# Network Video Analyzer

## Signal Analysis Software
## Version 7

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# About Network Video Analyzer
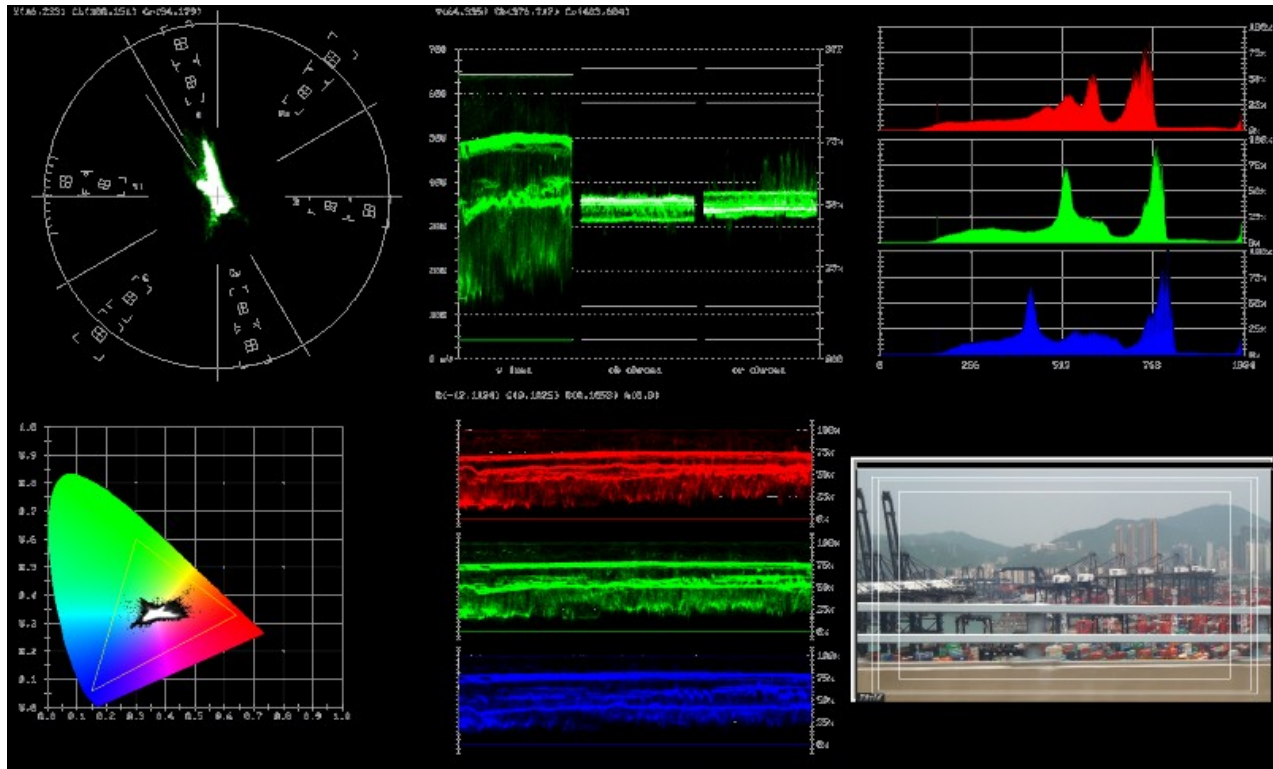


**Network Video Analyzer** Drastic Network Video Analyzer Version 7 is the world's most powerful ST2110/2022 (and optionally baseband video signals and TR-01) software signal monitoring tool.  It includes waveform (luma, YCbCr, RGB), vectorscope, histogram, chromaticity, and data/picture monitor for video.  It also includes audio histogram, phase, RMS, peak and loudness monitoring for up to 16 channels.  Raw hex views of the video and OP-47/CEA-708/CEA-608 closed caption decoding, with support for CCIR-601, Rec.709 and BT.2020 color spaces and HDR10/ST-2084 luma processing.

Network Video Analyzer is designed to take advantage of standard NICs as well as AJA's and Matrox's IP capture hardware.  It supports both Rec.709 or BT.2020 and SDR as well as HDR analysis. The Network Video Analyzer provides the most cost effective IP signal monitoring solution available. Network Video Analyzer is available for RedHat/Centos Linux or Windows 10 x64.

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
- Chromaticity

- IP Timing
- 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 **Network Video Analyzer** graphical user interface.

## Main Interface Overview
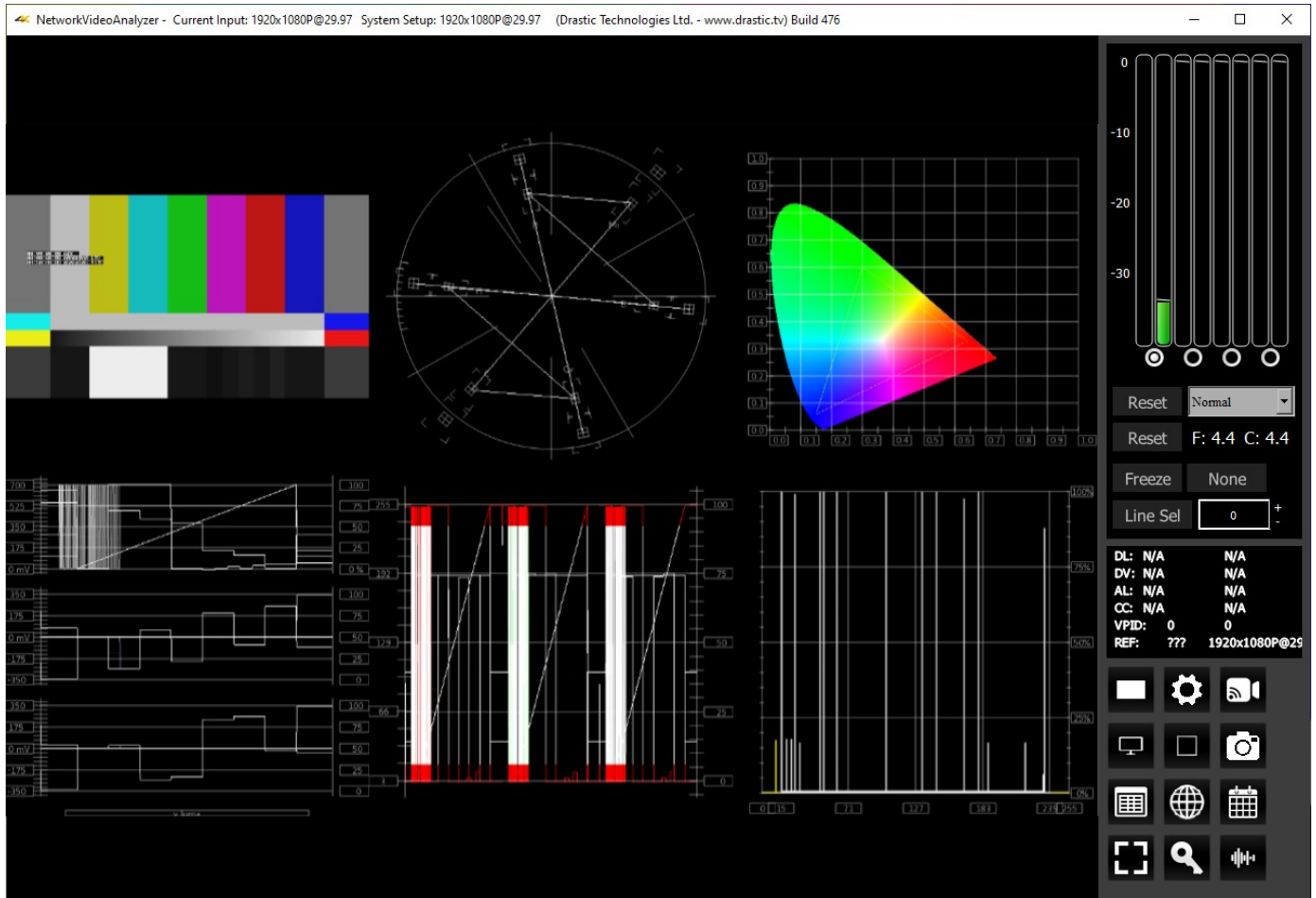


**Display section** – to the left of the controls (the main portion of the GUI) is the screen where the various scopes, meters, or data will be displayed. Network Video Analyzer features four different layouts:  single, side by side, four quadrants, and six up (three across, two down). These can be selected 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
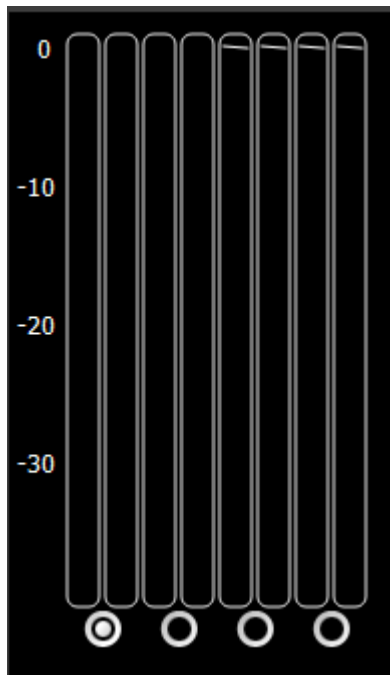


**Audio display and pair selectors** – At the top of the Controls section there are either 8 or 16 audio audio meters for loudness or Peak/RMS (Root Mean Square) display. The buttons just below the meters allow the user to select between audio pairs for monitoring.
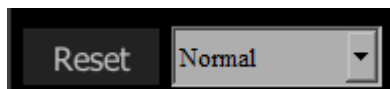


**Hold Peak/RMS** – Just under the audio pair selector buttons there is a reset button and a pulldown menu for options to hold the peak audio level. The following options are available:
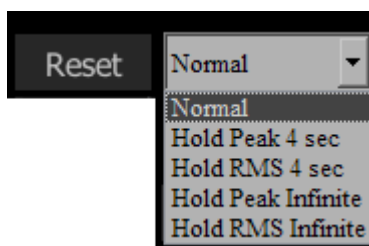


These values can be held for either 4 seconds, or frozen (Infinite Hold), or not held. A Reset button exists to clear any Peak/RMS values to refresh the display for a new measurement.
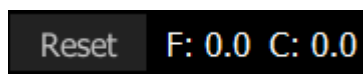


**MaxFall/MaxCLL section** – below the Peak/RMS is the MaxFall/MaxCLL section.

When working in HDR, MaxFall and MaxCLL values become available. MaxFALL/MaxCLL is metadata required for HDR10 content.

**MaxFALL** (Maximum Frame Average Light Level) indicates the maximum value of the frame average light level (in cd/m2 or nits) of the entire playback sequence. MaxFALL is calculated by averaging the decoded luminance values of all the pixels within a frame. MaxFALL is usually much lower than MaxCLL.

**MaxCLL** (Maximum Content Light Level) indicates the maximum light level of any single pixel (in cd/m2 or nits) of the entire playback sequence. MaxCLL is usually measured off the final delivered content after mastering.

The **F** field displays the MaxFall.

The **C** field displays the MaxCLL.

A reset button clears the measurement to view a new signal, or refresh the display for another look at the same signal.

# 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.
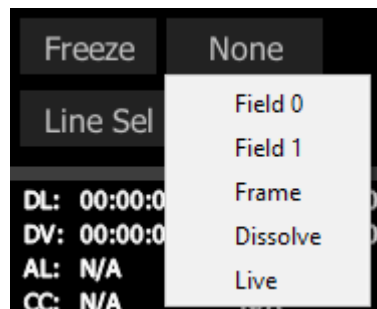


**Field/Frame/Live** drop down – selects how a frozen frame will be displayed against the live video
  Field 0 – show field 0 frozen, field 1 live
  Field 1 – show field 1 frozen, field 0 live
  Frame – show the frozen frame
  Dissolve – show 50% of the frozen frame and 50% of the live frame
  Live –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

# Status Display

```
DL:  12:37:44:01   0x00002500
DV:  12:37:44:01   0x00002500
AL:  12:37:44:01   0x00002500
CC:  N/A              N/A
VPID:   FFFFFFFF  FFFFFFFF
REF:     SDI     1920x1080I@25
```

**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 Setup



Scope 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.

## Picture View

To display the Picture view, press the **Scope Config** button. This opens the Scope Config window.
Click on the **Picture** button on the right. This opens the Picture Setup section of the Scope Config.

Select a layout. 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).

For a multiple scope layout, click on the window in which you would like the Picture displayed.
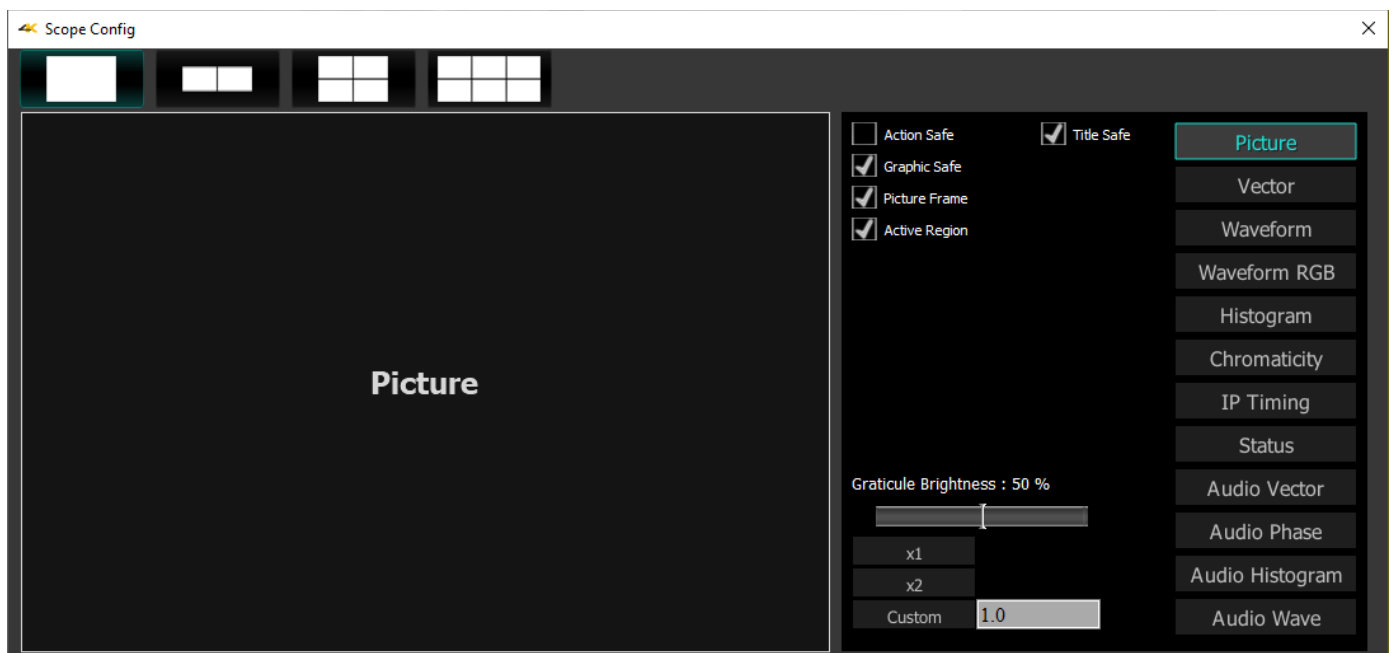


**Action Safe** checkbox - when selected, the Action Safe graticule is displayed over the video output.
**Title Safe** checkbox - when selected, the Title Safe graticule is displayed over the video output.
**Graphic Safe** checkbox - when selected, the Graphic Safe graticule is displayed over the video
      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.
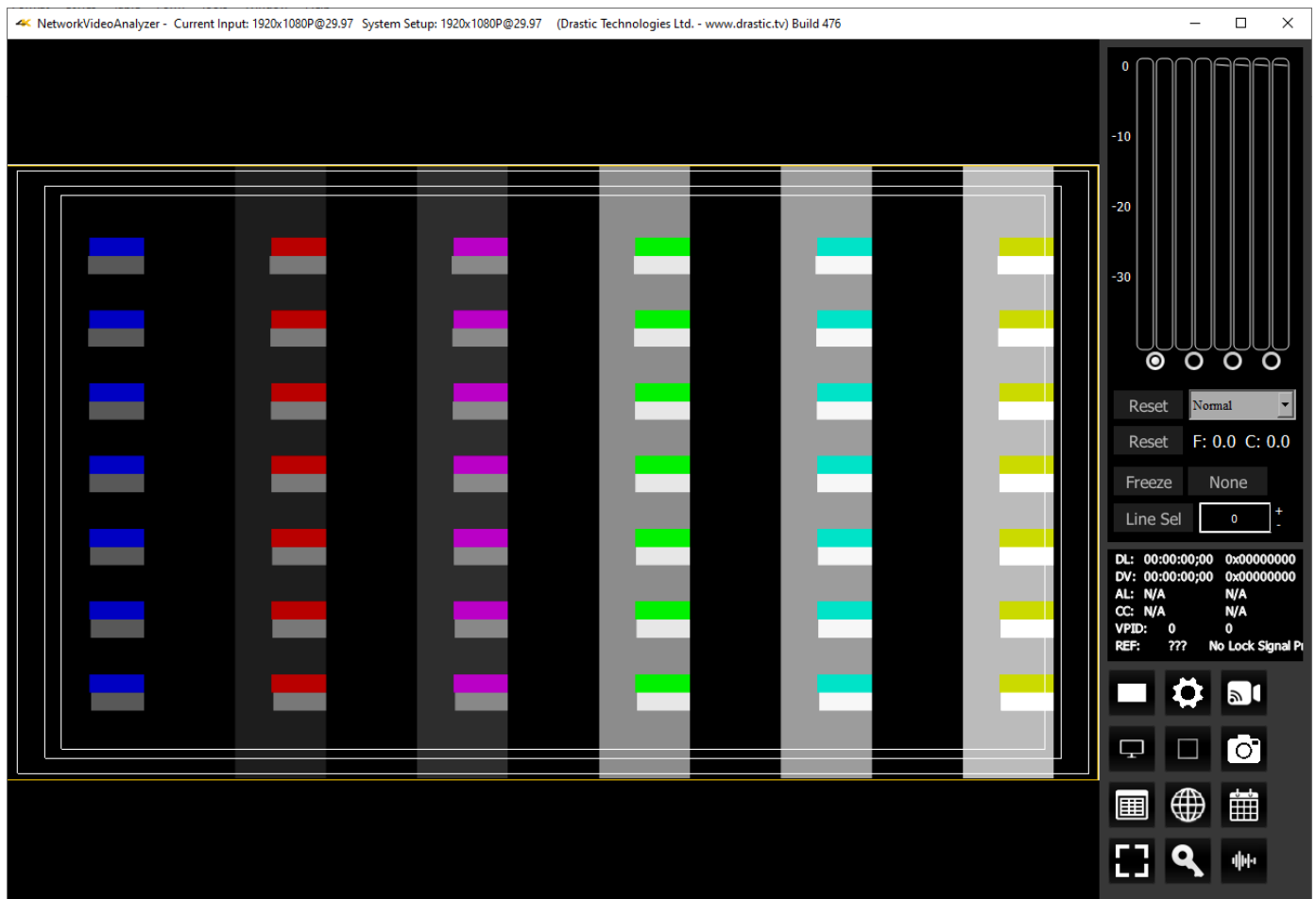


The Picture view shows the video signal, to confirm the source is correct and to display time code location. Action Safe, Title Safe, Graphic Safe, Picture Safe, and Active Region graticules may be optionally overlaid.

# Vectorscope

## Vectorscope Setup

To display the Vectorscope view, press the **Scope Config** button. This opens the Scope Config window. Click on the **Vectorscope** button on the right. This opens the Vectorscope Setup section of the Scope Config.

Select a layout. 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).

For a multiple scope layout, click on the window in which you would like the Vectorscope displayed.
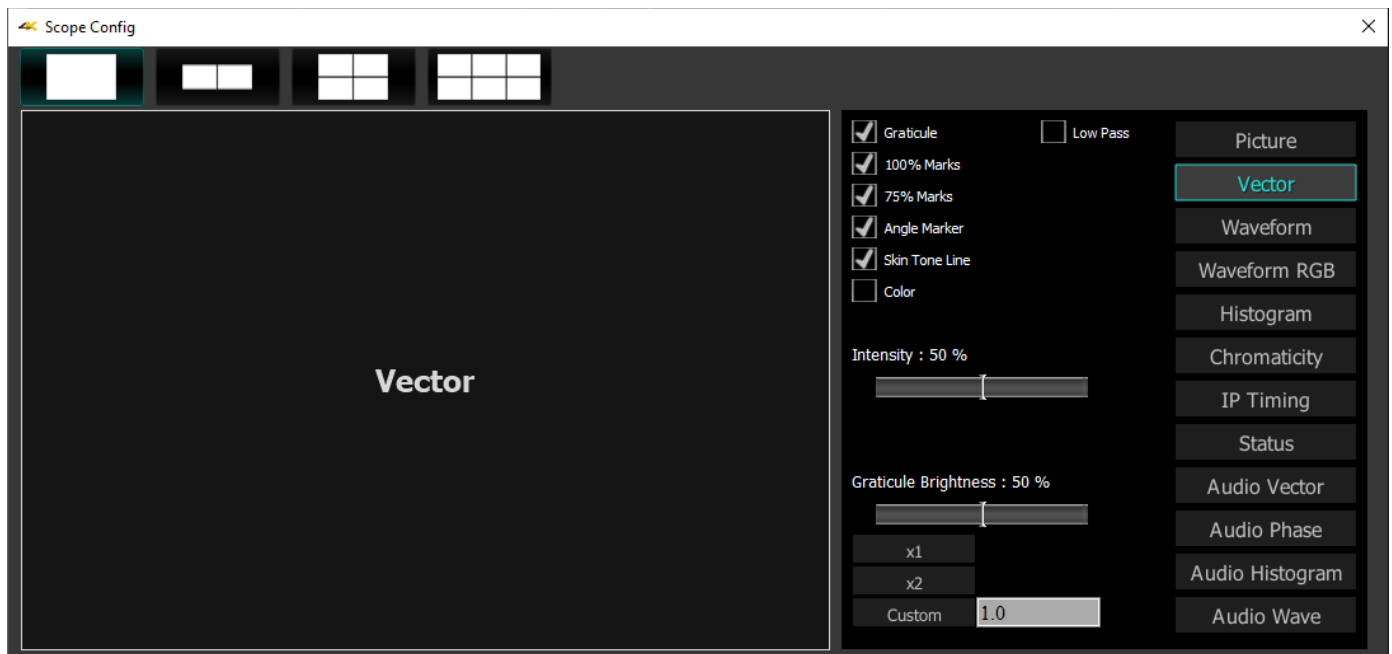


**Graticule** checkbox – when selected, the graticule is laid over the Vectorscope. The brightness of the Graticule may be adjusted using the **Graticule Brightness** slider described below.
**100% Marks** checkbox – when selected, the 100% Marks are displayed over the Vectorscope
**75% Marks** checkbox - 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 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.

