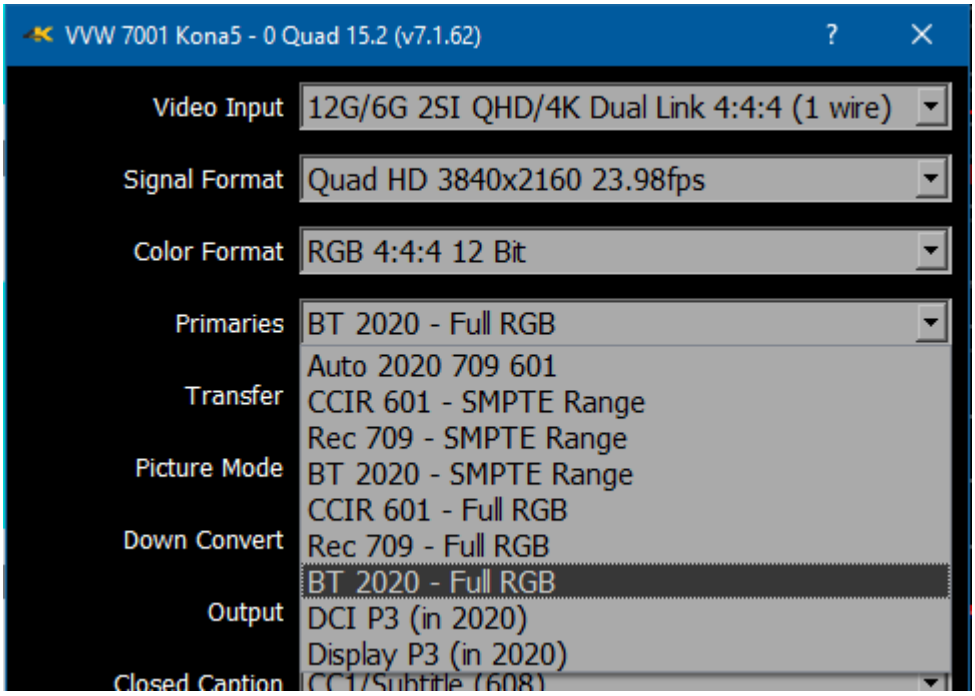
Primaries

4KScope supports a wide variety of primaries. These describe the color space being used in terms of chrominance and saturation. As a general rule of thumb, the following are the standard primaries for various signal types:

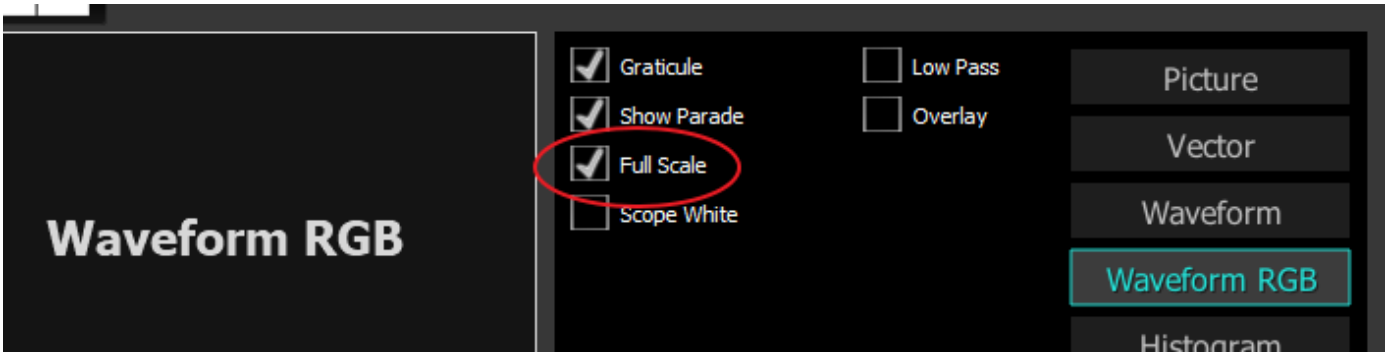
SD - CCIR 601
HD - Rec 709
QHD/4K - BT 2020 (but may be Rec 709)
QHD/4K Post - P3/BT 2020/709 (but may be Full Range RGB)

While it is possible to mix these (e.g. send 4K with CCIR 601 primaries), it would be very uncommon. The trickiest part of this configuration can be the SMPTE Video Range vs Full Range RGB, when running in RGB modes. When producing RGB over SDI/HDMI/IP, the creation software can choose to make the 0% color (standard black) and the 100% color (standard white) to be the 0 value and 4095/1023 value. In this case it is using the 'Full' range of the RGB to describe the standard color range. As normal video has a range that allows brighter than white and darker than black, it is very common to duplicate this functionality in RGB space, making standard black 64 and standard white

3760/940. This is known as SMPTE or Video Range. If the signal is using SMPTE or FULL, and 4KScope is set to the opposite, then the graticules will not line up properly. These settings must match.

