# Cine 7 User Guide

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# Regulatory Information

# Legal Information

On product information can be found in the monitor's Settings menus under Compliance.

## FCC 15.21 Information to user

Please be aware that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

## FCC 15.105 Class A compliance statement

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

# Quick Start Guide

# Cine 7 Quick Start Guide

Cine 7 is the ultimate 7” on-camera HD monitor for cinematographers, offering a color accurate wide-gamut display, cinema camera control, and 4K and HDR compatibility. View your production in full sunlight thanks to 1800 nits of brightness and save your favorite tools, functions, and setting pages in one tap with PageOS 4. The Full HD 7-inch IPS LCD display with 1920x1200 resolution ensures a clear look at your production, while 10-bit color processing in 100% DCI-P3 offers color accuracy. This guarantees the image on screen reflects what’s being captured by the camera. The Cine 7 features two 3G SDI inputs, with the second input doubling as a loop out, an HDMI input with an HDMI loop through, a Sony L-Series dual battery bracket, and the option to add on a Gold Mount or V-Mount battery plate attachment.

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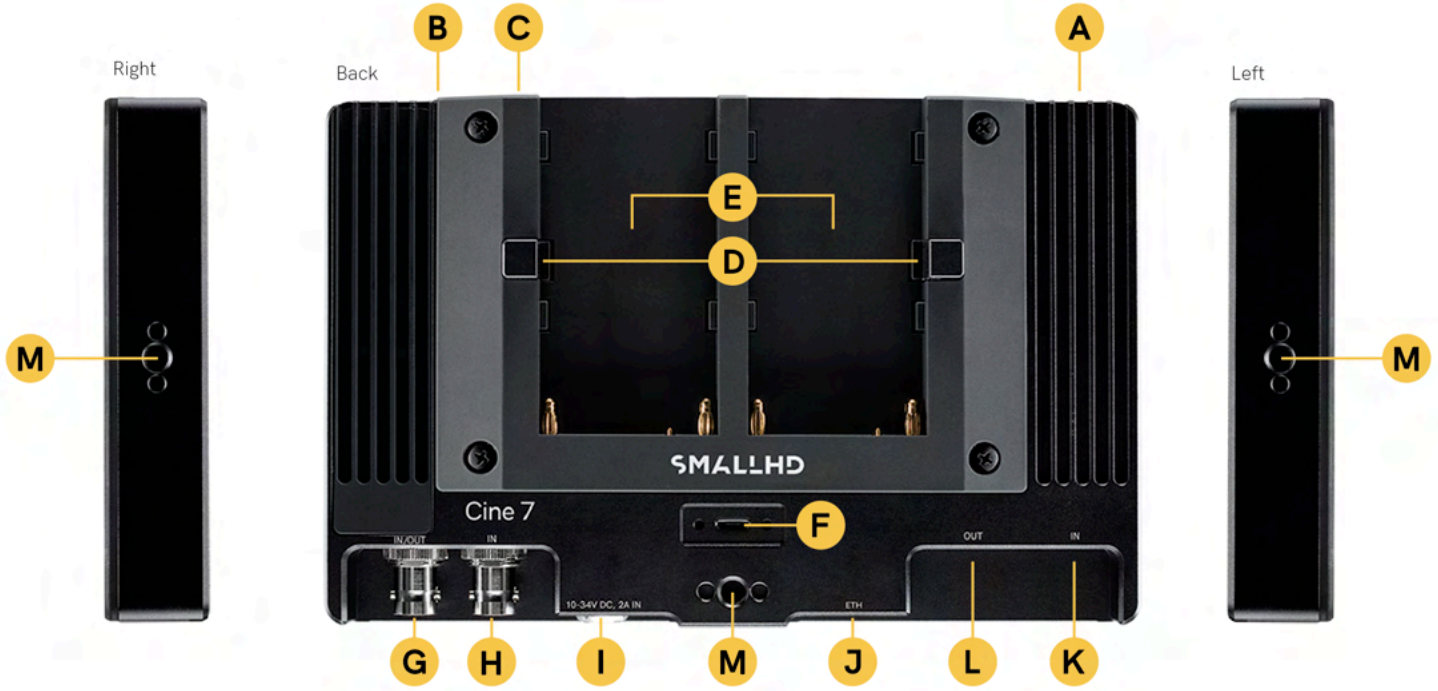
## ACTIVATE WARRANTY

To activate your monitor's warranty, please go to https://activate.smallhd.com/. You will need the serial number, which is located on the sticker where the battery goes (you may need to remove your battery to see it). You will also want to have a copy of your invoice from your purchase to confirm the purchase date.

## PHYSICAL PROPERTIES




**A:** Power On/Off

**B:** Headphone jack

**C:** SD Card slot

**D:** Battery release

**E:** Battery plate

**F:** Micro USB

**G:** SDI Input/Output

**H:** SDI Input

**I:** 10-34V DC, 2A Locking 2 Pin input

**J:** Ethernet

**K:** HDMI Input

**L:** HDMI Output

**M:** ¼”-20 Mounting Points

# POWER AND CONNECT

## POWER

1. Connect power to the monitor using a L-Series style battery or an alternative power source.
2. Press the power button.

## INPUT/OUTPUT

- Video signals via HDMI up to 4Kp30
- Video signals via SDI up to 1080p60

## MOUNTING OPTIONS

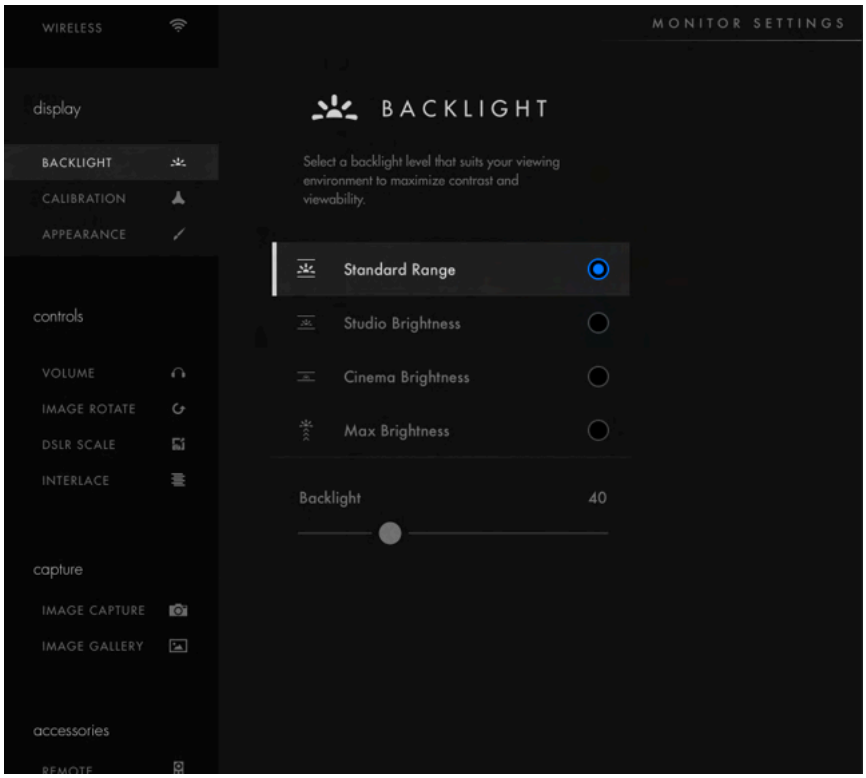
### ¼"-20 MOUNTING POINTS

There are four ¼"-20 mounting points to secure the monitor to a camera or rig (left side, right side, bottom, rear).

## PAGEOS 4 OVERVIEW

The PageOS 4 interface allows users to configure and assign specific image analyzing tools and/ or features to up to eight customizable pages. Users can access those tools by navigating to the corresponding page on the monitor, instead of enabling or disabling features individually.

### General Layout

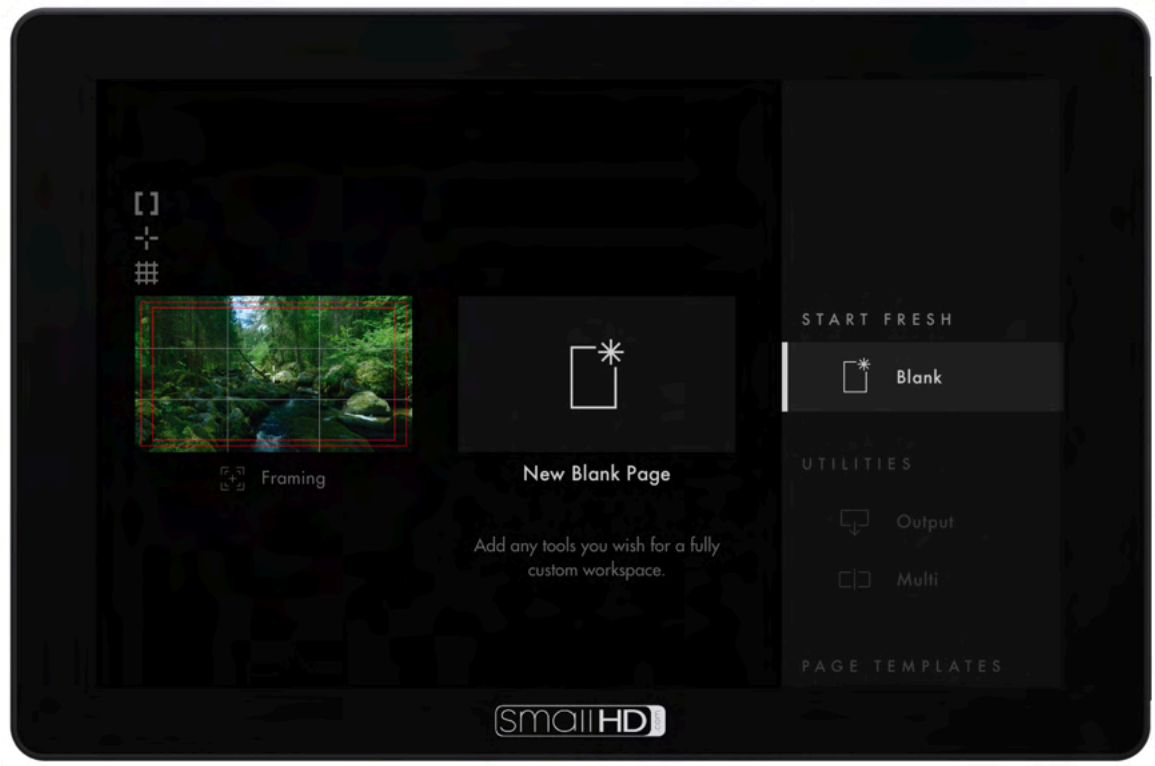


**Pages View**
The 'Pages View' offers a zoomed-out perspective of all configured pages, allowing organization and naming to ensure the most efficient overall setup.

**Settings**
Adjust a wide range of global monitor settings.

**Dashboard**
The Dashboard provides access to the most commonly-used settings such as Input, Volume and Backlight. The Dashboard can be disabled via **Full Settings > Dashboard**.

## Basic Navigation




**Touch Screen**
PageOS has an easy to navigate touch screen that works just like your smartphone.

- Pinch to zoom
- Swipe left and right between custom pages
- Slide you finger down for a view of all your preset pages
- Swipe all the way left to access your deep settings menu (Calibration, Profiles, etc)

**Adding New Pages**
To create a new page from either a fresh workspace, a template, or a specific utility, navigate to the right-hand side of the Pages View.

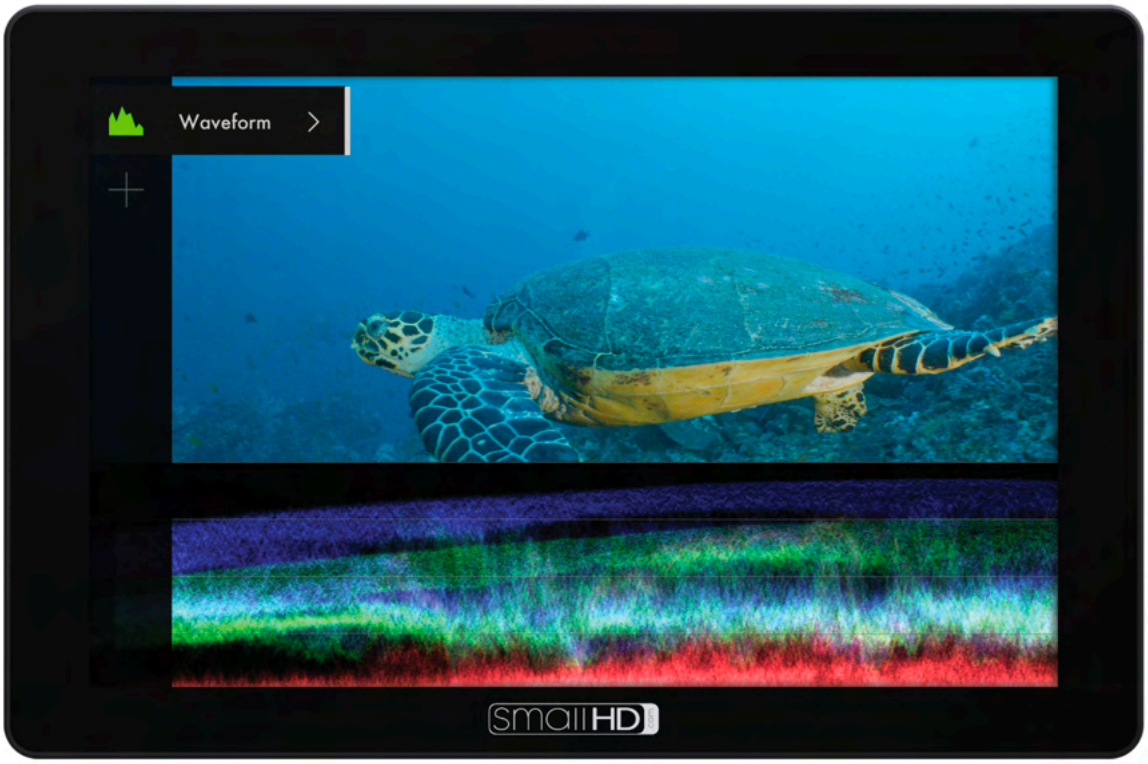
**Add New Tool to a Page**
Tap your screen while on any page to reveal the toolbar. Press the plus sign that appears on the left side of the page. Select the tool you want added to that page.

**Activating Tools**
Tap your screen while on any page to reveal the toolbar. Then select the tool you want to activate. To adjust the custom settings of that tool press the arrow that appears next to the name of the tool.

## Settings: Feed

**Input Config**
Select an input to display its image -- configure a source to unlock log conversions into HDR and SDR color spaces.

**Color Pipe**
Follow the Wizard instructions to assign and configure color space and curve transformations, to enable HDR and SDR from incoming log-based sources.



## Settings: Display

**Backlight**
Select a backlight level that suits your viewing environment to maximize contrast and viewability.

**Calibration**
Calibration ensures chrominance and luminance accuracy that can be relied upon for critical color decisions.

**Appearance**
Apply sharpening to the video data, if desired

## Settings: Controls

**Volume**
Adjust the audio output level for the headphone jack and/or monitor speaker.

**Image Rotate**
Image Rotate options enable upside-down mounting - or enable Mirroring for when the monitor must face the subject.

**Interlace**

These options control how interlaced footage is displayed.

## Settings: Capture

**Image Capture**
Configure the Image Capture tool to help facilitate shot matching or for automatic thumbnail creation upon pressing Record. (Note: SD card must be inserted into the monitor to perform an image capture).

**Image Gallery**
Browse the Image Gallery to review the images on your removable media.

## Settings: Interface

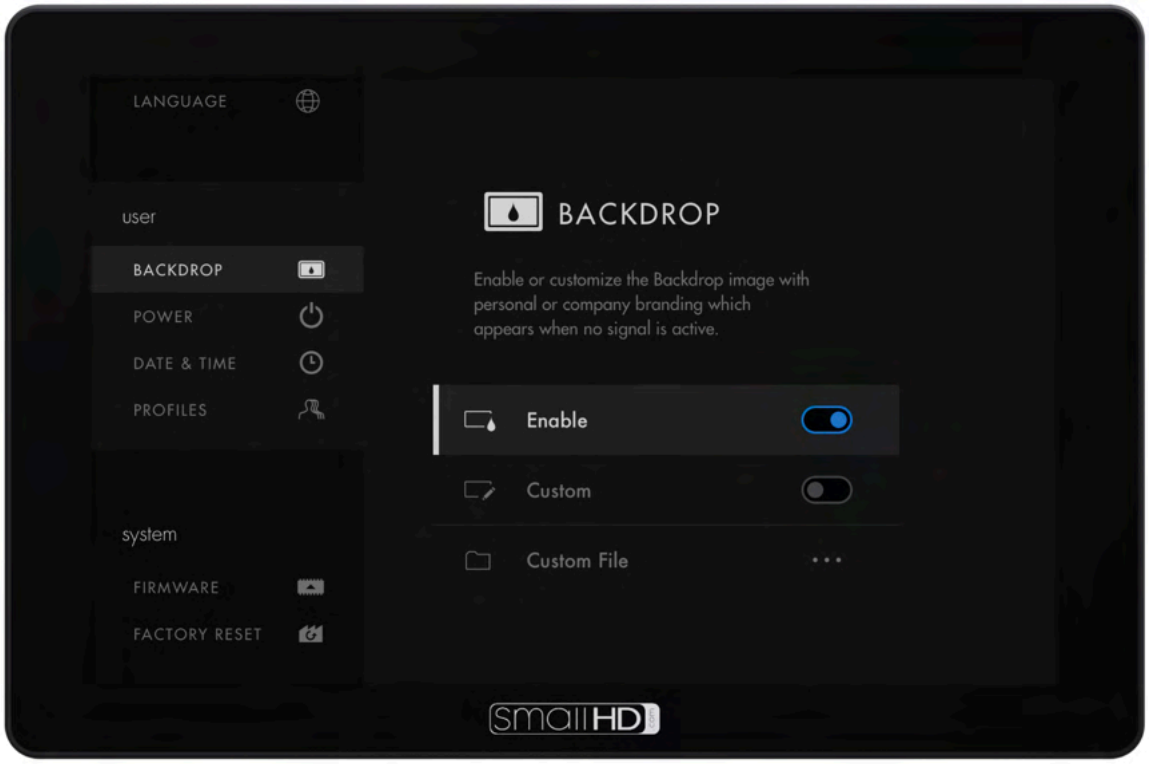
**Pixel Zoom**
Configure the default zoom levels for Pixel Zoom to ‘punch in’ to a desired amount when spot checking a particular shot.

**Status Display**
Enable and configure the Status Display to get info on various monitoring-related data such as battery life and frames per second.

**UI Lock**
Once enabled, pressing and holding on the touchscreen for five seconds will lock the UI. Repeating the process will unlock the UI.

**Language**
Change the language of the internal menu system.

## Settings: User




**Backdrop**
Enable a customizable backdrop for when the monitor is not displaying a signal.

**Monitor ID**
Set a custom name for your monitor, to make it more easily recognizable.

**Date Time**
Setting the correct Date & Time will ensure that captured images get an accurate timestamp.

**Power**
Power-related options such as auto recovery.

**Profiles**
Save or load the entire monitor's configuration to an SD card, great for keeping consistent settings across several monitors.

## Settings: System

**Firmware**
Firmware can be updated by inserting an SD card with a compatible update file.

**Factory Reset**
Reset the monitor settings to its original factory settings, with the option to clear registration and calibration.

# ADDITIONAL RESOURCES AND FCC COMPLIANCE

Additional Resources
**guide.smallhd.com**

Social Media
**@smallhd**

For more info go to
**smallhd.com/support**

**Certifications**
This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: this device may not cause harmful interference, and this device must accept any interference received, including interference that may cause undesired operation.

# User Interface

# User interface quick-start (touchscreen)

Once you get your monitor plugged in via HDMI or SDI, this is a quick overview of the touchscreen interface. There are more detailed sections in the guide that expands on many of these features, this is a quick overview to get you rolling.

## GESTURES - Introduction

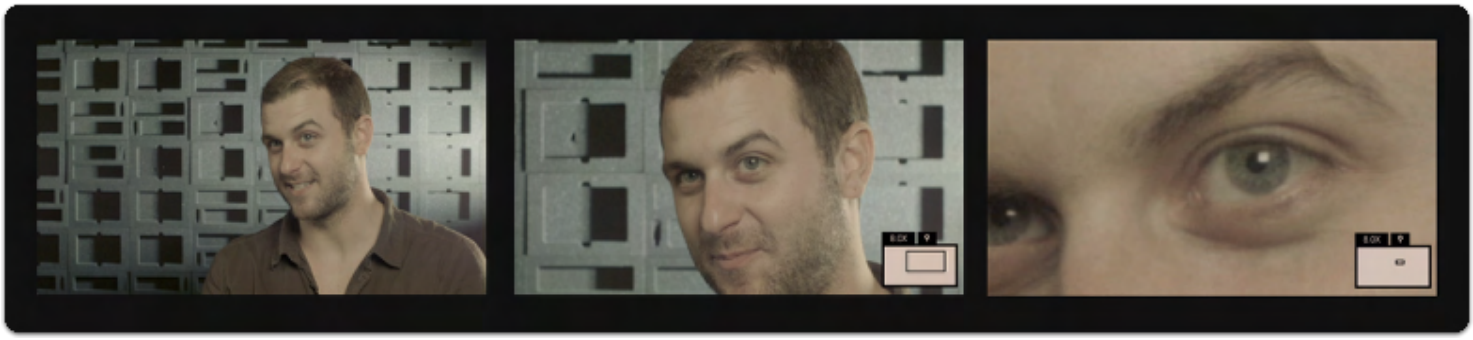
There are many touchscreen gestures that are outlined here. Below are some basics to get you up and running.

To Navigate, simple use one finger to move (**swipe**):

Left or Right - to change Pages
Down - Enter Pages mode
UP - Exit Pages mode

**Tap** to Select and open the TOOL bar on a page.

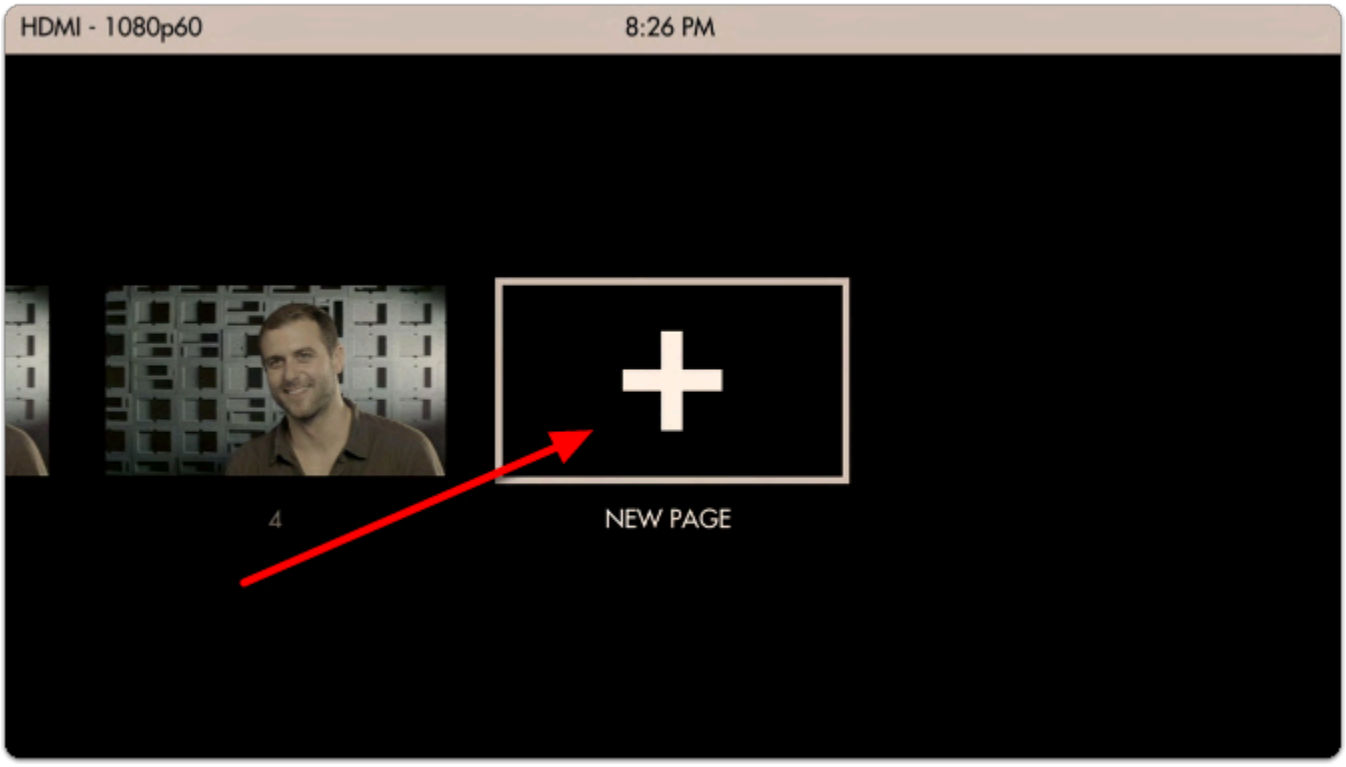
**Pinch-to-zoom** (fingers stat apart and pinch together) activates the 'Pixel Zoom' function, giving you a clear view of your signal for **critical focusing** & catching tiny details. The PIXEL ZOOM function that allows for a digital zoom on your image.  This is helpful for a detailed view of your image for **critical focusing** & catching tiny details.



# PAGES

The entire monitor is based on the concept of customizable **Pages** - instead of having to enable and disable features individually when needing to change a setup, create pages with a **task** in mind, for example **setting exposure**, and quickly **swipe** between each page on-set for a highly efficient workflow.

For a zoomed-out **overview** of your **pages**, **swipe down** on the monitor. Create a new page by swiping over to the **far right** and tapping on **'+ New Page'**.  More info on Pages can be found here




The SETTINGS, page contains all the monitors attributes, Preferences which controls settings that affect the entire monitor is always located to the far left.

The OUTPUT page allows for you to see/select what signal you are sending downstream (on applicable models).

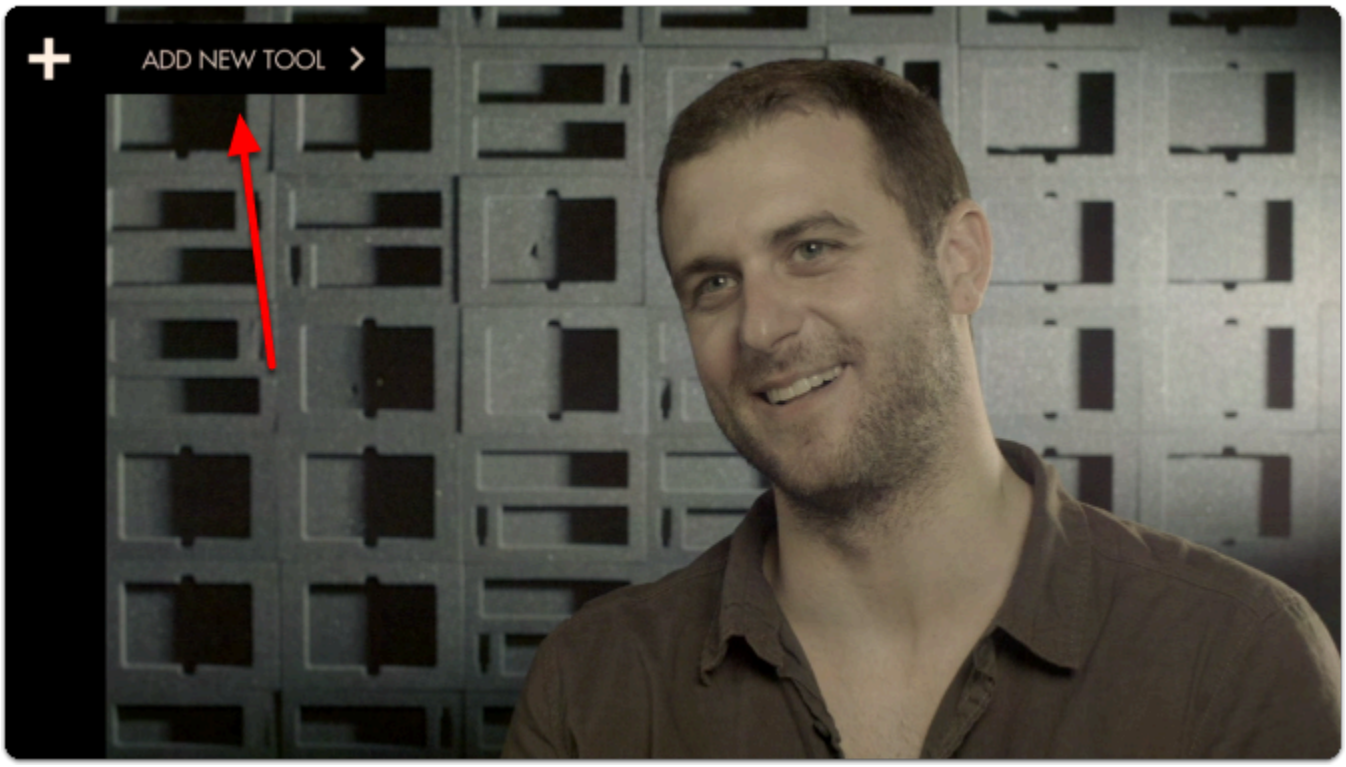
The CONTROL page allows for camera control (on applicable monitors, with appropriate license- sold separately).

The MULTI-VIEW page allows for Side-by-side viewing of two inputs (on applicable models).

## Using TOOLs

**Tap the screen** to bring up the 'add new tool' menu.
Tools can apply to a single page or all pages.
You can have up to 8 tools in use on a page at the same time (this includes the Global tools).

To Delete a tool, select it, and touch the trashcan icon on the bottom.  It will ask you to confirm you want to delete it and selecting it again will remove the tool form your toolbar.




Tools offer a variety of... well... tools, to help you in your filmmaking process and workflows. This should not be associated with the PA who is just there because his Uncle is a producer... These are helpful tools. :)

These TOOLs are broken down into subsections:

FRAME

EXPOSE

SCOPES

FOCUS

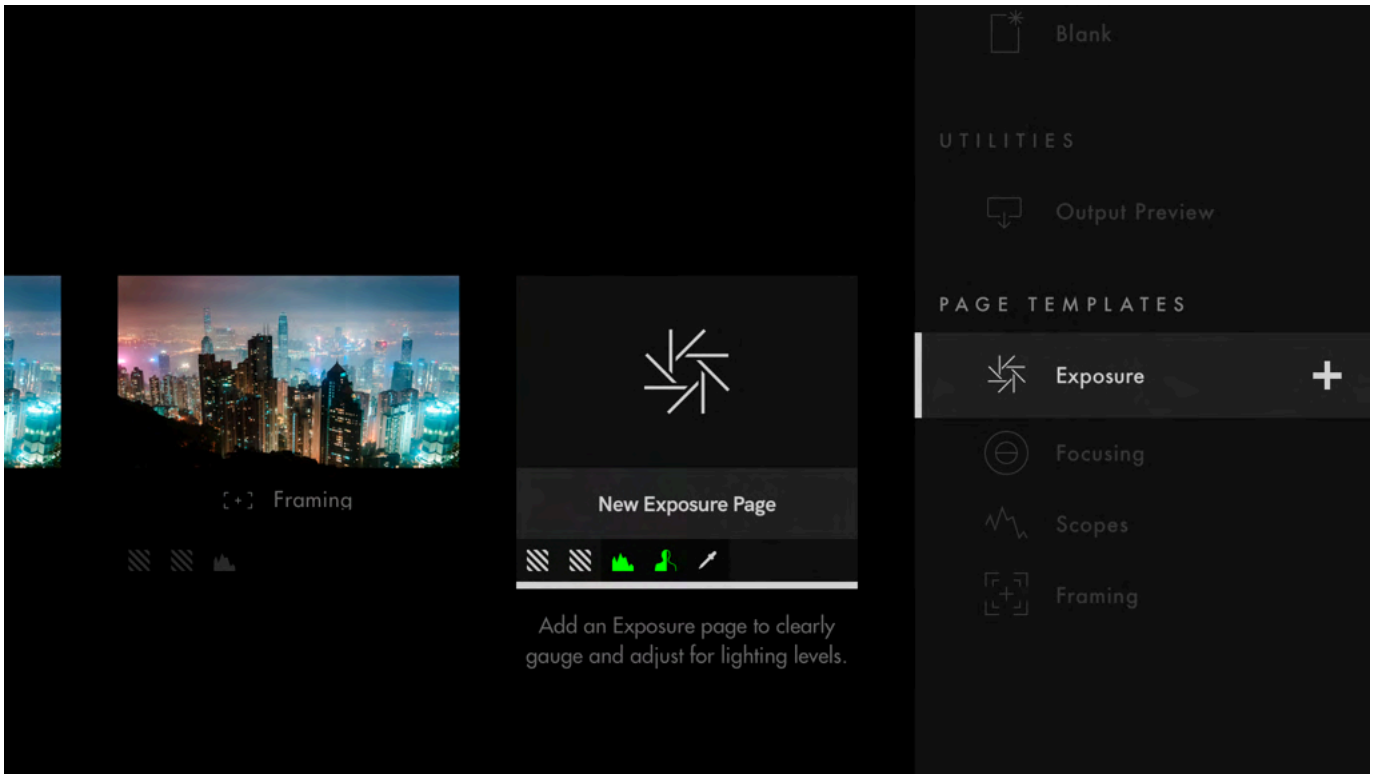
OVERLAY

SCALE

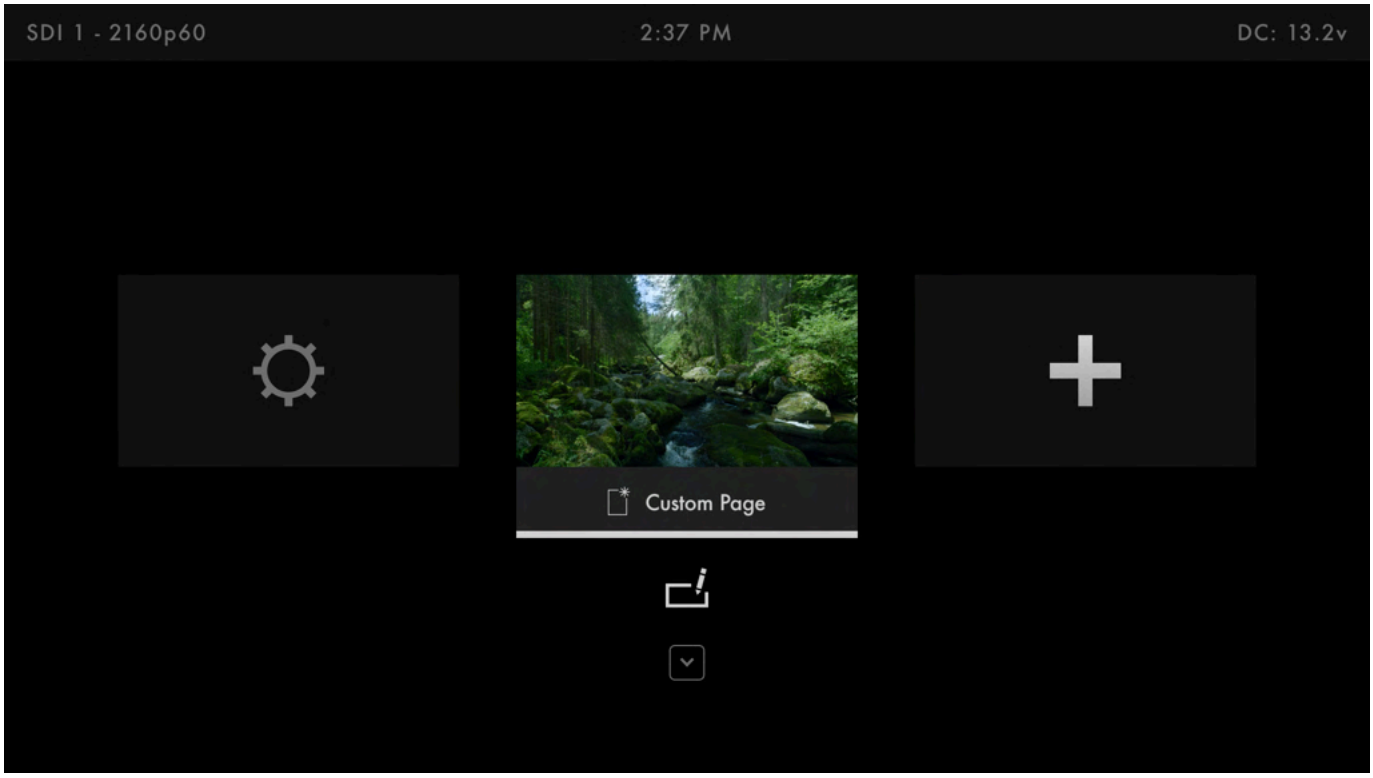
ADDONS

# Working with Pages

Pages allows you to have several different views set up using tools on multiple screens that can be customized to the users needs.  This will allow you to quickly swipe/ joystick between screens with applied tools.  i.e. This can be helpful when needing to use False color or Scopes to check exposure and then want to return to see the final LUT look applied while shooting with your audio tool.

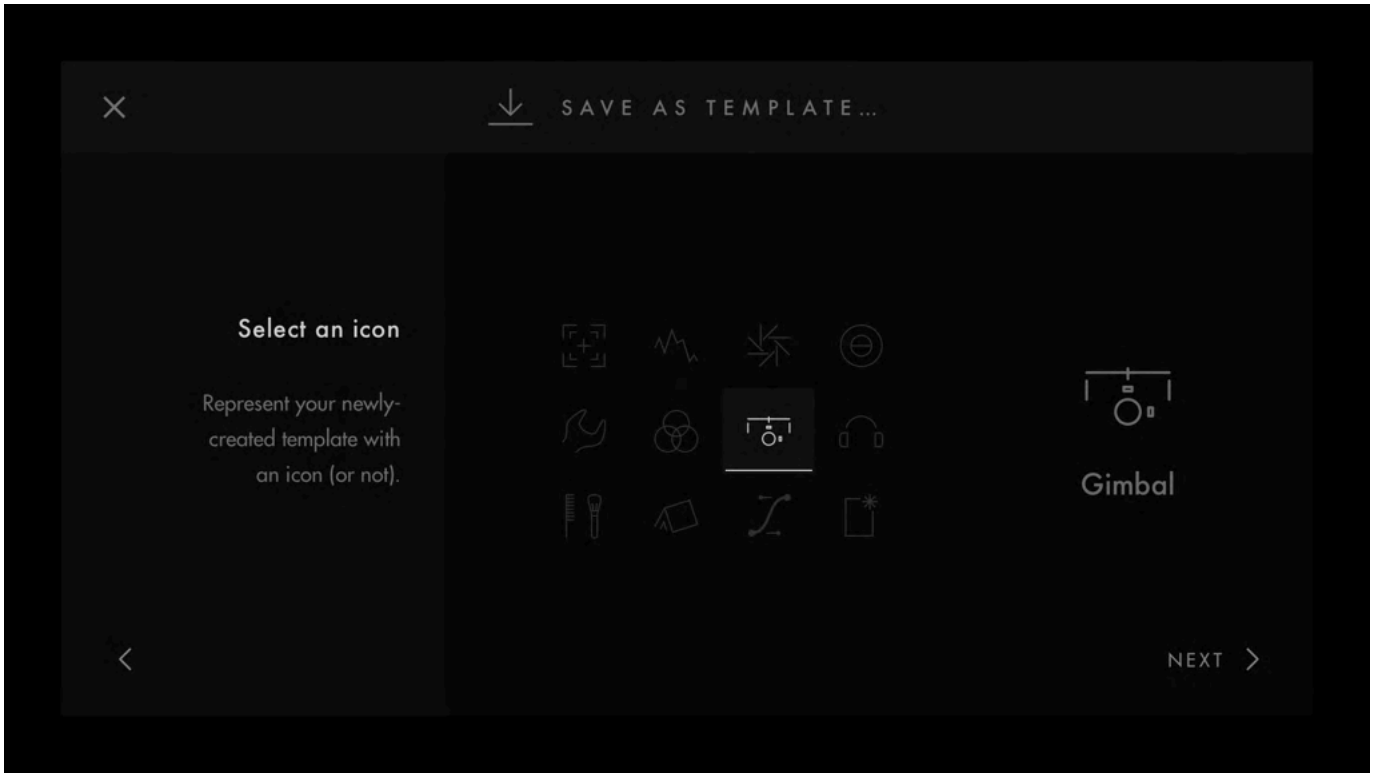


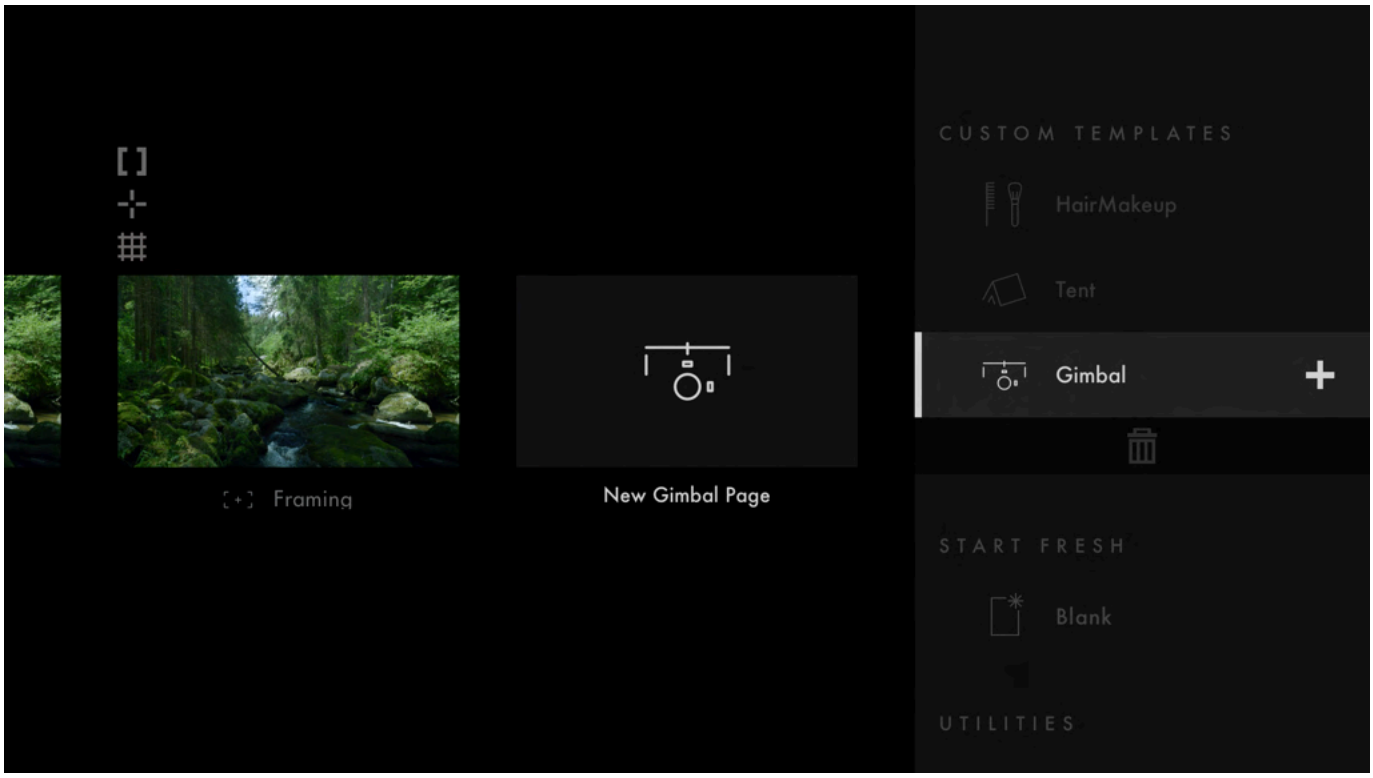

Pages can be Added, Moved (in order, Left or Right), Deleted or Named. To enter Pages Mode, swipe/ joystick down.



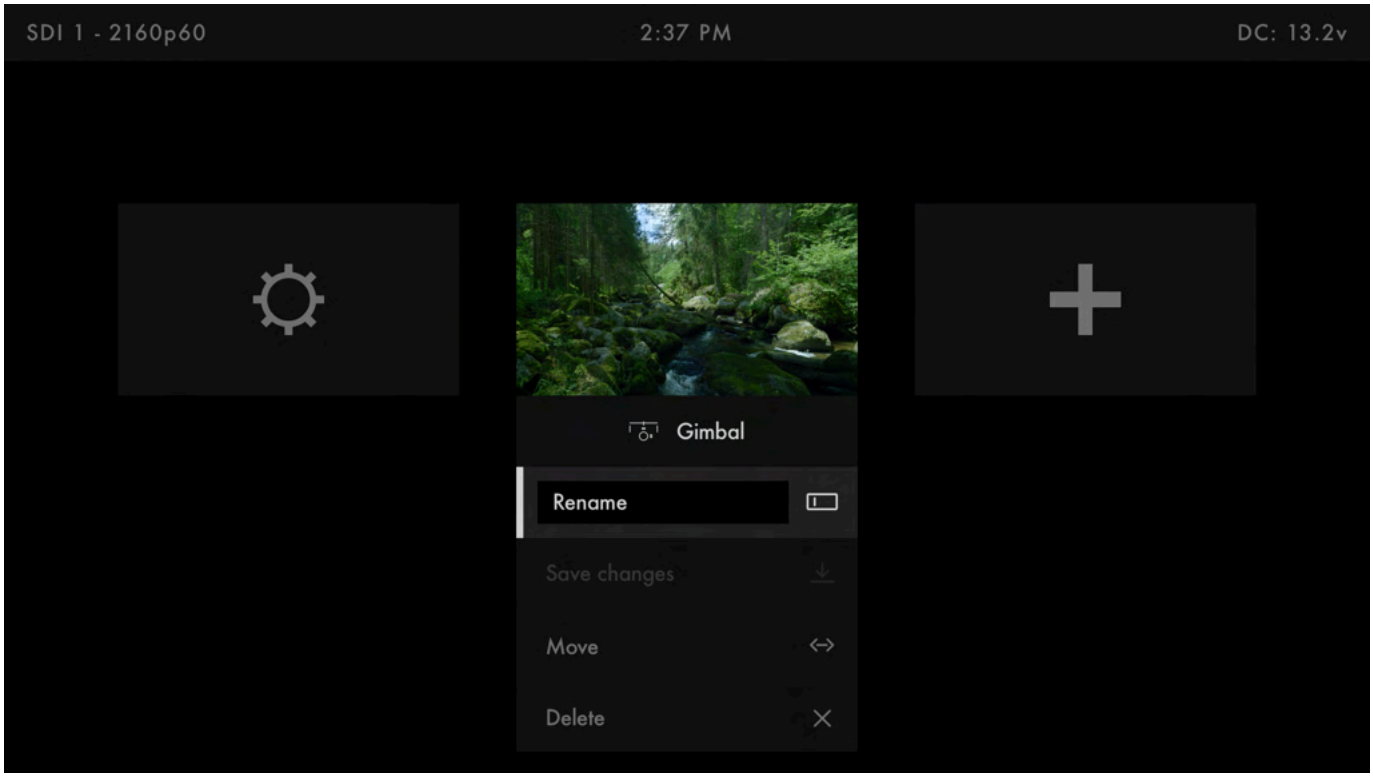

From here, to add a new Page, click the PLUS sign.  You can create a maximum of 8 Custom Pages in SmallHD OS3, not including the Settings Page, Output Page, Control Page or Multi-View Page (if available on your monitor).

**NEW IN OS4** - After creating and customizing a page, you can save it as a page template which can quickly be added back at any time.




You can also **RENAME**, **MOVE**, or **DELETE** a page by selecting  the box with downward carrot or arrow.




## Troubleshooting Tips

In Pages view, you can see what signal the monitor thinks it is receiving from the selected input in the upper left corner. You can also see the time and power data, even if you have the status bar hidden when working on a page.

Tools can be applied to all pages or by page individually. (OS 3.4+)

# Output Page

This page will show you what you are outputting.  This page can be turned off in the settings menu.

[pic]

You will have only limited tools on the output page: Look and add ons.

[pic]

## Troubleshooting Tips

Output page allows you to see what you are sending downstream to the selected output in the menu settings.  Some monitors have a FIXED passthrough on the #2 output from the #2 input.

# Touchscreen Gestures

There are several gestures that allow you to control your monitor if it has a touch screen.

## Pinch In: Zoom In

This is the same as most mobile devices.

Fingers together then spread apart zooms in.
Fingers apart then together zooms out.

## (When Using Pixel Zoom) Two-Finger Drag: Adjust What You Are Seeing

When using the Pixel Zoom tool you can also drag the image around in addition to zooming in and out. When zoomed in, leave two fingers on the screen and move them around in the direction you wish to move the viewing area.

## Pinch Out: Zoom Out

This is the opposite of most cell phones. By placing two fingers together and then separating them, the image will zoom out. This will only work if there is signal.

## Swipe Left or Right: Page Change

This is done with a single finger anywhere on the screen left or right (horizontally). You will need to move at least an inch in the direction you want to switch pages. When in Pages View you can still swipe between pages.

## Swipe Down: Pages View

This is done with a single finger anywhere on the page swiping down about a half inch or so. In pages mode you can see all your pages; they appear in a smaller view. You will also get metadata at the top of

the screen, like the video signal you are receiving and the time and battery life. This will be present even if you have the Status bar hidden, so it is a way to check that data if you do not want to see it on a page.

## Hold (3 Seconds): UI Lock/Unlock

There is a UI lock that is activated in the Menus>Interface>UI Lock. This must be checked to function. Once checked, hold a single finger on the screen for 3 seconds. You will see a status bar near the top center as it locks. Once locked, it will say “Locked”. To unlock, you will need to repeat the 3 second hold with a single finger. There will be no progress bar, but after 3 seconds you will see a message at the top of the screen “Unlocked”.

## Two-Finger Swipe: Jump to Settings Menu from a Page or from Settings Menu back to the Last Page

Using two-finger swiping from the Left to Right you will jump directly to the Settings menu page. Using a two-finger swiping motion while in the Settings menu from Right to Left will take you back to the page you were on. This gesture is helpful if you are several pages in and want to access the Settings menu quickly. Another way would be to go to pages view and select the Settings page. Using the two-finger swipe off the menus will take you back to the last page you were on.

## Tap: Open Toolbar

A single tap on a page screen will bring up the toolbar on the left. The toolbar will disappear on its own if there is no interaction after 5 seconds. Here you can add your tools, enable or disable tools, or adjust their settings. For more information please see the tools section of the guide.

## (While the Toolbar is Open) Swipe Right: Opens Selected Tool's Configuration Menu

Select a tool by touching it on the toolbar. A tool will remain selected even after the toolbar hides itself. Swiping with a single finger left to right will open the menu for that selected tool. After you finish adjusting the settings you can return to the page by either taping the screen or swiping right to left.

# Pixel Zoom

Zooms directly into your image on the monitor to get you an exact idea of your focus distance and any other fine details.
This tool requires a video feed.

## Pixel Zoom - Overview

Enable Pixel Zoom by pressing **up on the joystick** or **pinch-to-zoom/swipe up** on touchscreen monitors when viewing your camera feed normally.  When zoomed in, press the joystick/tap to switch to pan mode to move around the image.

With Pixel Zoom it's very easy and thorough to set proper focus when you have time to do so but the other methods- Focus Assist and Peaking can often be used more quickly when added to a page to swipe to for a quick spot-check.

Pixel Zoom gives you a zoomed-in view of your camera's feed which means it's most likely the tool that will enable you to **spot areas** where you can make improvements, be it **precise focus** or a piece of set dressing that's not angled correctly towards the camera, a stray light stand in the corner of the shot, etc.

As long as you have no image-altering features activated, Pixel Zoom lets you see exactly your image zoomed in, making it the best tool for 'seeing it for yourself'.

## Pixel Zoom - Settings

Because Pixel Zoom isn't added to a page in the traditional way tools operate, its settings can be found in the Settings Menu > Interface > Pixel Zoom

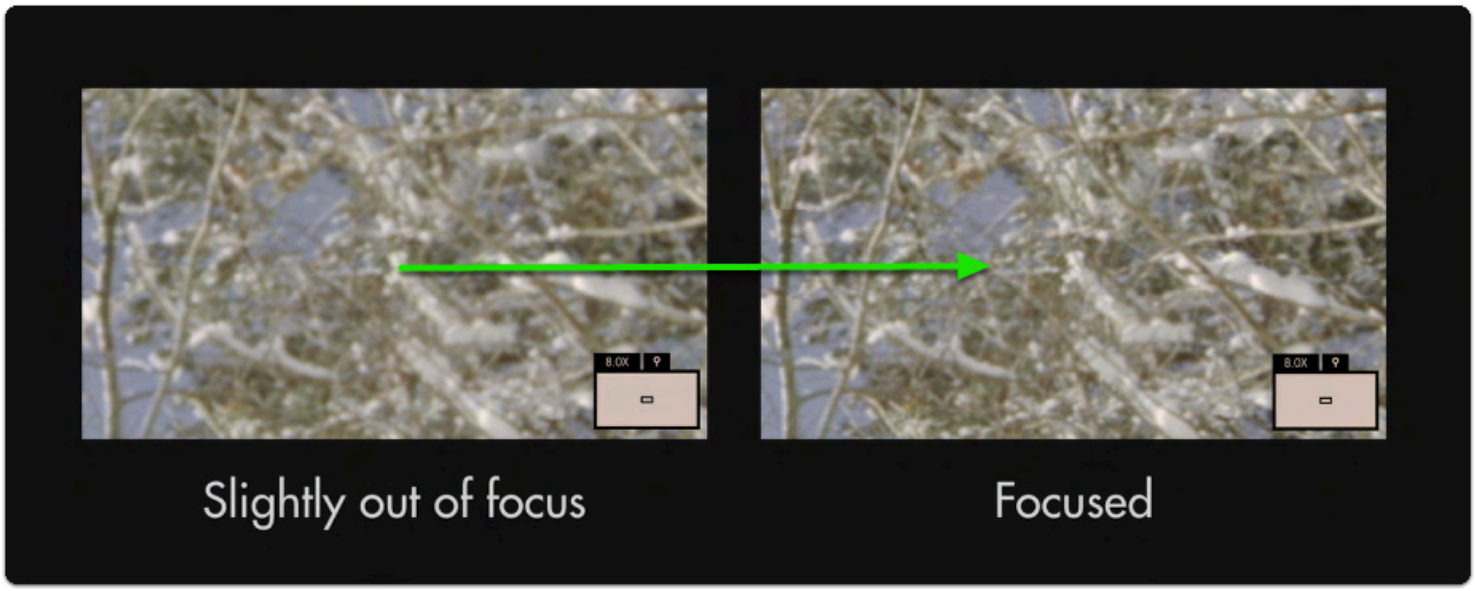
## Pixel Zoom - Quick Start

In this section we'll use Pixel Zoom to set focus and enable us to spot issues with our image.

From a distance this outdoor shot *looks* in focus but using Pixel Zoom reveals we need to make a slight adjustment.

If using a touchscreen, **pinch-to-zoom** to your desired level to check focus. (same and most mobile devices)

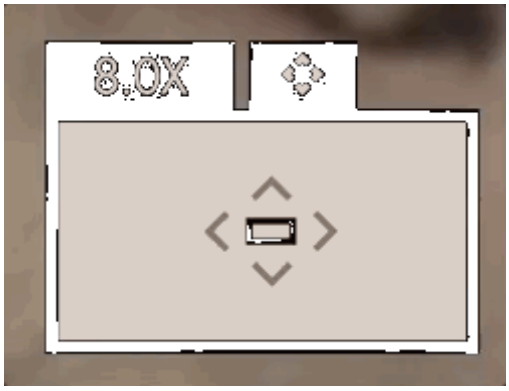
If using a joystick, **press up to zoom in up to 8x** (maximum zoom level may be adjusted in Pixel Zoom Settings).




Though a minor adjustment, this has **increased the effective resolution** of the entire image.

With 4k and 8k cameras becoming commonplace, achieving proper focus becomes **even more important** to properly utilize available resolution.

> To **pan** around the image once zoomed-in, **click the joystick** once and then **move in any direction**. To pan on touchscreen monitors, **drag with one finger** around the image when zoomed in.




**Pixel Zoom**, [Focus Assist] and [Peaking] are excellent tools to help keep your shots in focus. We recommend trying each to find which works best for your shooting style.

# Settings Menu

# Input/Output

Define which signal you wish to view and where to output; set up color properties to monitor your footage in its intended color space, for example DCI-P3 for previewing your footage the way it may appear in cinema projection.

Actual Input/Output settings dependent on monitor model.

## Input Settings

Use this section to choose your input and adjust related settings.

### HDMI

View the signal plugged into ‘HDMI IN’.

## SDI 1

View the HD-SDI signal plugged into ‘SDI IN 1’ (or ‘SDI IN’ depending on monitor model).

## SDI 2

View the HD-SDI source plugged into ‘SDI IN 2’.

Dual HD-SDI inputs available on SmallHD's Production monitors (13" and up).
SDI 2 is a pass though, only SDI 1 OUT is assignable.

The following options become available when the monitor has been calibrated (see Calibration section for details). This allows you to safely define a color space, white point and Log correction that are within the bounds of your calibration.

## Wireless Settings

Manage settings related to wireless protocols (*Option only available on Teradek TX or RX Integrated monitors).

### Airplane Mode

If shooting video on an airplane, check this box to disable Wireless if required. This can help save power/ extend your battery life.

## Color Space

Here is where you want to select the exact color space your camera is outputting to display properly on the monitor.

## White Point

Here is where you want to select the white point your camera is outputting to see it reflected on the monitor.

## Log Correction

If your camera is outputting a log-based gamma, here is where you select your intended output color space/gamma.

## Output Settings

Choose how signals flow once you plug in your camera.

## HDMI

This option will send HDMI 'downstream' via the 'HDMI OUT' port on the monitor.

> Any tools you have applied to the Output Page (such as a Look/3D LUT) will display on any monitor connected via HDMI OUT

## HD-SDI

This option will send HD-SDI 'downstream' via the 'HDMI OUT' port on the monitor.

> Any tools you have applied to the Output Page (such as a Look/3D LUT) will display on any monitor connected via HD-SDI OUT

## Output Page Settings

The Output Page enables lets you apply tools to a downstream output just like with any other page, enabling any monitor or TV to display, for example, a properly graded image on set, especially useful for client monitoring.

### Always Show

If you wish to apply tools to the output of your monitor before an output is physically connected (for example to set it up before shooting), check this option.

### Show if Output Enabled

This will enable the output page only if you are outputting a signal.  This option is useful when you wish to keep your interface free of clutter when no signal is being output but still allows you the ability to configure it when it is.

## Never Show

If you know you will not need to add and configure tools to apply to an output feed, check this option to keep the output page hidden even when an output signal is being sent downstream.

# Wireless Pairing

Pair a **SmallHD TX Monitor or** Teradek TX Transmitter to a **SmallHD RX Monitor** or Teradek RX Receiver following the steps below.

## Enabling Pairing mode on the SmallHD Monitor(s)

Power on your SmallHD and **navigate left** to access the **Settings Menu**.

Scroll down & click on **INPUT** options underneath **INPUT/OUTPUT** & ensure the input is set to **WIRELESS**.

Navigate downward to find the **WIRELESS** option under the **ACCESSORIES** category.

Click the joystick and select **PAIRED TX/RX** to enter pairing mode which will wait for a wireless signal from a compatible transmitter(TX) or Receiver (RX). Do this on both the TX and RX if you are pairing two SmallHD monitors.

> If a transmitter is already paired and you wish to unpair it, **select** where it says **'PAIRED TX/RX'** and then click the option to **'UNPAIR'**.

## Pairing to a Teradek Device

First ensure your Teradek device is connected to **DC power** & a video source/destination via **HDMI** or **SDI**.

**Power on the Teradek** via the **switch** opposite the inputs:

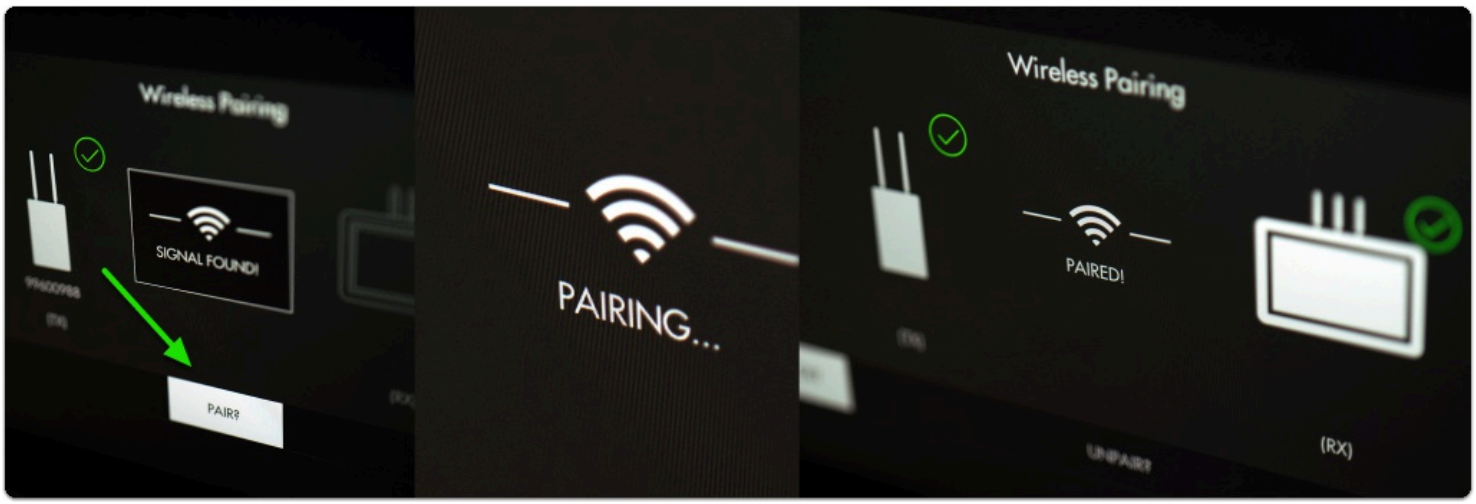
Using a **paperclip** (or similar precision instrument) press the **Reset** button on the transmitter until the **blue cloud LED** begins to **blink quickly**:
*We recommend using BoltManager software on a computer for the pairing process.  You will need a Micro USB cable. and simply hit the pair button.

Select **'PAIR'** on the monitor will begin pairing which typically takes 10-30 seconds *but can take up to 3 minutes in the presence of heavy 5Ghz interference*.

Wireless interference is a common culprit for pairing issues. If the red fault LED stops blinking without having paired, or the 703 Bolt indicates that pairing has failed - try and move to an area with less wireless traffic specifically in the **5Ghz** spectrum (ie **away from wifi routers**, antenna masts, etc). *Once paired*, the signal will be far less susceptible to issues caused by interference.

We also advise placing the devices around **1 Meter/ 3 feet apart** from one other.

*Sometimes, removing the antennas before starting the pairing process and adding a single after the pairing process has started can help the units work through interference.




Congratulations, you're paired up and receiving a wireless signal!

You can confirm by navigating (joystick or swipe) down and in the upper left corner you will see the signal type being sent or received with a green wireless icon.

## Teradek Wireless Products compatible with SmallHD Wireless Monitors

The SmallHD Sidekick (SK) RX and 703 Bolt are compatible with:
Teradek Bolt 500 (+ LT & XT)

Teradek Bolt 1000 (+ LT & XT)

Teradek Bolt 3000 (+ XT)

Teradek ACE 500

The SmallHD 500 RX/TX series are compatible with:
Teradek Bolt 500 (+ LT & XT)

Teradek ACE 500

## TROUBLESHOOTING TIPS FOR WIRELESS PAIRING

*You can only pair one RX to a TX at a time, you can have 4 RX units paired to a single TX.
*We recommend turning off all other wireless TX/RX units and work one at a time on set to help speed up the pairing process.

*Use Bolt-manager (on a computer) if on a Teradek product, it's easier to Pair and be sure everything is up to date. https://teradek.com/pages/downloads#bolt

*Be sure both RX and TX units are up to date on the latest firmware. (You can update the Teradek unit via Bolt-manager).

*The region settings must match between all devices (USA, Europe, Japan Indoor, etc.).

To prevent interference when pairing a transmitter and receiver:

*Turn off all other transmitter/receiver sets, and only turn on the transmitter and single receiver you are trying to pair.

*Turn off any receivers that are already paired to the same transmitter. Only have the transmitter and the one receiver you're trying to pair turned on!

*Have the transmitter and receiver at least 3 feet or 1 meter apart -- do not place them right next to each other!

*Remove the Antennas before pairing.  Once you start the pairing process, add a single antenna to both the RX and TX.

*NOTE: Sometimes if there is a lot of interference in the area, it may take a few tries to get the units to lock, continue to try the pairing process.

# Display

Settings that affect the output of the display can be found here such as backlight adjustment & auto calibration.

Individual options dependent on monitor model.

## Backlight Settings

Set up and fine-tune the brightness of the LED backlight.

### STANDARD RANGE

This option enables adjustment of the backlight up to its maximum limit within the specified color space.

## STUDIO BRIGHTNESS

If you are in a studio or other low-light environment, use this option to limit the backlight to 100 nits which enables a fine-tune adjustment within that range.

*Some monitors will default to Studio Brightness if the power source (voltage) is low to help save energy. Change power sources to allow for Full Backlight capabilities.

## BACKLIGHT

Adjusts the actual output of the backlight or in the case of OLED adjusts the maximum pixel brightness.

*OLED panels do not DIM the same as an LCD, be aware adjusting the brightness of an OLED will affect its performance.

## Calibration Settings

Your monitor ships calibrated from the factory with selectable calibration colorspace LUTs depending on how you may want to display your image, for example DCI color space for cinema projection or Rec. 2020 for HDR production (available on select monitors).

Auto-calibration can be performed here to account for long-term color drift by using a compatible calibration puck on select monitors. This will automatically set the gamma and white point to ensure your monitor is perfectly displaying its intended color space.

More information about Panel Calibration is located here.

## Enable Calibration LUT

This turns on or off the current Calibration LUT.

*You will want to disable the Calibration LUT when making a new one/ calibrating the monitor.

## Calibration LUT

If you already have a saved calibration LUT you wish to use, you can browse your SD card and apply it here.  Once a LUT is loaded onto the monitor it will save it to the hardware.

*Doing a factory reset on the calibration will reapply the factory LUT that came with the monitor.

### Targeted Color Space:

(not editable) Lists the color space that your monitor is currently displaying post-calibration.

*This is set during the calibration process, if using an intermediary, you can select a different colorspace.

### Targeted White Point:

(not editable) Lists the white point that your monitor is currently displaying post-calibration.

*This is set during the calibration process, if using an intermediary, you can select a different whitepoint, we recommend using D65.

## Reset Calibration LUT

Reverts to the factory calibration LUT that is shipped with the monitor.

## Run Auto-Calibration (On select models)

Automatically sets the white point and gamma of your monitor by using a compatible color calibration probe.  Results may vary.
*This is not available on all monitors.  Results may vary.  Run the Auto Calibration at your own risk.

## Appearance Settings

This menu allows you to directly alter the display's RGB output post-calibration if adjustments need to be made to match a lesser monitor on set.

⚠ This menu directly affects (and can therefore negate) the extensive calibration capability of the monitor - modify at your own risk.
This does not affect output or pass though signals.

## Gamma Shift

Adjusts the gamma curve being applied to the final output.

## Sharpness

Adjusts the intensity of edge detection.  See Peaking for a more user-friendly version of this.

## Contrast, Brightness, Saturation (Con,Brt,Sat)

Standard Contrast, Brightness and Saturation controls.

## Red, Green, Blue Gain (RGB Gain)

Adjusts the Gain or Contrast of the Red, Green and Blue channels individually.

## Red, Green, Blue Offset (RGB Offset)

Adjusts the amount of offset for Red, Green and Blue color channels.