# Vectorscope Window

Here is the Vectorscope.
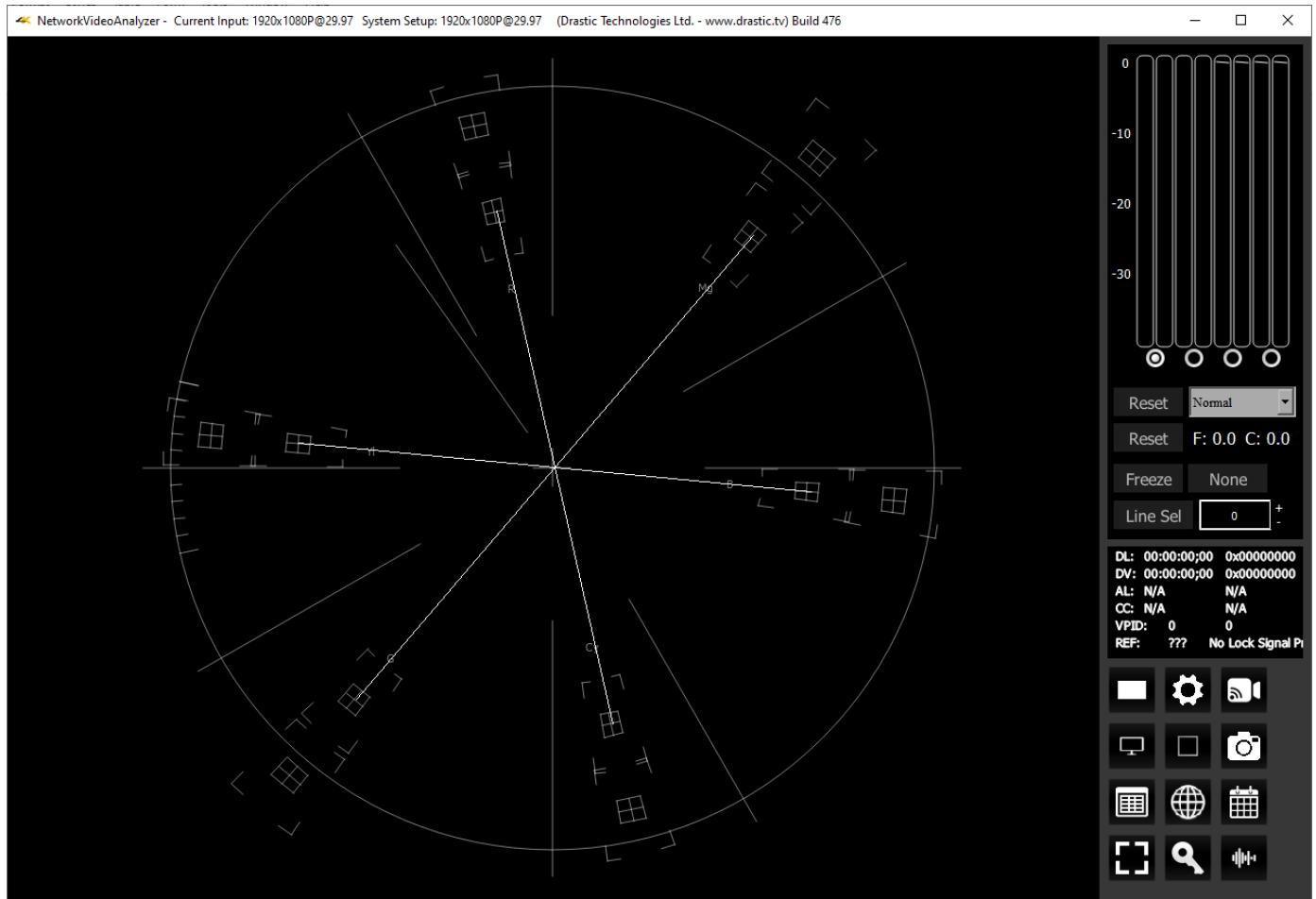


The **Vectorscope** displays a traditional Cb by Cr X-Y display with overlaid reference graticule. Color accurate graticules automatically switch between SD and HD color spaces. The markers include color points (for standard bar checks) at 75% and 100% saturation. All the standard points are boxed; red, 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 display the Waveform YCbCr view, press the **Scope Config** button. This opens the Scope Config window. Click on the **Waveform YCbCr** button on the right. This opens the Waveform YCbCr Setup section of the Scope Config.

Select a layout. 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).

For a multiple scope layout, click on the window in which you would like the Waveform YCbCr displayed.
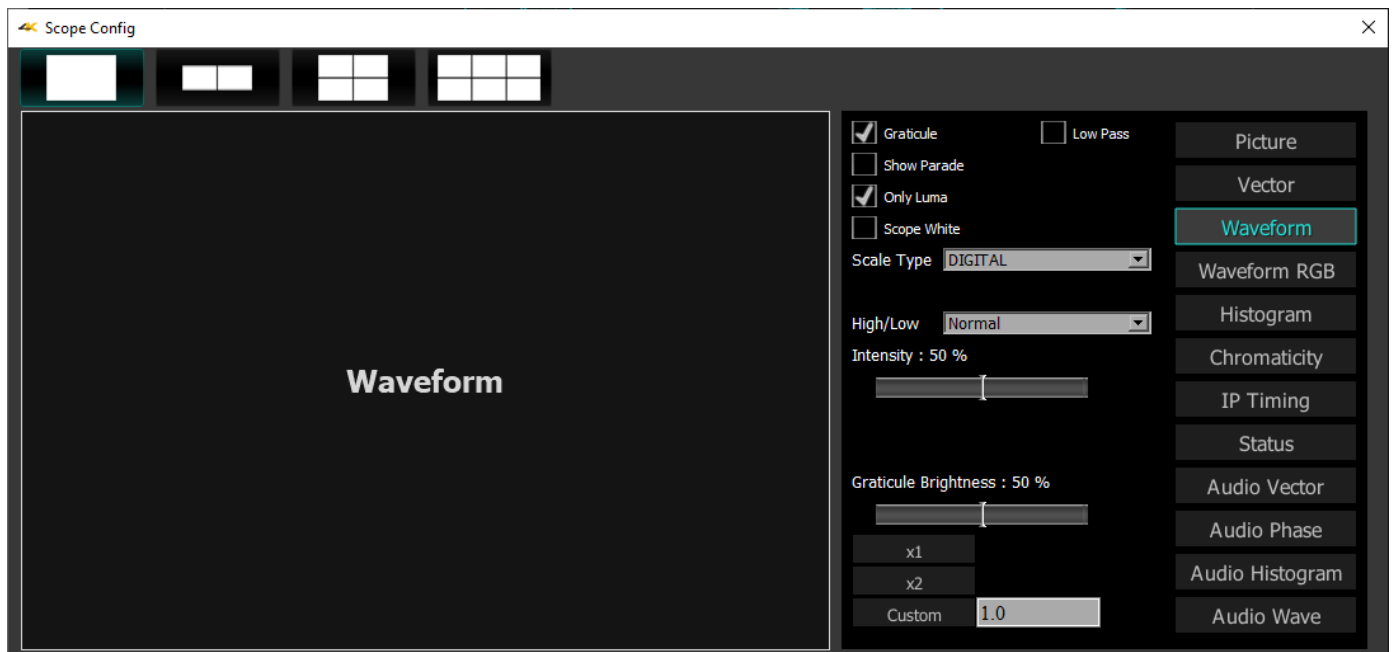


**Graticule** checkbox – when selected, the graticule is laid over the Waveform YCbCr display. The brightness of the Graticule may be adjusted using the **Graticule Brightness** slider described below.

**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.



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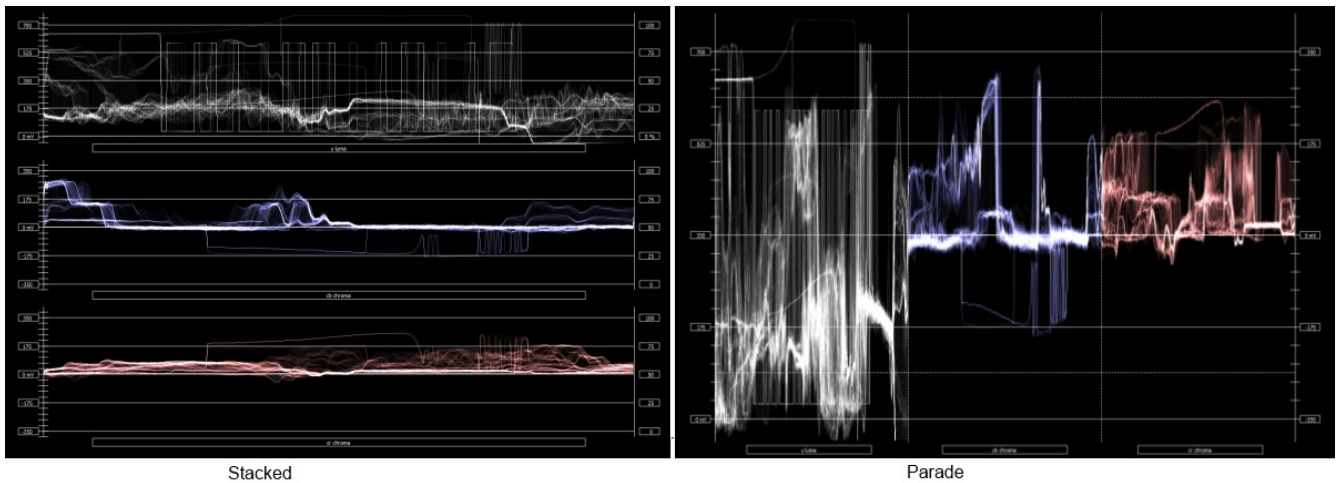
**Only Luma** checkbox – when selected, displays only the luminance of the signal.
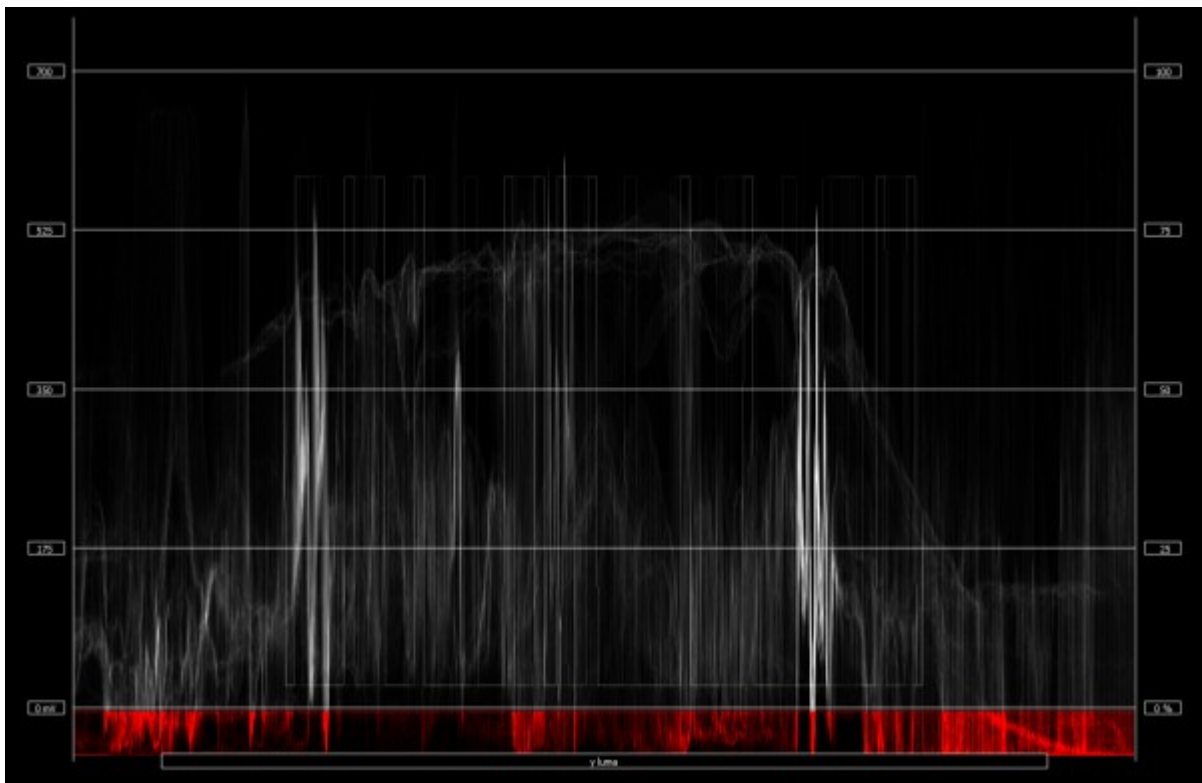


**Scope White** checkbox – turns the display white.
**Scale Type** pulldown – set the type of scale used to draw the histogram. Choices include:
- **Digital** - the actual 0..255. 0..1023 or 0..4095 numeric values of the signal.
- **MV** - the equivalent millivolts value of the signal if it was converted to analog.
- **IRE** – Institute of Radio Engineers units, spanning 0..100.
- **NITS** - (HDR only) maximum 10000 (1000 for HLG) where SDR is equal to 100 NITS.

**High/Low** pulldown – Show only the high and low portions of the signal, cutting out the middle. Choices include: Normal, 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.
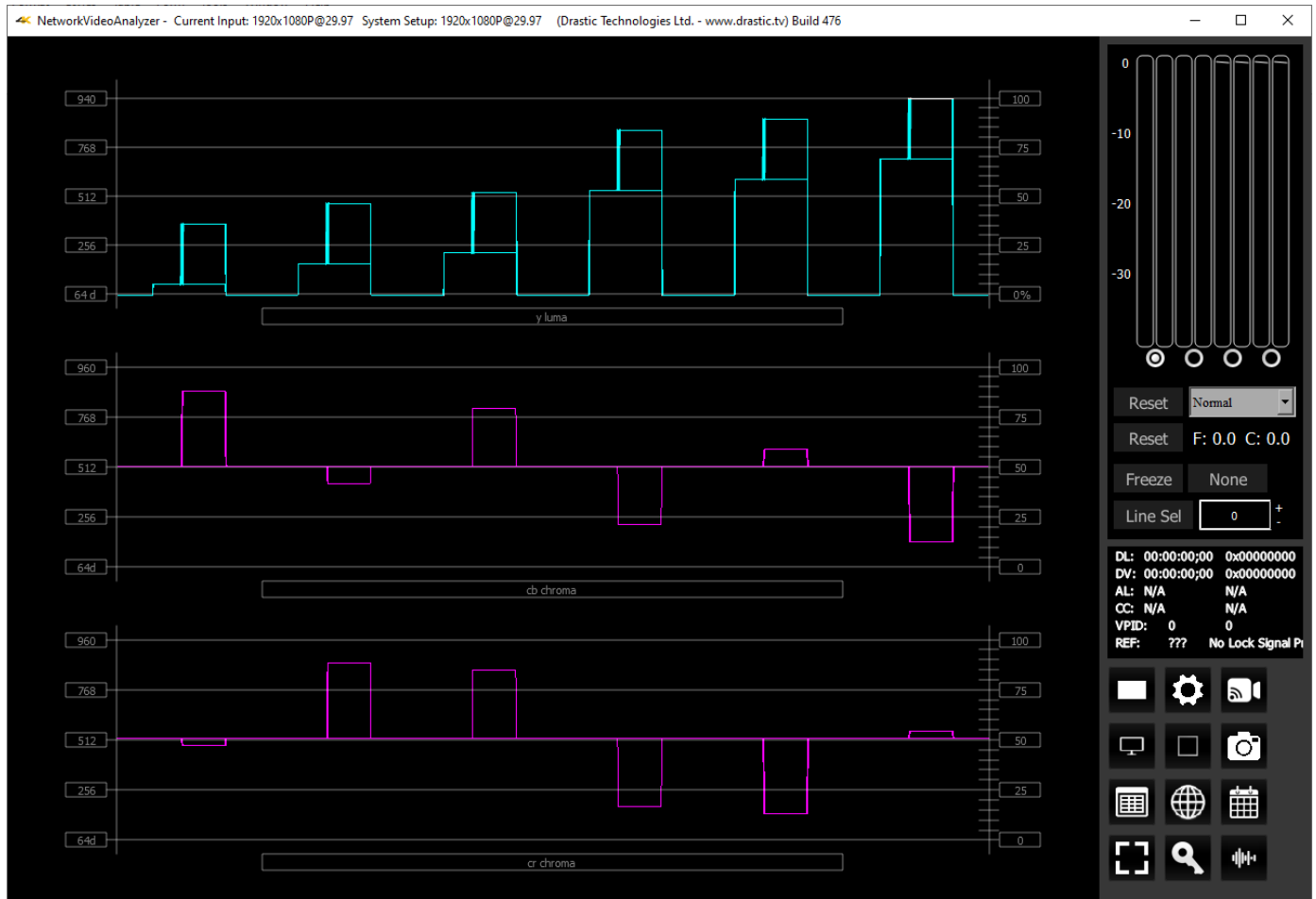


The YCbCr Waveform Monitor displays the levels of the Y, Cb and Cr from the left of the picture to the right of the picture with all the lines summed into one graph. The Y, or luma/luminance, graph provides accurate white and black level information, as well as the range in between. The Cb and Cr display 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 display the Waveform RGB view, press the **Scope Config** button. This opens the Scope Config window. Click on the **Waveform RGB** button on the right. This opens the Waveform RGB Setup section of the Scope Config.

Select a layout. 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).

For a multiple scope layout, click on the window in which you would like the Waveform RGB displayed.



**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.



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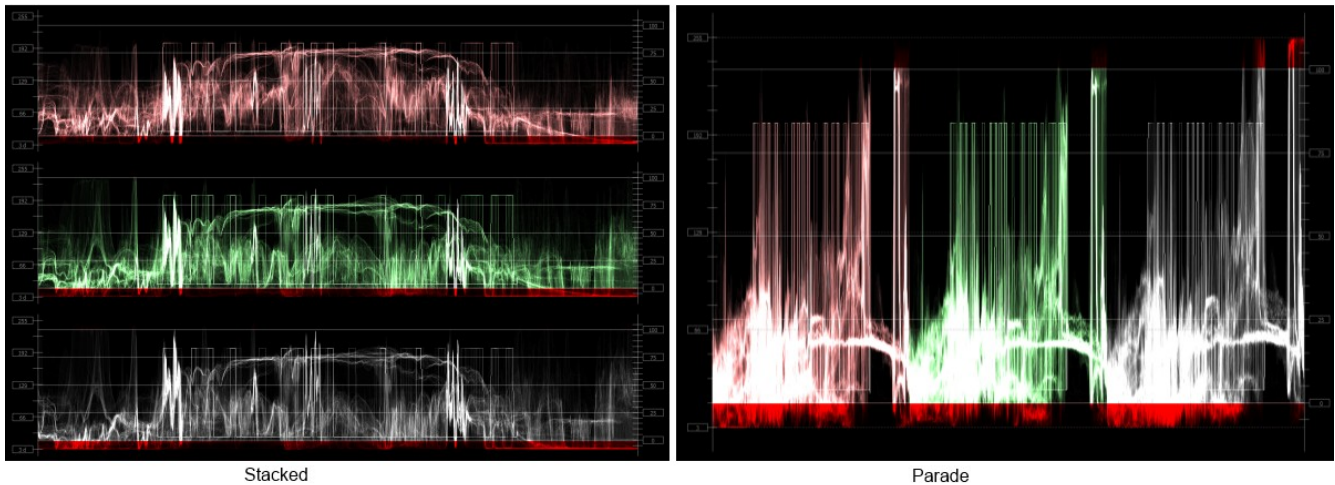
**Full Scale** checkbox – RGB, by default, will be sRGB.  The range of each color will be from 16 to 240 (in 8 bit), so the scale will place white at 240 and black at 16 in normal scale.  If in full scale, white will be placed at 255 and black at 0.

**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.
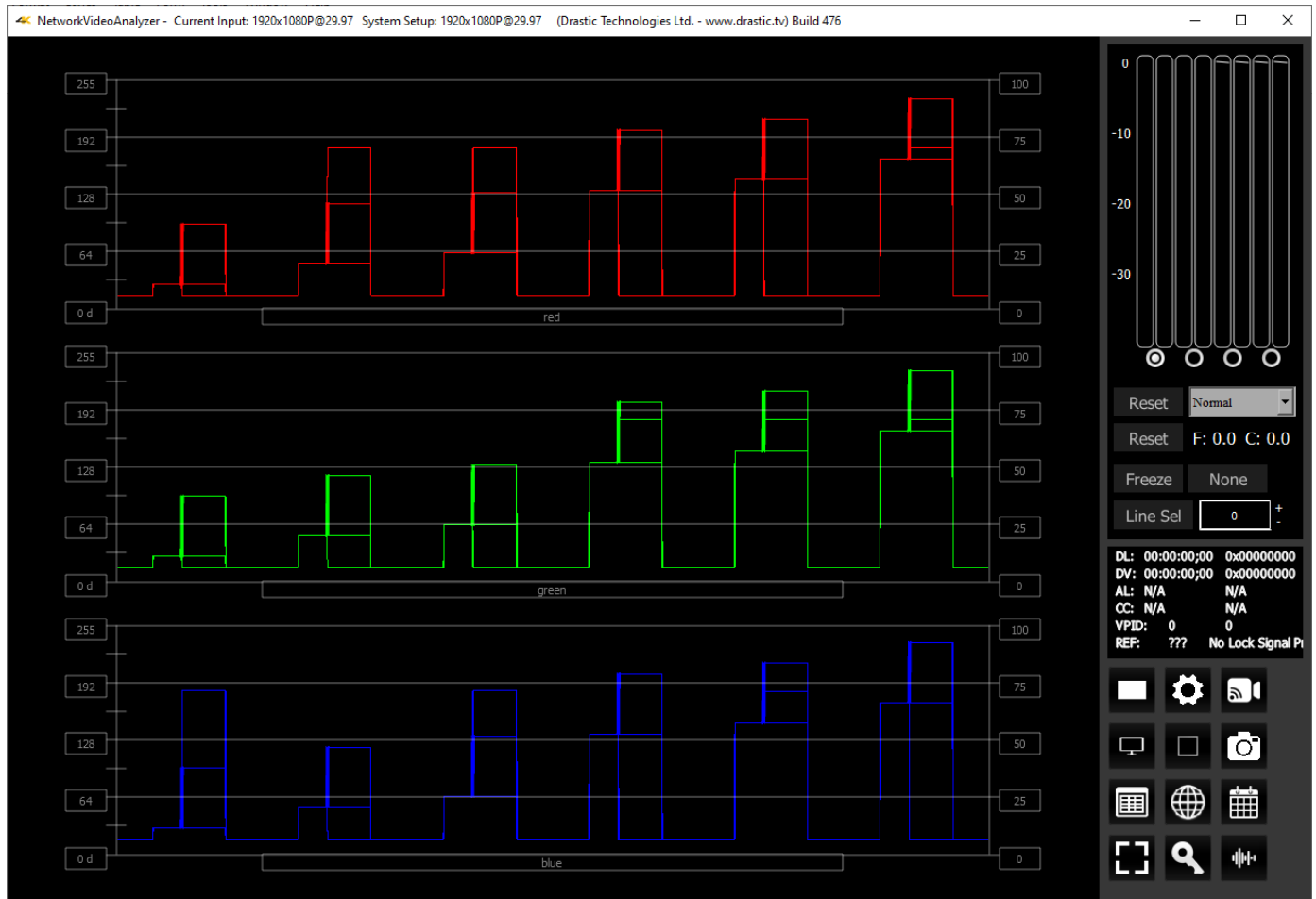


The RGB Waveform Monitor shows each of the red, green and blue signals as independent graphs, displaying the RGB, or chrominance/color values associated with the signal.

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.

# Histogram

## Histogram Setup

To display the Histogram view, press the **Scope Config** button. This opens the Scope Config window. Click on the **Histogram** button on the right. This opens the Histogram Setup section of the Scope Config.

Select a layout. 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).