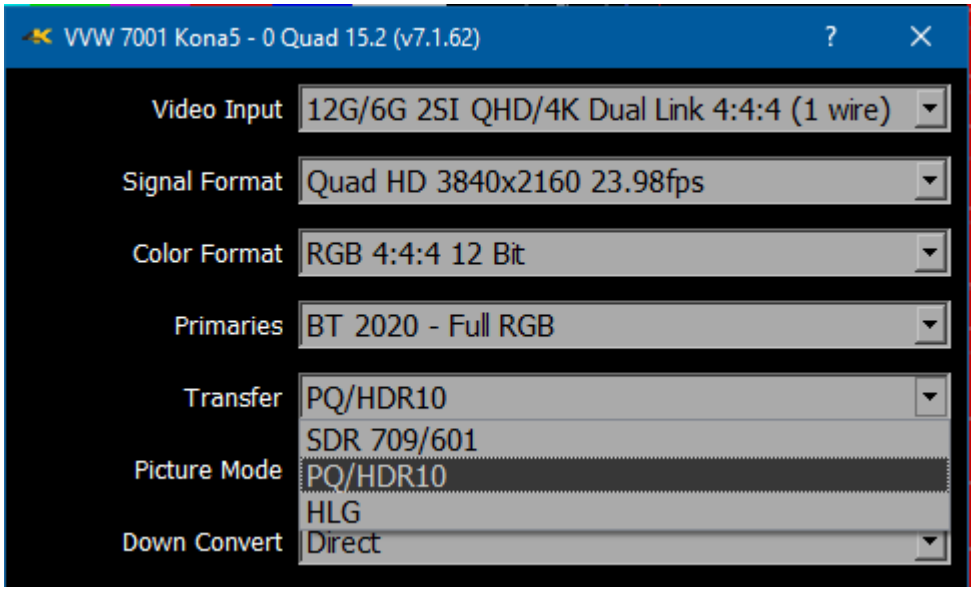


When using RGB Full, it is also important that the RGB Waveform Scope has its 'Full Scale' check box checked or unchecked to match. In some YCbCr cases it needs to be independent from the main primary selection.



Transfer Characteristics

The transfer characteristics describe how the luminance, or brightness, is encoded in the signal. Unless you are measuring a high dynamic range (HDR) signal, this will be set to SDR. If the source is an HDR10, SMPTE 2084 or HDR10+ signal, this should be set to PQ/HDR10 (max 10,000 nits). If it is an HLG signal, it should be set to HLG (max 1000 nits).



Turning Off Background Programs in Linux

If 4KScope is likely to be run with mostly with no direct interaction from the keyboard, and if there is a screen saver/power saver/sleep mode/kernel update set to run, these background programs can cause 4KScope to crash.

Here is how to prevent these from running under Linux.

Disable Hibernate, Sleep

sudo systemctl mask sleep.target suspend.target hibernate.target
hybrid-sleep.target

sudo systemctl disable

    systemd-hibernate.service
    systemd-hybrid-sleep.service
    systemd-suspend.service

Disable Kernel Updates

/etc/yum.conf
add, at the bottom of the file exclude = kernel*

Set Default Kernel

/etc/default/grub
GRUB_DEFAULT=saved
GRUB_SAVEDEFAULT=true

Operations

4KScope can be used to view an input signal through supported AJA, Bluefish444, Matrox or Blackmagic video hardware. Once a capable system has been equipped with an install of 4KScope, the user may connect a signal to the appropriate inputs and begin to use the software.

Multiple inputs may be connected to a switcher to compare and adjust any mismatched parameters of setup.

Use the **Setup** Window to confirm or adjust any settings for your video signal.

Use the **Scope Config** window to set the layout (number and arrangement of windows), and which window uses which scope.

At this point if all has been properly set up, the user should be able to view their signal through the appropriate scopes and other signal analysis tools.

Controlling 4KScope

4KScope supports both command line parameters and keyboard control. This command line parameters can be used to allow 4KScope to open automatically on startup in the mode and size required. The keyboard commands can be used to capture compressed and uncompressed frames directly from the incoming signal.

Command Line Parameters

4KScope -f -m -s D H P R W V
-f Open in full screen mode
-m Open in maximized mode
-s Open in standard mode
D Show Data view on open
H Show Histogram view on open
P Show Picture view on open
R Show Waveform RGB on open
W Show Waveform on open
V Show Vectorscope on open

Keyboard Commands

<SPACE> Freeze/Thaw data view
<ALT>-A - Display mode alpha only
<CTRL>-A - Set to audio vector
<ALT>-B - Display mode blue only
<ALT>-C - Display mode clipping
D - Show the frozen frame
<CTRL><SHIFT>-D - set the interface dimming for HDR display screens
<ALT>-D - Display Mode flip flop
<CTRL>-D - Show data view
<ALT>-E - Display mode edges
<CTRL>-E - Show scope view
F - Toggle full screen