# Controls

Miscellaneous settings we had a hard time categorizing :)

## HEADPHONES

Control output volume of the 1/8” stereo port and internal speakers if applicable.

### Headphone Volume

Adjusts the output of the 1/8” stereo mini port

### Speaker Volume

Only available on SmallHD Production Monitors

If using a monitor with speakers (Production Monitors 13” and up), adjust their output volume here.

## Image Rotate Settings

Use this section to rotate/flip the image and/or menu to enable operation from a funny angle.

### Auto Flip Image

Depending on how your monitor is oriented (portrait, upside down) select this to automatically flip the displayed image, similar to a smartphone.

### Rotate Image

This will rotate the displayed image 180° bypassing any automatic functionality

## Mirror Image

Mirrors the image horizontally, useful when pointed towards the talent/scene for more intuitive framing.

## Match Menu to Video

For situations with an upside-down camera - low mode on a stabilizer for example - use this option to rotate the image and not the menu.

> The following options become available when "MATCH MENU TO VIDEO" is disabled.

## Auto Flip Menu

This option keeps the menu right-side up regardless if the image itself is set to rotate.

## Rotate Image

If you wish to explicitly flip the menu independently of the image select this option. (disables auto rotation)

## Mirror Menu

For the one person who needs to view and operate the monitor through a mirror but keeping the image itself un-flipped, congratulations this option is for you :-)

## DSLR SCALE

[pic]

This is basically a digital crop zoom for older cameras that output a 4x3 frame at lower resolutions.

[pic]

## INTERLACE

[pic]

Our monitors prefer a progressive image.  With Interlaced images, we select either Even or ODD fields to view.  The BOB and WEAVE selections choose between this.  The terms are referring to fix how the footage is behaving.  When using an Interlaced (i) signal, try switching between bob or weave if you are having issues.

*We also recommend that you change the cameras output setting to a 1080 p signal (if possible).  You can record in your desired format and this will yield your best results for monitoring the image.

[pic]

## Anamorphic Settings

Anamorphic de-squeeze moved from the Settings to a Tool beginning in firmware version 3.5.0. This tool has more flexibility than the older setting. If you don't see this setting, check under **Tools** > **Scale**. If you'd like to take advantage of these new features, we recommend updating your firmware.

If using anamorphic lenses which squeeze the picture horizontally, the following options will 'de-squeeze' your image, stretching it out horizontally.

### 1X (off)

This option performs no image de-squeeze - for use with non-anamorphic lenses.

### 1.33X

Use to de-squeeze anamorphic footage using lenses or adapters with a 1.33X squeeze factor.

## 1.5X

Use to de-squeeze anamorphic footage using lenses or adapters with a 1.5X squeeze factor.

## 1.66X

Use to de-squeeze anamorphic footage using lenses or adapters with a 1.66X squeeze factor.

## 2X

Use to de-squeeze anamorphic footage using lenses or adapters with a 2X squeeze factor.

## DSLR Scale Settings

For older Canon DLSRs that like to output a cropped image over HDMI, use these options to 'un-crop' for a fullscreen view.

### None (no scaling)

Disables DSLR Scale.

### Canon 5D Mark II

Scales the HDMI feed from a Canon 5DMKII to fill the screen properly.

### Canon 7D

Scales the HDMI feed from a Canon 7D to fill the screen properly.

# Capture

Settings related to capturing and viewing images on the monitor.

## Image Capture Settings

These options will help determine what happens when you use the built in Image Capture function.
*This is a tool for some monitors.

## Capture LUTs (Look files)

When capturing an image, this option will apply any user Look files (3D LUTs) to the saved image, great for reviewing color-graded stills of a shoot day.

## Timestamp in Filename

To get a precise measure of when a screen capture is taken for easier file sorting/searching, enable this option.

## Capture on Record Start

This will automatically capture an image as soon as the monitor detects the camera is recording- useful for a quick overview of a shoot day.

This feature is currently available for SDI signals only

## Reset Capture Number

Resets the naming of captured images starting with 0001, useful when beginning a shoot for easy grouping of captured files.

## Capture Location

Choose where to save your image captures- save to an SD card for quickly dropping files onto a computer or save to the monitor's internal memory.
*You can set the folder structure on your computer which will be accessible when using the SD card.
*SD card needs to be 2,4,8 or 16 GB

## Reset Capture Location

Sets the Image Capture location back to the monitor's internal memory.

## Image Gallery Settings

View and access files taken with Image Capture

## Open Media Gallery

Opens the image browser where you can view and manage files taken via Image Capture.
*This may slow down the UI the more data there is on the card. We recommend keeping the data clean to hep with lag in the UI.

# Accessories

Manage and control accessories connected to the monitor.

## Remote

Use this section to pair up to three bluetooth remotes to your monitor for bump-free menu access.

The remote is a great option for steadicam, gimbal, crane/jib or even sensitive tripod work because it allows you to access the entire monitor without physically coming in contact with it.

## [Remote Slots]

Pairing the remote:
To connect the remote, go to the menus under remote and be sure its enabled. Hold the blue joystick down for about 5 seconds, you should see the Remote link under the status column. Select it on the monitor and it will “bind”. Once this is tied (Active), it will work as a normal joystick would. It will blink blue light slowly when paired. It will blink fast blue when not paired.

If a bluetooth remote is found within range (make sure to remove the battery cover on the remote) it will display as 'Found' - select this to pair your remote which will change the readout to 'Active'. After that you should be all set!

## TROUBLEHSOOTING TIPS

*Remotes will remain paired to a specific monitor and will need to be Unpaired if you want to use it with a different monitor.
*BT-1 remotes update with firmware when they first pair, it is recommended if you have not used the remote recently, to allow 3-4 minutes for the remote to update upon first pairing.
*If the remote is blinking red and blue quickly, you will need to replace the batteries. It takes 2x CR1620 watch style batteries.
*More BT-1 Remote Tips here.

# Interface

Options related to customizing the user interface for your shooting style.

## Pixel Zoom Settings

These settings adjust the functionality of Pixel Zoom which enables you to zoom in on your image at any time when viewing your shot (move up on joystick or swipe up on touch screens)

### First Level

This option determines the desired zoom level for the first ‘stage’ of pixel zoom.

### Second Level

This option determines the desired zoom level for the second ‘stage’ of pixel zoom, by pressing up twice on the joystick (swiping on touchscreen) when viewing a shot.

### Scopes Button

⚠ Only available on SmallHD Production Monitors and UltraBright Monitors

# SCOPES BUTTON

These settings determine which scopes are displayed when the Scopes Button is activated on the front face of SmallHD's production monitors.

### Waveform

Displays the Waveform on-screen when the Scopes button is activated.

### Histogram

Displays the Histogram on-screen when the Scopes button is activated.

### Vectorscope

Displays the Vectorscope on-screen when the Scopes button is activated.

## Status Display Settings

# STATUS DISPLAY

The Status Display is a discreet information bar at the top or bottom of the image for displaying signal format, frame rate, time and battery life (if applicable).

### Off

Turns the Status Display off.

### Top

Enables the Status Display and places it at the top of the image.

### Bottom

Enables the Status Display and places it at the bottom of the image.

### Show Frames/Sec

Displays the frames per second next to your camera's resolution on the status bar.

### Show Fields/Sec

Displays the fields per second next to your camera's resolution on the status bar.

## UI Lock Settings

UI Lock is like a 'hold' switch which disables user input while active. This is useful in scenarios where there is a risk of the monitor's controls getting bumped.

UI Lock was added to touchscreen monitors in firmware 3.5.0. Once enabled in the Settings menu, pressing a finger on the screen for 2½ seconds will lock the screen. Pressing the screen again for 2½ seconds will unlock the screen.

## Hold Joystick to Lock UI/ Press and Hold screen to Lock

Enables or disables the UI lock at any time via a press-and-hold on the joystick or touchscreen for 5 seconds.

When you touch the screen or hold the joystick down, you will see a progress bar appear at the top of the screen and then it will say locked.  There will be no other indication that the screen is locked.
To unlock, again, hold for 5 seconds and the word Unlocked will appear.

## Language Settings

Choose your preferred language in which to operate the user interface.

### English

Sets the user interface language to English.

### 简体中文

Sets the user interface language to Chinese (Simplified).

### 日本語

Sets the user interface to Japanese.

# User

Settings related to monitor personalization.

## BACKDROP

Your monitor has a default backdrop.  This is what will show when there is no signal on your monitor.

You can have this turned on or off (which will display NO SIGNAL over a black background) or you can load your own custom backdrop.

To load a custom file, select the custom checkbock and then custom file "..."  This will allow you to load a file form your SD card.

*We recommend making the custom file the same resolution as the panel for best results.

## Power

This section is for controlling user-definable power options.

### Auto Recover

Automatically turns the monitor back on after a power loss.

## Date & Time

Use this menu to adjust the current date & time - this will keep you organized when taking screen captures by using a date in the file name.

### Date

Sets the month/day/year.

### Time

Sets the current time.

### 24H Display

Displays the clock in a 00:00 to 24:00 format, known commonly as 'military time' which makes 12am and 12pm slightly less confusing.

### MONITOR ID

This feature is available in firmware 3.6+

This setting will allow you to give your monitor a specific name.  You can have 19 alpha numeric character or symbols.

*If desired, this is where you could record your Serial Number incase you lose the sticker or if you have a number of units there there is an internal ID system that you use for inventory.

# Profiles [Settings]

Save and load profiles between monitors to keep your monitor's configuration consistent on set or between sets.

A profile will contain the settings on your pages, tools and most of the settings in your menus.  It will not save the Calibration, appearance, date time, monitor ID or firmware.

## Profile Name:

The default will be Config, you can change this if desired.

## Save Profile to Storage

Saves a profile files, with the name selected name onto your SD card.

## Load Profile from Storage

Load a saved profile from internal memory or SD card to keep from having to reconfigure all your settings, pages and tools if moving from monitor to monitor.  To load a profile, select load profile, and then navigate to the file and select it.

# System

Update system firmware or reset to factory defaults.

## Firmware Settings

Go to this section to update & manage your firmware via SD card.

If no SD card or update files is recognized, it will tell you your current Firmware version.

Once an SD card with an appropriate file(s) is inserted into the monitor, it will give you the files firmware version and your current one.

Selecting this option will update your firmware to the version contained on your SD card (if any).

*When doing a firmware update, be sure not to lose power during the process.  If you do, the firmware will not boot in many cases, and if this happens, you will need to reach out to support@smallhd.com

The latest SmallHD firmware is always available from smallhd.com/pages/software. To apply the update, unzip the file, drop the resulting .bin file right onto the main directory of your SD card, plug it into the monitor and select this option to perform the update.

# Factory Reset Settings

Go to this section to reset the monitor's pages & settings to how it was when it came out of the box.

## Execute Factory Reset

Select this option to reset the monitor to its factory default settings.

A default factory reset will reset all settings in the menus and pages data. It will keep the firmware, calibration file and registration information. You can reset these also, if you select the appropriate box.

Factory Reset is useful when swapping between different users or when encountering issues that may be a result of fiddling around with unfamiliar settings of if there has been a lot of issues.  Reloading the firmware, or updating to the lasted stable version are also ways to troubleshoot issues. ;-)

# Camera Control

# ARRI® Camera Control

Applicable to both tutorials: first connect Ethernet (RJ45) to the monitor and the LEMO cable (for Alexa Mini / Mini LF) to the camera on the port labeled 'ETH' - for the Amira use a standard RJ45 to RJ45 cable.

## Activating Your License

Your license kit comes with a card that has your activation code as a special link in a QR code. Scan this link with your smartphone or enter it on a computer to go to the activation webpage.

> You can also buy the license separately off the website and this code will be emailed to you.

On your monitor, go to Settings and scroll down to System > Licenses. Tap the button to add a new license.

Your monitor will display a token. Enter this token on the activation webpage. The webpage will then display your activation key and all you need to do is to enter on the monitor. Once entered your monitor will add a Camera Control page where you can control your camera.

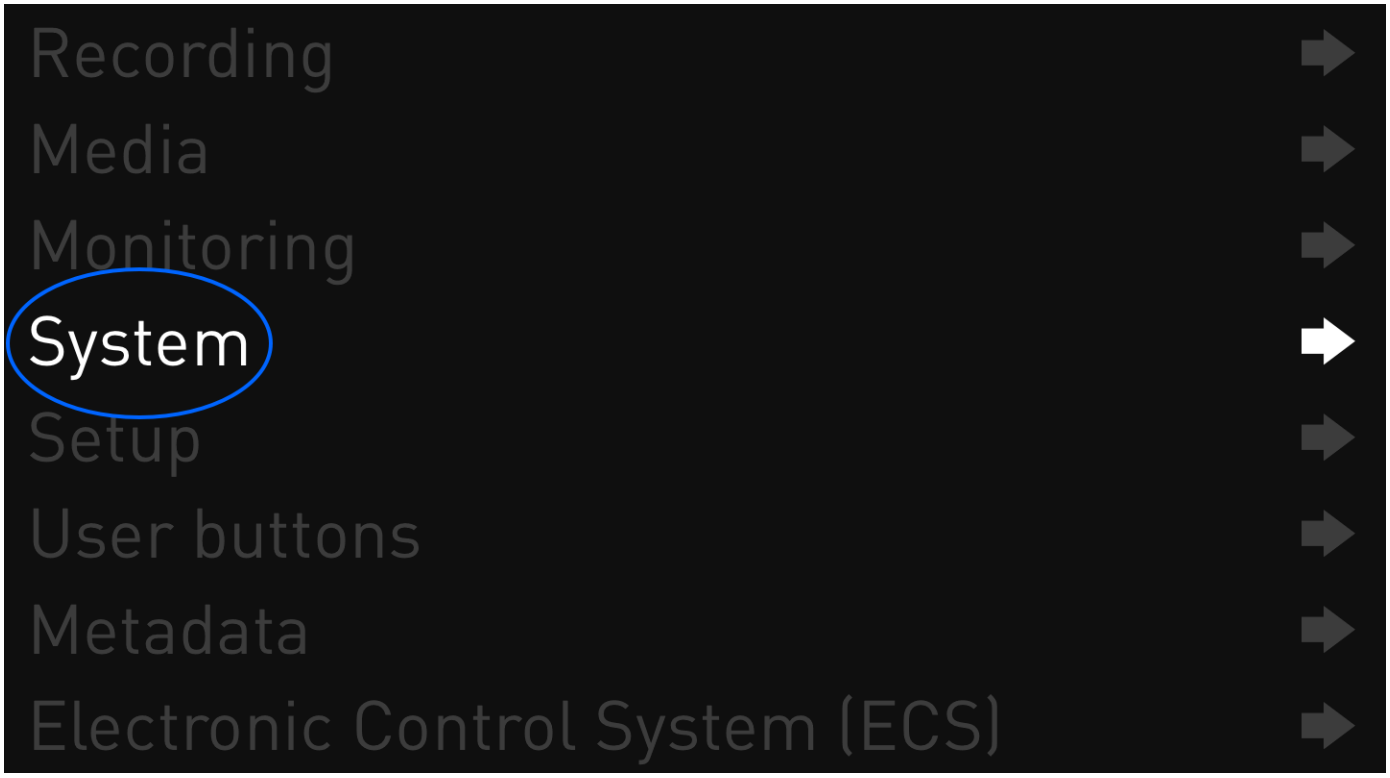
> You will need to be sure that your CAMERA CONTROL PAGE is active.

For a more detailed overview of adding a license, see this support page.

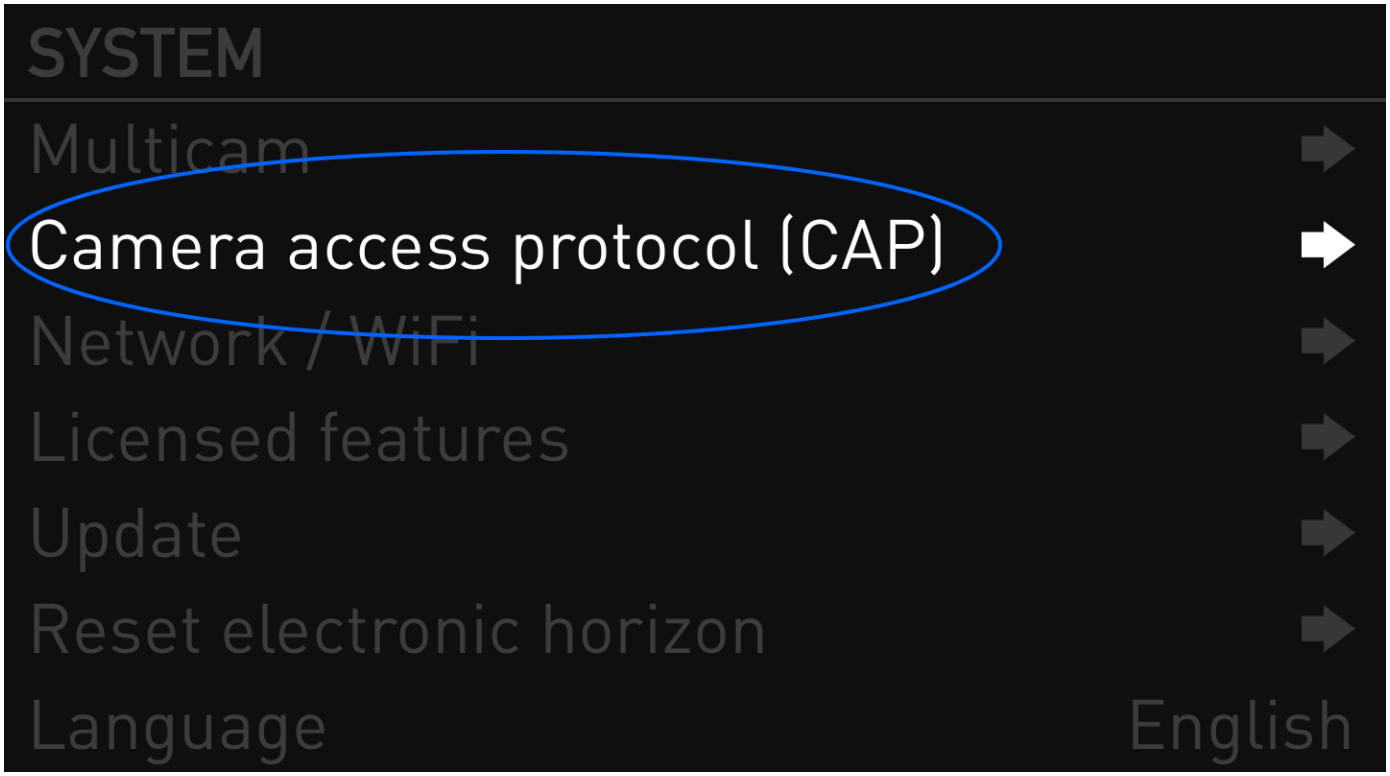
## Using the EVF to Connect

Via ARRI EVF:

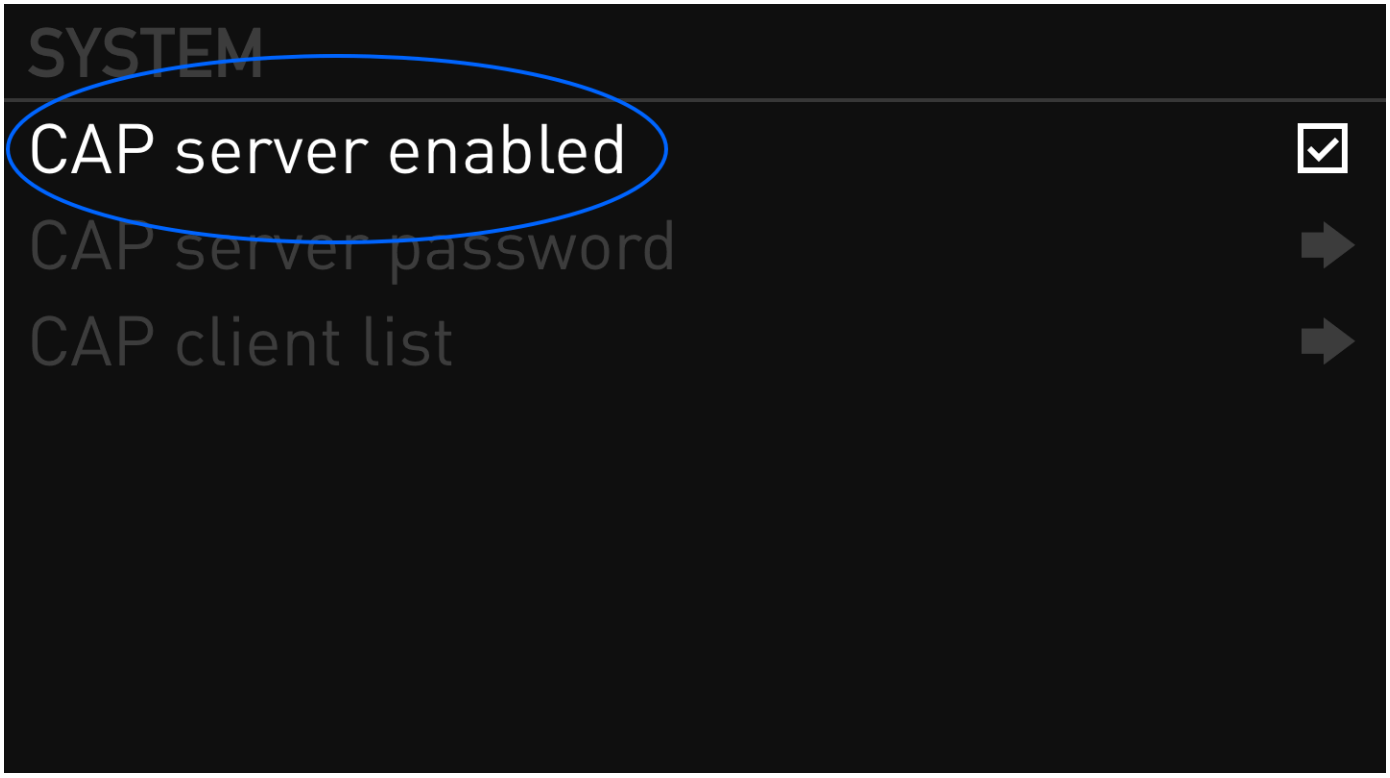
Access the MENU on your ARRI camera & navigate to 'System'.
Navigate to 'Camera access protocol (CAP)'.
Ensure 'CAP server enabled' is checked - this is what will allow communication with the ARRI camera.
If the default password 'arri' has been altered, you can locate or modify the password here.
Press 'BACK' on the camera and navigate to 'Network / WiFi'.
Ensure LAN IP mode set to 'Static'.
Lastly make sure the IP Address field to the left matches the 'LAN static IP' field from the camera, then press Connect.



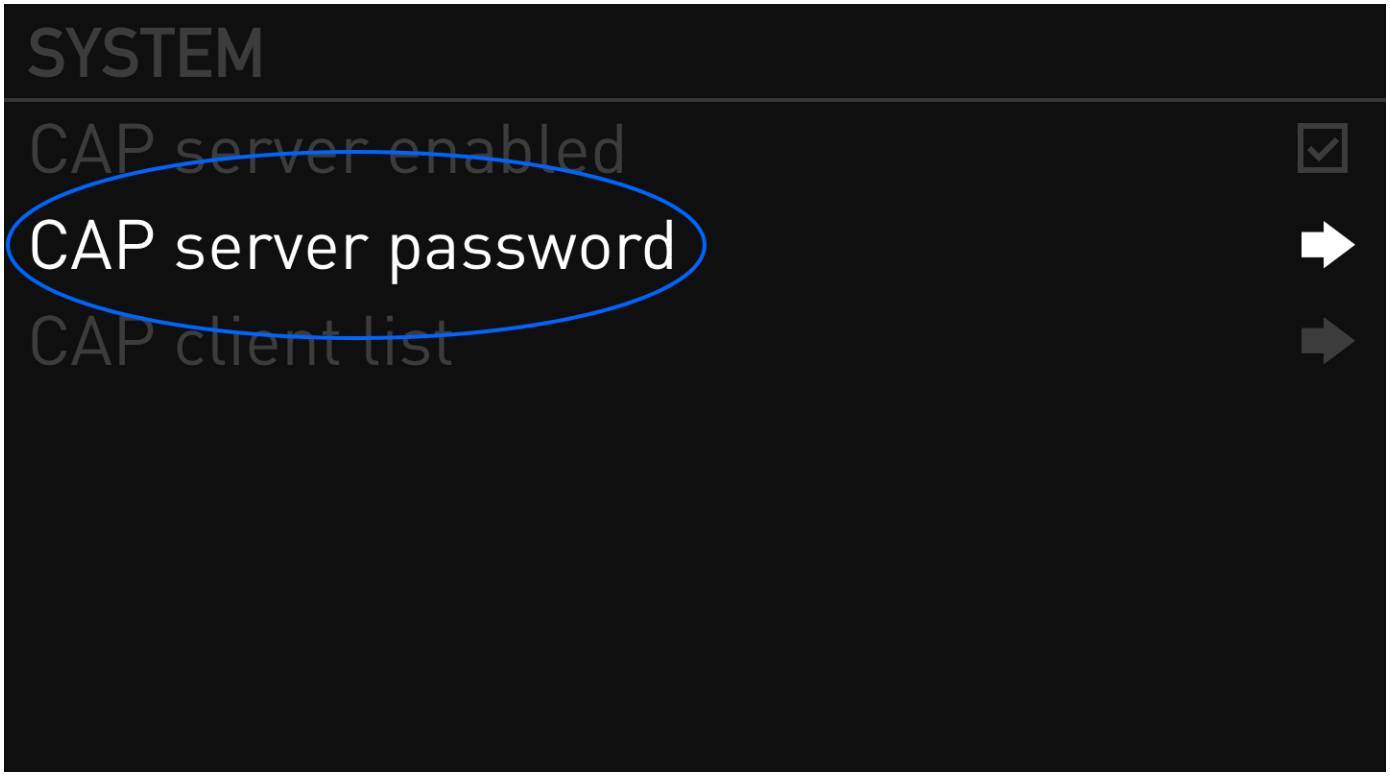

Access the MENU on your ARRI camera & navigate to ‘System’



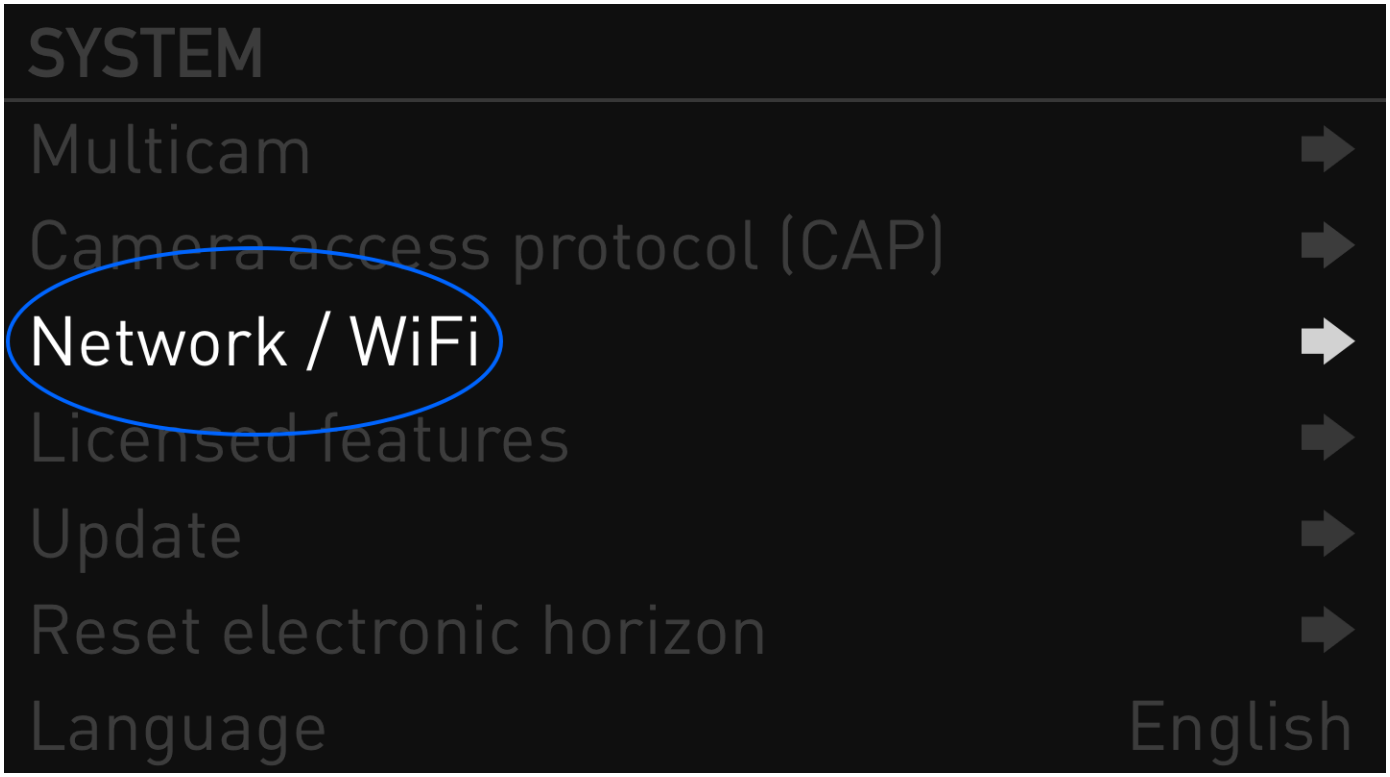

Navigate to ‘Camera access protocol (CAP)’



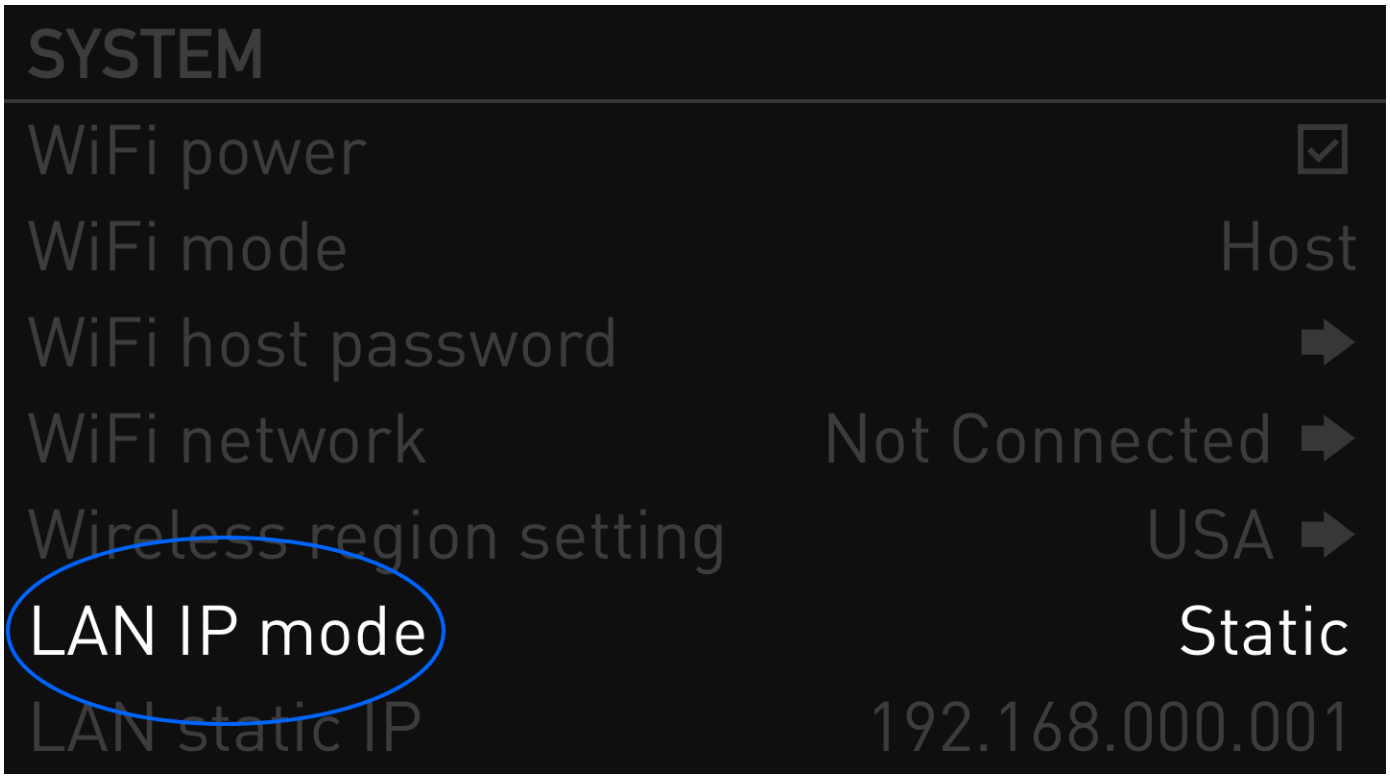

Ensure ‘CAP server enabled’ is checked—this is what will allow communication with the ARRI camera



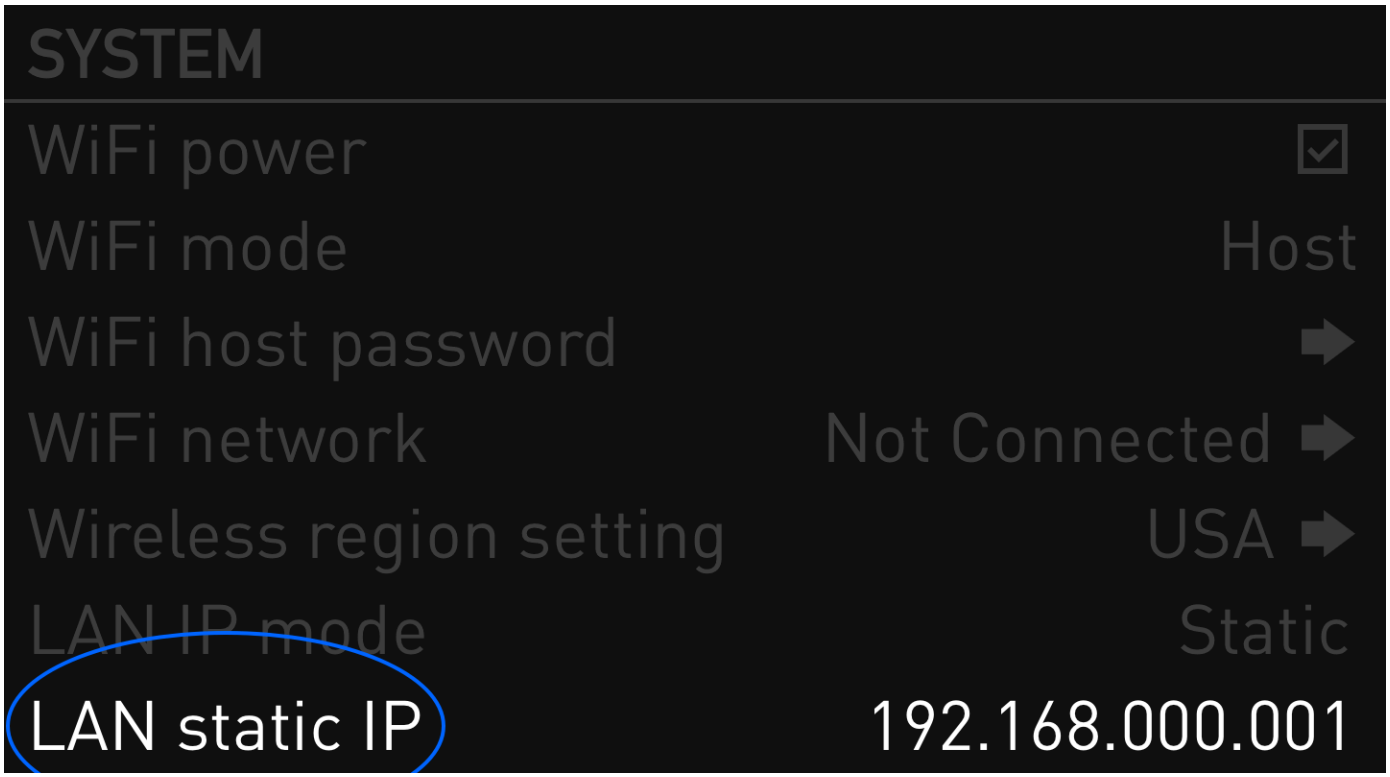
If the default password `arri` has been altered, you can locate or modify the password here




Press 'BACK' on the camera and navigate to 'Network / WiFi'



Ensure LAN IP mode is set to ‘Static’




Lastly, make sure the IP Address field to the left matches the ‘LAN static IP’ field from the camera, then press Connect on your monitor

## Using Wifi to Connect

Via WIFI:

Known:  If Wifi password has changed from its default and the password is not known, an EVF will be required to control the camera (as far as I know) to reset the camera’s factory defaults (which this guide is based on).

Turn on camera
On a computer, connect the wifi network the camera has created:  “MINI-XXXXX” (5 digit number is the serial # of the camera) with the default password “arriarri”
On a web browser go to http://mini-XXXXX.local  (replace XXXXX with the same serial number as seen in the previous step)
Once connected click ‘Menu’ on the left
Navigate to System > Camera Access Protocol (CAP) > and check “CAP SERVER ENABLED”
For a clean feed, navigate to Monitoring > SDI > SDI 1 Image (or SDI 2 Image) > “Clean”
Connect lemo>ethernet cable from the ‘ETH’ port on the Alexa to the ethernet port on the monitor
Go the Arri control page and connect to the camera from the monitor

## ARRI ALEXA Mini LF

*Be sure your SmallHD Firmware is 3.6.4 or later to use the MINI LF Control.

# Troubleshooting

You will need to be sure the IP addresses match.  If you are seeing something other than xxx.xxx.xxx.xxx on the camera, you may need to add 0's to the IP address to make it fit this medium on the monitor.

i.e. if you see xxx.1.xxx you will need to add xxx.001.xxx to the monitor.

If you are on firmware 3.5.2 or below and your monitor is failing to connect to the camera's IP address, you may need to adjust what you type for the IP address. Please eliminate any leading zeros in the IP address. For example, your camera may show an IP address of `192.168.010.000`. On your monitor, you will need to type `192.168.10.0`. Firmware 3.6.0 fixes this issue.

If you suspect the Ethernet to 10-pin LEMO cable might not be working you can connect the cable to the Ethernet port on your computer and try connecting to the camera's web control interface.

> The next step assumes you have some familiarity with computer networking. If you do not, ask a friend or colleague who does for assistance.

If you suspect the Ethernet interface for the monitor is not working, you can connect the monitor using a standard Ethernet cable to a router. You should be able to locate the monitor's IP address in the router's DHCP table and you can try to ping the monitor at that IP address.

# Features

ARRI camera control is limited by the manufacturer to the following features:

RecordStart
RecordStop
Playback control
Set & read TC
Set & read Project Rate
Read & set system date/time
Read Clip List from medium
Camera Type

Camera Serial
Camera State
Look Filename
Color Temperature
Tint Variable
Exposure Index
Sensor FPS List
Sensor FPS
Shutter Angle List
Shutter Angle
Exposure Time List
Exposure Time
Exposure Index List
ND Filter List
ND Filter
White Balance List
Media Status
Recording Mode
Clip Scene
Clip Take
Medium Type
Model Name
Serial Number
Clip Count
Current Reel
Medium Size
Medium Status
Write Protection
Clip Count
Current Reel
Free Capacity
Clip Filename
Clip UUID
Clip Project Rate
Clip Start TC
Clip Duration TC

# RED® DSMC2 Camera Control

RED DSMC2 camera control is available as a license on compatible Camera Control monitors and is compatible with cameras that have a DSMC2 Brain. A specific Controller and USB adapter (if applicable) must be purchased as well to allow the monitor to communicate with the camera. The license and cable are available bundled directly from SmallHD or authorized resellers.
*It is one license per monitor for control, it is not transferable. You will need both the software and control cable to use this feature with your compatible camera.

## Activating Your License

Your license kit comes with a card that has your activation code as a special link in a QR code. Scan this link with your smartphone or enter it on a computer to go to the activation webpage.

*If you purchase the software only online, you will be emailed this Activation code.

On your monitor, go to Settings and scroll down to System > Licenses. Tap the button to add a new license.

Your monitor will display a token. Enter this token on the activation webpage. The webpage will then display your activation key and all you need to do is to enter it on the monitor. Once entered your monitor will add a Camera Control page where you can control your camera.
*Once a License is activated it can not be inactivated or transferred toa different monitor.

## Connecting Your Camera

Connect your USB cable to the port on the back of your Cine 7, below the battery plate. Tighten the locking connector into the adjacent screw for security. Connect the other end of the cable to your camera.

You will need to enable serial communication on your camera prior to connecting the monitor **and after any firmware updates on your camera**. Try Menu > Settings > Setup > Communication > Serial and choose Red Command Protocol

Once all physical connections are made, go to your monitor's camera control page. If you have more than one camera control license, choose the Red license, then click the Connect button.

Your monitor will remain connected to the camera even if the camera enters sleep mode. Turning the monitor off will require you to re-connect to the camera. If you need to connect to a different camera, you will need to turn the monitor off and then on again.

## FEATURES

Supported control will depend on your version of RED camera.  Certain cameras have features others do not.  You should have control over all aspects available minus the ones listed below.

This is a list of the features NOT currently available: (3.6.1)
Configuring User Buttons
Custom Profiles (User Presets)
Goalposts
Color Matrix

## TROUBLESHOOTING TIPS

"Check cable Connection" - If you are getting this error and have followed the above steps, be sure to check all 3 connection points (monitor to the adapter, adapter to cable, cable to camera).
You can remove the USB adapter, click connect, and then re-plug in the USB adapter to the monitor. Sometimes this does not seat quite right the first time.  If the problem persists, contact Support.

If you build a custom extension cable, The 4 pin Lemo cable can be checked with a Voltmeter to be sure the connections are good. It's a 1:1 pin configuration. This will not work on the Orginal Control cable.

To check the Micro USB port, you can get a Micro USB to SD card reader and plug in your SmallHD (or 2,4,8,16 GB) SD card and see if the monitor can see it, if not, then there is an issue with the port. [Or thumb drive]

If your camera stops connecting after upgrading the camera's firmware, be sure to re-enable the Red Command Protocol under Menu > Settings > Setup > Communication > Serial.

If your camera suddenly loses power, you may need to allow 5 minutes for the camera to boot again and test itself before attempting to connect.

*Monitoring Audio Levels:
You will have a couple of options.  To use any tools, you can set them up on the next page and swipe between the two.

You can also use the RED overlay sent down the SDI:
RED Menus > Monitoring > HD-SDI > Auto-Hide Menus Option
The drawback of this method is it reduces your screen real estate and the actual image from the camera a bit.

# RED® RCP2 Camera Control

If you update your KOMODO firmware to version 1.4, be sure to update your monitor to firmware version 4.4.3 or newer, available from our Downloads page.

Red camera control is available as a license on monitors that support Camera Control and is compatible with both the **RED KOMODO** series and **RED V RAPTOR** series cameras. A specific USB cable must be purchased as well to allow the monitor to communicate with the camera. The license and cable are available bundled directly from SmallHD or authorized resellers.
**NOTE: You will need Software and a Compatible Cable to control the camera.**

## Activating Your License

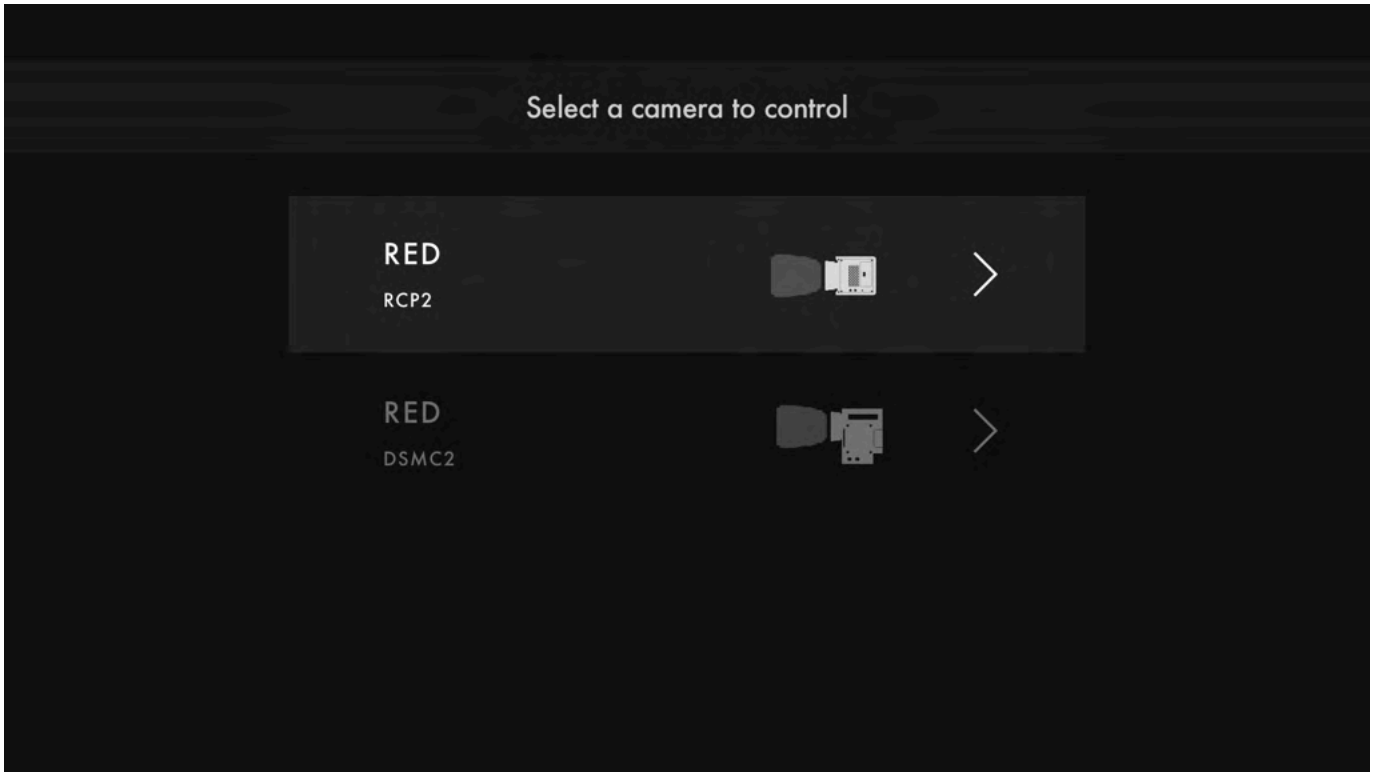
Your license kit comes with a card that has your activation code as a special link in a QR code. Scan this link with your smartphone or enter it on a computer to go to the activation webpage.
*You can also buy the license separately off the website and this code will be emailed to you.

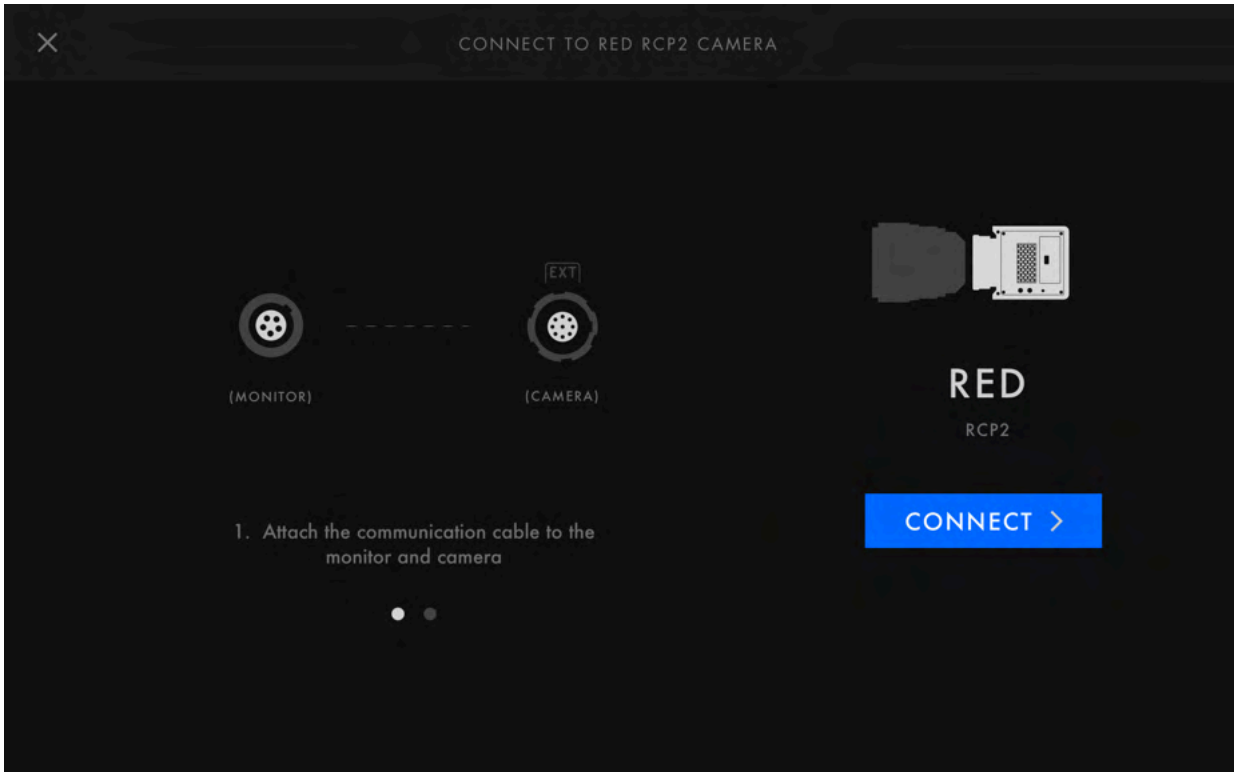
On your monitor, go to **Settings** and scroll down to **System > Licenses**. Tap the button to add a new license.

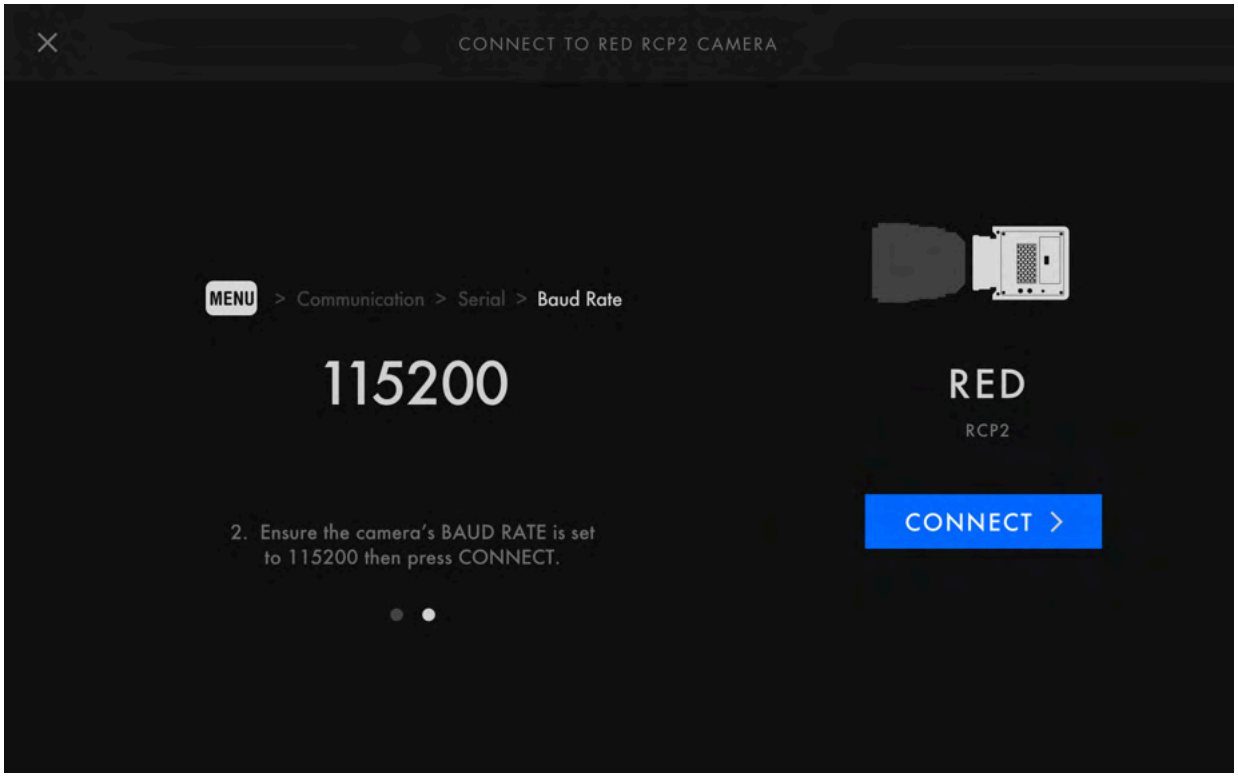
Your monitor will display a token. Enter this token on the activation webpage. The webpage will then display your activation key and all you need to do is to enter on the monitor. Once entered, your monitor will add a Camera Control page where you can control your camera.

*You will need to be sure that your CAMERA CONTROL PAGE is active.

# Connecting Your Camera






Connect your USB cable to the port on the back of your Monitor, wither directly using the Camera Control cable and USB adapter (If Applicable), below the battery plate. Tighten the locking connector into the adjacent screw for security. Connect the other end of the cable to your camera. Be sure the serial communication is enabled on the camera and that the baud rate is set to 115200.

Once all physical connections are made, go to your monitor's camera control page. If you have more than one camera control license, choose the Red RCP2 license, then press the Connect button. Wait 30 seconds after connecting and powering on the devices before pressing the Connect button.

> Your monitor will remain connected to the camera even if the camera enters sleep mode. Turning the monitor off will require you to re-connect to the camera. If you need to connect to a different camera, you will need to turn the monitor off and then on again.

## FEATURES

Supported control will depend on your version of RED camera.  Certain cameras have features others do not.  You should have control over all aspects available minus the ones listed below.

This is a list of the features NOT currently available: (3.6.1)

Configuring User Buttons
Custom Profiles (User Presets)
Goalposts
Color Matrix

## TROUBLESHOOTING TIPS

"Check cable Connection" - If you are getting this error and have followed the above steps, be sure to check all 3 connection points (monitor to adapter, adapter to cable, cable to camera).
You can remove the USB adapter, click connect and then re-plug in the USB adapter to the monitor. Sometimes this does not seat quite right the first time.

The 4 pin Lemo cable can be checked with a Volt meter to be sure the connections are good. It's a 1:1 pin configuration.

To check the Micro USB port, you can get a Micro USB to SD card reader and plug in your SmallHD (or 2,4,8,16 GB) SD card and see if the monitor can see it, if not, then there is an issue with the port. [Or thumb drive]

If your camera stops connecting after upgrading the camera's firmware, be sure to re-enable the Red Command Protocol under Menu > Settings > Setup > Communication > Serial.

*Monitoring Audio Levels, Goal Posts or other RED interfaces Metadata
You will have a couple of options. To use any tools, you can set them up on the next page and swipe between the two.

You can also use the RED overlay sent down the SDI set the following to ON:
RED Menus > Monitoring > SDI >
-Guides
-Tools
-Overlay

The drawback of this method is it reduces your screen real estate and the actual image from the camera a bit.

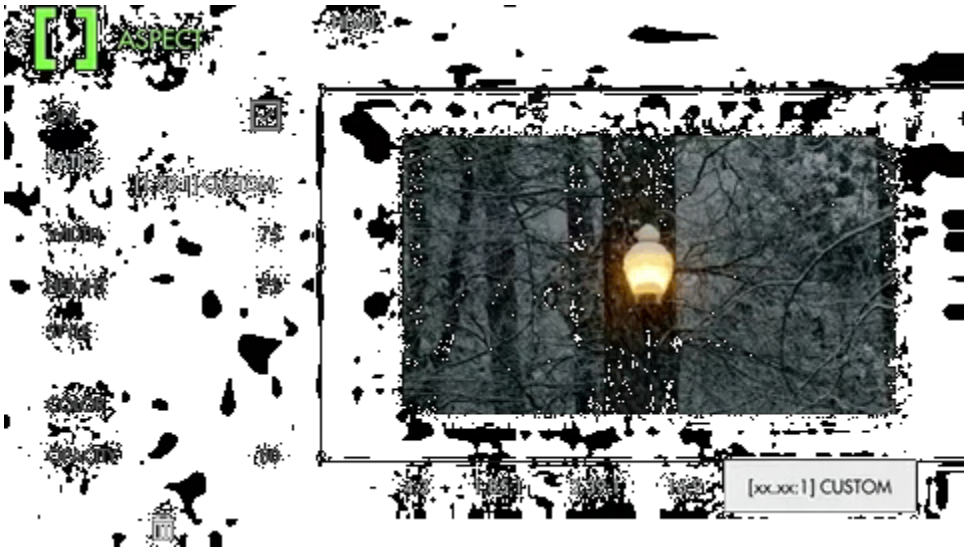
Connection Options:

**RED KOMODO** or **V RAPTOR CONTROL CABLE** and SmallHD unit with 5pin LEMO Controlport
or
**RED DSMC2** or **DSMC3 CONTROL CABLE**, Wooden Camera C Box for Komodo, and SmallHD unit with 5pin LEMO Controlport
or
**RED KOMODO** or **V RAPTOR CONTROL CABLE** and SmallHD unit with USB to 5 pin Adapter.

or
**RED DSMC2** or **DSMC3 CONTROL CABLE**, Wooden Camera C Box for Komodo, and SmallHD unit with USB to 5 pin Adapter.

# Tools - Framing

# Aspect (guides)




If you are **shooting** in a **different aspect ratio** than the expected **final output**, place an **Aspect Guide** on your page for framing your shots instead of just using gaffer tape. These act like a Matte, but do not affect your footage.

## Aspect - Settings

### ON

Enable/Disable the Aspect guide. You can also enable or disable the tool by selecting it on the tool bar. It will be Green when enabled and Grey when disabled.

### RATIO

Select the aspect ratio you wish to visualize with the guide. There are several presets that you can use. If none of these meet your needs, you can create your own with the Custom setting if using a non-

standard ratio.

Custom Ratio (x.xx : 1) will open two new menu options:
WIDTH - This sill translate as a % from left to right.
HEIGHT - This will translate as a % from top to bottom of the frame.

### STYLE

You have two options.
MATTE - will give you "bars" over the top of the image.
LINE - Will have a 2-3 Pixel line, like a guide line, showing you the edges of the aspect you have selected.

*Line style may be more helpful when needing to see very clearly what is outside the active area as it will not get 'painted' over as it does with solid color.

## Color

Define the color of the overlay area if using 'MATTE' style or define the color of the border when using 'LINE' style.

## Opacity

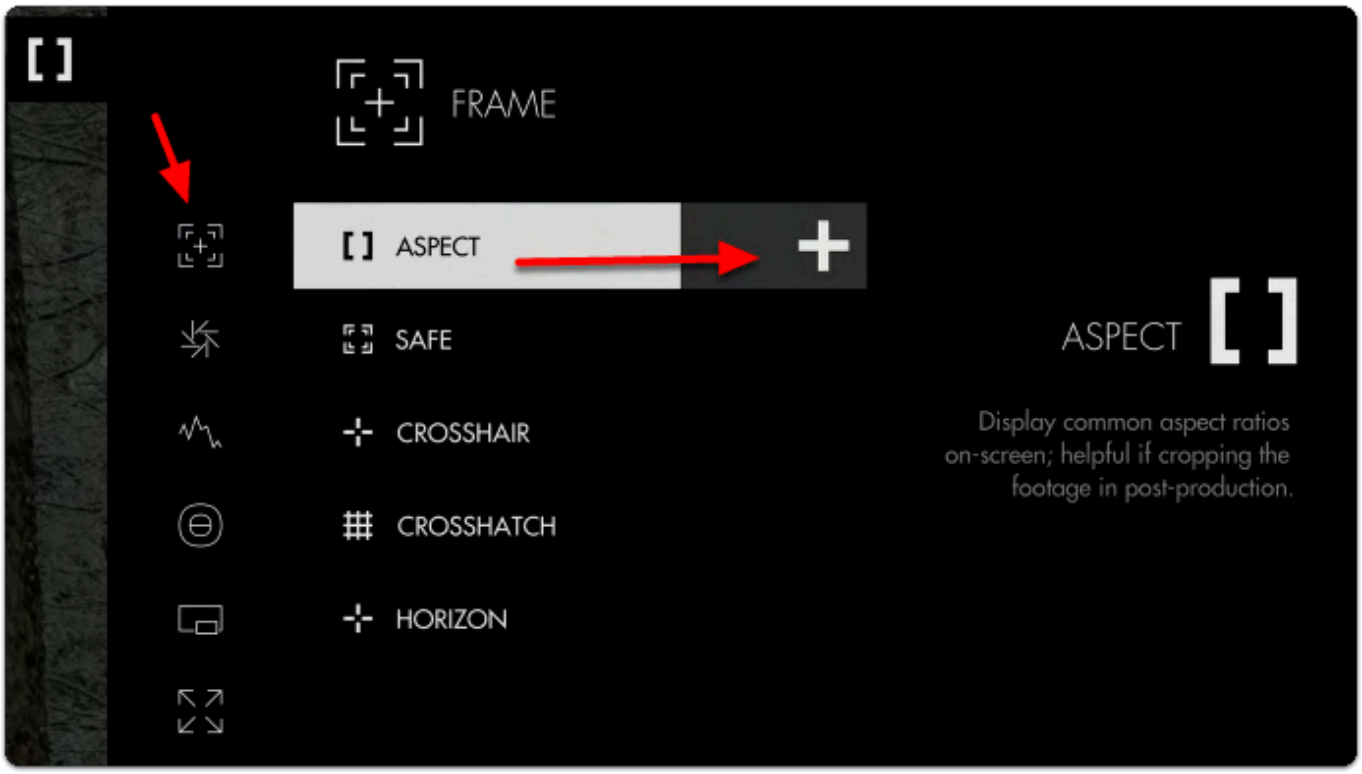
Adjusts the opacity/transparency of the matte area or line borders depending on the chosen Style.

# Aspect - Quick Start

For this example we will be preparing for a **cinemascope (2.39:1)** aspect ratio while filming in standard **16x9**. This means we wish to visualize the top and bottom of the image being cropped for the final product via **Aspect Guides**.

From any page, **click the joystick** or **tap the screen** on a touchscreen monitor and select **'Add New Tool'**

Navigate to **Frame** > **Aspect** and select the **'+'** to add it to the current page.




Once added you can **edit** the settings by **navigating right** or **tapping the right arrow** when 'Aspect' is highlighted.

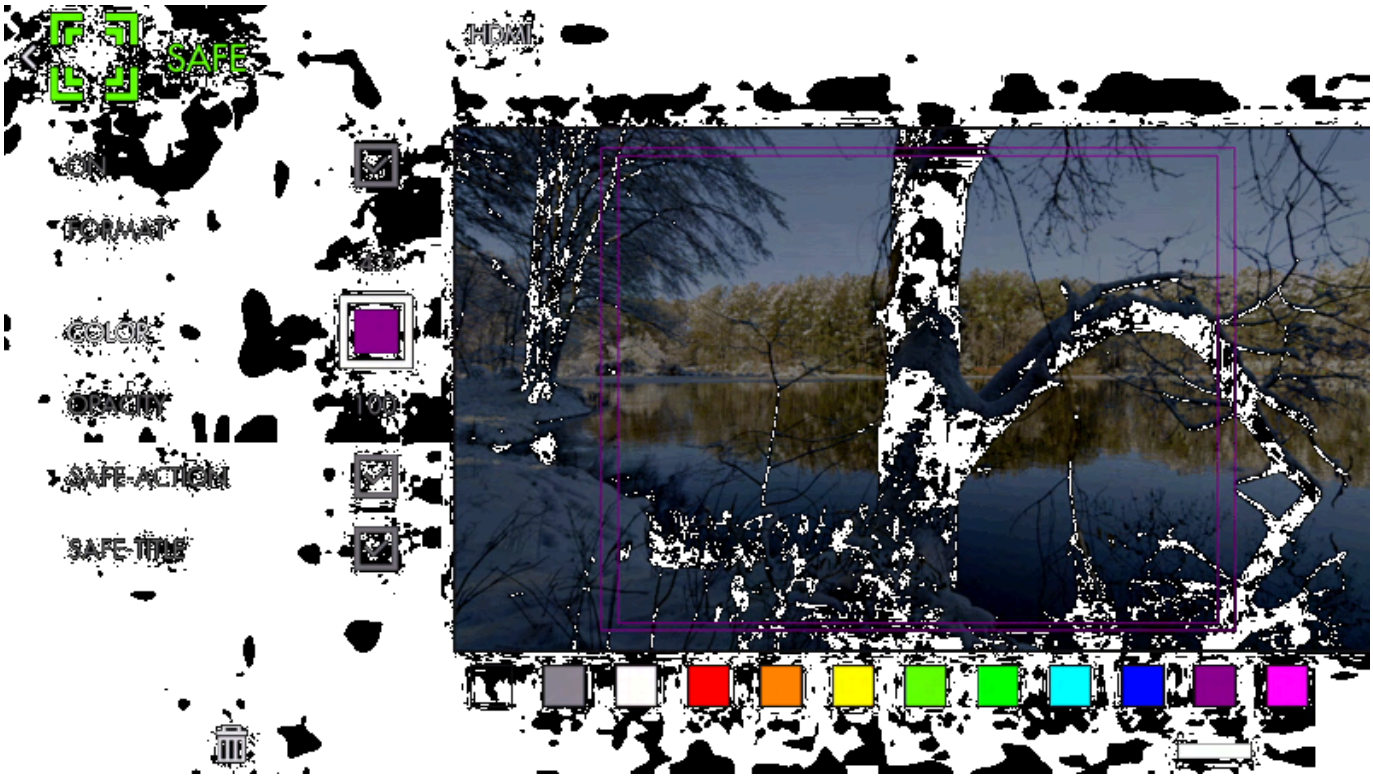
The **default** setting is for previewing a **4:3** aspect ratio for older TVs. Select **'Ratio'** and change it to **2:39** to see the black bars switch to a horizontal configuration.

By default the bars are set to 50% opacity; adjust **'style'** and **'opacity'** to taste for whatever you find most viewable.  Here I set the opacity to 80% to keep the off-screen areas from being distracting.

> If your production relies on boom audio, you can use the top and bottom dead zones to give your boom operator a 'grace area' for getting close-but-not-too-close.

# Safe (guides)

Also known as Title-safe, this tool provides a simple line **border** near **edges of the frame** as a friendly reminder to keep important elements in-frame to account for 'overscan'- some TVs will crop out part of the frame to fit various aspect ratios/resolutions being sent and title safe is still used by broadcast stations and other users not using an internet medium.



# Safe (guides) - Settings

## On

Enable/Disables Safe guides.  This can also be done at the tool bar level by activating or deactivating the tool.  It will be Green when active and Grey wen not.

## Format

Adjusts the aspect ratio of the safe guides; set this to what you consider the 'least common denominator', i.e. if you have to make a 16x9 AND a 4x3 deliverable, use the 4x3 guide to account for the 'worst case'.
*These are the two standard when it comes to Broadcast Television.  If you know you will need a custom title safe area, you can use the ASPECT tool in line mode.

## Color

Choose the line color of the guides for easier view-ability depending on your shot.

## Opacity

Adjust the transparency/visibility of the guide lines, best practice is typically to go with 'visible but not distracting'.

### Safe-Action

Enables/disables the Action safe (outside) border.
*This again dates back to broadcast, if you wanted to be sure that the crop of the panel on the TV would not interfere with your image/ or action in the frame.

## Safe-Title

Enables/disables the Title safe (inside) border.

*This again dates back to broadcast, if you wanted to be sure that graphics would not interfere with your image/ or action in the frame.

# Safe (guides) - Quick Start

Let's apply Safe guides to a page to help judge where to keep titles and action

From any page, click the joystick or tap the screen to bring up **'Add New Tool'.**

Navigate to **Frame** > **Safe** and select to add it to the current page.

Odds are the default setup is all you will need but you can edit the settings by navigating right when 'Safe' is highlighted.

Let's change the aspect ratio to 4:3 so we can visualize how an old TV would crop our image.