For a multiple scope layout, click on the window in which you would like the Histogram displayed.
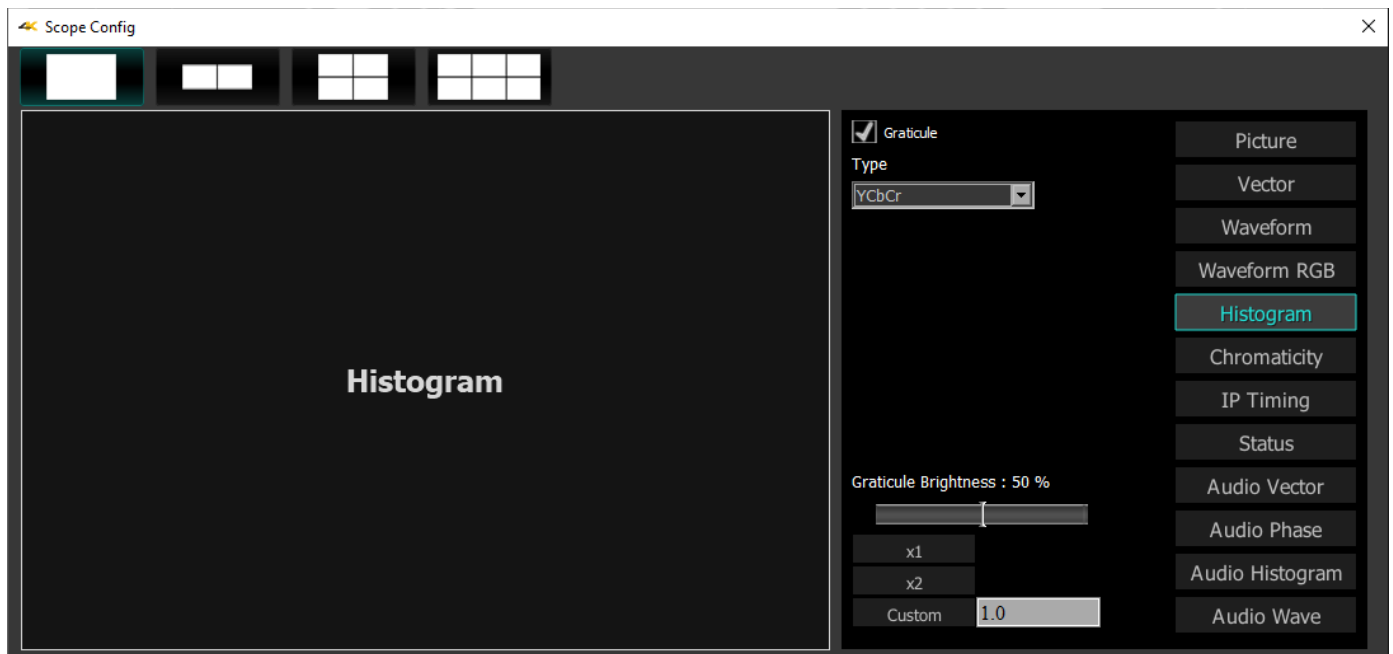


**Graticule** checkbox – when selected, the graticule is laid over the Histogram display. The brightness of the Graticule may be adjusted using the **Graticule Brightness** slider described below.

**Histogram Window**

**Type** pulldown menu – choices include:

**YCbCr**  - display 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.
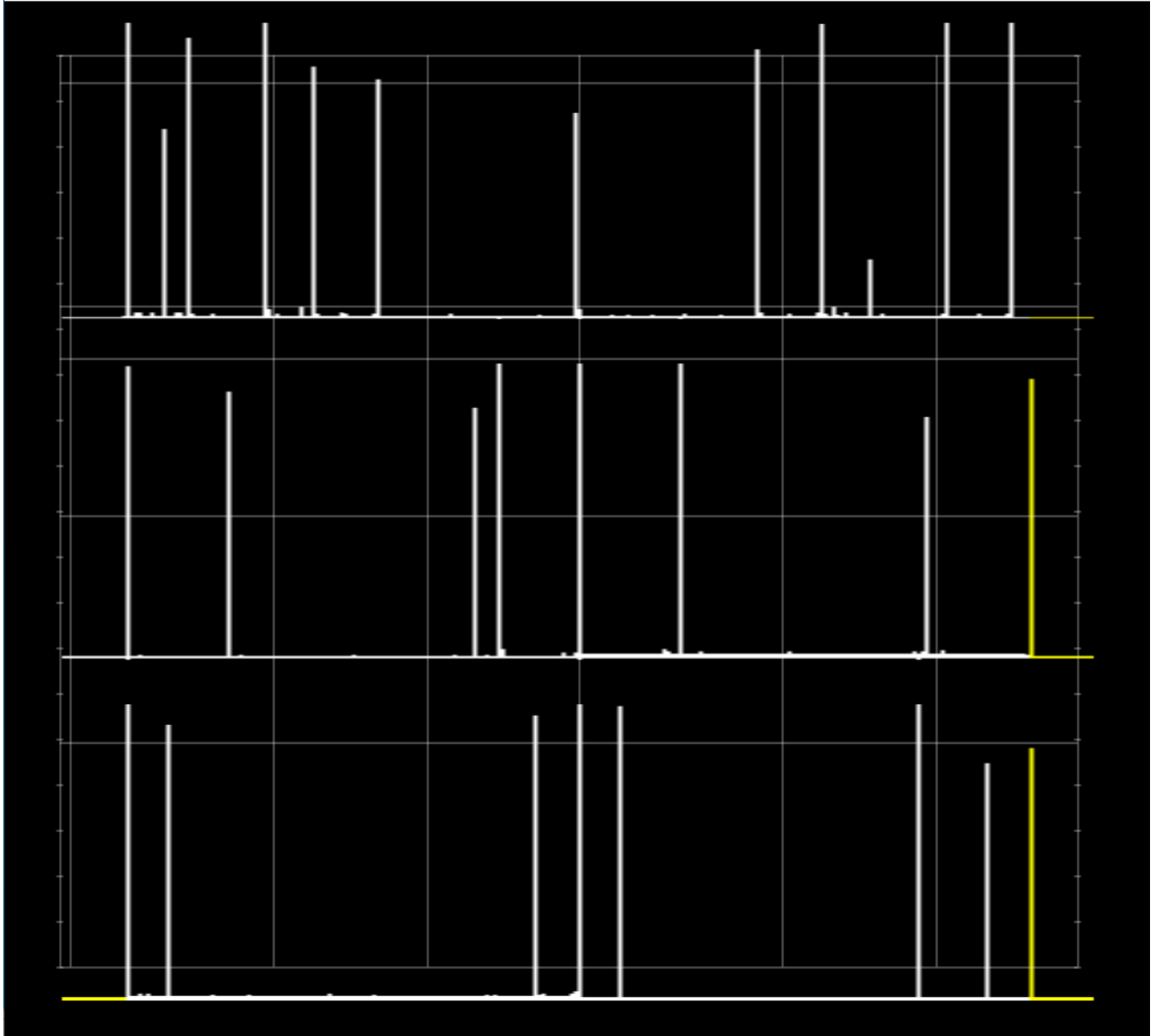


*YCbCr Histogram*

**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.
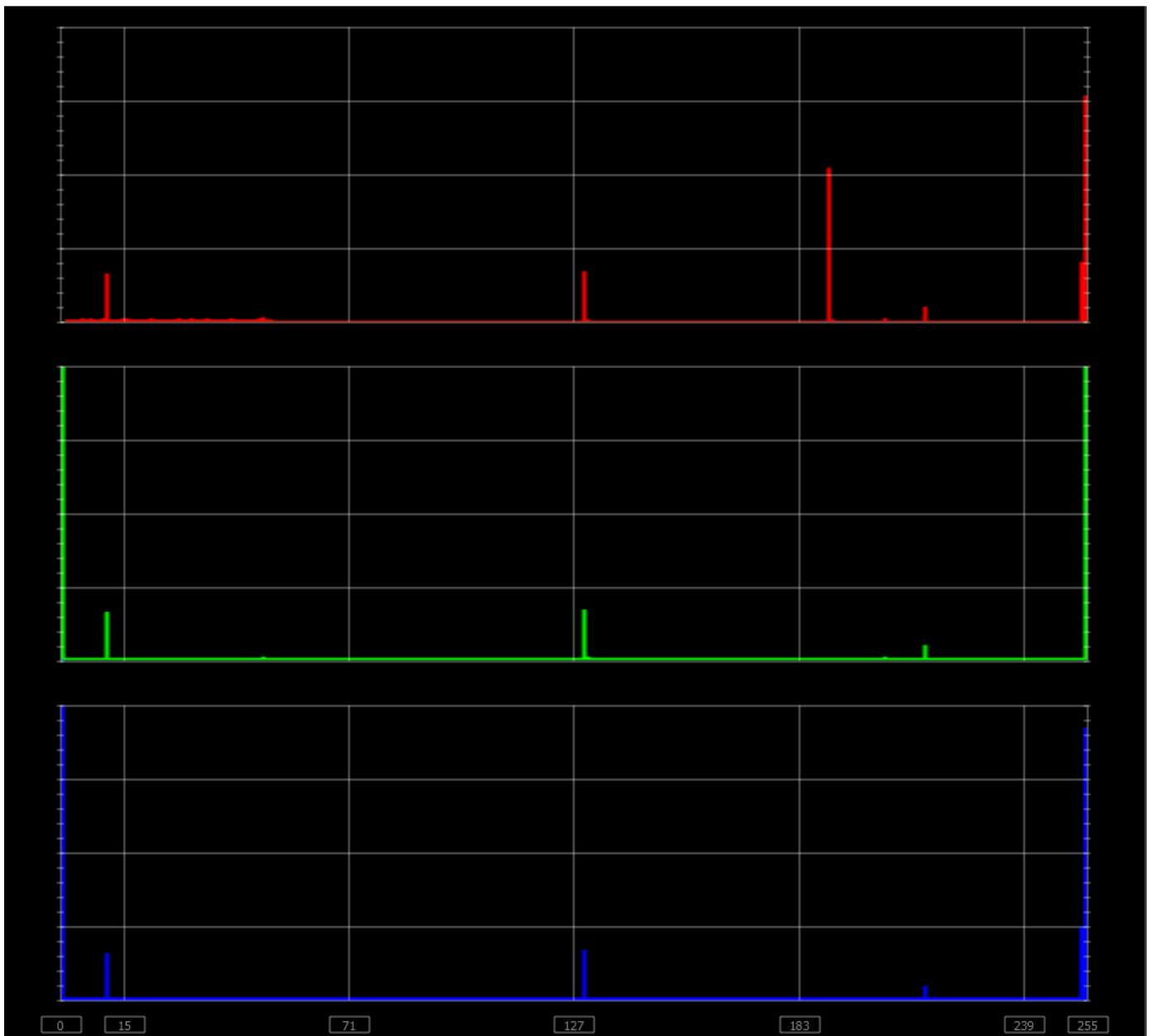


*RGB Histogram*

**HSV –** display an HSV (Hue/Saturation/Value) range
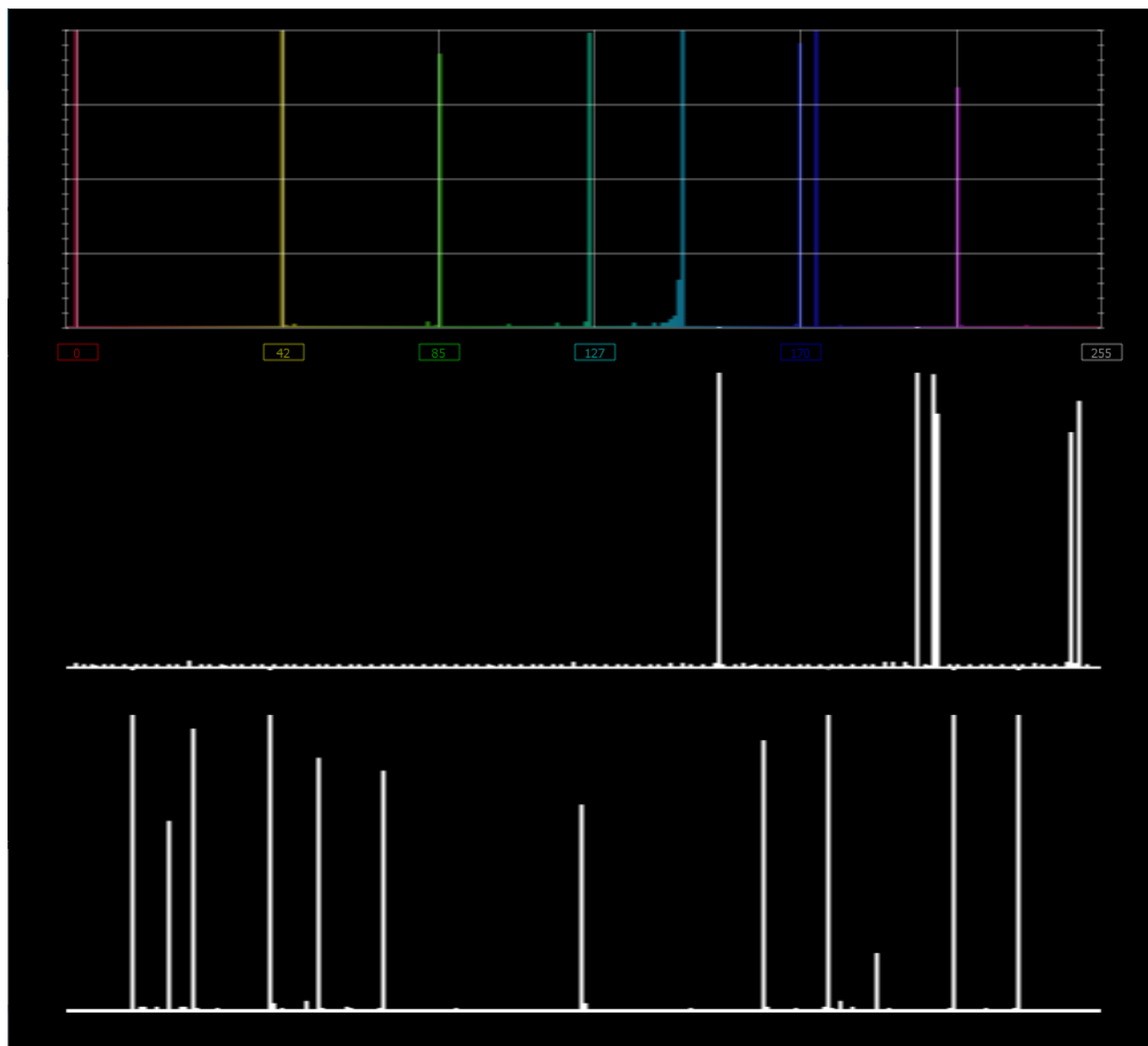


*HSV Histogram*

**Luma –** display only the luma in the signal
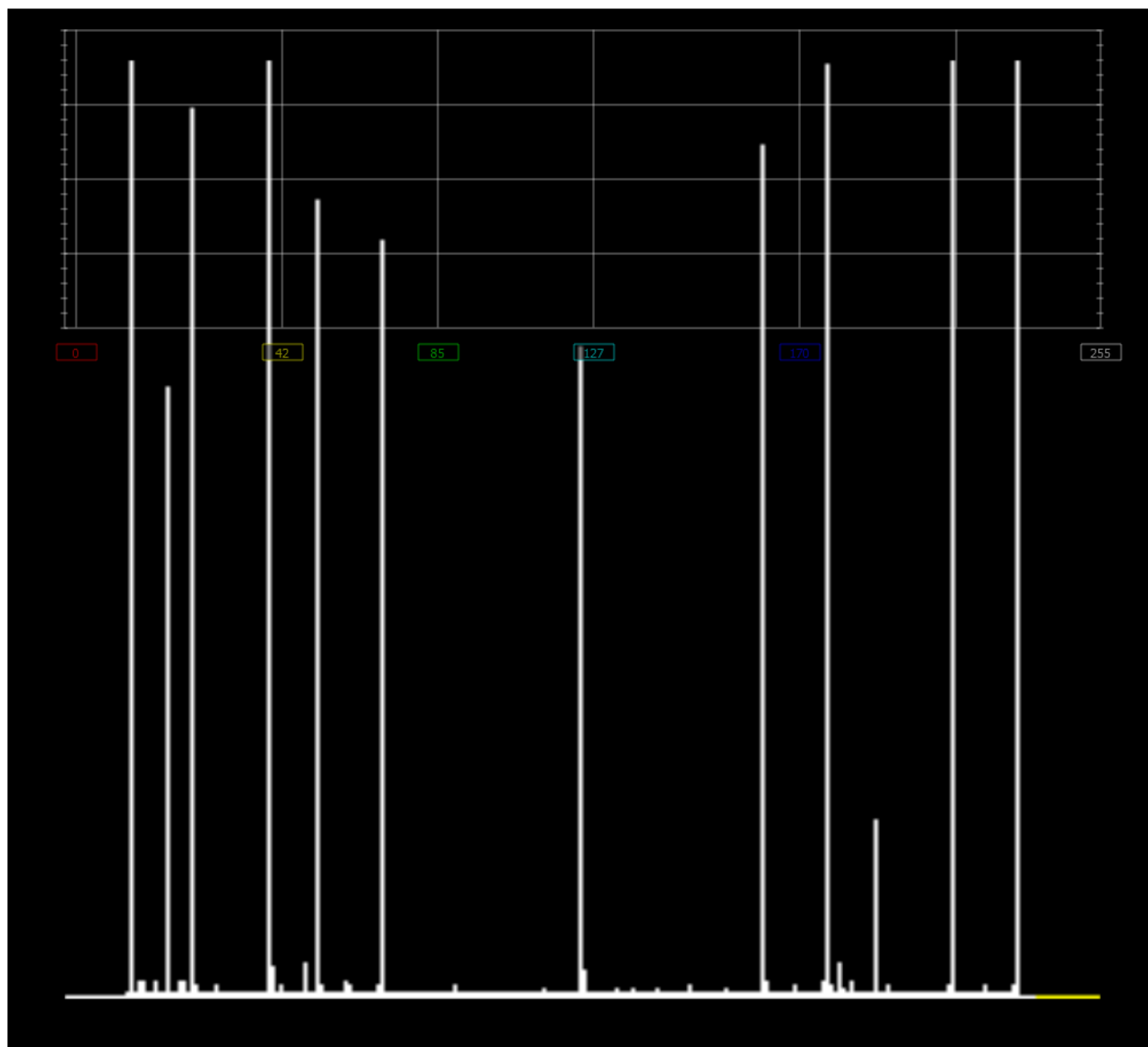


*Luma Histogram*

**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.

There are additional setup parameters for the H/S Scope.
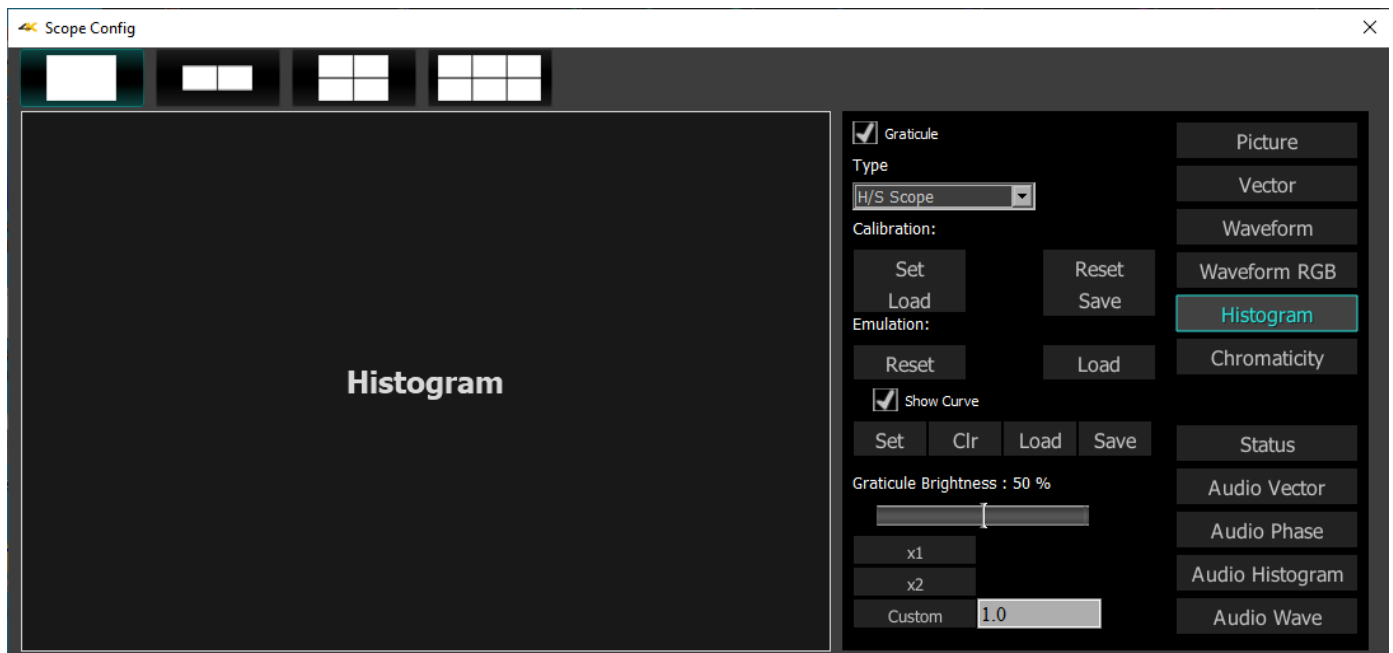


**H/S Scope Setup**

**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.
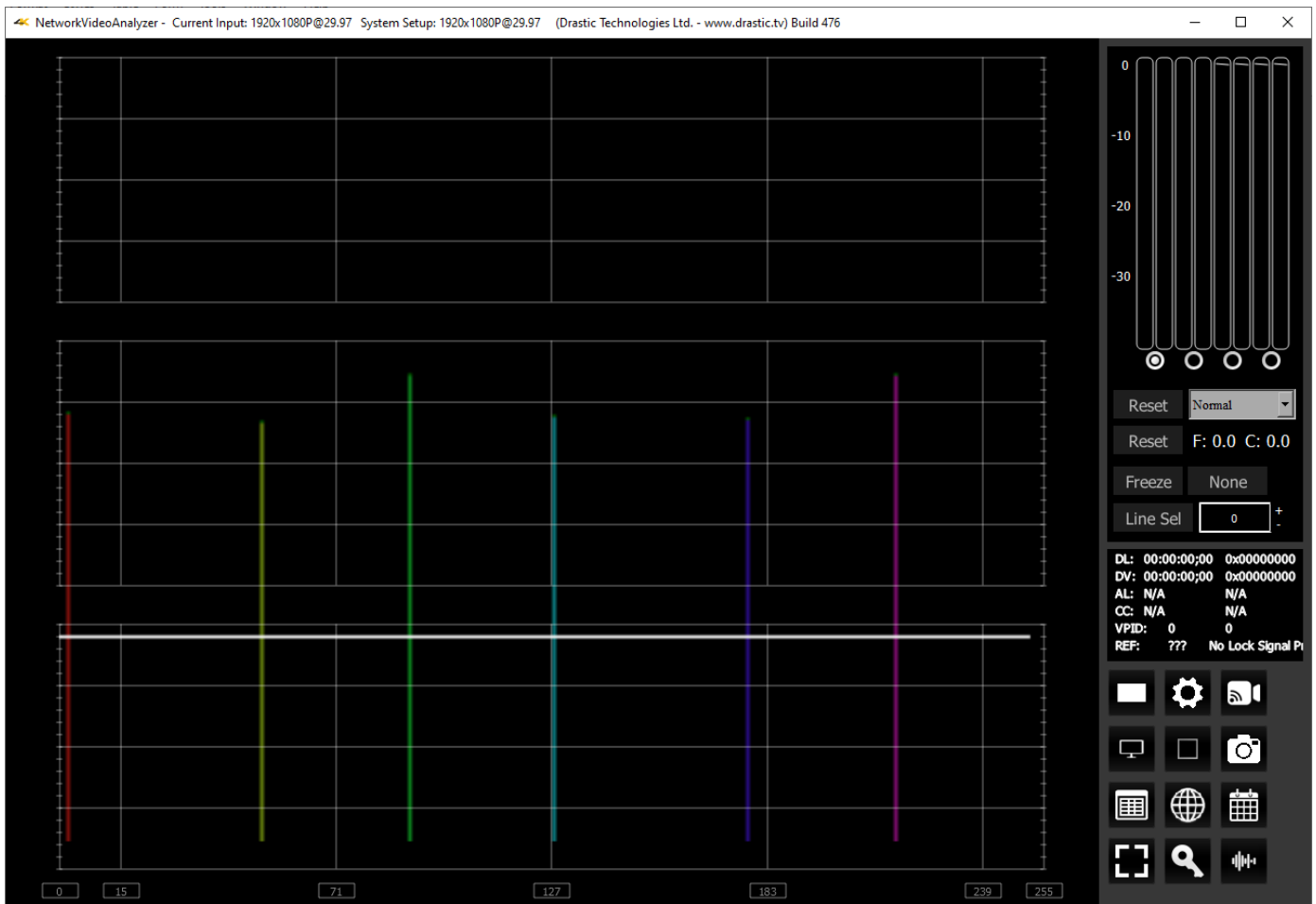
*H/S Scope Histogram*

Finally at the end of each Histogram setup, there are the following controls:

**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.

The Histogram view shows the distribution of red, green and 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
1024 possible colors.  These totals are then auto ranged to fit within the graticule and represent the
relationship between the shades of each color and between each other.