<ALT>-F - Display mode focus assist
<CTRL>-F - Freeze and thaw
<ALT>-G - Display mode green only
<CTRL>-G - Set to chromaticity
<ALT>-H - Display mode HDR false color
<ALT>-I - Display mode calibrate
<CTRL>-I - Set to audio histogram
<ALT>-J - Display mode luma key
<ALT>-K - Display mode chroma key
<ALT>-L - Display mode luma only
M - Show mix of live and frozen signal
<ALT>-M - Display mode false color
<ALT>-N - Display mode none
<ALT>-O - Display mode opacity
<ALT>-P - Display mode chroma key despill
<CTRL>-P - Set to picture
<CTRL>-Q - Set to audio phase
<ALT>-R - Display mode red only
<CTRL>-R - Set to waveform RGB
S - Show the live signal
<ALT>-S - Display mode green screen
<CTRL>-S - Set to status
<CTRL>-T - Set to timing
<ALT>-V - Display mode buffer weighted
<CTRL>-V - Set to vectorscope
<ALT>-W - Display mode weighted RGB
<CTRL>-W - Set to waveform
<ALT>-X - Display mode expt
<CTRL>-X - Set to audio wave
<ALT>-Y - Display mode zebra chroma
<ALT>-Z - Display mode zebra luma
1 - set first scope for flags and type
<ALT>-1 - set to single scope
2 - set second scope for flags and type
<ALT>-2 - set to two scopes
3 - set third scope for flags and type
4 - set forth scope for flags and type
<ALT>-4 - set to four scopes
5 - set fifth scope for flags and type
6 - set sixth scope for flags and type
<ALT>-6 - set to six scopes
<ESC> Leave full screen mode
<CTRL>-0 Capture uncompressed frame as YUV (8 bit), v210 (10 bit), RGB10 (10 bit) These are headerless frames, with only the raw data in them. They can be viewed or read in Drastic software like videoQC or loaded into 4KScope for review. Please contact Drastic for the bit format of these files.
<CTRL>-1 Capture a full size JPG image (in 8 YCbCr bit only)
<CTRL>-2 Capture a 50% size JPG image (in 8 YCbCr bit only)
<CTRL>-3 Capture a 25% size JPG image (in 8 YCbCr bit only)
<CTRL>-4 Capture a 10% size JPG image (in 8 YCbCr bit only)
<CTRL>-9 Capture a 1% size JPG image (in 8 YCbCr bit only)

4KScope Front Panel Controller

Use the layout menu in the 4KScope GUI to set up the number of screens available to display scopes on.

Once the layout has been set, you can use the front panel controller to change which scope is displayed in which screen, and to set various overlays and methods of display for each scope.

Controls and Displays

Along the left are the LEDs which function as audio meters.
In the center the LCD screen displays various data and menus, and allows the user to navigate to specific scopes to choose which scopes are displayed, and to access settings for each scope.
At the right are the controls: The up/down arrows, the left/right arrows, the X, and the check mark. These provide various functions as described below.

Scope Selection

The LCD display will show all the scopes that have been set up. One of the scopes will have angle brackets around it to indicate it is selected.

You can change which scope is selected by using the up/down/left/right arrow keys.

Change Settings For the Scope

Once you have selected a scope, pressing the Check button will bring up the menus for that scope in that location. The menus let you set whether particular graticules are displayed, whether luma or parade views are displayed for particular scopes, and so on.

You can then go up/down to change the menu you are on and left/right to change the value of that menu.

Pressing the X button will bring you back to the main screen.

Change the Scope

Select the scope you want to change and press the X button; this will show the selection of available scopes and let you select a new scope for that spot.

To select a new scope to display, navigate to it and press the Check button. To cancel, press the X button. Please note, there are more scopes than will fit in one screen. To get the rest of the selections, go to the arrow on the right part of the screen and press the Check button. This will switch to the other screen of choices.

Audio Meters

The LEDs will light up as audio meters going from off to green to orange to red. The time code will be displayed at the bottom of the display, if on the main page.

The Scopes and Settings

The available scopes, overlays, settings options appear on the screen as the text in brackets (below), which are shortened to fit as fields in the LCD display.

Here are the available choices:

<pict >	LCD Picture View
<vect >	LCD Vectorscope
<wrgb >	LCD Waveform Monitor RGB
<wave >	LCD Waveform Monitor YCbCr
<gamut>	LCD Chromaticity Scope
<histo>	LCD Histogram
<timng >	LCD IP Timing
<stat >	LCD Status View
<avect>	LCD Audio Vectorscope
<aphas>	LCD Audio Phase
<ahist>	LCD Audio Histogram
<awave>	LCD Audio Waveform Monitor
<afreq>	LCD Audio Frequency
<meter>	LCD Audio Meters
<asprm>	LCD Audio Spectrum
<data >	LCD Data View
<grat >	LCD Graticule

The available overlays and methods of display for the selected scopes appear on the screen as the text in brackets (below), which are shortened to fit as fields in the LCD display.