If the guides are not visible in your viewing environment you can edit the Color and Opacity for better viewability.

# Crosshair

Places a crosshair reticule in the center of your image; great reference point on shoots when symmetry or panning accuracy is an important part of the composition.

*You will need a video signal to use most tools.

## Crosshair - Settings

### On

Enable/Disables the Crosshair.  This can also be done on the tool bar by selecting the the tool and activating or deactivating it.  Active tools are green, inactive are grey.

### Style

You have three choices:

CROSS +

BOX ▫

POINT •

### Color

Define the color of the Crosshair for better visibility depending on your shot.

### Size

Choose the size of the Crosshair to taste for your preferred balance of visibility and cleanliness.

### Opacity

Sets the transparency/opacity of the crosshair.

## Crosshair - Quick Start

From any page, click the joystick or tap the screen to bring up ‘Add New Tool’ and navigate to Frame > Crosshair and select to add it to the current page.

A crosshair will be placed on your image.  You can edit the settings by navigating right when ‘Crosshair’ is highlighted.

# Crosshatch

Also known as "Grid" this tool will overlay ta geometric grid pattern over your image with customizable rows/columns for a variety of on-set compositional needs.

Crosshatch is beneficial for aligning elements of a shot into a grid-like and structured pattern, and can also be used for frame balance/ composure.

## Crosshatch - Settings

### On

Enable/Disable the Crosshatch. This can also be done on the tool car by activating or deactivating the tool.  It will be Green when active, and Grey when inactive.

### Color

Set the line color of the Crosshatch to adjust its visibility.

### Opacity

This will adjust how much you can "see through" the grid.

### Regions

This setting lets you define the density of the Crosshatch grid for achieving the desired amount of granularity.
You can have 2x2 <to> 9x9 equal portions on the grid.

# Crosshatch - Quick Start

‘Add New Tool’ and navigate to Frame > Crosshatch and select to add it to the current page.

Once the Crosshatch is added you can edit the settings by navigating right when ‘Crosshatch’ is highlighted.

The pattern is going to be a 1:1 in sections.  So if you want a 3x3 (rule of thirds) it will give you 3 wide by three high which is 9 equal squares in total.

# Tools - Exposure

# Exposure Assist (False Color)

Exposure Assist is a **highly visible**, **quick** and **accurate** guide to setting exposure for your shots by 'painting' pixels when they hit a specified luma (brightness) value.  This helps you **pinpoint** the exact areas your image may be **clipping** and quickly roll exposure to adjust for it, particularly in difficult viewing conditions (outdoors or on a gimbal or crane)

## Exposure Assist - Overview

Use this section to compare Exposure Assist with SmallHD's other exposure tools to help you find what suits your personal preference.

Because Exposure Assist 'paints' your image different colors depending on what their luma (brightness) value is, it can be beneficial to memorize these colors to make the most sense of your exposure range.

Alternately you can now create your own exposure/color scale if you find the presets not to your tastes or suitable for your camera.

Exposure Assist is a very fast tool for finding proper exposure because you can simply look at your image - if a desired portion of the picture is being painted the color designated for highlights for example, that typically means you'll have to bring down the exposure to regain the detail in that area. As an example it can be used for shots that need to have an even exposure, like a keyed background (green screen).

If the colorizing effect of Exposure Assist is too distracting for your other on-set tasks, try creating a new page specifically for it so that you can flip back and forth for a quick exposure spot-check when needed.

Because the Exposure Assist scale can now be customized allowing you to map many colors to many brightness ranges, it can give you an incredibly comprehensive look at your exposure values. The Waveform only offers slightly more utility in that it can be used to gauge chrominance (color) in addition to luminance (exposure) when using Parade or RGB modes.

If you would rather look at a graph to expose your image than to have it 'painted over', have a look at the Waveform.

Because of the nature of Exposure Assist and how it paints the image various colors, it can become distracting to other necessary jobs on set. Tools like the Zebra, though less comprehensive, may work better for you. This is a simplified single spectrum IRE tool. EXPOSURE ASSIST is meant for more complicated exposure level monitoring of the image.

## Exposure Assist - Settings

Access Exposure Assist's settings menu by navigating right or pressing the right arrow when the Waveform is highlighted.

### On

Toggles Exposure Assist Off/On. You can also do this on the tool bar by selecting the tool and activate ot deactivating it. It will be green when active and grey when inactive.

## Style

Choose from a preset exposure assist scale or start with a generic map that you can customize.

You will have the Following Options:

ARRI - R(99-100),Y(97-99),Pk(52-56),G(38-42),B(2.5-4),Pu(0-2.5)
Spectrum - Rainbow Gradient from Pink(0) to Red(0)
MAP (1,2,3) - Custom settings that you create

## Edit (MAP)

You can make up to 3 different MAP styles.
You can have up to 10 different gradient selections on a single MAP setting.

The new customizable MAP allows you to really fine tune your exposure settings to your liking.

Once a MAP is selected, entering edit mode will bring up the IRE guide.
Select the [+]
This will add a line with a COLOR box, MIN value, MAX value and GRADIENT slider.
Adjusting the MIN and MAX will set your values for start and stop for that color against your exposed image.

This will be represented on the slider. Selecting the slider, you can adjust the overall position of the MIN/ MAX against the overall gradient form 0-100.
Selecting the trashcan will delete that line/ color.
Once finished you can hit save to store your settings.

## Ignore Look

Allows Exposure Assist to work on the signal directly from the camera even if you have a Look (3D LUT) applied as a tool on the monitor which would otherwise affect the results on the scale.  Uncheck if you wish to monitor exposure values AFTER a look has been applied to see what effect it may bring to the final image.

We recommend leaving this on for most shooting scenarios unless you are baking a LUT into your footage on set and do not intend to color grade in post.

### Show IRE Guide

Display a visual 'legend' to help make sense of the colors that correspond to brightness values. This is helpful as a reminder if you have a wide variety of aspects you are monitoring.

### Guide Location

Set the location of the IRE guide to a spot of your choosing.
This can be moved to 6 positions on the monitor:
TOP = Left, Center, Right
BOTTOM = Left, Center, Right

### Intensity

Dial in the intensity of Exposure Assist to make its effect more subtle, allowing an easier view of the original image. Dialing back the Intensity will also decrease Exposure Assist's greyscale influence, bringing saturation back into your image.

## Exposure Assist - Customization

**NEW with firmware version 3.0!** - Continue this section to learn how to get the most out of Exposure Assist by **creating your own preset (MAP).**

Many cameras, particularly when shooting in 'log' mode keep their **brightest** highlight and **darkest** shadow at values **other than 100%** and **0%** respectively. Full shadow clipping might be as high as 10% and highlights might be as low as 90% for example. **Customizing the Exposure Assist** scale ensures these settings are **tuned** to your **specific camera** for **guaranteed accuracy**.

To begin setting the scale we need to first **find the limits**.  For the following example I'm using a DVX200 set to V-Log gamma but this procedure applies to any camera or gamma.

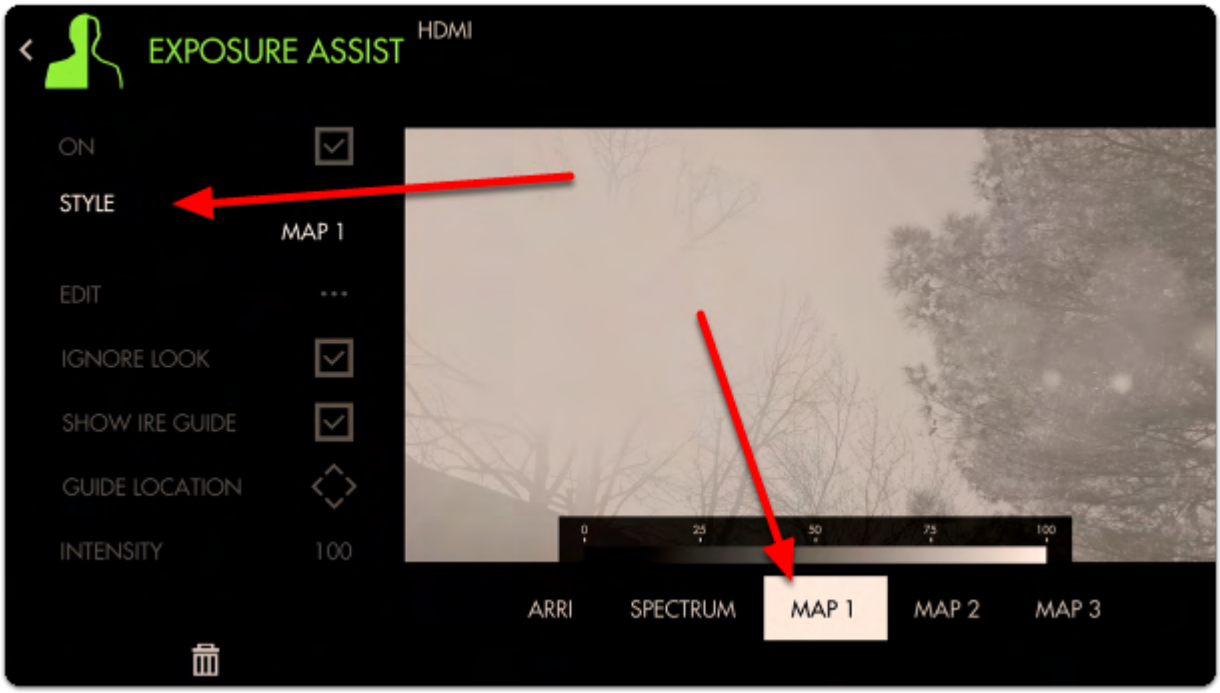
First, point the camera toward any **bright** objects that will **overexpose** the shot (a white car or exposed concrete on a bright day will do fine) - **turn off ND filters**, **open the aperture** and **decrease the shutter speed** if needed:

I briefly pointed the camera towards the sun during midday for this shot - this is generally not advisable to keep the sensor safe but I did it so you don't have to ;-)

Add an Exposure Assist via **Add Tool > Expose > Exposure Assist** if not already applied.

Even though the **sun** area is **clearly clipping**, the Arri false color scale doesn't pick it up - **we need to fix this for an accurate reading**.

Select **'Style'** and choose **'Map1'** to start with an empty preset that we can modify.

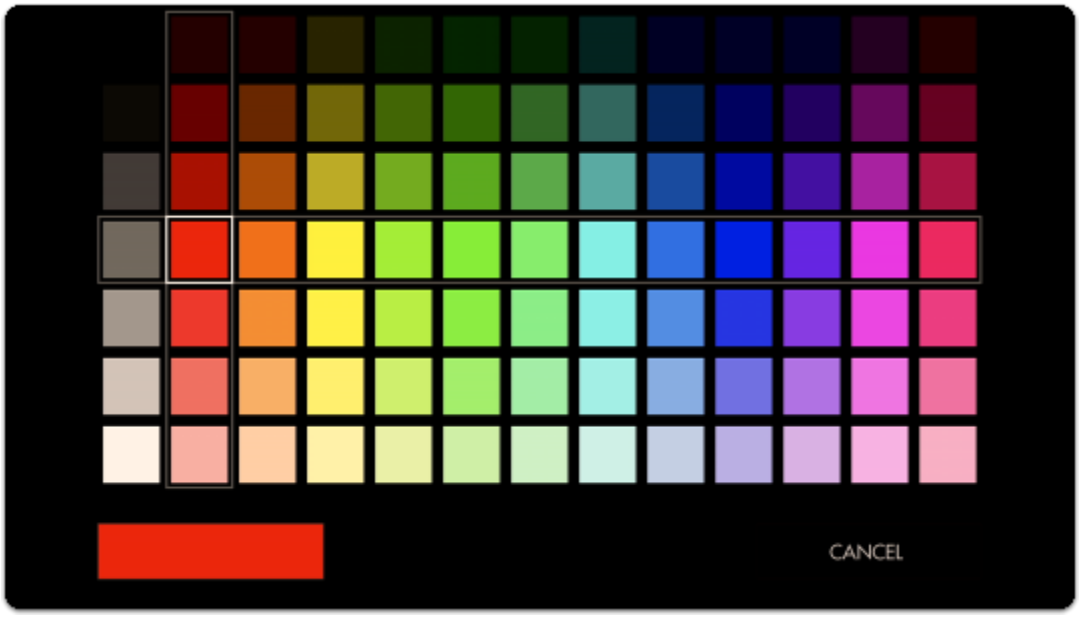



Select **'EDIT'** to begin customization

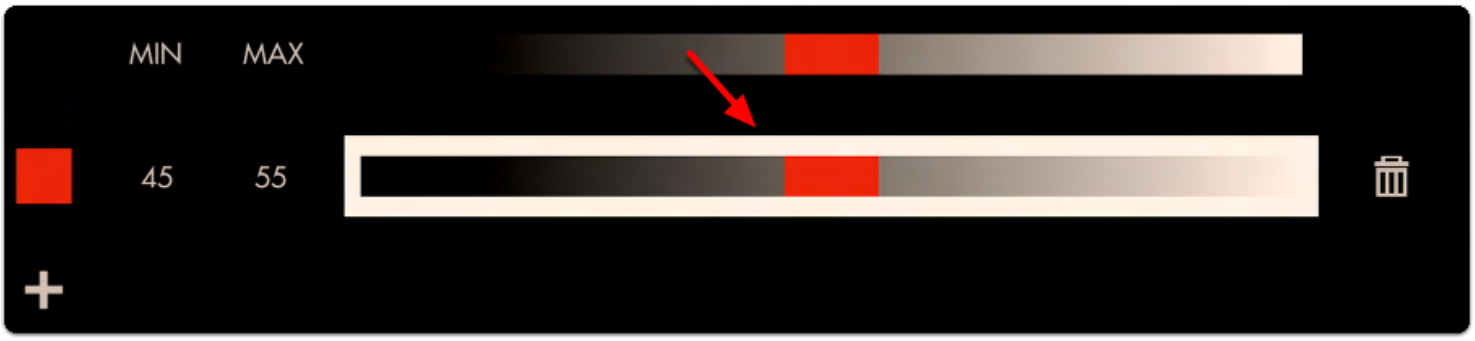
To begin adding a range, **select the '+'**

A default color and range is placed onto the scale; let's **change** this color by **selecting** it

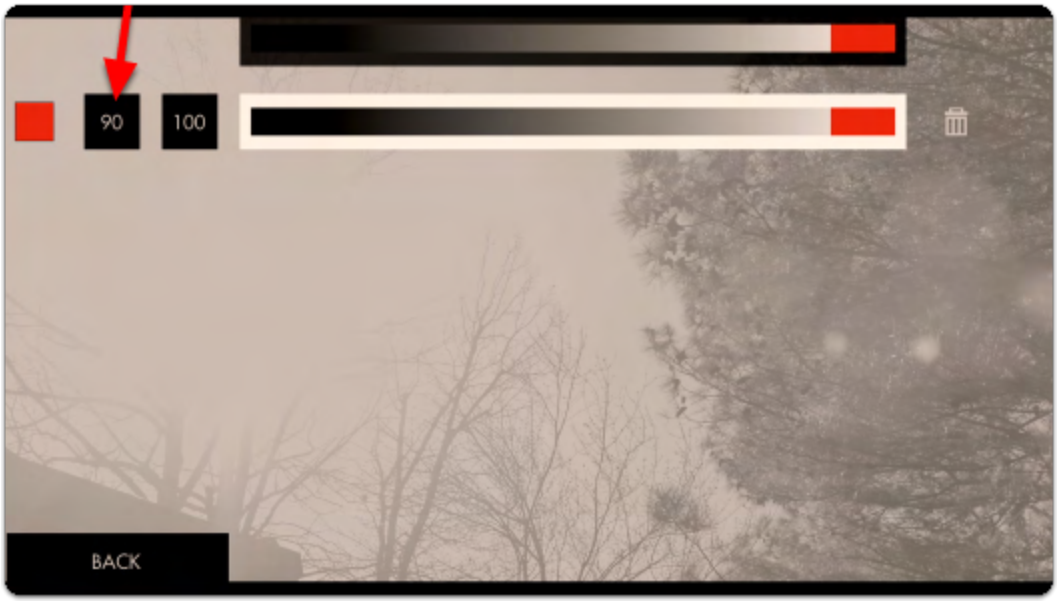
Let's choose **red** to act as an overexposure clip warning.




Next we can **edit the position** of this color on the luminosity scale by **selecting it** and dragging in either direction



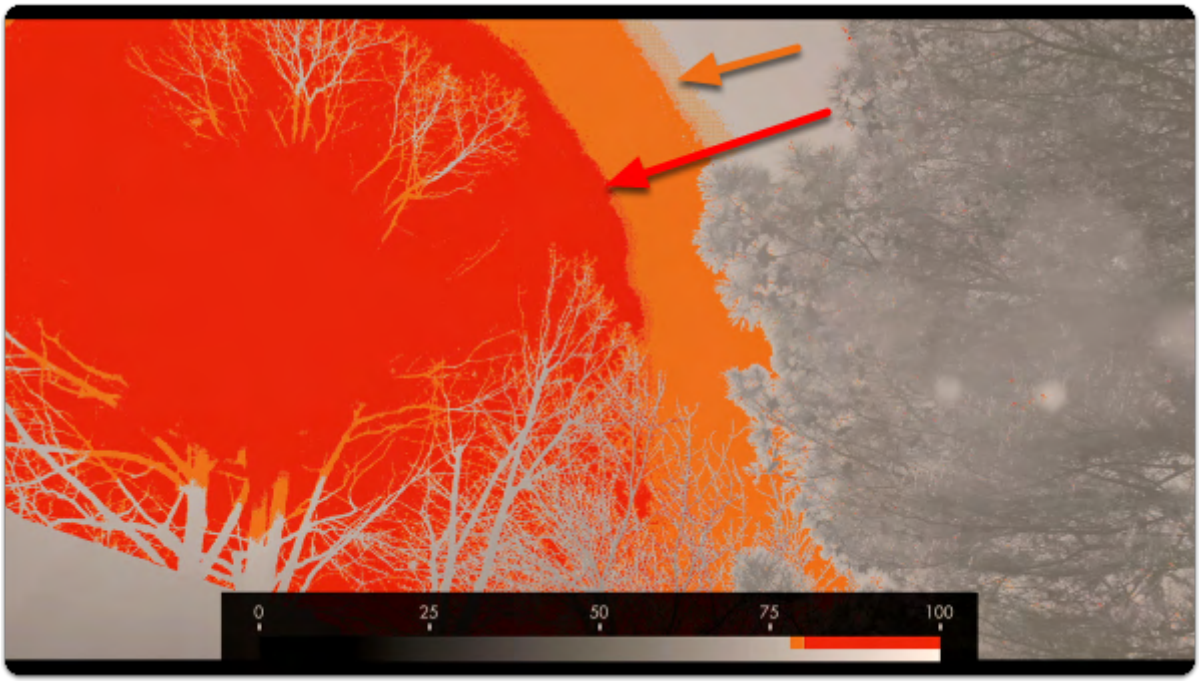

Move the color block to the far right - now any **values in the 90%-100% range will get painted red**. As can be seen none of the values in this image even reach 90% so we need to **decrease the 'MIN'** until we see a **red blob** appear where the sun is located.



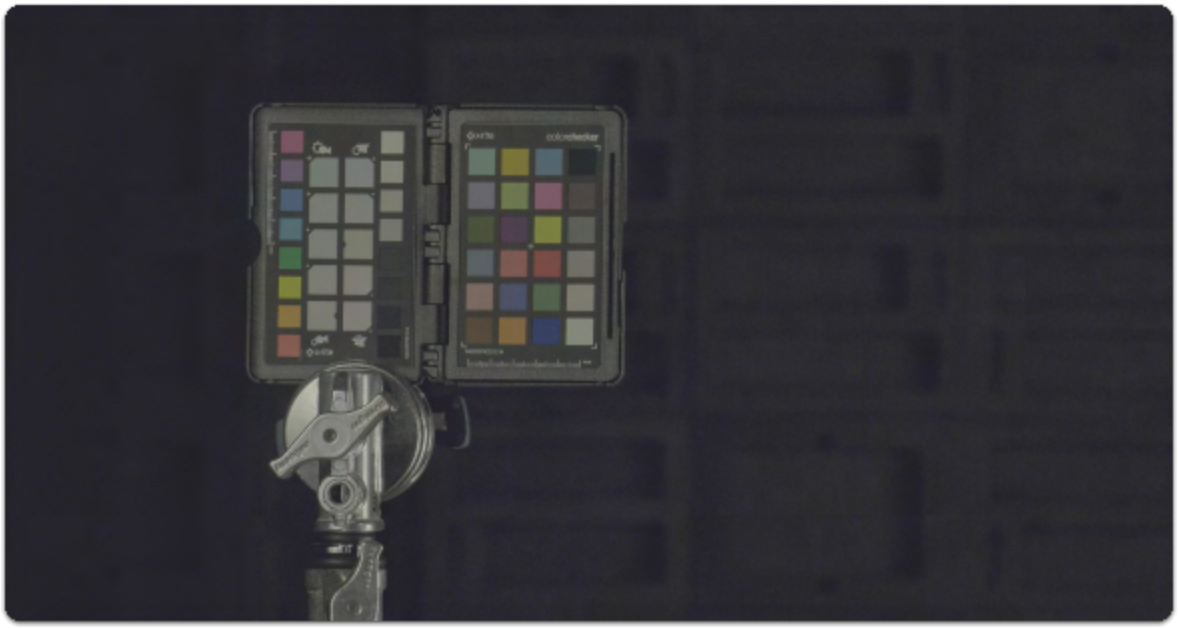

When decreased to **80%**, we have finally found the **limit** at which this camera **clips highlights**.

This red area is telling you 'this data is getting clipped' so let's set up another small color value immediately beside this one to act as a warning:

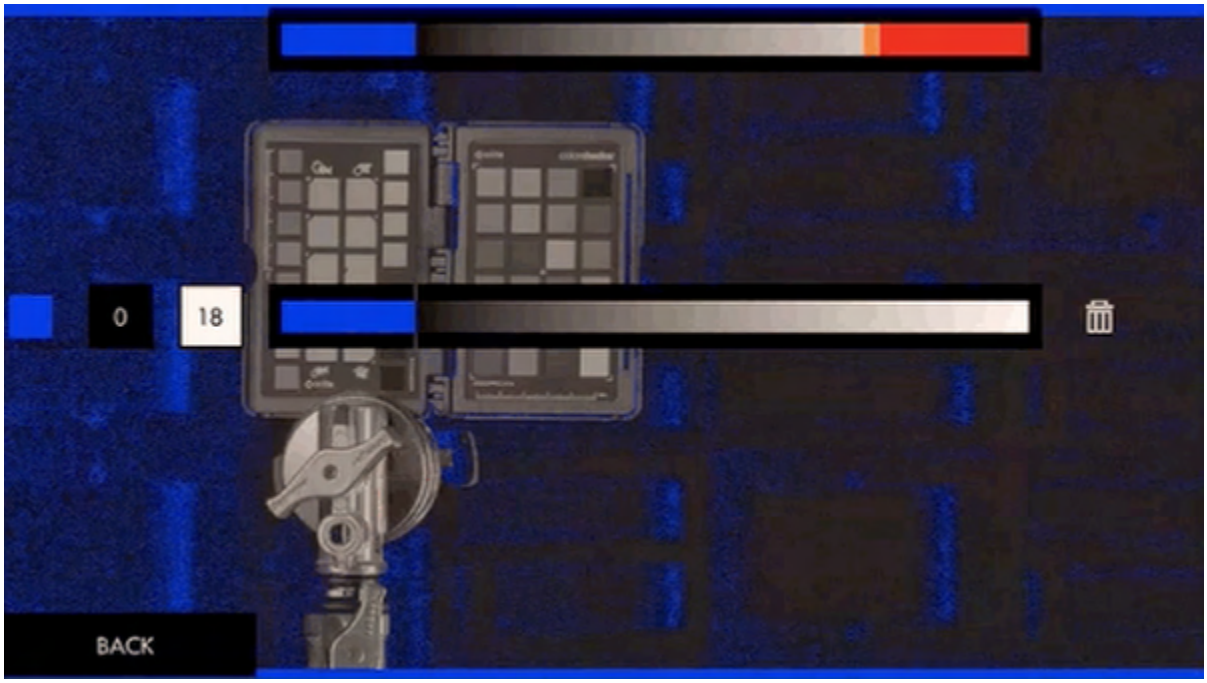
Now if you see orange it means you're **almost clipping highlights** and if you see red you **are clipping highlights**.




Repeat the same process but this time to the **darker extremes** - I have my shot set up in a dark environment but you may simply cover the lens for this stage when looking to pinpoint the camera & gamma's **native black point**.



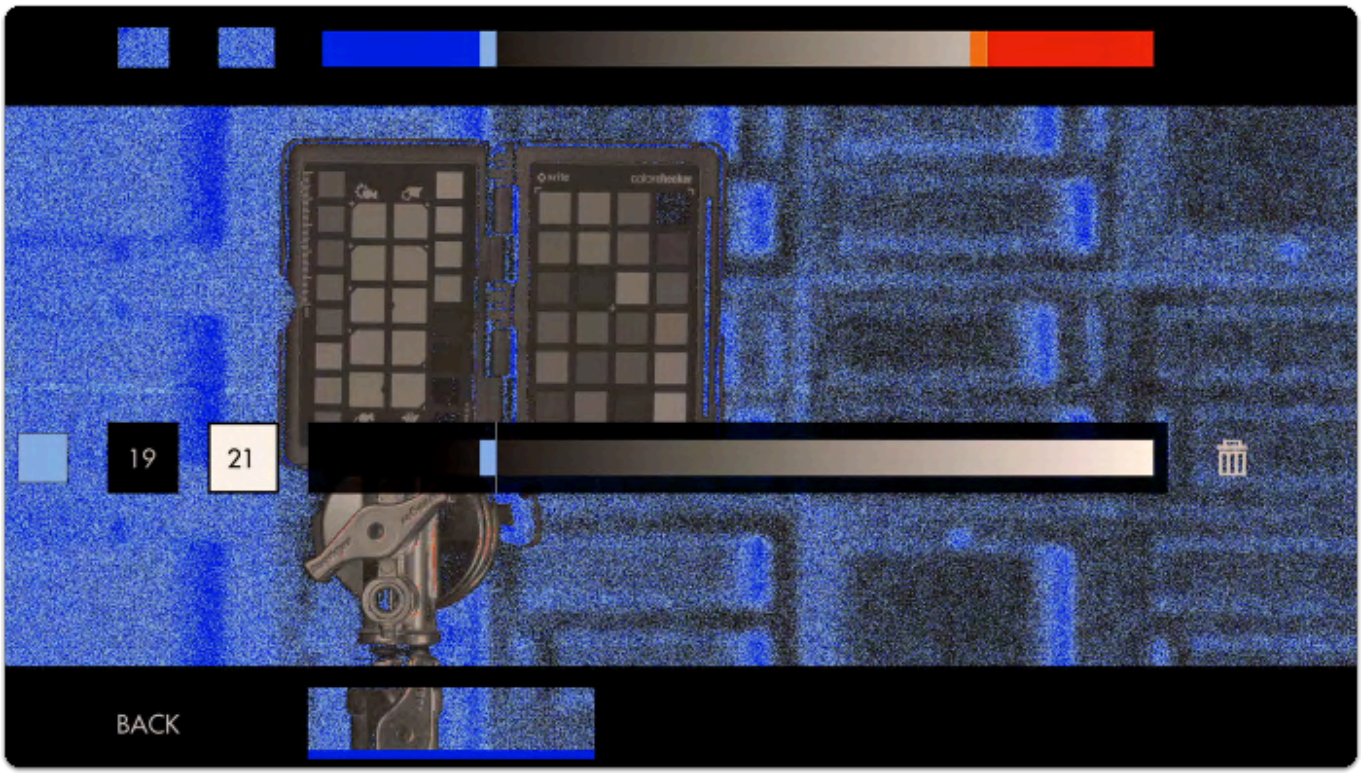
Create a new color band for the **shadows** - I prefer 'cool' colors for dark areas and normally set highlights to 'warm' colors to help me identify each zone quickly but feel free to use any configuration that makes sense to you!



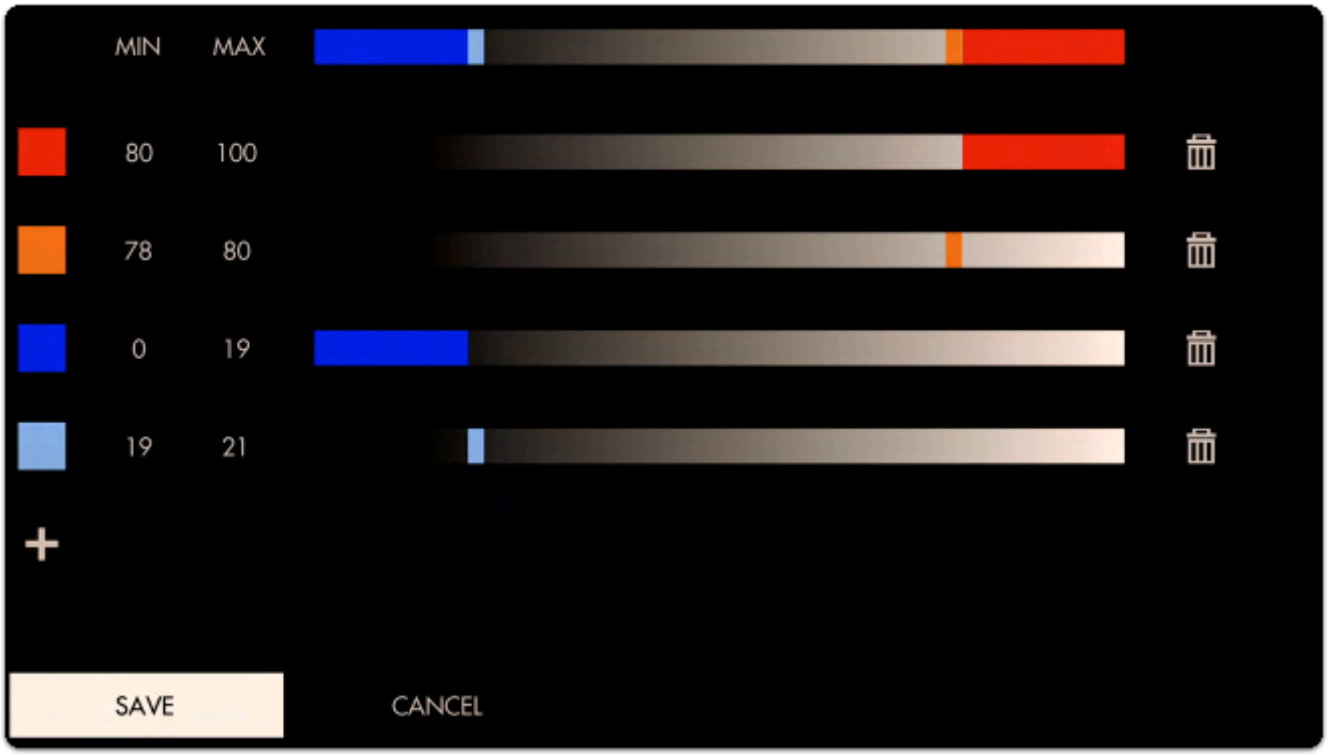

Set the **MIN** to **0** and adjust the **MAX** value to the point where color starts being introduced - You can customize this value until the **noise level** is acceptable to you (anything that gets painted blue is considered 'clipped', so increase the **MAX** to 'clip' more of the noise).

> Because Exposure Assist is ultimately a guide, setting these ranges is for keeping us aware of issues as soon as they show up. In this case if we see a **deep blue** on someone's face, we'll need to **increase exposure** or the footage will be **noisy**.

Next we can add a small 'warning zone' next to our 'clipping zone' just like with the highlights:

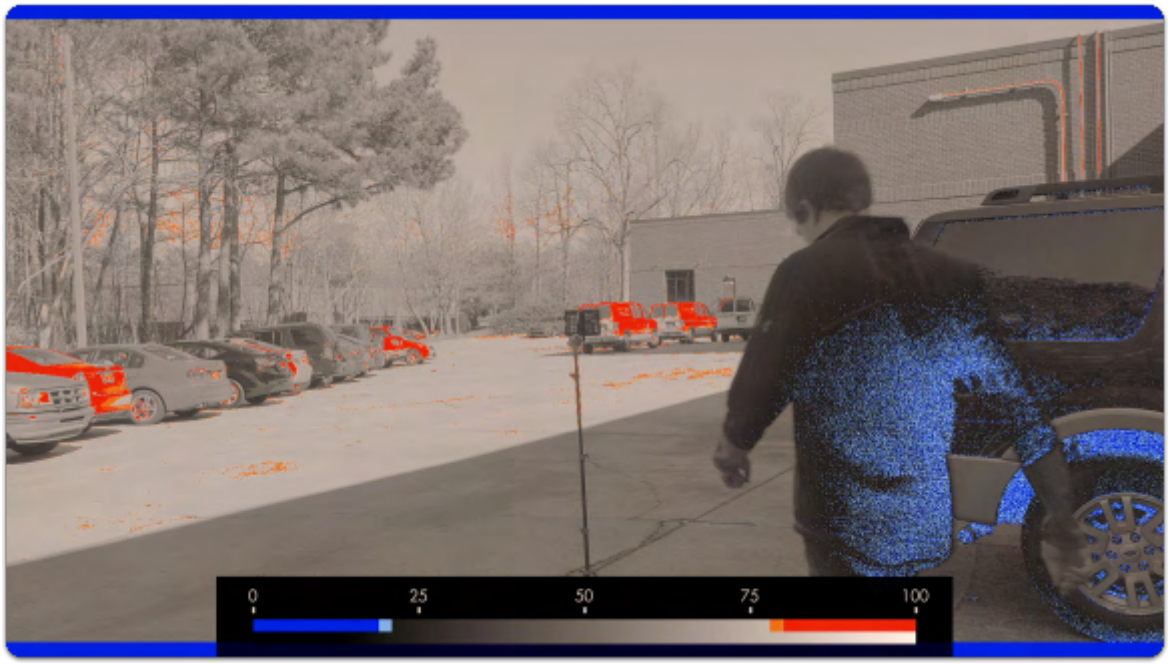



This is what our scale looks like with the upper and lower ranges applied:



Here is what a shot looks like when we're employing the new exposure scale.  The colors reveal precisely which areas are **recoverable** and which are **lost**.

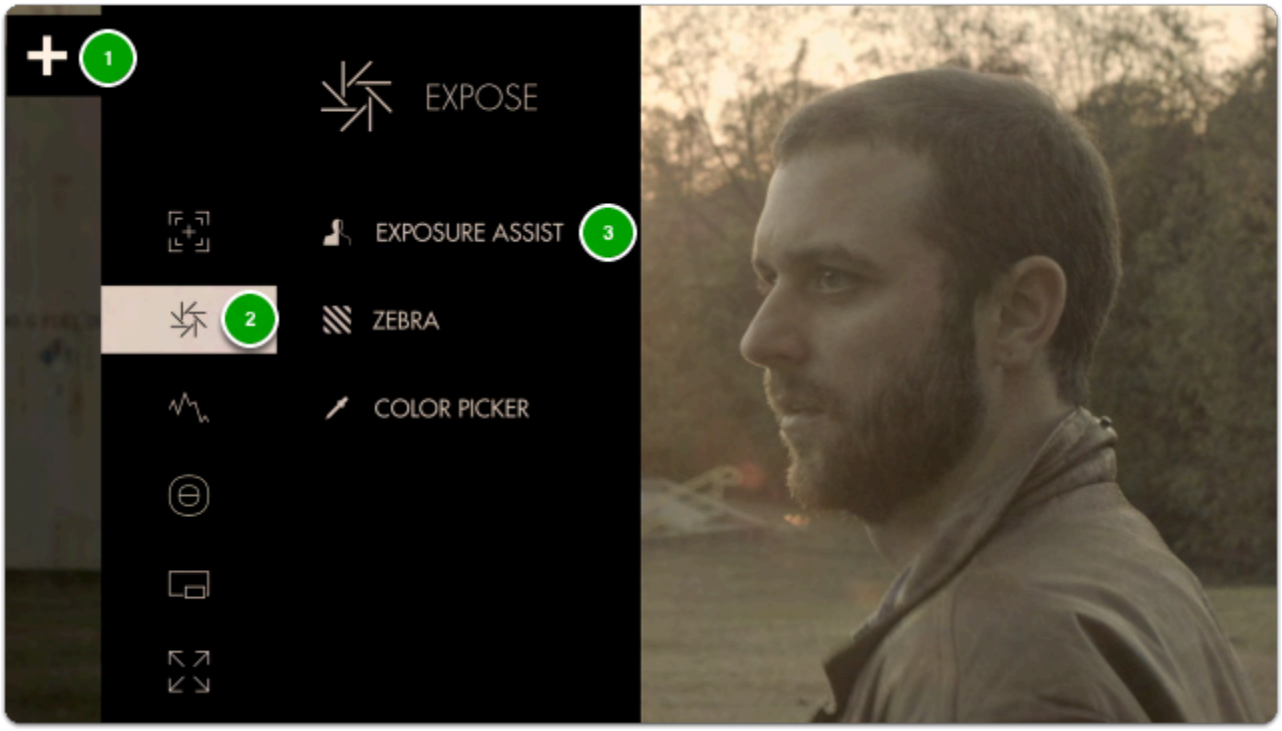
**Red areas are clipped highlights,** blue areas are noisy/clipped shadows.



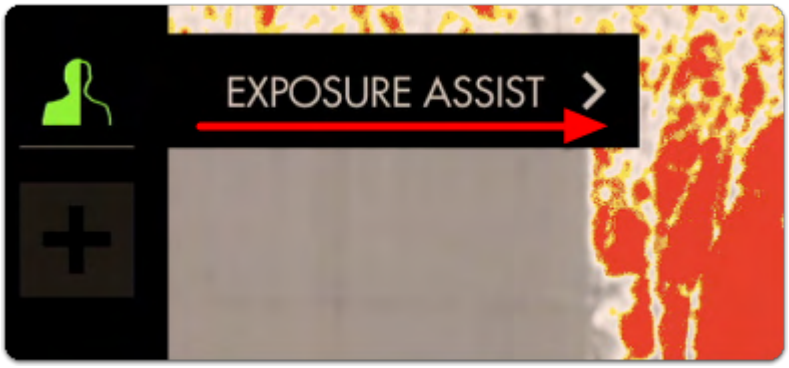

You may continue to add colors to the scale, for example a **midpoint** to represent **skin tones** or an 18% grey card/chart.

## Exposure Assist - Quick Start

From any page, click the joystick or tap the screen to bring up (1) **'Add New Tool'** and navigate to (2) **Expose >** (3) **Exposure Assist** and select to add it to the current page.




Once added you can **edit** the settings by **navigating right** or tapping the right arrow when 'Exposure assist' is highlighted.




By default the **Arri False Color** scale is used which is a great place to start.
You will also have the **Spectrum** False color, which is a gradient of color from Pink-Blue-Green-Yellow-Red. This is easily seen on the Guide bar.
You can also create your own custom set, up to 3.

The chart below describes what each color means for **ARRI**- essentially when an **element** in your scene gets **colorized**, that means it is **within the brightness range specified** here.

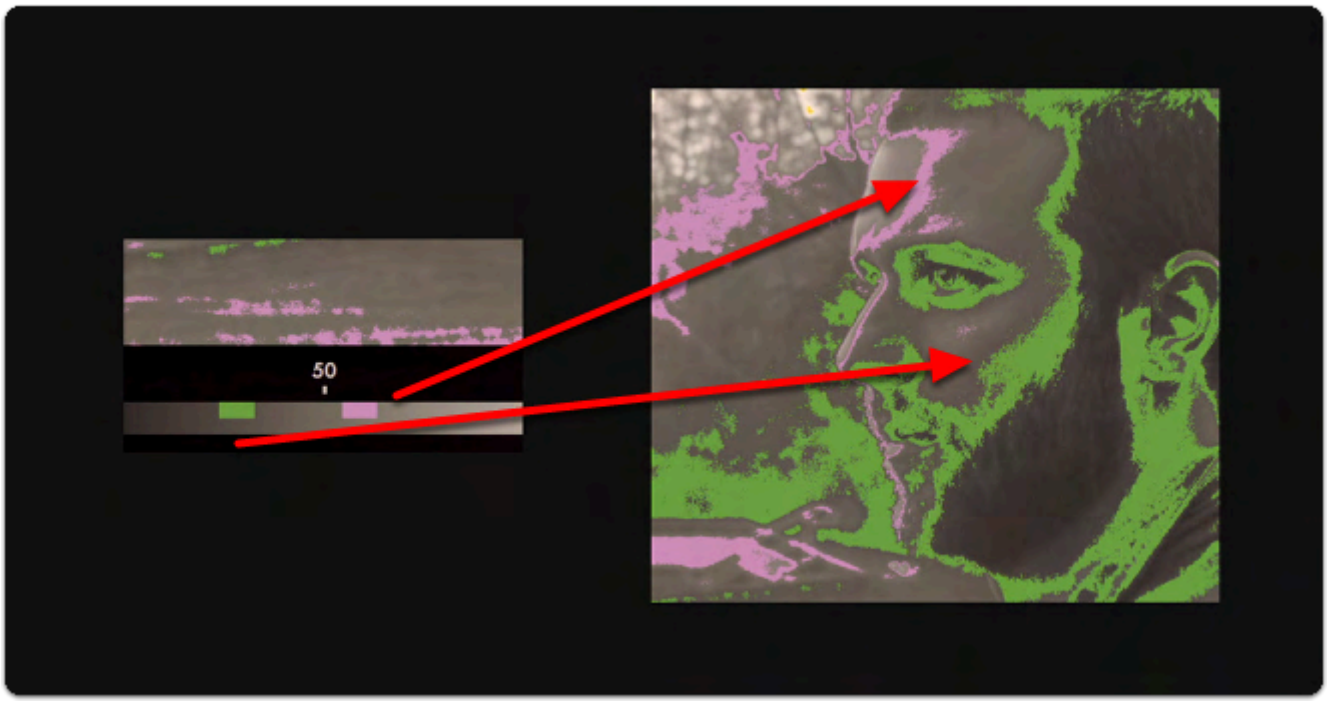
| Color | Level | Description |
|---|---|---|
| red | 99 – 100% | White clipping |
| yellow | 97 – 99% | Just below white clipping/white shoulder |
| pink | 52 – 56% | One stop over medium gray (Caucasian skin) |
| green | 38 – 42% | 18% neutral gray |
| blue | 2.5 – 4.0% | Just above black clipping/black slope |
| purple | 0 – 2.5% | Black clipping |

(ARRI FALSE COLOR SCALE)

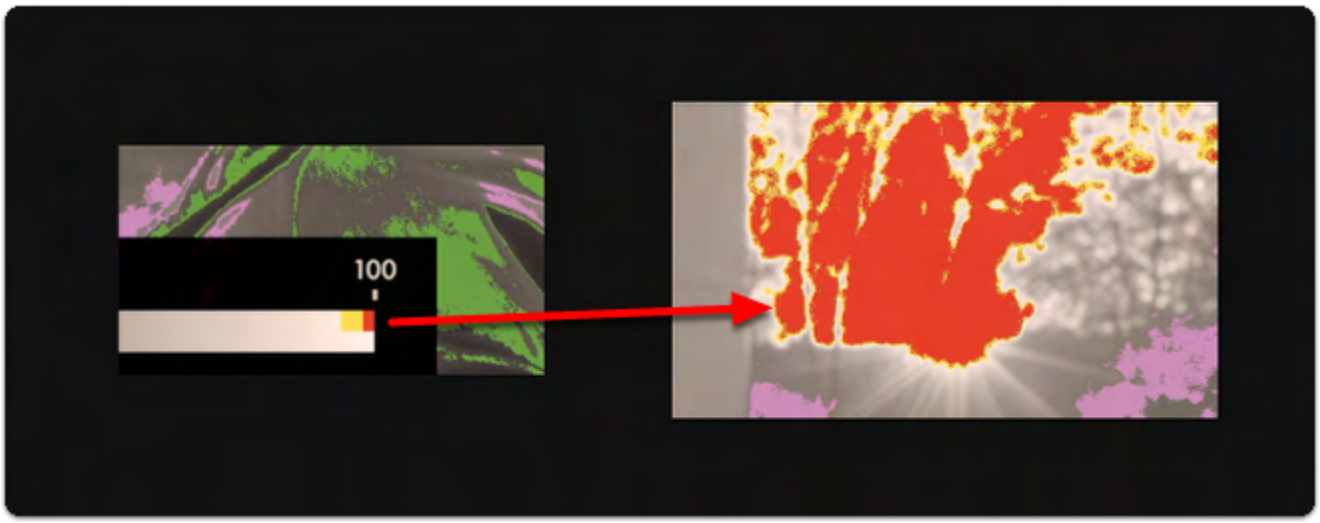
This allows you to make exposure decisions that are based on **numeric values** as opposed to simply how the image **appears**, which depending on viewing environment and many other factors can yield inconsistent results.

Enable **'SHOW IRE GUIDE'** to get an on-monitor view of which **values** are getting **mapped** to the colors on the scale.

Exposure values near the **50%** mark on the scale will generally provide the most **natural result** on **human skin**. With the **Arri scale** this means the **pink** and **green** bands provide a great guide as the **upper** and **lower** range for exposing faces.

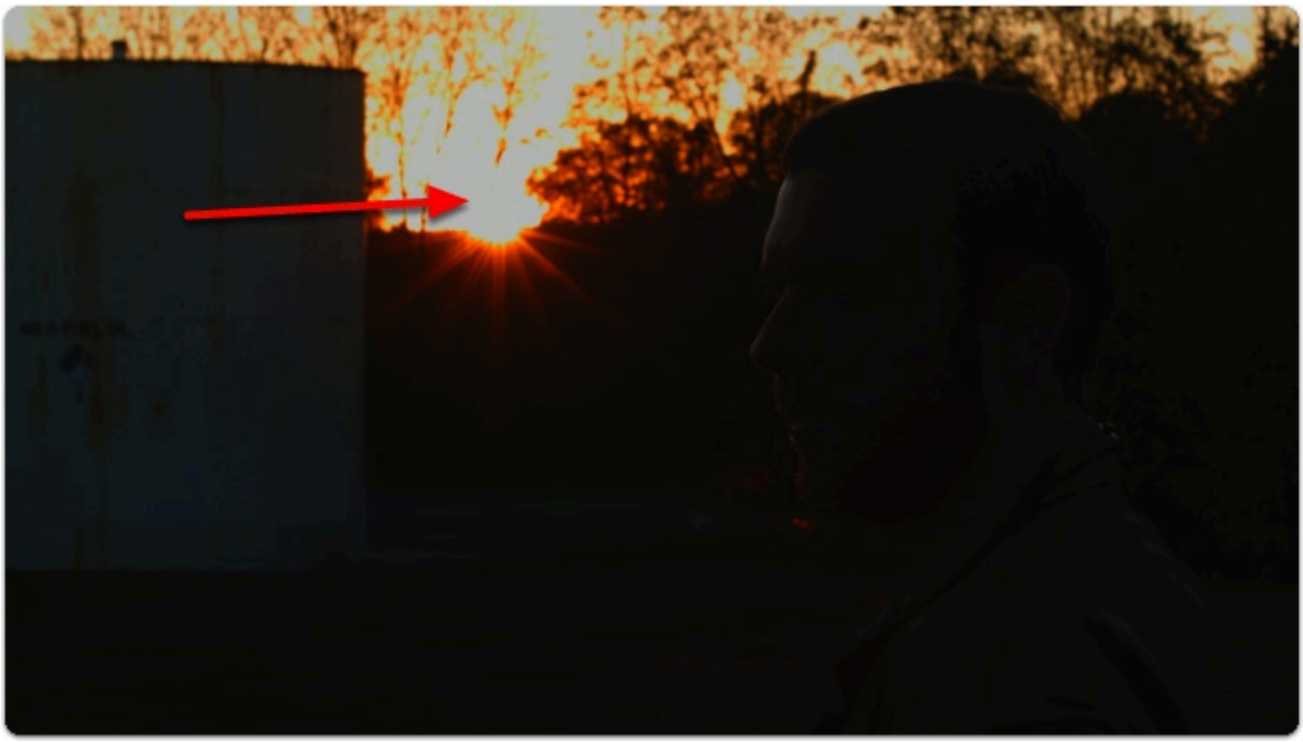



Sticking with this exposure value means we'll be **clipping** a portion of the sky & sun - Exposure Assist makes it clear which areas will be clipping/losing detail as a result of overexposure by painting such areas **red**.




Clipped areas are tricky to manipulate in post production because they are effectively comprised of a single 'blob' of color/value.

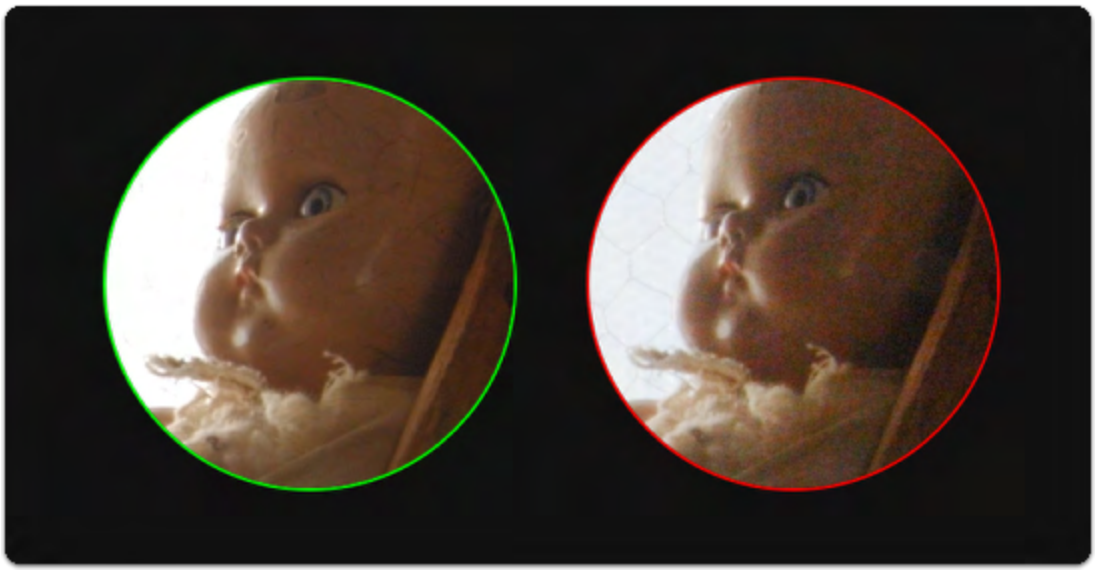
If I **darken the entire shot**, the clipped areas of the sky & sun appear quite unnatural:



If I darken **everything but** the sky/sun, they each appear much more acceptable:

When graded normally, **skin tones maintain plenty of detail** due to being exposed in an optimal range.

**Below-left** is an example of **normally-exposed face**, **below-right** is an example of an **underexposed face** that has been brought up in color grading - take note the difference in **image noise.**



Exposing a shot 'just right' will vary greatly between shoots, operators and cameras but is always a compromise in some way.  You must decide **how important** are your **highlights** and **shadows** and what will contribute to the better final image, and this can vary depending on many elements including

intended color grade, delivery methods, VFX and of course the camera itself - some handle highlights better than shadows for example, others vice-versa.

# Zebra

**Similar to [Exposure Assist](), the Zebra tool helps you monitor exposure to your image properly by displaying a stripe pattern (sometimes called marching ants) over a specific brightness range (IRE) on your image.**

This is useful for essentially setting exposure 'boundaries' typically for highlights but you can add one for shadows as well; as soon as a value hits the range you specify, a zebra pattern is displayed on that portion of the image to warn you of over or under exposure if desired.

## Zebras - Overview

The Zebra tool acts on only one brightness range at a time (maximum of 2 instances of Zebra allowed simultaneously) AND it doesn't desaturate the image like Exposure Assist.

If set to the proper range, In many cases using the Zebra tool is as fast as rolling the iris until you don't see -- or see the appropriate amount of -- zebra stripes.  If the zebra pattern effect is still too distracting

for your other on-set tasks, try creating a new page specifically for it so that you can flip back and forth for a quick exposure spot-check when needed.

If you would rather look at a graph to exposure your image than to have it 'painted over', have a look at the Waveform.

## Zebra - Settings

Access Zebra tool settings menu by navigating right or pressing the right arrow when Zebra is highlighted in the tool list.

### On

Toggles Zebra Off/On.  This can also be done on the tool bar by selecting the tool and activating or deactivating it.  It will be Green when active and Grey when inactive.

### Min IRE

Sets the minimum IRE (brightness value) that will activate the Zebra functionality. This will be the exposure you will 'start" to see the stripes.

### Max IRE

Sets the maximum IRE (brightness value) that will activate the Zebra functionality. This will be where the 'stripes' will stop showing.

### Color

Choose the background color of the zebra pattern - adjust for visibility in difficult viewing conditions such as outdoors or on a jib/gimbal.

## Ignore Look

When using a Look (3D LUT) file, you may want to enable this feature which applies the zebra tool to the **original picture** coming into the monitor and **ignores the applied 3D LUT** which would alter the points at which the tool would activate.  This is important because it allows you to adjust for the original shot, giving you the most flexibility in post.

*We recommend keeping this option activated unless you plan to apply a Look/3D LUT directly to your footage in post without any additional adjustments before exporting.

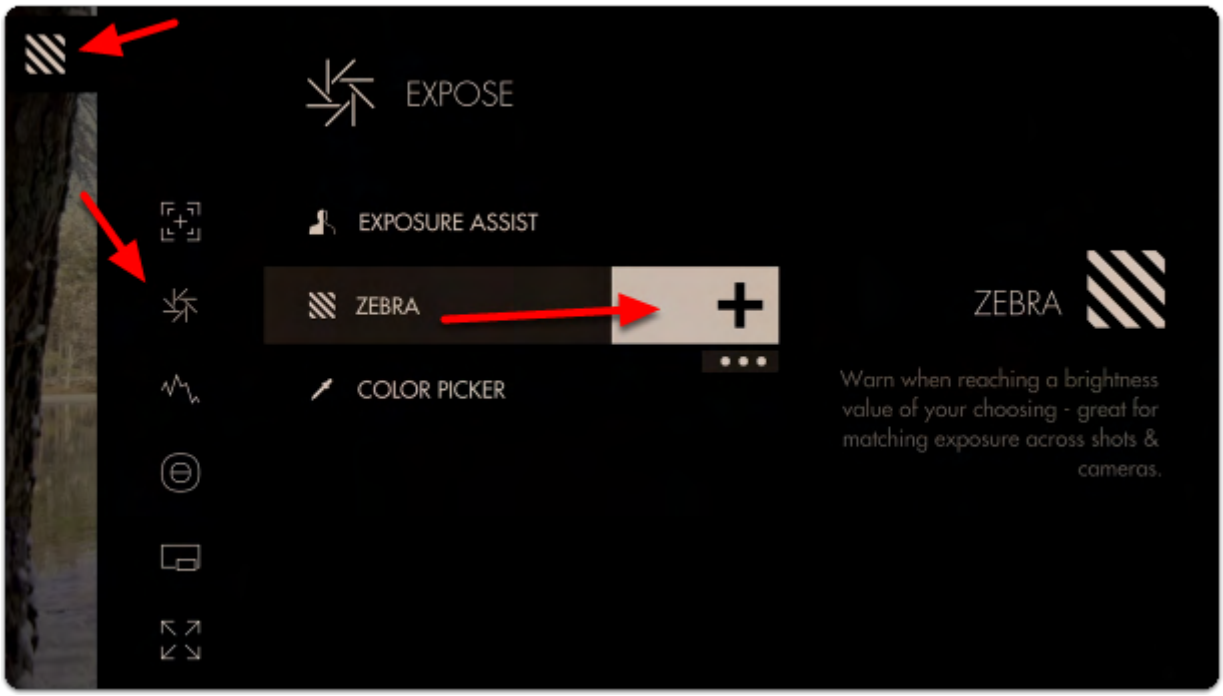
# Zebra - Quick Start

In this section we will add a Zebra to a page and customize it to use as a functional exposure aid.

Here we have a shot that is **overexposed**; we can use the **Zebra** tool to determine **what we need to do** to compensate for it and by **how much**.

From any page, click the joystick or tap the screen to bring up 'Add New Tool'

Navigate to **Expose > Zebra** and select the **'+'** to add it to the current page.




We don't see any effect yet because the **Zebra** tool only **activates by default on 100% brightness and above** (confusingly, luma values can reach below 0% and above 100%).

Because our camera **places its overexposure limit below 100%** or 100 IRE (quite common when shooting in log/flat gammas) **we need to adjust the minimum IRE** until the Zebra is activated.

You can **edit** the settings by **navigating right** (tap the arrow on touchscreen) when 'Zebra' is highlighted.

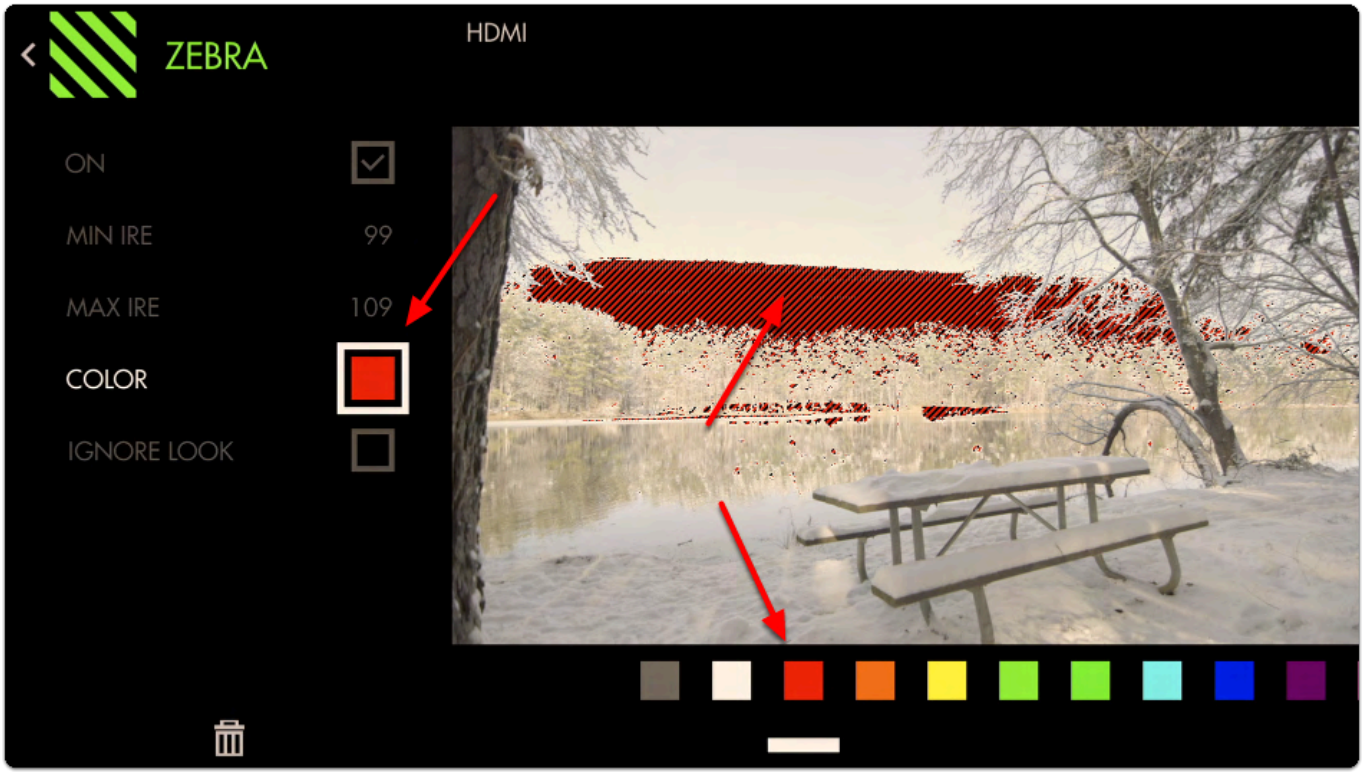
Now **decrease the 'MIN IRE'** setting until you can see a **zebra pattern** being painted over the **brightest** portion of your image.

This adjustment will vary between cameras/gammas.

The zebra pattern is now informing us the **exact area** on our image that the **camera clips highlights**; this marks the **'top end' of our dynamic range**. From now on if we see a zebra pattern, we know for sure that the shot is being overexposed in that portion of the frame.

Bright objects, lights, sun often **need** to be overexposed and will display a zebra pattern in these cases.

If you wish to make the Zebra pattern more **visible** (purely cosmetic) you can **change the color** of the highlighted area.  I have changed mine to **red** to make a very distinct **overexposure warning area**.




At this stage we can roll **exposure down**, add an **ND filter**, **decrease ISO** or **increase shutter speed** to **darken** the image until the zebra pattern is no longer visible to get **highlight detail back**.

At this point you may wish to add a **second Zebra** tool and set its range to **shadow areas** to act as exposure 'boundaries' to help **maximize dynamic range**.

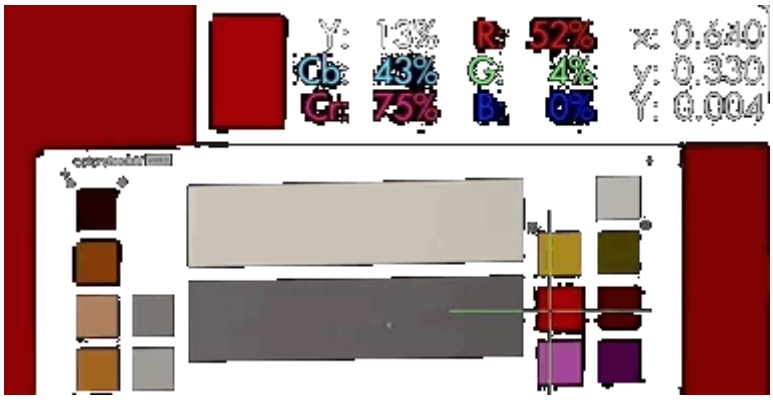
Here we place the **MIN IRE** at its **lowest possible** setting then set the **MAX IRE to 0** and **increase if necessary** until pitch-black shadow areas activate the filter.

Feel free to place a lens cap on your camera to gauge what it considers pitch black.

Now we have a page configured to warn us when we are **overexposing** and when **underexposing** our footage.  Anything in these areas will be clipped so you can now adjust for these limits consistently and precisely.

Because the Zebra tool doesn't activate on parts of the image outside the specified ranges, it combines well with other tools such as a Focus Assist or Frame Guides without the screen becoming too cluttered.

# Color Picker




**Color Picker** samples color/value information from a **single pixel** to give a precise readout of a specific location. Great for **matching** multiple cameras or getting **consistent exposure** in changeable lighting conditions by sampling from a color chart or an actor/subject's face.

The Color Picker is unique in that it doesn't remain active when not in use, meaning when the tool is activated, moving the joystick will move the crosshair around the image and not flip through pages. To freely move between pages, disable the Color Picker.
You must have a video signal to use this tool.

## Color Picker - Overview

The Color Picker is **easily placed** anywhere on the image moving the **joystick** or **tapping on the touchscreen for a quick select and then touch hold and scrolling with your finger for more delicate movement around the screen**. Making judgements based on the data will depend on the user's preference.

> An example use case for the color picker is placing the sampler on a **mid grey card** before every take during changing weather conditions. **Roll exposure** to keep the values matched for consistent exposure throughout the day.

Speed is not where the Color Picker shines for setting exposure if you need to keep an eye on several areas simultaneously - for the fastest exposure tools we recommend Zebra, Exposure Assist or the Waveform if you prefer a scope. (Scroll speed is adjustable, but this is a very precise tool).

The Color Picker serves exposure decisions that can be made from a **single point** such as a **human face** or a color chip on a **test chart**. To gauge a slightly wider area, have a look at the Spot Meter function of the Waveform.

The Color Picker displays only a crosshair and a popup containing some information on the pixel that's being highlighted so it keeps a relatively **low profile**, allowing other imaging decisions to be made without too much on-screen distraction.

# Color Picker - Settings

## On

Toggles Color Picker Off/On. This is also done on the tool bar by selecting the tool. It will be Green when it is active and Grey when it is not.

## Format

Choose how you wish to display brightness ranges:
PERCENT - (%)
RAW - image value which will change depending on bit depth (8-bit is 0-255, 10-bit is 0-1023, etc).

## Location

Set the location of the on-screen display to a spot of your choosing for best readability or to make room for the crosshair itself. You have 6 positions:
TOP - Left, Center, Right
BOTTOM - Left, Center, Right

### Color

Adjusts the color of the crosshair for easier viewability.

### Joy Speed

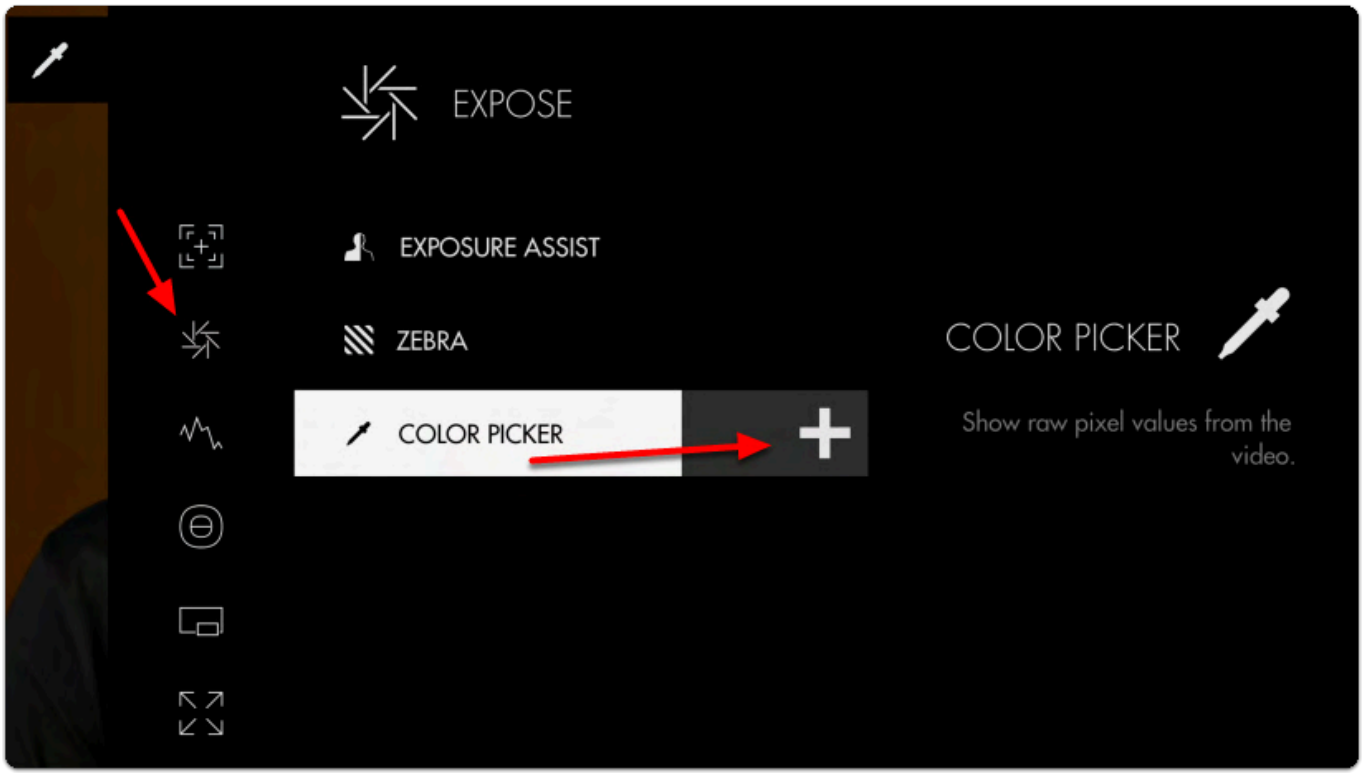
Adjusts the speed at which the color picker crosshair will glide across the screen when moved.