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 display the Chromaticity view, press the **Scope Config** button. This opens the Scope Config window. Click on the **Chromaticity** button on the right. This opens the Chromaticity Setup section of the Scope Config.

Select a layout. 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).

For a multiple scope layout, click on the window in which you would like the Chromaticity displayed.
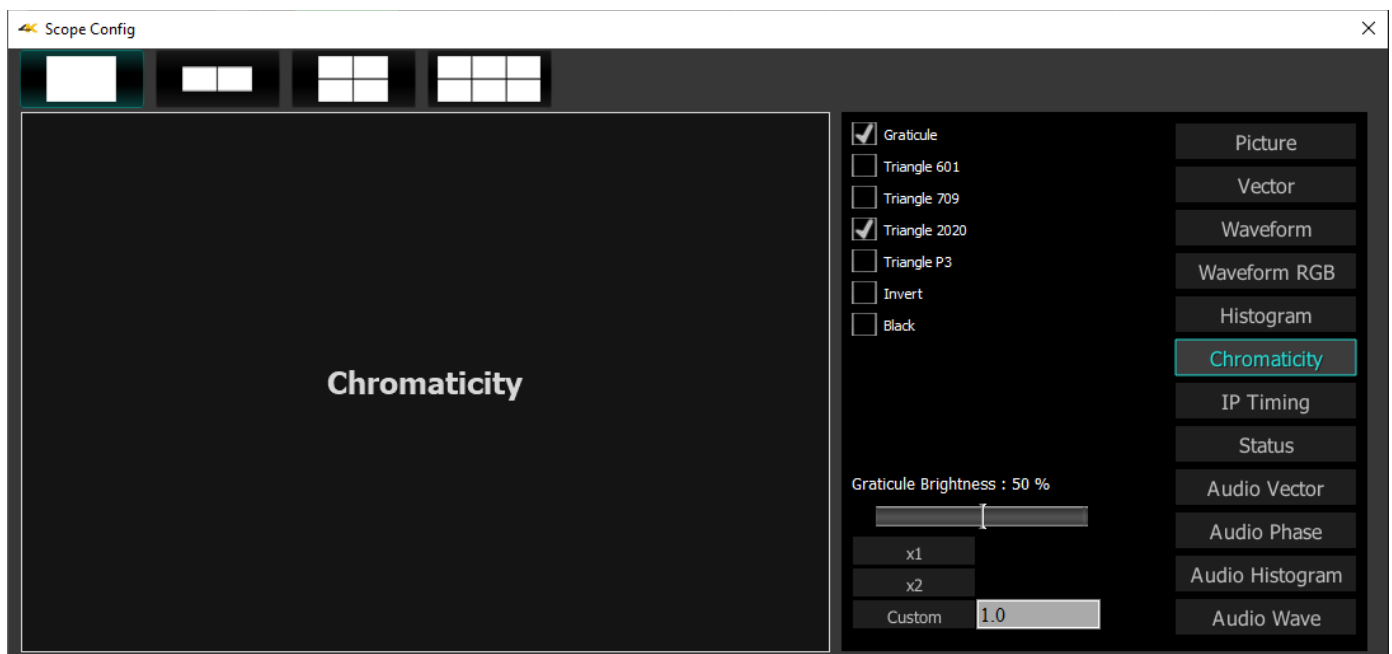


**Graticule** checkbox – when selected, the graticule is laid over the Histogram display. The brightness of the Graticule may be adjusted using the **Graticule Brightness** slider described below.
**Triangle 601** checkbox – when selected, displays the CCIR-601 (Rec. 601 or BT.601) triangle.
**Triangle 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.
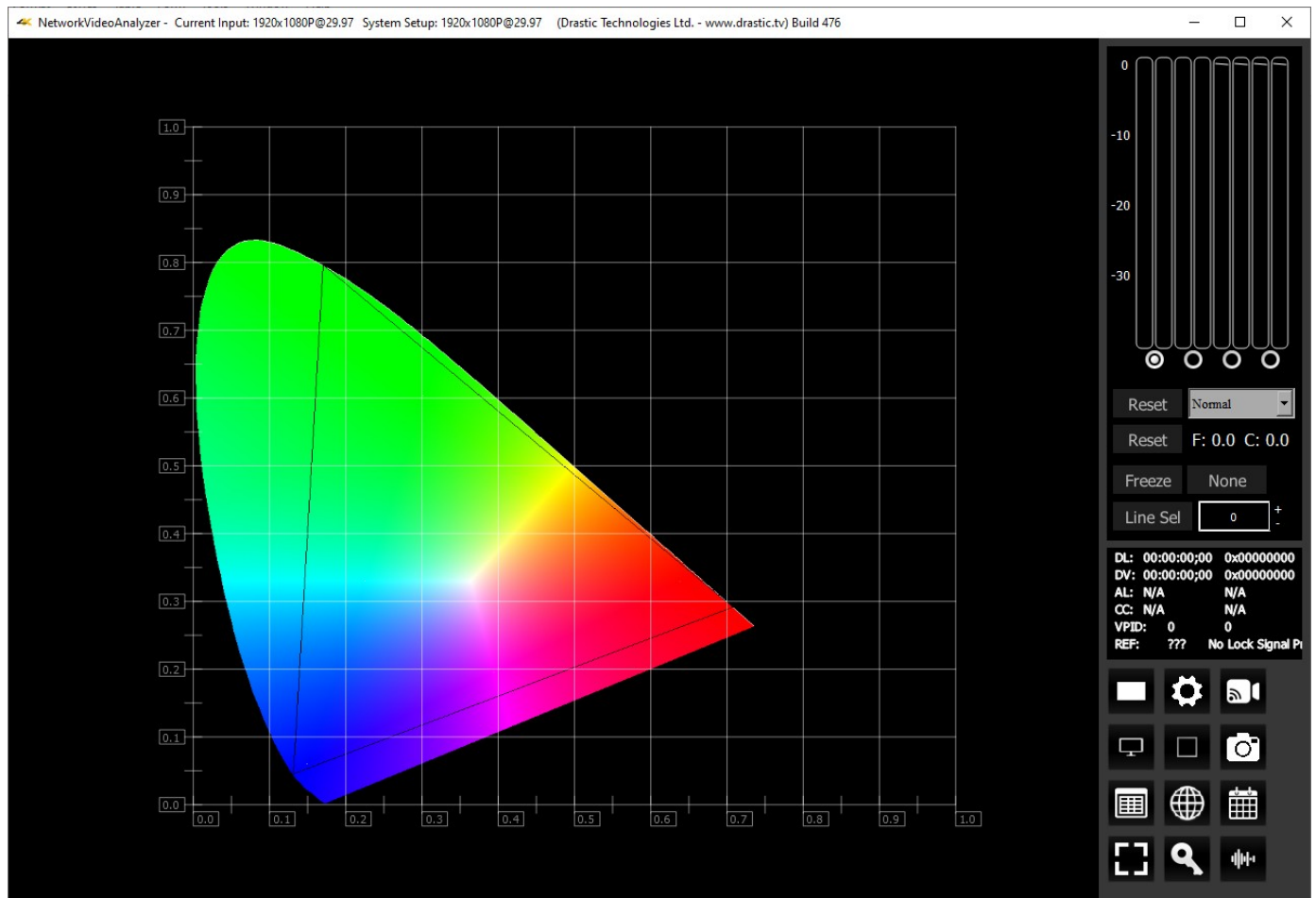


The Chromaticity scope provides a visual representation of the color in a video across all the colors of visible light.  For a particular YCbCr range (BT.2020, P3, Rec.709, CCIR-601) a triangle can be superimposed.  This will delineate the colors that fall within the acceptable range and those that are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

# IP Timing Window

## IP Timing Setup

To display the Status view, press the **Scope Config** button. This opens the Scope Config window. Click on the **Status** button on the right. This opens the Status Setup section of the Scope Config.

Select a layout. 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).

For a multiple scope layout, click on the window in which you would like the Status displayed.



**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 IP Timing window.

## IP Timing Window

Here is the IP Timing window.
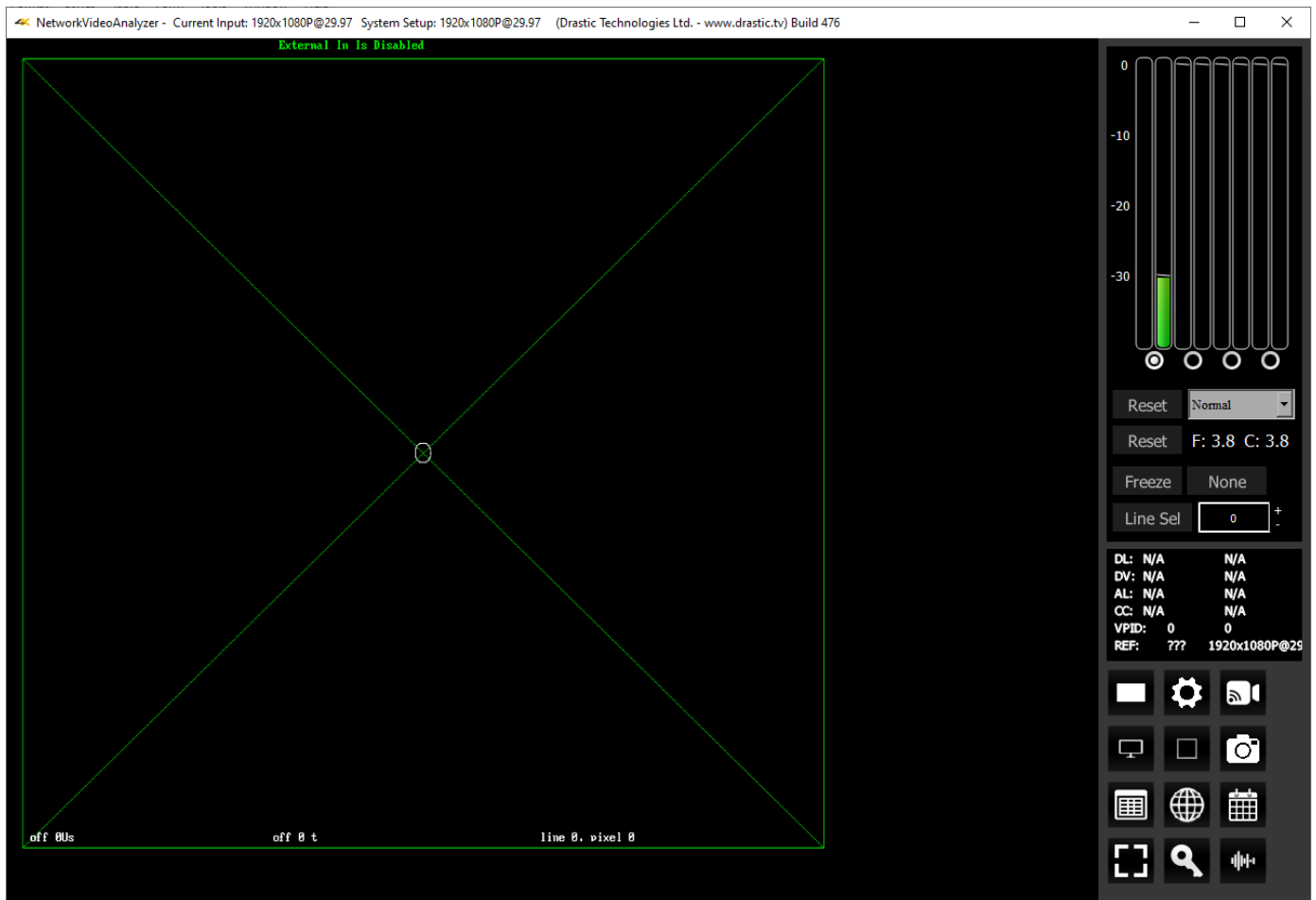


IP timing tracks the timing of the incoming SMPTE 2110 or 2022 packets on the network. The Min/Max/Avg/Mean of the distance between packets is calculated, as well as the expected value. Jitter and out of order packets are also tracked. A packet timing histogram is generated as well as a packet time vs ideal time line graph.
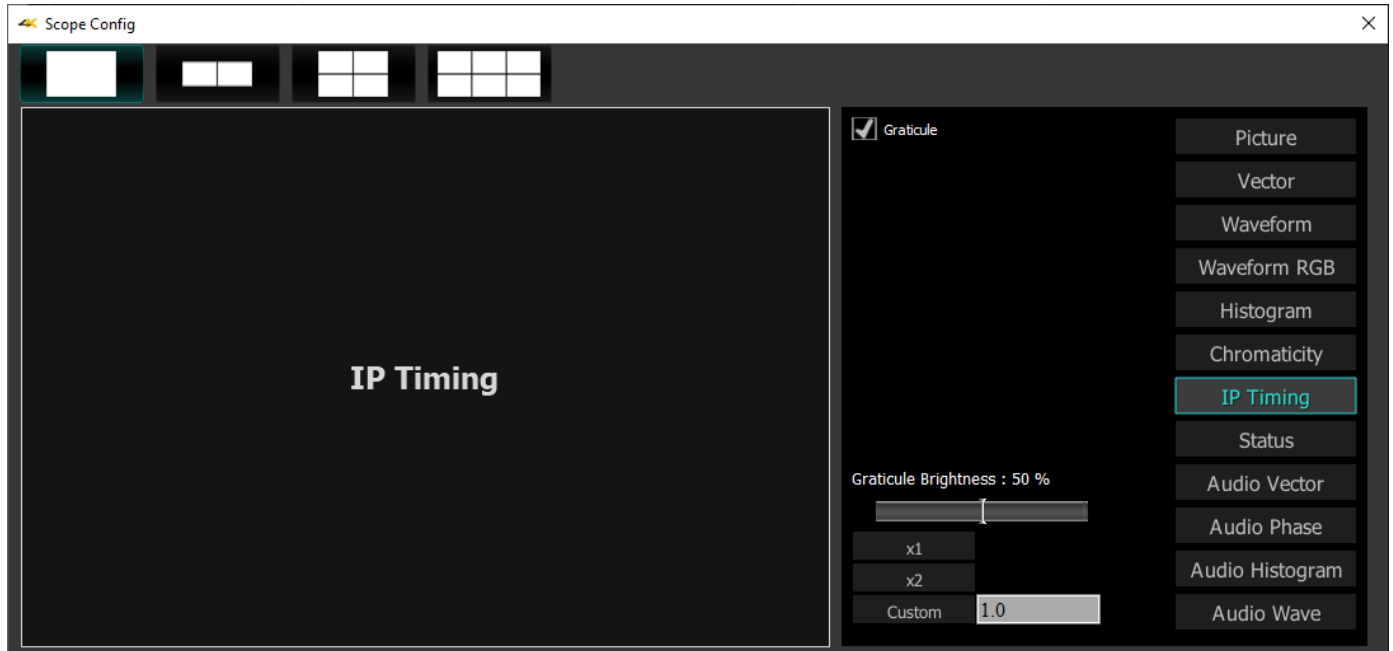
# Status Window

## Status Setup

To display the Status view, press the **Scope Config** button. This opens the Scope Config window. Click on the **Status** button on the right. This opens the Status Setup section of the Scope Config.

Select a layout. 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).

For a multiple scope layout, click on the window in which you would like the Status displayed.



**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.

# Status Window

Here is the Status window.
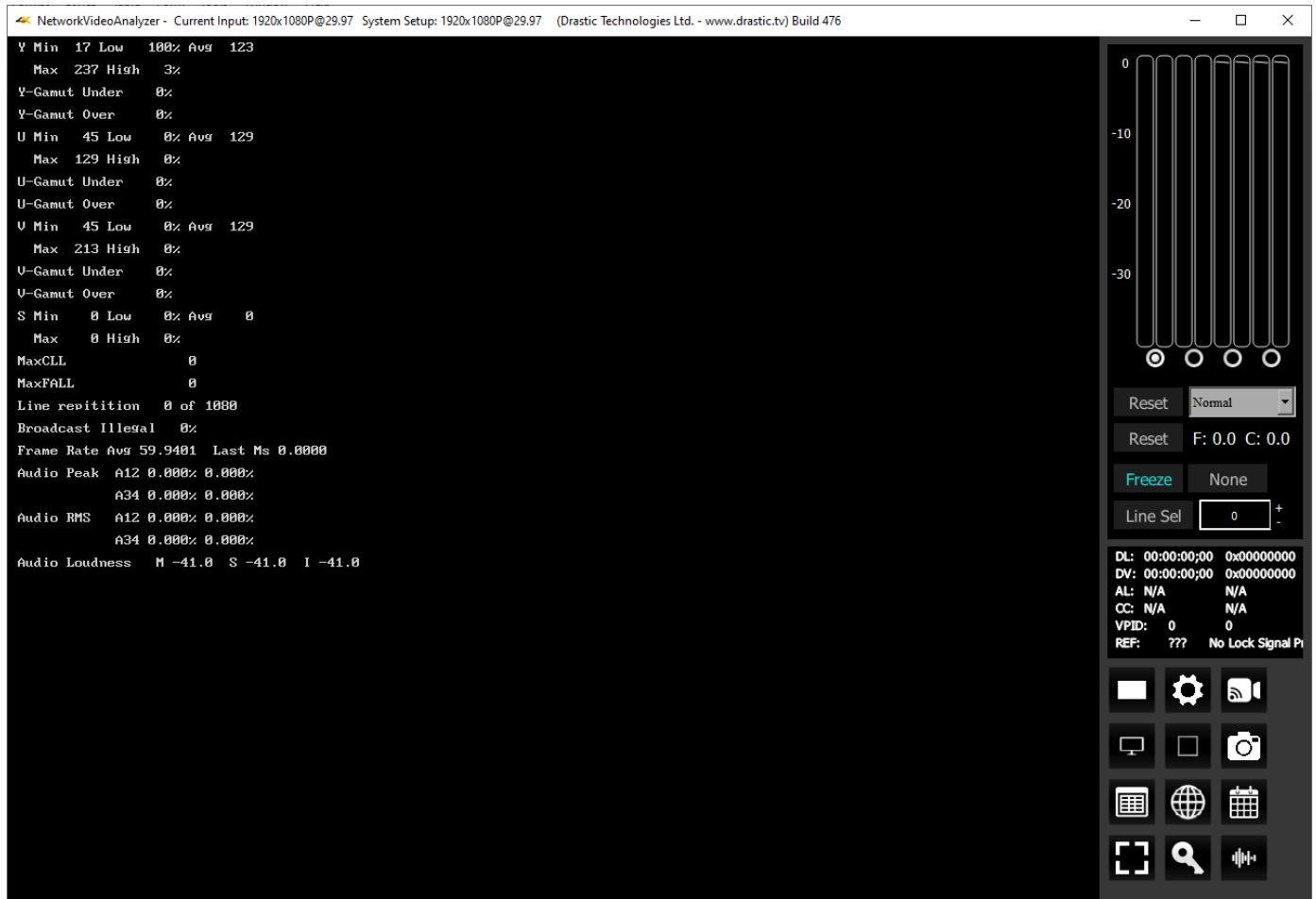


The Status window displays:

Y: Minimum and Maximum, Low and High, Average, Gamut Under, and Gamut Over values
U: Minimum and Maximum, Low and High, Average, Gamut Under, and Gamut Over values
V: Minimum and Maximum, Low and High, Average, Gamut Under, and Gamut Over values
S: Minimum and Maximum, Low and High, Average, Gamut Under, and Gamut Over values
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
Audio Peak per channel pair
Audio RMS per channel pair
Audio Loudness per channel pair

# Audio Vector

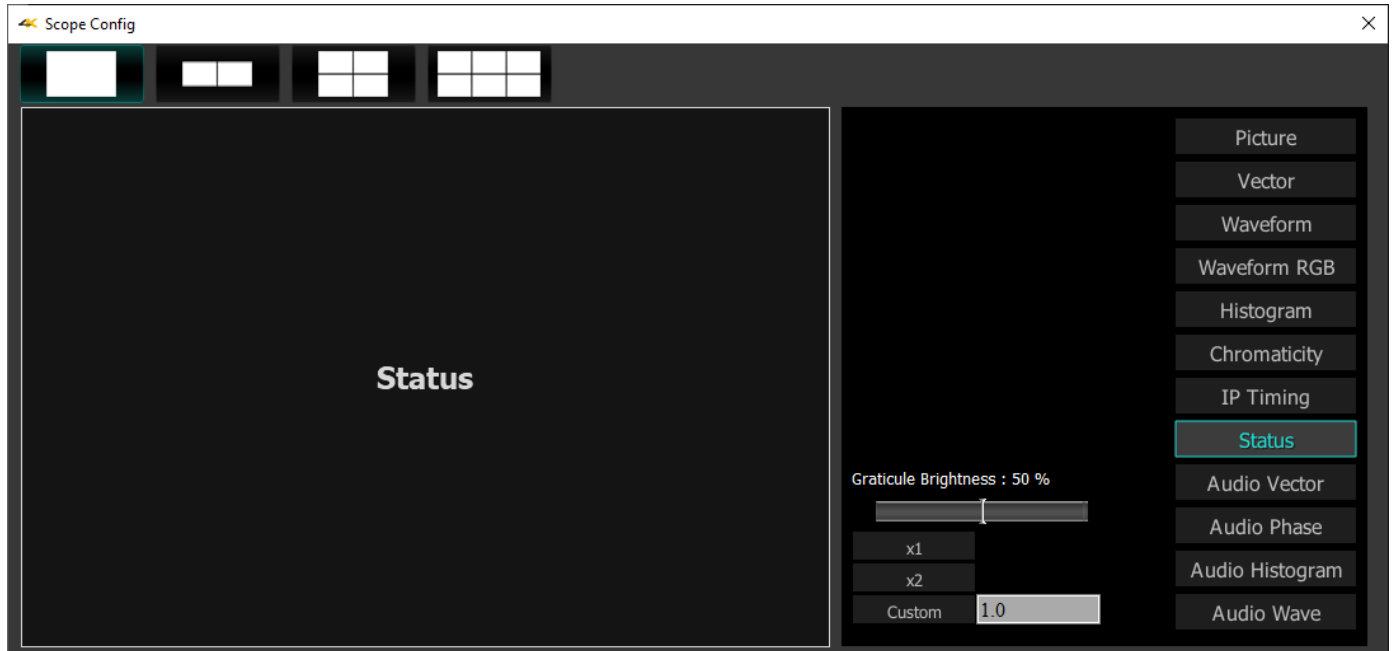## Audio Vector Setup

To display the Audio Vectorscope view, press the **Scope Config** button. This opens the Scope Config window. Click on the **Audio Vectorscope** button on the right. This opens the Audio Vectorscope Setup section of the Scope Config.

