702 Bright User Guide



Table of Contents

Regulatory Information 4
Legal Information 5
User Interface 6
User Interface Quick-Start (Joystick and Custom Function Buttons) 7
Working with Pages 16
Pixel Zoom 20
Output Preview Page 23
Settings Menu 25
Tutorial for Joystick Monitors (section) 26
Input Config/Output 27
Backlight 29
Controls 46
Capture 54
Accessories 57
Interface 59
User 67
System 70
Tools - Framing 84
Aspect (guides) 85
Safe (guides) 91
Crosshair 94
Crosshatch 96
Tools - Exposure 98
Exposure Assist (False Color) 99
Zebra 120
Color Picker 128
Tools - Scopes 136
Histogram 137

Waveform 145
Vectorscope 157
Tools - Focusing 164
Focus Assist 165
Peaking 171
Tools - Overlay 173
Look (3D LUT) 174
Image Overlay 179
Image Capture 185
Audio Meters 197
Metadata 200
Tools - Scale 202
Crop & Scale 203
Size & Position 211
Anamorphic 219
Tools - Addons 221
RT Teradek Motion Overlay 222
Shotover Gimbal Overlay 224
Firmware Updates 225
PagesOS 3 Software Update 226
Samples & Tutorials 228
How to use Look (3D LUT) files with your monitor 229
How to make a LUT 230
How to calibrate your monitor (PagesOS 3) 235
Focusing Tips 237
Exposure - Case Study 241
How to use Tools - Case Study (Joystick) 255
How to Calibrate Your Monitor with Free Software (PagesOS 4) 267

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.

User Interface

User Interface Quick-Start (Joystick and Custom Function Buttons)

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

A tutorial is built into the monitor itself under Settings > Help which will run you through the basics via on-screen prompts. This written guide can be followed separately if you don't have a monitor in your hands to train with.

Navigation & Interface



A. Joystick

To Navigate, simple use of the Joystick Button:

- **Left or Right** - Change Pages
- **Down** - Enter Pages mode
- **Up** - Zoom or Exit Pages mode
- **Press In** - Select and open the TOOL bar

B. Back/Power Button

Press the Back (<) Button to:

- **Close the current page**
- **Navigate back/exit**
- **Power Off (on some models) - hold for 3+ seconds to power off.**

Custom Function Buttons

Custom Functions buttons can be programmed as shortcuts, tools, or configurations.

To Customize:

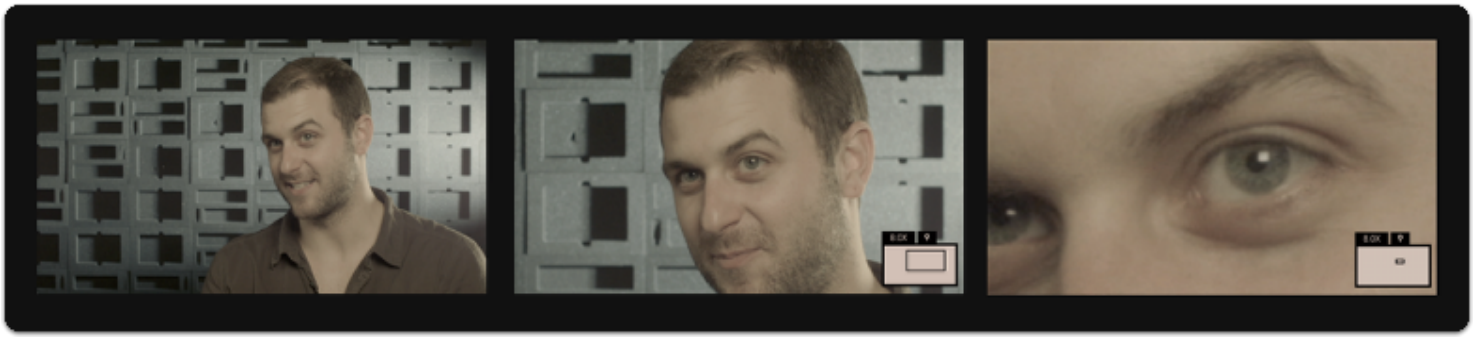
1. Press and hold any Function button to enter the **Function Buttons page**.
2. To program the Function Button, tap to select a **Shortcut**, **Tool**, or **Configuration** from the lists.



3. Repeat these steps for all other Function Buttons (3 or 4).

Pixel Zoom

To zoom into any page for quick spot checks, press up on the joystick.



To pan when zoomed in, click the joystick.

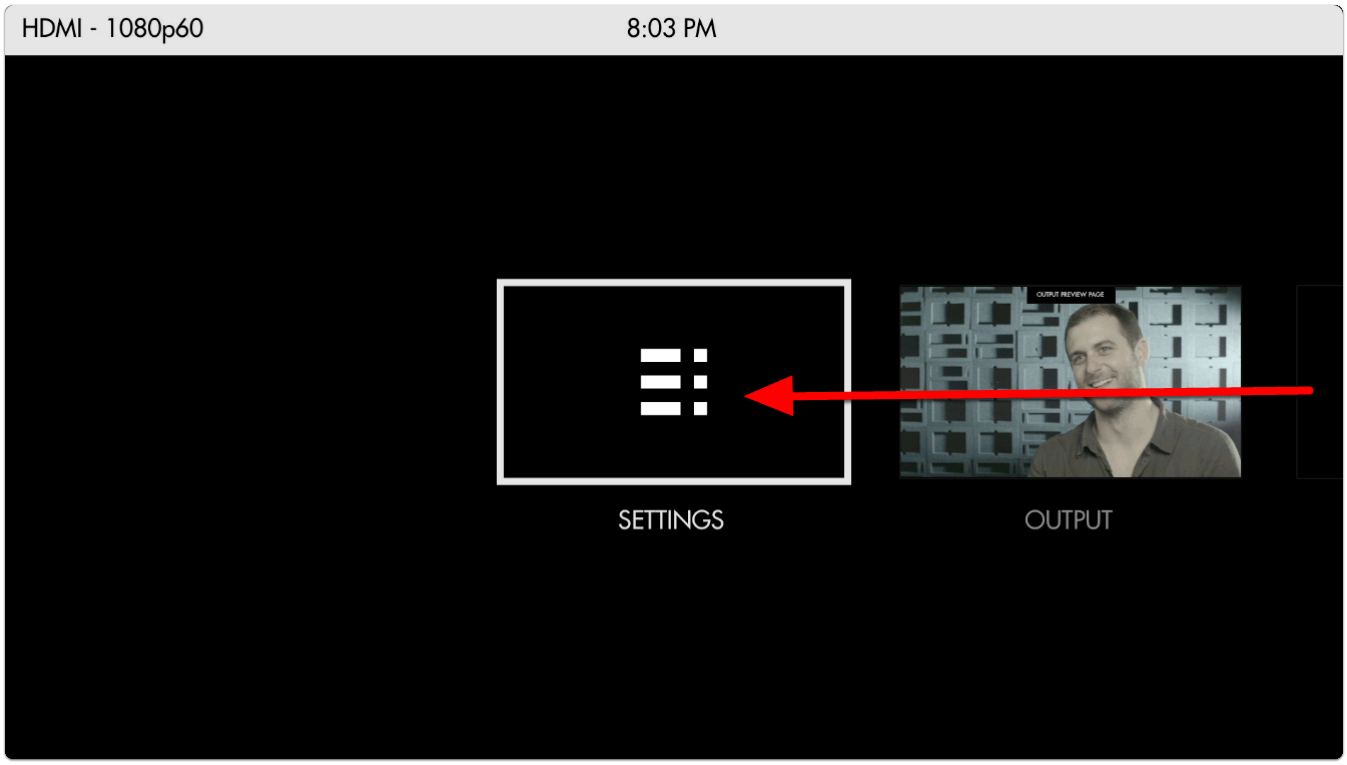


If you wish to adjust the maximum zoom level go to Settings > Interface > Pixel Zoom