## Color Picker - Quick Start

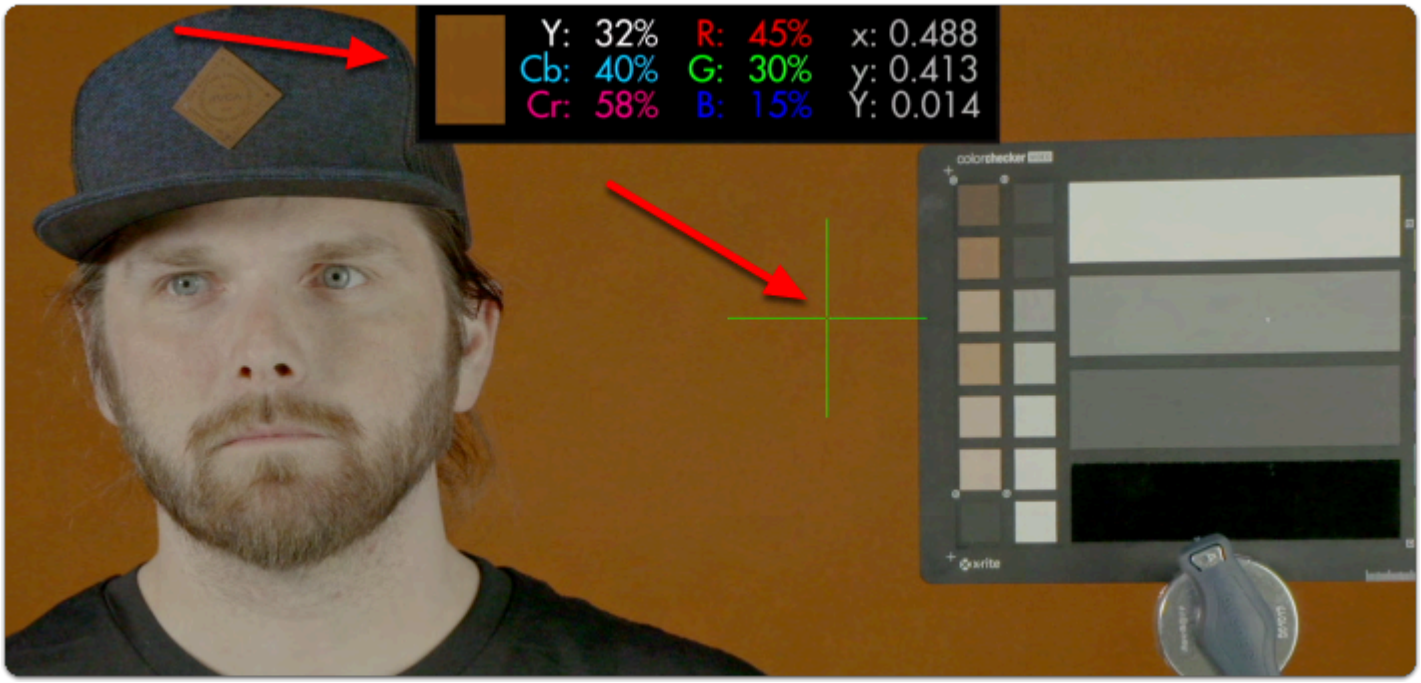
In this section we will add a Color Picker to a page and use it to set exposure in **differing lighting conditions** using a calibration chart.

From any page with a video feed, **click the joystick** or **tap the screen** to bring up **'Add New Tool'.**

Navigate to **Expose** > **Color Picker** and select to add it to the current page.

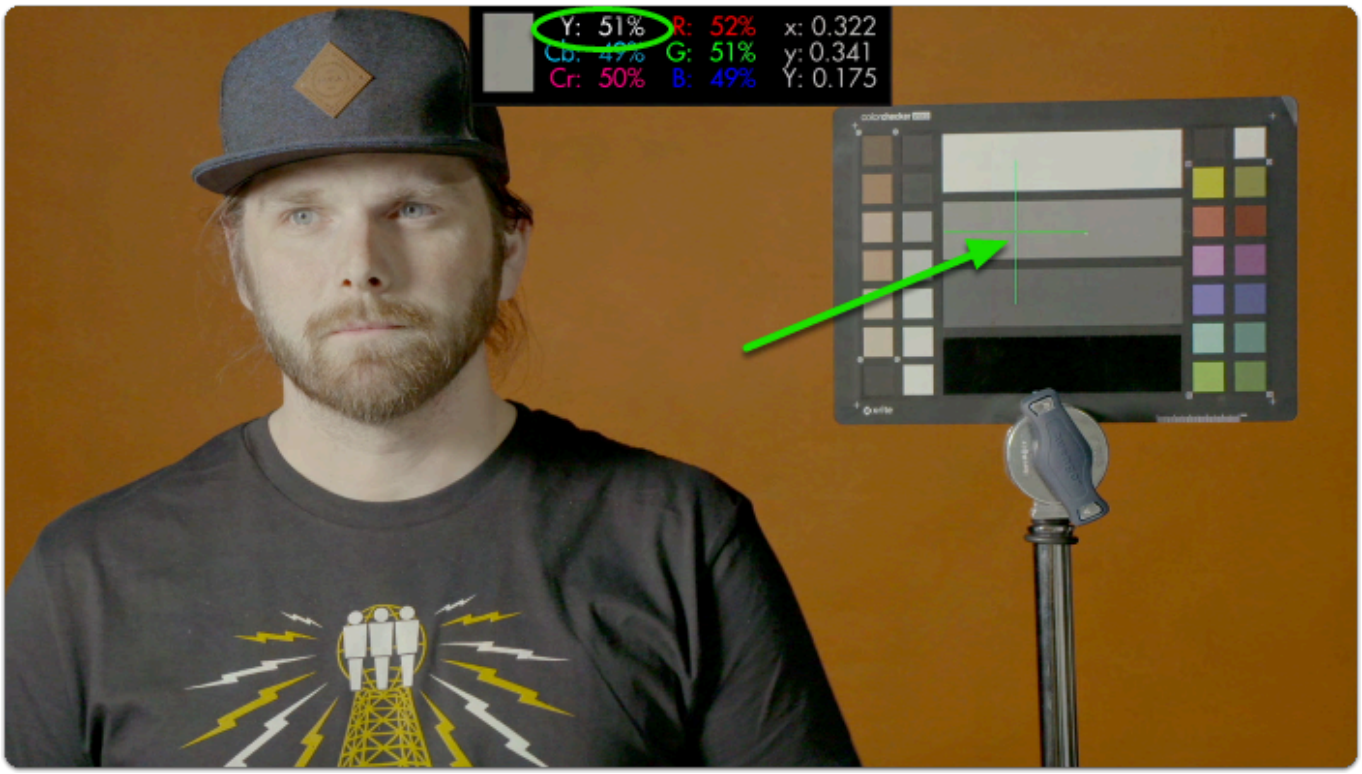


A **stats window** and **crosshair** populate the window; if we **move the joystick** or **tap the screen** we can **change the point** currently being sampled.




Set the crosshair on a **point** on the image that you wish to get a **precise reading** from.  In my case I will pick the **middle grey chip** on an [X-Rite ColorChecker Video]() chart.

This enables us to **set consistent exposure** shot-to-shot, resulting in less work fixing levels in post.




This particular color chip has been designed to read as 'middle grey'.  Look for the 'Y' (luma/brightness) percentage and roll exposure until it reads **near 50%**.

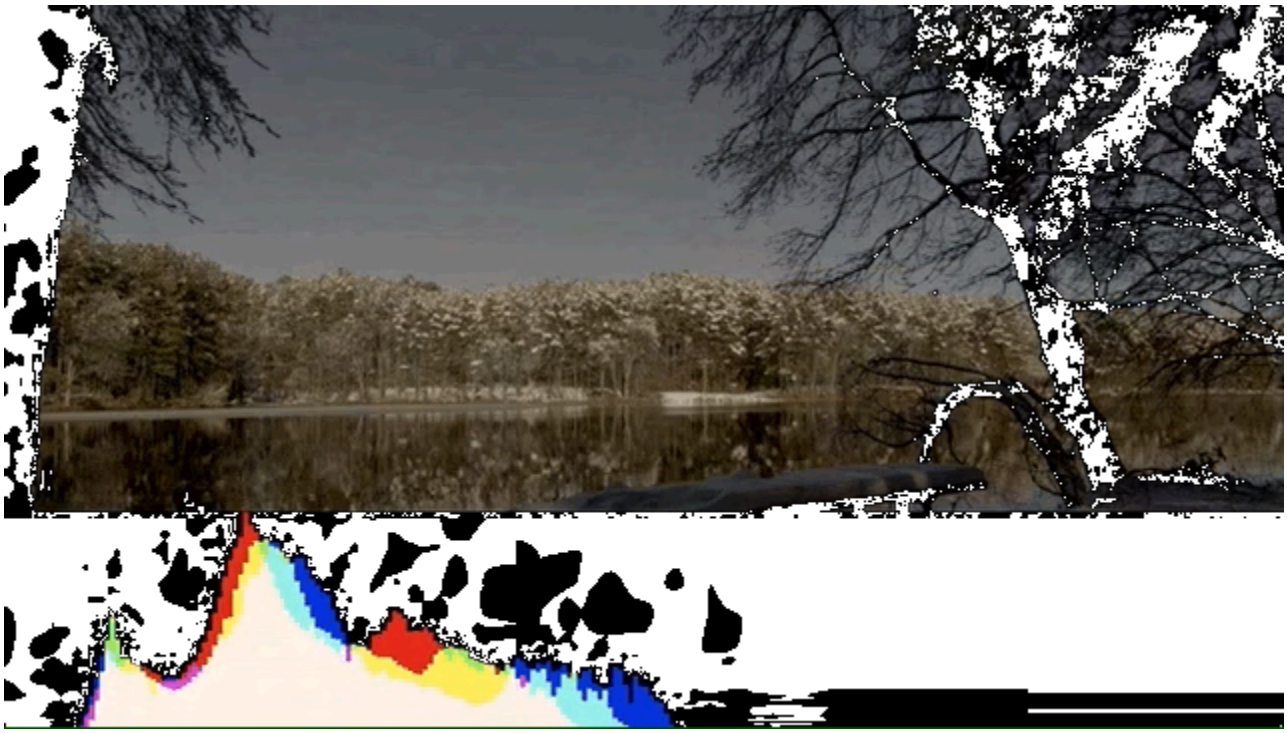
Changing the light setup means our exposure gets **thrown out of its proper range**:

To compensate all we need to do is roll (close) the iris until we get back to the **same value from before**.

Using the same technique we can adjust for exposure under any lighting condition and arrive at a clean result that will give us **consistent, gradeable footage!**

# Tools - Scopes

# Histogram



The Histogram is a brightness graph - left side is darker values, right side brighter. Use it to judge the **overall balance of exposure** in your image.

## Histogram - Overview

Determining where your exposure is balanced is simple with the Histogram- if a **'lump'** is shifting more to the **left**, more of your image is in **shadow**, if a **'lump'** is towards the **right**, your image is largely in **highlight**.

One quick glance of the Histogram is enough to **determine the overall exposure balance** of your image -- not fine details about it but a general gauge of where most of your image is 'weighted'.

Beyond determining exposure balance, the Histogram is outclassed in utility by the other exposure aids that are more suitable for pinpointing specific issues on the image.  For the most versatile scope for most setups, have a look at the Waveform.

The Histogram is a good low-profile scope as it doesn't generally lose any utility by being scaled down and mostly out of the way.

# Histogram - Settings

## On

Toggles Histogram Off/On.  This can also be done on the tool bar by selecting the tool and either activating or deactivating it.  It will be Green when active and Grey when inactive.

## Style

Pick your flavor of Histogram-
LUMA -  displays a brightness/luma plot only
RGB - displays Luman, red, green and blue values individually for a look at the chromaticity of the image.

## Full Screen

Displays the histogram in a full-screen view, which is useful when viewing from a distance or if using multiple monitors where another can be displaying the image itself.

## Width

Scales the Histogram horizontally to help with rearranging your workspace.

## Height

Scales the Histogram vertically.

## Location

Set the location of the Histogram to a spot of your choosing - useful when placing multiple tools/scopes on screen.

There are 9 locations to place the Histogram field:
TOP - Left, Center, Right

MIDDLE - Left, Center, Right

BOTTOM - Left, Center, Right

*(Full Screen is another option)

## Opacity

Adjusts the transparency of the black background behind the Histogram for readability. Boosting Intensity helps to compensate for a lower Opacity.

## Ignore Look

Because monitoring with a Look (3D LUT) alters the image and therefore its exposure, it can be useful to ignore its effects on exposure tools.  This means you can monitor with any graded Look while using the Histogram to set up your camera to be exposed properly for any other grading possibilities in post because it's working off the camera's original ungraded image.

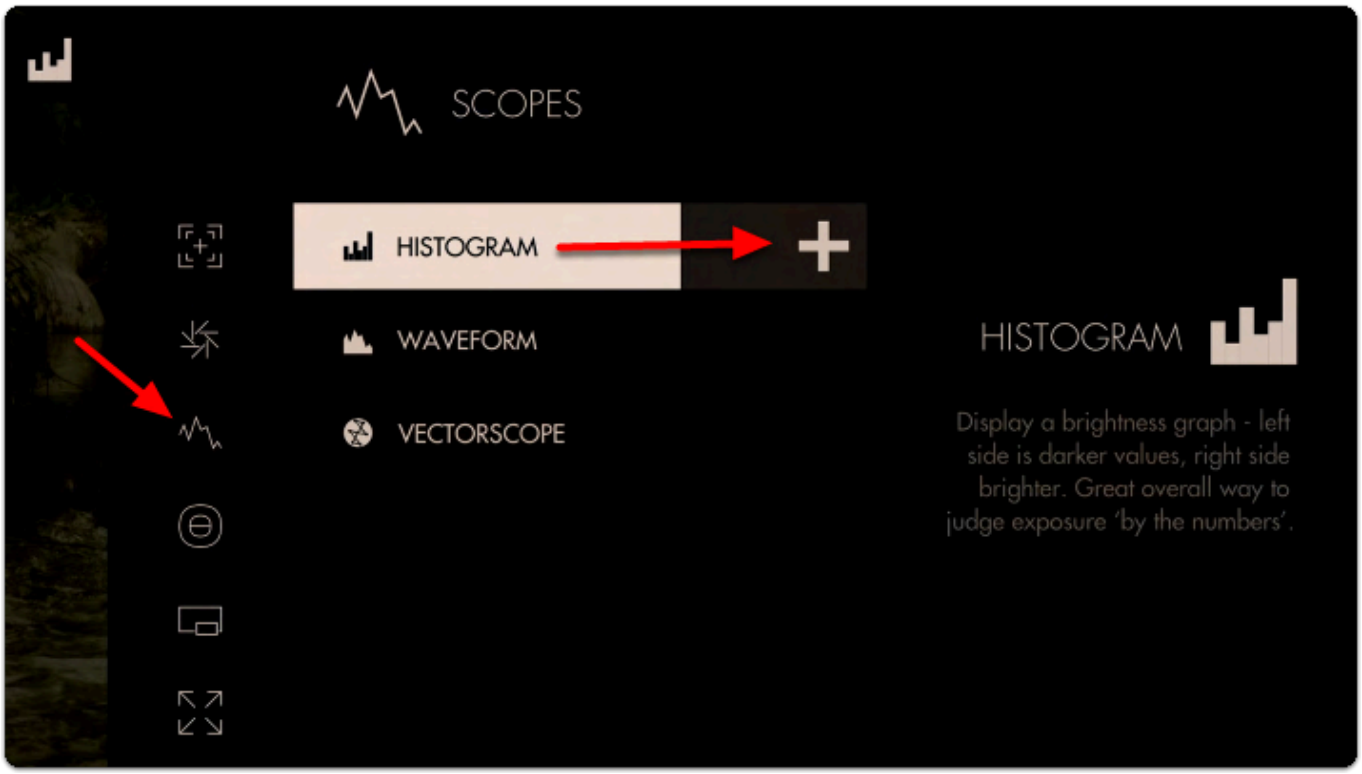
We recommend leaving this on for most shooting scenarios unless you are baking a LUT into your footage on set and do not intend to color grade in post.

# Histogram - Quick Start

In this section we will add a Histogram to a page and use it to set exposure.

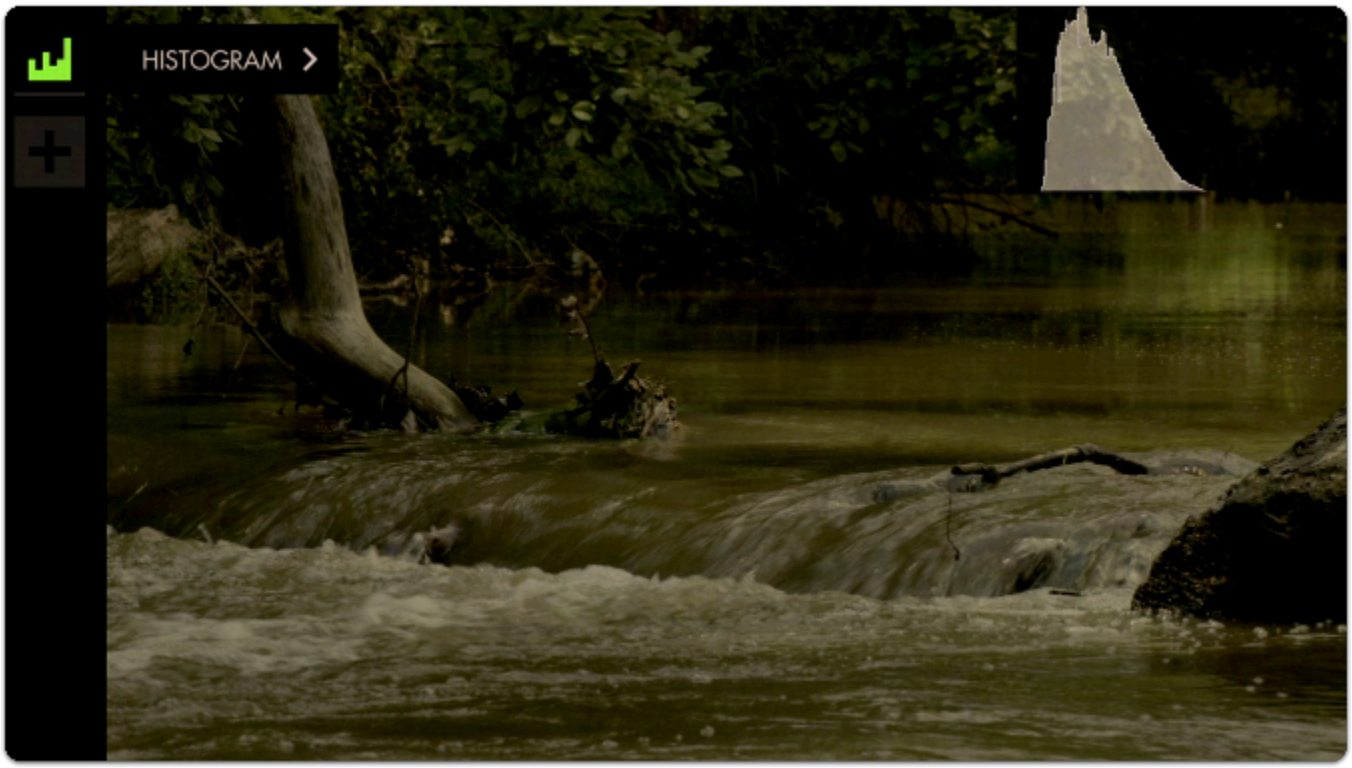
From any page with a feed, **click the joystick** or **tap the screen** to bring up **'Add New Tool'**

Navigate to **Scopes > Histogram** and select the **'+'** to add it to the current page.




A graph appears in the top-right of the image. It will default to LUMA values (Overall Exposure). Histograms read Shadow levels on the left and Highlights on the right.  The weight of the curve will tell you where your exposure values are falling along that scale.

The overall 'weight' of the image data is positioned towards the **left of the graph**; this is telling us we have a lot more shadow areas than highlight areas.

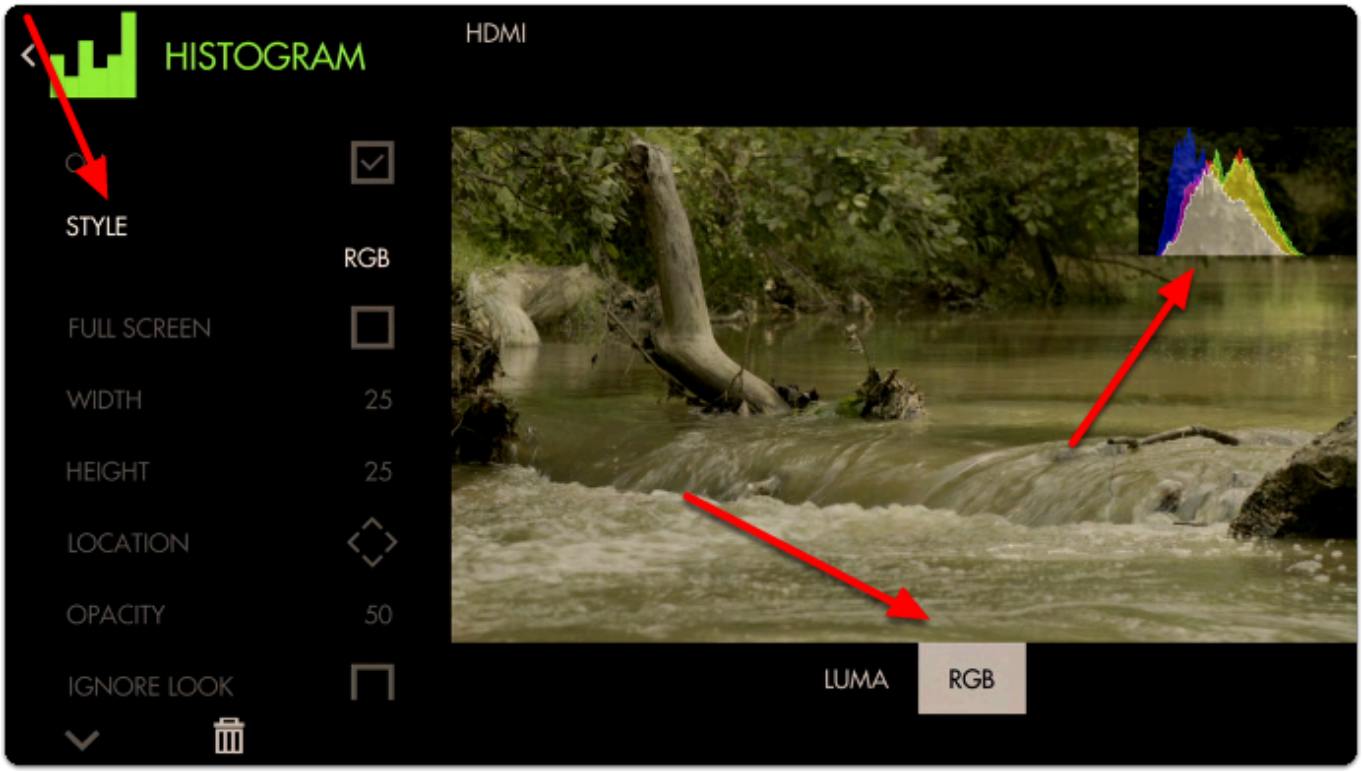



Since this is a daytime shot with relatively even light (no super-bright objects) we can **roll exposure** to better balance the **'lump'** of the graph toward the **center**.

There are no 'spikes' toward the far-left or far-right of the graph, meaning **everything in our shot** is within a **usable exposure** range and as a result **no clipping** is occurring.

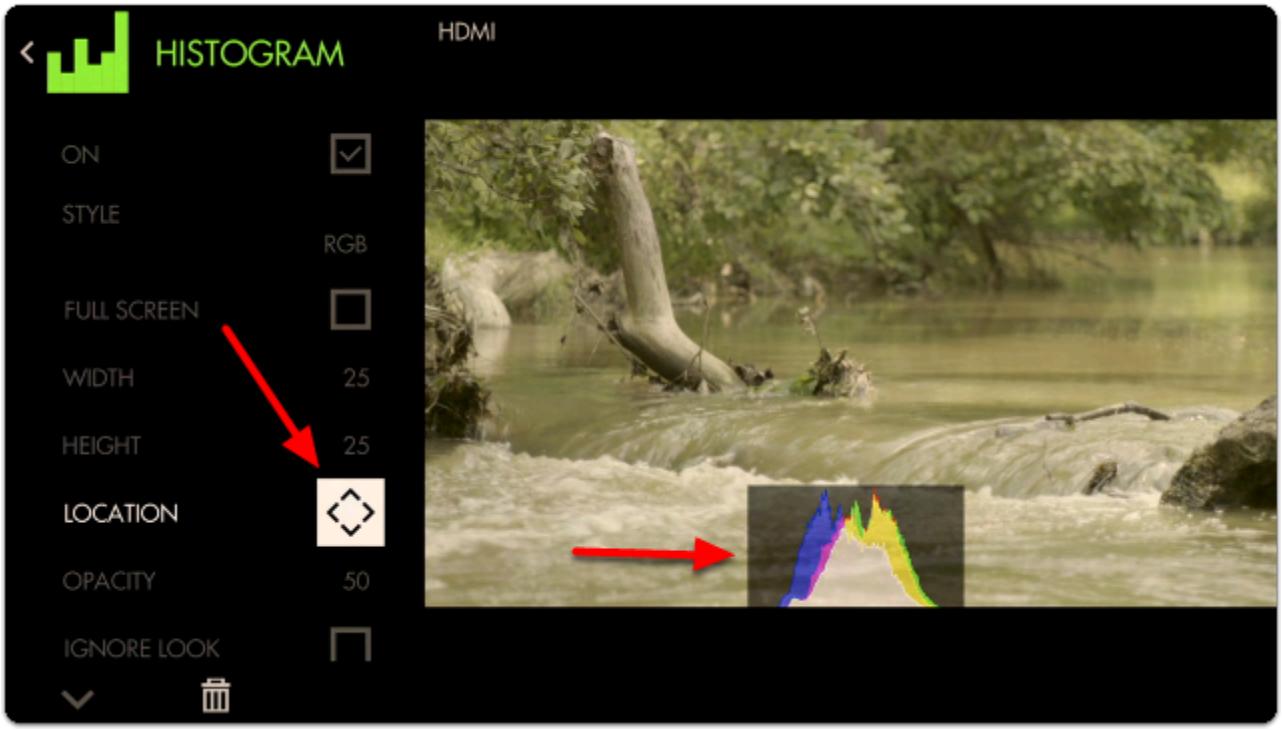
Let's edit how the graph appears by **navigating right** or **tapping the arrow** when 'Histogram' is highlighted.

For a bit more useful info you can navigate to **'STYLE'** and set from **LUMA** to **RGB** to get access to color information in addition to luma/value.

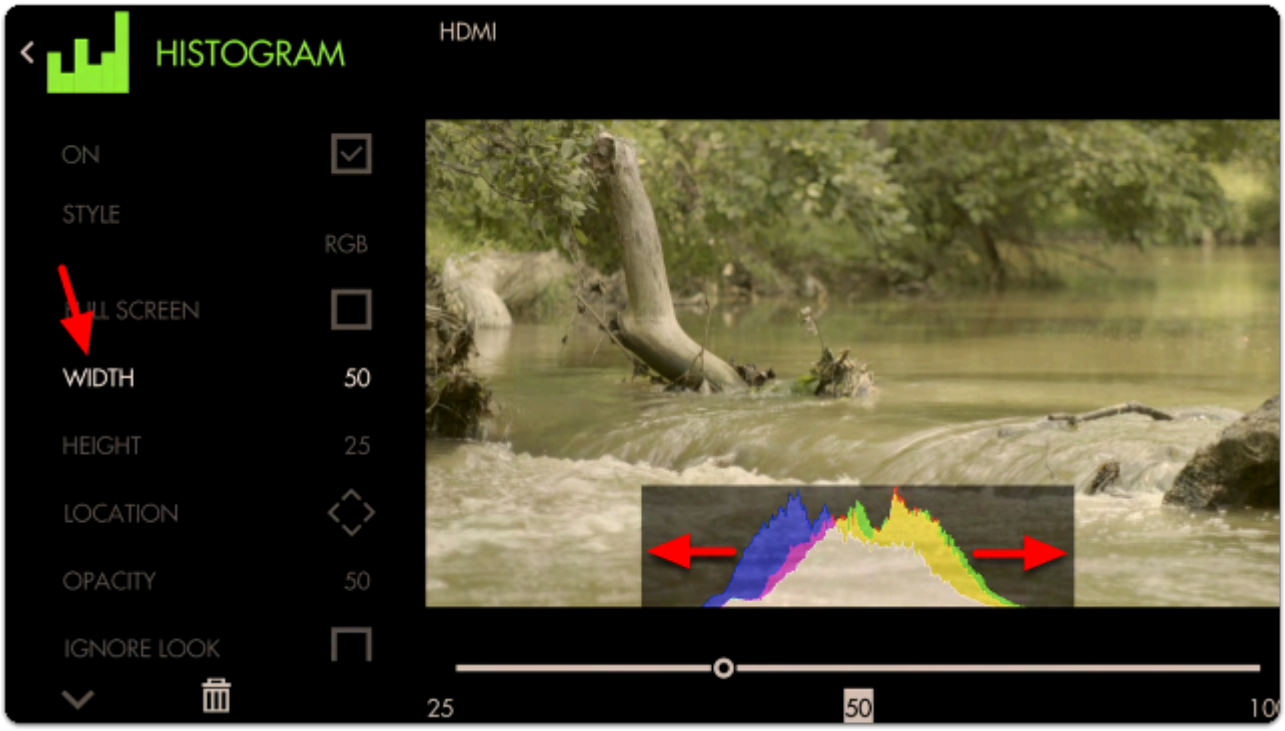



Just as with Waveform, using RGB mode lets you see the individual luma values of red, green and blue that make up your image - If you see a distinct separation of colors on the graph you will notice more colorization/saturation.

To adjust the position of the Histogram on the screen (to arrange with other tools or for better general visibility) alter the **LOCATION** and use the joystick or tap around the screen to place the graph.




We can also adjust the **size** of the graph any way we wish (or use FULL SCREEN to dedicate an entire page to the feature)




With the addition of RGB data, we can tell that our image has a warm cast toward the brighter end (yellow area) and a cooler cast in the shadows (blue area).

Cameras which have an 'auto exposure' will often use an internal histogram as their guide, meaning it will center the 'weight' on the graph as best as possible just as we are doing here manually.

Because the Histogram does not know the context of your shot it can sometimes be tricky to use for exposure balance. For example a brightly lit snow scene will weigh heavily on the right but if we roll exposure to center the 'lump', the whole scene will then be too dark, because brightly lit snow should appear brightly lit. Conversely if you are shooting a subject under a spotlight but against a dark background, the Histogram may appear as if you have an underexposed image if it's reacting to the dark background. For these cases we recommend the Waveform, Exposure Assist or Zebra as they can report issues from discrete portions of the image.

# Waveform

The **Waveform** is generally considered the **most robust exposure tool** because it plots your image's luminance (brightness) -- and chrominance if using RGB mode -- to a graph but unlike the Histogram, it physically **matches the screen from left-to-right**.

## 1. Waveform - Overview

Although SmallHD provides many available tools to help with setting proper exposure, most of the decision will be down to what works for you.  Use this section if you need help deciding where to start.

The Waveform is an extremely comprehensive exposure tool but when needing to understand your exposure levels from a quick glance, Exposure Assist or Zebra may be better options.

Once you get comfortable with how the Waveform works you can quickly reach optimal exposure with it by **balancing exposure** between the top and bottom of the graph to **make sure highlights and shadows aren't being clipped too harshly**. If they are, perhaps adding some light into shadow areas or diffusing/filtering highlights can help compensate.

Waveform is often considered the best exposure tool because it allows very precise measurement of all aspects of the image's luma (brightness) and chroma (color) by setting the 'style' to RGB.

> Because the Waveform gains the most benefit when using the full width of the screen (so that it matches the image horizontally) it might consume more of your image than you are comfortable with. It might work best as its own screen or taking up the lower portion (1/3) of the screen, but you can use this tool however it will work best for you.

## 2. Waveform Settings

> Access the Waveform's settings menu by navigating right or pressing the right arrow when the Waveform is highlighted.

### On

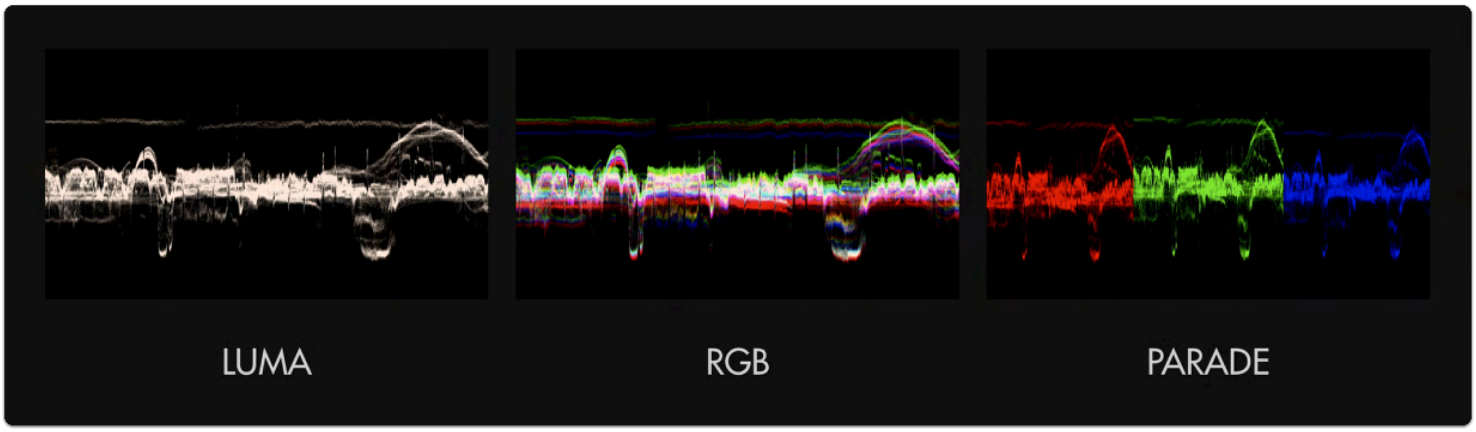
Toggles the Waveform On/Off. This can also be done on the tool bar by selecting the tool and activating or deactivating it. It will be Green when active and Grey when inactive.

### Ignore Look

Allows you to apply a Look (3D LUT) to your footage while monitoring a waveform that is not affected by the Look. This lets you make exposure decisions based on the signal coming from the monitor for ideal flexibility in post-production.

> **We recommend leaving this on** (Ignoring your LUT) for most shooting scenarios so that the waveform applies to the **footage being recorded** instead of shifting around while adding or adjusting a 3D LUT.

## Style




You will have three options:

LUMA displays a brightness/luma plot only

RGB graphs each primary color on top of one another.

RGB PARADE physically separates the Red, Blue and Green channels into discrete sections from left to right so they can be viewed easily in isolation.

## LAYOUT

Layout has a set of Submenus that will allow you to set the positioning, scale and visibility of the Waveform.

### *Full Screen

Displays the waveform in a full-screen view, useful when viewing from a distance or if using multiple monitors where another can be displaying the image itself.

### *Width

Scales the Waveform horizontally.

We recommend leaving this at 100 (or set to the same width as your image) to gain the benefit if the graph matching up evenly with your image from left-to-right.

### *Color

This is only available if using LUMA Style.
You can select the color of the waveform if desired from a specified set.

### *Height

Scales the Waveform vertically.

### *Location

Set the location of the Waveform to a spot of your choosing - useful when placing multiple tools/scopes on screen.
There are 9 positions to choose from:

TOP - Left, Center, Right
MIDDLE - Left, Center, Right
BOTTOM - Left, Center, Right

(Full screen is also an option)

### *Intensity

Adjusts the brightness of the waveform graph (the plotted portion) - increase if the graph appears too faint. This affects the colored part of the graph, not the black background, adjust the Opacity to change that.

### *Opacity

Adjusts the transparency of the black background behind the Waveform. 100 is black, 0 is opaque.

For better visibility, boost Intensity to compensate for a lower Opacity if desired.

## SPOT METER

Brings up a small, moveable 'window' you can place on the image that highlights the portion of the Waveform it corresponds to. Useful for getting very specific exposure information from a specific part of the image such as skin tones, hot spots or calibration charts.

This will open a submenu for more settings.

### *Enabled

Toggles visibility of the Spot Meter. This must be enabled to open the sub menu.

### *Width

Adjusts the width of the Spot Meter.

### *Height

Scales the height of the Spot Meter.

### *Spot Location

Set the location of the Spot Meter to an area of your choosing. It follows a 7x7 grid giving you a preset 49 locations.

## LEGEND

Places a guide onto the Waveform graph listing numeric IRE (brightness) values for measuring levels.
This will open up a set of submenus.

## *Overlaid

Toggles if the legend is outside of the waveform (right) or over the top of it (left).
*If in full screen mode, the outside will push the legend off the screen. If you want the legend outside and have a full screen waveform, you will need to adjust the size manually rather than using the fill screen and shorten the width 94.

## *Num Labels

This breaks the measurements from 0 to 100 into multiples:
2 - x100 (0,100)

3 - x50 (50,100)

4 - x33 (33,66...)

5 - x24 (25,50...)

6 - x20 (20,40...)

7 - x17 (16,33...)

8 - x14 (14,28...)

9 - x13 (12,25...)

10 - x11 (11,22...)

11 - x10 (10,20...)

## *Legend Color

Change the legend (numbers) color if in need of extra readability of IRE values against your background.

## *Line Color

Change the line color of the graph to more clearly see when your values are reaching a specific level. This will correlate to any numbers on your legend, giving you a horizontal line to use for measurement.

Adjusts the opacity of the graph lines to make them stand out - or invisible to improve graph visibility.

Adjusts the thickness of the graph lines for readability.

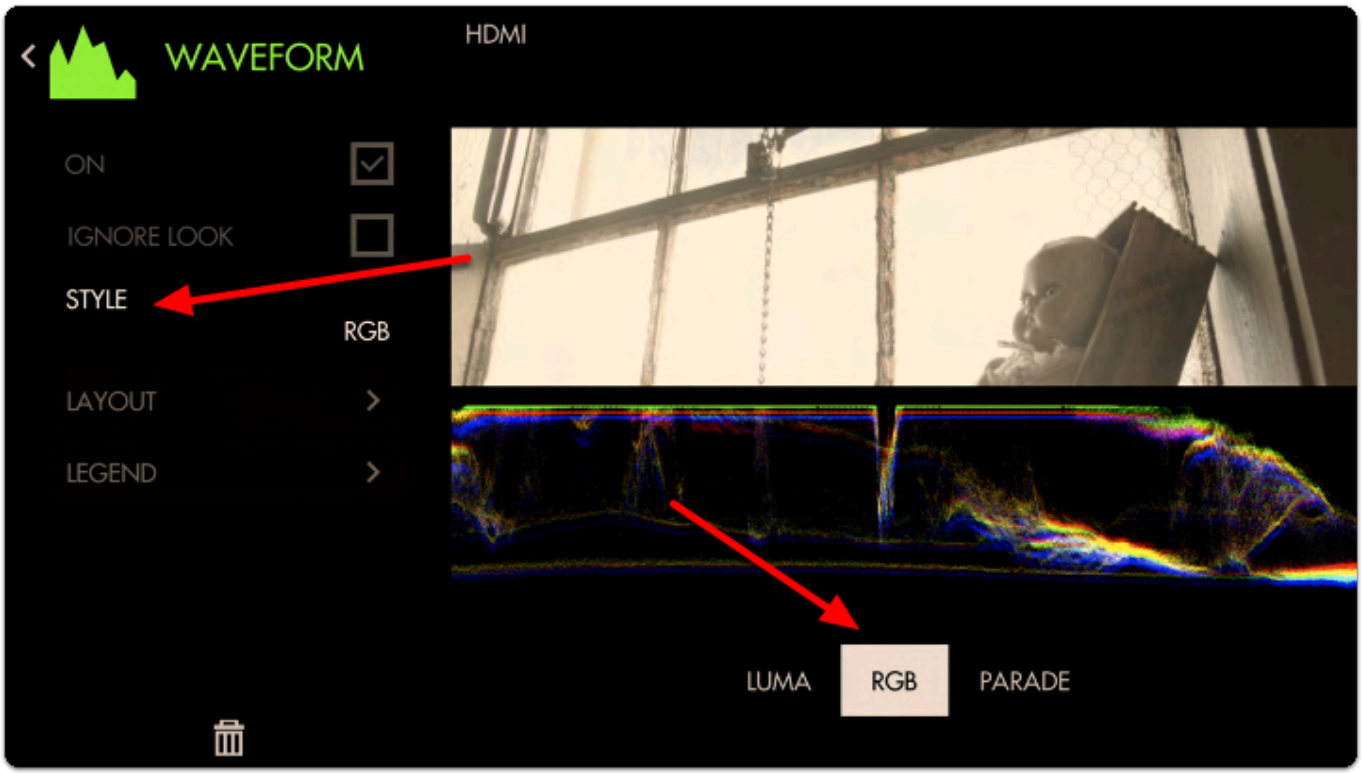
Pixel 0-5.

# 3. Waveform - Quick-Start

Press right on the joystick or tap the right arrow next to 'ADD NEW TOOL' and navigate to **Scopes > Waveform** and select to add it to the current page.

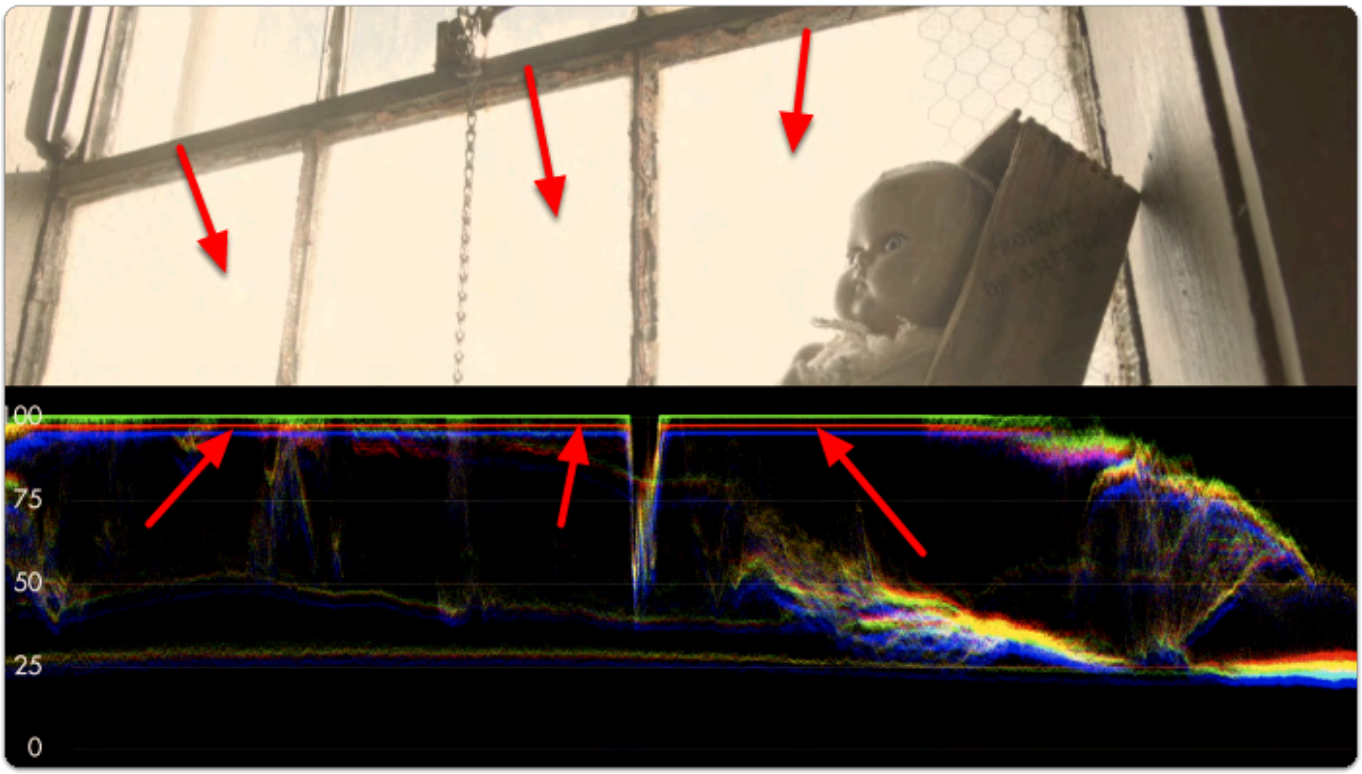
Once added you can **edit the settings** by **navigating right** when 'Waveform' is highlighted.

Select **'Style'** and switch from **LUMA to RGB** - this will let you observe each **Red**, **Green** and **Blue** value simultaneously - a unique benefit of the Waveform.

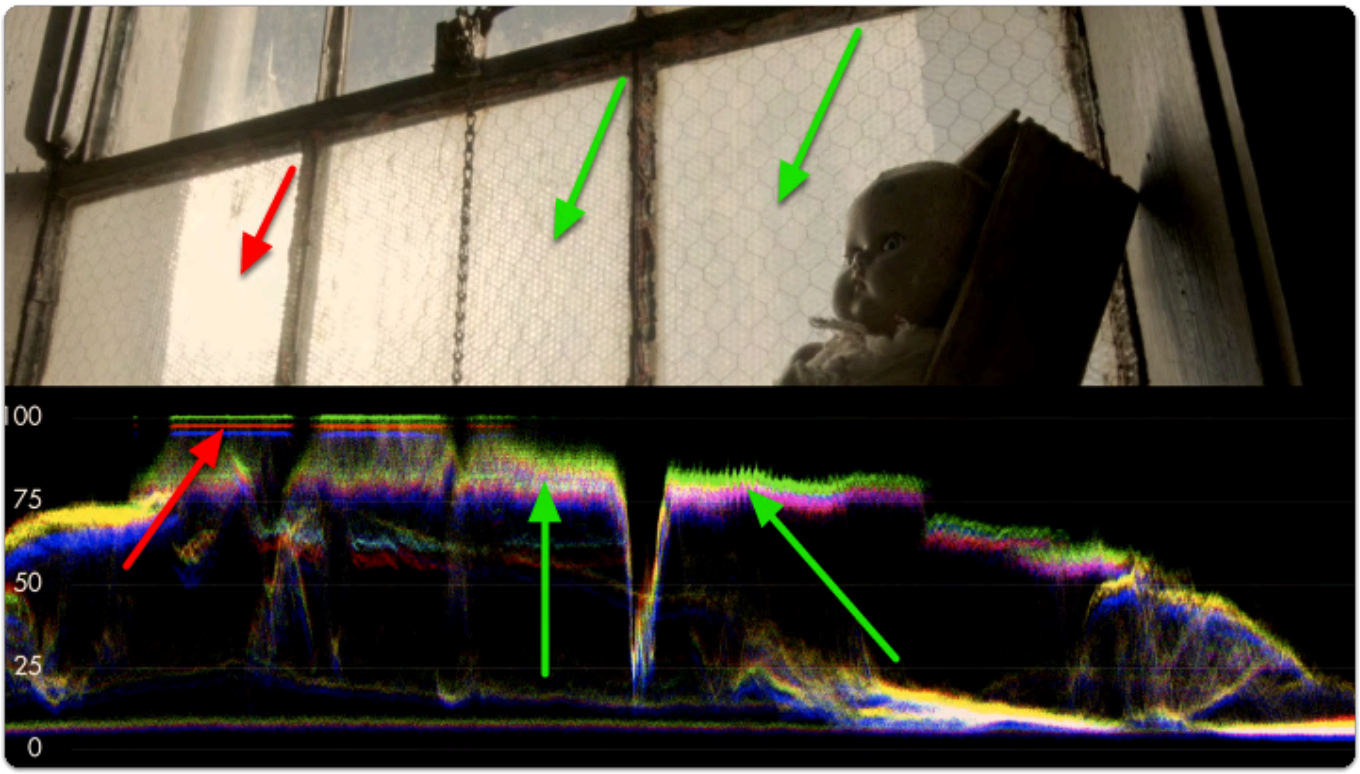



Back out of the Edit Tool menu to observe the waveform in action and to accurately expose your footage.

The Waveform **'flattens'** at the top when highlights are being **blown or 'clipped'** - this will result in footage that is a solid 'block' of color **without the ability to manipulate** it meaningfully in post production.

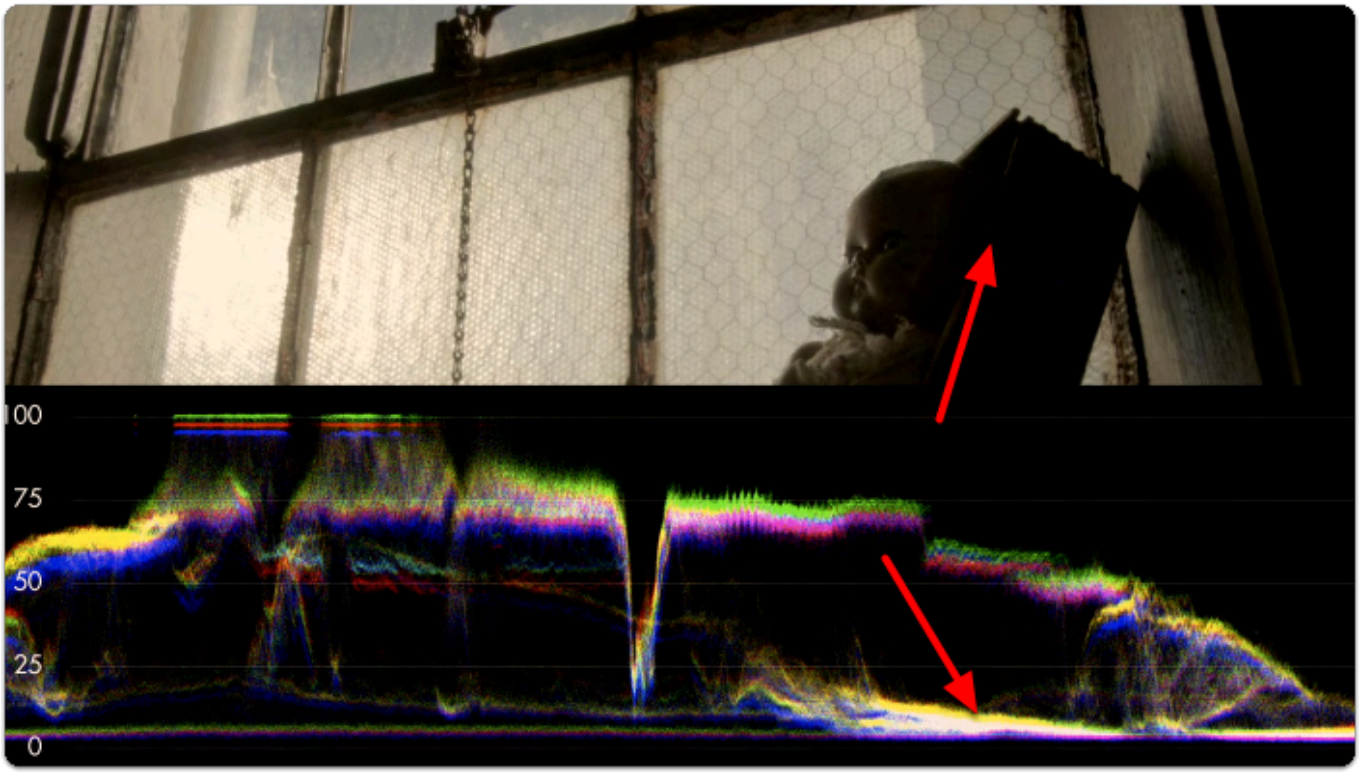



**Rolling exposure downwards**, the lines **'un-flatten'** and much more of the window can now be **manipulated in color grading** while some areas **remain overexposed.**



If we keep rolling exposure down (closing the aperture) we will continue seeing more 'into' the brighter details at the expense of **shadow details** which become **'crushed'** or **'clipped'** and **effectively lost** similar to overexposure.

> The key to finding a healthy exposure relies on a graceful balance between clipped highlights (top of graph) and crushed/noisy shadows (bottom of graph).




> The **difference** between the **darkest** and the **brightest** areas that a camera can effectively see detail is known as its **dynamic range** - this is why high dynamic range is a highly sought after feature among cameras; you are able to capture and therefore **manipulate more of your image**.

As mentioned before, because we're looking at an **RGB Waveform** we can can use it to make color decisions in addition to luminance.

If a **pure white** or **pure gray** element occupies part of your scene, you can actually **white balance** with the **waveform**. Many newer cameras will do this automatically, but it is a good idea to use the spot meter if using a local source.

*Using a Macbeth or Grey card in the field works well.

Notice how adjusting the white balance setting on the camera shifts the RGB 'bands' - when lined up they **turn white**, indicating a **proper white balance** setting.

# Vectorscope

Though generally not considered as 'mission critical' during shooting as exposure scopes such as Waveform & Histogram, the **Vectorscope** plots the **chromaticity**, or the **hue + saturation** of your image onto a **color wheel** so you can help gauge **complimentary color**, ensure **skin tones** are being colorized properly, to visualize how overall scene color is being placed, and where potential adjustments may need to be made in general.

Vectorscopes are also used in Broadcast to make sure that the colors of the footage are exact. Vectorscopes will have a target for each zone. The idea would be if shooting a pure sample (such as a color or macbeth card) that the targets would be hit.  You will see vector scopes used in post production to be sure that the colors from shot to shot will match.

# Vectorscope - Settings

Access Vectorscope tool settings menu by navigating right or pressing the right arrow when Vectorscope is highlighted in the tool list.

## On

Toggles Vectorscope Off/On.  This can be done on the Tool Bar by selecting the tool.  Active tools are Green, while inactive tools are Grey.

## Size

Adjust the size of the Vectorscope for best view-ability.
The size ranges from 20 to 60. At 60, the scope takes up about 2 quadrants of a 3x3 grid.

## Location

Arrange the Vectorscope on-screen using various pre-set locations.
There are 9 positions:
TOP - Left, Center, Right

MIDDLE - Left, Center, Right

BOTTOM - Left, Center, Right

## Opacity

Set the transparency/opacity of the black background  and Vectorscope graticule/graph.

## Show Skintone

Displays a skin-tone line/taget directly on the Vectorscope to indicate where to place skin color during lighting to achieve a neutral, natural result.

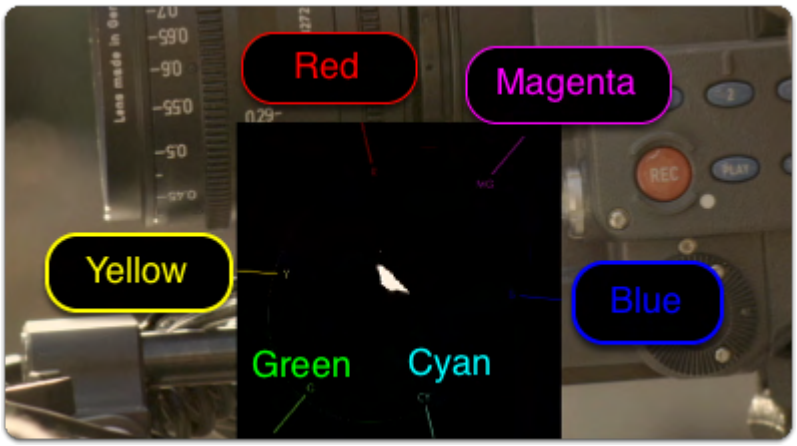
# Vectorscope - Quick Start

In this section we will add a Vectorscope to a page and use it to light a scene with complimentary colors.

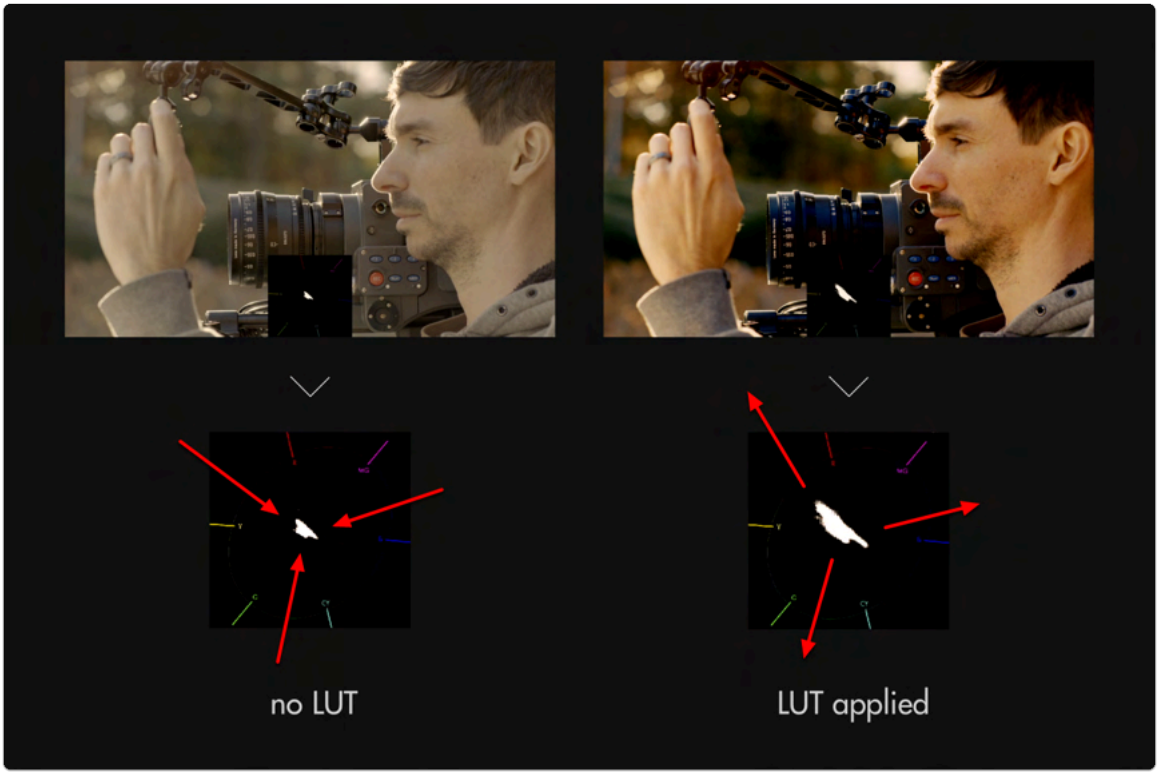
**'Add New Tool'** Navigate to **Scopes > Vectorscope** and select the **'+'** to add it to the current page.

A **Vectorscope** appears at the bottom of the image.  The **'blob'** is largely contained in the **center** of the graticule/crosshairs which means the colors of the current image are **not very saturated** (which is especially true as this footage is using log-based gamma).

The Vectorscope represents saturation as **distance** from the **center** of the circle, and **hue** as the **angle** around it.



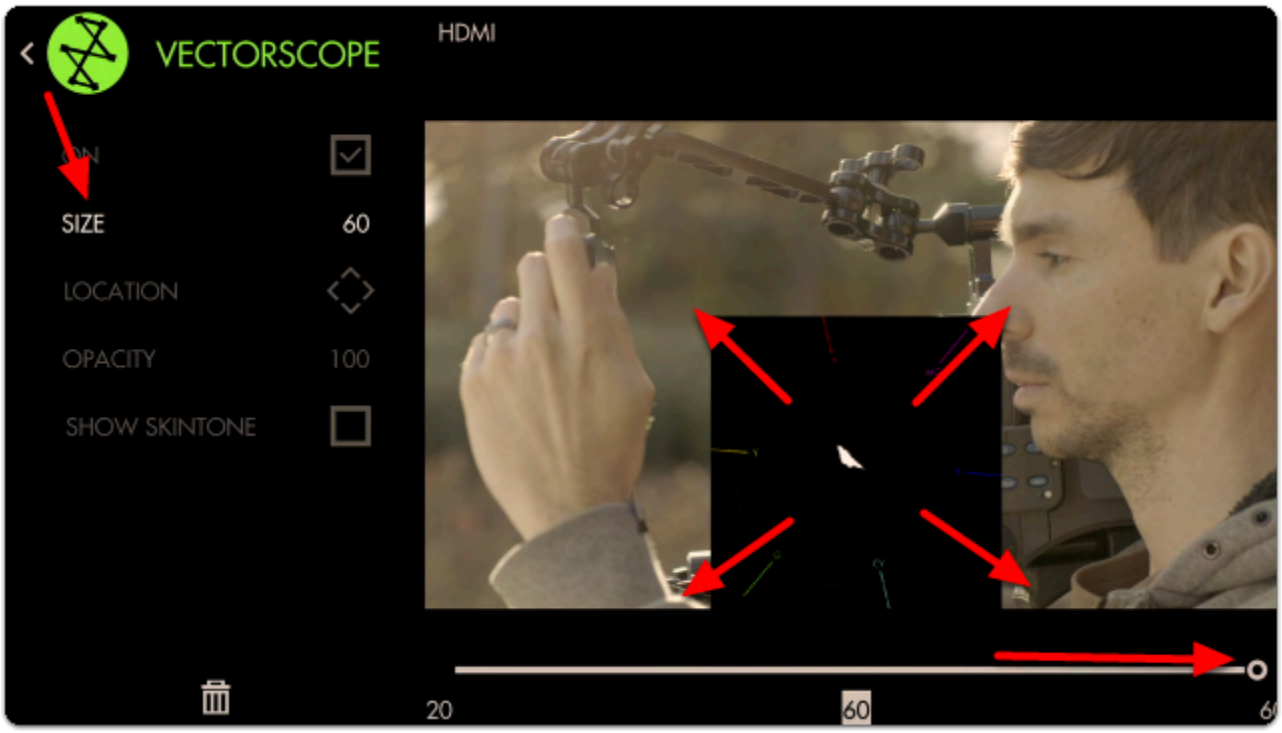

If we **apply a LUT** to this page, the Vectorscope reacts by **expanding** its plotted area. The scope confirms that we are viewing a more heavily saturated image after applying the look.




The Vectorscope uses the same layout as a **color wheel** and therefore principles of **color theory** apply - for example we can achieve **complimentary** colors by ensuring our scene plots to the graph on **exactly opposing sides**. Perhaps the most common example of this is the

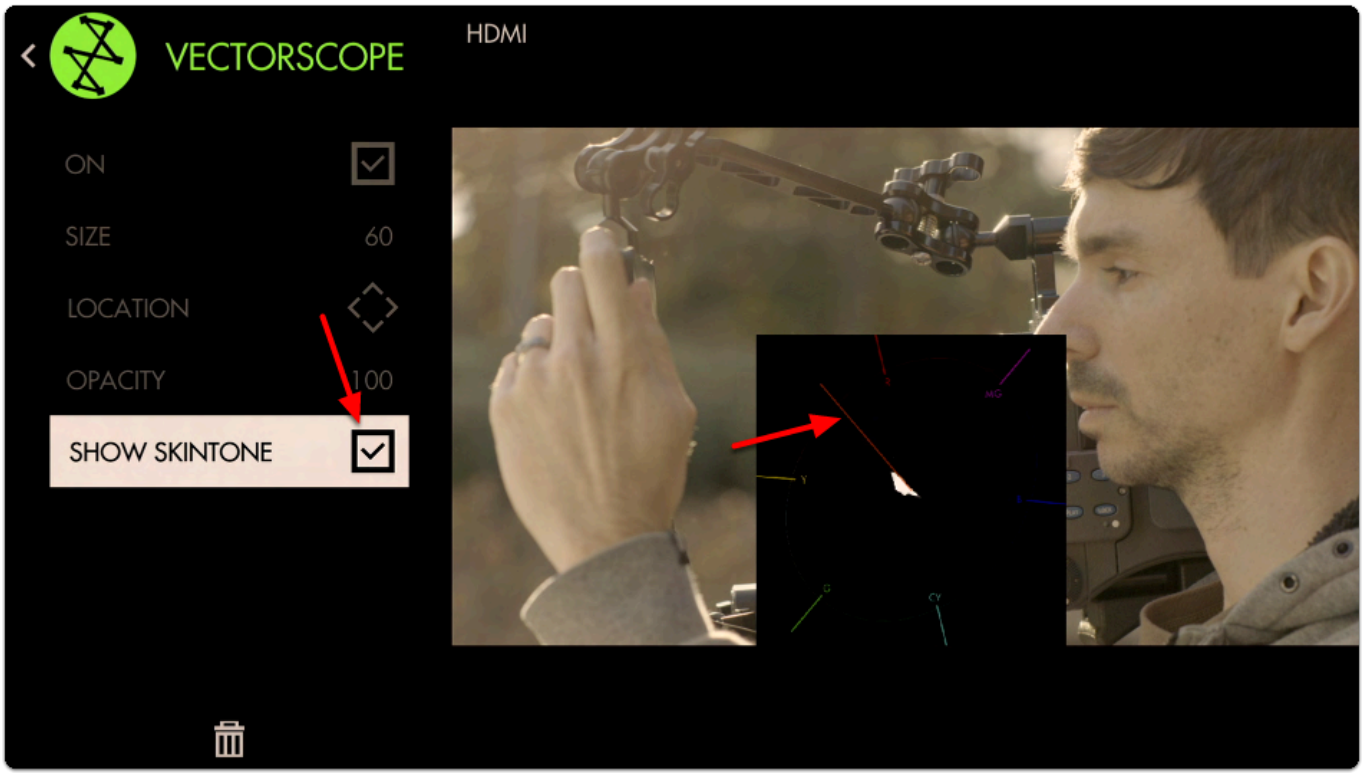
famous/infamous 'teal/orange' look popularized in Hollywood where skin is orange and nearly everything else gets colorized as teal.

We can **edit** some settings by **navigating right** or **tapping the right arrow** when 'Vectorscope' is highlighted in the toolbar.



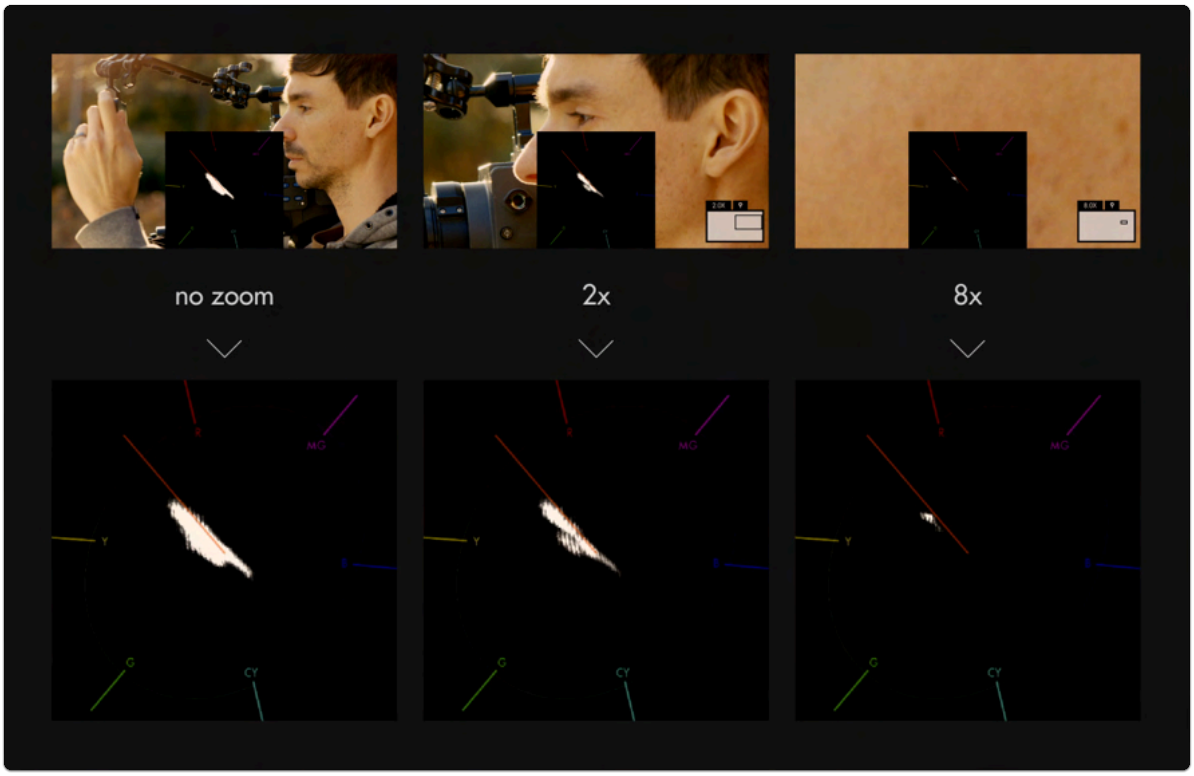

You can adjust the **SIZE** of the graph for better visibility. At this stage feel free to use **Size & Position** or **Crop & Scale** to **arrange** the image and scope so that they **don't overlap**.