Not all choices will be available for all scopes, and certain choices may be scope-specific:

<picture >	Picture Safe
<Action >	Action Safe Overlay
<Graphic >	Graphic Safe Overlay
<Pict Frame>	Picture Frame Overlay
<Active Rgn>	Active Region Overlay
<Title Safe>	Title Safe Overlay
<waveform>	Waveform Overlay
<Graticule >	Graticule Overlay
<100% Marks>	100% Marks Overlay
<75% Marks >	75% Marks Overlay
<AngleMarkr>	Angle Marker Overlay
<Skin Tone >	Skin Tone Overlay

<Show Prade> Show Parade
<Scp White > Display the scope using white only
<Scale Type> Scale Type setting
<Full Scale> Full Scale Setting
<Only Luma > Display the scope using only luma
<Color > Color
<Intensity > Intensity setting
<vector > Vectorscope Overlay
<Trngl 601 > Triangle 601 Overlay
<Trngl 709 > Triangle 709 Overlay
<Trngl 2020> Triangle 2020 Overlay
<Trngl P3 > Triangle P3 Overlay
<Invert > Invert the black and white in the display
<Black > Black setting
<Brightness> Brightness setting
< > Empty Space
<[> Open Bracket
<]> Close Bracket

Specific settings may be available in setting up certain scopes.

Action Safe
Title Safe
Picture Safe
Graphic Safe
Active Region
8 Bit Processing On/Off
LissajousXY On/Off
Lissajous On/Off
Polar On/Off
Amp Linear On/Off
Amp Logarithmic On/Off
Scale Linear On/Off
Scale Sqrt On/Off
Scale Cbrt On/Off
Scale Logarithmic On/Off
Scale R Logarithmic On/Off
Zoom In/Out
Histogram Type 1
Histogram Type 2
Wave MV Scope
Graticule On/Off
Lines On/Off
Marks 100% On/Off
Marks 75% On/Off
Angle Marker On/Off
Skin Tone Marker On/Off
Drastic Luma Stick On/Off
Chromaticity/Gamut Scope On/Off
709
2020
P3
Invert Chromaticity Display Black/White

Chromaticity Black Only
Intensity Setting
Quality Setting
Brightness Setting
Waveform Parade Display
Waveform White Only Display
Illegal Marker On/Off
Luma Only Display
RGB Histogram Display
HSV Histogram Display
Spectra Histogram Display
Overlap Histogram Display
Color Histogram Display
ST2084 Display
Full Scale Display
Intensity Setting
Quality Setting
Brightness Setting
Select Audio Pair

Adding Picture Scope

Add Picture Scope
- Action Safe Overlay
- Graphics Overlay
- Picture Safe Overlay
- Active Region Overlay
- Title Safe Overlay

Adding Vector Scope

Add Vectorscope
- Graticule
- 100% Marks
- 75% Marks
- Angle Marker
- Skin Tone
- Color
- Intensity
- Brightness

Adding Waveform YCbCr Scope

Add Waveform Monitor
- Select between (Digital/MV/IRE) Scale Settings
- Graticule
- Show Parade Setting
- Luma Only Display
- White Only Display
- MV Scope Scale
- Intensity
- Brightness

Adding Waveform RGB Scope

Add Waveform RGB
- Graticule
- Show Parade
- Full Scale Setting
- White Only Display
- Intensity Setting
- Brightness Setting

Adding Histogram Scope

Add Histogram
- Select between (YCbCr/RGB/HSV/Luma/H/S Scope) Settings
- Graticule
- MV Scope Scale

Adding Chromaticity Scope

Add Chromaticity (Gamut) Scope
- Graticule
- TR601 Setting
- TR 709 Setting
- TR 2020 Setting
- TR P3 Setting
- Invert Black/White Setting
- Black Only Display

Adding Status Scope

Add Status Scope
- Brightness

Adding Audio Phase Scope

Add Audio Phase Scope
- Graticule
- Brightness Setting

Adding Audio Wave Scope

Add Audio Wave Scope
- Graticule
- Brightness

Configuring the Crystalfontz Front Panel Linux

/etc/udev/rules.d/99-usb-crystalfontz.rules

SUBSYSTEMS=="usb", KERNEL=="ttyACM[0-9]*", SUBSYSTEM=="tty", SYMLINK+="cryfontz", ACTION=="add", ATTRS{idVendor}=="223b", ATTRS{idProduct}=="0004", MODE="0666"