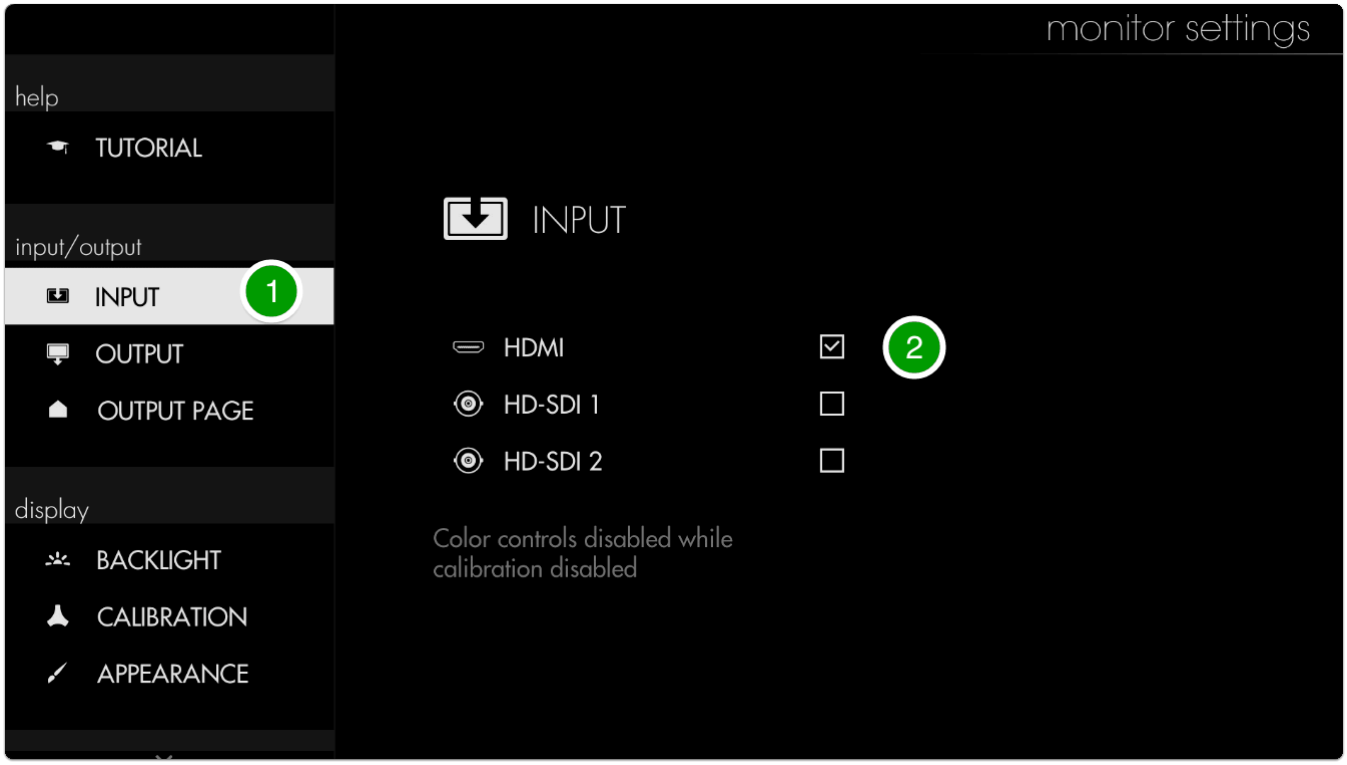


Select an Input

To start, ensure you have an input being displayed on your monitor by visiting the **Settings** page.



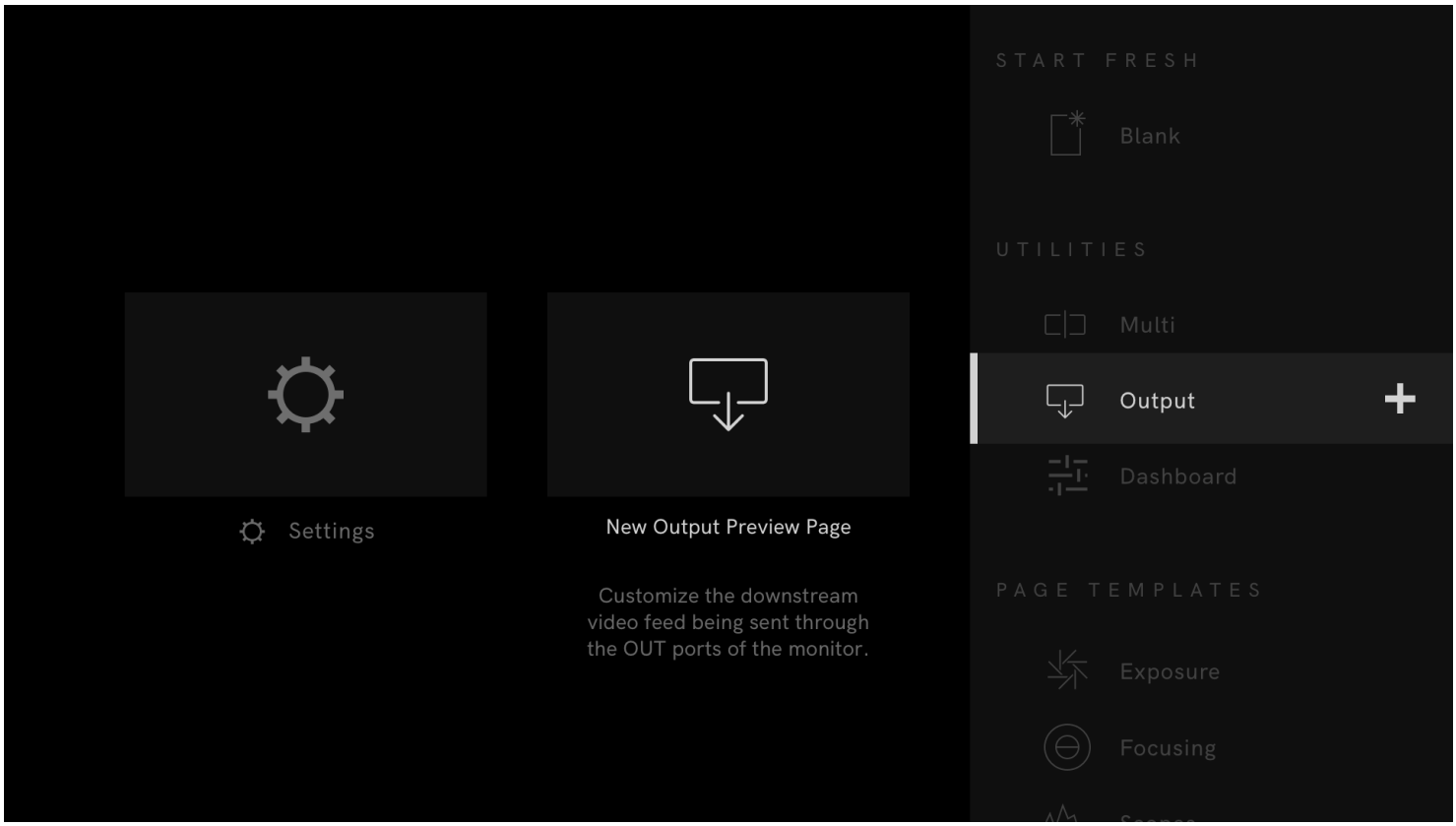
To select the monitor's input **press the joystick left** until you reach the **Monitor Settings** page. Navigate with the joystick to the **(1) Input section** and click to go 'into' the input menu. From here **(2) select HDMI or HD-SDI** depending on which signal you wish to display.