Select a layout. 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).

For a multiple scope layout, click on the window in which you would like the Audio Vectorscope displayed.
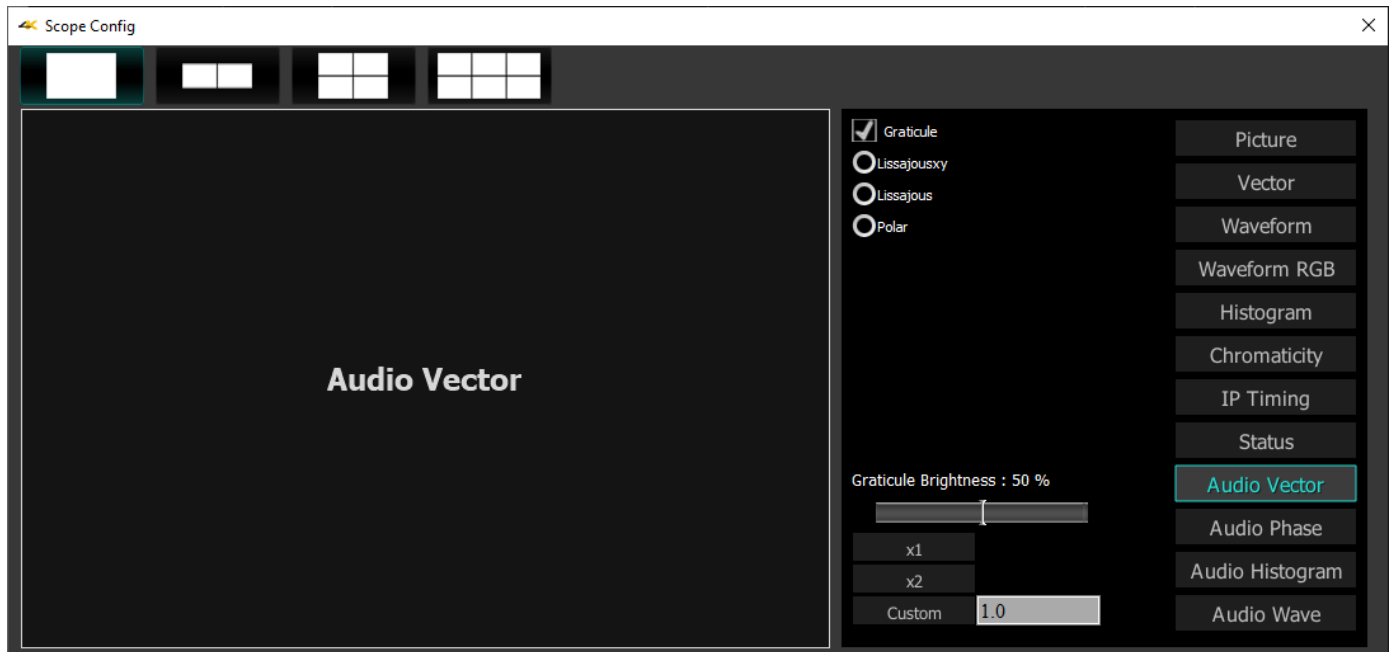


**Graticule** checkbox – when selected, the graticule is laid over the Histogram display. The brightness of the Graticule may be adjusted using the **Graticule Brightness** slider described below.
**Lissajousxy** checkbox – when selected, displays the relative phase of the selected audio pair in Lissajous 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

Here is the Audio Vectorscope window.



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. Any pair may be selected in the setup.

# Audio Phase

## Audio Phase Setup

To display the Audio Phase view, press the **Scope Config** button. This opens the Scope Config window. Click on the **Audio Phase** button on the right. This opens the Audio Phase Setup section of the Scope Config.

Select a layout. 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).

For a multiple scope layout, click on the window in which you would like the Audio Phase displayed.



**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.
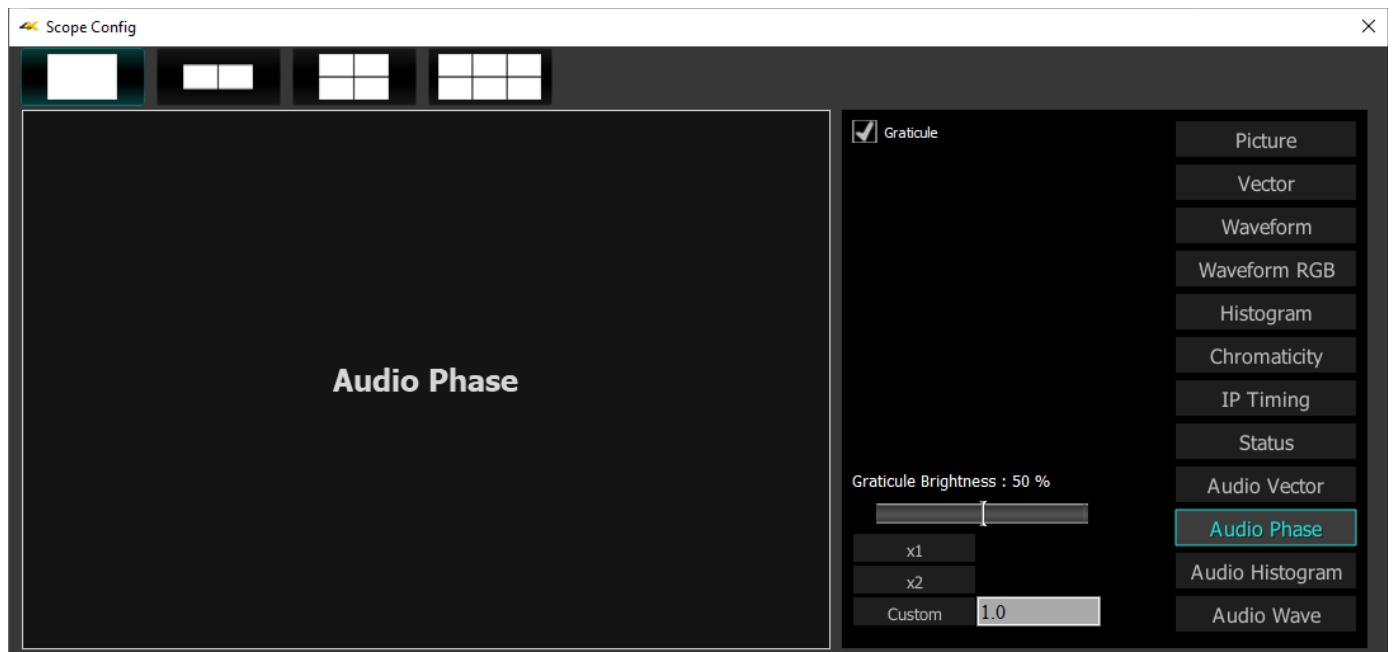
# Audio Histogram

## Audio Histogram Setup

To display the Audio Histogram view, press the **Scope Config** button. This opens the Scope Config window. Click on the **Audio Phase** button on the right. This opens the Audio Histogram Setup section of the Scope Config.

Select a layout. 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).

For a multiple scope layout, click on the window in which you would like the Audio Histogram displayed.
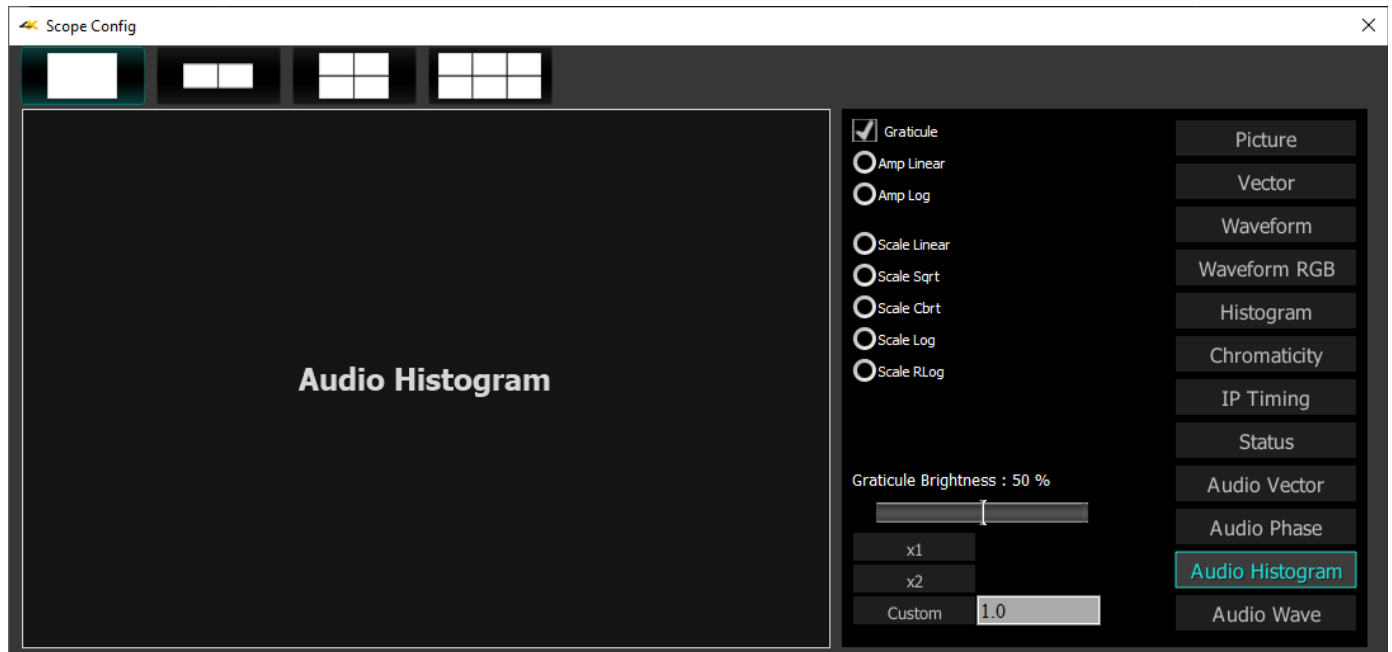


**Graticule** checkbox – when selected, the graticule is laid over the Audio Histogram display. The brightness of the Graticule may be adjusted using the **Graticule Brightness** slider described below.
**Amp Linear** selector – clicking in the Amp Linear checkbox sets the Amp to linear
**Amp Log** selector – 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 displ. 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.

# Audio Wave

## Audio Wave Setup

To display the Audio Wave view, press the **Scope Config** button. This opens the Scope Config window. Click on the **Audio Wave** button on the right. This opens the Audio Wave Setup section of the Scope Config.

Select a layout. 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).

For a multiple scope layout, click on the window in which you would like the Audio Wave displayed.



**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.

# Scope Layout

## Scope Config

To set up the layout of the various scopes, press the **Scope Config** button.

Along the top of the Scope Config window, there are four available layouts for the interface.



**Layout 1** – clicking on layout 1 sets the display to use a single scope. Once this selection has been made, clicking on one of the scope selectors to the right will set the display to that scope.

**Layout 2** – clicking on layout 2 sets the display to show two scopes of equal size side by side.

**Layout 3** – clicking on layout 3 sets the display to show four scopes of equal size stacked in a two by two grid.

**Layout 4** – clicking on layout 4 sets the display to show six scopes of equal size, configured in 2 rows of 3 screens each.

# An Example - 4 Scopes in a 2x2 Grid

In the **Scope Config** window, pressing the 3rd icon from the left (displayed with blue highlight to indicate selected) sets the window to use four scopes arrayed in a 2 x 2 grid. Clicking on the window at top left (outlined, in gray to indicate selected), and then pressing the **Picture** selector sets this window to display the Video signal.
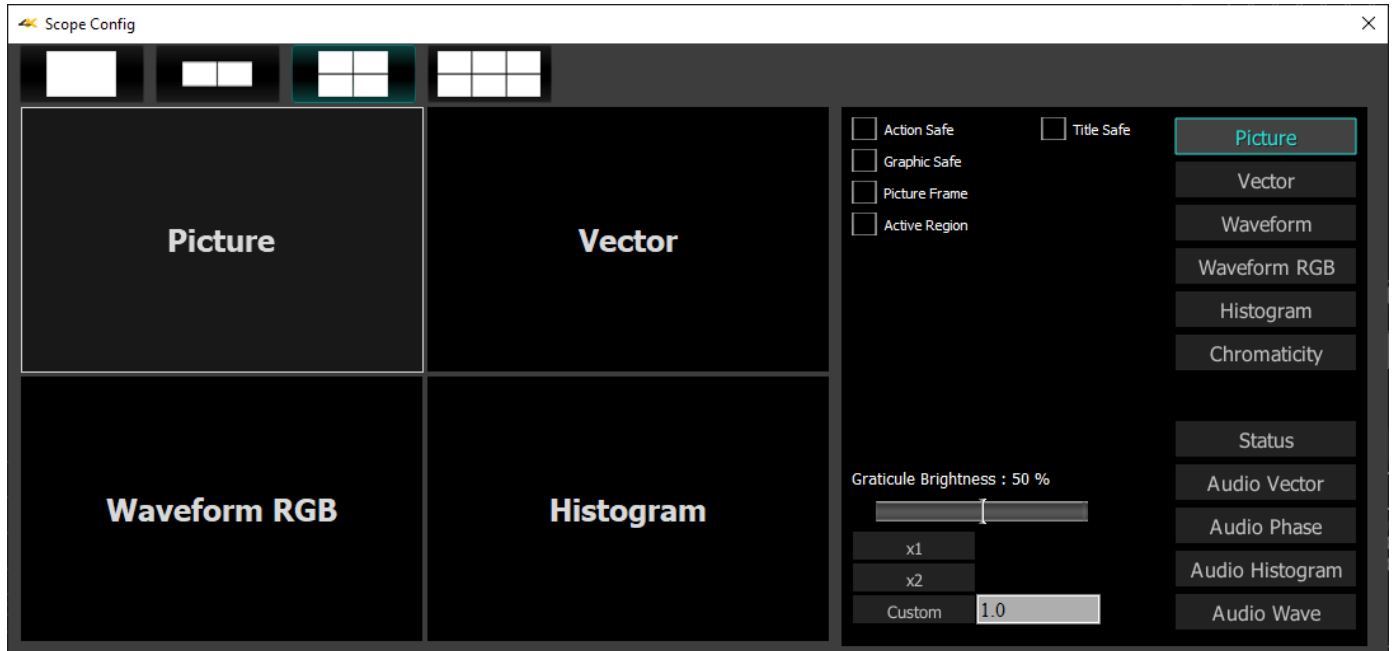


To set each screen:

Click on the screen.
Click on the desired scope's button from the selection on the right. Currently this selection includes Picture, Vector, Waveform, Waveform RGB, Histogram, Chromaticity, IP Timing, Status, Audio Vector, Audio Phase, Audio Histogram, and Audio Wave.
Selecting the scope as per the previous step sets the selected screen to that scope, and displays the scope's available settings. Adjust these settings as required for the application.

Once the layout has been set up, press the red x in the corner to close the **Scope Config** window.

**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.

**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.
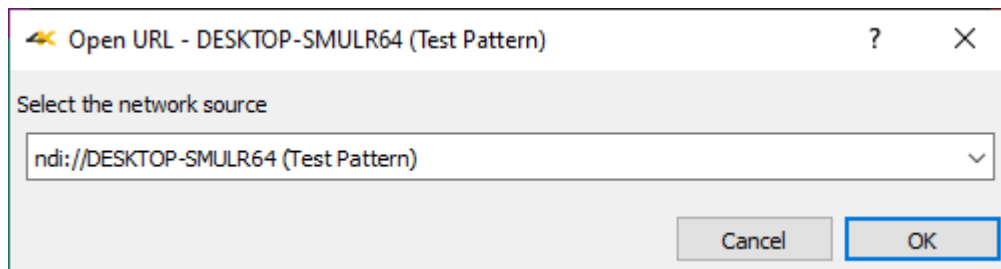


**Video Input** pulldown menu - allows the user to select between the HD-SDI, HDMI or analog inputs. In the case of dual link, 2 inputs are used. In the case of quad HD (3840 x 2160) and 4K (4096 x 2160), all four I/O ports of the 3D are in use, so the downconvert is HDMI and analog only. The user may 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

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

**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** – 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** – adjust the Transfer Gamma setting. The user will be presented with a list similar to this:
- SDR 709/601
- PQ/HDR10
- HLG

**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** 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** 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
- Component RGB
- Component YUV
- Component YUV M2
- Component YUV SMPTE

**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** 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** – 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 –** 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
- Screen Capture
- Adobe ScopeDirect
- Avid ScopeDirect
- OpenFX ScopeDirect
- Assimilate ScopeDirect

**Board Select –** allows 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. Clicking between boards can reset the selected board. The user may be presented with a list similar to this:

- First Service/Screen
- Second Service/Screen
- Third Service/Screen
- Fourth Service/Screen
- Fifth Service/Screen
- Sixth Service/Screen

**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** fields – allows the user to set 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.
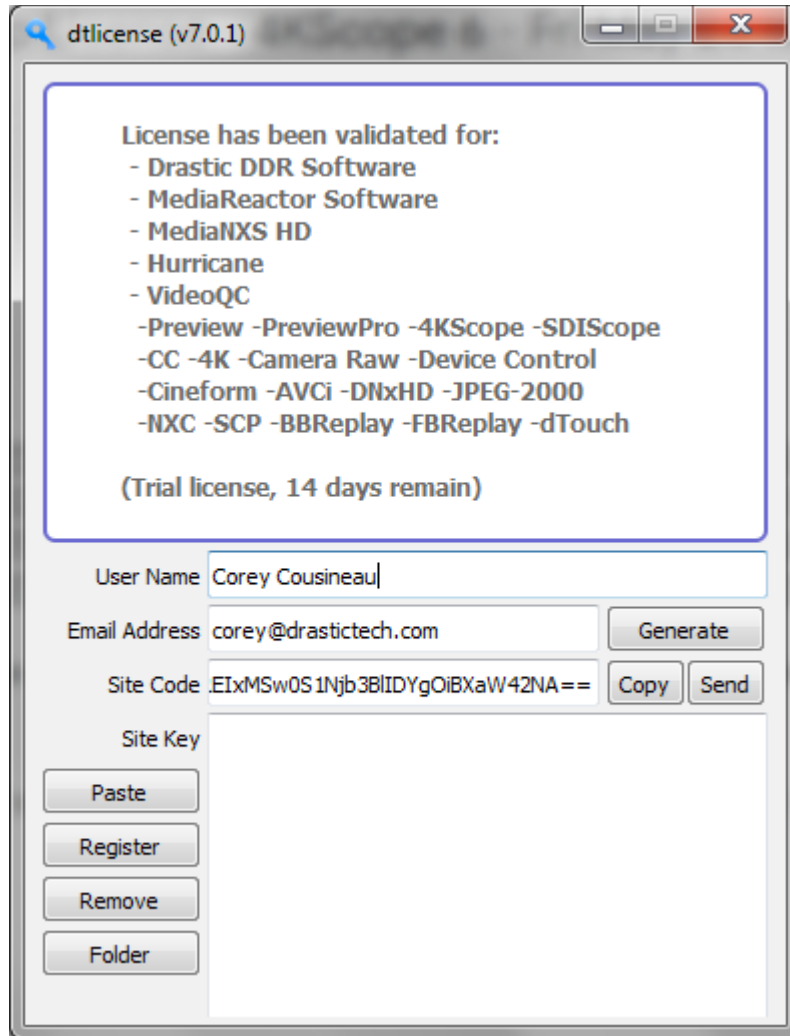
**Auto Follow Input** checkbox is selected, whenever the input type is changed, the settings for Network Video Analyzer are changed as well. If not checked, switching the input signal will not switch the settings.

**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 –** (hardware dependent) In systems that support 16 channel audio, the user would be able to select between 8 and 16 channel audio. Otherwise, only the 8 channel button would appear.

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

**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



This button does one of two things when pressed, depending on what the IP input type is set to in the System Config window.

When set to IP video, the IP Setup button opens the **IP Video Setup** window, which allows the user to set up how IP video is handled.

When set to NDI video, the IP Setup button opens the **Open URL** window, which allows the user to select between available NDI video sources.

**IP Video Setup** window – this window allows the user to set up how IP video is handled, and to specify the source, destination, and interface addresses for the Receiver, and the Sender. Clock source, master, and domain settings are present. Settings are maintained separately for video, audio, and ancillary data.



**Channel** pulldown – select between channels.
**Override Board Settings** checkbox – select to automatically set up the configuration according to the source signal parameters.
**Type** pulldown – set the type of signal. Choices include ST2110, ST2022, and TR-01.
**Receive Settings:**
    **Source Address** field – enter the source IP address for receiver mode
    **Source Port** field – enter the source port for receiver mode
    **Destination Address** field – enter the destination IP address for receiver mode

**Destination Port** field – enter the destination port for receiver mode
**Interface** field – enter the interface IP address for receiver mode
**Send Settings:**
**Source Address** field – enter the source IP address for sender mode
**Source Port** field – enter the source port for sender mode
**Destination Address** field – enter the destination IP address for sender mode
**Destination Port** field – enter the destination Port for sender mode
**Interface** field – enter the interface IP address for sender mode
**Clock Source** pulldown - select between Internal, Black Burst, or SMPTE 2059
**Clock Master** pulldown - select between Best, Channel 1, and Channel 2
**Video**, **Audio**, and **Ancillary** radio buttons - settings are maintained separately for video, audio, and ancillary data. Clicking one of these buttons turns the other two off, and provides settings for the selected parameters.
**Load File** button – opens a browser which allows the user to load a saved settings (*.ini) file.
**Save File** button – opens a browser which allows the user to save the current IP configuration as a settings (*.ini) file.
**Accept** button – press to set any changes that have been made to the configuration
**Cancel** button – press to close the IP Video Setup window without making any changes.

**Open URL** window – this window provides a pulldown menu which allows the user to select between available network sources to monitor.
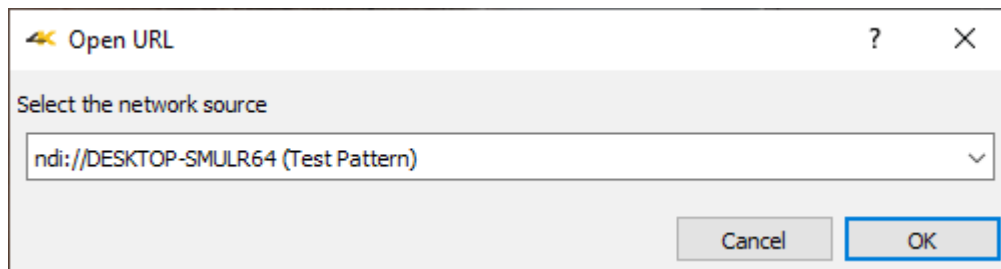
# Display Mode
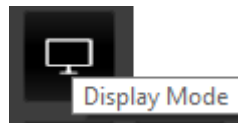


**Display Mode** button – opens the Monitor Settings window, which allows the user to select between available display modes.