Permission Commands

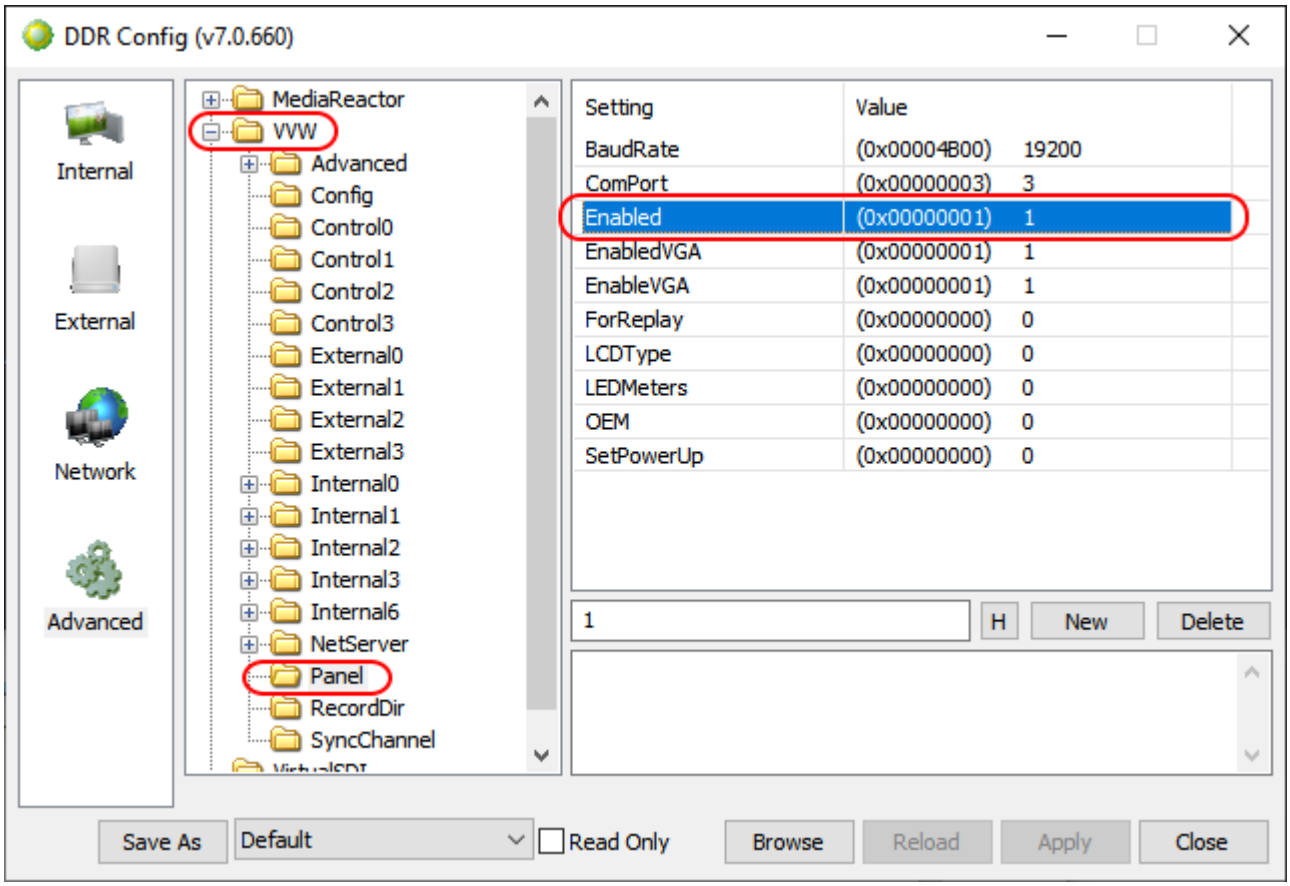
sudo chown root:root /etc/udev/rules.d//99-usb-crystalfontz.rules
sudo chmod 0644 /etc/udev/rules.d//99-usb-crystalfontz.rules

udevadm control –reload-rules

Disabling the Front Panel Controller

In some cases, a demo of 4KScope will take over a front panel controller if a demo is installed on a system. Or you may want to use the front panel controller for other purposes. It is possible to disable 4KScope's use of the controller.

To do this, open **DDRConfig**, and change the config.xml so the /VVW/Panel/Enabled = 0



REST API Commands

Basic Command Structure

4KScope REST API provides many commands that allows you to modify the number of scopes displayed, to select which scopes are displayed, and to adjust specific scope settings.
All commands to 4KScope start with:
http://127.0.0.1:1080/drasticcmd?

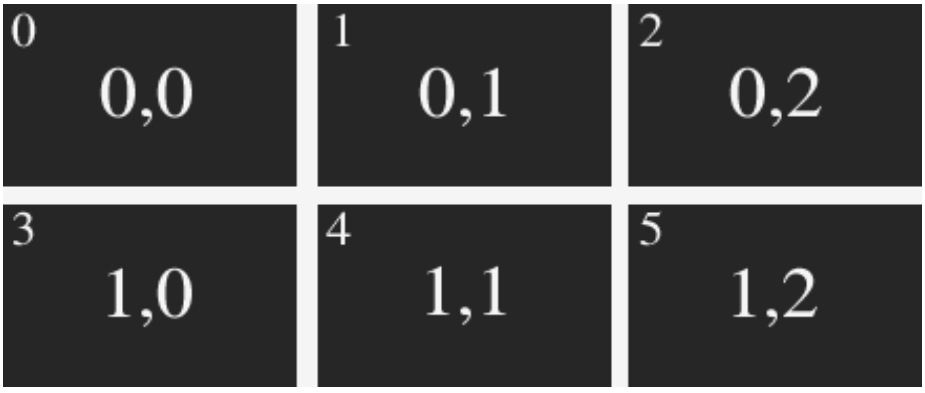
Most commands must includes an x= and y= to specify the target scope
http://127.0.0.1:1080/drasticcmd?x=0&y=1

The x and y coordinates represent the positioning of scopes in the form of a grid. This grid has a maximum of 2 rows and 3 columns. The maximum number of scopes that can be displayed is 6 and the minimum is 1 scope. The image below displays 4 possible scope layouts depending on how many scopes the user would like to have active.