Press the Back button once to access the rest of the settings menu, and press it once more to get to a zoomed-out view of all the monitor's 'Pages'

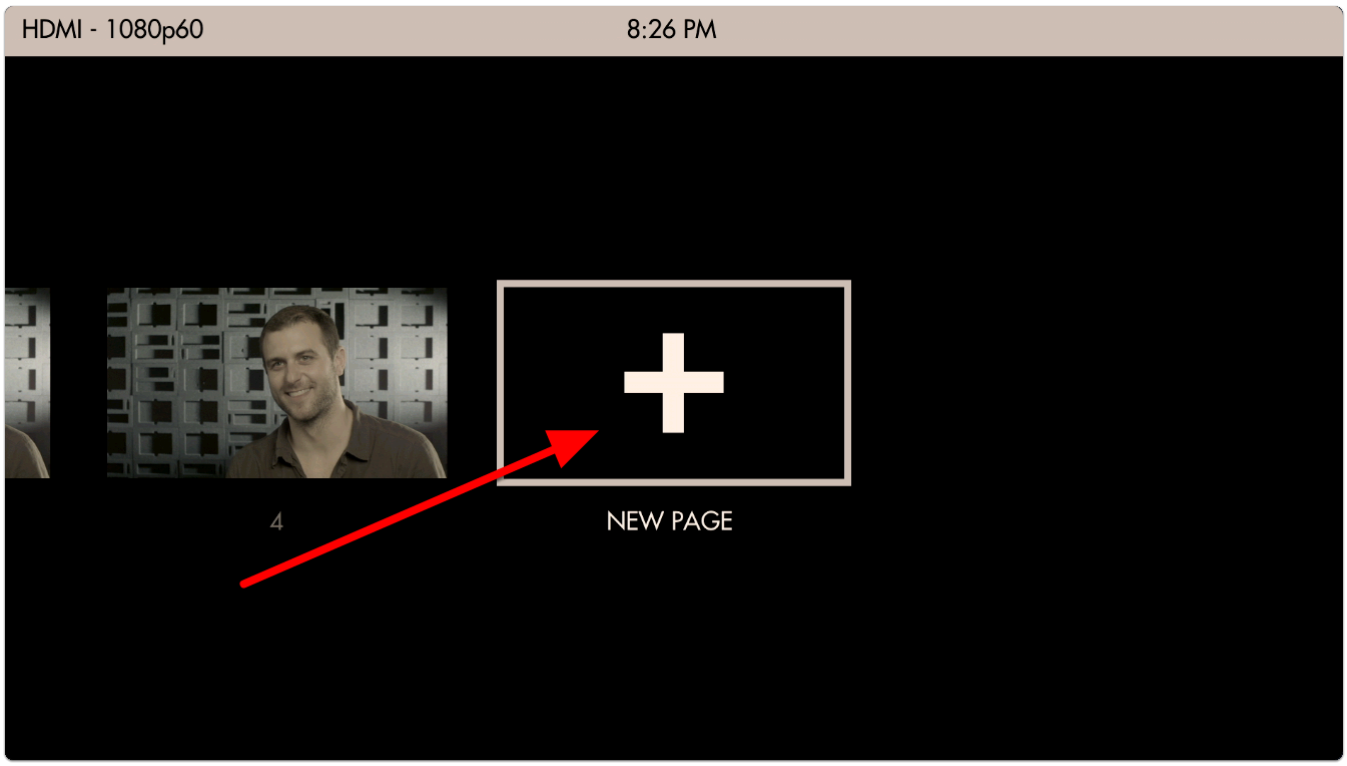
Utility Pages

Utility Pages can be added, moved (in order, Left or Right), deleted, or named. To enter Pages Mode, swipe/joystick down, then use the dial to navigate to the Utilities section on the right side of the screen.



- The **SETTINGS** page displays all the monitor's attributes and preferences, allowing you to manage settings that apply to the entire monitor.
- The **MULTI-VIEW** page lets you view multiple video feeds simultaneously and apply individual tools to each feed (Production Monitors only).
- The **OUTPUT PREVIEW** page will enable you to customize the downstream video feed being sent through the output ports of the monitor (Production Monitors only).
- The **DASHBOARD** page allows quick access to the most common settings.

While still zoomed-out, **scroll all the way to the right** and **click the joystick** (or press upward) **when the '+' is selected**. This will add a brand new page that you can customize however you wish to accomplish a range of on-set tasks. You can create a maximum of 8 pages.



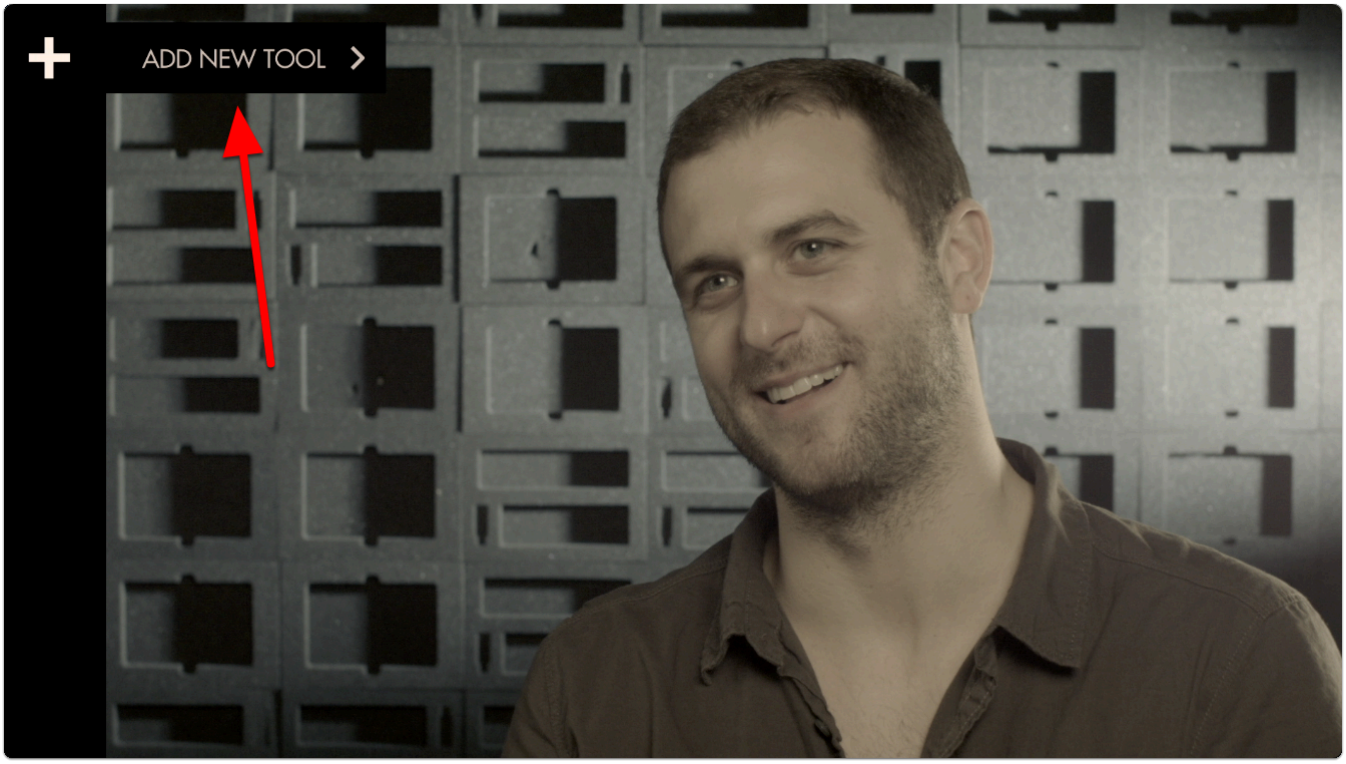
The entire monitor is based on the concept of customizable**Pages**- instead of having to enable and disable features individually when needing to change a setup, create pages with a **task** in mind, for example **setting exposure**, and quickly joystick **(switch)** between each page on-set for a highly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

Using Tools

Click the joystick 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.