*Monitor Settings window*

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

Modes include:

- **Off** – Display the signal normally
- **Luma Only** – Show only the Y or brightness of the picture.
- **Red Only** – Show only the red channel
- **Blue Only** – Show only the blue channel
- **Green Only** – Show only the green channel
- **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.
- **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.
- **Clipping** – Draw green anywhere the signal is too high or too low. Activates the High Luma slider and the Low Luma slider, allowing the user to adjust these settings.
- **Edge Difference** – Highlight every edge in the picture
- **Focus Assist** – Show areas of the image that are in focus
- **Calibrate** – Activates the Brightness, Contrast, Saturation, Warmth, and Gamma sliders, and the Interlaced checkbox. Allows the user to calibrate the display, and select for interlaced signals.
- **Flip Flop** – Reverse the picture horizontally or vertically. Activates the Flip checkbox and the Flop checkbox, which allows the user to select one and/or the other.
- **Show Alpha** – Show the alpha component of an RGBA or YCbCr+A signal
- **Opacity** – Mix the signal with a loaded still image for reference. Activates the opacity slider, and the Invert checkbox, which allows the user to set the opacity level, and Invert the display.
- **Luma Key** – Show the video luma keyed over a checkerboard or image. Activates the High Luma slider, the Low Luma slider, the Smoothing slider, and the Invert checkbox, so the user can adjust the luma settings, and check the box to Invert the key.
- **Green Screen Key** – Show the image green screen keyed over a checkerboard
- **Chroma Key Simple** – activates the Interlaced checkbox. 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.
- **Chroma Key Despill** – Activates the Basic/Primatte/Ultimatte/Mask radio buttons. 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.
- **False Colour** – Show each exposure level as a color. 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 |

**Browse** button and field – press the browse button to locate and select...

Depending on the hardware, the following settings may be adjusted.

- **Luma** slider – activated by selecting the Zebra Luma display in the top pulldown menu. Allows the user to adjust the luma setting.
- **High Luma** slider – activated by selecting either the Luma Key display, or Clipping display in the top pulldown menu. Allows the user to adjust the high luma setting.
- **Low Luma** slider – activated by selecting either the Luma Key display, or Clipping display in the top pulldown menu. Allows the user to adjust the low luma setting.
- **Smoothing** slider – activated by selecting the Luma Key display in the top pulldown menu. Allows the user to adjust the smoothing setting applied to the luma key.
- **Opacity** slider – activated by selecting the Opacity display in the top pulldown menu. Allows the user to adjust the opacity setting.
- **Intensity** slider – reserved for future development
- **Brightness** slider – activated by selecting the Calibrate display in the top pulldown menu. Allows the user to adjust the brightness setting.
- **Contrast** slider – activated by selecting the Calibrate display in the top pulldown menu. Allows the user to adjust the contrast setting.
- **Saturation** slider – activated by selecting the Calibrate display in the top pulldown menu. Allows the user to adjust the saturation setting.
- **Warmth** slider – activated by selecting the Calibrate display in the top pulldown menu. Allows the user to adjust the warmth setting.
- **Gamma** slider – activated by selecting the Calibrate display in the top pulldown menu. Allows the user to adjust the gamma setting.

- **Chroma** slider – activated by selecting the Zebra Chroma display in the top pulldown menu. Allows the user to adjust the chroma setting.
- **Hue Diff** slider – reserved for future development
- **Sat Diff** slider – reserved for future development
- **Lightness** slider – reserved for future development
- **Interlaced** checkbox – activated by selecting the Calibrate display in the top pulldown menu. check to set Network Video Analyzer for an interlaced signal format.
- **Full Range** checkbox – check to use the full range
- **Invert** checkbox – activated by selecting the Chroma Key Simple, Chroma Key Despill, Green Screen Key, Luma Key, or Opacity display in the top pulldown menu. Allows the user to invert what is being passed through the matte or key.
- **Flip** checkbox – activated by selecting the Flip Flop display in the top pulldown menu. Checking this box displays the signal reversed from top to bottom.
- **Flop** checkbox – activated by selecting the Flip Flop display in the top pulldown menu. Checking this box displays the signal reversed from left to right.
- **Basic/Primatte/Ultimatte/Mask** radio buttons – activated by selecting the Chroma Key Despill display in the top pulldown menu. Allows the user to select the type of chroma key being used.

# Manual
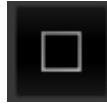
Manual button – opens up this manual for quick reference.

# Capture Image

**Frame Grab** button – provides options for capturing a frame of video for reference. Images are saved in C:\Users\<your computer>\Pictures\Network Video Analyzer. Opens the following dialog:
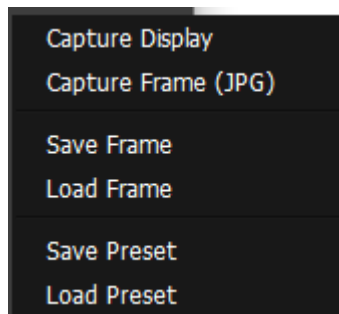
**Capture Display** – Capture the interface with the current video and scopes to an image

**Capture Frame JPG** - by selecting this option or using <CTRL>-1, a JPG image can be captured to your Pictures/Network Video Analyzer/ directory 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 (YUV, V210, RGB10) image in full, bit perfect images to your Pictures/Network Video Analyzer/ directory by selecting this option or by pressing <CTRL>-0.  These can be read with videoQC or converted with MediaReactor.

**Load Frame** – opens a browser pointed at your Pictures/Network Video Analyzer/ directory so you can load a frame you have saved.

**Save Preset** – opens a browser, which allows the user to save the current layout in a location of their choice, 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.



At the top of the data view the following controls are offered:



**Start Pixel** field and +/- buttons – displays the current start pixel. The user may click in this box to enter a new start pixel, or use the +/- buttons to increment the start pixel up or down by single pixels.

**Start Line** field and +/- buttons – displays the current start line. The user may click in this box to enter a new start line, or use the +/- buttons to increment the start line up or down by single lines.

**Hex/Dec** buttons – select between hexadecimal or decimal values to display.

**Freeze** button – freeze the current frame of video for closer inspection.

**Find** field and button – enter a hexadecimal value into the field and press the Find button, and the data view will highlight any instances of this value it finds.

**Show ANC** checkbox – selecting this checkbox will display any valid ancillary data found

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.

# Web Page



**Globe** button – opens up the web page for Network Video Analyzer.

# Network Video Analyzer Web Interface
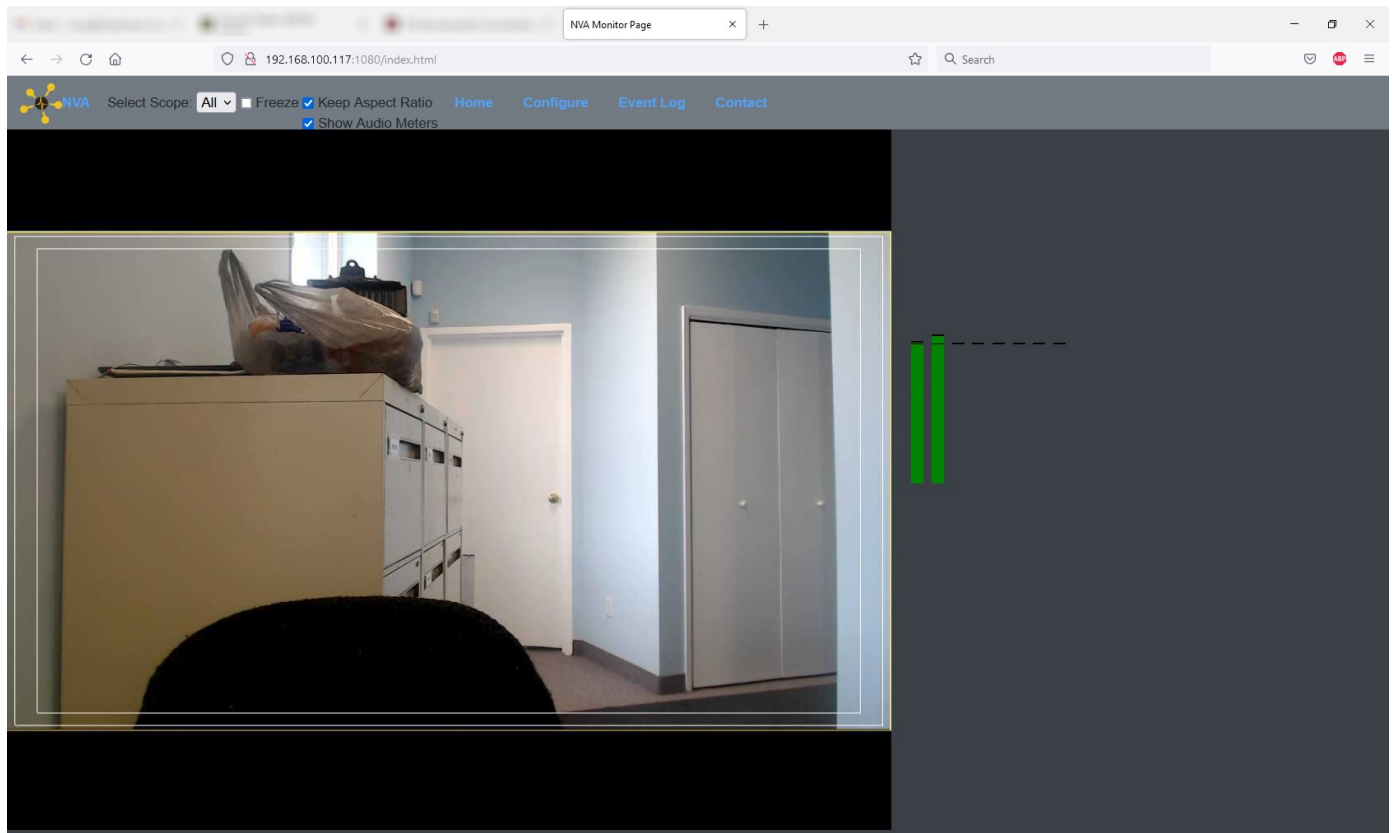


Network Video Analyzer version 7 and greater software features a web interface, so the user can remotely set up the scopes. Specifically, the user can set:

- 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
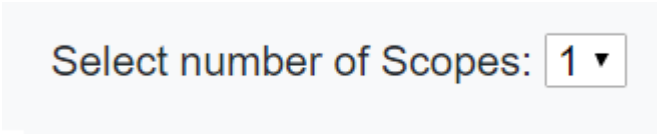
The main menu offers the following options:
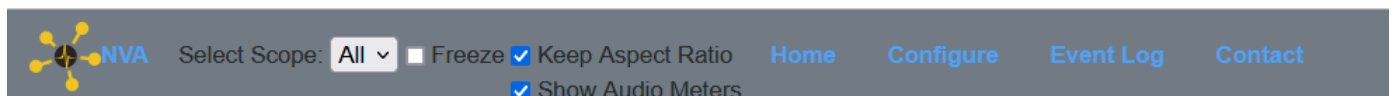


**Network Video Analyzer Logo** - open the Network Video Analyzer main menu
**Freeze** checkbox – freezes the current frame of video for closer inspection

## Scope Select

Select number of Scopes: 1 ▾

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** - open the Network Video Analyzer main menu

# 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
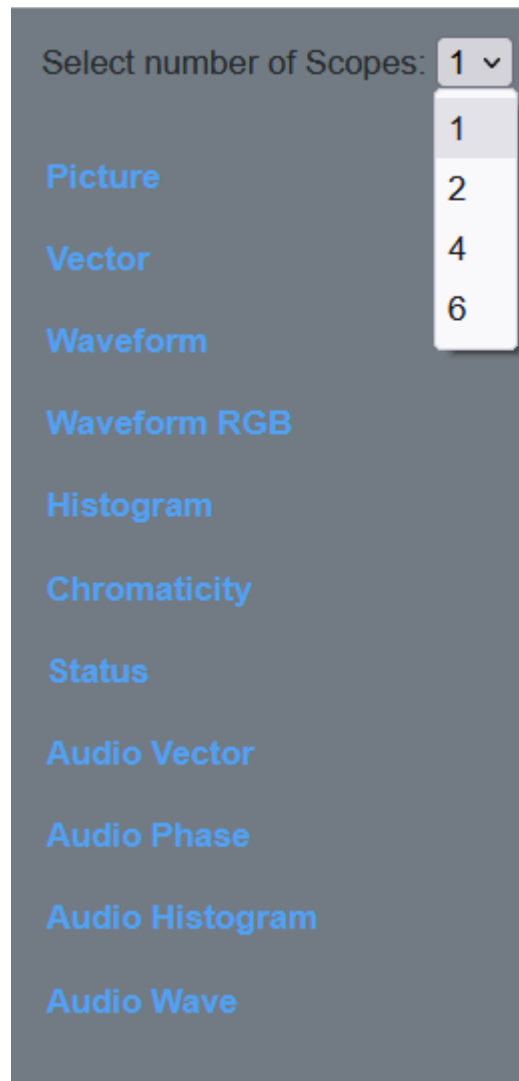


Below the layout selector there are buttons to select between the available scopes for display. Currently this selection includes Picture, Vectorscope, Waveform YCbCr, Waveform RGB, Histogram, Chromaticity, Status, Audio Vector, Audio Phase, Audio Histogram, and Audio Wave.

## Picture

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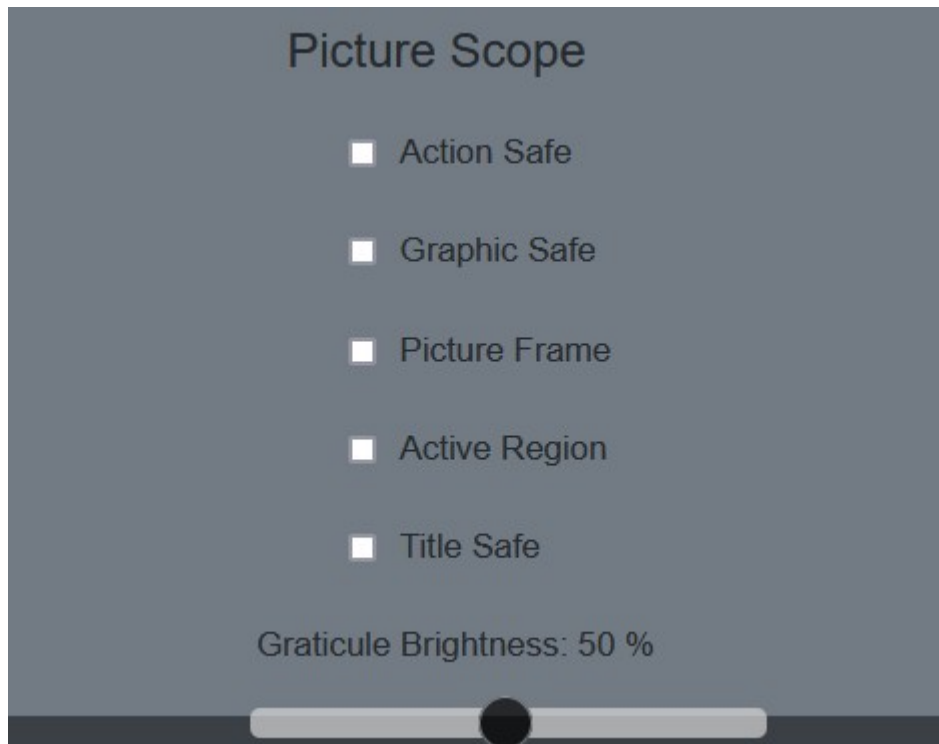


**Action Safe** checkbox – select to display the Action Safe rectangle over the picture
**Graphic Safe** checkbox – select to display the Graphic Safe rectangle over the picture
**Picture Frame** checkbox – select to display the Picture Frame rectangle over the picture
**Active Region** checkbox – select 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:
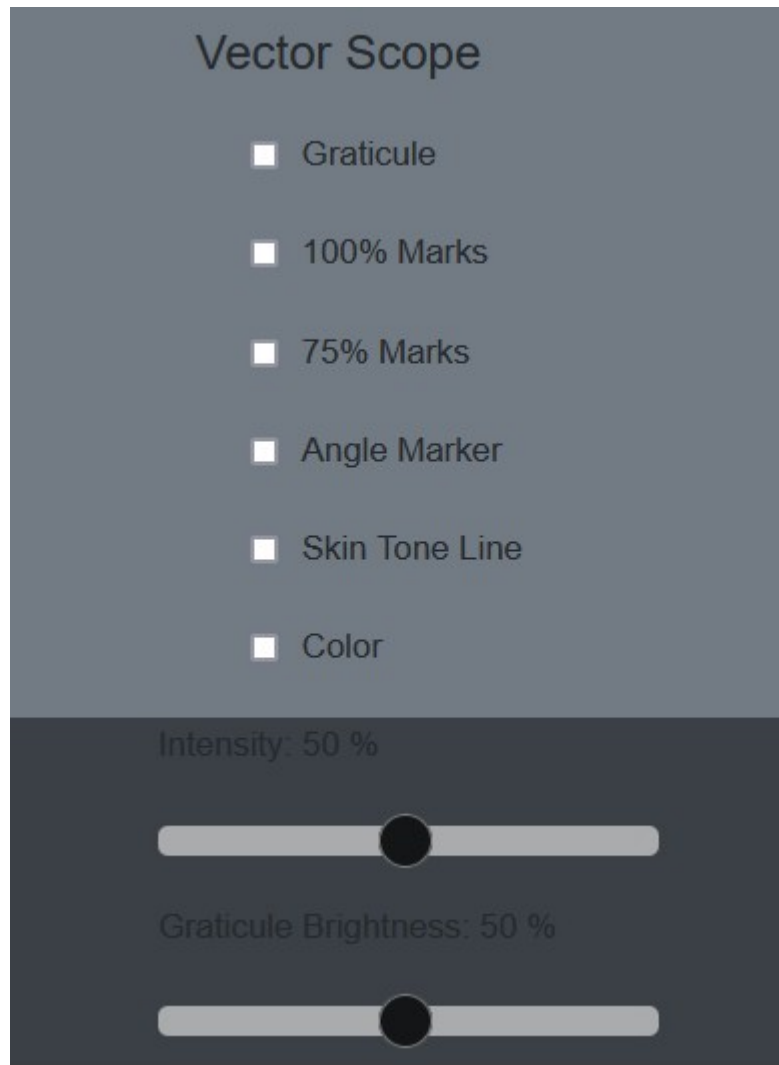


**Graticule** checkbox – select to display the graticule over the vectorscope
**100% Marks** checkbox – select to display the 100% Marks
**75% Marks** checkbox – select to display the 75% Marks
**Angle Marker** checkbox – select to display the Angle Marker
**Skin Tone Line** checkbox – select to display 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
**Scale Type** pulldown – select between available scale types. Choices include Digital, MV, and IRE.
**High/Low** pulldown –
**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:
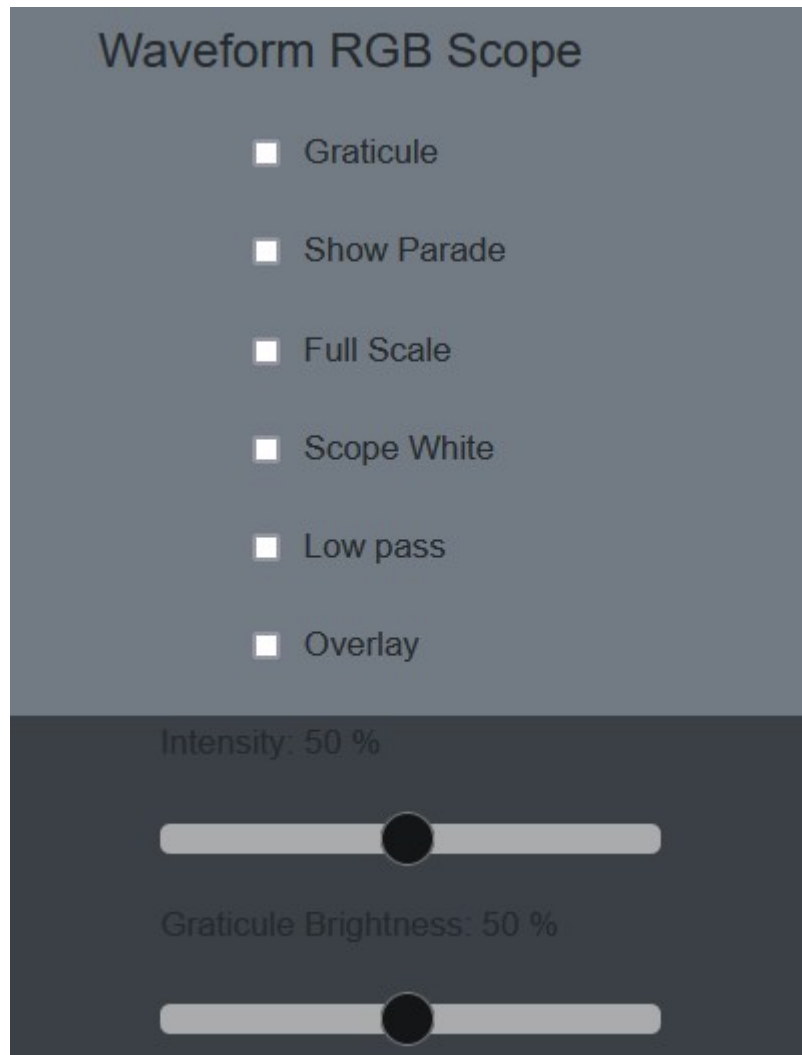