Next let's enable **SHOW SKINTONE** - this provides a line on the graph for where to keep skintone hues for the most natural result under neutral lighting.




Because the **entire image** is being plotted to the graph all at once, we can check the status of individual areas by using **Pixel Zoom** in combination with the **Vectorscope** for **spot meter** functionality!

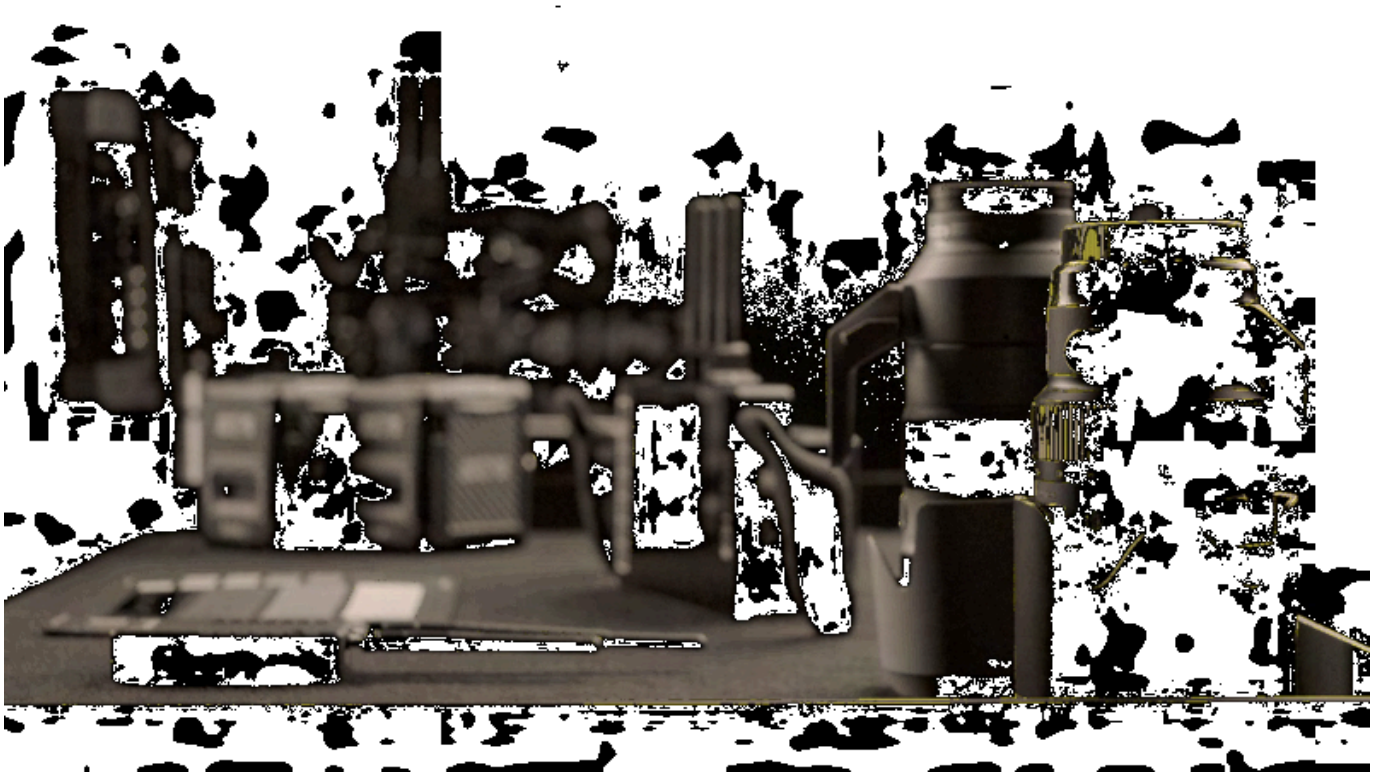
**Press up** on the joystick or **pinch-to-zoom** on touchscreens while the scope is activated to see its effect.




Zooming into an area consisting of **only** skin tones reveals the **exact hue** in which they plot - the result is **slightly** toward the **yellow** side - this is the result of a golden reflector which was used to bounce light onto the face.  If we had used a silver reflector, the facial tones would rest precisely on the **skin tone line**.

# Tools - Focusing

# Focus Assist



Paints a highlight around in-focus edges, enabling very fast and accurate focusing on-the-fly without needing any additional tools.
We have some Tips for focusing here.

## Focus Assist - Overview

If configured properly, Focus Assist makes finding your focus point extremely easy- simply **roll focus** until your subject is displaying **bright edge highlights**. Focus Assist is a method to find your focus point because of its pronounced effect on in-focus edges.

Focus Assist is versatile and accurate, only at a slight disadvantage to Pixel Zoom in its overall utility since it doesn't allow for as much direct scrutiny of the underlying image, but at the advantage of

speedy usage. The way it works is that the filter is looking for hard, crisp edges. When it sees crisp lines, it will add digital noise over the top, giving you a visual cue that those areas are in focus.

*FOCUS ASSIST is a tool that can be very useful for critical focus. It is best used when your depth of field is shallow and you want to be sure that your subject falls within the goldilocks zone. Focus Assist will not be very helpful when used in shots where you have a large depth of field. You will be better off to use calculations based on your Stop, distance and lens.

Depending on how it is set up, Focus Assist generally has a pronounced enough effect on the image that it tends to require its own page to not confuse readings with another feature or other aspects of the image. If you wish to, for example be able to focus and expose your image on the same page with minimal overlays, perhaps try a combination of Peaking and Zebra.

# Focus Assist - Settings

## On

Enable/Disable Focus Assist tool. You can also do this on the tool bar. Select the tool and activate or deactivate it as desired. Green tools are active, they are Grey when inactive.

## Color

Choose the edge highlight color of the Focus Assist- this can be useful to modify if the current color isn't visible enough against your footage.

*If this is still an issue after adjusting color, try lowering the Brightness and/or Contrast

## Sensitivity

Sensitivity adjusts the intensity of Focus Assist - a low number causes a faint edge highlight, high numbers cause many more edges to be detected.
In essence this will increase how many edges it will highlight.

### Peak Threshold (Peak Thresh)

Peak Threshold is like a 'confidence' slider, the higher the Peak Threshold, the more confident Focus Assist needs to be about an area to paint it as 'in-focus'. Increase this setting to taste after increasing Sensitivity for best results.

### B&W Background

Makes the underlying image monochrome so that the highlight color is more visible. This can be useful when you have trouble finding a color for the highlight that will not separate from your background.

### Brightness

Adjust the brightness, which will affect black levels and luminance. (ie not a flat log signal) source, translating into a clearer view of what is in focus.

> ⚠ Any active exposure tools will respond to changes in brightness and contrast made here unless "Ignore Look" has been applied on each exposure tool - we recommend leaving these settings checked so that you are making exposure judgements off your original un-manipulated footage.

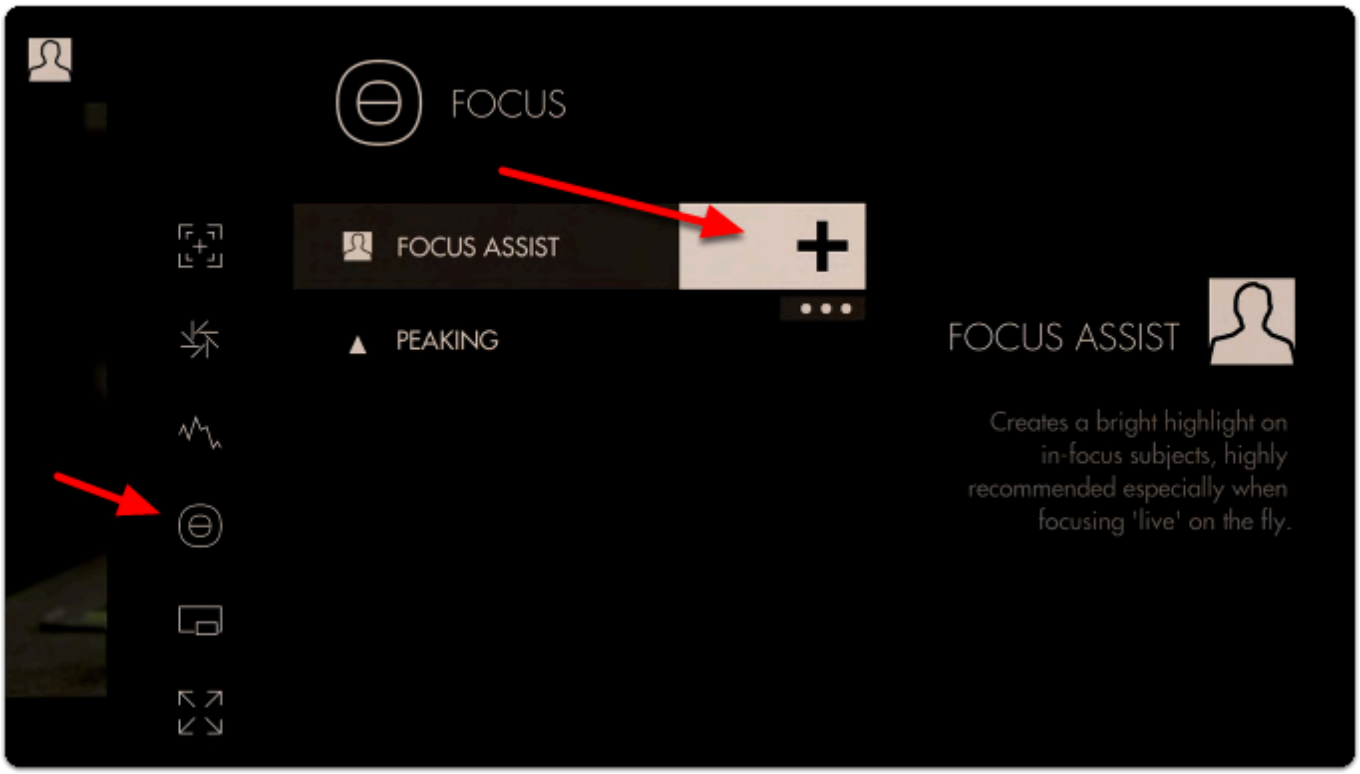
### Contrast

Adjust the contrast of the image, affecting gamma levels.

## Focus Assist - Quick Start

> Focus Assist benefits from being **configured** for each camera due to differences in **noise levels** which can affect readings and exhibit false positives.

**'Add New Tool'.** Navigate to **Focus > Focus Assist** and select to add it to the current page.

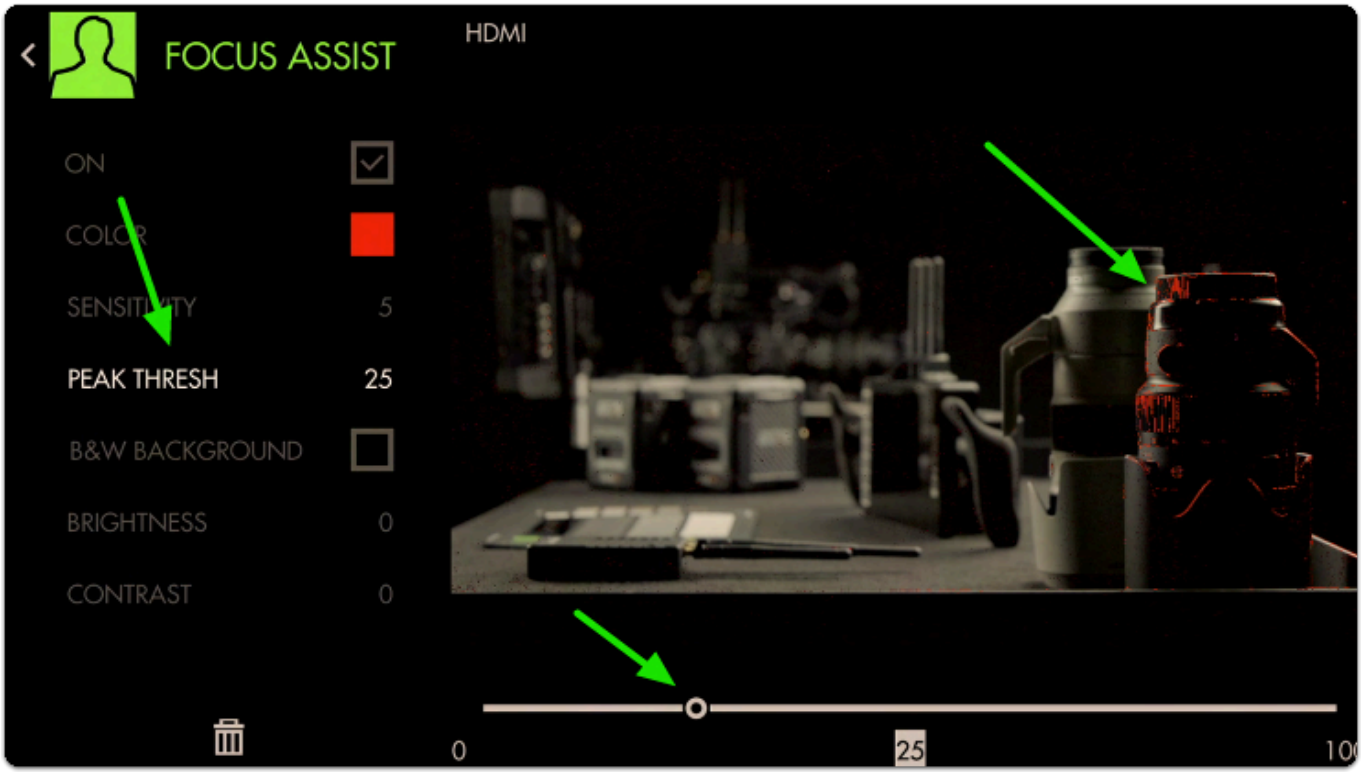



Once added you can **edit the settings** by **navigating right** or **tapping the right arrow** when 'Focus Assist' is highlighted.

The default **sensitivity** is usually a good starting point but if you are **not** seeing enough **edge highlighting**, give this value a **boost**.

Notice how we are picking up many edges that are **not in focus** in addition to the areas that are in focus.

**Increase** the next slider labeled **'Peak Thresh'** to help eliminate the false positives.



Now we are getting a **much more isolated** area of focus with this particular setup.

> A good rule-of-thumb for sensitivity/threshold is to adjust until image noise is *just* out of range of affecting the filter drastically. Some false positives will almost always be present and proper usage is generally about looking at the 'center of mass' of the colorized area as the focus distance.

You can check 'B&W Background' to make the colorizing effect stand out more if view ability is compromised.

Accurately rack focusing on-the-fly is now made vastly less tricky by way of Focus Assist!

# Peaking

Peaking essentially mimics an exaggerated 'sharpening' filter like you may find on a consumer TV - this effectively increases contrast on in-focus portions of your image while retaining full color unlike Focus Assist. Because of its relatively benign effect on the image this makes it great to use in combination with other features.

## Peaking - Overview

Focusing with Peaking is simple- just look at where edges are being highlighted more drastically than others and this gives an indication of where your focus is placed.

Apart from the effect not being as visible as with Focus Assist, getting focus with Peaking can be done very quickly if within a clear enough view of your monitor.

Because Peaking doesn't have an extremely pronounced overall effect, critical applications where you may not have as clear a view of the monitor may benefit when using Pixel Zoom or Focus Assist.

Because it only enhances edges to a certain degree and doesn't otherwise mess with the image, Peaking is very useful in combination with other tools and scopes.

## Peaking - Settings

### On

Enables/disables the Peaking tool. You can also enable or disable the tool by selecting it on the tool bar. It will be Green when enabled and Grey when disabled.

### Intensity

Adjust the opacity of the edge highlighting effect - increase for a more visible 'halo' with which to focus.

## Brightness/Contrast

Adjust the brightness/contrast of the image to feed the Peaking filter with an adequate (ie not a flat log signal) source, translating into a clearer view of what is in focus.

> Any active exposure tools will respond to changes in brightness and contrast made here unless "Ignore Look" has been applied on each exposure tool - we recommend leaving these checked so that you are making exposure judgements off your original footage.

# Peaking - Quick Start

> The main benefit of using Peaking to focus your shot is that due to its relatively low impact on the image, we can use multiple tools along with it on a single page.  in this example we'll add Peaking to a page that already has Frame Guides, a Look (3D LUT) file and the Zebra tool applied.

From any page, click the joystick or tap the screen to bring up ‘Add New Tool’ and navigate to Focus > Peaking and select to add it to the current page.

Once added you can edit the settings by navigating right when ‘Peaking’ is highlighted.

To make the effect more visible on footage, increase the intensity slider.

Press the Back button to get to a full screen view of your footage.

You can look at the white 'haloing' appearing around in-focus edges to determine where your focus plane is.  Pointing the camera at the ground, you can very clearly what area is in focus.

> For tricky shots where you need to focus on a subject as they move toward or away from the camera, try using the ground as a reference point before shooting to get a feel for moving the lens, how far/how fast to turn etc.

If you want a similar but more pronounced effect with which to focus your shot, try Focus Assist

# Tools - Overlay

# Look (3D LUT)

A Look or 3D LUT is a simple but very powerful way to apply a color grade to footage.  3D LUT files are quite small, (often around 1MB) and can be produced with most any color grading software and can be saved on to an SD card for use on the monitor or at any point in post production.

3D LUTs are particularly powerful when used with SmallHD monitors - many can be applied simultaneously on several pages so visualizing color variants on set is made as easy as swiping from page to page.  We have some sample LUTS that you can

## Look - Settings

Access Look tool settings menu by navigating right/pressing the right arrow when Look is highlighted in the tool list.

### On

Toggles the Look Off/On. You can also do this on the tool bar. Select the tool and activate or deactivate it as desired. Green tools are active, they are Grey when inactive.

### Look File

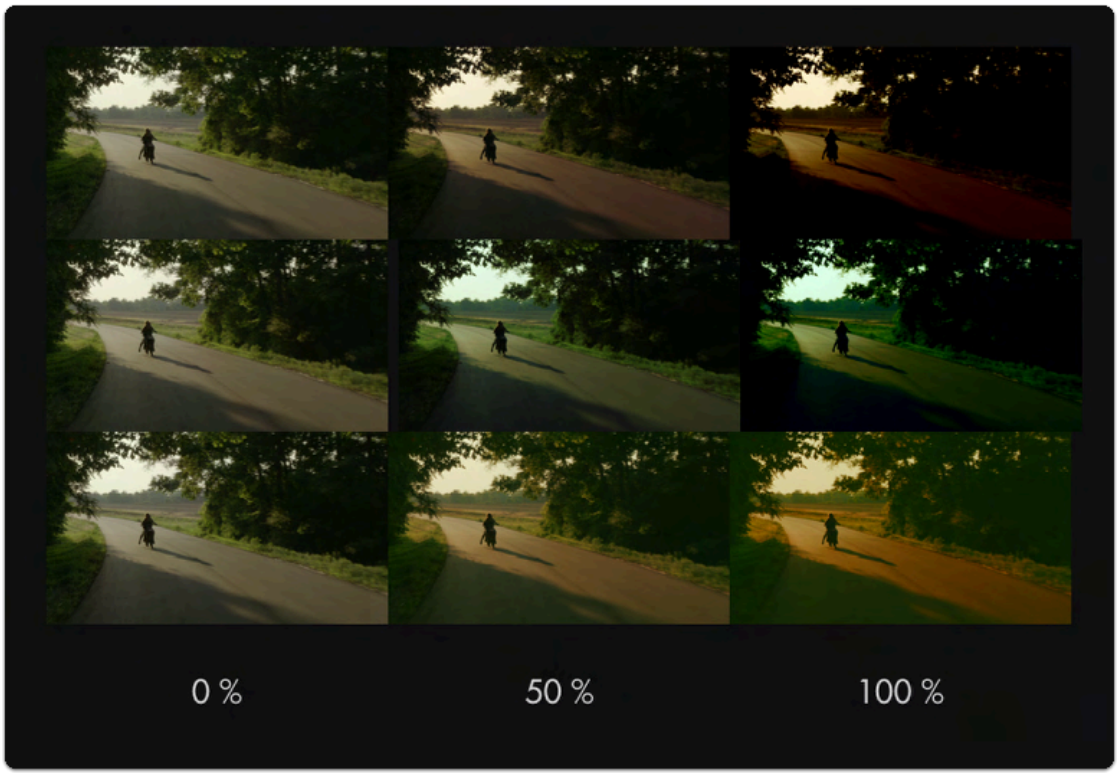
This will list the LUT file associated with this too.  To add a LUT, Select this option and it will open a browser for your SD card. There should be some default Internal LUTS that we have provided as a base, but we always recommend that you use one that is ade for your production by either your DIT or Editor to give the closest results to Final.

*Many camera manufactures will post LUTS for corrections for their specific camera models on their websites.  This is a god place to go to get a base LUT.

*REMEMBER this is an approximation to show what the footage will remember when finalized.  Since there has been no post processing (color enhancements etc) this will not be the Final result but rather a representation.

## Intensity

This setting lets you scale back the effect of the Look for situations where color & value are being pushed too far.  Leave this at 100% if you wish to maintain accuracy of the LUT, this will in effect, change the "overlay opacity" like in photoshop.




For LUTs with a high default intensity, this is a great option to be able to visualize a 'toned down' version - just apply the same LUT with the same intensity in your color grading application to match the look on set!

### Input Data Range

If your LUT has been designed for 'legal' broadcast range (16-235 for 8-bit, 64-940 for 10-bit), use this setting so that your signal gets displayed properly. If you aren't sure what this means, leave at the 'full' setting. Full should give you the spectrum set in the LUT itself. This will be most noticeable when using scopes.

### Output Data Range

This setting currently mirrors the selection of 'Input Data Range' - splitting input/output data ranges is on the roadmap for a future firmware update.

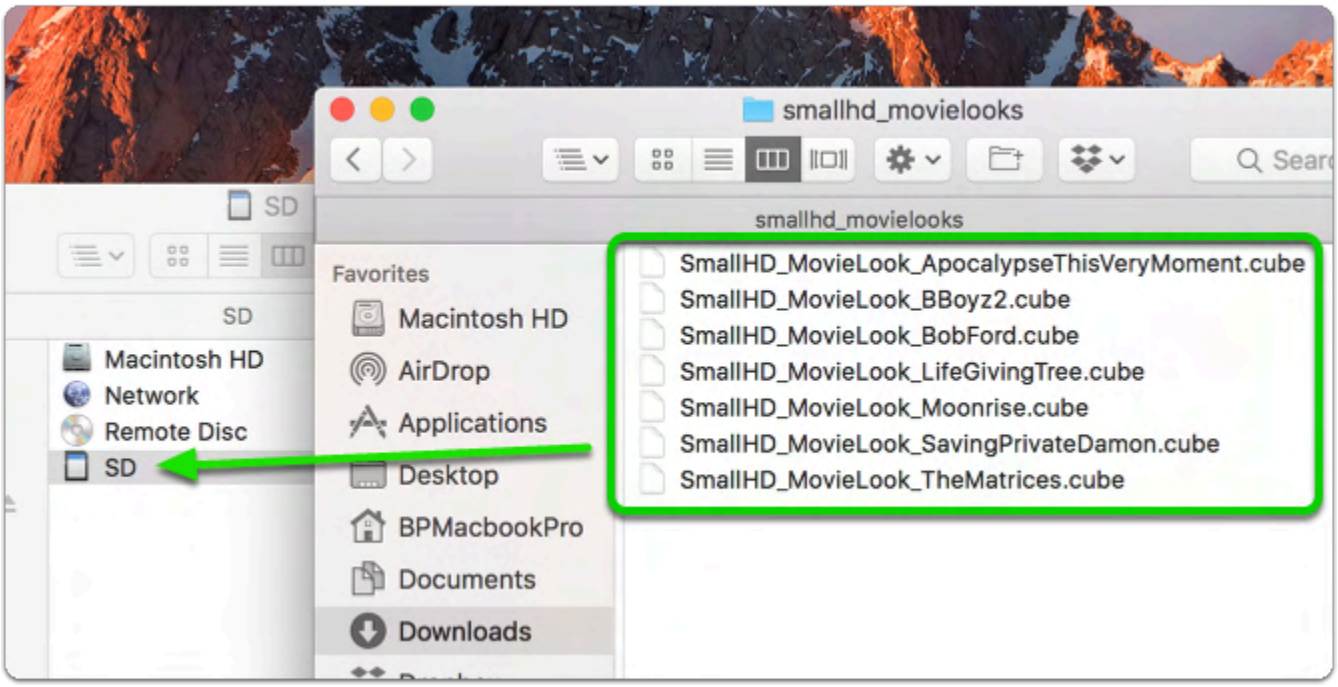
### Converting a LUT using Davinci Resolve

If you need help creating a LUT or are having issue loading one, we have a tutorial that can help.
We also have a more detailed walkthrough of the using the LUT process that you may also find helpful.

## Look (3D LUT) - Quick Start

In this section we'll place a downloaded look on an SD card and apply it to a page.

Using a computer, place as many Look files as you wish onto an SD card. For this example we'll be using our very own "Movie Looks" pack that you can download here for free.




With the LUTs placed on the SD card, insert it into your monitor. From any page with a video feed, click the joystick or tap the screen to bring up 'Add New Tool' and navigate to Overlay > Look.

You will then be presented with a file browser where you can select your Look. You can see a preview before making a selection.

The Look is now applied to the page.  To get the most benefit out of this feature, try applying different Looks to several pages to switch between them at any point to help inform your decisions about how to approach any given shot!

# Image Overlay

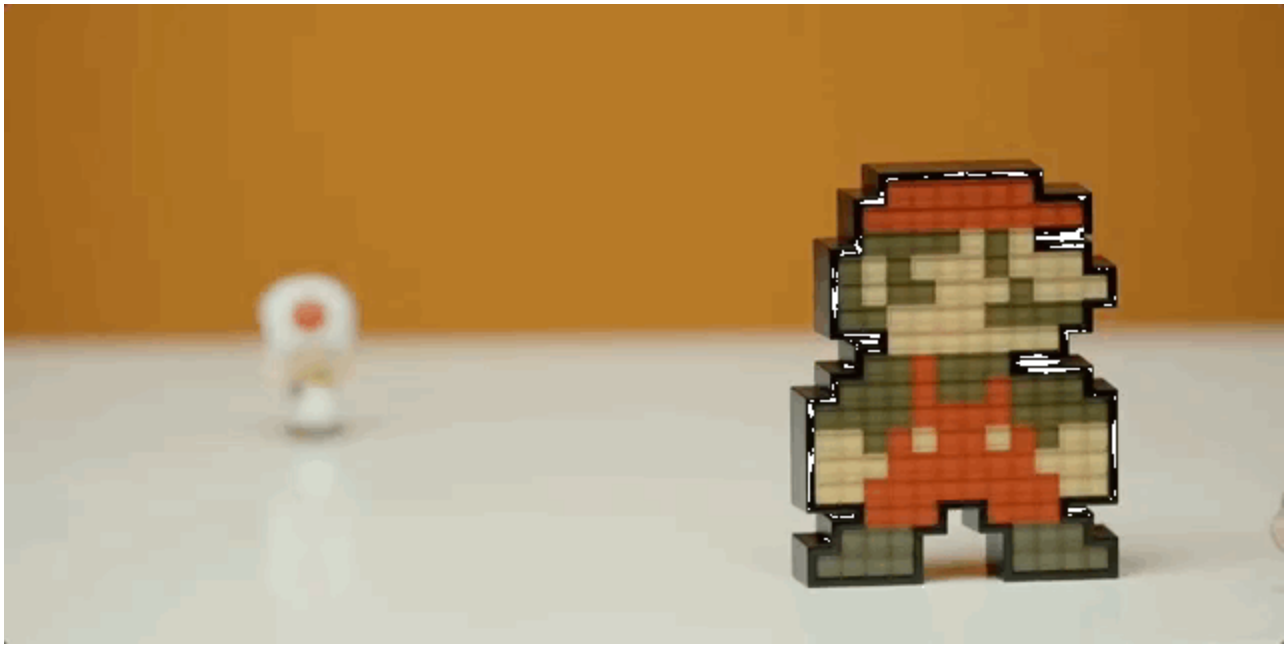


Image Overlay places an image (taken with the **Image Capture** function or manually placed from a computer onto the SD card) directly on top of your footage - very useful for judging **shot continuity**, particularly when using the built-in **'blink'** feature.

## Image Overlay - Settings

Access Image Overlay tool settings menu by navigating right or pressing the right arrow when Image Overlay is highlighted in the tool list.

### On

Toggles display of the currently selected Image Capture.  You can also do this on the tool bar. Select the tool and activate or deactivate it as desired. Green tools are active, they are Grey when inactive.

### Opacity

Set the transparency/opacity of the Image Overlay.

### Blink Speed

Blinks the overlaid image at a speed of your choosing.  Leaving this at zero disables the Blink functionality. Speed of 1 = on for 2 seconds, off for 2 seconds. Speed of 10 = on and off 2x per second.

### Use Latest Capture

Displays the latest Image Capture automatically, even as a new one is taken.

Turning off this option will open the **Choose Image** option.

Navigate to the image you wish to use, select and confirm and the image name will appear on the tool panel.

## Image Overlay - Quick Start

In this section we will add an Image Overlay to a page to help us shot-match.

Having already used the Image Capture function to take a snapshot of our scene, we can now use Image Overlay to display that snapshot back on top of our footage.

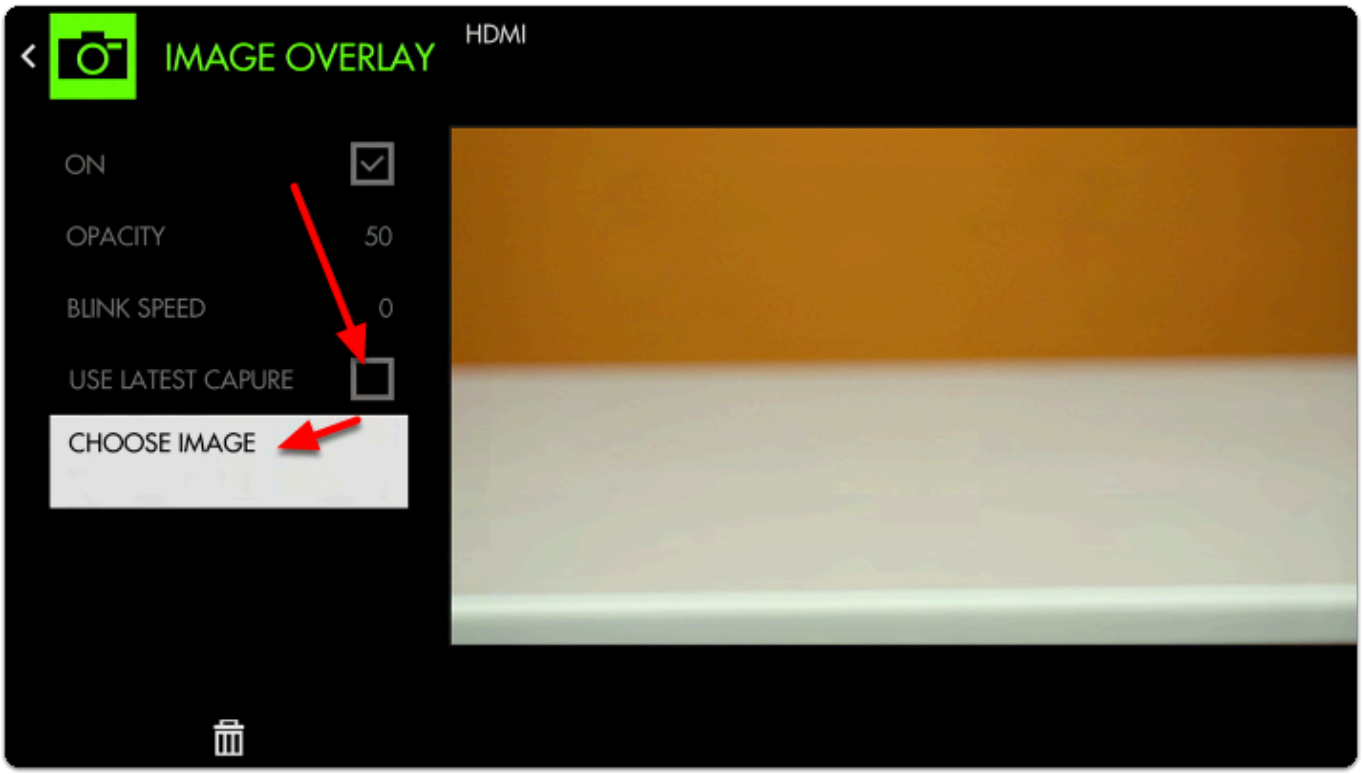
From any page with a feed, **click the joystick** or **tap the screen** to bring up **'Add New Tool'**

Navigate to **Overlay** > **Image Overlay** and click on the **'+'** to add it to the current page.

By default Image Overlay displays the **latest snapshot** taken with Image Capture at 50% opacity.

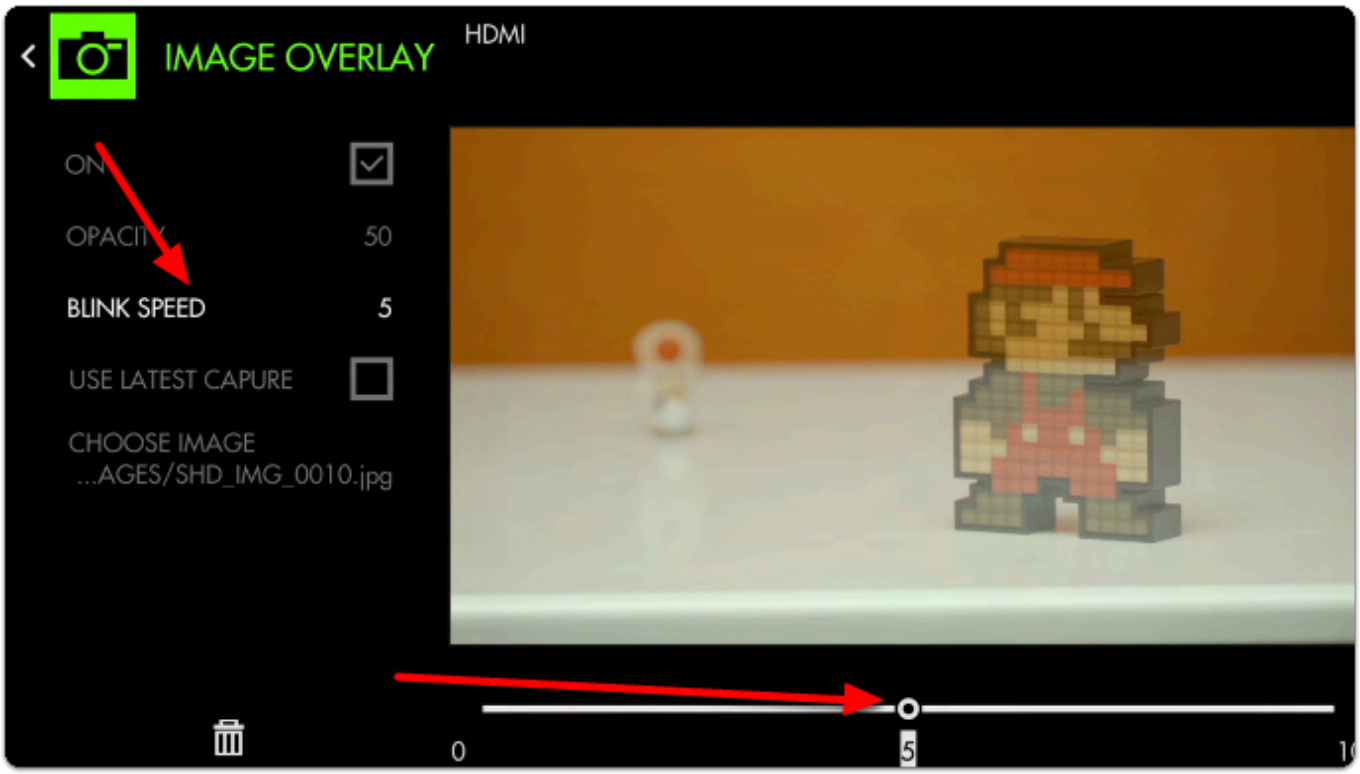
You can edit the settings by **navigating right** with a joystick or **tapping the right arrow** on a touchscreen when **'Image Overlay'** is highlighted.

If you wish to overlay a different image, disable **'USE LATEST CAPTURE'** and select **'CHOOSE IMAGE'**

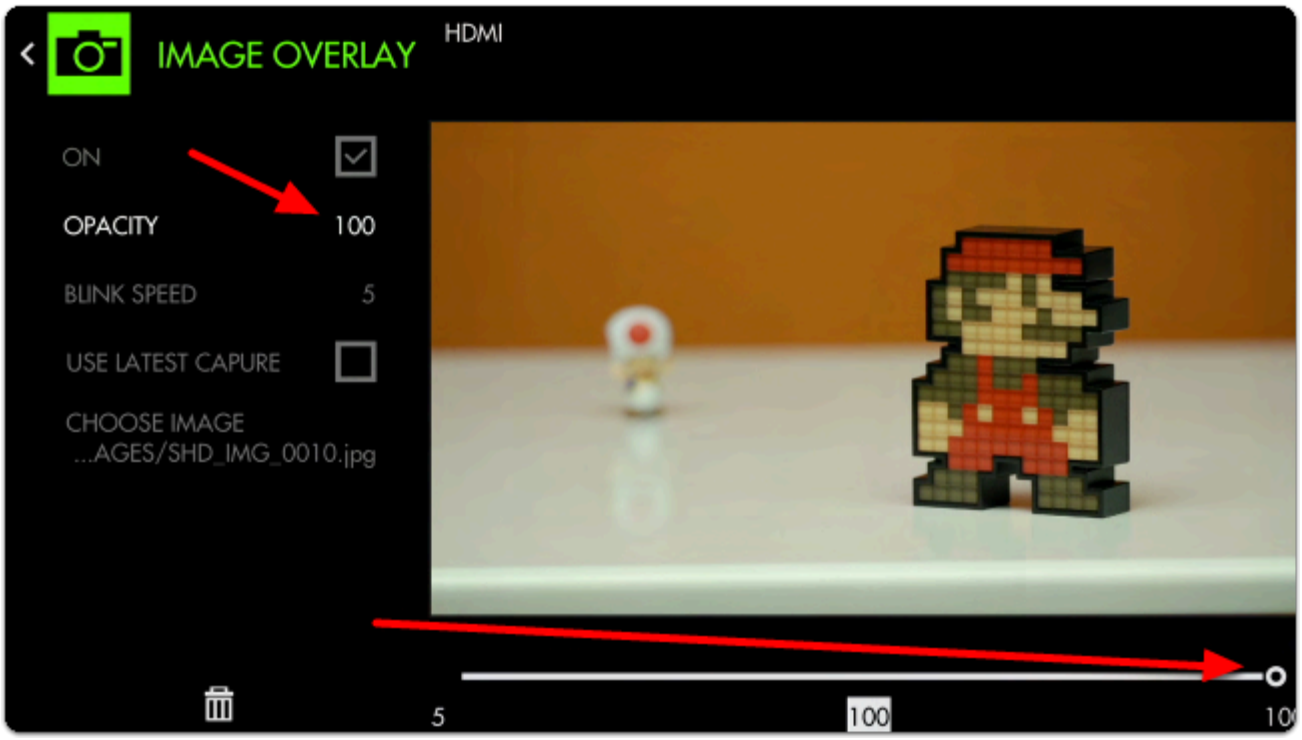



If you wish to overlay an image from a computer, first ensure it is in .jpg format and save it anywhere to the SD card. You can select it with **CHOOSE IMAGE** [above]

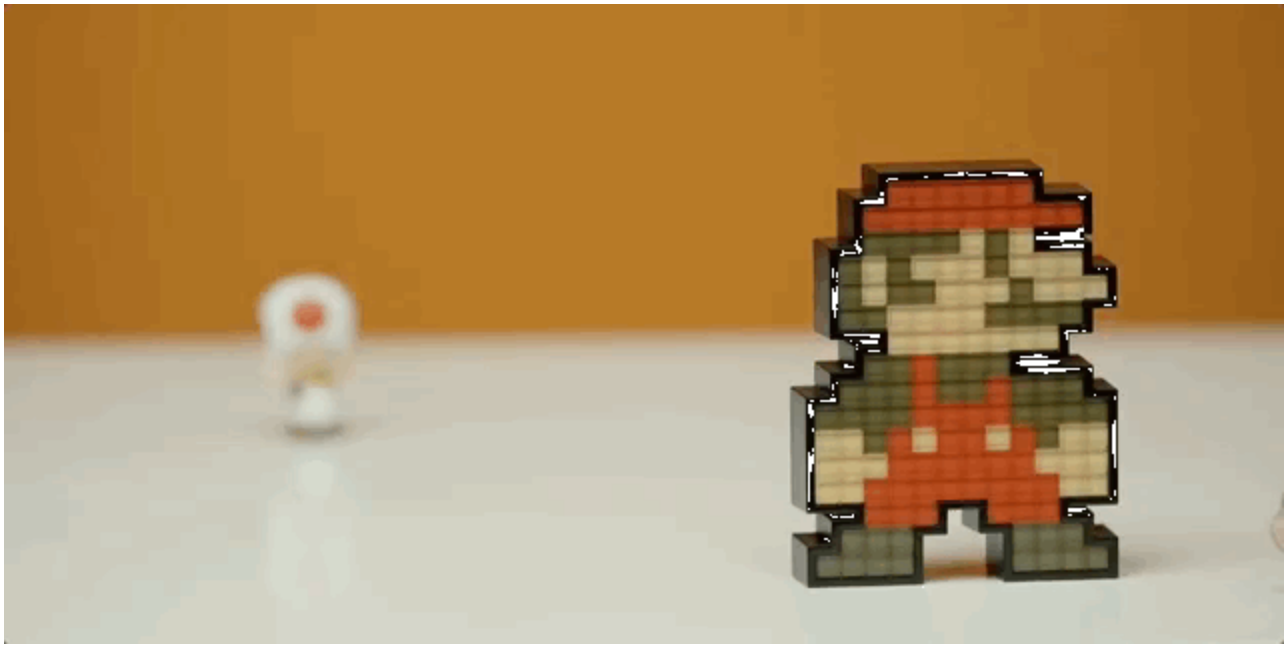
If we then dial up **BLINK SPEED** the monitor will flash alternately between the live feed and the Image Capture, offering a very clear view of how to fix the shot.




Increasing the **OPACITY** gives us a clearer distinction between the two images when blinking (if not set to blink, this will make the overlaid image completely opaque, covering the underlying feed)



With Image Overlay blinking, we now have a straightforward means of **matching** the **original placement** of characters on screen!



# Image Capture

**Image Capture** takes a **snapshot** of the video feed being sent through SDI or HDMI (combined with a LUT if desired) and **saves** it to an **SD card** - great for **shot matching** (continuity) or a quick overview of the days' shots.

If using a 500/700 (joystick) series monitor, the snapshot function can be quickly accessed by pressing the 'O' (capture) button on the top-right of the unit.  On Production monitors press the 'CAP' button next to the joystick. Touchscreen monitors will need to tap to activate the tool bar and tap the tool icon to take an image.
*The BT-1 remote can be used with its capture button for any paired monitor.

## Image Capture - Settings

Image Capture Settings can be found in the global Settings Menu > Capture > Image Capture

## Image Capture - Quick Start

In this section we will add **Image Capture to a page** and set it up so that a **snapshot** (with a LUT) gets taken every time we **press record** on our camera (currently compatible with SDI cameras only) resulting in **graded stills** of each take from the day's footage.

First **insert an SD card** on which to save your images.

*You can set a folder structure on your computer and select the destination is the settings menu.

From any page with a feed, **click the joystick** or **tap the screen** to bring up **'Add New Tool'**.

Navigate to **Overlay** > Image Capture and select the **'+'** to add it to the current page.

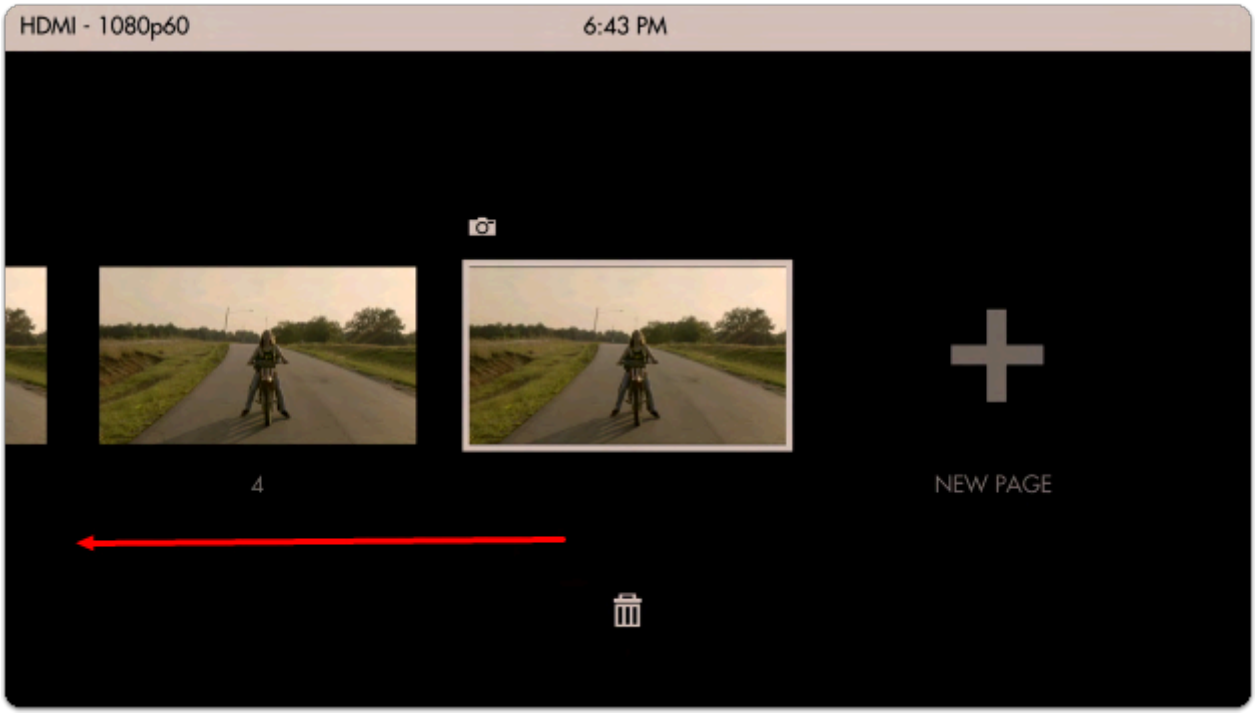
You will see the **snapshot overlay** appear indicating the monitor is ready for a snapshot.
*This is just letting you know the tool is active, it does not get captured to the image.  It does not apply to the capture zone.  The Capture will be of the entire frame.

**Click the joystick** (or **tap the touchscreen**) to capture an image.

A flag appears at the top to inform you of **where** you are saving your image and its **name**.

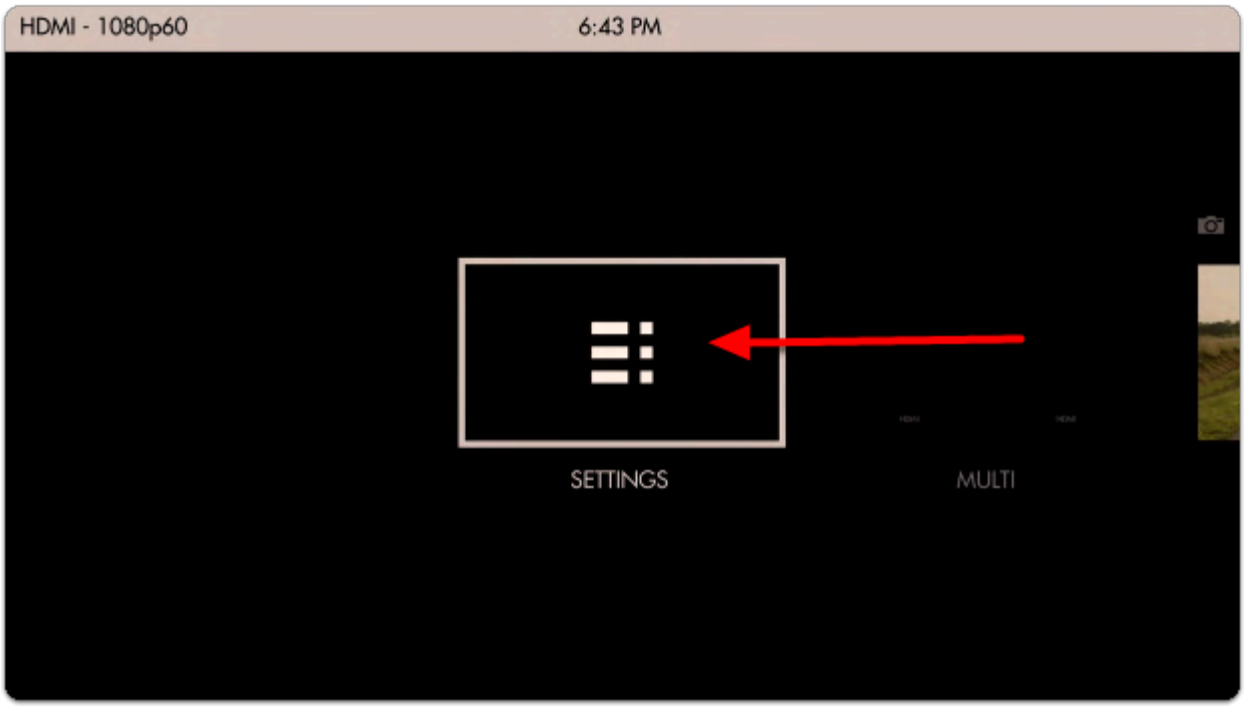
Next let's enable the **capture of LUTs** so that we can take **color-graded snapshots.**

Start by **pressing down** on the joystick or **swiping down** on a touchscreen monitor to access the **zoomed-out view**.

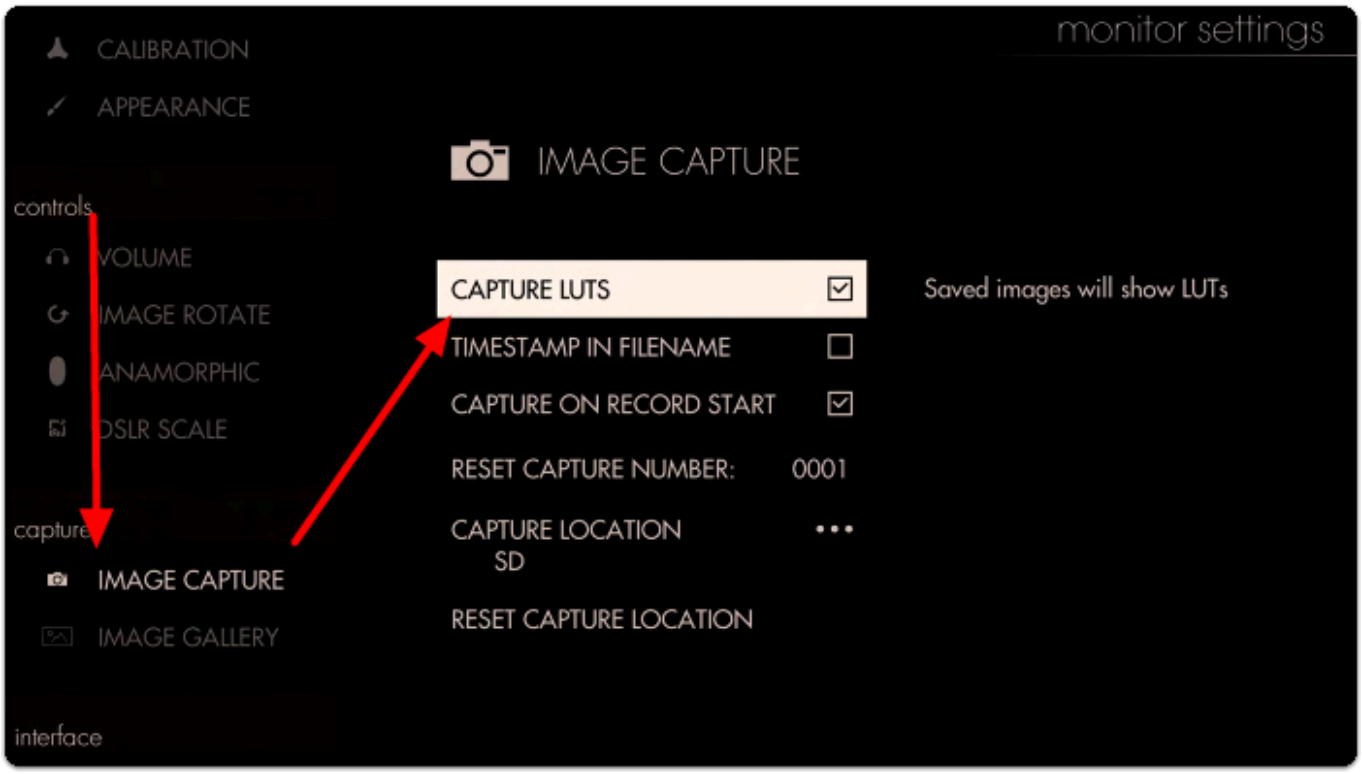



Move left until you reach the **global Settings menu**.

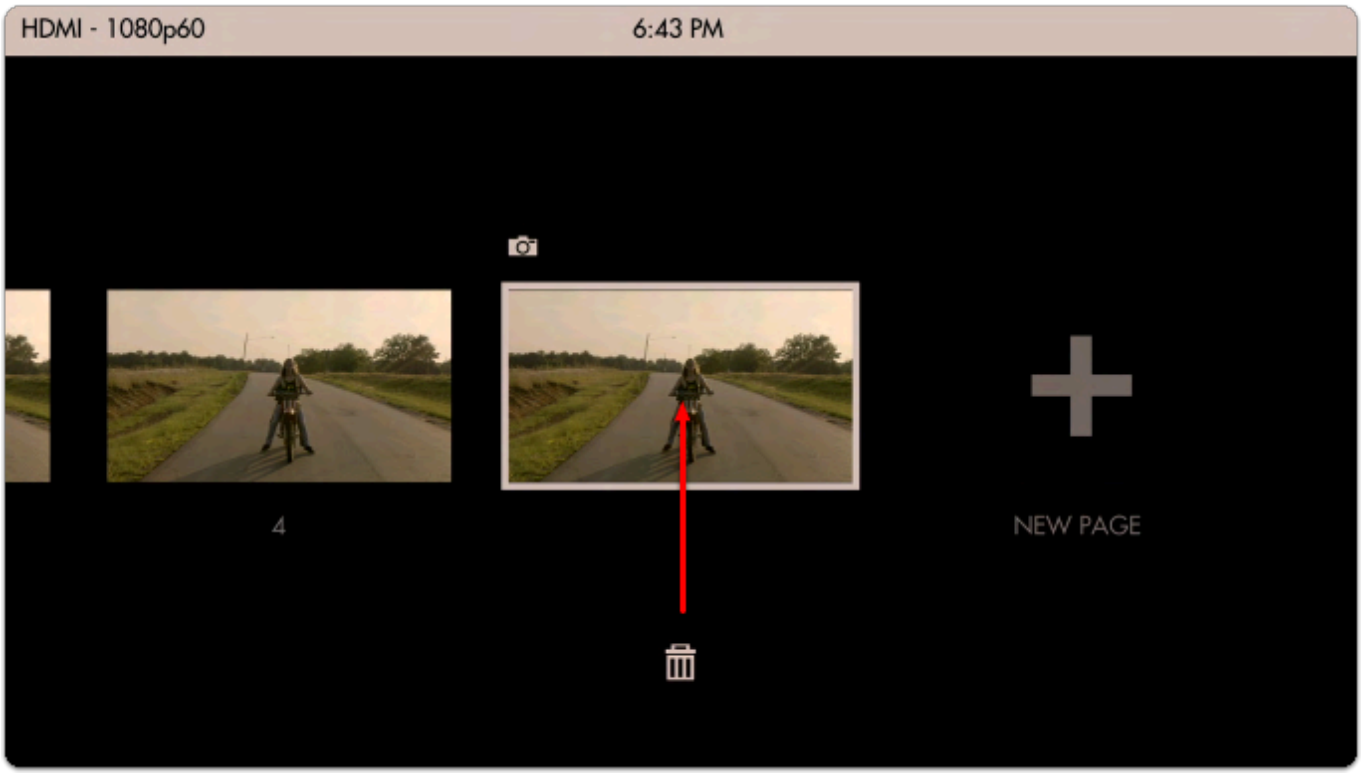
> **Image Capture settings** are located in the **far-left Settings menu** since they affect the way images are captured **globally** across the monitor.



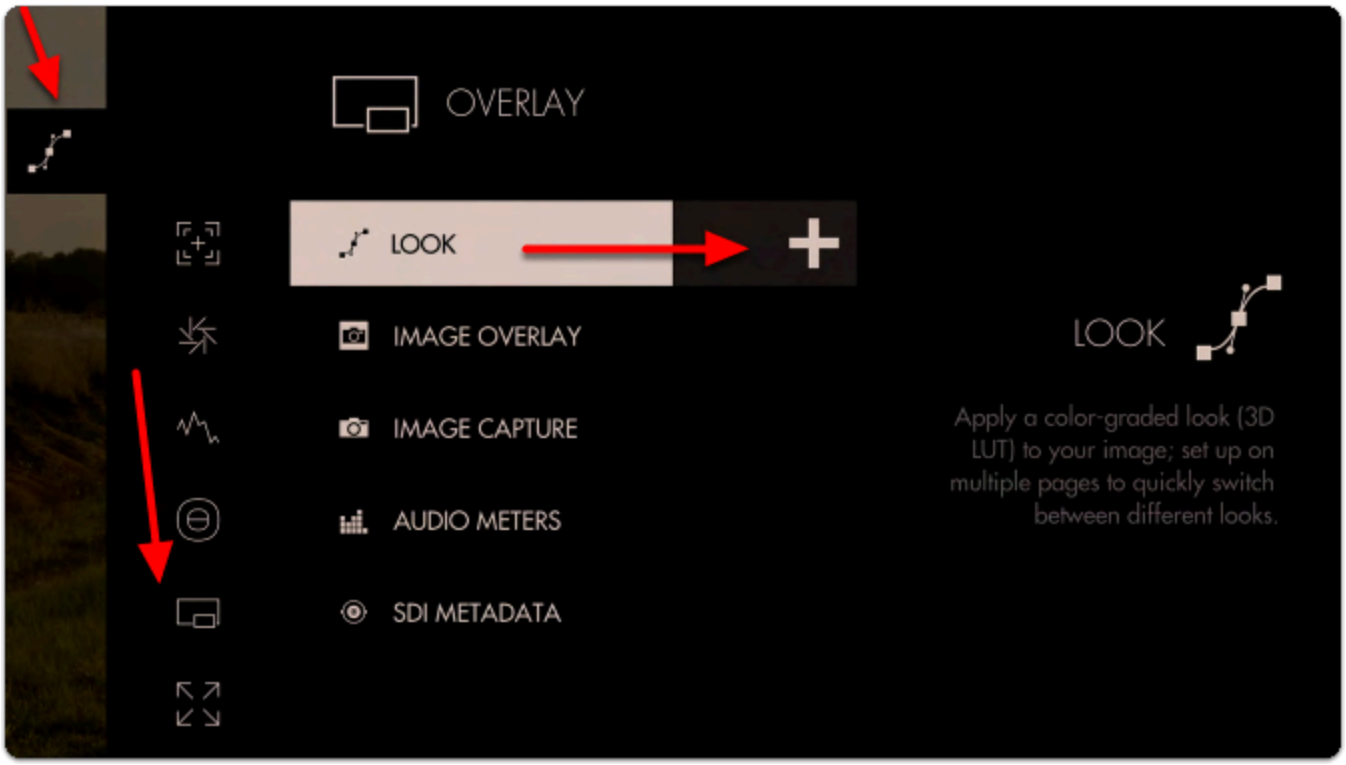

Navigate to **Capture > Image Capture** and select **'CAPTURE LUTS'** to automatically apply any active Look/3D LUT to the saved image.




Flip back over to the page with **Image Capture** applied so that we can take a snapshot.

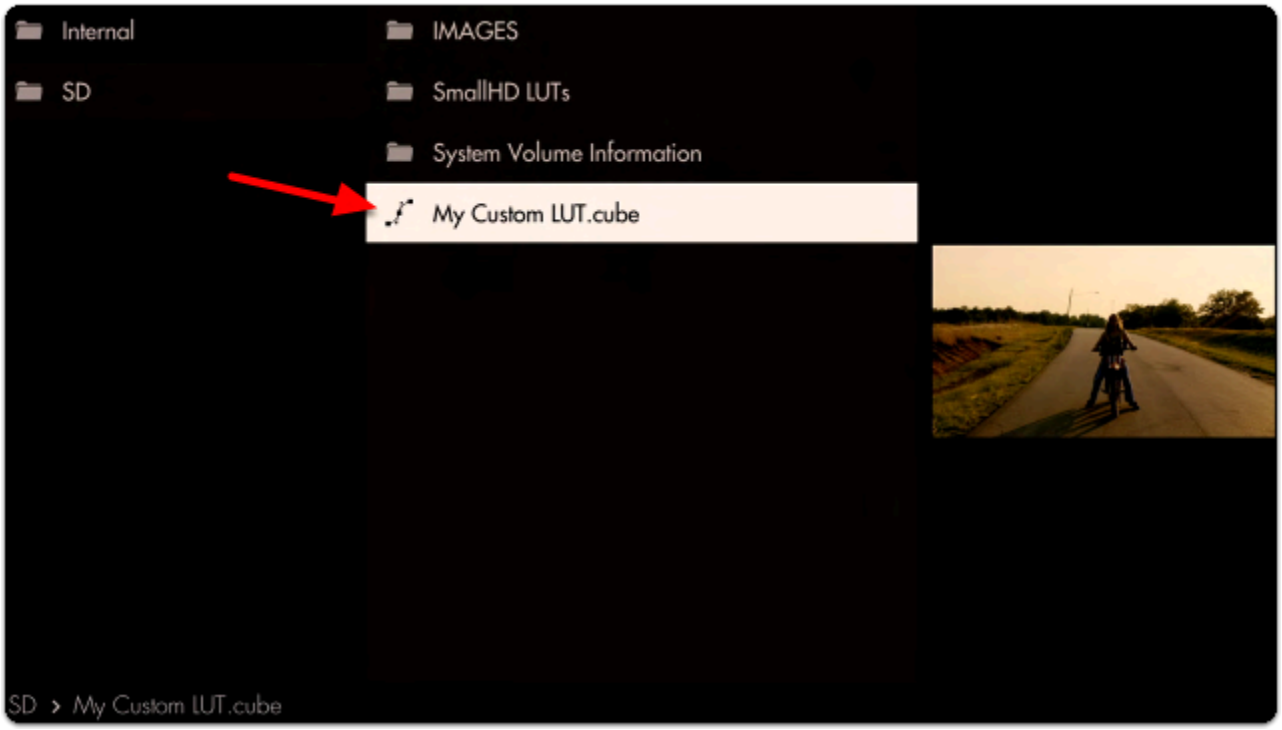



Let's add a Look (3D LUT) to the page via **Add Tool** > **Overlay** > **Look**

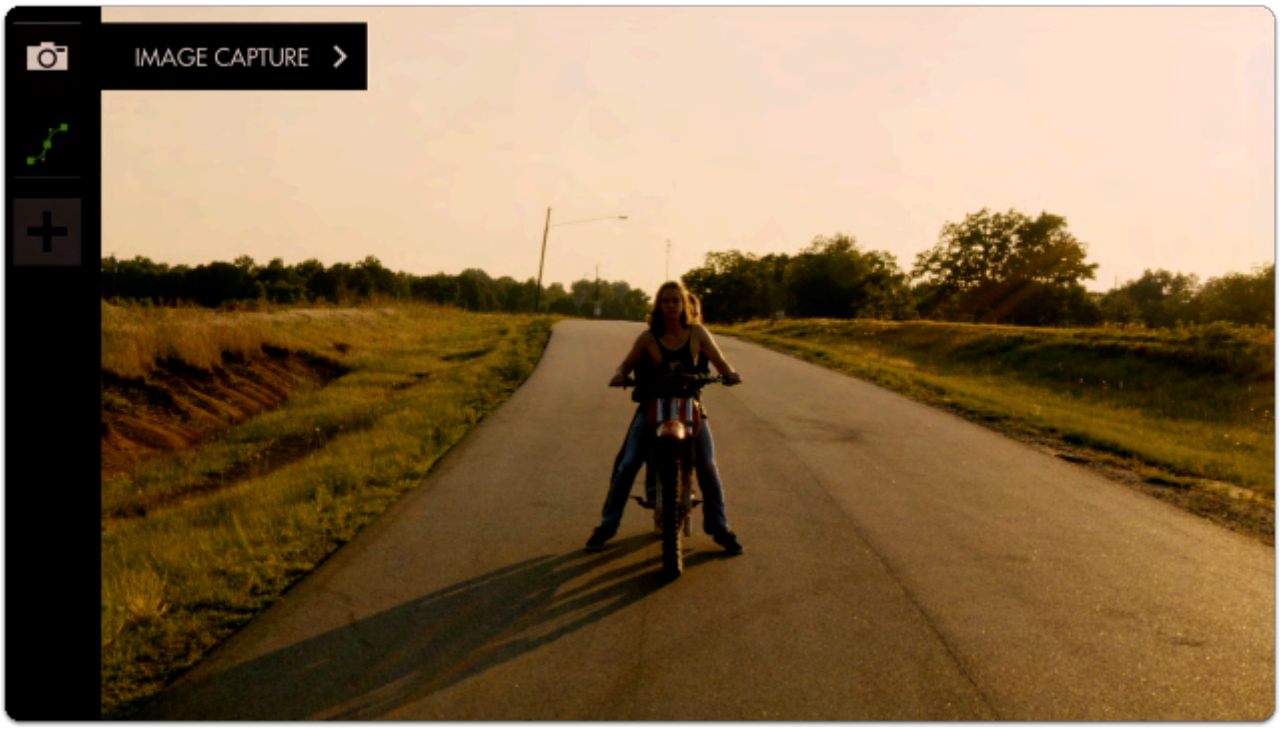



Next **select a Look/3D LUT** from an SD card or the internal memory.