The x and y coordinates can range from (0,0) to (1,2). From the last layout from the image above, the first row is represented by (0,0), (0,1), (0,2) and the second row is represented by (1,0), (1,1), (1,2). Below is a more detailed explanation about the scope layout.

Number of Scopes

The maximum number of scopes that can be displayed is 6 and the minimum is 1. There are four possibilities on how the scope layout can be displayed. The scope layout can display either 1 scope, 2 scopes, 4 scopes or 6 scopes as provided with the image above. The linear number in the upper left corner in the image below shows each quadrant's ID in the list, while the x/y numbers identify the quadrant's display ID (for positioning and settings). When 4 scopes are visible, we hide scopes 2(0,2) and 5(1,2). For 2 scopes only 0(0,0) and 1(0,1) will be visible.



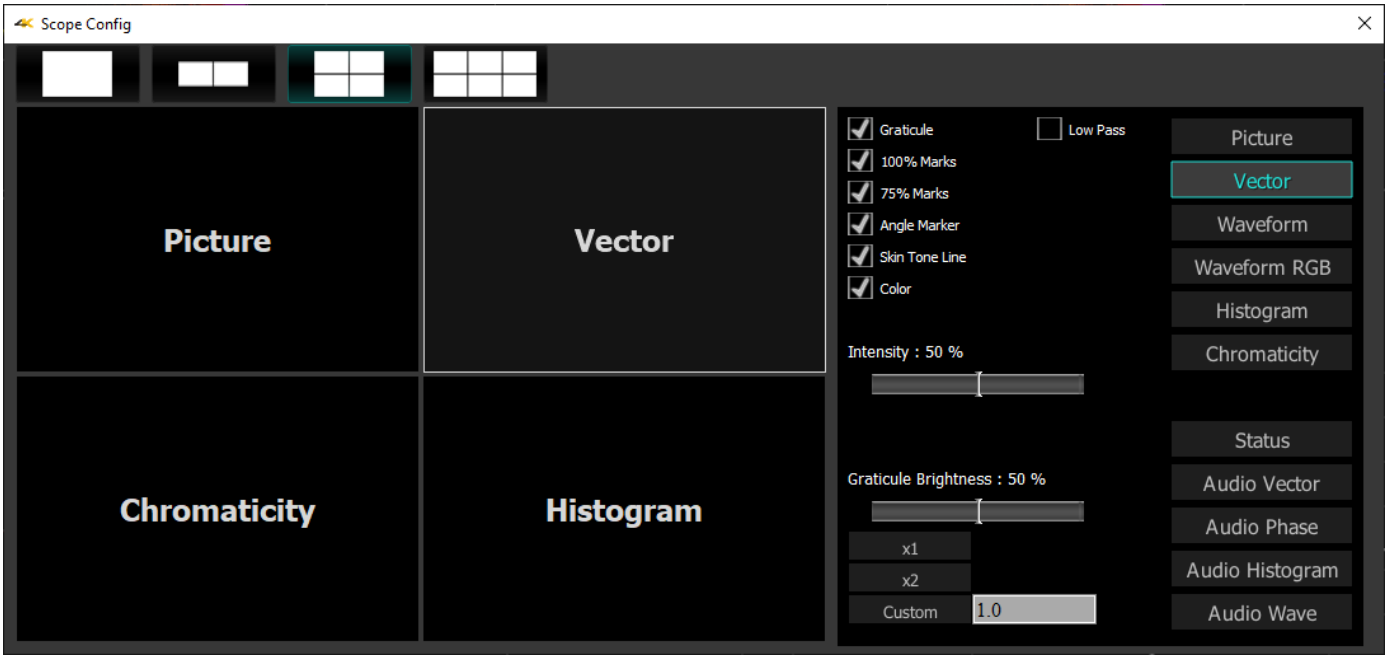
The **getscopenumber** command will return a value which represents how many scopes are being displayed. It will only return a value of 1, 2, 4 or 6 depending on how many scopes are currently visible. The command below will return how many scopes are currently visible.

http://127.0.0.1:1080/drasticcmd?getscopenumber=
{
	“response”: 0.
	“value”: 4
}

The **setscopenumbe**r command will allow you to change the number of scopes that are displayed. There are only 4 possible input values when using this command. **setscopenumber** can only be set to 1, 2, 4, or 6. The command below will set the number of scopes visible to 2 scopes.
http://127.0.0.1:1080/drasticcmd?setscopenumber=2
{
	“response”: 0.
}

Set/Get Individual Scopes

The commands below provide ways of getting a specific scope and setting a specific scope. The user must make sure the x and y coordinates are within the range of the number of scopes present. From the image below, the selected scope is a Vectorscope as it is highlighted and has an x and y coordinate of (0,1).