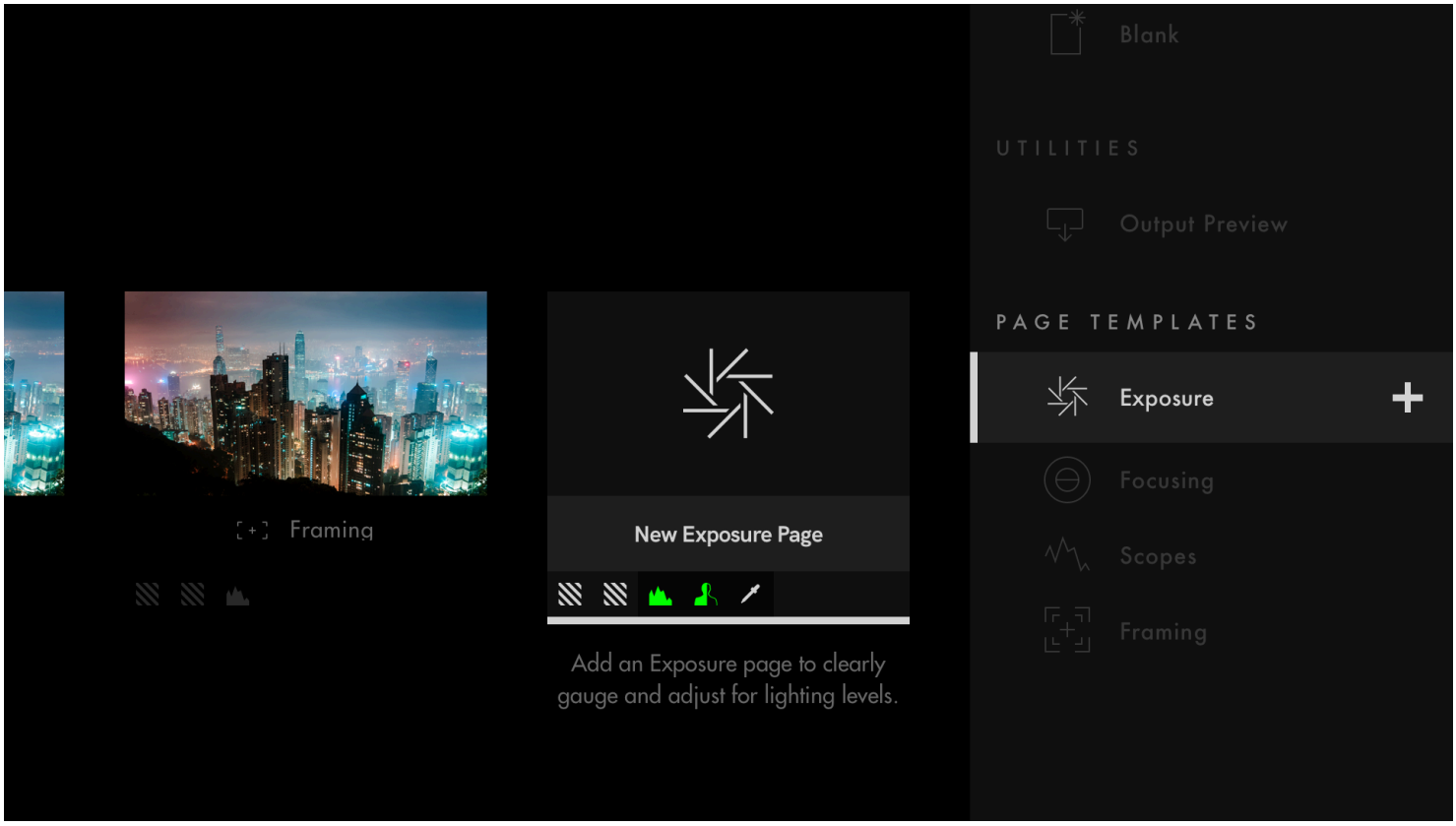
Tools offer a variety of... well... tools, to help you in your filmmaking process and workflows. This should not be associated with the PA who is just there because his Uncle is a producer... These are helpful tools. :)

Tools are broken down into subsections:

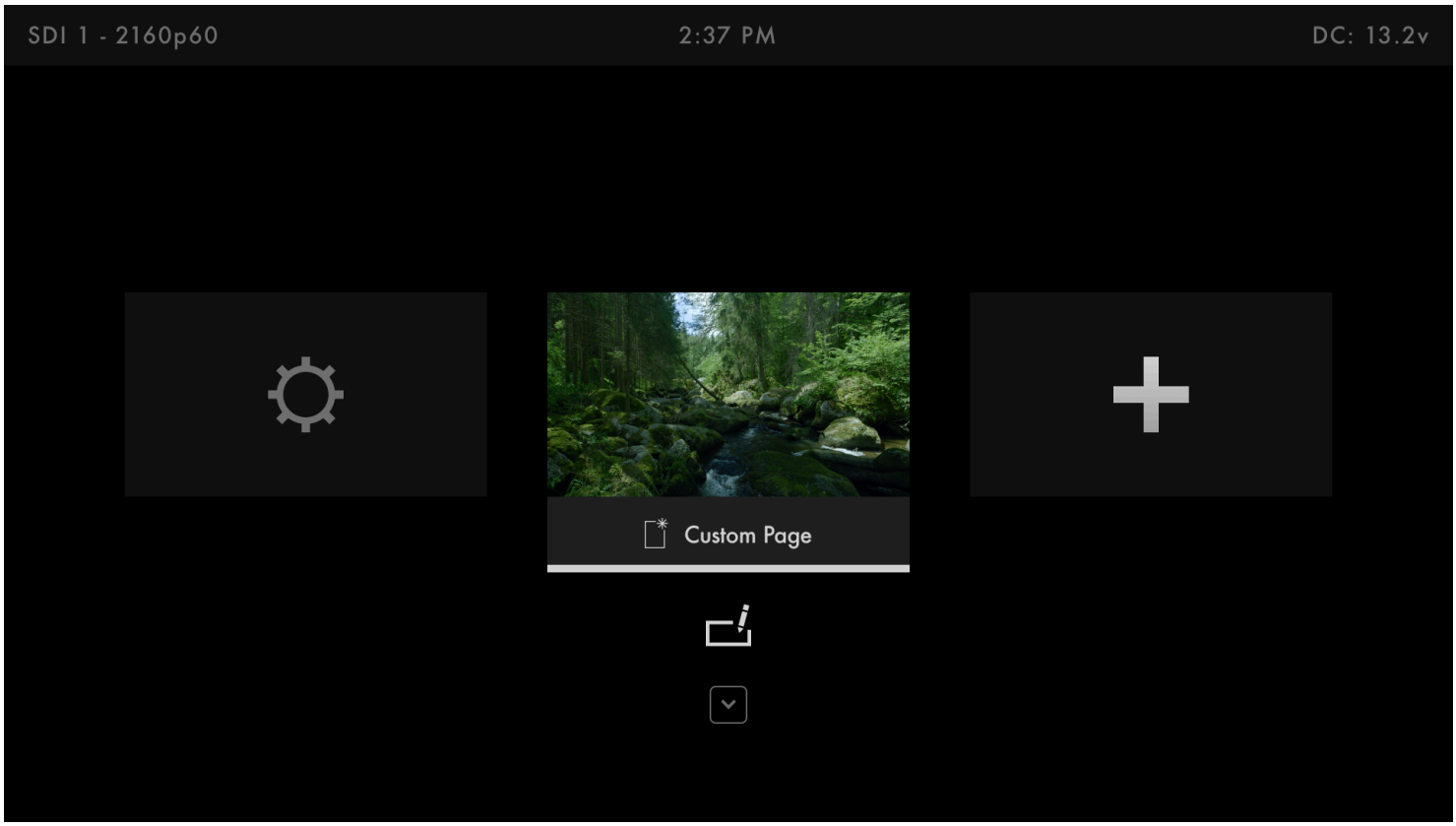
- **FRAME**
- **EXPOSE**
- **SCOPES**
- **FOCUS**
- **OVERLAY**
- **SCALE**
- **ADDONS**