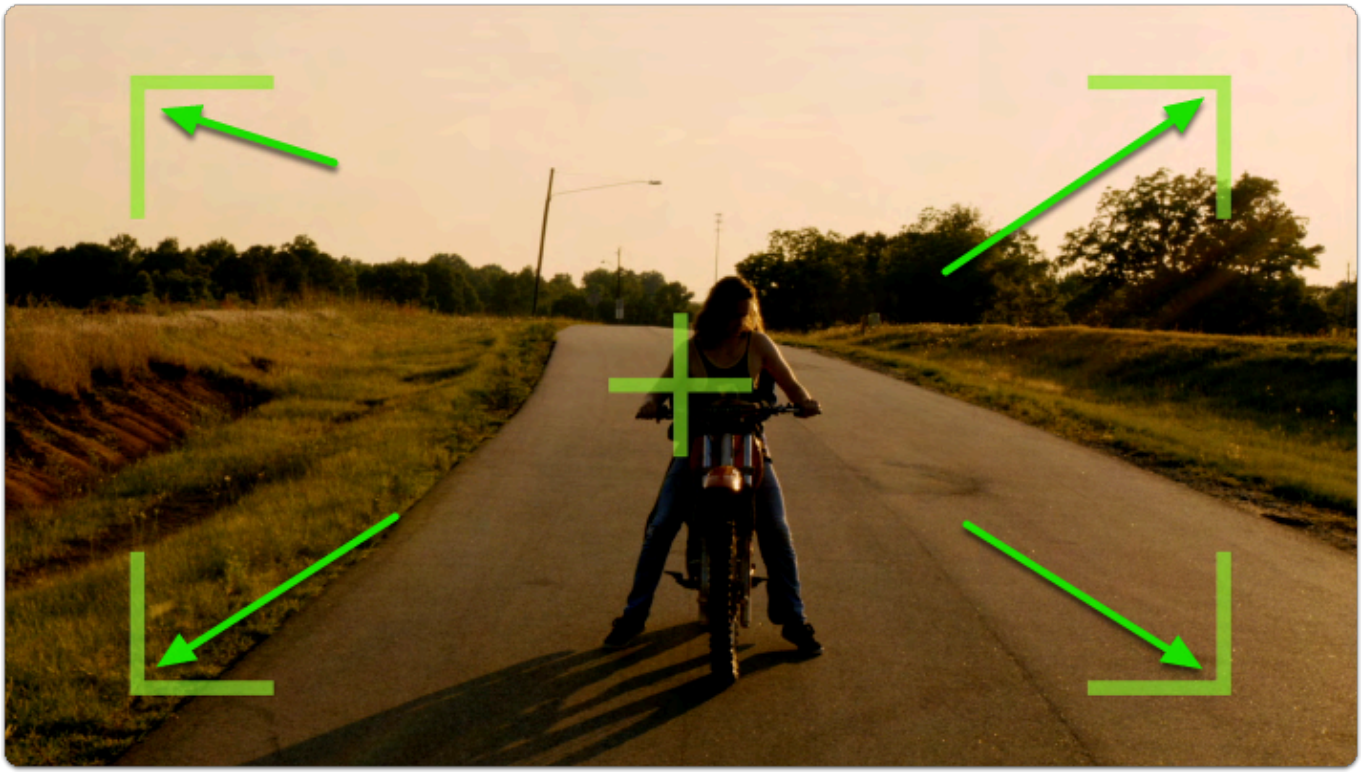
If you wish to learn how to create your own Look/3D LUT in Davinci Resolve, follow our video tutorial!



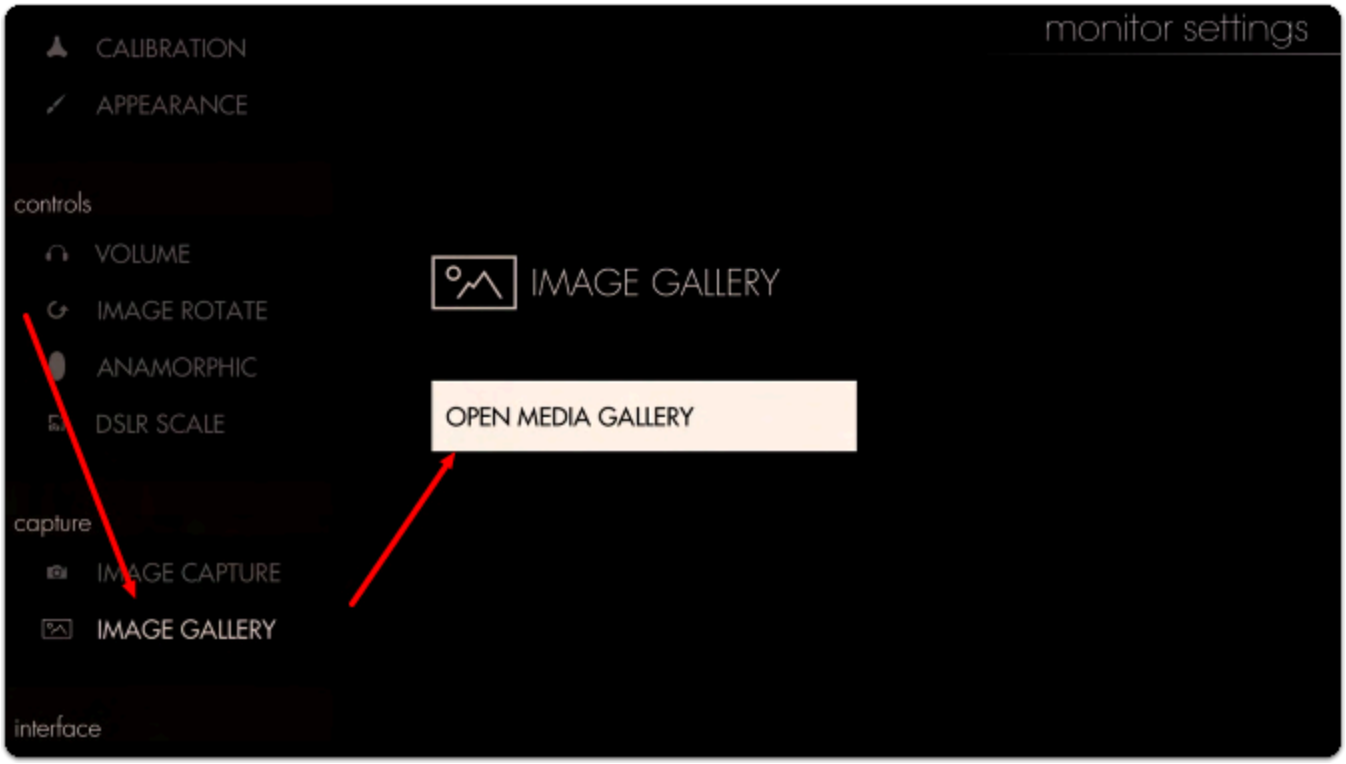

We're finally ready to take a snapshot!  Select **Image Capture** that's already in the toolbar.



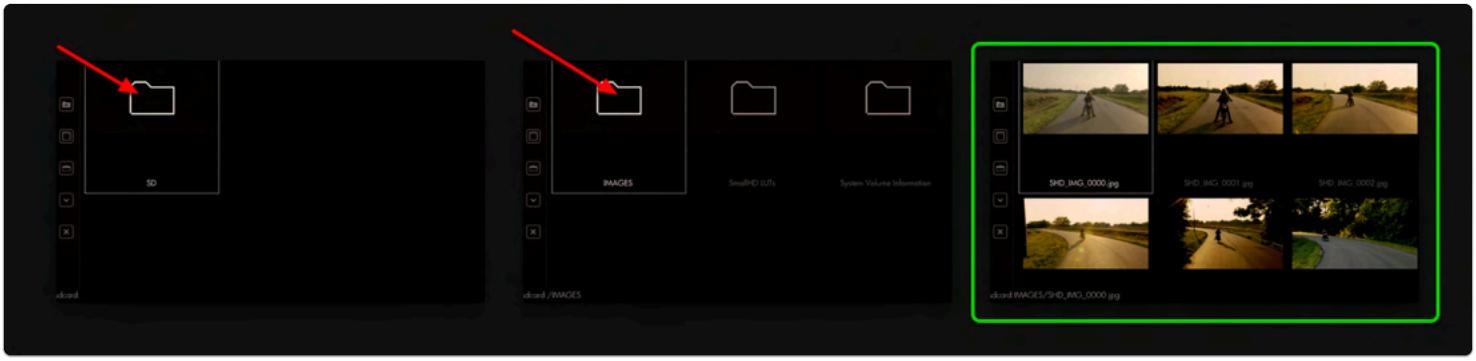

A grey **snapshot overlay** will appear; **click the joystick** or **tap the screen** and the overlay turns **green, indicating a snapshot has been taken. The screen will also appear to flicker.**



To **browse** through your captured images on the monitor, you can access the **Image Gallery** back from within the global **Settings** menu.




The default capture location is under the SD/IMAGES, so navigate to this folder by selecting the appropriate folders in the Image Gallery.



Note the **difference in color grade** between our **first capture** and **each additional capture** due to the application of the **Look/3D LUT**.

Select any image to display it in **full screen**.

*If you are having issue displaying the image full screen on the LITE series, use the Image Overlay tool at 100% to preview your images.

At this point you could apply any screenshot as an **Image Overlay** for help with **continuity/shot matching** or plug the **SD card** into a **computer** to backup/save/edit.

# Audio Meters

Monitor up to 8 channels of audio with a built-in clip warning.

## Audio Meters - Settings

Access Audio Meters tool settings by navigating right or pressing the right arrow when Audio Meters is highlighted in the tool list.

### On

Toggles the Audio Meters Off/On. You can also do this on the tool bar. Select the tool and activate or deactivate it as desired. Green tools are active, they are Grey when inactive.

### Size

Adjust the size of the Audio Meters to make way for other tools or for better visibility when viewing from a distance. The range is from 20% to 100% and this translates to horizon real estate.  It will scale form the position/ location you have selected.

### Channels

Adjust the amount of audio channels you wish to monitor - up to 4x stereo (8 channels in total)- which stack vertically.

## Location

Arrange the Audio Meters on-screen using various pre-set locations to make way for other tools or the image itself.  You have 6 options:

TOP - Left, Center, Right

BOTTOM - Left, Center, Right

## Opacity

Set the transparency/opacity of the Audio Meters.

# Audio Meters - Quick Start

In this section we will add Audio Meters to a page so we can keep an eye on levels.

From any page with a feed, click the joystick or tap the screen to bring up ‘Add New Tool’ and navigate to Overlay > Audio Meters  and select to add it to the current page.

This may be all you need at this point, but let's increase the size of the meter for better viewability.

When 'Audio Meters' is highlighted, press the joystick right or tap the right arrow to edit its settings.

Select 'Size' and bring it up to 100 for a full-width audio meter.

You can also increase the amount of channels being displayed if your production requires it.

> If you don't wish to have Audio Meters covering your image, you can scale the image to make room with Size & Position.

# Metadata

Displays a small information bar containing metadata information being sent over HDMI or SDI such as timecode and tally flags. Useful for ensuring the camera is recording without having to take your eyes off the monitor.

Not all cameras support outputting metadata over HDMI or SDI. Some cameras may not have metadata enabled by default. Please refer to your camera's user manual for information on supported metadata and how to enable this feature.

## Metadata - Settings

Access Metadata settings by pressing to the right when the tool is highlighted.

### On

Toggles Metadata Off/On.  You can also do this on the tool bar. Select the tool and activate or deactivate it as desired. Green tools are active, they are Grey when inactive.

### Timecode

Enables display of the camera’s timecode being sent over HDMI or SDI.  This will appear in a small black box in the location selected.

## Record

Enables display of the camera's record flag being sent over HDMI or SDI. This displays as a red rectangle around the edge of the monitor frame.

## Location

Arrange the SDI Metadata on-screen using various pre-set locations to make way for other tools or the image itself.

You have 6 locations:

TOP - Left, Center, Right
BOTTOM - Left, Cetner, Right

## Opacity

Set the transparency/opacity of the Metadata.

# Metadata - Quick Start

Let's add Metadata to a page.

From any page displaying an SDI signal, click the joystick or tap the screen and select Add New Tool > Overlay > Metadata.

By default timecode and record tally are enabled, meaning you will be able to view your camera's specific timecode value and an indicator if the camera is currently recording.

# Tools - Scale

# Crop & Scale

If you plan to crop your image, for example shooting interviews in 4K and zooming in post for the 'close up' or for cameras that don't send a fullscreen feed to the monitor, this tool lets you **pre-visualize a custom crop** and will automatically scale up the remaining portion to fill the page.

You will need a video signal to use this tool.

# Crop & Scale - Settings

Access Crop & Scale tool settings menu by navigating right or pressing the right arrow when Crop & Scale is highlighted in the tool list.

Once you make your adjustments, the image will become full screen. When in the tool module, you will see a red guide to show where your selected frame line is.

## On

Toggles Crop & Scale Off/On. You can also do this on the tool bar. Select the tool and activate or deactivate it as desired. Green tools are active, they are Grey when inactive.

## Center Crop

If you wish to crop your image symmetrically, select this option. It will crop down to the center point.

## *Width

When ‘Center Crop’ is selected, this will adjust the width of the cropped area symmetrically.

## *Height

When ‘Center Crop’ is selected, this will adjust the height of the cropped area from the center of the image.

## Left

When ‘Center Crop’ is unselected, this will adjust the amount of cropping being applied to the left-hand side of the image.

### Right

When ‘Center Crop’ is unselected, this will adjust the amount of cropping being applied to the right-hand side of the image.

### Top

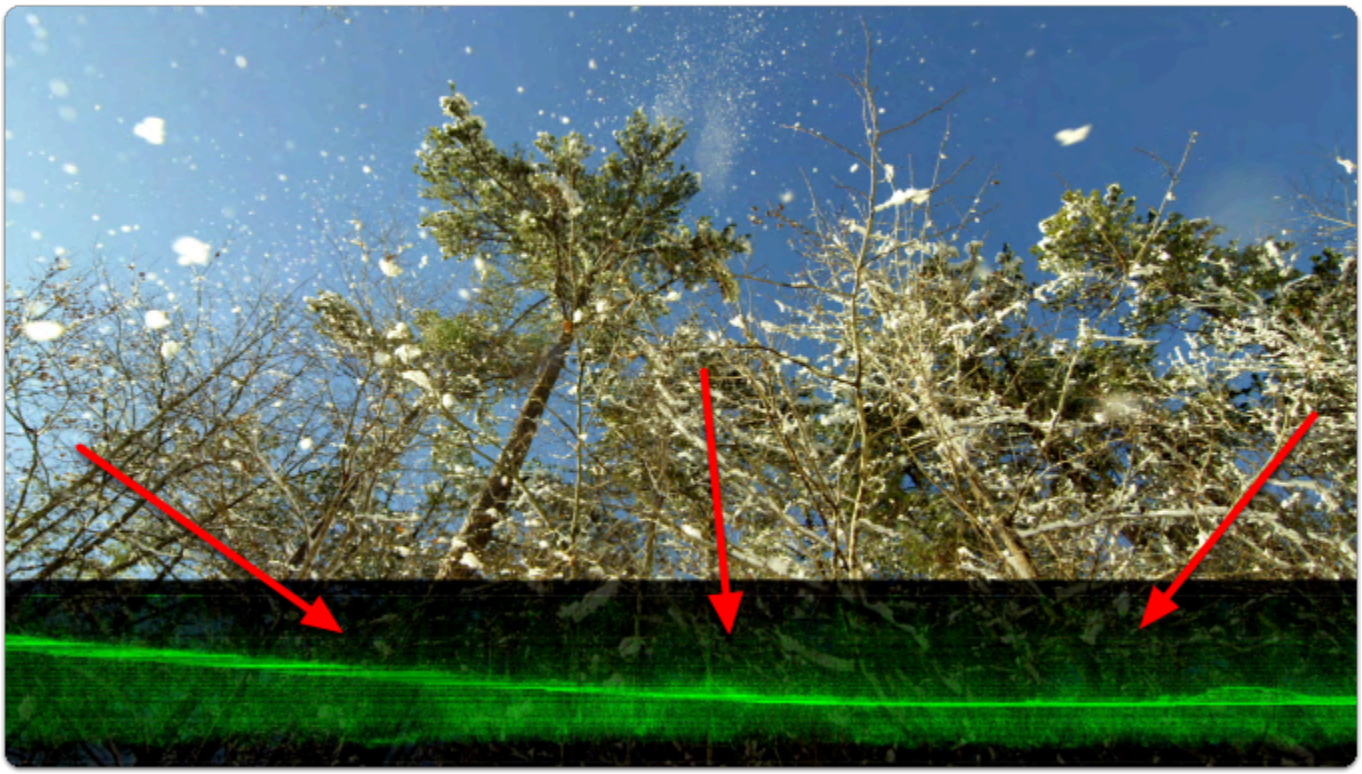
When ‘Center Crop’ is unselected, this will adjust the amount of cropping being applied to the top of the image.

### Bottom

When ‘Center Crop’ is unselected, this will adjust the amount of cropping being applied to the bottom of the image.

## Crop & Scale - Quick Start

In this section we will make highly **efficient use of screen space** by employing **Crop & Scale** to preview a **2.39 cinemascope aspect ratio** and a full-width **Waveform** with **no overlapping elements** or wasted space.



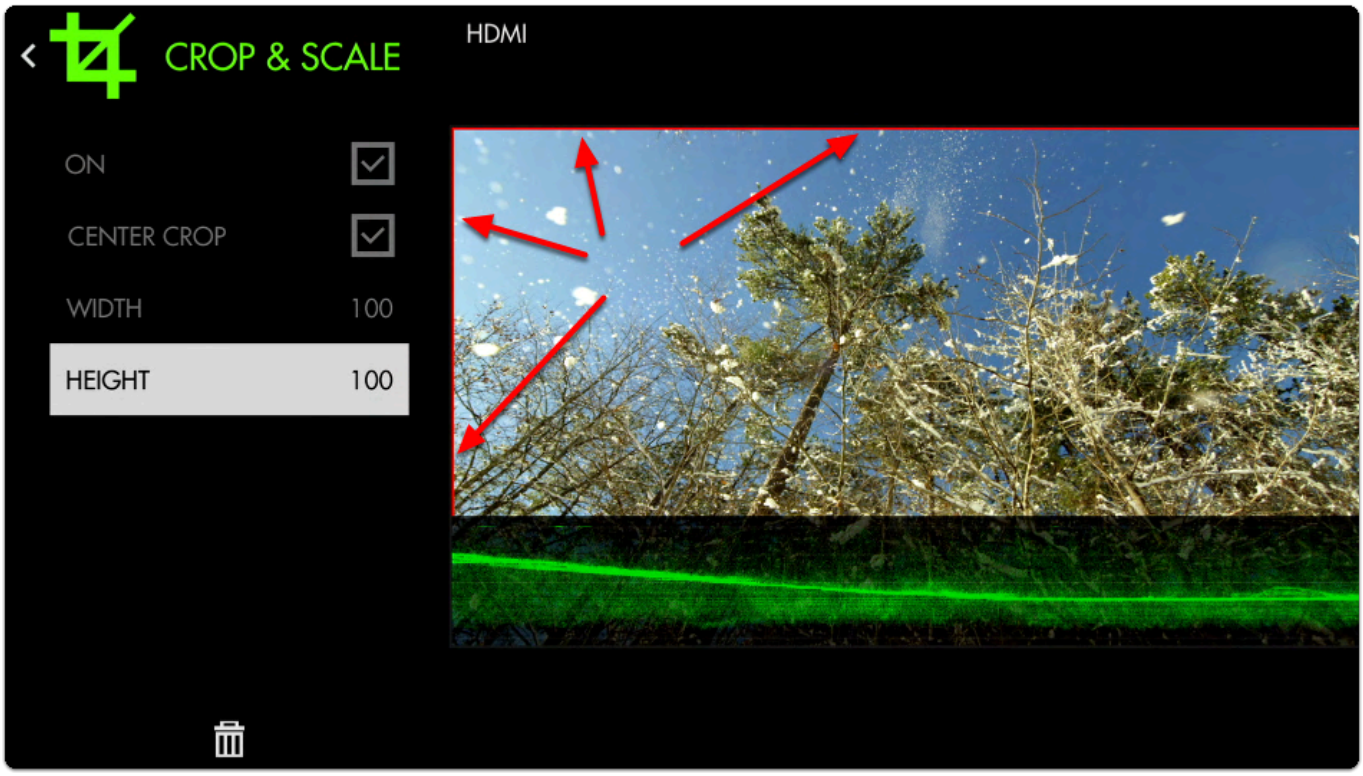
From any page with a feed, **click the joystick** or **tap the screen** to bring up **'Add New Tool'.**

Navigate to **Scale** > **Crop & Scale** and select the **'+'** to add it to the current page.

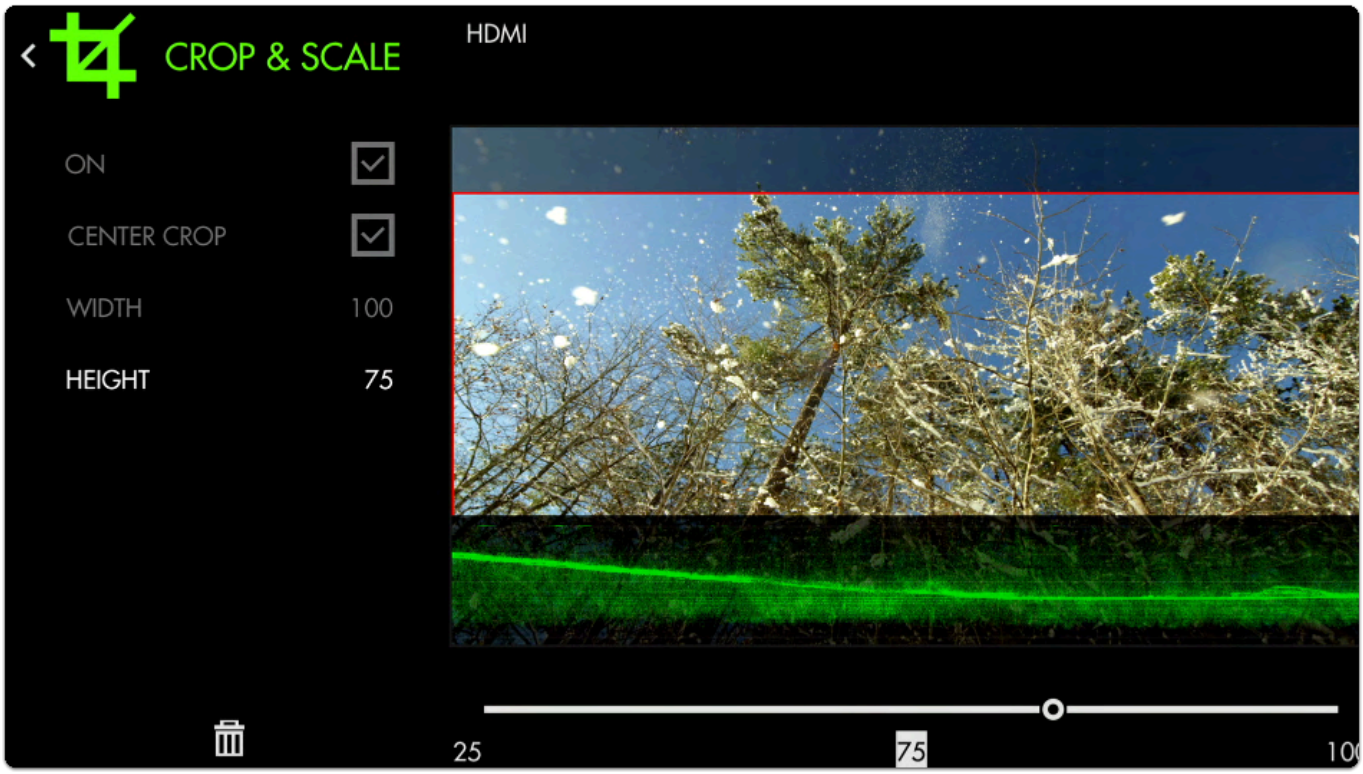
Once added you can **edit** the settings by **navigating right** or **tapping the right arrow** when **'Crop & Scale'** is highlighted.

Navigate to **HEIGHT**.

Take note of the **red border** - anything outside this area gets cropped when exiting the tool.

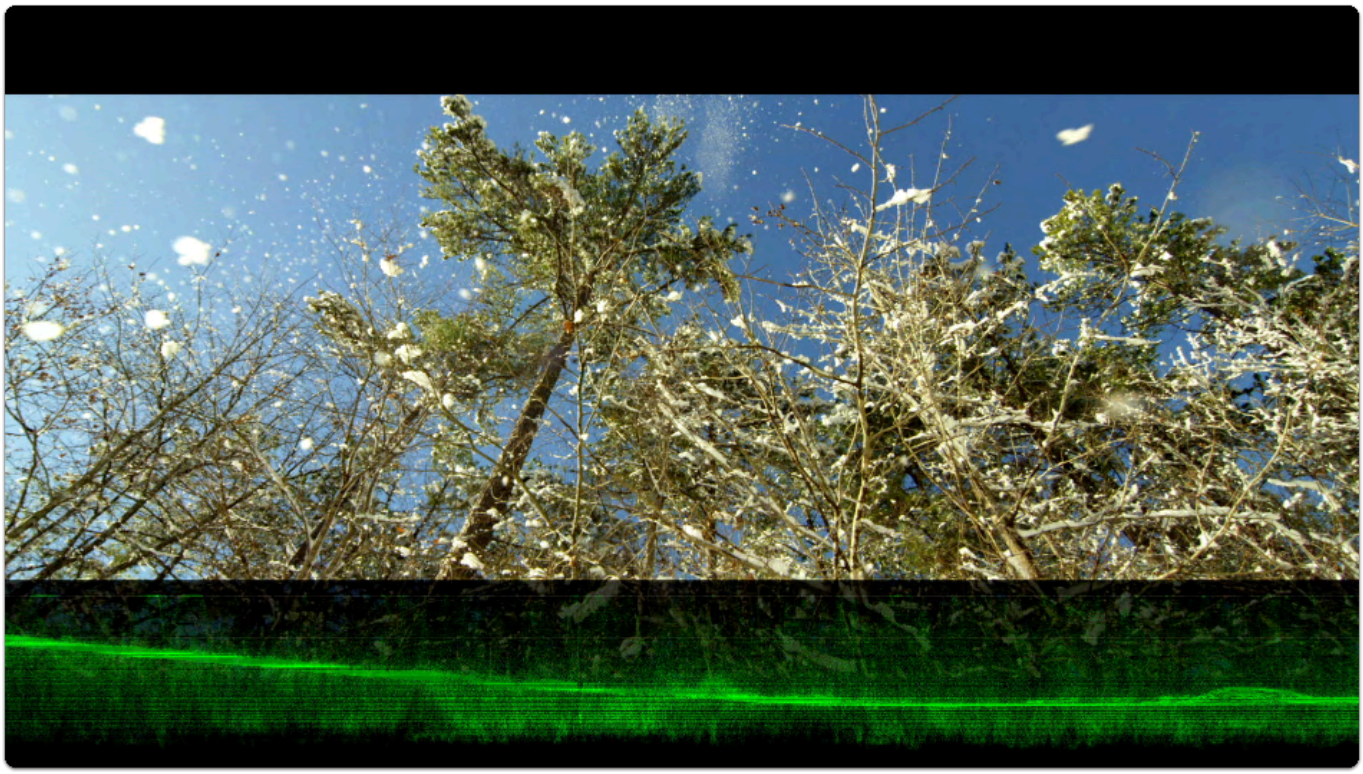



Decrease the **HEIGHT** to **75%** which simulates the same cropped area as a **2.39:1 aspect ratio**.




Press the **Back** button or tap the **top-left arrow** to back out of the **edit** menu.

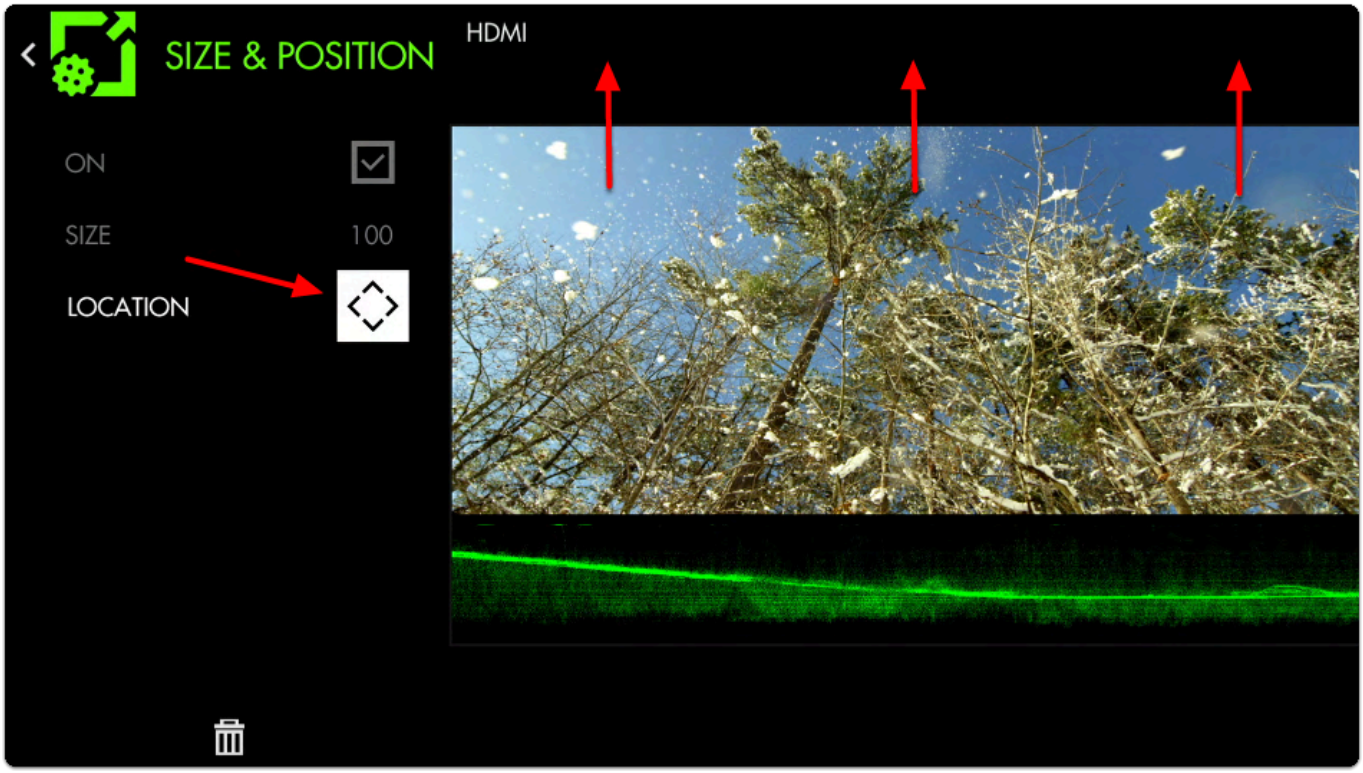
Now our image is being cropped to the setting we chose. We just need to **shift it upwards** with **Size & Position** so it no longer overlaps with the Waveform.



Add Size & Position via **Add New Tool** > **Scale** > **Size & Position**.

Once added, open the **edit** menu by **tapping** or **pressing right** on the Size & Position tool.

Select **LOCATION** and then **tap** towards the **top** of the image or **press up** on the joystick.




Back out of the edit menu for a **full-screen** view of a **2.39 cinemascope aspect ratio** accompanied by a **full-width Waveform!**

# Size & Position

Resize and position your image to accommodate other features you may wish to simultaneously view, such as scopes or audio meters.
This will be helpful for users that want to keep multiple tools on the same screen, rather than using pages.

## Size & Position - Settings

### On

Enables/disables the Size & Position tool. You can also do this on the tool bar. Select the tool and activate or deactivate it as desired. Green tools are active, they are Grey when inactive.

### Size

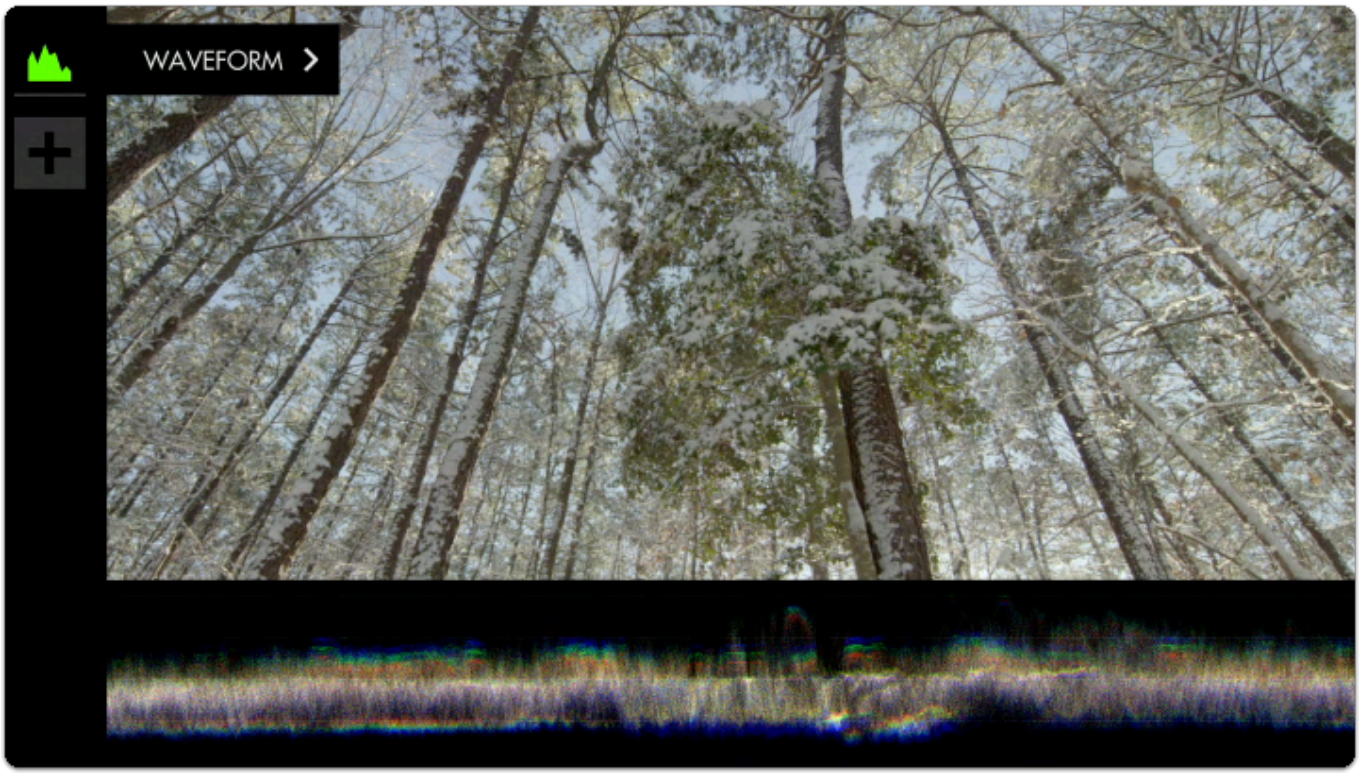
Adjusts the size of the image proportionally within a page compressing toward the center of the selected location.

### Location

After scaling the image, use this to position it where desired.  There are 9 positions:
TOP - Left, Center, Right
MIDDLE - Left, Center, Right
BOTTOM - Left, Center, Right

# Size & Position - Quick Start

In this section we will use **Size & Position** to help arrange the image so that a **full-width Waveform** will not overlap the footage, enabling a **clean view** of the **picture** and the **scope** on the **same page**.




I have already added a **Waveform** to an empty page and adjusted its **height** from **50** down to **25** to make a bit more room for the image, but it is still **covering a portion of the picture** which we can address with **Scale & Position**.

**Click the joystick** or **tap the screen** to bring up **'Add New Tool'.**

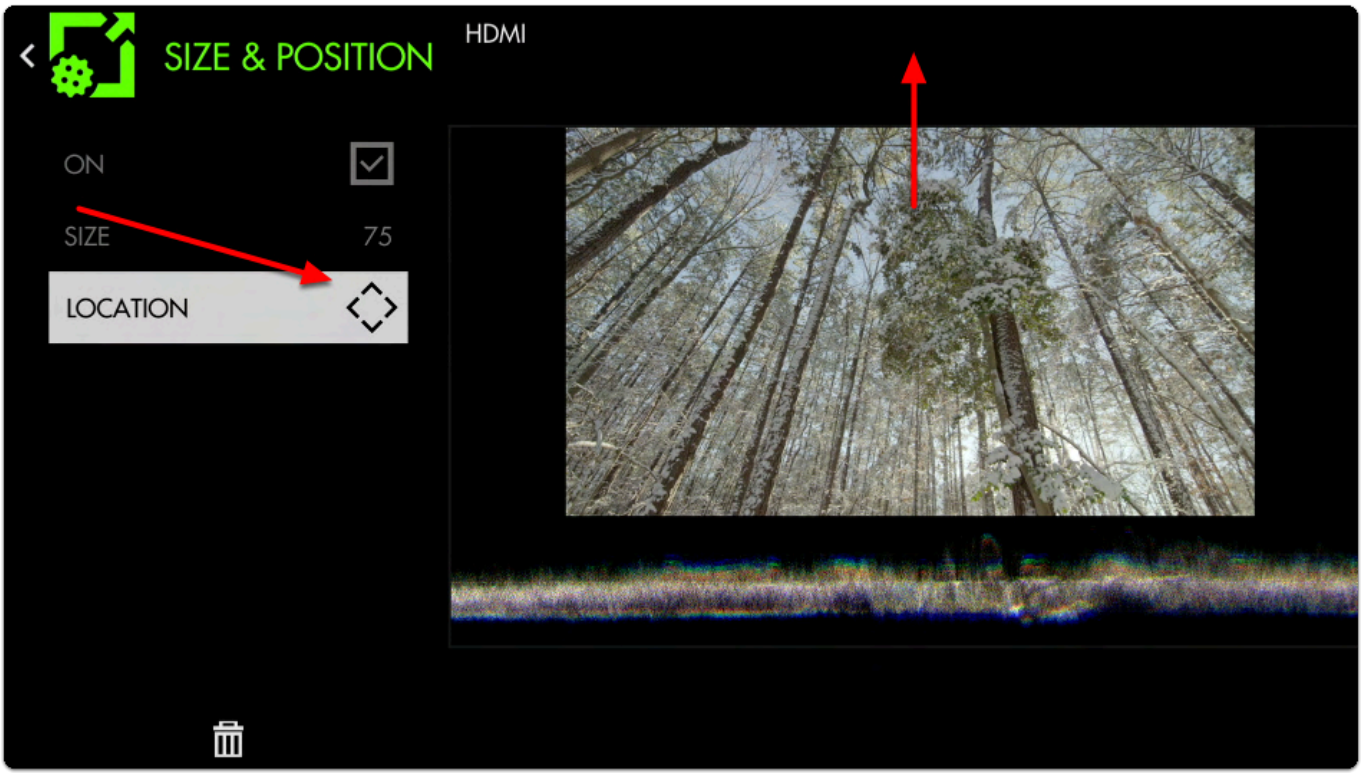
Navigate to **Scale** > Size & Position & select the **'+'** to add it to the current page.

Once added you can **edit** the settings by **navigating right** when **'Size & Position'** is highlighted.

Navigate to **SIZE** and adjust it from **100** to **75**- you will notice the image scaling from its' center point.

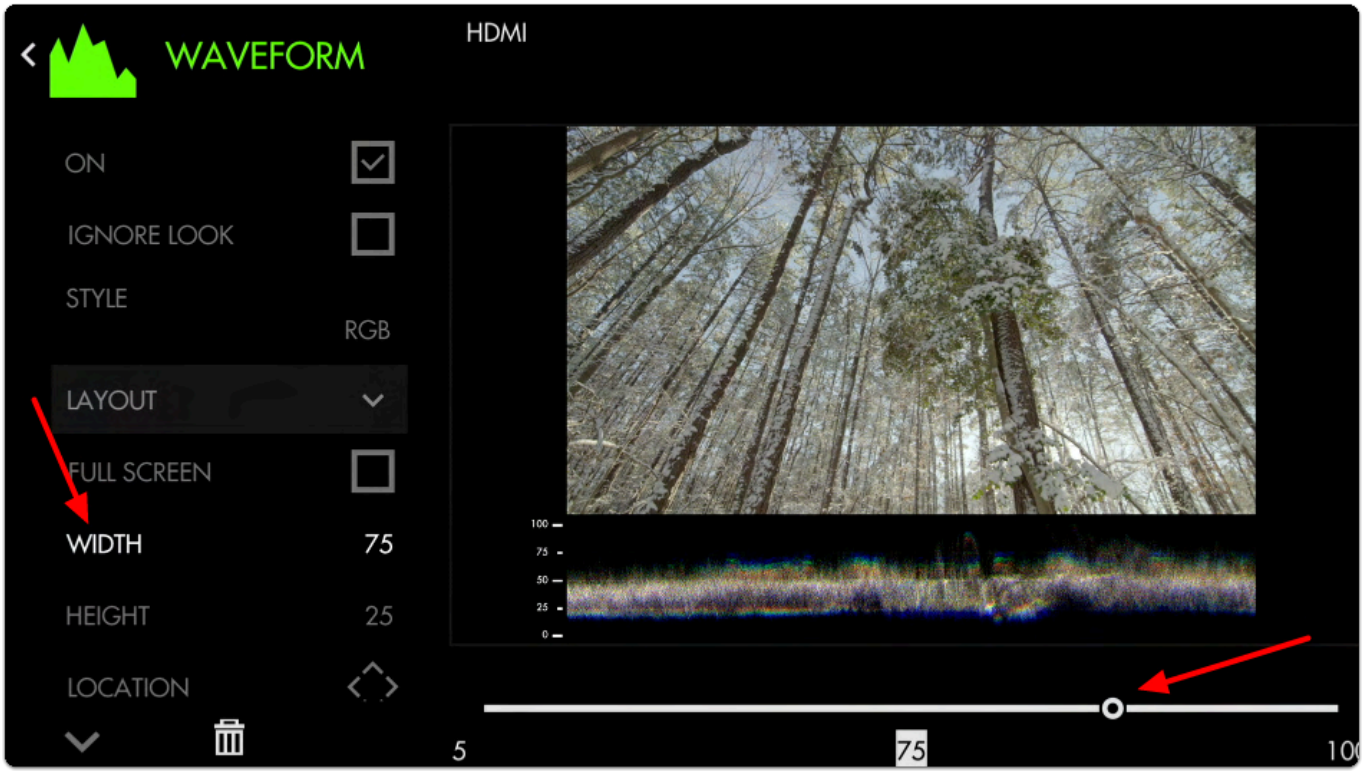
> Because the Waveform is scaled to 25% height, the image fits perfectly when scaled to 75%.

Now move the image to the top of the frame by selecting **LOCATION** and pressing **up on the joystick** or **tapping the top portion of the image**. This leaves us with an unobstructed view of the **Waveform**.

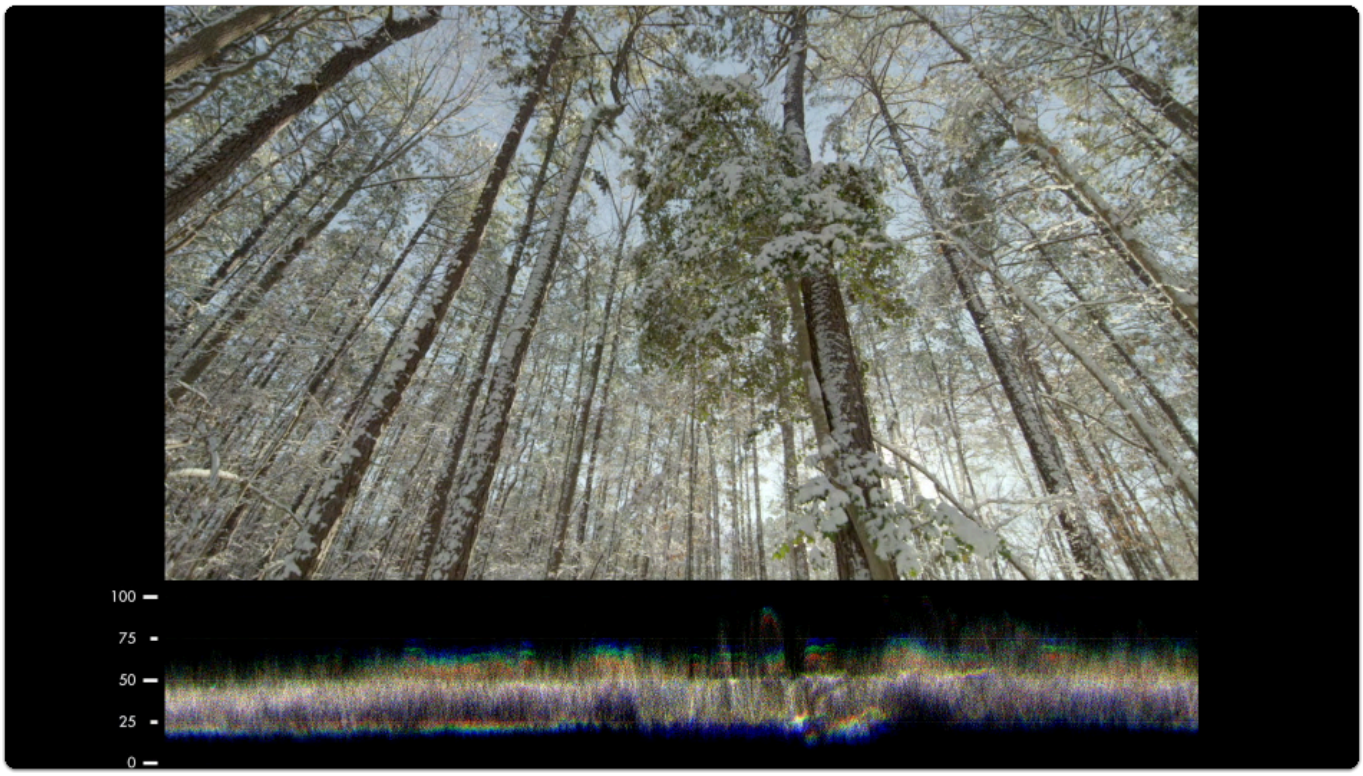


Press **Back** or tap the left arrow at the top right hand corner to **exit.**

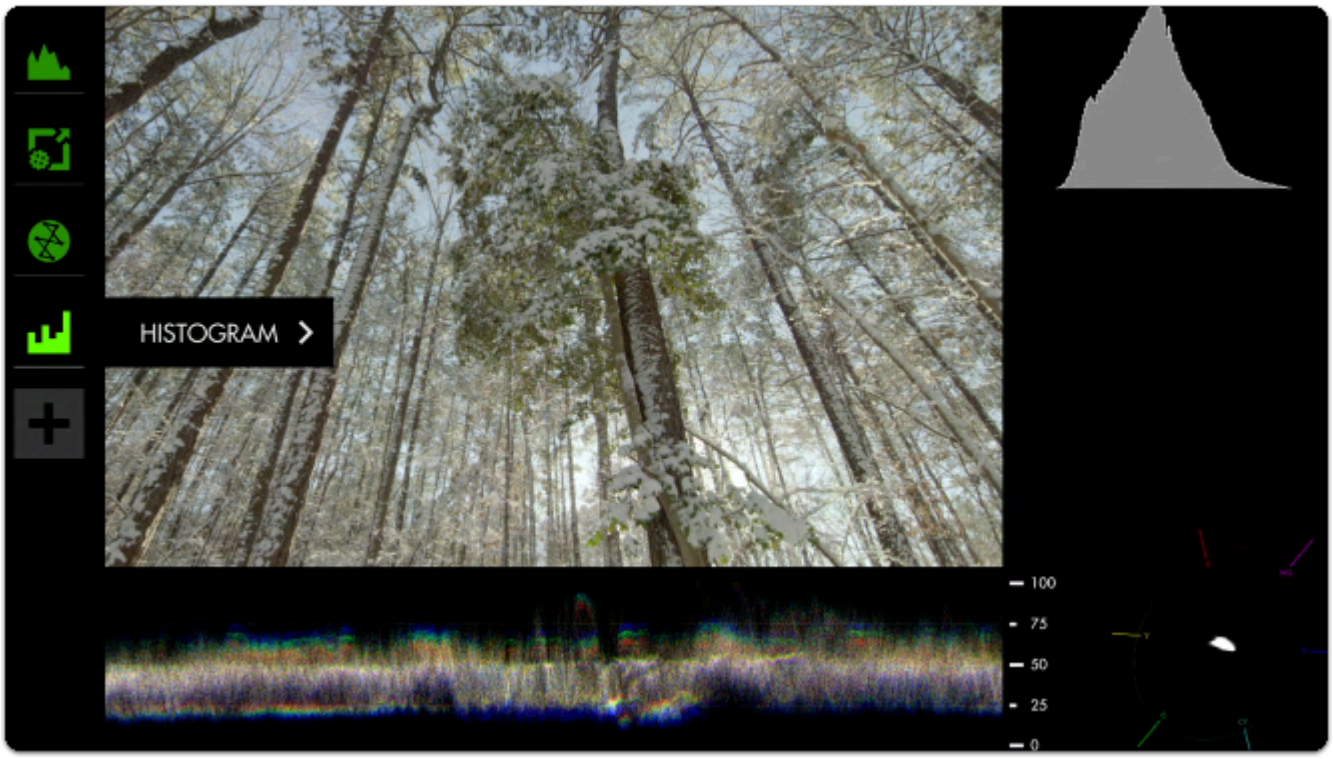
Next we **edit** the Waveform and scale its **WIDTH** to **75** to match the width of the image.




We now have an unobstructed view of our **image** and its corresponding **Waveform!**




At this stage you can use the **LOCATION** adjustment to add & arrange more tools such as a **Vectorscope** and **Histogram** if you wish.



# Anamorphic

Anamorphic video is a technique where an image is squeezed horizontally during the recording process. On film sets this is done to make better use of the film or sensor's vertical space using specialty lenses. It is also often seen when footage originated in HD needs to pass through SD equipment. In all cases an anamorphic de-squeeze can restore footage to its native aspect ratio, although lost resolution is not recovered. Lost horizontal resolution is generally not perceptible to human eyes; lost vertical resolution (such as from HD footage being sent through SD equipment) may be noticeable.

## Anamorphic - Settings

### On

Enables/Disables Anamorphic de-squeeze

### Input Video

The monitor will automatically attempt to determine the correct aspect ratio for the video from its resolution and any flags in the video stream. In some cases those flags are incorrect and this tool can be used to fix the video.

Select the aspect ratio of the video input (4:3 or 16:9), regardless of what the monitor identifies the input video as being. (This will squeeze a 16:9 image into a 4:3 frame for example if 4:3 is selected and you are sending it a 16:9 image).

If you need to correct video that has been incorrectly identified as 16:9 or 4:3, this may be the only setting you need to adjust.

## Desqueeze

Choose the amount to de-squeeze your input by. Choices are **1×**, **1.33×** (this will stretch a 4×3 video back to 16×9), **1.5×, 1.66x, 1.79x**, **2×**, or **Custom**.

Selecting **Custom** from the Desqueeze setting will add this additional setting. It brings up a slider allowing you to adjust your anamorphic de-squeeze by a custom value between 1.00× to 3.00×. Please note that this is an adjustment factor based off your video input, not the aspect ratio you are working in.

# Anamorphic - Quick Start

Anamorphic was added as a tool in firmware version 3.5.0. Previous firmware versions had a limited Anamorphic de-squeeze function in the monitor **Settings** under **Controls**.

From any page, click the joystick or tap the screen to bring up **Add New Tool**.

Navigate to **Scale** > **Anamorphic** and choose **Add to This Page** or **Add to All Pages**

If the footage connected to your monitor is all coming from an anamorphic source you may want to add this tool to all pages

# Tools - Addons

# RT Teradek Motion Overlay

https://support.teradek.com/hc/en-us/articles/360020392513-Teradek-RT-SmallHD-Integration

Below are steps to activate the Lens Data Overlay feature.

**Before continuing, please see the following requirements:**

- **Lens Mapping License**
  If you have a CTRL.1, you need to purchase a Lens Mapping License.
  If you have a CTRL.3, the license is already included.

- **A compatible SmallHD/Teradek RT Controller Interface Cable**
  Be sure you purchase the appropriate cable for your monitor. Cables can be purchased at teradek.com

**UPDATE YOUR CONTROLLER AND MONITOR TO THE LATEST FIRMWARE**

**MONITOR:**

1. Visit https://www.smallhd.com/community/os3 and download firmware version 3.4.0 or later to a compatible SD card.
2. Insert the SD card into the monitor.
3. From the main screen, swipe left to access the monitor settings, then scroll down to the system menu and select **firmware**. You will then be prompted to install the firmware file from the SD card.
4. Restart your monitor.

**CTRL.1/CTRL.3:**

1. If you have a CTRL.1, be sure to purchase a lens mapping license before you continue. If you have a CTRL.3, the lens mapping license is already included.
2. Visit https://teradek.com/pages/downloads#teradekrt and download version 1.1.0 or later of the RTFW application. Run the RTFW software once it completes the installation.
3. Turn the controller **off** and connect it to your computer via a USB to mini-USB cable.
4. Turn the controller back **on.** RTFW will automatically detect the controller.
5. Click **Update Device**.

**CONFIGURE YOUR CONTROLLER:**

1. If you have not yet activated lens mapping on CTRL.1, visit https://activate.teradek.com/ and enter your controller's UID to generate a license key.
2. From the controller, navigate to **LENS>LENSMAP** and select one of the configured lens maps. If you have not yet created a lens map, follow the instructions here: https://player.vimeo.com/video/301290121
3. Firmware **1.4** and earlier : Press the MENU button to return to the main menu, then navigate to **ADV>SMALLHD.** Select **YES** to activate SmallHD Comms.
4. Firmware **1.5** and later: Press the MENU button to return to the main menu, then navigate to **IO CONFIG**, select **SMALLHD**, and press SET.

**CONNECT A CABLE FROM THE CONTROLLER'S WIRED MODE CONNECTOR TO THE MONITOR'S USB PORT:**

- 5-pin to micro-USB for Focus (part number 11-1469)
- 5-pin to 5-pin for 703/703 Bolt
- 5-pin to USB-A for larger monitors

**CONFIGURE YOUR MONITOR:**

1. Tap the screen on the monitor and navigate to **ADD NEW TOOL>ADD ONS**.
2. Select **TERADEK RT**.
3. The Lens Map Overlay will appear on the right and move according to the controller's knob movements.

**ABOUT:**

- The Teradek RT tool appears when a lens map is selected. If no lens map is selected, no information will be displayed on the monitor.
- The focus units will match those configured on the controller unless overridden by the **Focus Units** option in the Teradek RT tool configuration.
- The overlay only displays the axis that is currently being controlled by CTRL.1.

# Shotover Gimbal Overlay

# Firmware Updates

# PagesOS 3 Software Update

Latest version overview can be found here.

## Compatibility

OS3 firmware is compatible with all current SmallHD monitors (FOCUS series monitors, 500 series monitors, 700 series monitors, Cine 7 series monitors, all Bolt monitors, 1300 series monitors, 1700 series monitors, 2400 series monitors, and 3200 series monitors).

OS3 is **not compatible** with legacy monitors (DP1, DP6, DP4, AC7, and DP7-PRO).

## How to Install OS3 Firmware

**CAUTION**: Make sure you do not lose power during firmware update

Download the latest firmware update

1. Click the .zip download file to extract the .bin (firmware file).
2. Drag and drop the .bin file onto your SD card
   - Card must be 16 GB or smaller
   - Formatted as **FAT** or **FAT32** for Windows, **MS-DOS (FAT)** for macOS (if partitioned, select the MBR Master Boot Record option under Scheme)
3. Remove SD Card from computer or card reader attached to computer
4. Insert SD card into your SmallHD monitor
5. Turn on your monitor
6. Swipe/toggle left to the monitor's Settings Menu
7. Select "FIRMWARE" in Settings Menu and follow on-screen prompts
8. Once the firmware is installed and the on-screen prompts tell you to reboot your monitor – Hold down the power button for at least 5 seconds and then release.
9. Press the power button again to begin operating your SmallHD monitor with the new firmware installed.

# How to Format an SD Card

You must format the SD card using a computer. The monitor cannot format the card.

## Windows Instructions

Formatting a card in Windows

## macOS Instructions

Format your card using Disk Utility.

Click **Erase** to begin the formatting process.

When choosing the format, be sure to select **MS-DOS (FAT)**.

# Samples & Tutorials

# How to use Look (3D LUT) files with your monitor

# How to make a LUT

## TROUBLESHOOTING TIPS

All Monitors – SmallHD – Technical – Conversion LUTs

PROBLEM

Is there a way to get the LUTs pre-installed on my SmallHD Focus monitor from the monitor to my computer? In particular the one converting the slog-3 to a rec 709. Any chance I can get that one?

SOLUTION

Unfortunately that internal conversion is not made with a LUT. We recommend this free pack of utility/ conversion LUTs, though, which includes S-Log3 to Rec 709:

https://luts.iwltbap.com/free-lut-log-to-rec709-and-rec709-to-log-conversion/#freeware

We also offer a free pack of look LUTs for download here:

https://www.smallhd.com/community/gradetrade

Keywords

LUTs, conversion, Log, S-Log, S-Log2, S-Log3, Rec 709, Rec 2020, DCI P3

Firmware Software – All – Troubleshooting - LUTs not displaying correctly

PROBLEM

My Luts are not displaying correctly. They either don't work or don't act right. one even makes the picture black and white. Why are these not working? Downloaded directly from Canon

SOLUTION

These luts appear to be in a different configuration that the monitor is used to seeing. This can be solved by converting this to a 3D lut. This can be done with a free program called Davinci Resolve. The instructions are below:

https://www.blackmagicdesign.com/products/davinciresolve/

1. Drop the LUT file into your Davinci Resolve LUT folder; on a mac this is in:

(Mac HD) > Library > Application Support > Blackmagic Design > Davinci Resolve

or in Windows:

C:/ProgramData/Blackmagic Design/DaVinci Resolve/Support/LUT/

2. Select the Edit page at the bottom of the main window

3. Drag and drop a video clip from the desktop into the timeline - (any video clip will work, we will only use it to ensure the LUT actually gets applied)

4. Click on the Color page at the bottom of the main window

5. In the Node view in the upper-right, right-click the only node (01) and select LUTs > (location of your LUT from step 1) to apply the grade to the clip

6. You should see a grid icon appear at the bottom of the node indicating it has a 3D LUT applied.

7. Select the clip itself toward the middle-left of the main window (as opposed to the node at the upper-right)

8. Right-click and select ‘Generate 3D LUT (CUBE)’

9. Save to an SD card for use in SmallHD monitors and elsewhere (ensure that the file retains a .cube extension or the LUT will not be recognized by the monitor).

Keywords

Sony, Canon, fuji, panasonic, 3d, 1d, LUT, LUTS, camera, card, sd card, profile, loading,

# How to calibrate your monitor (PagesOS 3)

You can calibrate any monitor if you wish, you will need a probe that can handle the respective contrast ratio, panel type, and nit (backlight) levels.  You will also need an intermediary, like a computer, with calibration software.
*OLED, HDR, and Specialty panels are harder to calibrate, ou will want to be sure that you probe and software can handle these.

Here are some tips to help with the calibration:

For NON OLED panels:

Warm Up Monitor for 60 minutes before calibration

Software set to Full Range levels

Pattern Generator set to Full Range output

Backlight 100%

Calman Targets BT.709 Gamma Power 2.4

3D LUT format: 17pt .3DL

LUT Creation method: Fixed Grid 9^3 or Fixed Grid 17^3

## Using the Auto-Calibrate

**This was feature removed in OS 4.0 and is no longer supported.

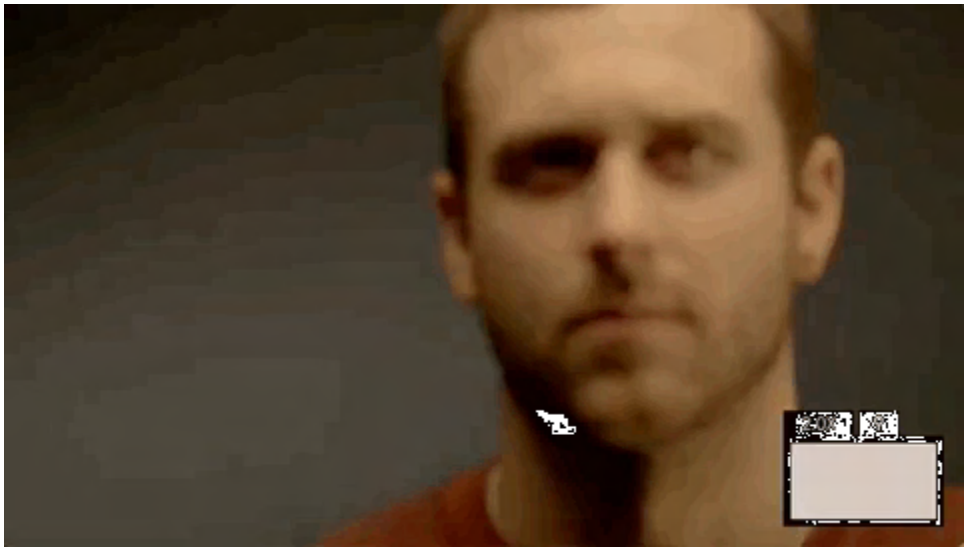
*Please be aware that the SmallHD branded i1 Xrite probe has been discontinued.  (2019)

The probe will work on some of our older products for the "Auto Calibration Function". The unit must have a USB port and be within the specs that the Probe will function with.
The Probe can be used with an intermediary (computer) as long as the Panel is below 1000 nit and is not recommended for OLED or HDR.  You will want to set the Backlight to 90% if it is a1000 nit panel.

*You should calibrate your monitor at your own risk.
**The probe does NOT work will ALL SmallHD Products.
The Probe can work with the following models:

501, 502, 502 Bright (90%), 702 (90%), FOCUS, FOCUS 7, 1303 Studio, 1703 Studio/ P3/ P3X, 2403 Studio, Cine series, Vision Series, 702 Touch, any product produced after 2019.

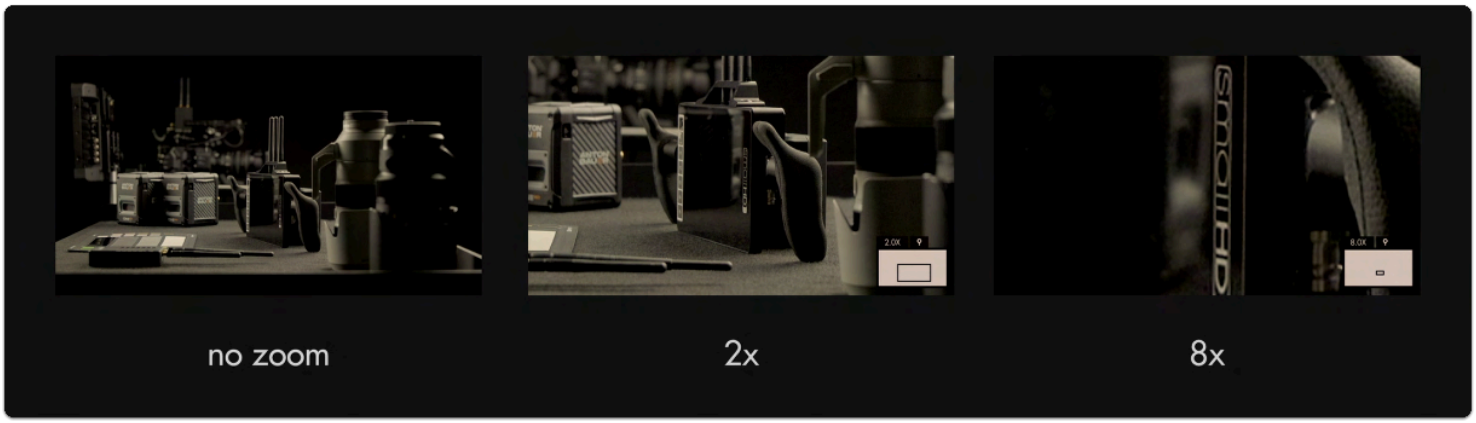
# Focusing Tips



Manually focusing a camera with accuracy can be difficult, thankless, and if unchecked can lead to a surprise of the worst kind in post-production.  Use SmallHD's industry-leading focusing toolset to help achieve razor-sharp focus every time and to free you up for other on-set tasks.

## Pixel Zoom

Pixel Zoom lets you quickly 'push in' to your image to make careful judgements over any details and to check for accurate focus before rolling.  Because you're seeing the actual image up close you can be extra confident making decisions using this tool.




Pixel zoom is unique in that it isn't added to a page like other tools but is accessible from any time by pushing up on the joystick or using pinch-to-zoom on touchscreen monitors.

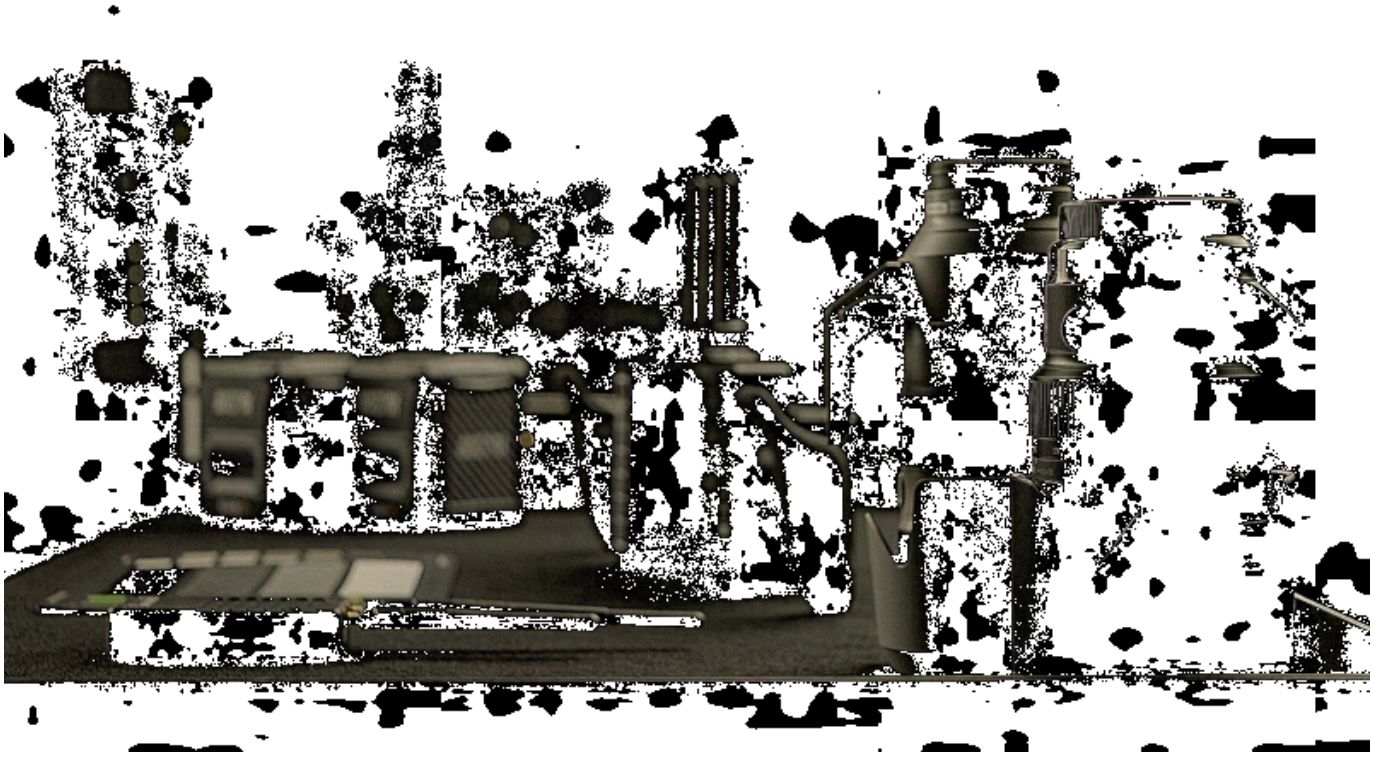
## Focus Assist

Focus Assist is a filter that looks at your image for areas of **dense contrast** and **highlights** those areas with a **color of your choosing**.  This represents the 'in-focus' portion of your image which can be seen clearly in a wide variety of viewing conditions.

If you need the fastest, most apparent view of what's in focus, for example when shooting with a gimbal where you can't get a close view of the screen, Focus Assist is a great option.