**Graticule** checkbox – select to display the graticule over the vectorscope
**Show Parade** checkbox – select to display the R, G, and B from left to right. When not selected, the
display is stacked top to bottom.
**Full Scale** checkbox -
**Scope White** checkbox – select to display the signal in white
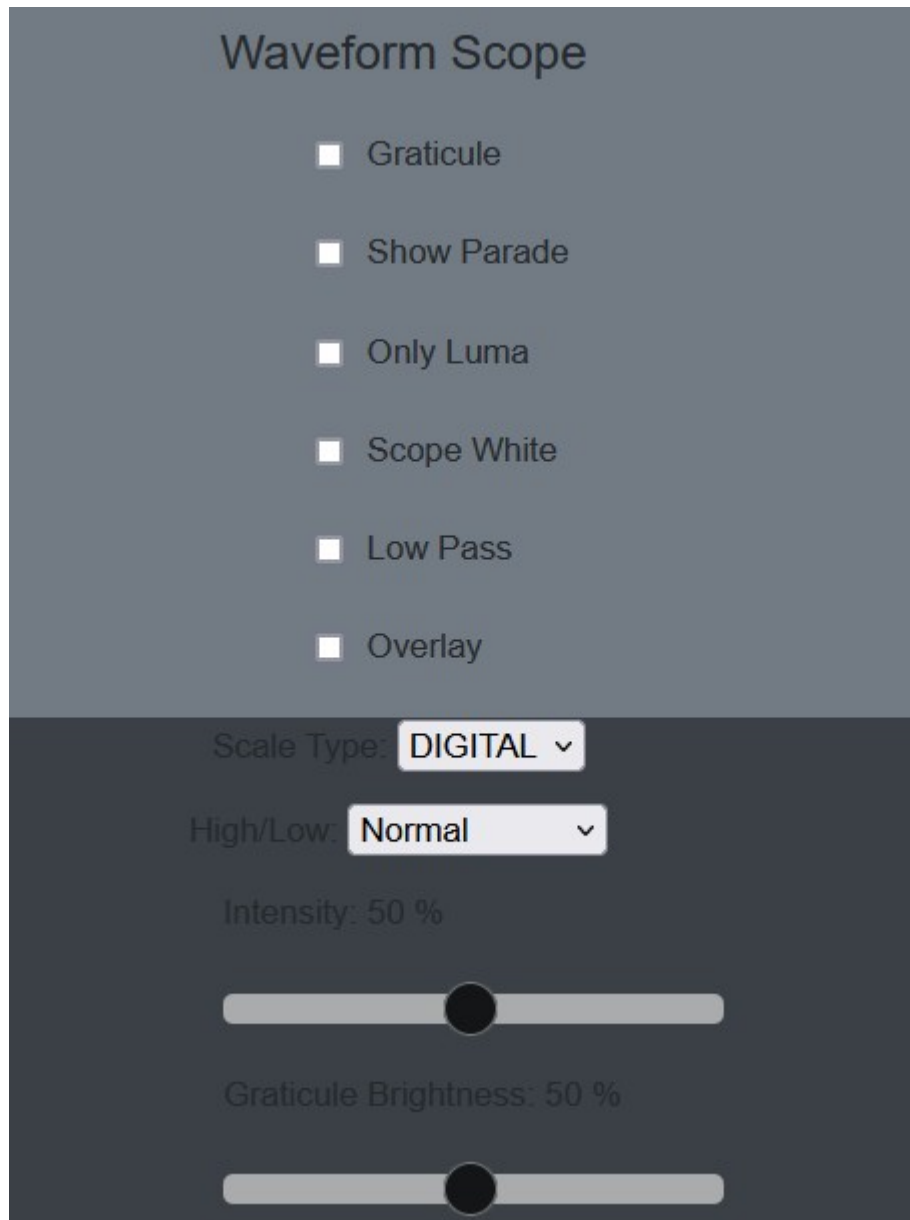**Low Pass** checkbox – select to smooth the scope with a 1/3 filter to remove single pixel anomalies.
**Overlay** checkbox – select to display the overlay
**Intensity** slider – use the slider to adjust how intense the vector display will be. Pull to the left
reduces the intensity, and pull to the right 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:
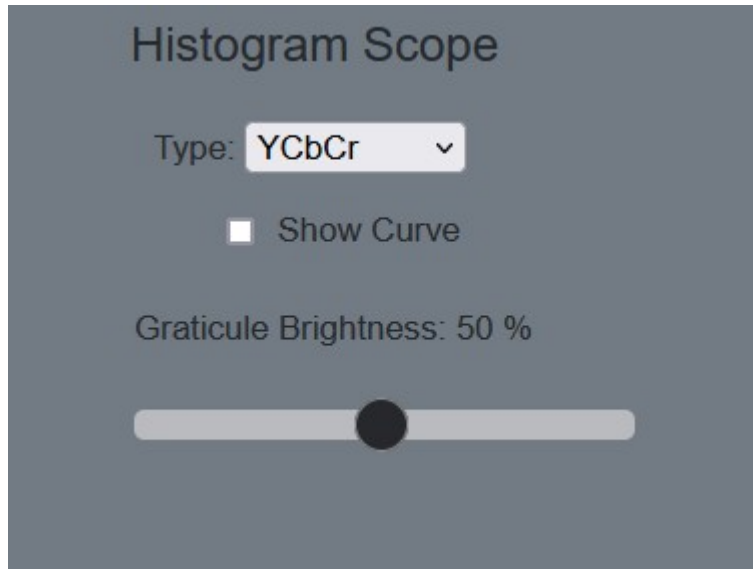


**Type** pulldown – select between available histogram types. Choices include:
- YCbCr
- RGB
- HSV
- Luma
- H/S Scope

**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:
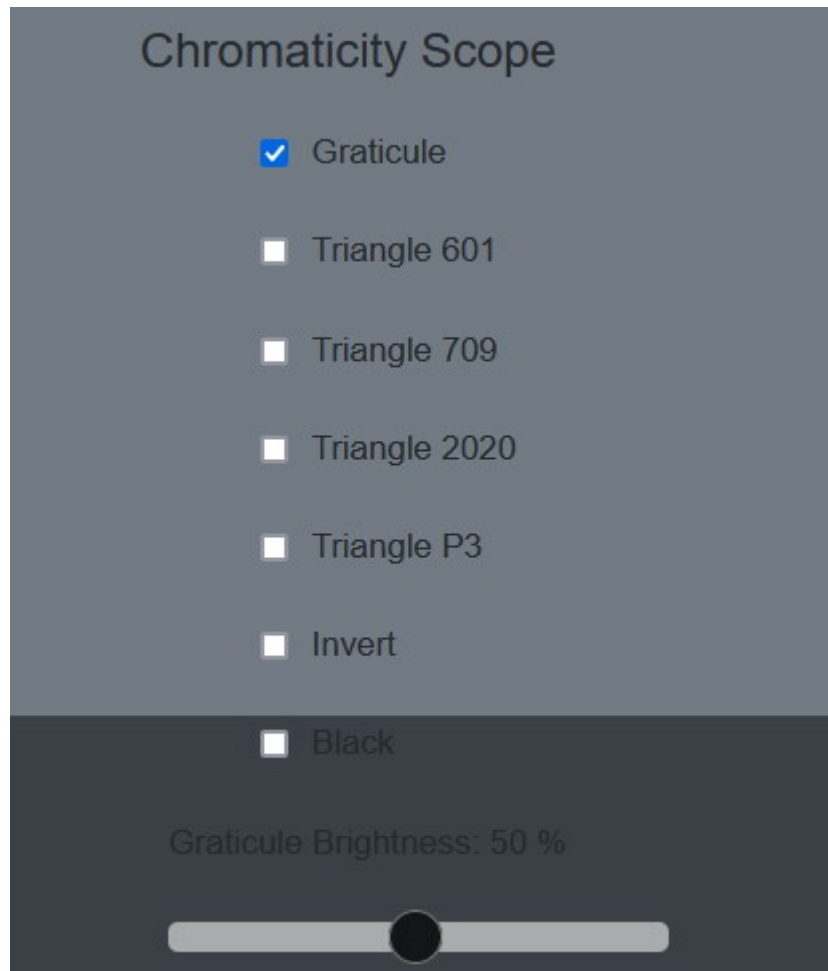


**Graticule** checkbox – select to display the graticule over the chromaticity scope
**Triangle 601** checkbox – select to display the 601 triangle
**Triangle 709** checkbox – select to display the 709 triangle
**Triangle 2020** checkbox – select to display the 2020 triangle
**Triangle P3** checkbox – 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:
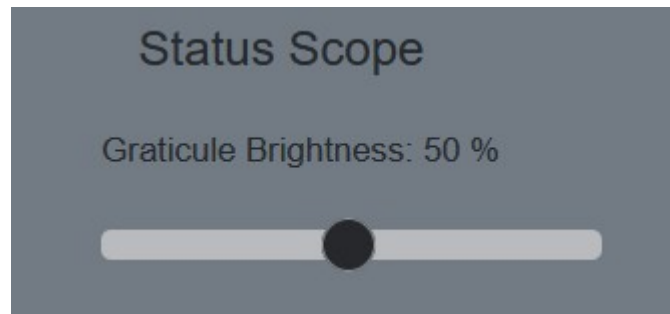


**Graticule Brightness** slider – adjust the brightness of the graticule overlay by using the slider. Pull
to the left makes the graticule dimmer, and pull to the right makes it brighter.

## Audio Vector Scope

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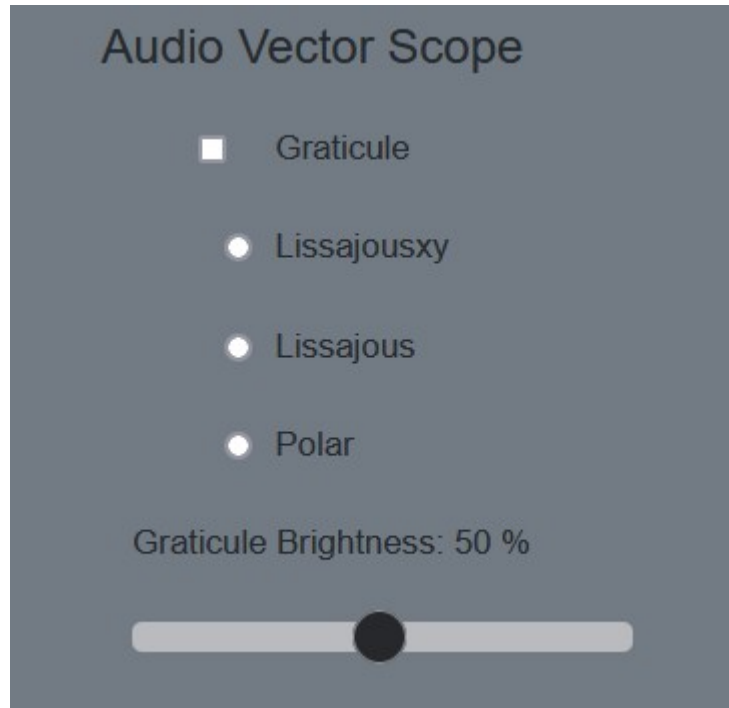


**Graticule** checkbox – select to display the graticule over the audio vectorscope
**Lissajousxy** checkbox – select to set the audio vectorscope to Lissajousxy mode
**Lissajous** checkbox – select to set the audio vectorscope to Lissajous mode
**Polar** checkbox – select to set the audio vectorscope 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:
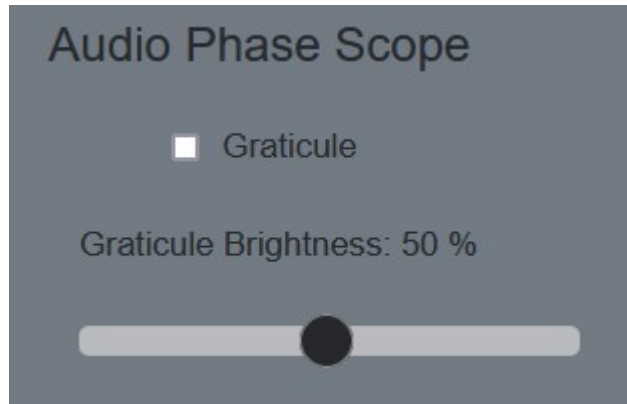


**Graticule** checkbox – select to display the graticule over the audio phase scope
**Graticule Brightness** slider – adjust the brightness of the graticule overlay by using the slider. Pull
to the left makes the graticule dimmer, and pull to the right makes it brighter.

## Audio Histogram Scope

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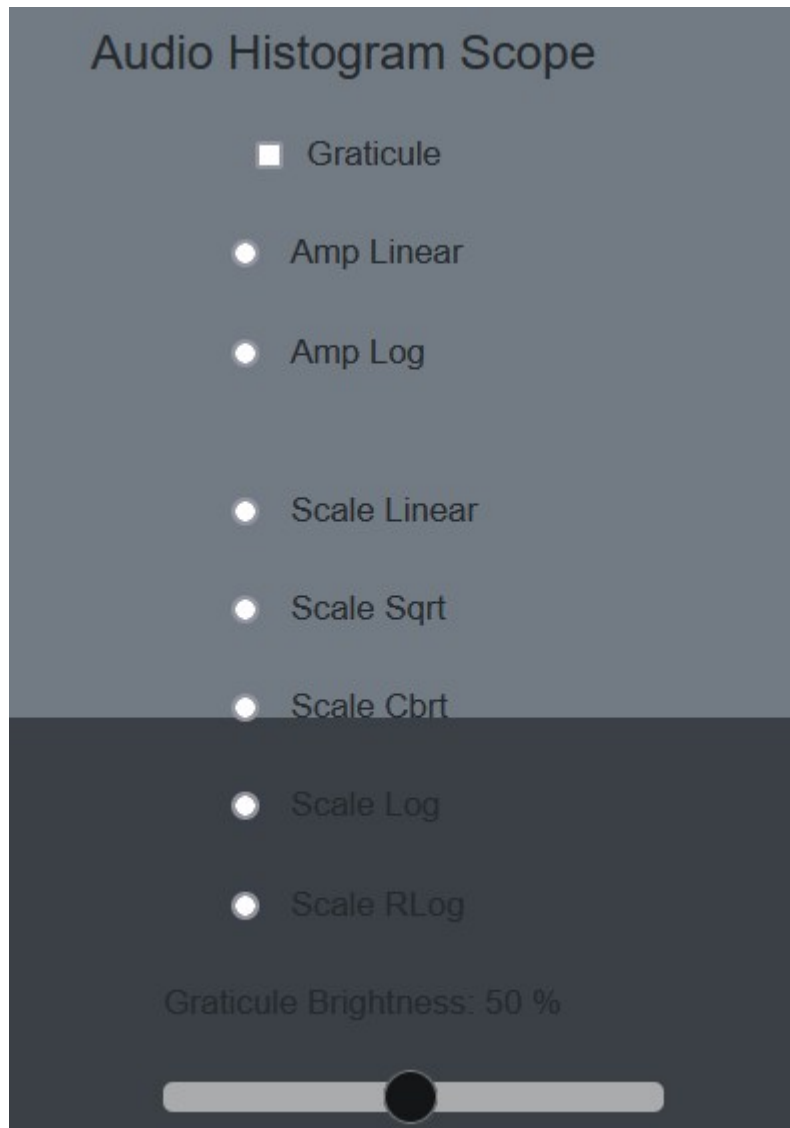


**Graticule** checkbox – select to display the graticule over the audio histogram scope
**Amp linear** checkbox – select to set the display to Amp Linear
**Amp Log** checkbox – select to set the display to Amp Logarithmic
**Scale Linear** checkbox – select to set the display to Scale Linear
**Scale Sqrt** 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:
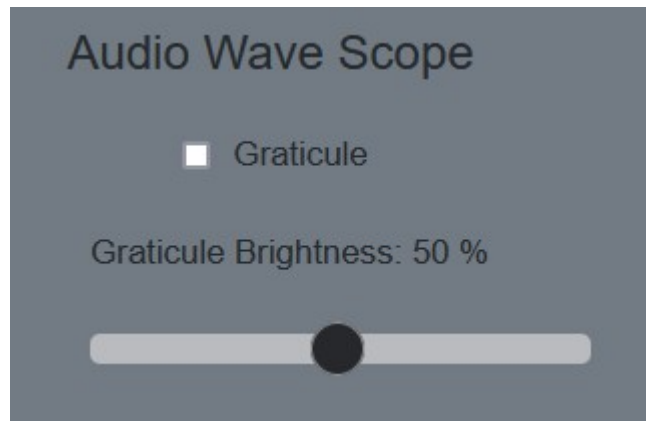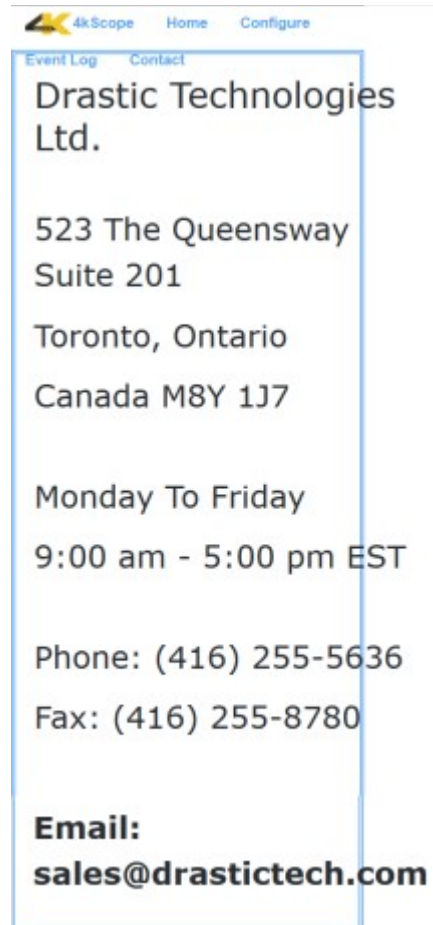


**Graticule** checkbox – select to display the graticule over the audio phase scope
**Graticule Brightness** slider – adjust the brightness of the graticule overlay by using the slider. Pull
    to the left makes the graticule dimmer, and pull to the right makes it brighter.

# 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



4kScope   Home   Configure

Event Log   Contact

Drastic Technologies
Ltd.

523 The Queensway
Suite 201

Toronto, Ontario

Canada M8Y 1J7

Monday To Friday

9:00 am - 5:00 pm EST

Phone: (416) 255-5636

Fax: (416) 255-8780

**Email:**
**sales@drastictech.com**

# 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 |
|---|---|---|---|---|---|---|---|
| 1 | 2022_1_5-10_36_07 | n/a | Hardware | 0x00000002 | 0x0000000A | Found and opened VGA ... | |
| 2 | 2022_1_5-10_36_20 | n/a | Hardware | 0x00000002 | 0x0000000B | Closing video board | |
| 3 | 2022_1_5-10_36_23 | n/a | Hardware | 0x00000002 | 0x0000000A | Found and opened AVNDI | |
| 4 | 2022_1_5-10_36_23 | n/a | Hardware | 0x00000002 | 0x0000000A | Found and opened VGA ... | |
| 5 | 2022_1_5-10_37_15 | n/a | Hardware | 0x00000002 | 0x0000000B | Closing video board | |
| 6 | 2022_1_5-10_37_15 | n/a | Hardware | 0x00000002 | 0x0000000B | Closing video board | |
| 7 | 2022_1_5-10_37_15 | n/a | Hardware | 0x00000002 | 0x0000000A | Found and opened Scree... | |
| 8 | 2022_1_5-10_37_16 | n/a | Hardware | 0x00000002 | 0x0000000A | Found and opened VGA ... | |
| 9 | 2022_1_5-10_37_17 | n/a | Hardware | 0x00000002 | 0x0000000B | Closing video board | |
| 10 | 2022_1_5-10_37_17 | n/a | Hardware | 0x00000002 | 0x0000000B | Closing video board | |
| 11 | 2022_1_5-10_37_18 | n/a | Hardware | 0x00000002 | 0x0000000A | Found and opened Scree... | |
| 12 | 2022_1_5-10_37_18 | n/a | Hardware | 0x00000002 | 0x0000000A | Found and opened VGA ... | |
| 13 | 2022_1_5-10_37_28 | n/a | Hardware | 0x00000002 | 0x0000000B | Closing video board | |
| 14 | 2022_1_5-10_37_28 | n/a | Hardware | 0x00000002 | 0x0000000B | Closing video board | |
| 15 | 2022_1_5-10_37_29 | n/a | Hardware | 0x00000002 | 0x0000000A | Found and opened AvDir... | |
| 16 | 2022_1_5-10_37_30 | n/a | Hardware | 0x00000002 | 0x0000000A | Found and opened VGA ... | |
| 17 | 2022_1_5-10_37_31 | n/a | Hardware | 0x00000002 | 0x0000000B | Closing video board | |
| 18 | 2022_1_5-10_37_31 | n/a | Hardware | 0x00000002 | 0x0000000A | Found and opened AvDir... | |
| 19 | 2022_1_5-10_37_39 | n/a | Hardware | 0x00000002 | 0x0000000B | Closing video board | |
| 20 | 2022_1_5-10_37_42 | 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.
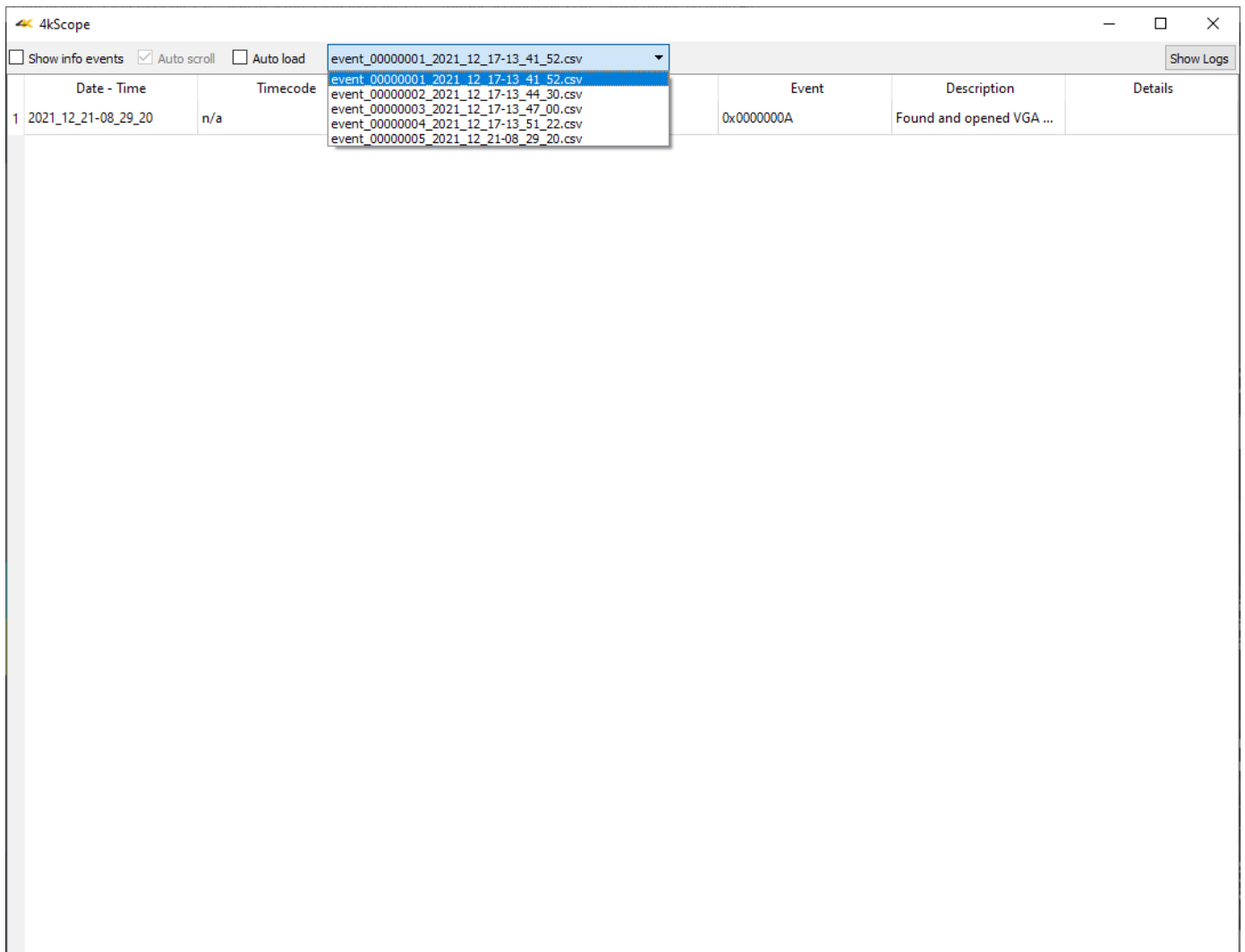
Selecting an event log from this list lets the user view less recent event logs.