Working with Pages

Pages lets you set up different views with tools across multiple screens, which can be customized to suit your needs. You can quickly swipe or use a joystick to switch between screens with the selected tools. For example, you can use False Color or Scopes to check exposure, then easily return to the final LUT view while using the audio tool during shooting.

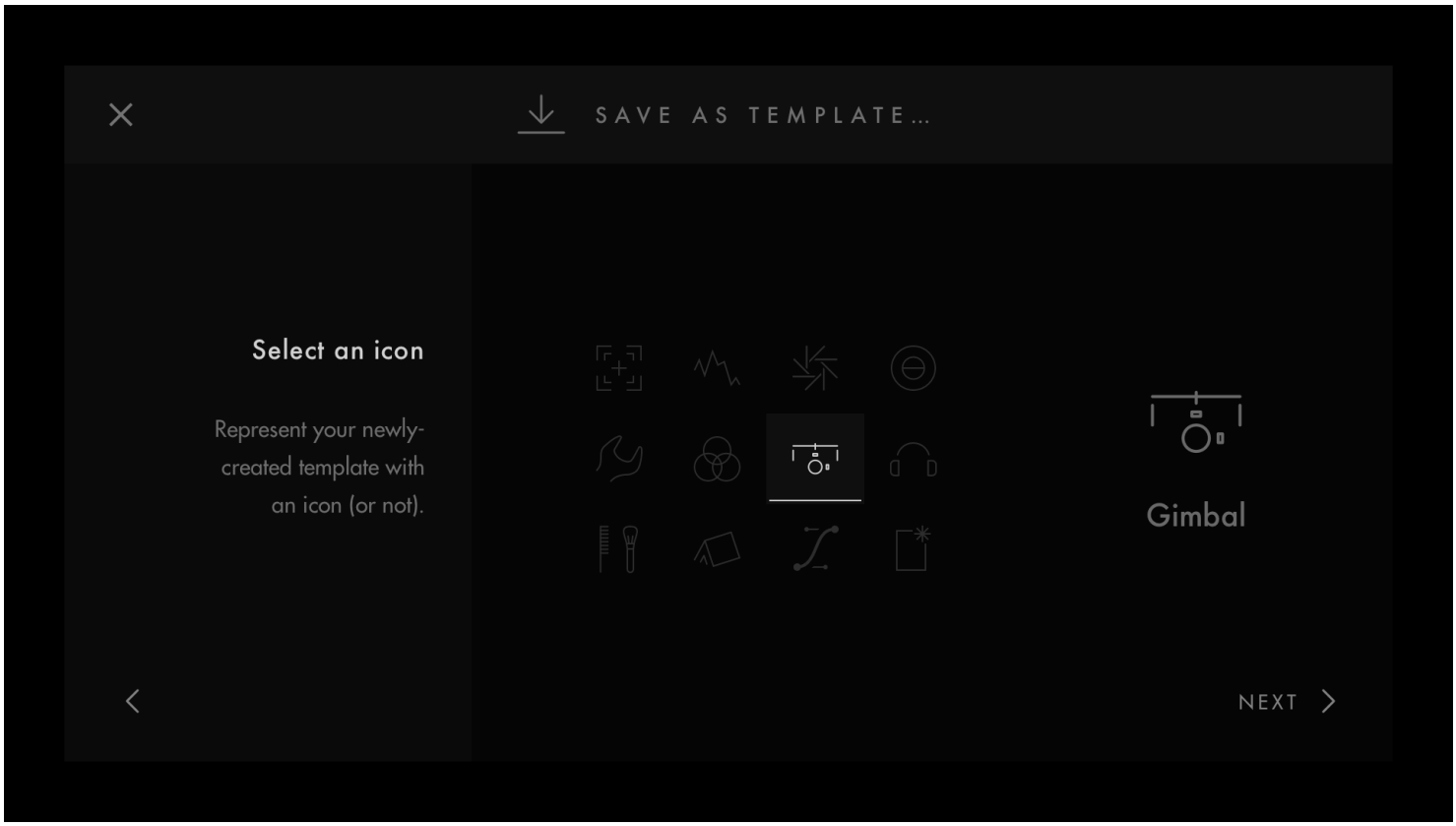


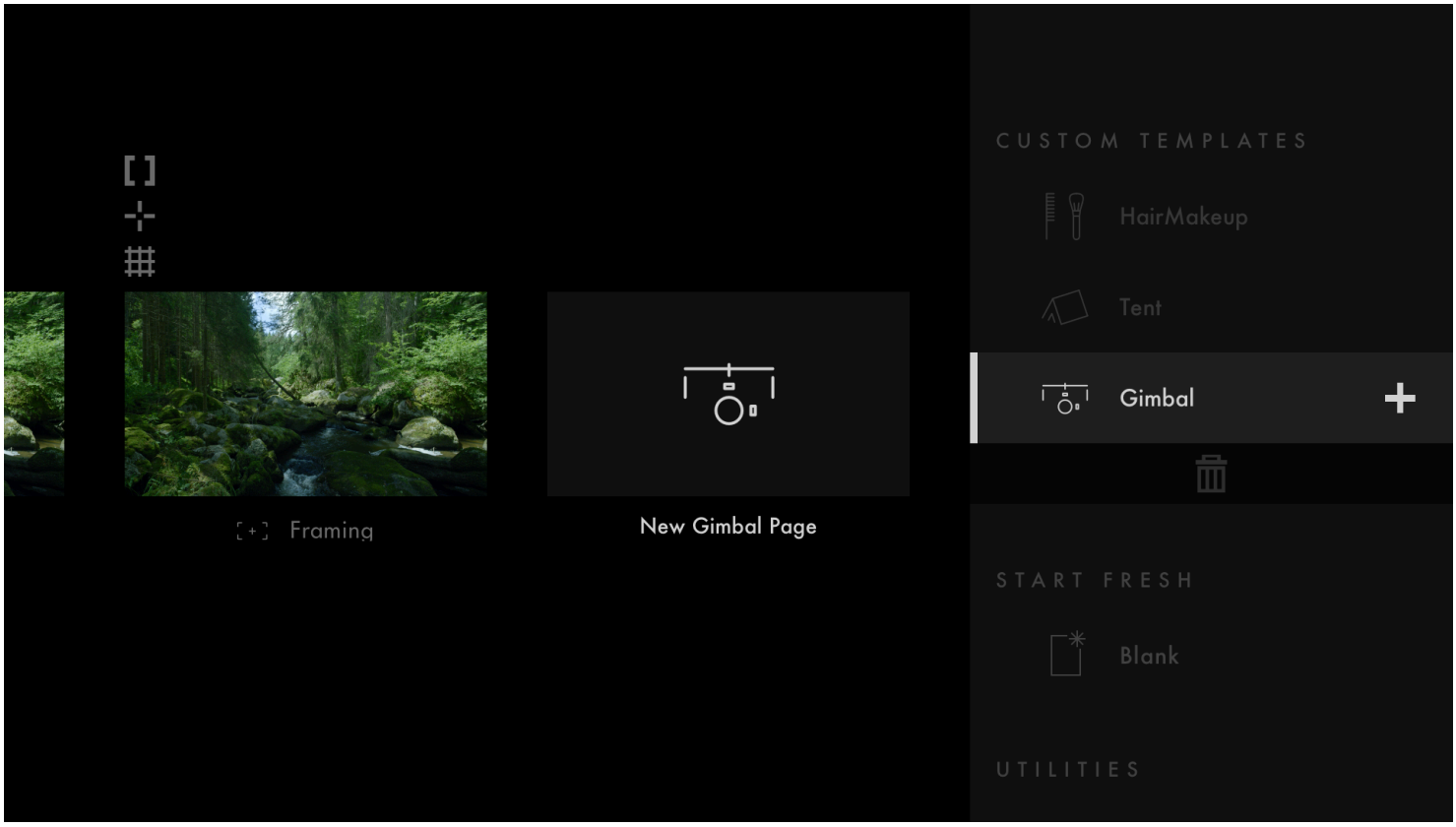
Pages can be added, Moved (in order, left or right), deleted, or named. To enter Pages Mode, swipe down on the display (Touchscreen monitor), or press down on the joystick (Production monitor).