## Peaking

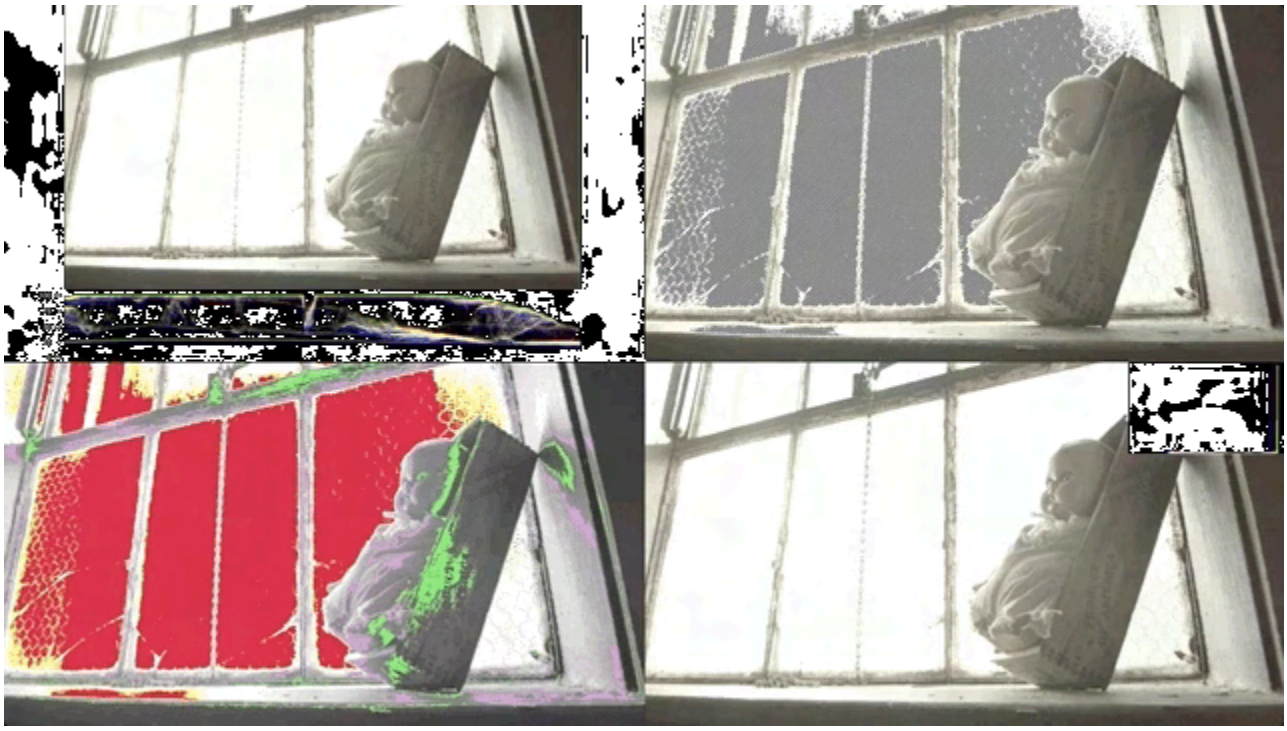
Peaking is essentially the **'sharpness' filter** turned all the way up -- meaning in-focus edges highlight similarly to Focus Assist, but it **doesn't alter the image as drastically** which can be helpful when used in combination with other tools.



If you need to manage several aspects of your image at once while still focusing, Peaking may be the correct tool for the job since it doesn't mess around too much with the integrity of the original image.

# Exposure - Case Study

Either before or after reading this guide you will have an understanding of how to set proper exposure using SmallHD's industry-leading toolset. Learn how **Waveform**, **Exposure Assist**, **Zebra, Histogram** and **Color Picker** compare and how to get the most from each.



## The Dynamic Range 'bucket'

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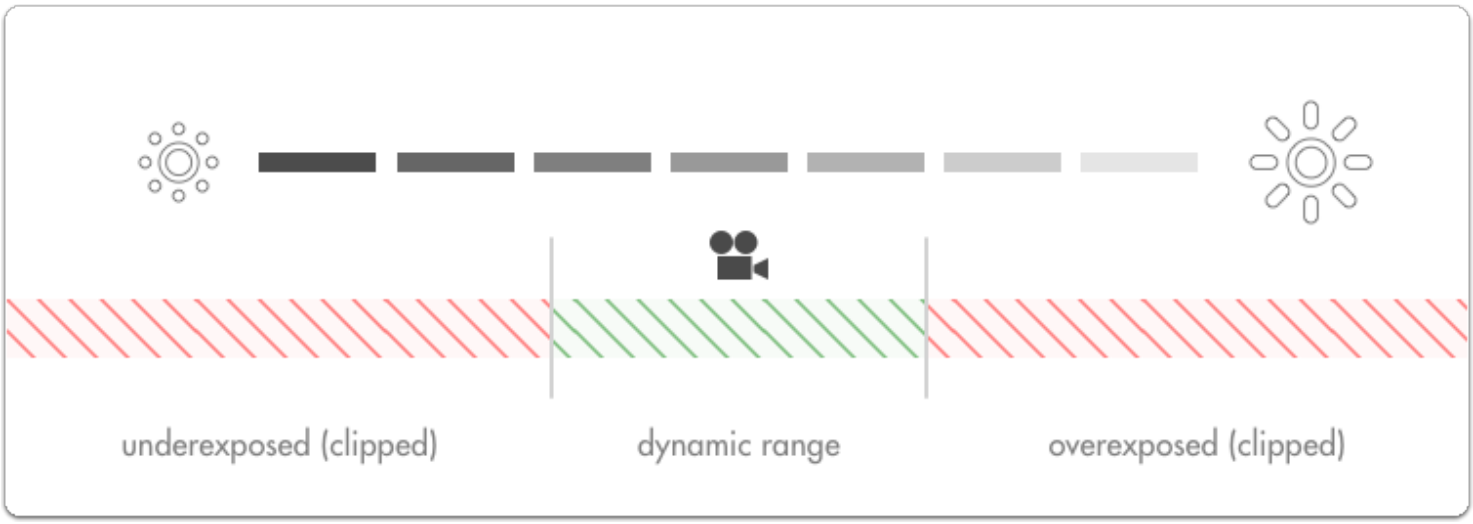
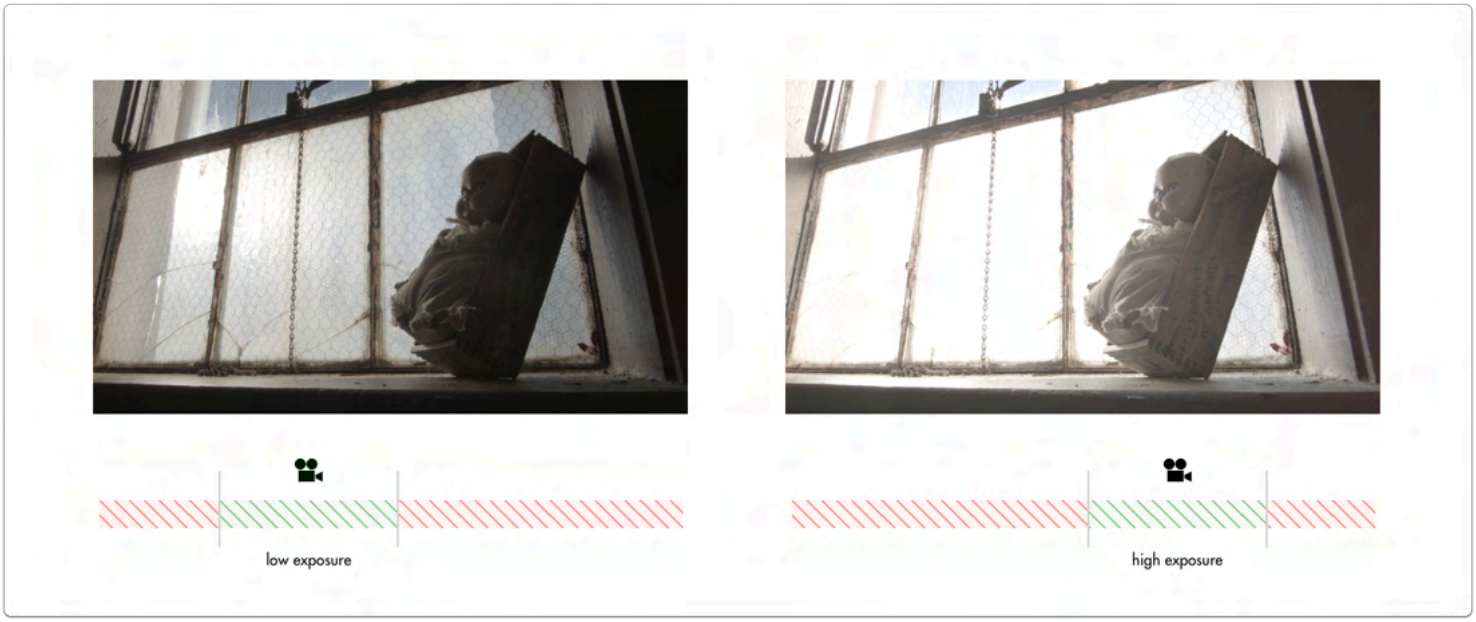



Adjusting **exposure** will shift the **dynamic range** to capture brighter or darker detail in order to accommodate the most important aspects of the image.  Anything outside the **dynamic range** gets **clipped**, meaning a badly placed exposure is ***wasting the camera's potential***.

## Exposure Examples

Let's look at the problems we face with a shot with a relatively **low exposure (underexposed)** and one with a relatively **high exposure (overexposed).**



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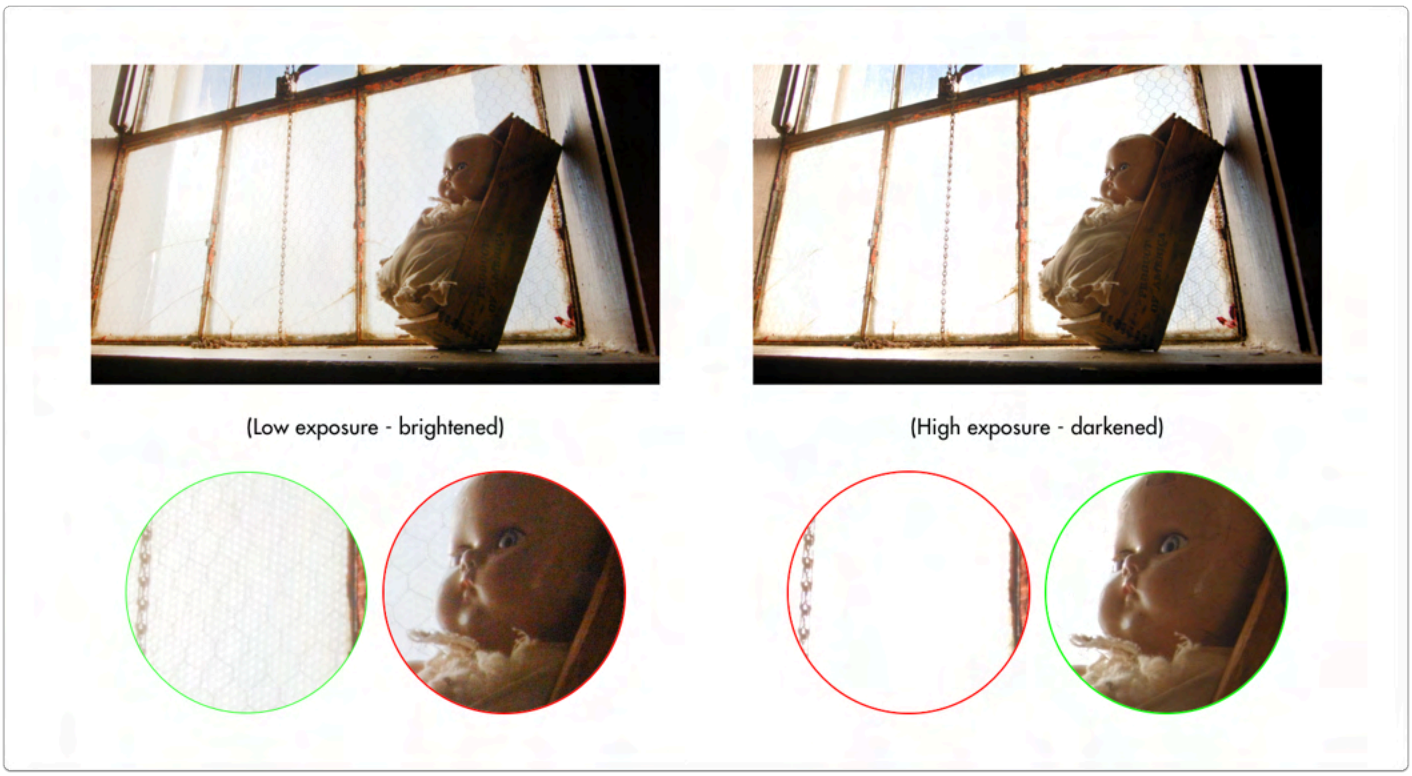


| **Underexposure --> Brightened** | **Overexposure --> Darkened** |
|---|---|
| **1.** Bright highlight detail remains in-tact (good) | **3.** Bright highlights have been clipped, meaning the detail of the window cannot be recovered (bad) |
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There will almost always be something in your image that is clipping like a dark shadow or a light bulb - the key is to be aware of and balance the extremes while ensuring the desired midtones (typically skin tones) are placed in the center of the camera's dynamic range.

# Adjusting exposure

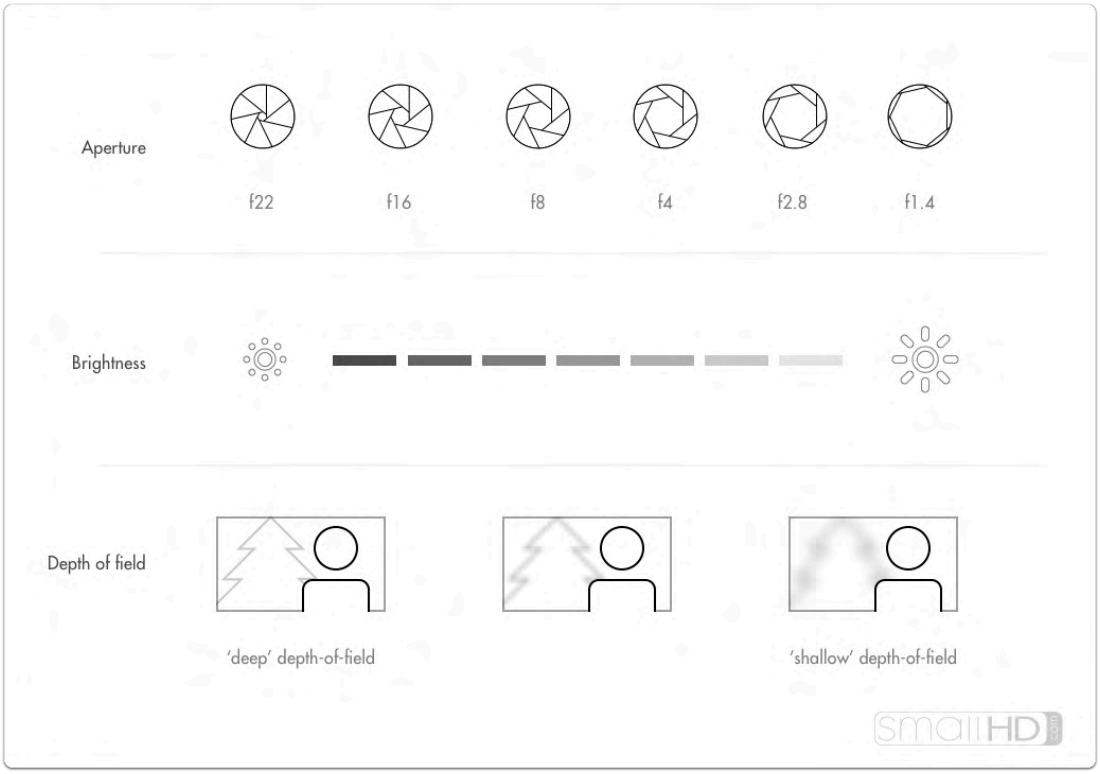
There are several ways to control exposure on a camera and it is critical when operating to have a firm grasp of the benefits and trade-offs of each.  Let's have a look at them:

## Scene lighting

If you have the benefit of a set with controllable lighting, the best scene exposure can be generally achieved without touching the camera.  Because this is such a huge topic, we will just be covering adjustments that can be made on-camera.

## Iris/Aperture

The most commonly used method for controlling exposure, the **Iris** or **Aperture** adjusts the **physical size of the opening in the lens** at which light passes through to reach the camera's imaging plane.



| Notes on adjusting iris/aperture for exposure |
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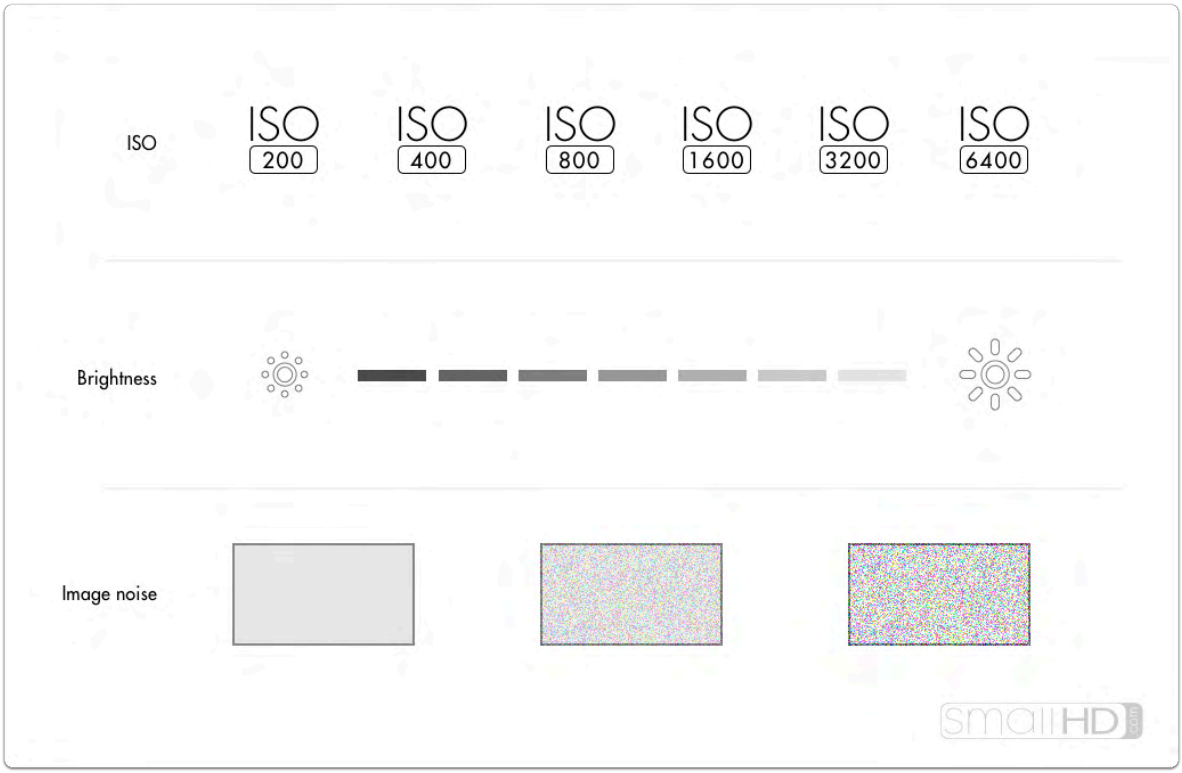
| **Speed** - Iris/Aperture is most often a physical ring on the lens, making it very quick to turn and immediately see a result. |
| **Fine-tuned control** - Higher-end & cinema lenses often have smooth or 'de-clicked' aperture rings making very precise exposure adjustments simple to achieve. |
| **Affects depth of field** - If part of the intended look of the scene is to have a character in focus with the background blurry, just be aware that adjusting the iris will affect the amount of blurriness (bokeh) in out-of-focus objects. |

## ISO

Increasing camera **ISO** essentially **'boosts'** the camera's image digitally beyond its native ISO level, brightening the image but increasing the likelihood of image noise.




| Notes on adjusting ISO for exposure |
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| **Flexibility/Night Shooting** - Some cameras have incredibly low-noise sensors and effective noise processing that can allow for high ISO values without noticeable artifacting meaning easier shooting in the dark. Mileage varies greatly and older cameras tend not to fare as well in this respect. |

| Notes on adjusting ISO for exposure |
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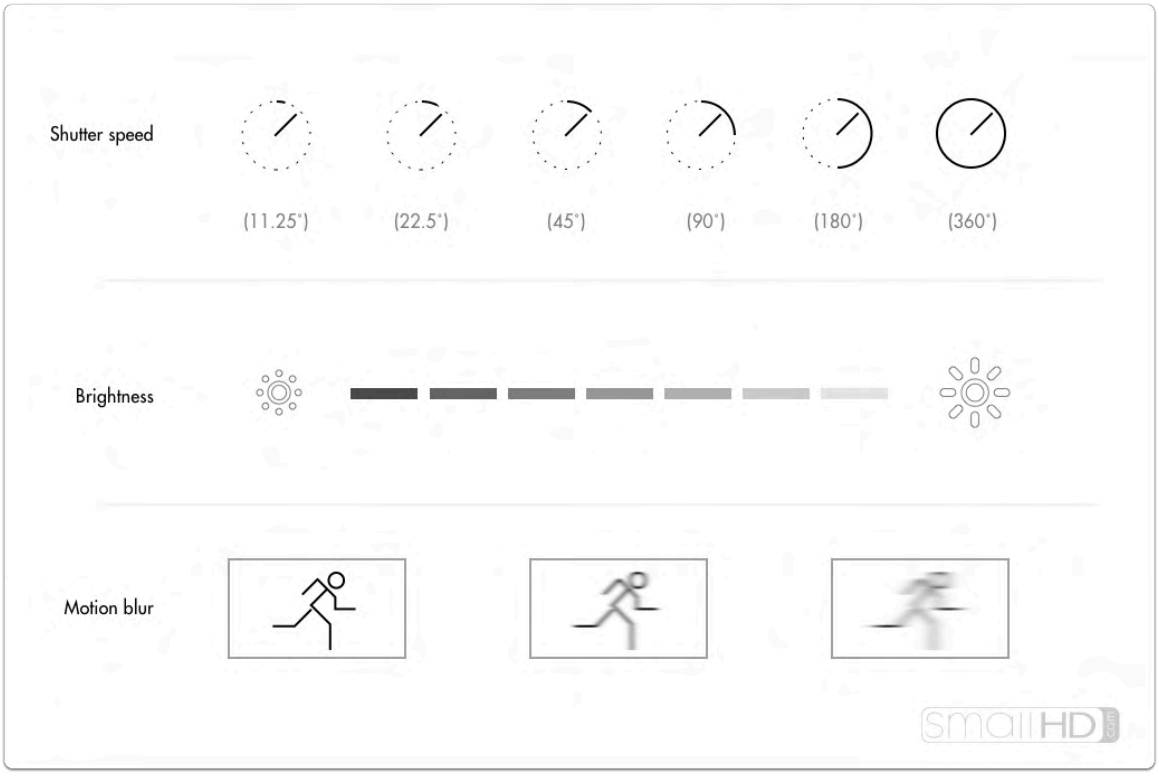
| **Variable Image Noise** - Because adjusting ISO is artificially 'boosting' the output of the sensor, image noise, especially in shadows becomes more apparent at higher ISO values. |

Every digital camera has a native ISO which tends to produce the least noisy results and the most dynamic range. Pushing the ISO up is asking the camera to reach further outside its 'comfort zone' and will increasingly apply image noise/lessen dynamic range.

## Shutter Speed

**Shutter speed** refers to the **amount of time** the sensor is being **exposed to light for each frame**. Shutter speed is slightly less commonly used when adjusting exposure due to it having a more pronounced stylistic effect at different extremes.

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| **Consistency of shots** - If adjusting shutter speed for every shot to compensate for lighting, the amount of ‘strobing’ (ie perceived smoothness) will vary shot-to-shot as well and this may be displeasing to some viewers. |

An extremely common & widely acceptable shutter speed setting is at half the frame rate being captured, commonly referred to as a 180˚ shutter. If shooting at 24 frames per second, this means the shutter speed would be 1/48th of a second.

## Lens Filters

Lens filters offer creative flexibility on brightly lit scenes - instead of having to raise shutter speed and increase strobing, or close down the aperture and deepen the depth of field, ND (neutral density - aka darkening) filters can darken the shot without adjusting the aesthetic.

| Notes on adjusting lens filtration for exposure |
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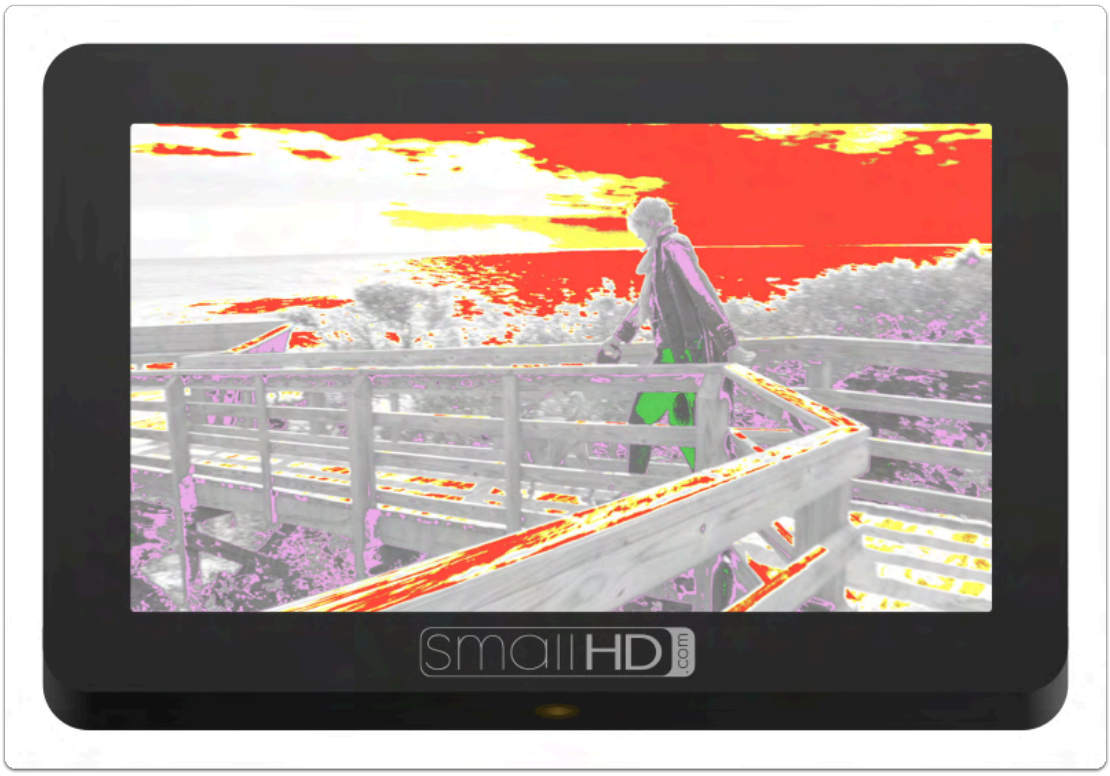
| **Shallow depth of field on bright days** - dense ND (neutral density ie darkening) filters make shallow depth-of-field possible on very bright days - other options are to close down the iris (resulting in deep depth of field) or increasing shutter speed (resulting in stuttery motion). |
| **Localized Adjustments** - ND filters often have a graduated (dark to light) effect so that adjustments are made only to a portion of the image - great for dimming a bright sky while keeping a darker foreground in tact. |
| **Speed of operation will vary** - Many cameras have built-in ND filters which are speedy to operate but for cameras that dont, they will have to be threaded onto to a lens or slid into a matte box which can be slower options than rolling the iris/aperture. |

## Choosing an exposure tool

We have found personal preference to be the biggest factor when choosing an exposure tool. Wish to see exposure issues directly on the image as they happen? Exposure Assist or Zebra may be right for the job. Prefer an untouched image with a separate graph to provide value readings for spotting issues? Waveform or Histogram may suit your needs better.

### Exposure Assist




Exposure Assist is a great overall balance of utility and ease of use and can benefit most shooting scenarios. It allows 'painting' the image depending on the intensity of a pixel's luma value. For example you could set 97% IRE and up to turn bright red as an overexposure warning while creating a scale to turn green when a face is exposed properly at 55%, etc. (& anything else you wish to plot to any points on the range). Click to learn more about Exposure Assist.

New firmware 3.0 feature - Exposure Assist scale is now fully customizable!

## Zebra

Zebra is essentially a simplified version of Exposure Assist which allows the specific 'painting' of areas depending on brightness value but is less destructive to the underlying image -- it is however limited to painting one value range at a time, though up to two Zebra tools can be activated simultaneously. Click to learn more about the Zebra tool.

## Waveform

Waveform plots the value of the entire image onto a graph that physically matches it from left-to-right, meaning if you see an area that's too bright on the left side of the image, it will create a 'peak' on the left side of the waveform graph. It also has other benefits by way of RGB & RGB Parade modes. Click to learn more about the Waveform.

Use the Waveform to check evenness of lighting across a solid-color backdrop- just look for a straight line all the way across.

## Histogram

Histogram sorts every pixel in your image based on its brightness and plots it to a chart; darker values on the left and brighter values on the right. Click to learn more about the Histogram.

If you see that the Histogram is mostly a 'lump' towards the left hand side, you may have a generally under-exposed image (or a normally-exposed night scene). If it is stacked up towards the right, you may have an over-exposed image (or a normally-exposed day time snow scene).

## Color Picker

Color Picker samples color/value information from a single pixel to give a precise readout of a specific location. Click to learn more about the Color Picker.

When you need an extra level of information on a very precise location, set up a color picker on your subject's face and as light levels change, roll exposure or relight to compensate to achieve the same or a similar readout.

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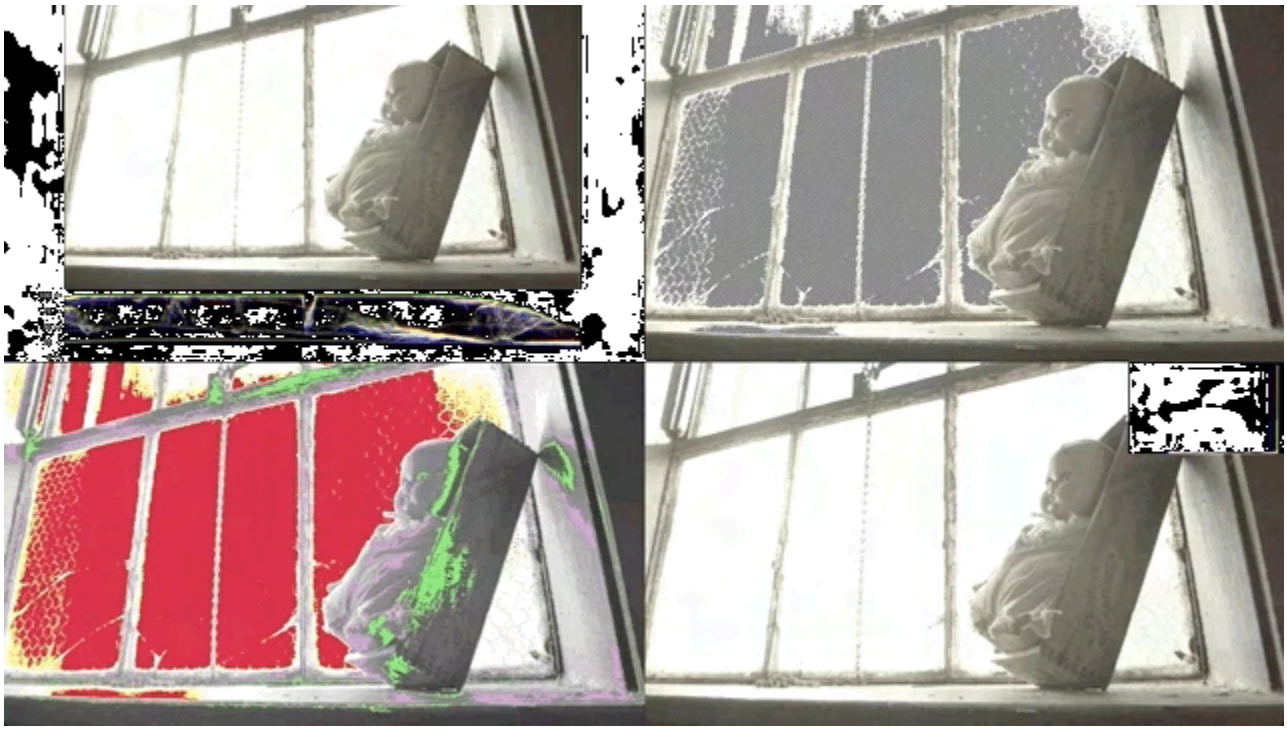

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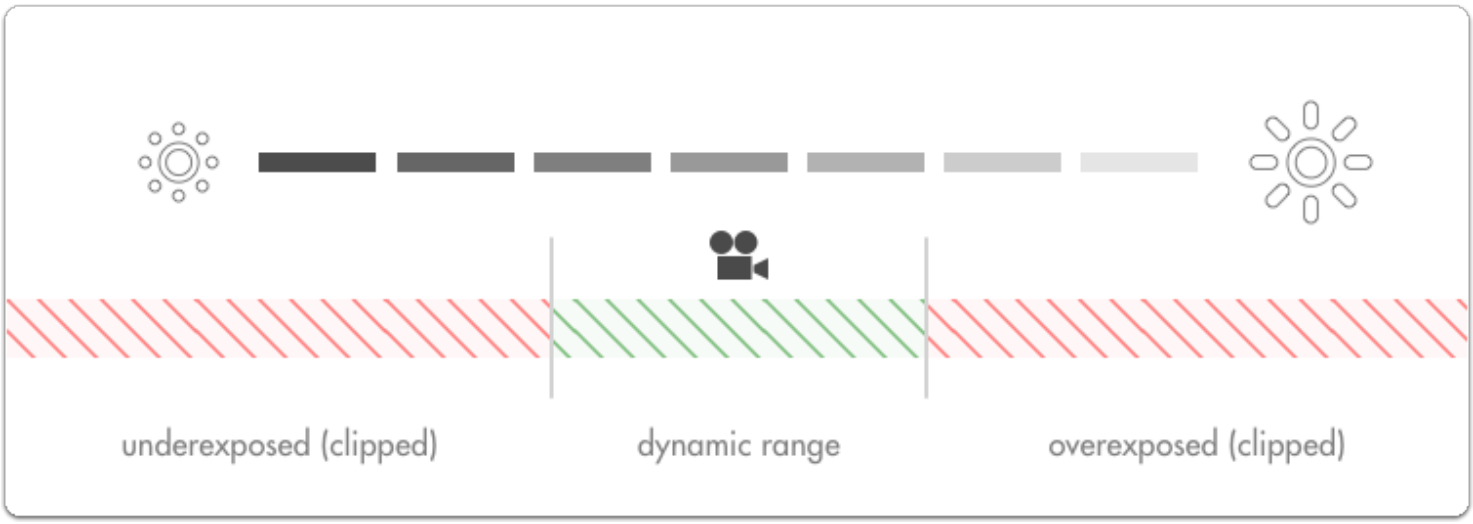


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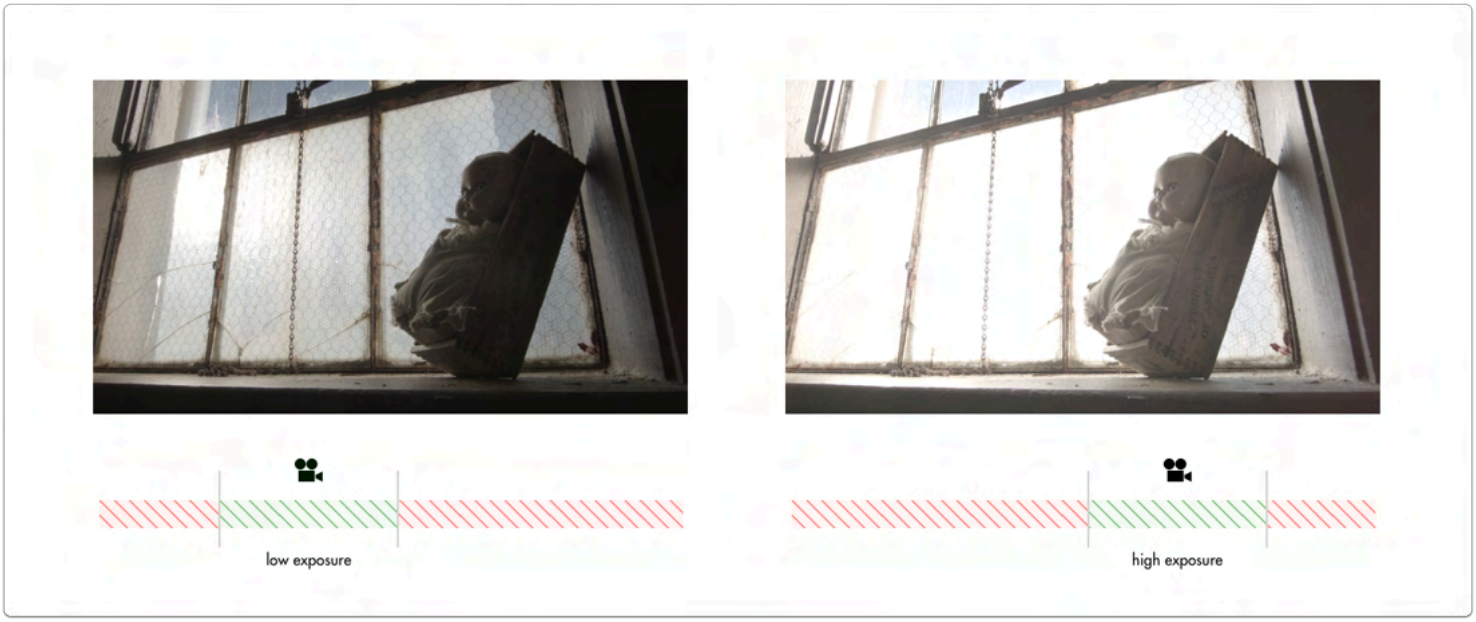

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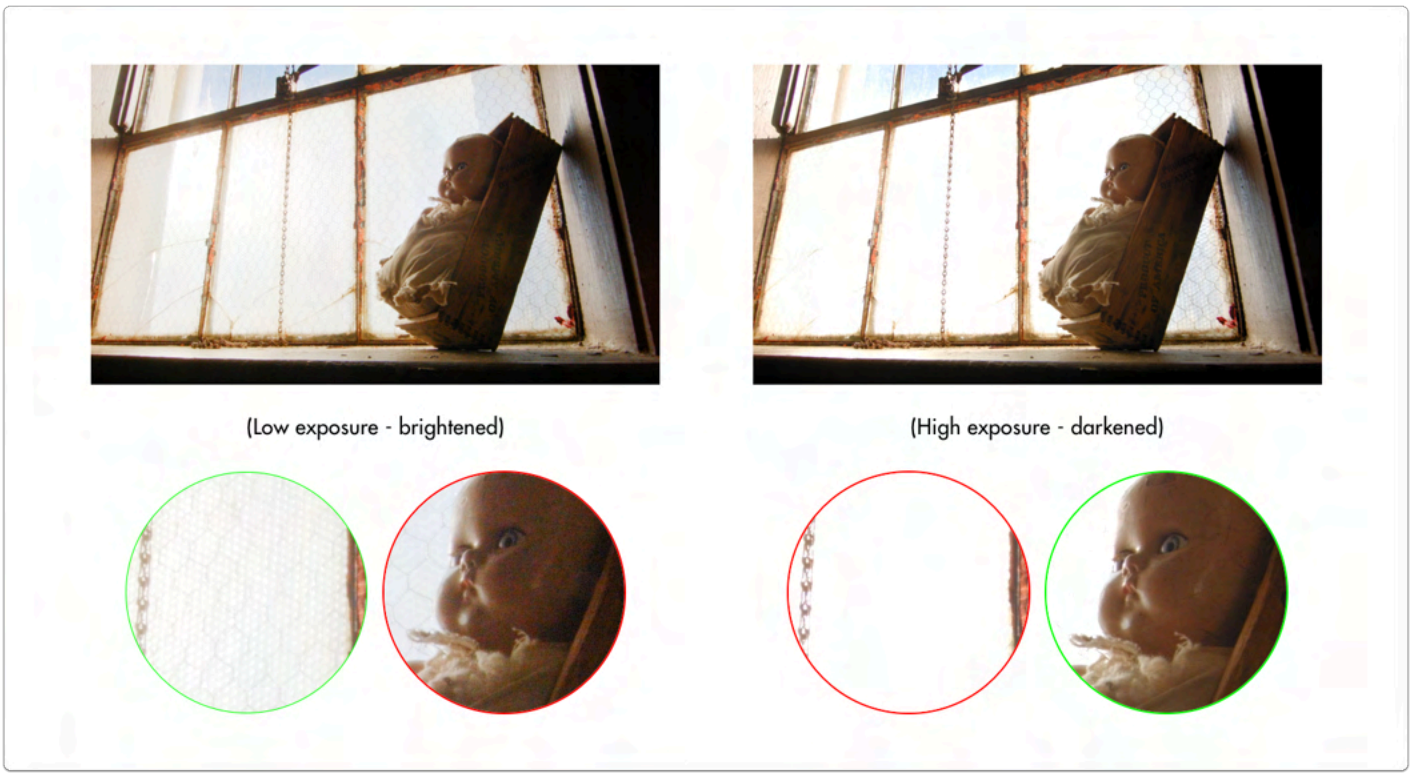


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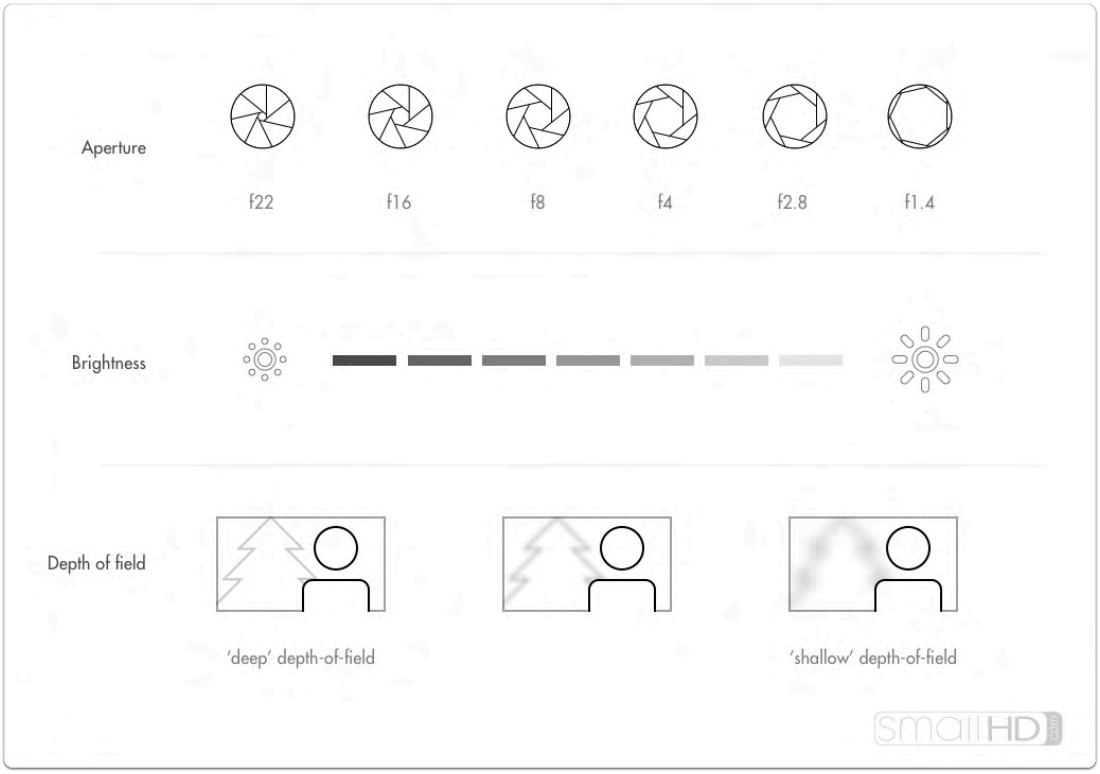

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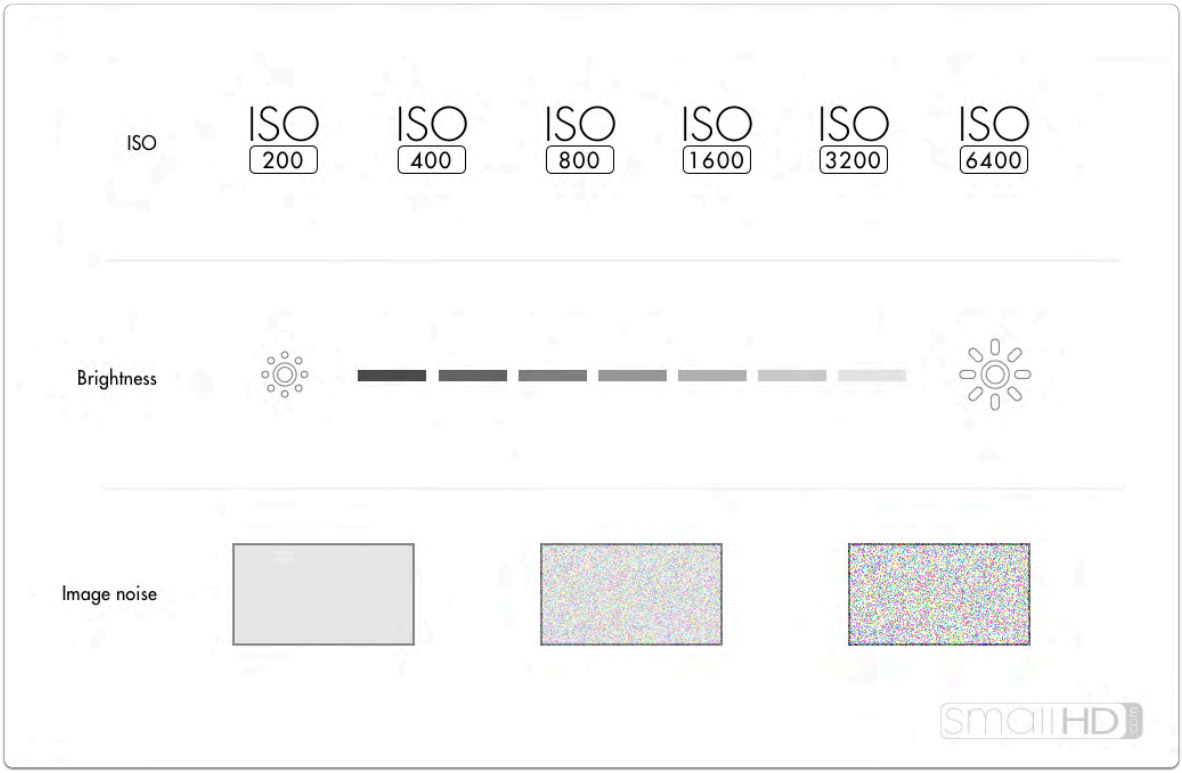


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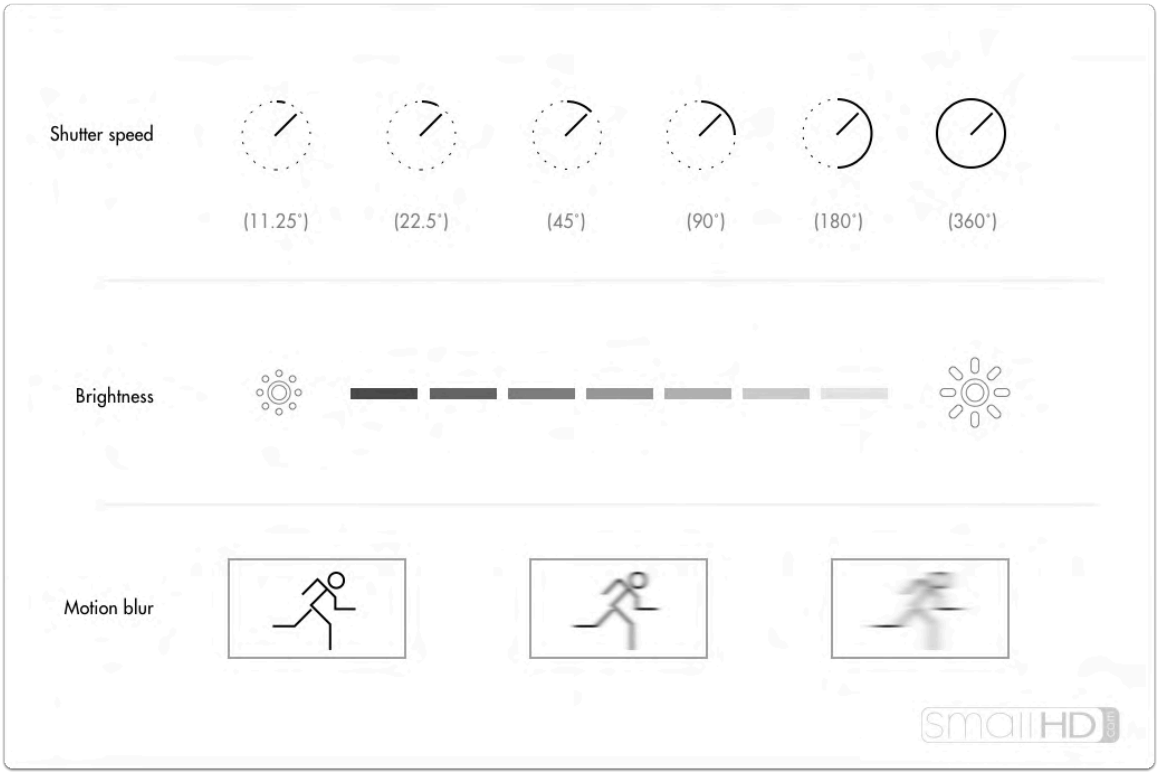


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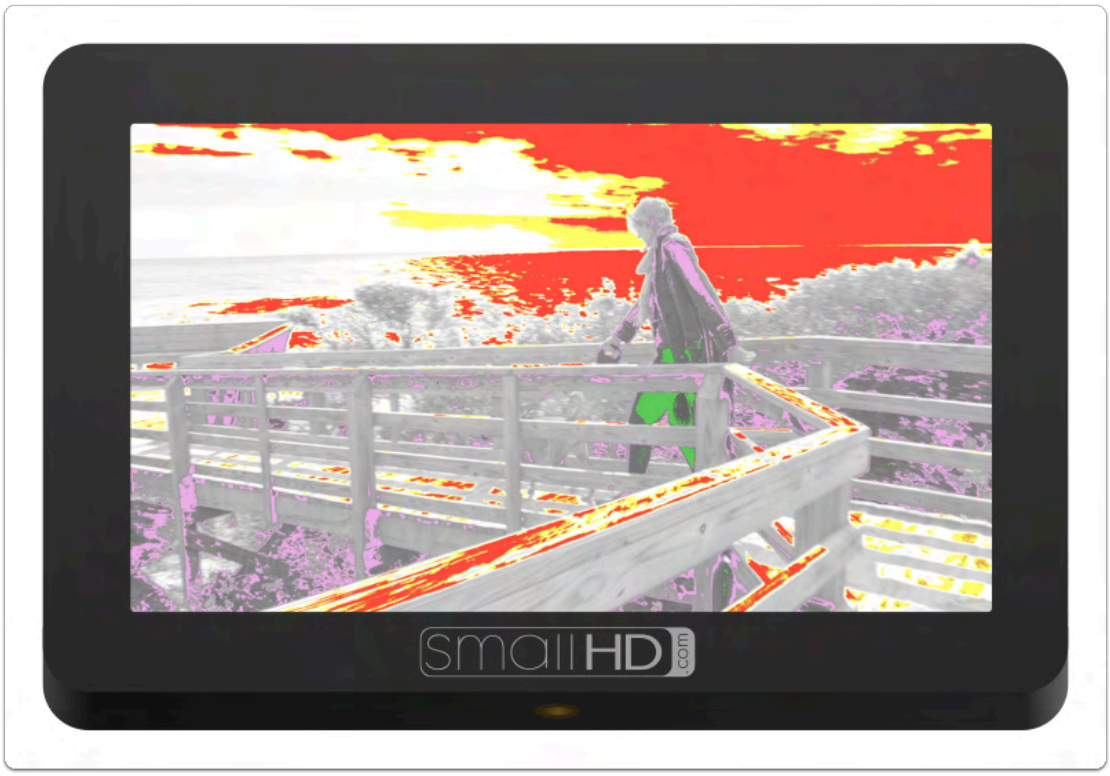
| **Speed of operation will vary** - Many cameras have built-in ND filters which are speedy to operate but for cameras that dont, they will have to be threaded onto to a lens or slid into a matte box which can be slower options than rolling the iris/aperture. |

## Choosing an exposure tool

We have found personal preference to be the biggest factor when choosing an exposure tool. Wish to see exposure issues directly on the image as they happen? Exposure Assist or Zebra may be right for the job. Prefer an untouched image with a separate graph to provide value readings for spotting issues? Waveform or Histogram may suit your needs better.

### Exposure Assist




Exposure Assist is a great overall balance of utility and ease of use and can benefit most shooting scenarios. It allows 'painting' the image depending on the intensity of a pixel's luma value. For example you could set 97% IRE and up to turn bright red as an overexposure warning while creating a scale to turn green when a face is exposed properly at 55%, etc. (& anything else you wish to plot to any points on the range). Click to learn more about Exposure Assist.

New firmware 3.0 feature - Exposure Assist scale is now fully customizable!

## Zebra

Zebra is essentially a simplified version of Exposure Assist which allows the specific 'painting' of areas depending on brightness value but is less destructive to the underlying image -- it is however limited to painting one value range at a time, though up to two Zebra tools can be activated simultaneously. Click to learn more about the Zebra tool.

## Waveform

Waveform plots the value of the entire image onto a graph that physically matches it from left-to-right, meaning if you see an area that's too bright on the left side of the image, it will create a 'peak' on the left side of the waveform graph. It also has other benefits by way of RGB & RGB Parade modes. Click to learn more about the Waveform.

Use the Waveform to check evenness of lighting across a solid-color backdrop- just look for a straight line all the way across.

## Histogram

Histogram sorts every pixel in your image based on its brightness and plots it to a chart; darker values on the left and brighter values on the right. Click to learn more about the Histogram.

If you see that the Histogram is mostly a 'lump' towards the left hand side, you may have a generally under-exposed image (or a normally-exposed night scene). If it is stacked up towards the right, you may have an over-exposed image (or a normally-exposed day time snow scene).

## Color Picker

Color Picker samples color/value information from a single pixel to give a precise readout of a specific location. Click to learn more about the Color Picker.

When you need an extra level of information on a very precise location, set up a color picker on your subject's face and as light levels change, roll exposure or relight to compensate to achieve the same or a similar readout.

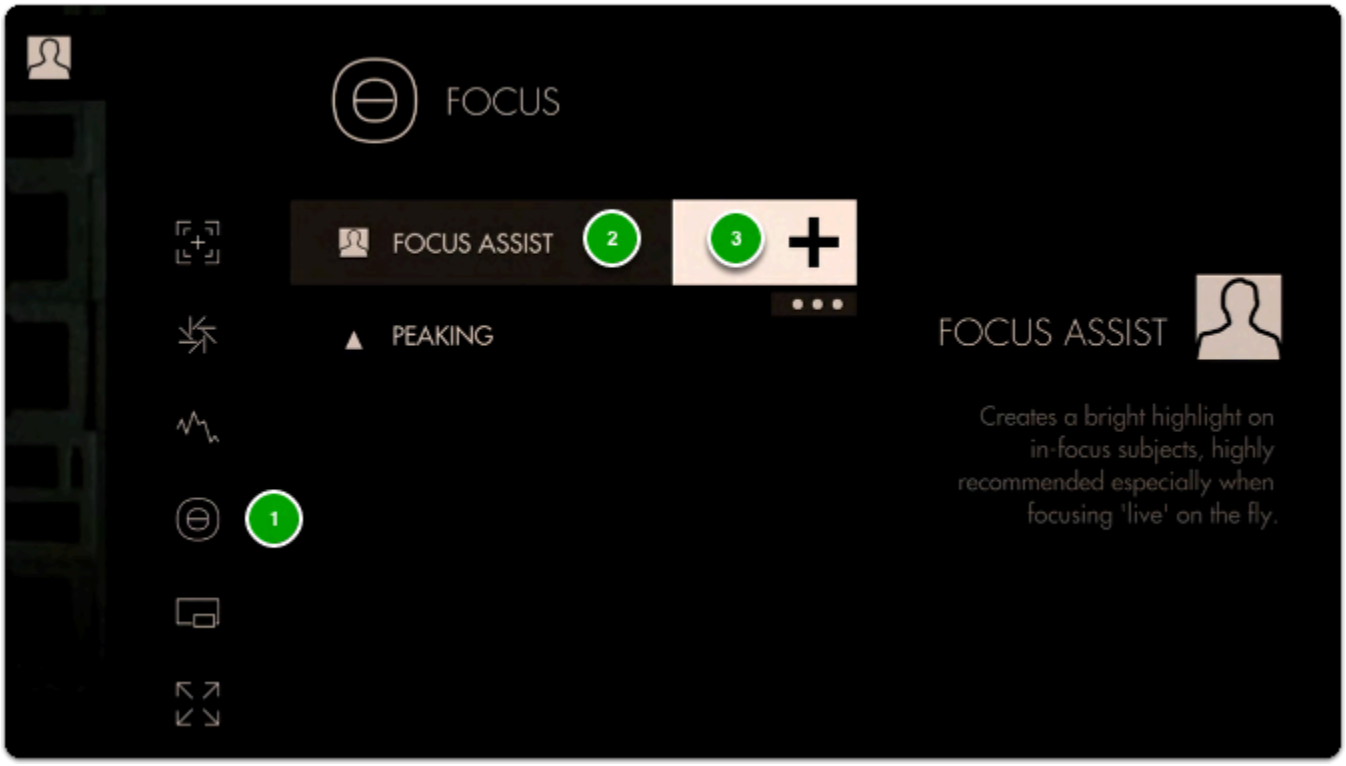
# How to use Tools - Case Study (Touchscreen)

## USING TOOLS - CASE STUDY

Below we will walk through an example of adding a few tools: FOCUS ASSIST, CROSSHAIR,

We will start by making a new page into a **'focus + framing'** page that we can flip to for **composing our shot** and **nailing focus**. This will include a **focus assist**, a **crosshair** for accuracy performing pan/tilt and custom **frame guides** for a cinemascope aspect ratio.

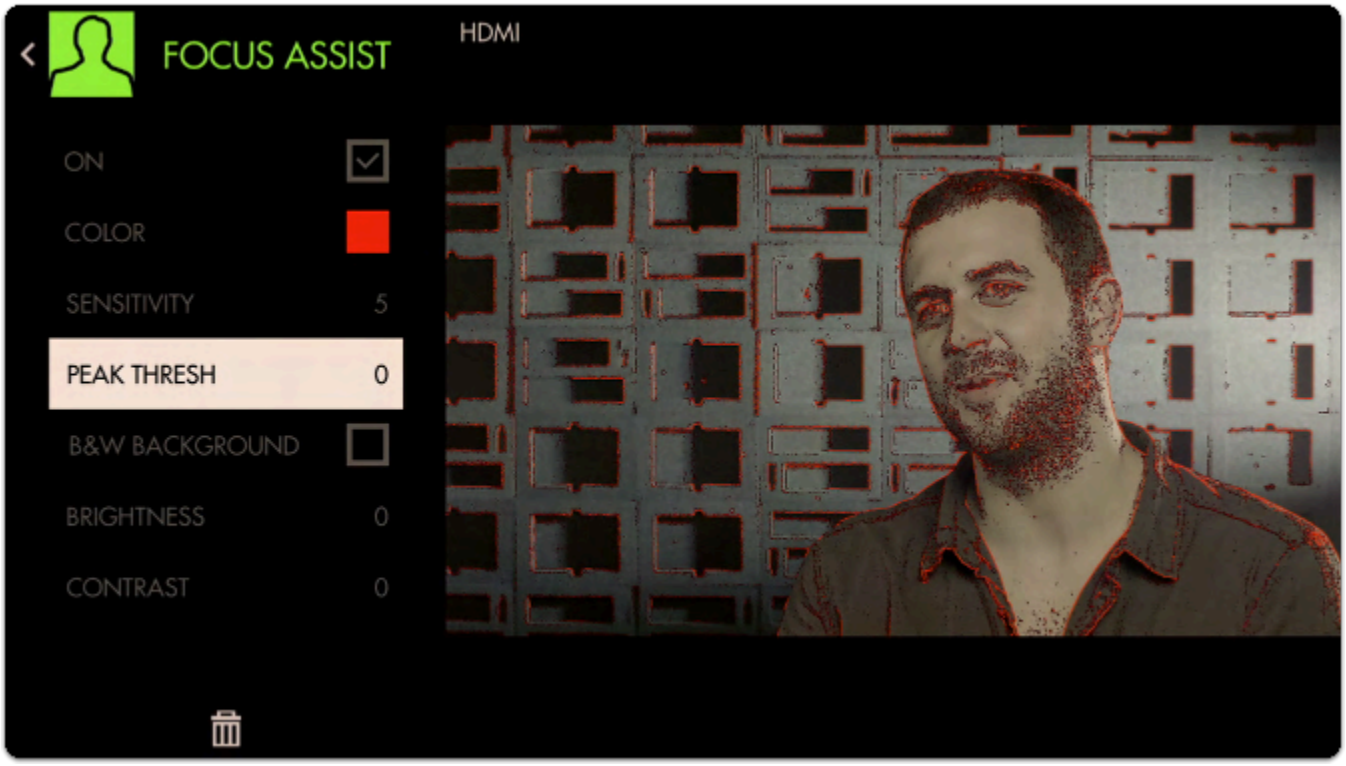
Navigate to **Focus** (1) **> Focus Assist** (2) and select the **'+'** (3) to add **Focus Assist** to this page.



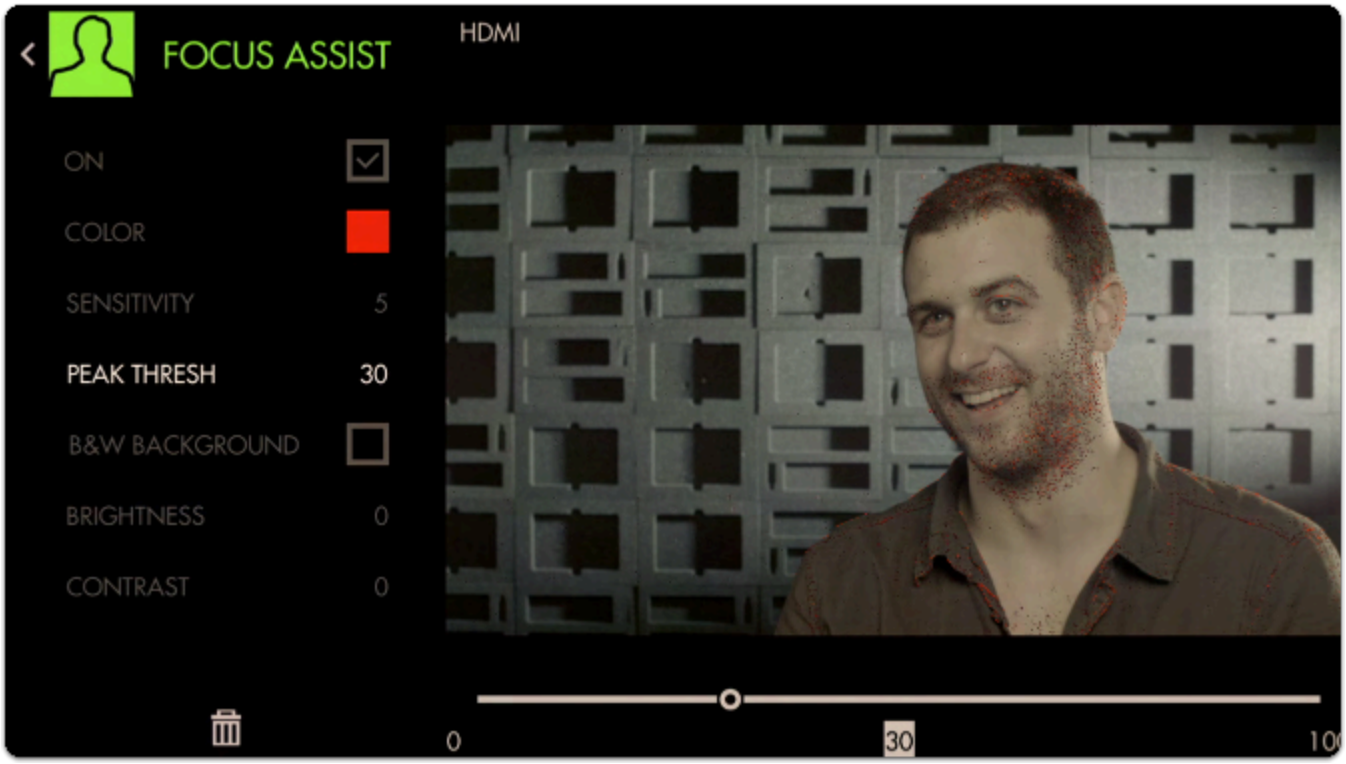

**Focus Assist** will paint a **highlight** around areas it determines to be in focus based on small/harsh changes in contrast.

The **Peak Threshold** is a bit high, meaning we are picking up extraneous edges on the back wall which are not quite in focus.

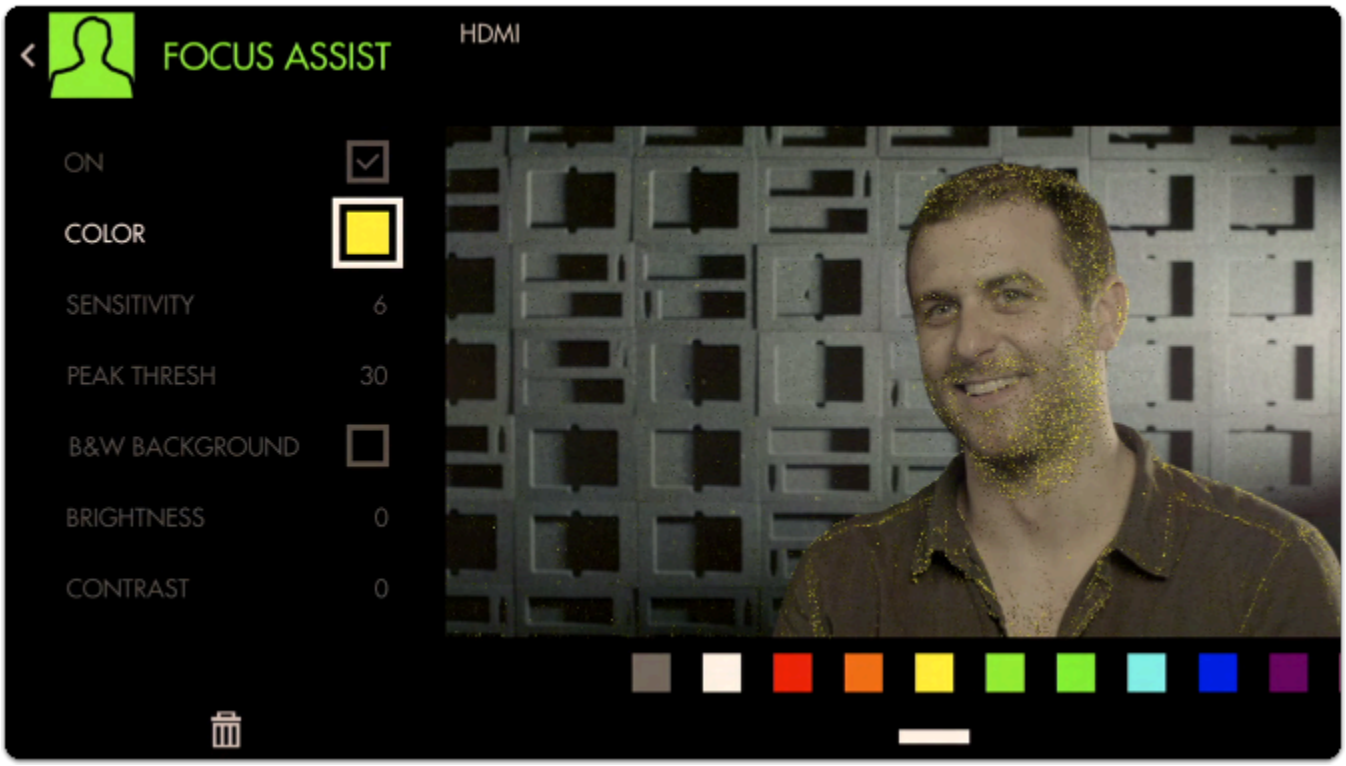
To fix this, **edit Focus Assist** by **tapping on it** when it is highlighted in the tool bar, and navigate to **Peak Threshold**.