The **getscope** command will return a value representing a specific scope type. The user must specify the x and y coordinates in order to get the desired scope. The list below provides scope values and their corresponding scope type. The command for getting the Vectorscope from the image above is provided below.
http://127.0.0.1:1080/drasticcmd?x=0&y=1&getscope=
{
	“response”: 0.
	“value”: 1
}
The user can then compare this value to the values in the list and find the corresponding scope
List of scope values vs names

- 0 = picture
- 1 = vector
- 2 = waveformrgb
- 3 = waveform
- 4 = histogram
- 5 = gamut
- = timing
- 10 = status
- 11 = audiovector
- 12 = audiophase
- 13 = audiohistogram
- 14 = audiowave
- = data

The **setscope** command will allow the user to change the scope based on the x and y coordinates and the scope type name. The command below will change the scope at (0,1) which is the Vectorscope to a Histogram scope

http://127.0.0.1:1080/drasticcmd?x=0&y=1&setscope=histogram

```
{
	"response": 0.
}
```

Set/Get Audio Meters

Not Implemented Yet

http://127.0.0.1:1080/drasticcmd?getmeters=

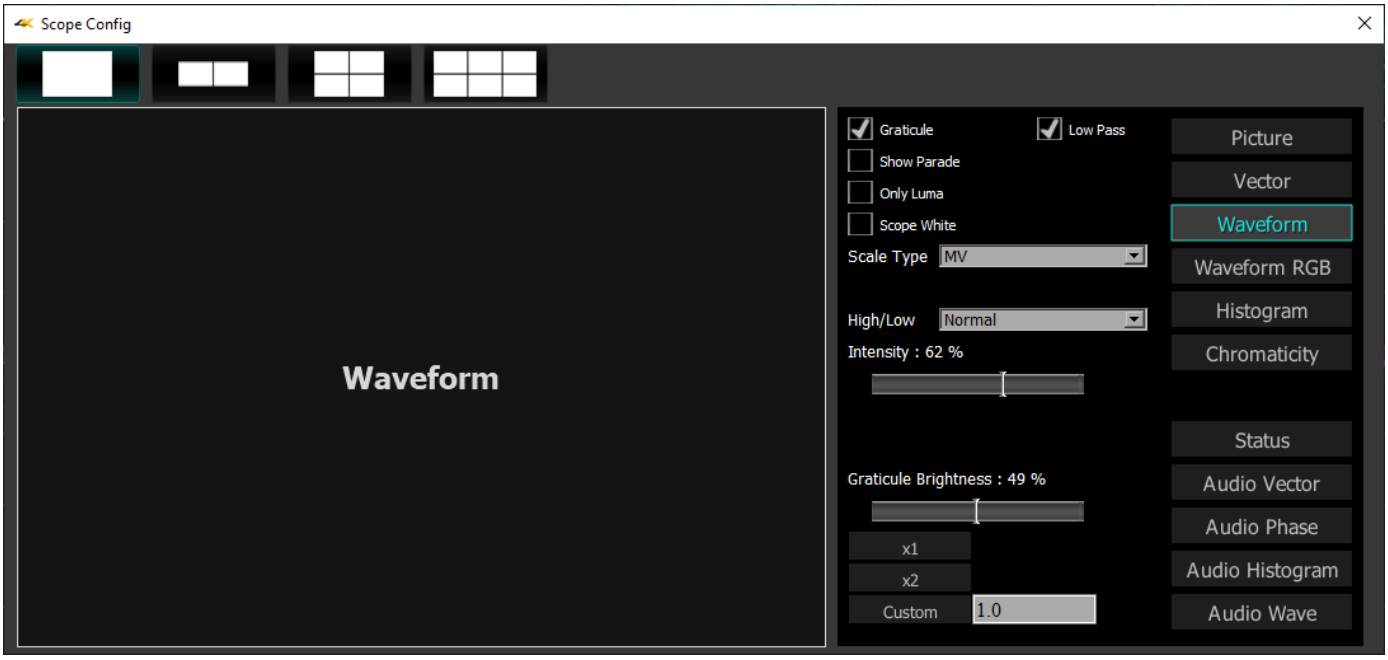
```
{
	"response": 0.
	"value": 2
}
```

http://127.0.0.1:1080/drasticcmd?setmeters=0

```
{
	"response": 0.
}
```

Set/Get Scope Settings

The commands below provide ways of getting the settings of a scope or assigning a value to a setting of a specific scope. The image below displays a Waveform scope with multiple settings such as Graticule, Show Parade, Only Luma, Scope White, Intensity and Graticule Brightness.