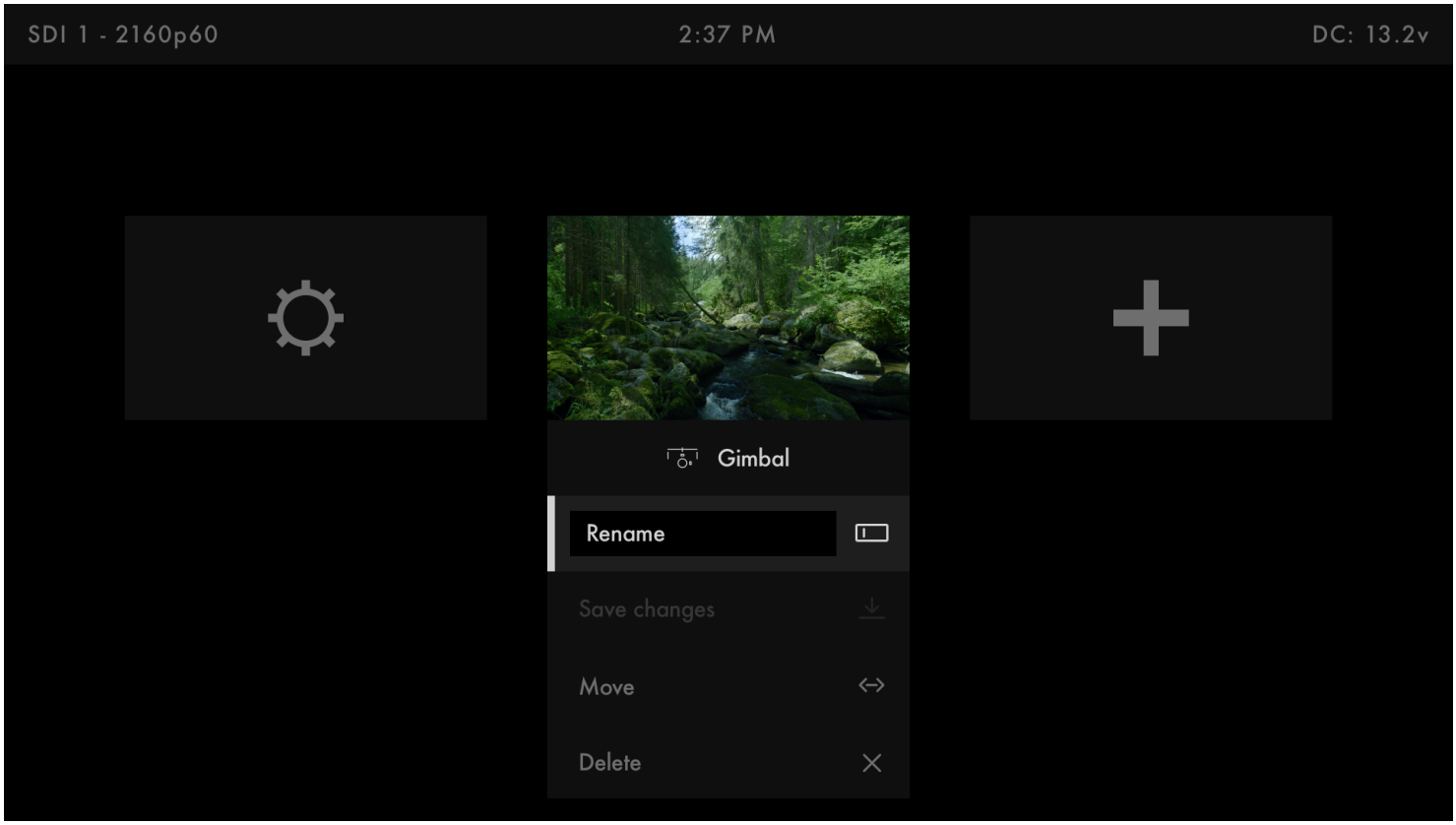
From here, to add a new Page, click the PLUS sign. You can create a maximum of 8 Custom Pages in SmallHD OS3, not including the Settings Page, Output Page, Dashboard Page, or Multi-View Page (if available on your monitor).

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.


SAVE AS TEMPLATE...
Select an icon
Represent your newly-created template with an icon (or not).
Gimbal
NEXT


CUSTOM TEMPLATES
HairMakeup
Tent
Gimbal
Framing
New Gimbal Page
START FRESH
Blank
UTILITIES

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 the status bar is hidden when working on a page.