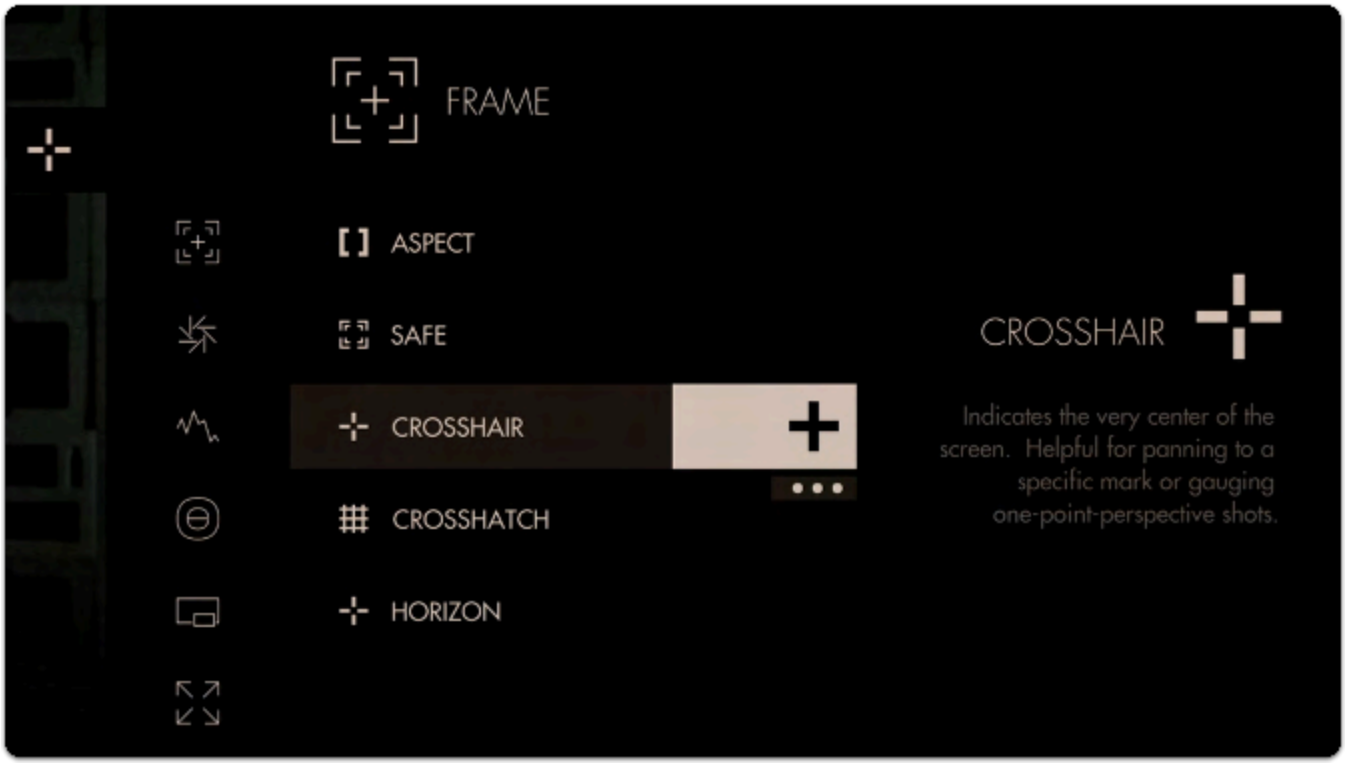
Bringing **Peak Threshold** up to around 30 does a better job of causing **only in-focus areas to activate the filter** but this is ultimately a balance that may need tweaking depending on the camera/shot.




To make the effect more visible we can boost up the **Sensitivity** and **change the Color.**

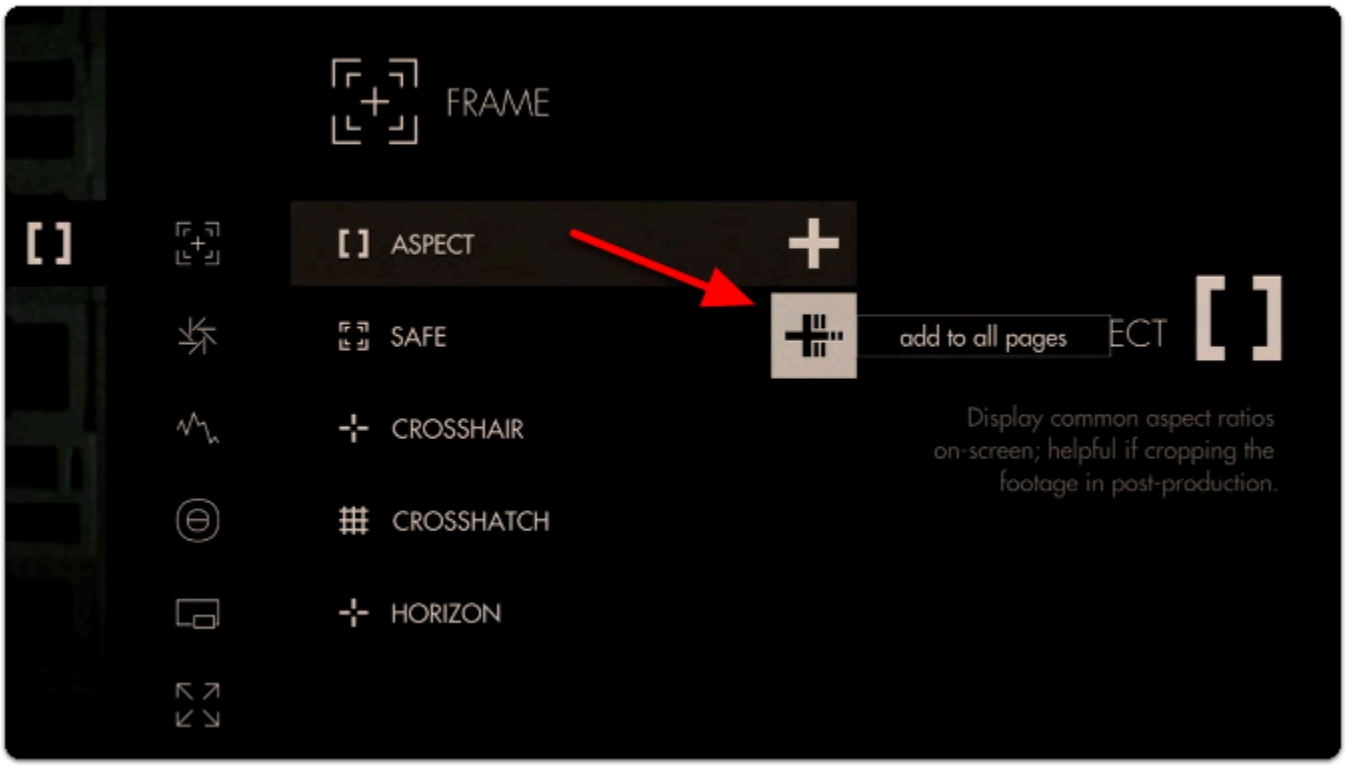



Next **Add a Crosshair** to the page by going through **Add Tool > Frame > Crosshair**

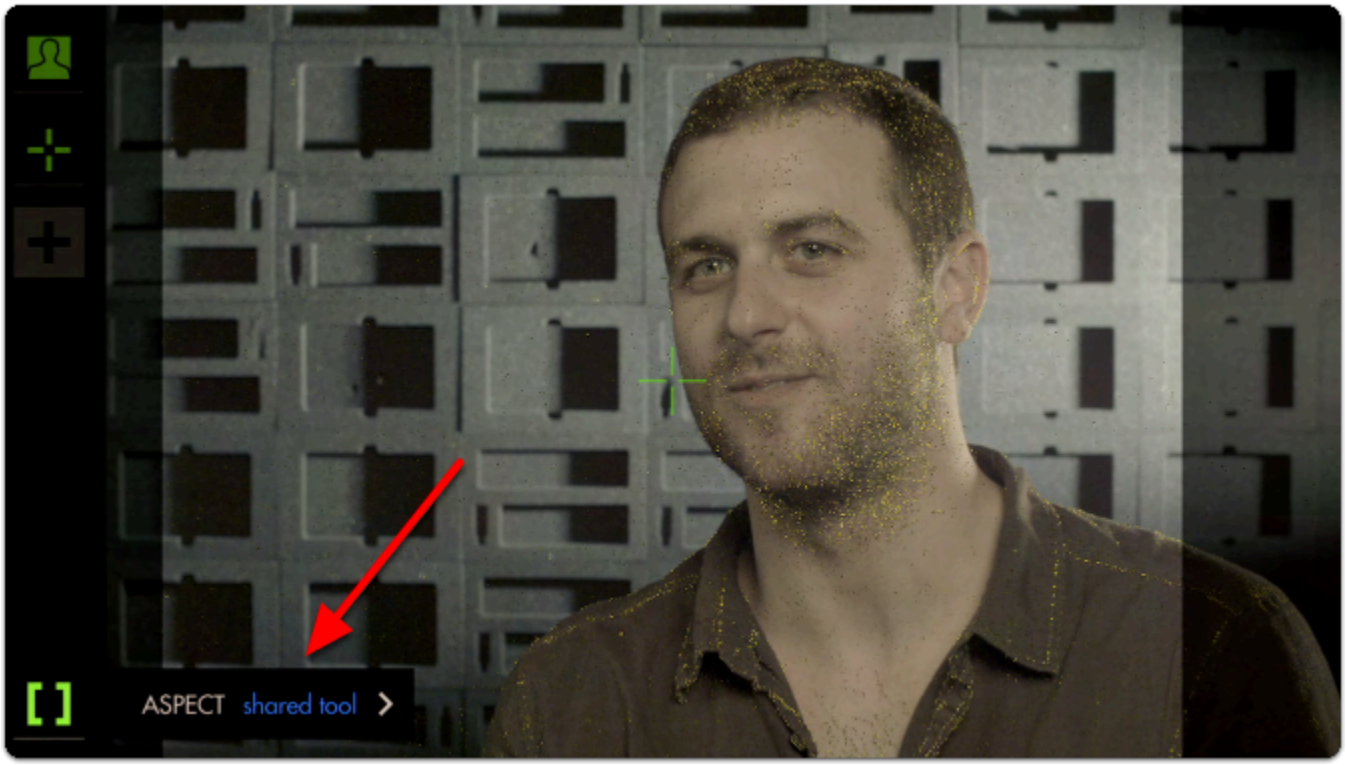


Finally we can add an Aspect Guide to all pages simultaneously by going to Add Tool > Frame > but this time **press-and-hold Aspect briefly** to keep the menu up then **tap the three dots** under the '+'.

Next tap the pictured icon to add Aspect Guides to **all pages**.

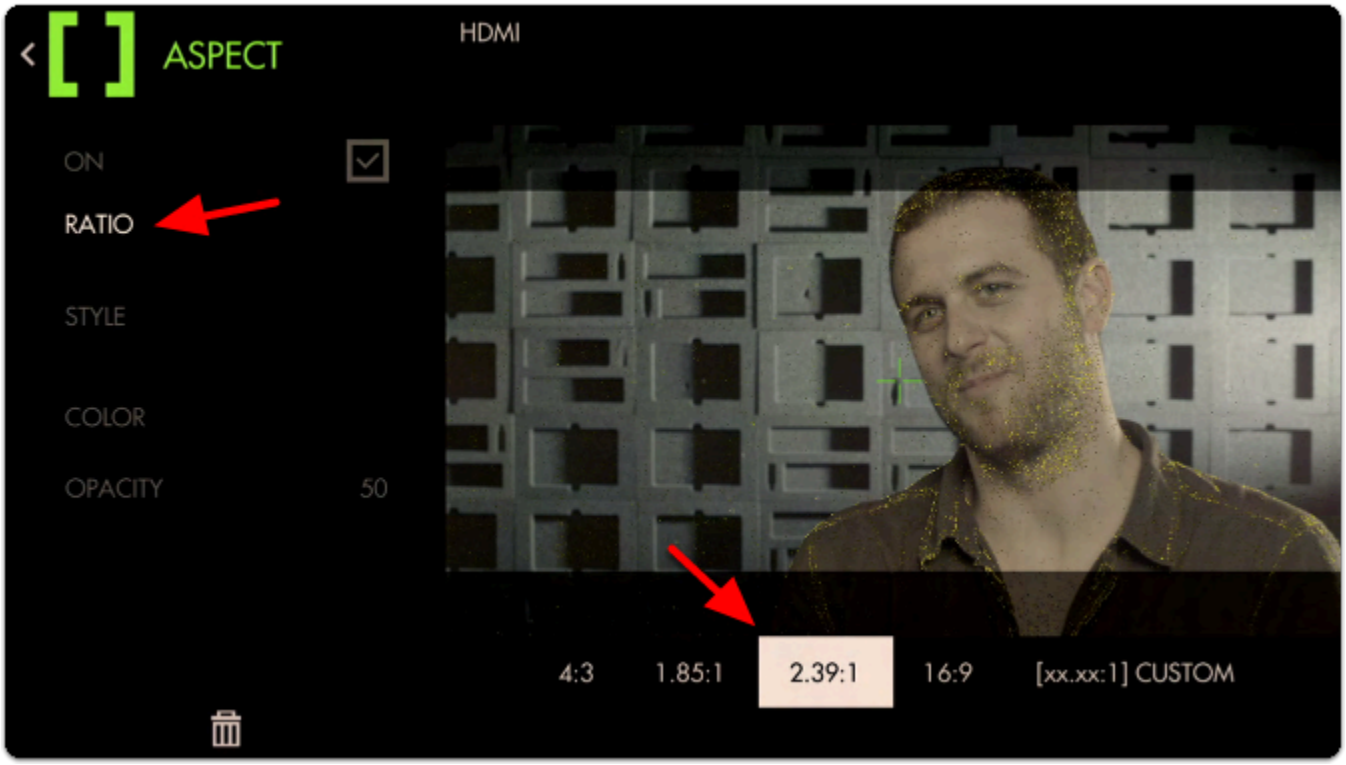



This will ensure you are able to **view this tool** on **every page** of the monitor, and any edits to it are made **globally**. Any tool can be added to all pages, including scaling adjustments and Look (3D LUT) files.



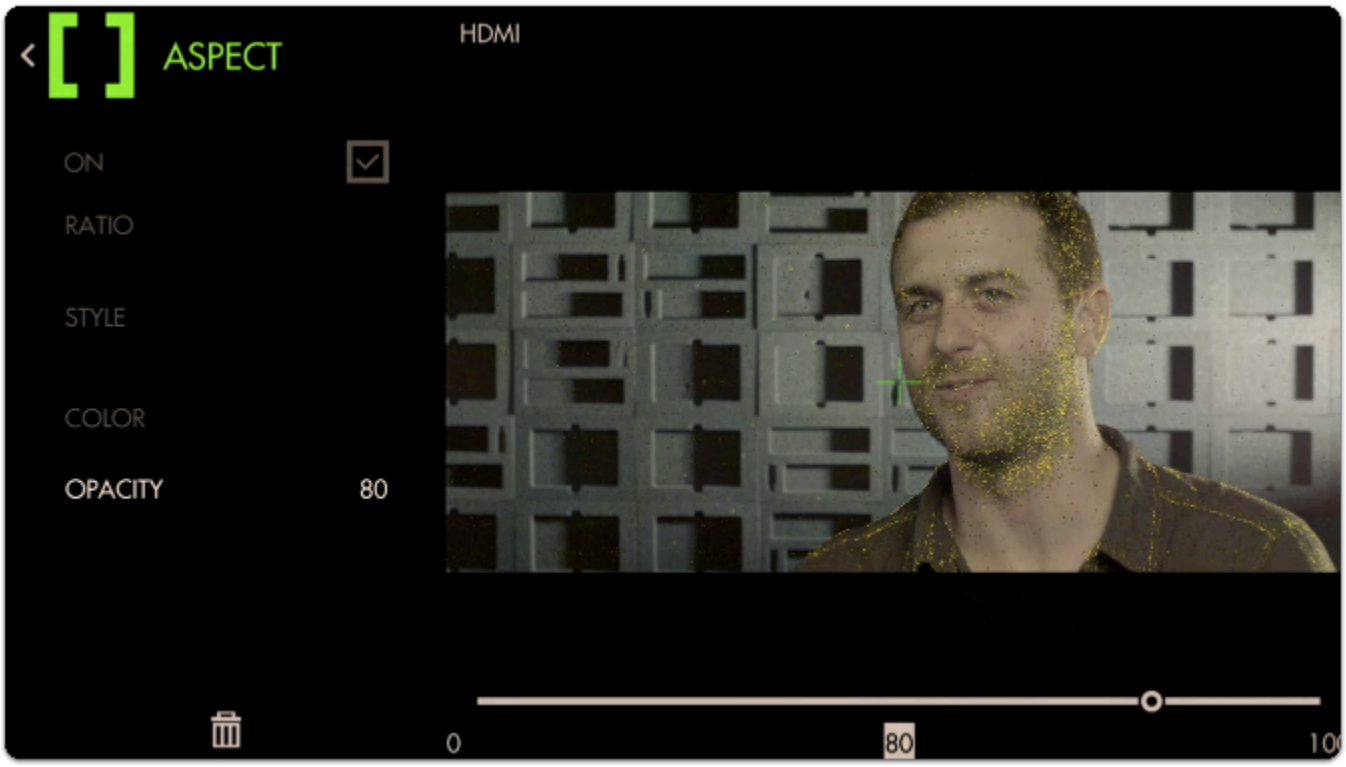
By default the Aspect Guide is set up for a 4x3 aspect ratio for times when you're needing to preview the cutoff area of an old-school monitor.

Tap on the **Aspect Guide to edit the tool.**




Navigate to "**Ratio**", select it and change the aspect ratio to "**2.39**" for cinemascope viewing.

Next move down to '**Opacity**' and **increase its percentage** to view the guide becoming more opaque for a more visible effect.

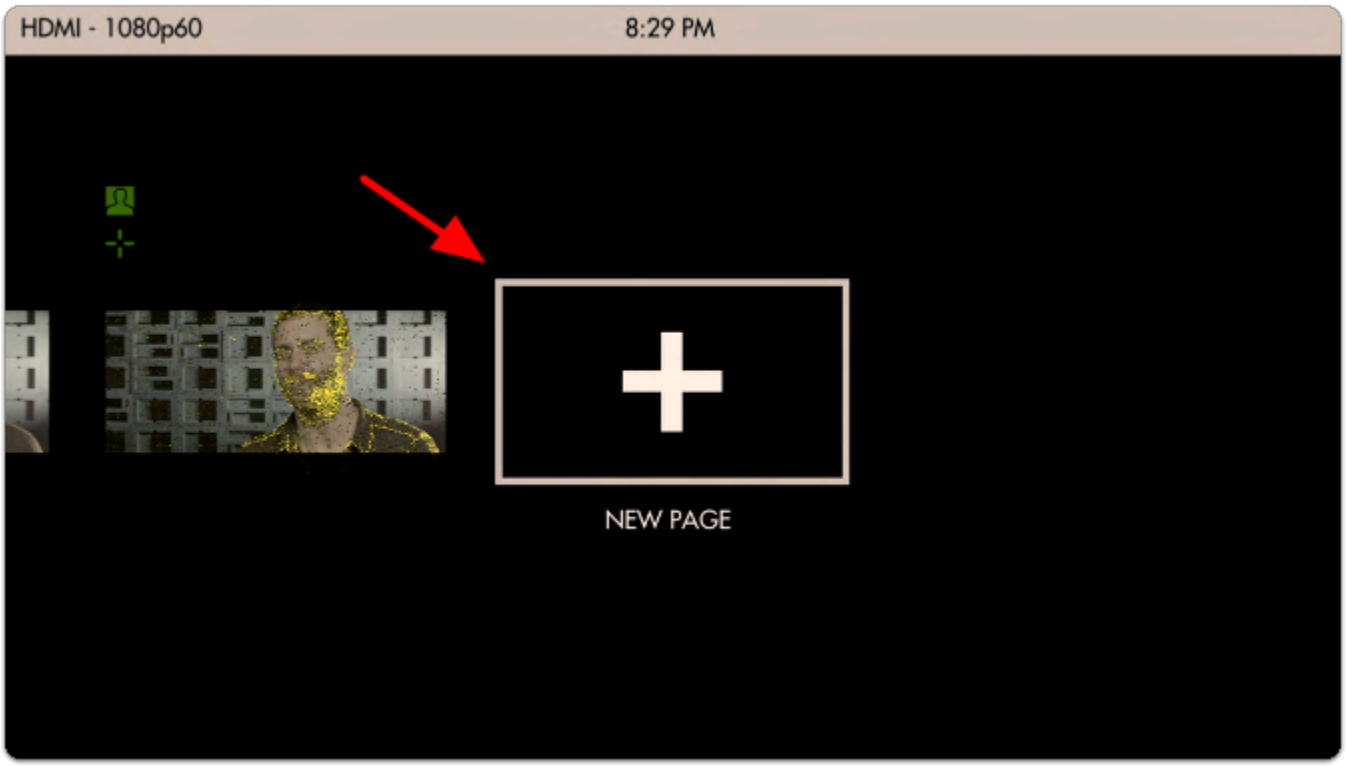



Now we have a page that lets us **focus our shot** and **frame it up** properly for the common **2.39 aspect ratio**.

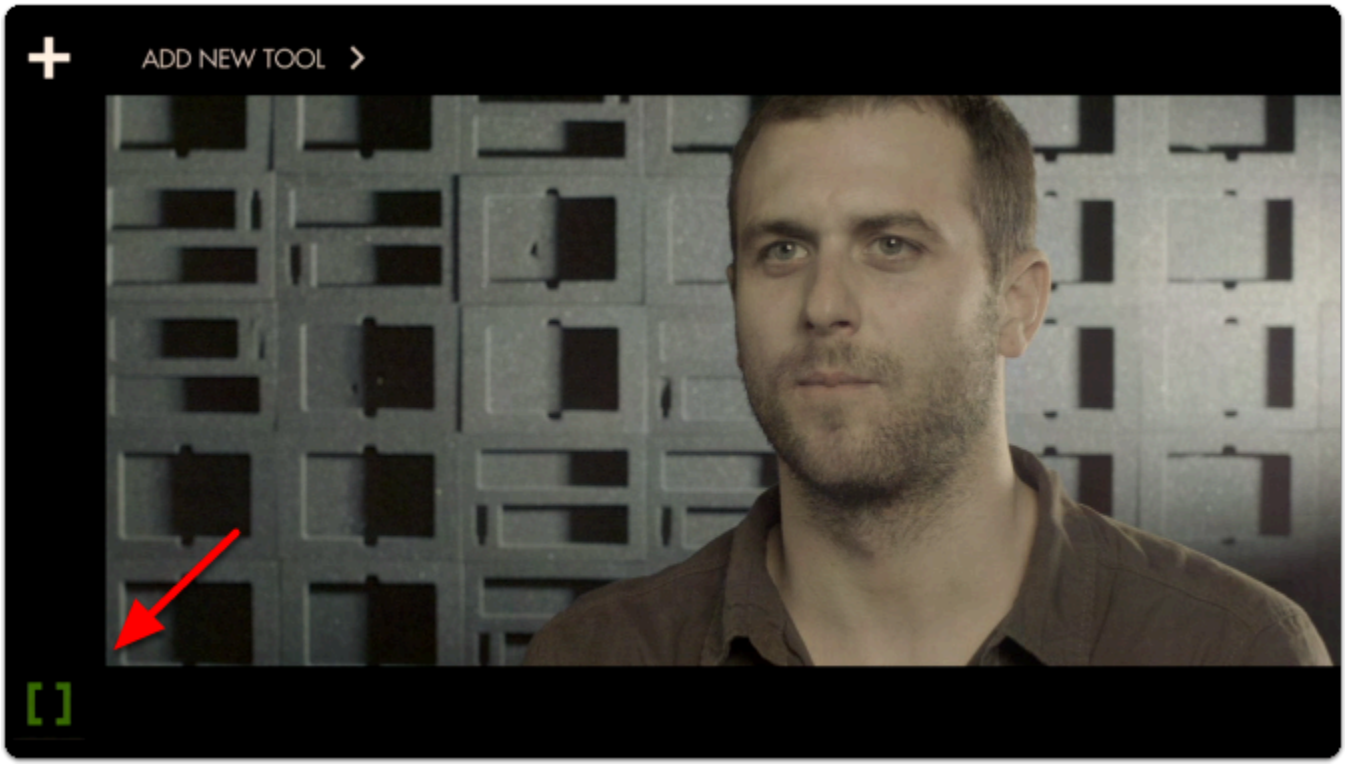
## Adding a Look (3D LUT) file to a page

**Look Up Table files (3D LUTs)** are a great way to **visualize color grades** without 'baking' anything into the footage - great for testing out different looks on set. Try our free **'Movie Looks' pack** which can be placed on an SD card for use on your monitor or at any point in post production.

Let's add a **Look** to a new page - start by swiping down to navigate back to the zoomed-out view, move to the far right and select **'New Page'** once more.

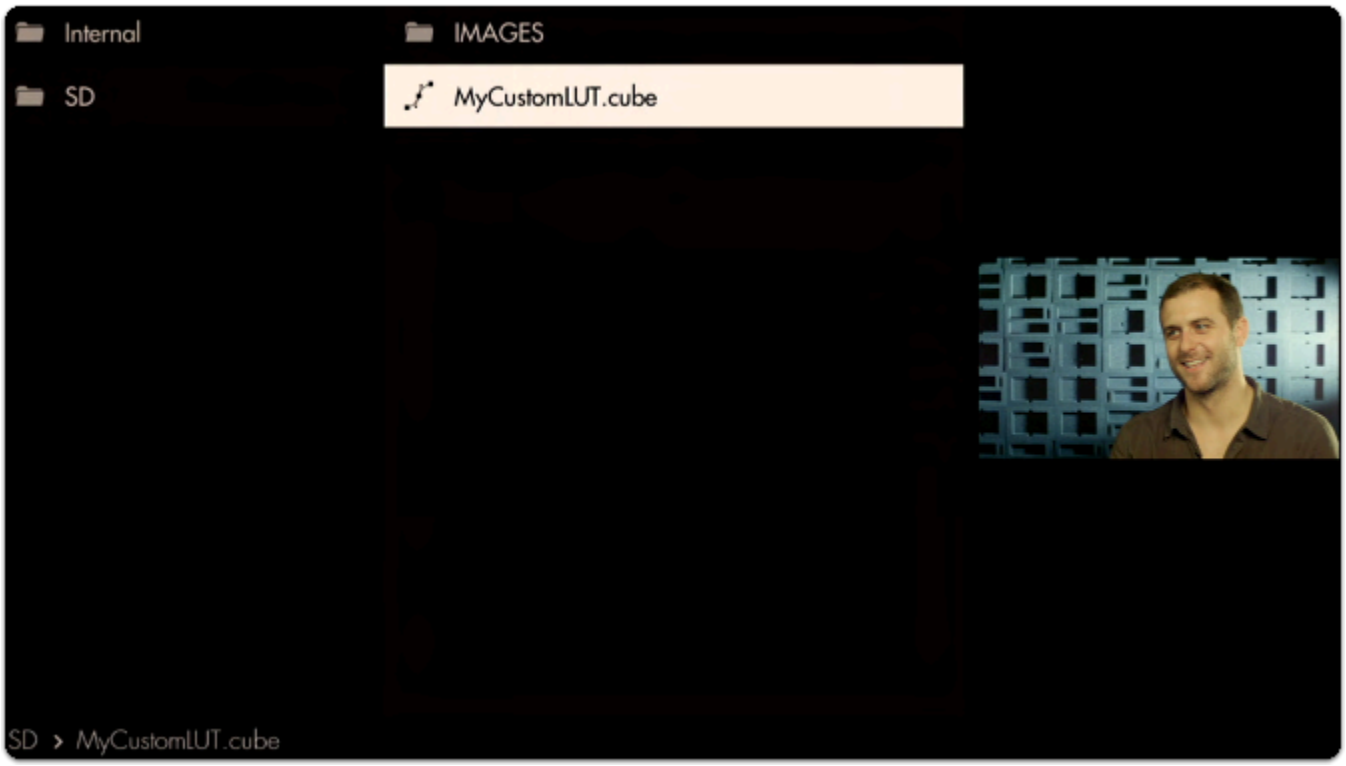



Notice how when you add a new page, the **Aspect Guide** that was set for 'all pages' **shows up automatically**.



Tap to add a new tool, navigate to **Overlay > Look** and select the '**+**'.

You will immediately be presented with a file browser to **select a 3D LUT file**. If you have any on an SD card, insert it into the monitor and it will be visible here.




Selecting the LUT applies it to this page.

Adding **several LUTs** to **several pages** can be a great way to test out looks for a shoot while mobile, enabling creative decisions to be made early rather than in post production.

To learn how to create your own color grade in Davinci Resolve and save the result as a LUT to be used on your monitor, check out the tutorial video (19m).

## Conclusion

As you can see Pages & Tools can take very different roles depending on your needs.  Don't be afraid to experiment to find the best setups!

# How to Calibrate Your Monitor with Free Software (PagesOS 4)

Note: This article refers to SmallHD OS4, please refer to this tutorial for OS3.

Your SmallHD monitor's color is factory calibrated before it ships, however, as with all monitors, colors may begin to shift over time with use.

SmallHD  is happy to calibrate your unit for you, but you can also do it yourself using a calibration probe and computer software. This works by connecting your monitor to your computer as a computer display and using calibration software to create a calibration LUT to load into your SmallHD monitor.

We recommend probes that can handle at least 2000 nits of brightness and 1:100000 contrast ratios (depending on your monitor Nit level, your probe should handle more). Common professional calibration probes include the Klein Instruments K-10A and Colorimetry Research CR-100. More budget probes are available on the market, you will get what you pay for in many cases.

SmallHD uses the professional software CalMan with a Klein Probe. Some probes will include their own software and there are free/open-source options on the market (some may or may not utilize a color probe): DisplayCAL, Calibrize, and Natural Color Pro among a few . We will use DisplayCAL as an example, paired with the K-10A probe.

**THINGS YOU NEED:**

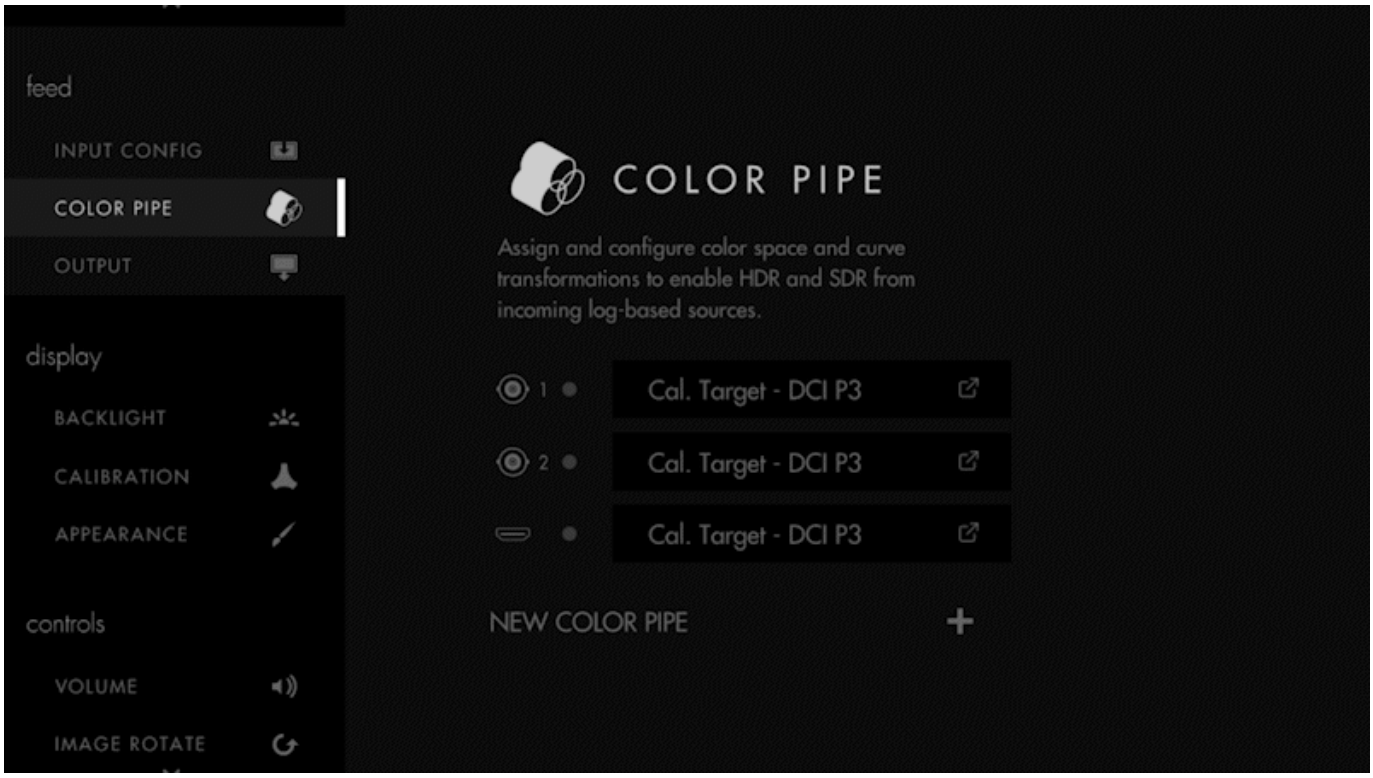
- Monitor
- Computer
- Software
- SmallHD OS4 or later (in this example)
- SD Card 2,4,8,16 GB properly formatted

**WORKFLOW:**

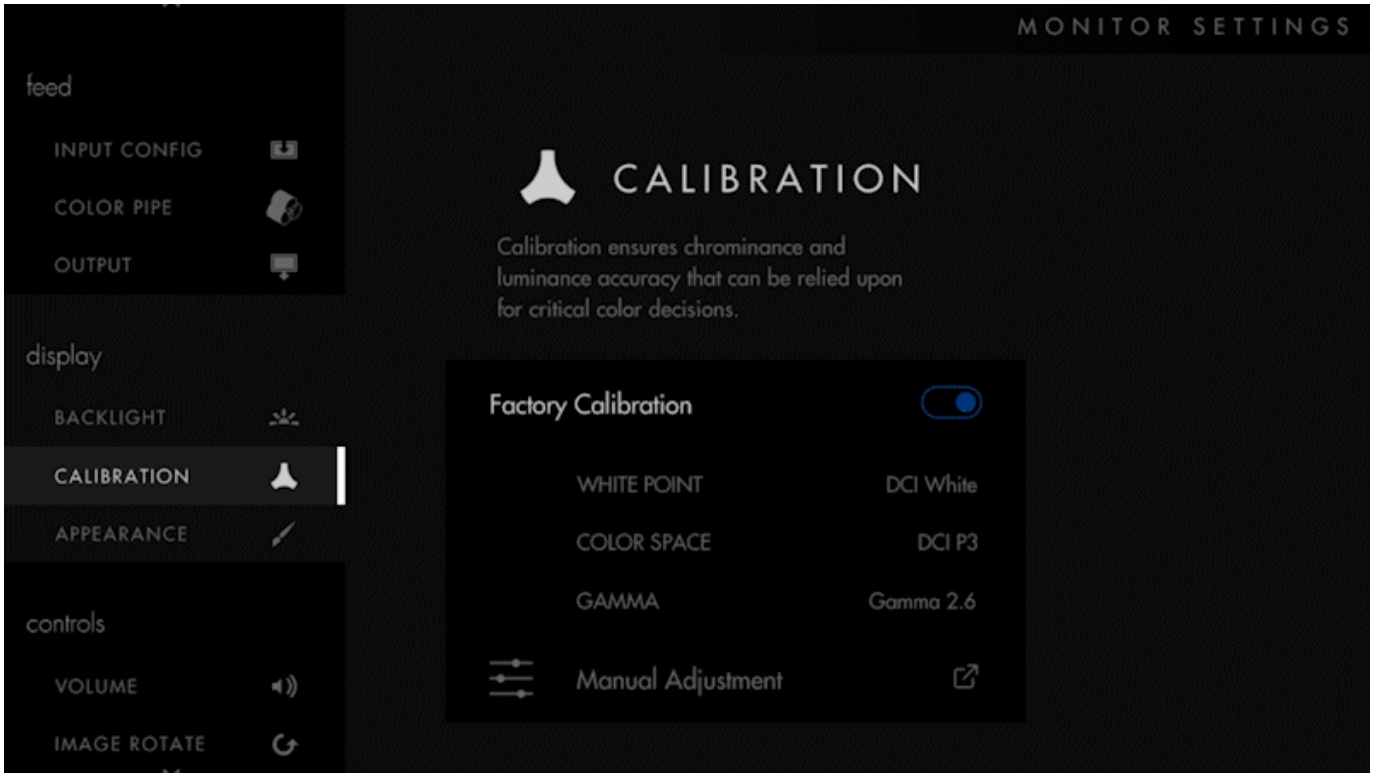
First, power on and connect your SmallHD monitor to your computer via HDMI and make sure it's detected as a display and receiving a signal.

Turn on the monitor allow it to warm up at least 45 minutes.  You can run video or a test signal during this time.

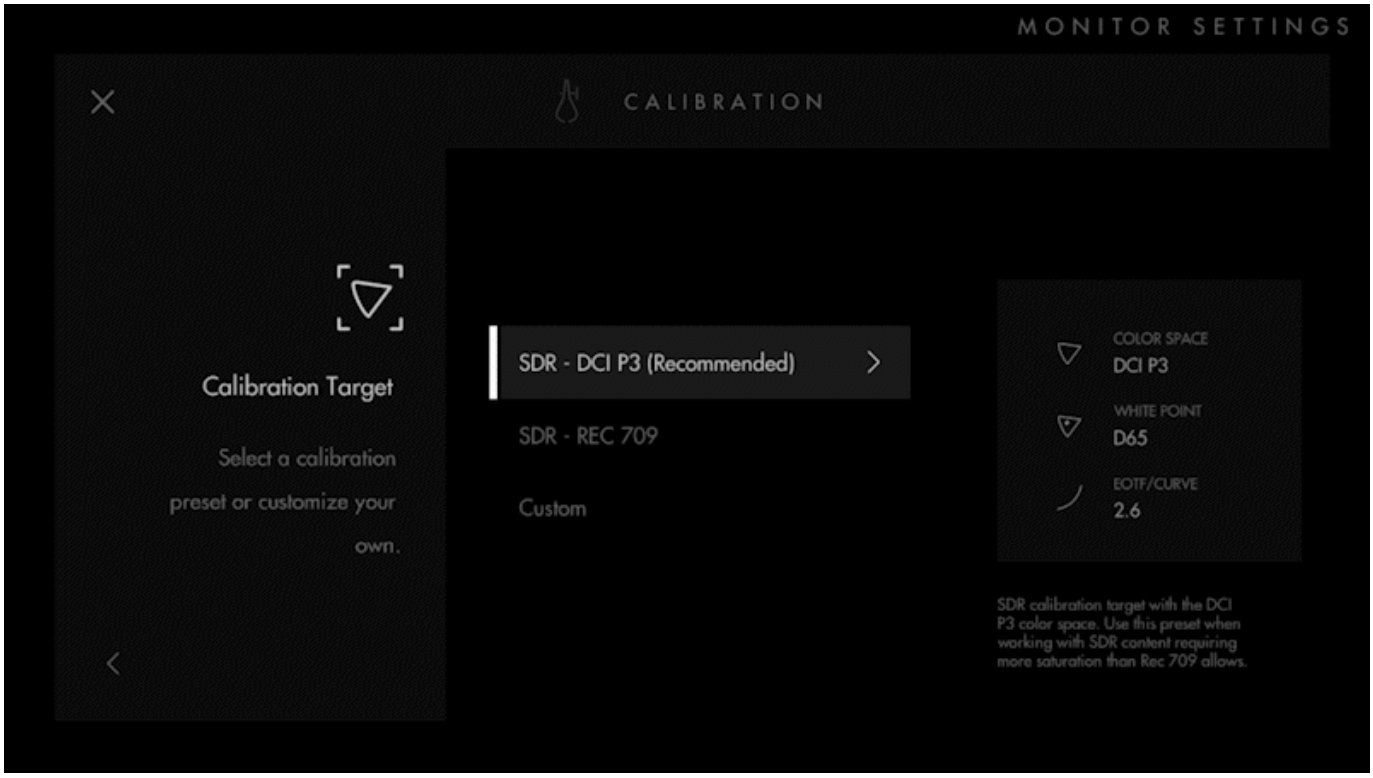
Enter your monitor's settings page and select Calibration.



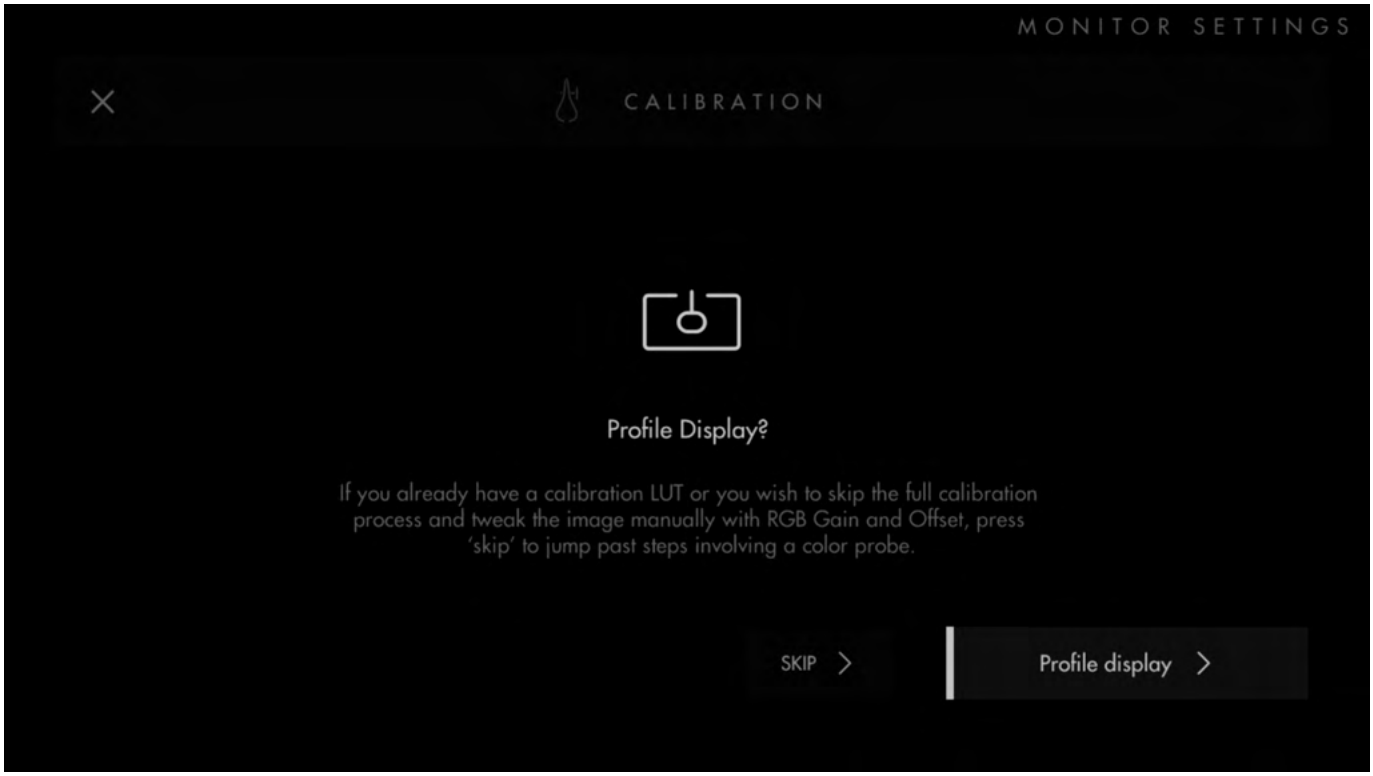

Scroll down to reveal additional options and select Create New Calibration. You will enter a calibration wizard with introductory pages to the calibration process.



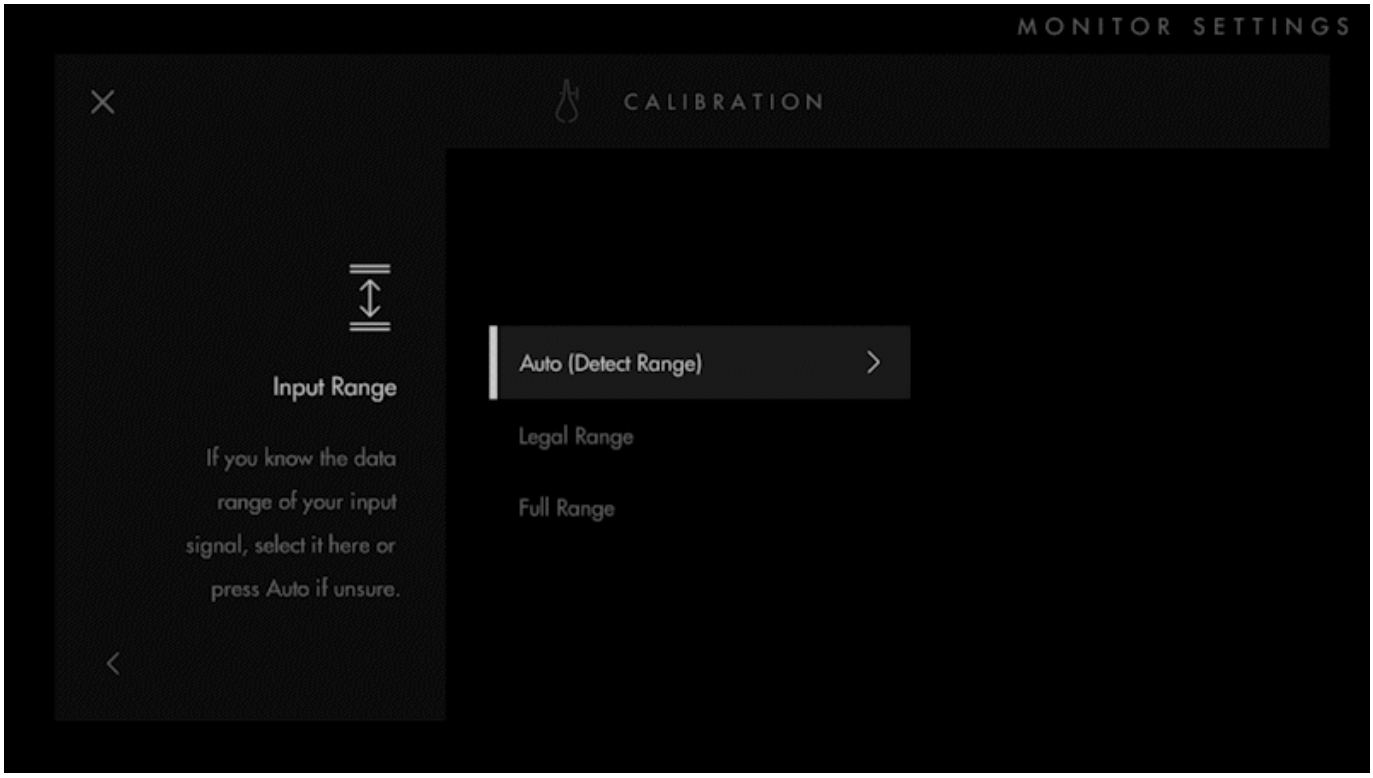

After clicking through the introduction, you will choose your calibration target. For non-HDR monitors, SDR - REC709 will be the recommended calibration. Select your calibration target and in the next screen, select Accept Calibration Target.



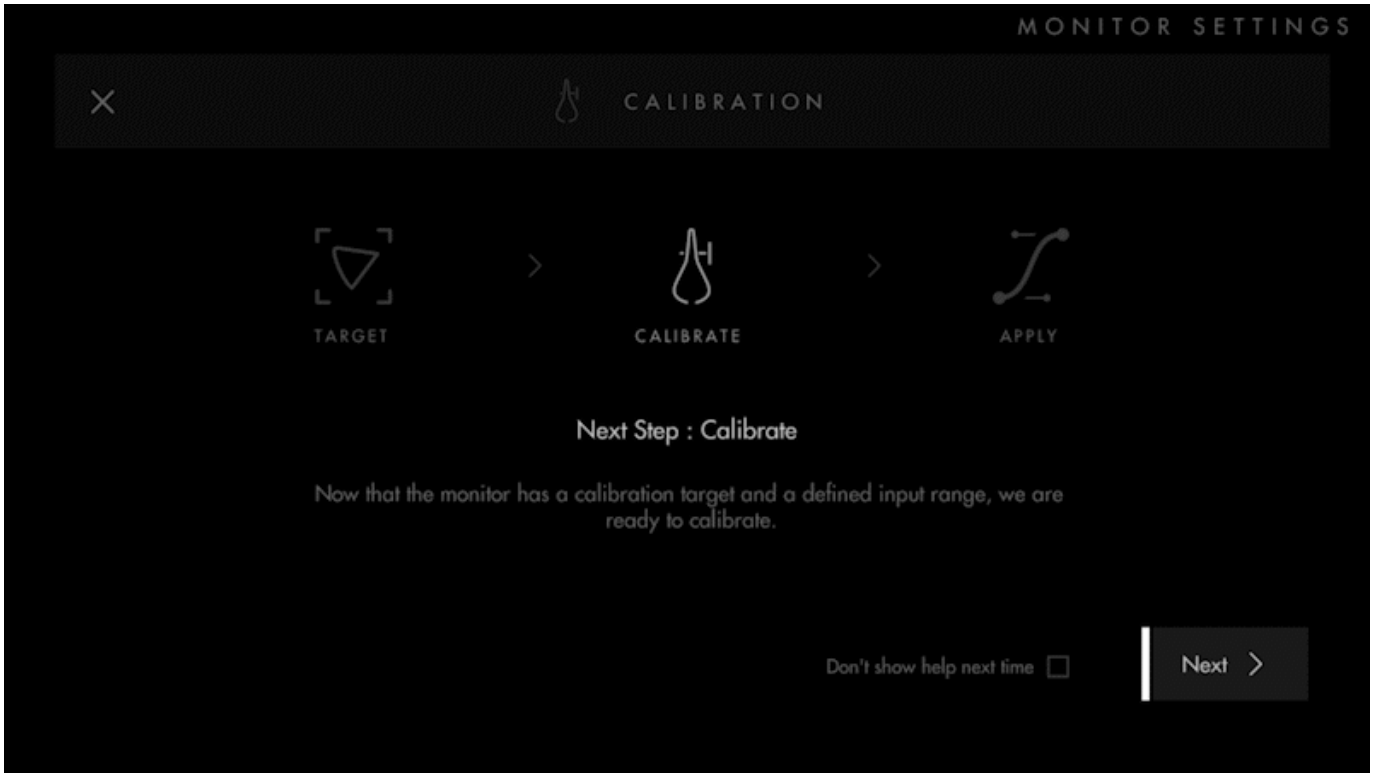

In the Profile Display? Page, select Profile Display if a new calibration LUT hasn't already been created.



Next, you'll be asked to select the Input Range. Select Next and you will have the choice of Auto calibrating by feeding full white and black screens into the monitor or just choose either Legal or Full Range options.  (We recommend Full)




Next you will Calibrate. Select Next and you will be brought to a calibration UI that will display the feed from your computer with no calibration applied, so your probe can start measuring.



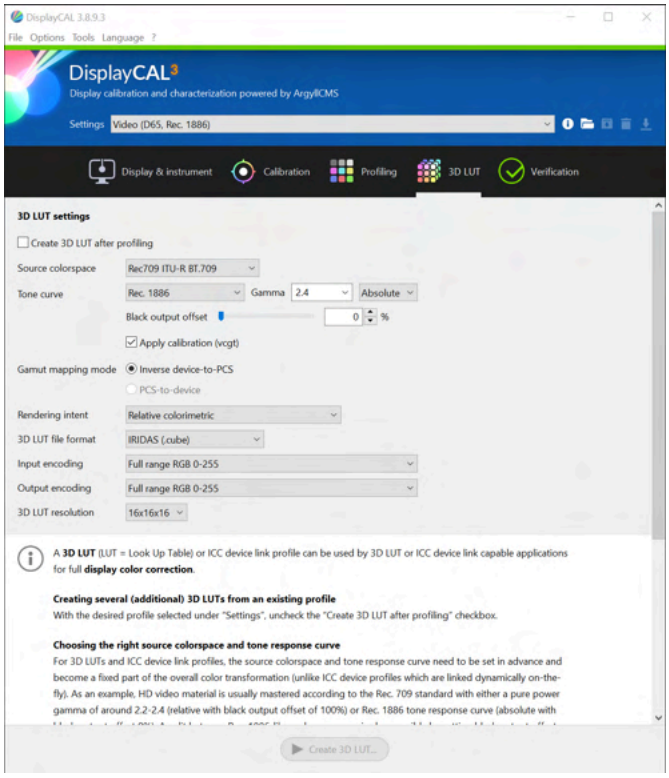

Position your probe according to the manufacturer's recommendations.

Follow the DisplayCal instructions, making sure that you have the correct monitor and probe selected. Also make sure that your calibration settings match the calibration target. We are not affiliated with DisplayCal so please refer to the documentation and support from DisplayCal for operating the software.

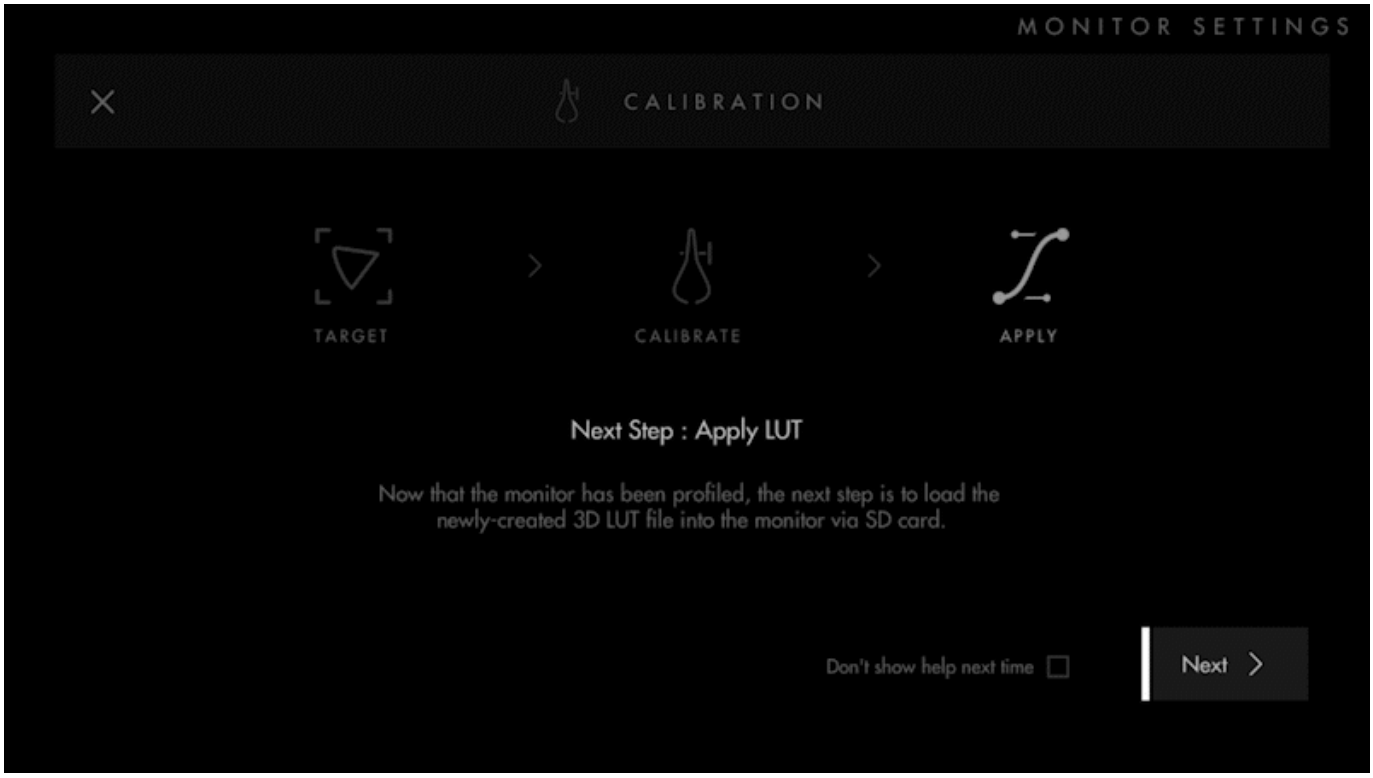
Be sure to select the correct color space (rec.709 etc) and white point to match what you chose in the menus.

You will have an option to test this calibration to be sure its correct.  Cheaper probes will possibly not be accurate so they should be checked, it may take a second or third run to get the unit the way you want it to be. Showing true white.

After calibration is complete, create a calibration LUT from the 3D LUT tab. Load this LUT onto an SD card and insert it into your monitor.

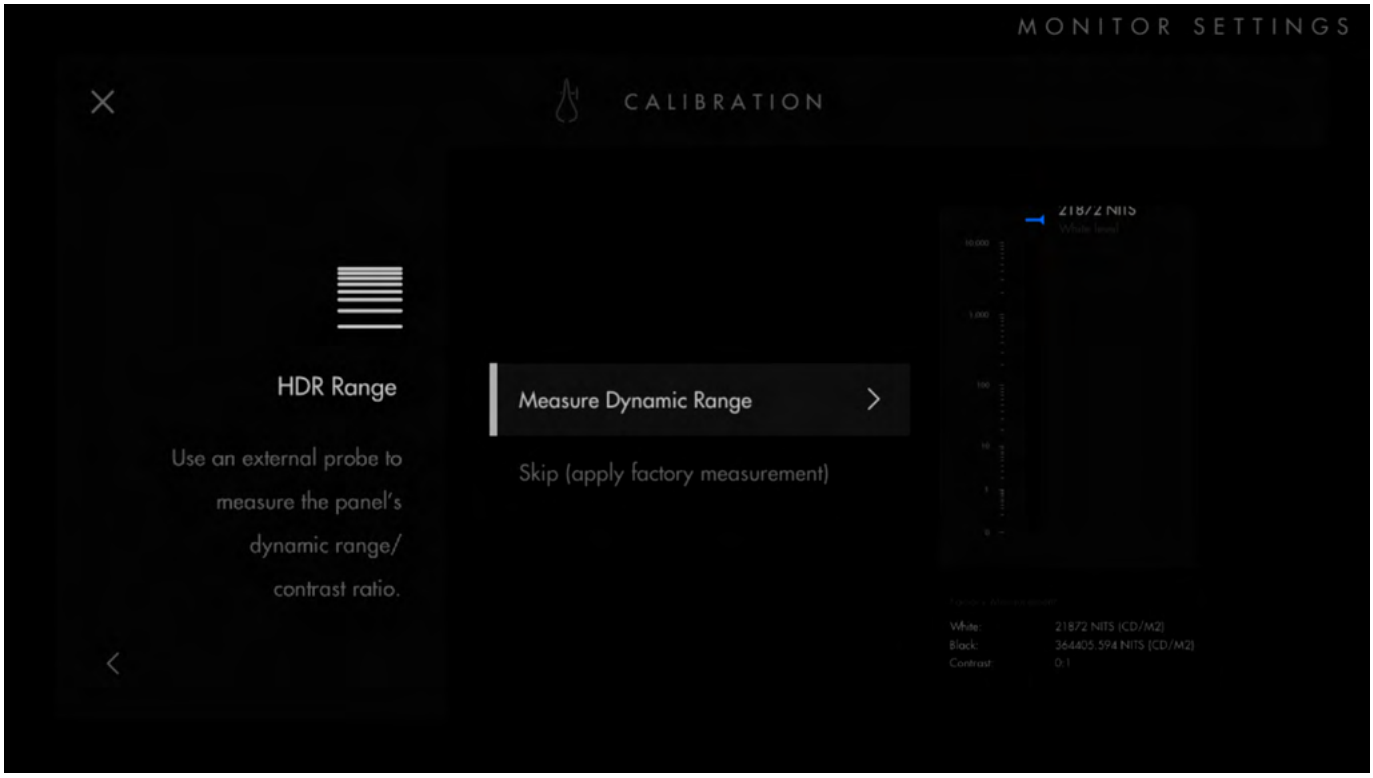



On your monitor, which should still be in the calibration screen, select Done and in the following page, select Next then Browse for LUT

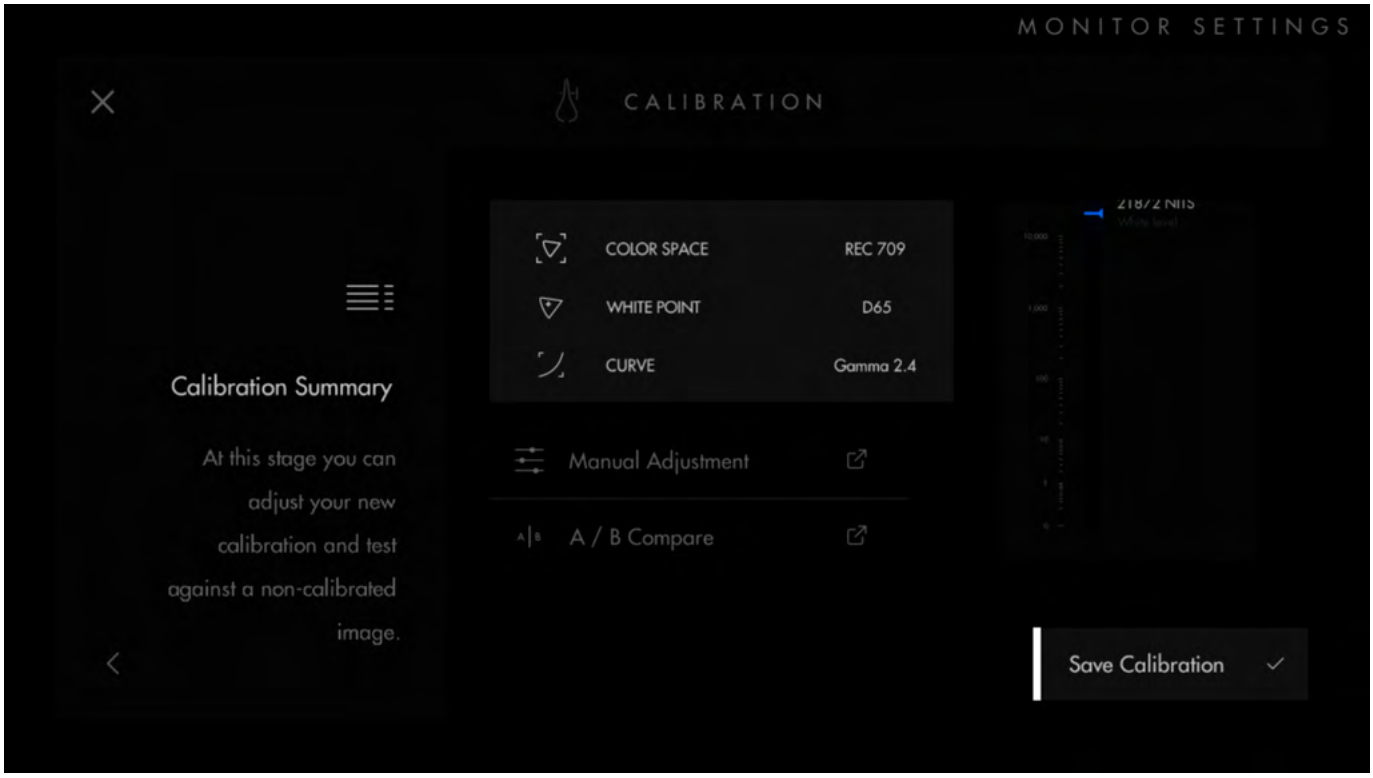


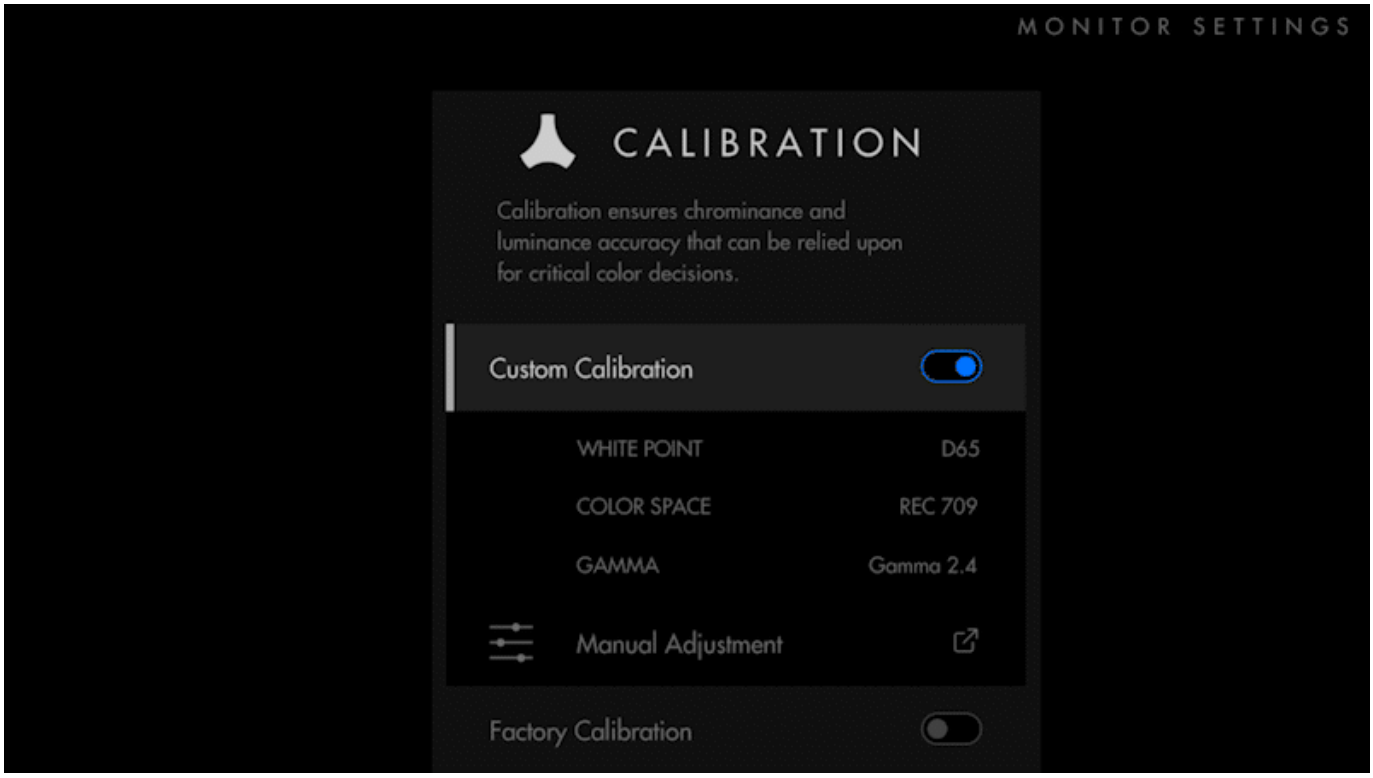
Select the LUT file you created and select Select. In the confirmation window, you can see your applied LUT affecting the screen. Our new calibration is more natural compared to the blue shifted old calibration. Select Keep to continue.

Next you will be prompted to select your HDR Range option. You can use your probe to measure the monitor's dynamic range and enter the values, or select Skip to apply factory measurements. We will skip in this example.




You will be presented with a Calibration Summary screen. Here you can use Manual Adjustment to tweak the calibration, as well as compare a before and after with A/B Compare. Select Save Calibration to save your settings.




Your calibration will show up as Custom Calibration in the Calibration settings. You can toggle between Custom Calibration and Factory Calibration at any time.