The list below provides correct input setting name commands according to a specific scope setting

- Active Picture = activepicture
- Graphic Safe = graphicsafe
- Picture Safe = picturesafe
- Active Region = activeregion
- Title Safe = titlesafe
- Graticule = graticule
- 100 Marks = 100marks
- 75 Marks = 75marks
- Angle Marker = anglemarker
- Skin Tone Line = skintoneline
- Color = color
- Intensity = intensity
- Brightness = brightness
- Show Parade = showparade
- Only Luma = onlyluma
- Scope White = scopewhite
- Scale Type = scaletype
- Full Scale = fullscale
- Triangle 601 = triangle601
- Triangle 709 = triangle709
- Triangle 2020 = triangle2020
- Triangle P3 = trianglep3
- Invert = invert

- Black = black
- Histogram Type = histogramtype
- Audio Vector Type = audvectortype
- Audio Histogram Log = audhistlog
- Audio Histogram Scale = audhistscale
- Display Mode = displaymode
- Freeze = freeze
- Line Select = lineselect
- Wave Hi/Lo = wavehilo
- Overlay = overlay
- Lowpass = lowpass
- Display None = display_none
- Display Luma = display_luma
- Display Red = display_red
- Display Green = display_green
- Display Blue = display_blue
- Display Edges = display_edges
- Display False = display_false
- Display Alpha = display_alpha
- Display Focus = display_focus
- Display Zebraluma = display_zebraluma
- Display Zebrachroma = display_zebrachroma
- Display Clip = display_clip
- Display Calibrate = display_calibrate
- Display HDR False = display_hdrfalse
- Display Weighted RGB = display_weightedrgb
- Display Weighted = display_weighted
- Display FlipFlop = display_flipflop
- Display Opacity = display_opacity
- Display Key Luma = display_keyluma
- Display Key Green = display_keygreen
- Display Key Chroma = display_keychroma

The **getsetting** command allows the user to get a specific setting from a scope based on the x and y coordinates provided and the setting name. From the image above, only one scope is present which is the Waveform scope. This scope has (x,y) coordinates of (0,0). The command below will give us the value of the setting Graticule for this Waveform scope

http://127.0.0.1:1080/drasticcmd?x=0&y=0&getsetting=graticule

{
"response": 0.
"value": 1
}

Since the Graticule box is checked, it is returning a value of 1.

The command below will return the setting value of Show Parade

http://127.0.0.1:1080/drasticcmd?x=0&y=0&getsetting=showparade

{
"response": 0.
"value": 0
}

Since the Show Parade box is unchecked it will return a value of 0.

When dealing with checkboxes, a checkbox will either return a value of 1 or 0. If the value is 1 then a checkbox is checked, if 0 then it is not checked. Getting the setting value of Intensity or Graticule Brightness will return the numeric value it is currently set to.

Some scopes may have a pulldown menu with many options. As an example, we can assume the Waveform scope from above has a pulldown setting item called ColorSelection. ColorSelection contains options such as red, blue and green. We can say red, blue and green are stored in a list called colorsList somewhere in the back end of the code. Assume green is already selected. The command below will give us the value of the setting ColorSelection.
http://127.0.0.1:1080/drasticcmd?x=0&y=0&getsetting=ColorSelection
{
"response": 0.
"value": 2
}
You can think of colorsList as a list that contains three items, red, blue and green with the corresponding numeric value automatically assigned.
colorsList:

- red = 0
- blue = 1
- green = 2

Each item in the list has a corresponding number value. The user can get information based on the number value returned from the setting. Since the command above returned a value of 2, the color green must be the current setting value of the scope setting ColorSelection.

The **setsetting** command allows the user to set a value to a specific setting. To set a scope setting the user must provide: the x and y coordinate of the desired scope, the scope setting name and a value to set the setting. From the image above, Scope White is unchecked. The command below will set the Scope White setting value to 1. This will allow the Scope White checkbox to be checked
http://127.0.0.1:1080/drasticcmd?x=0&y=0&setsetting=scopewhite&value=1
{
"response": 0.
}
The command below will set the Graticule checkbox to be unchecked
http://127.0.0.1:1080/drasticcmd?x=0&y=0&setsetting=graticule&value=0
{
"response": 0.
}

If the scope setting is a checkbox, a value of only 1 or 0 should be used when setting the value. A numeric value between 0-100 can be used when assigning a value to the scope settings Intensity or Graticule Brightness. The command below will change the value of the Intensity setting from the image above from 50 to 60.

http://127.0.0.1:1080/drasticcmd?x=0&y=0&setsetting=intensity&value=60
{
"response": 0.
}
Referring back to the setting ColorSelection above, user can set the value of this setting using a numeric value. The command below will set the ColorSelection setting to blue.
http://127.0.0.1:1080/drasticcmd?x=0&y=0&setsetting=ColorSelection&value=1
{
"response": 0.
}
The command above looks for the setting ColorSelection and assigns it a value of 1. The value of one is passed back into the code and will be sent to the colorsList.
colorsList:

- red = 0

- blue = 1
- green = 2

Since we set the value of the setting ColorSelection to be 1, it will now set the setting ColorSelection to a value of blue (1).

This manual has been compiled to assist the user in their experience using **4KScope** software. It is believed to be correct at the time of writing, and every effort has been made to provide accurate and useful information. Any errors that may have crept in are unintentional and will hopefully be purged in a future revision of this document. We welcome your feedback.

Drastic Technologies Ltd
523 The Queensway, Suite 201
Toronto, ON, M8Y 1J7
Canada
(416) 255 5636
(416) 255 8780