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

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

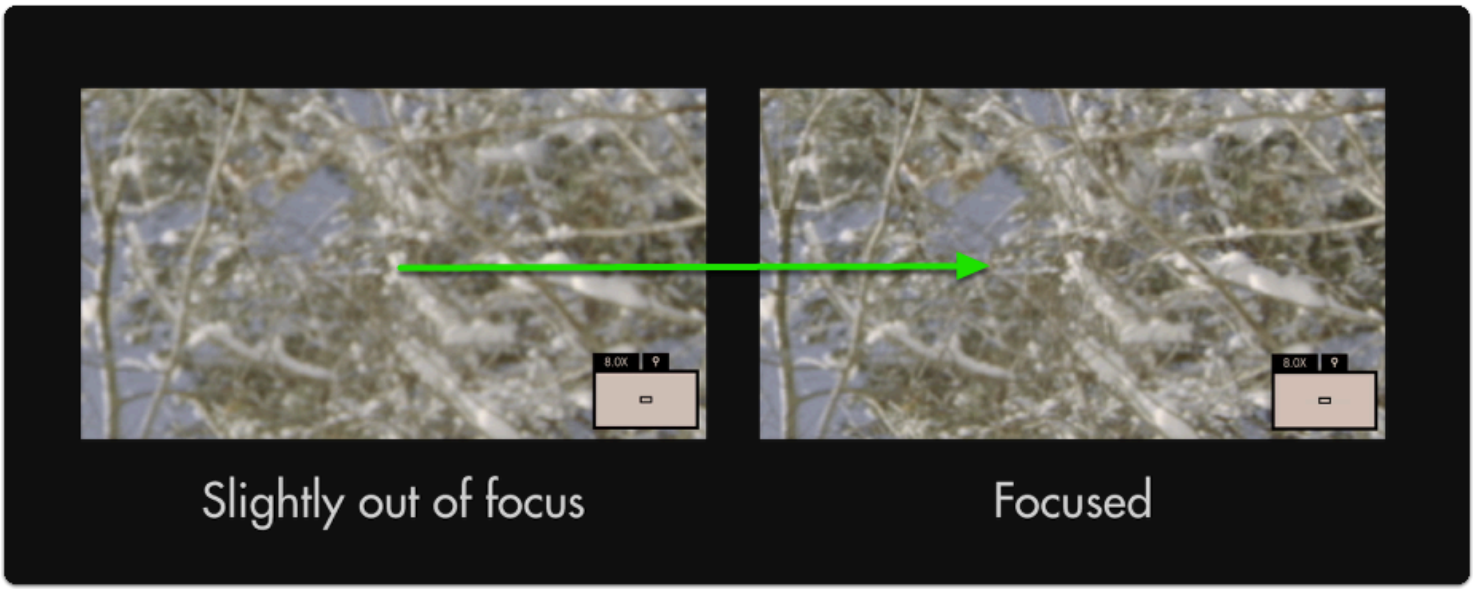
In this section we'll use Pixel Zoom to set focus and enable us to spot issues with our image.

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.



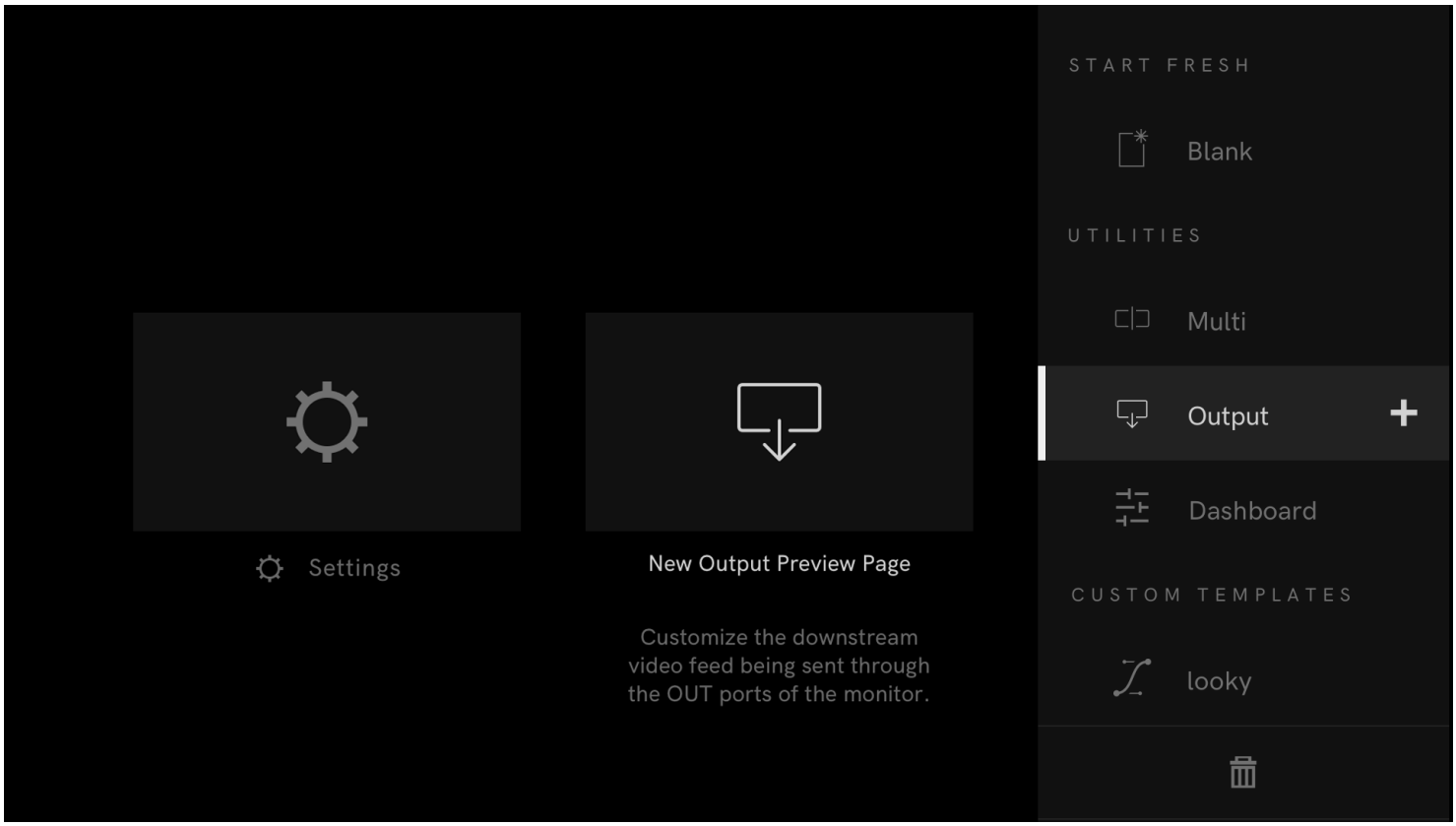
Pixel Zoom, **Focus Assist** and **Peaking** are excellent tools to help keep your shots in focus. We recommend trying each to find which works best for your shooting style.

Output Preview Page

The **Output Preview** page displays the video being sent downstream from your monitor to the selected output in the menu settings.



To **enable** the Output Preview page, press down on the joystick to enter Pages View, then use the dial to navigate to the **Utilities** section on the right side of the screen and select **Output Preview +**. To **disable** it, select **Delete** from the Output Preview page's dropdown menu. The available tools on the output page are limited to **Look** and **Add-ons**.


START FRESH
Blank
UTILITIES
Multi
Output
Dashboard
CUSTOM TEMPLATES
looky
Settings
New Output Preview Page
Customize the downstream video feed being sent through the OUT ports of the monitor.

Settings Menu

Tutorial for Joystick Monitors (section)

Tutorial Settings



If you wish to have your monitor teach you about your monitor, this is where to go.

Start Tutorial (button)



Begins a step-by-step overview to get you familiar with the monitor's user interface.

Once the Tutorial is started, you may exit anytime by pressing the BACK (<) button twice quickly at any time.

The Tutorial will walk you though adding a page, adding a tool and swiping between pages.