4kScope

Show info events ☐    ☑ Auto scroll    ☐ Auto load    event_00000004_2021_12_17-13_51_22.csv ▼      Show Logs

| | Date - Time | Timecode | Code | SubCode | Event | Description | Details |
|---|---|---|---|---|---|---|---|
| 1 | 2021_12_17-13_51_22 | n/a | Hardware | 0x00000002 | 0x0000000A | Found and opened AVNDI | |
| 2 | 2021_12_17-13_58_58 | n/a | Hardware | 0x00000002 | 0x0000000A | Found and opened VGA ... | |
| 3 | 2021_12_17-14_00_29 | n/a | Hardware | 0x00000002 | 0x0000000B | Closing video board | |
| 4 | 2021_12_17-14_00_29 | n/a | Hardware | 0x00000002 | 0x0000000B | Closing video board | |
| 5 | 2021_12_17-14_00_29 | n/a | Hardware | 0x00000002 | 0x0000000B | Closing video board | |

# 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.
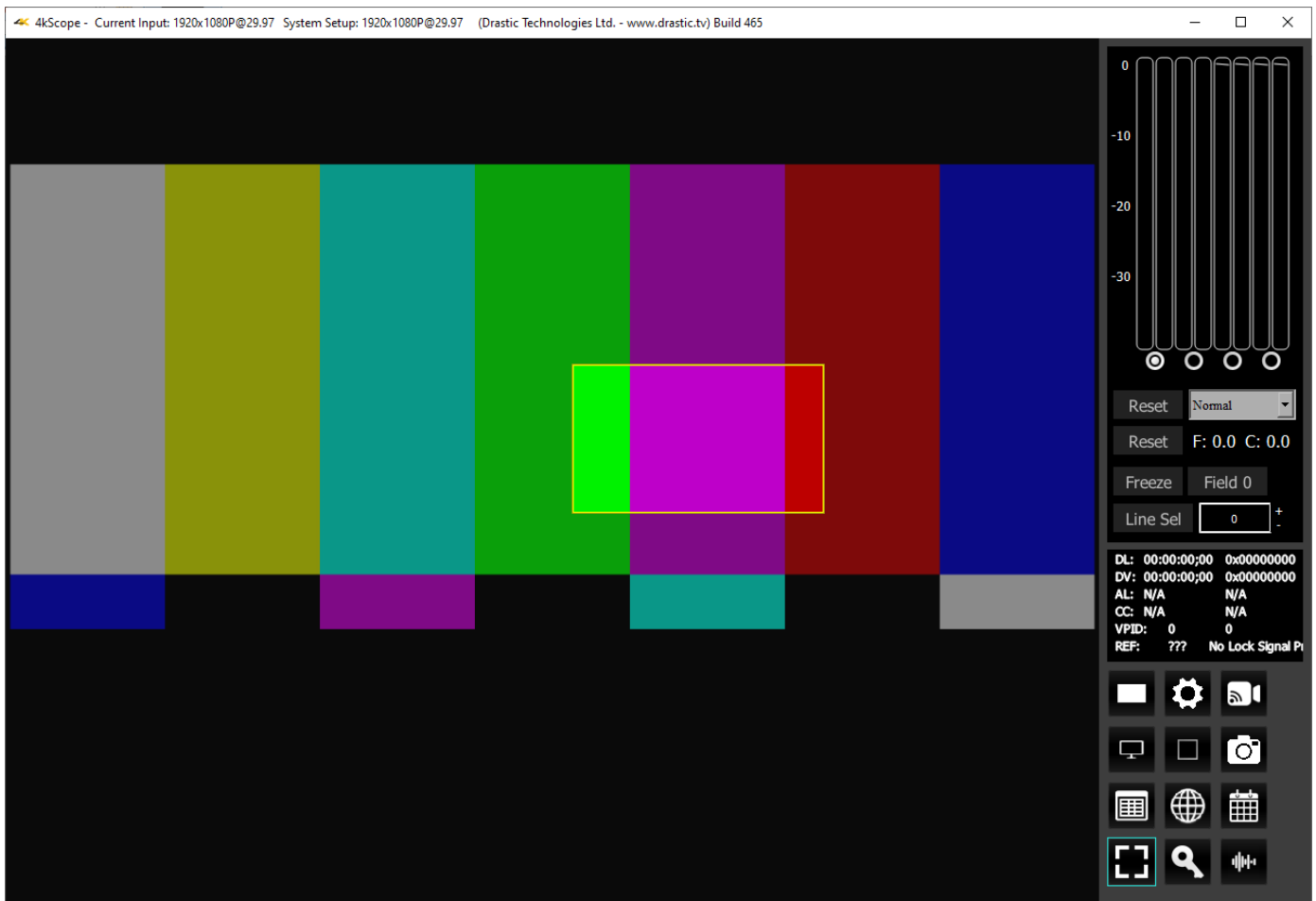


The rest of the screen will be darkened, and the selected area will be highlighted. In the above example, the selected area of the color chart features orange, red, and magenta color chips. With the H/S scope selected, only these areas of the spectrum are seen by the scope.

> **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

Network Video Analyzer 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

Network Video Analyzer 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)
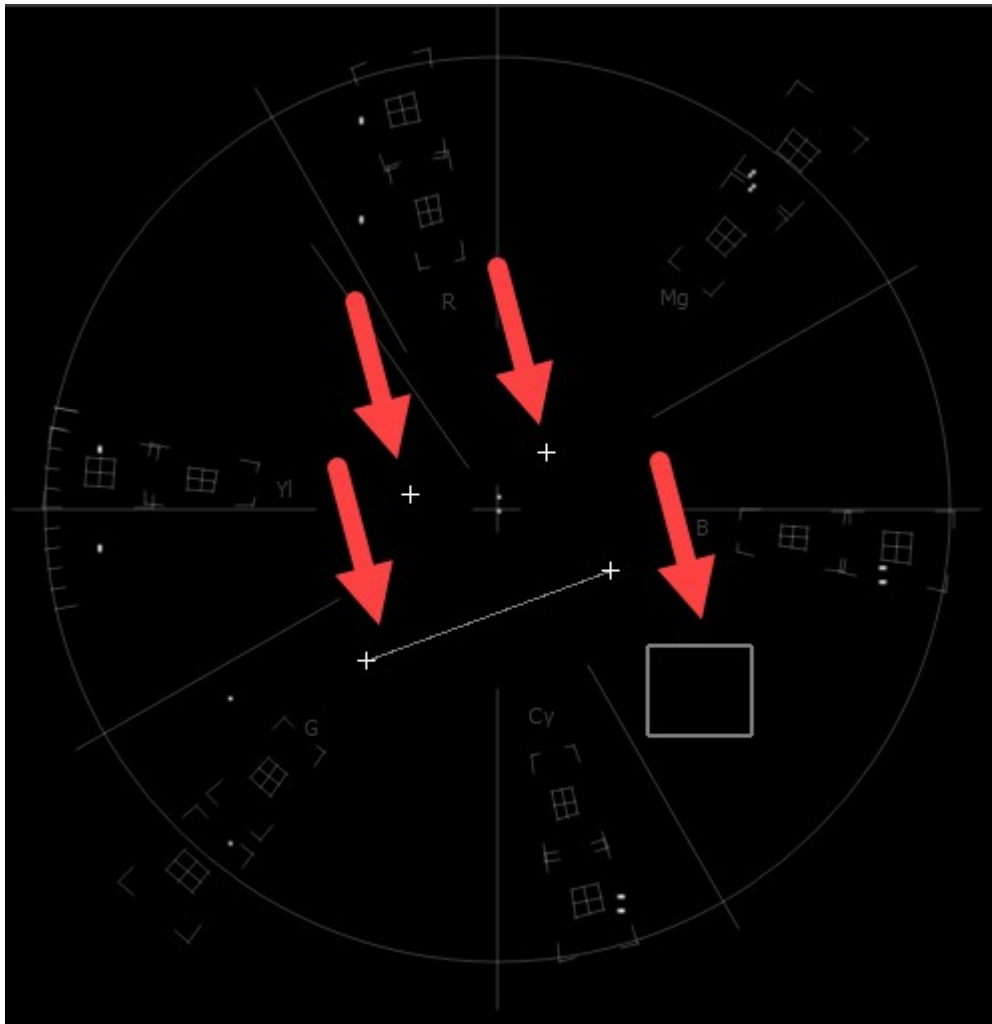


&lt;SHIFT&gt;&lt;LeftClick&gt; - Make a point/cross
&lt;SHIFT&gt;&lt;ALT&gt;&lt;LeftClick&gt; - Undo last
&lt;SHIFT&gt;&lt;CTRL&gt;&lt;LeftClick&gt; - Drag to make a line
&lt;SHIFT&gt;&lt;CTRL&gt;&lt;ALT&gt;&lt;LeftClick&gt; - Drag to make a box
&lt;CTRL&gt;&lt;ALT&gt;&lt;LeftClick&gt; - Drag to make a circle
&lt;SHIFT&gt;&lt;RightClick&gt; - Clear all markers/guides

# Frame Compare

Network Video Analyzer includes a signal compare feature that can be used to freeze a complete frame of video (two fields in interlaced), every second line (field) or at a 50/50 dissolve to compare two signals or cameras.

Once frozen, all the standard scopes are still available for setup and comparison. While a frame is frozen, the comparison mode and type of scope can be changed.

To access the frame compare features, press the **Frame Grab** button.

# Setup

## Install the Software

Install **Network Video Analyzer** 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 **Network Video Analyzer**, the system should contain one of the supported AJA, Blackmagic, Matrox or Bluefish444 boards. The board's manufacturers will have up to date recommendations for system specifications.

## License the Software

**Network Video Analyzer** installs in demo mode, with various limitations. To remove these limitations, you will need a valid license.

In order to license Network Video Analyzer, open Network Video Analyzer 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 Network Video Analyzer|Network Video Analyzer**. The software will then need to be set up.

### Setup Window

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 Network Video Analyzer

Network Video Analyzer 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.  Network Video Analyzer 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 Network Video Analyzer.
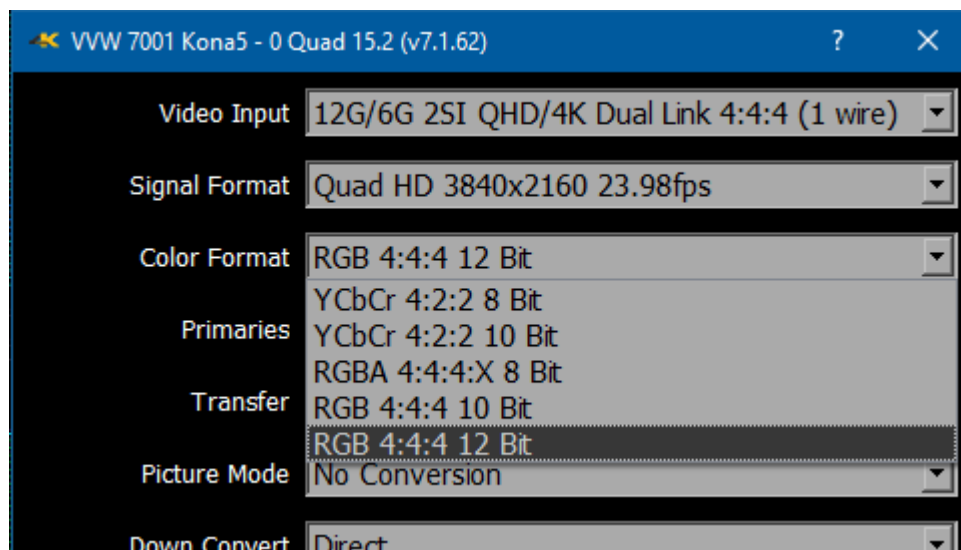


## Primaries

Network Video Analyzer 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 Network Video Analyzer is set to the opposite, then the graticules will not line up properly.  These settings must match.
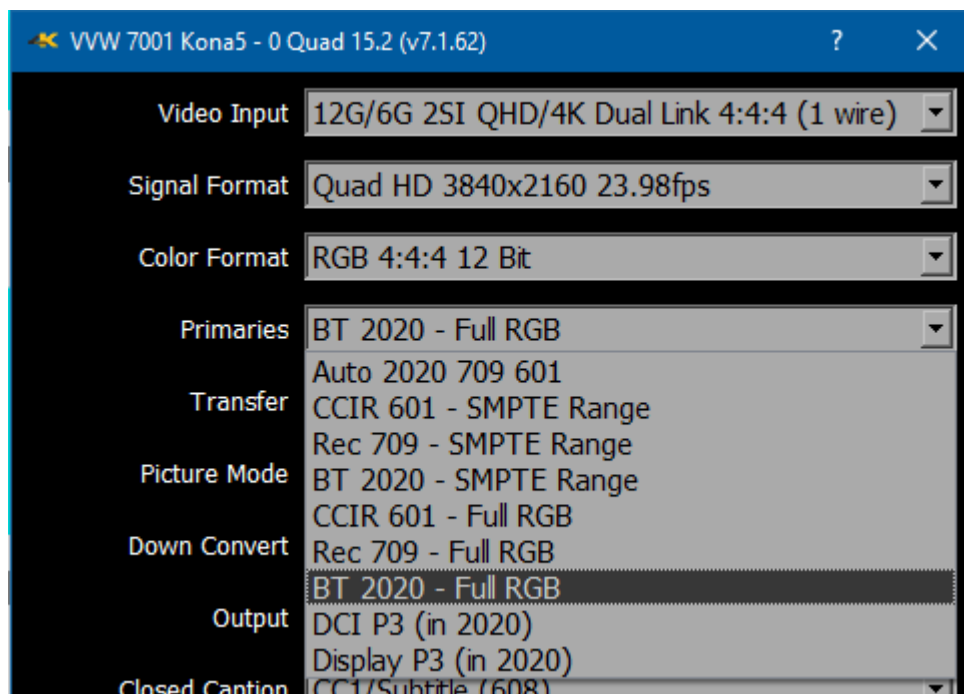


When using RGB Full, it is also important that the RGB Waveform Scope has its 'Full Scale' check box checked or unchecked to match. In some YCbCr cases it needs to be independent from the main primary selection.
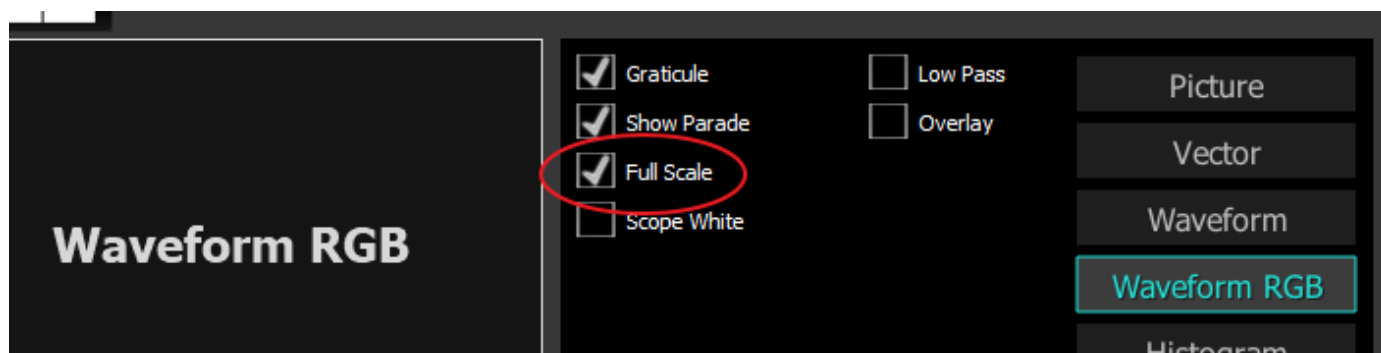
## Transfer Characteristics

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 HDR10 (max 10,000 nits). If it is an HLG signal, it should be set to HLG (max 1000 nits).
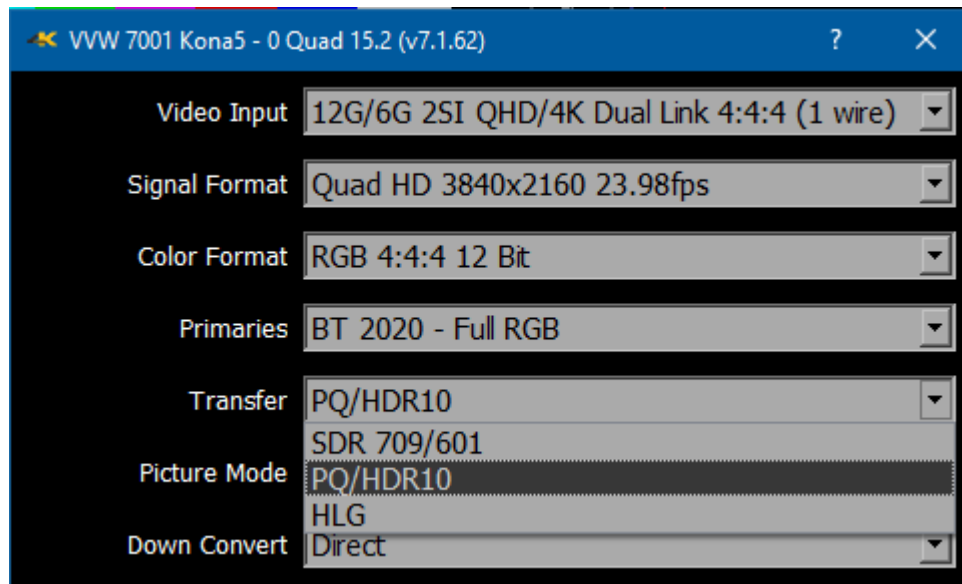
# Turning Off Background Programs in Linux

If Network Video Analyzer 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 Network Video Analyzer 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

**Network Video Analyzer** 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 Network Video Analyzer, 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 Network Video Analyzer

Network Video Analyzer supports both command line parameters and keyboard control.  This command line parameters can be used to allow Network Video Analyzer 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

Network Video Analyzer -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 frames 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, DTMediaRead, MediaNXS, etc.  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)

# Network Video Analyzer Front Panel Controller

Use the layout menu in the Network Video Analyzer 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 Scp) 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

# REST API Commands

## Basic Command Structure

Network Video Analyzer 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 Network Video Analyzer 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).
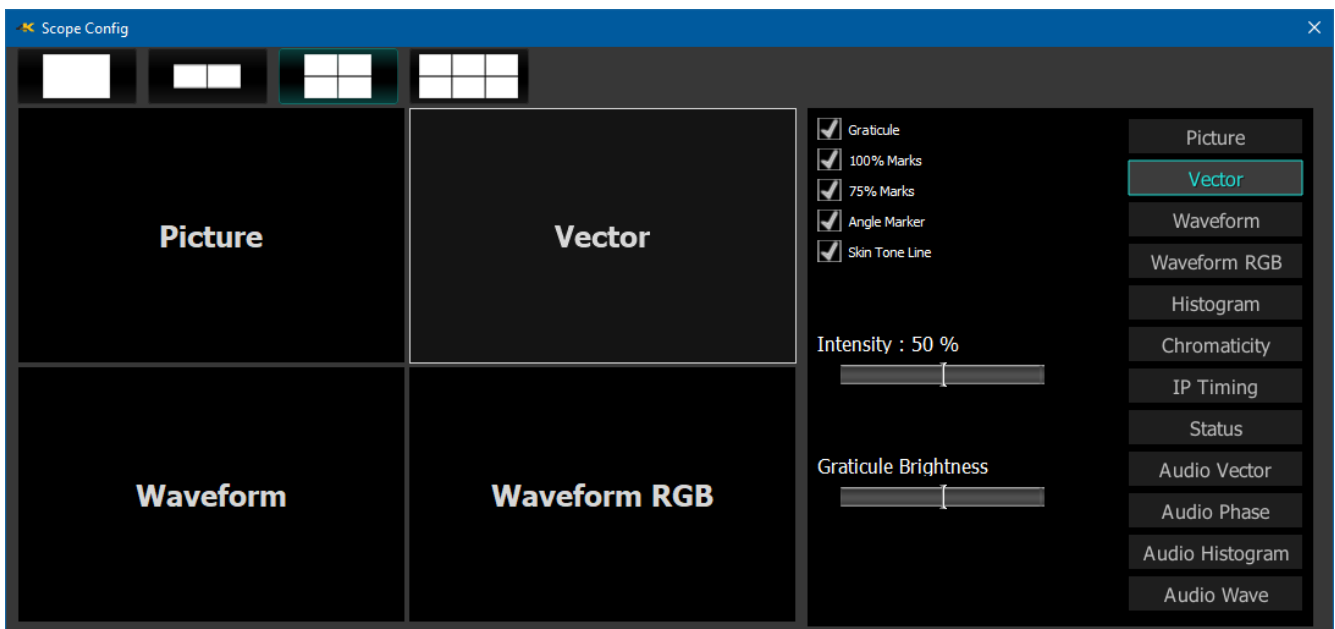


The **getscope** command will return a value representing a specific scope type. The user must specify the x and y coordinates in order to get the desired scope. The list below provides scope values and their corresponding scope type. The command for getting the Vectorscope from the image above is provided 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.
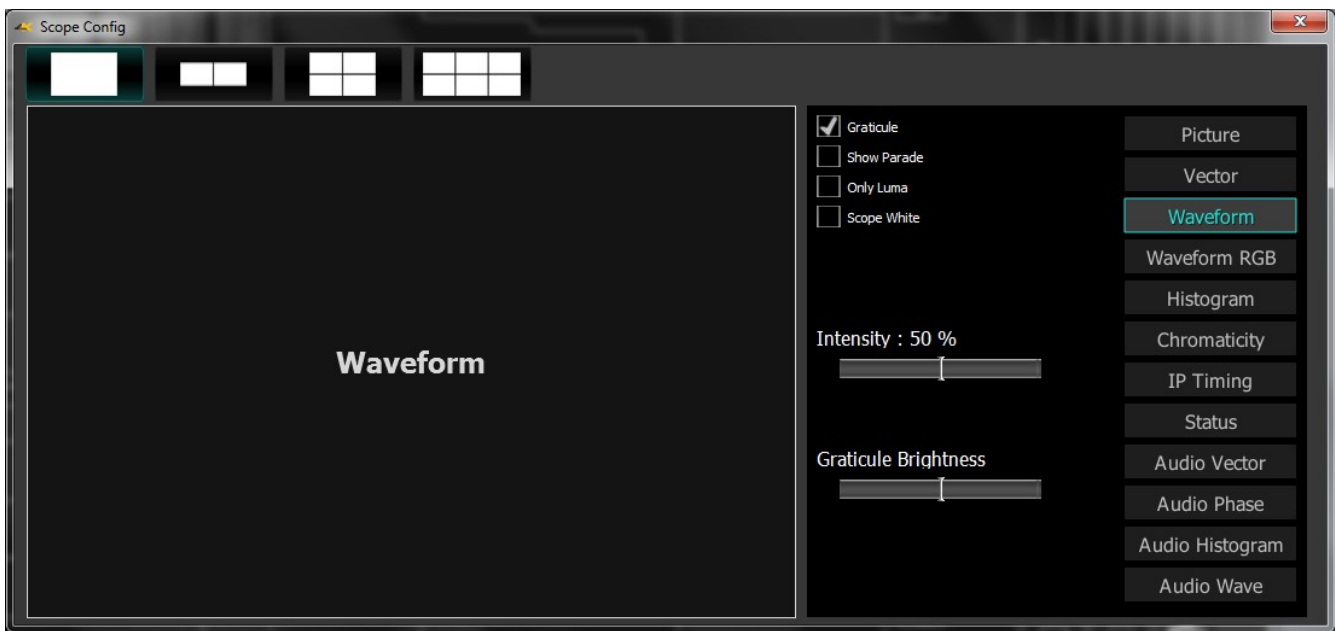
The list below provides correct input setting name commands according to a specific scope setting

- 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 **Network Video Analyzer** 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.

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