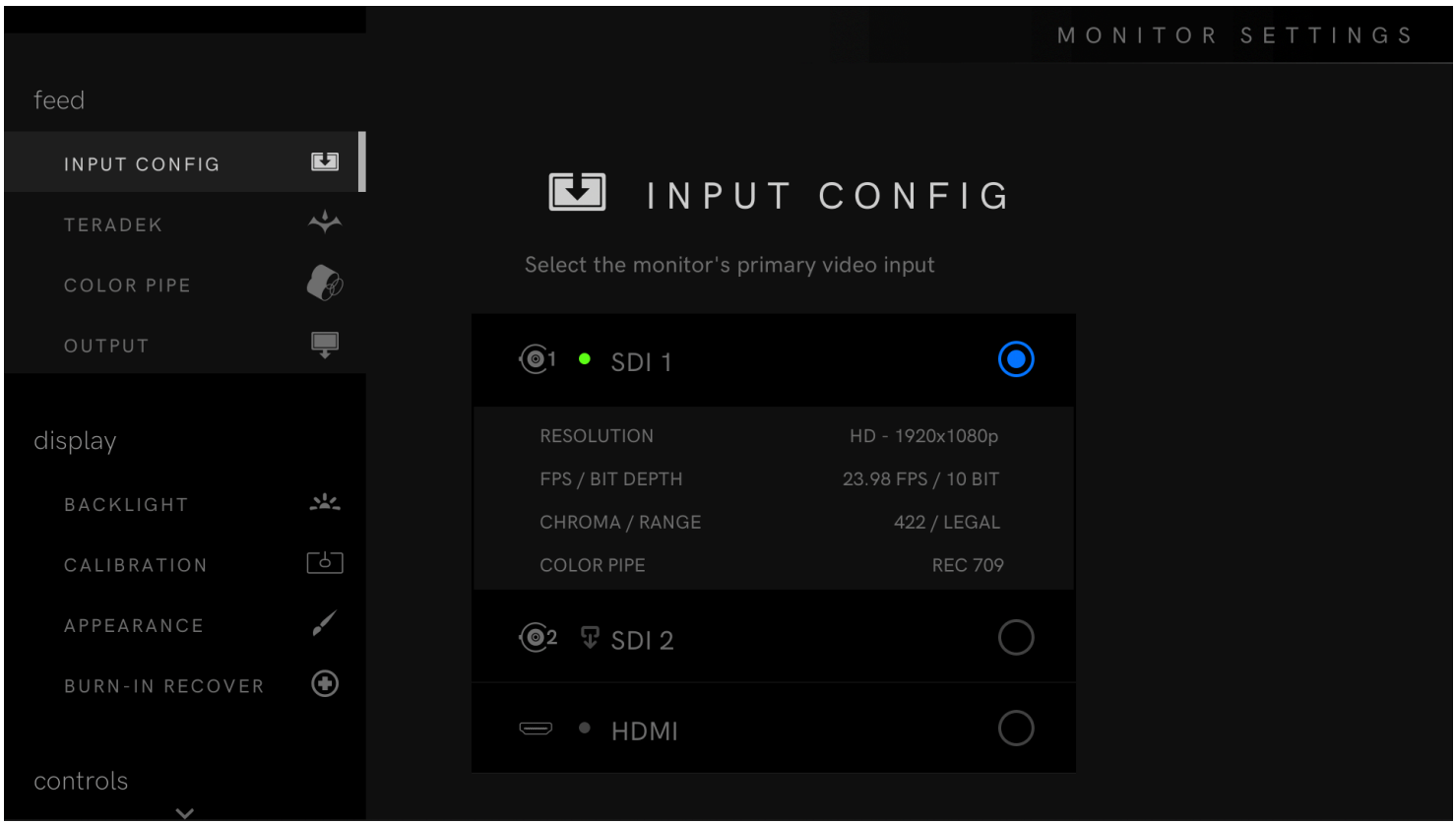
Input Config/Output

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 Configuration Settings

Use this section to select the monitor's primary video output (**SDI 1, SD 2,** or **HDMI)**

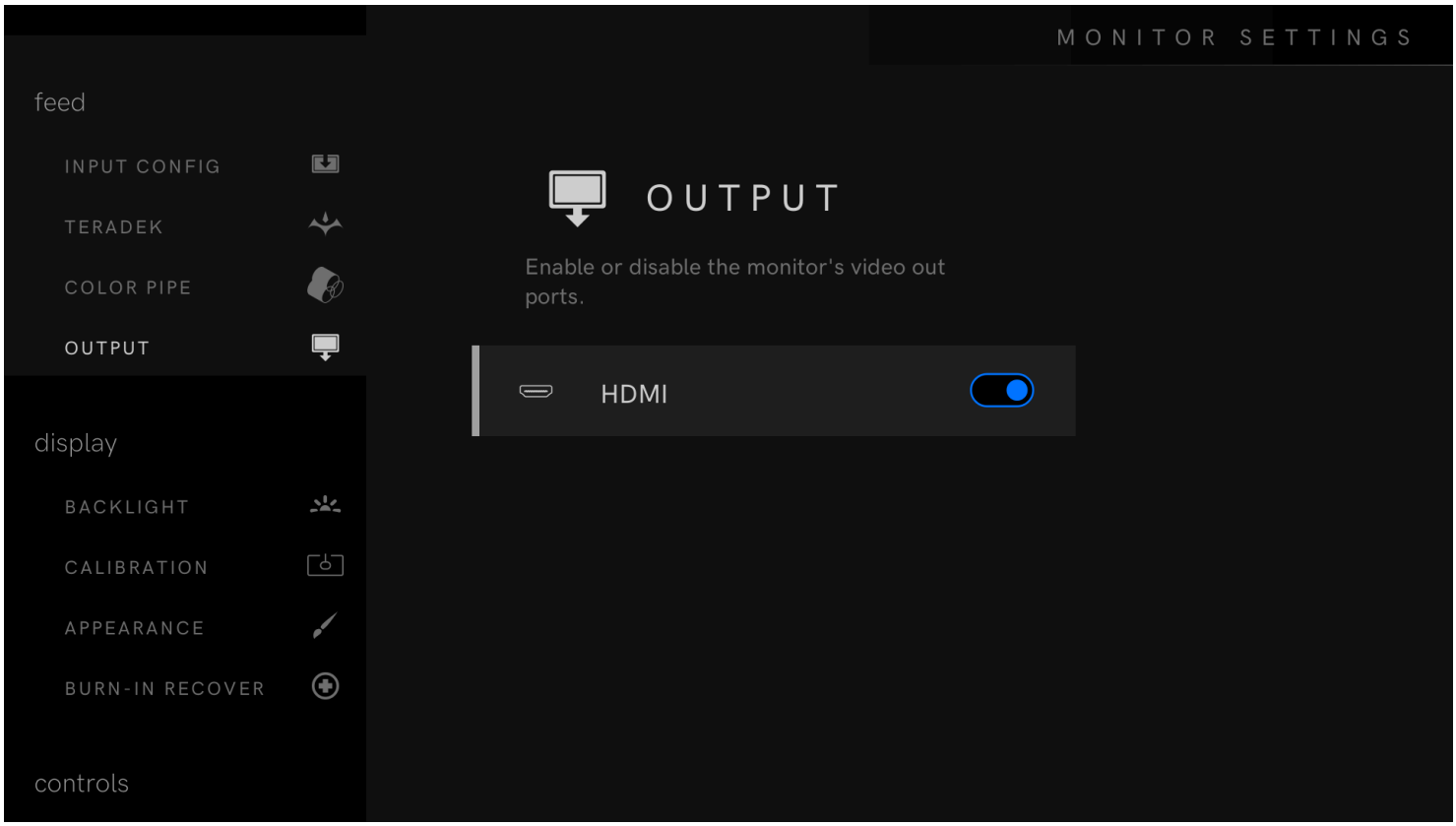


Output Settings

Enable or disable the monitor's HDMI video output port.

NOTES:

- When disabled, the monitor will automatically loop the feed out via SDI.
- This feature only applies to 5" and 7" monitors, as it is intended to save power.



Backlight

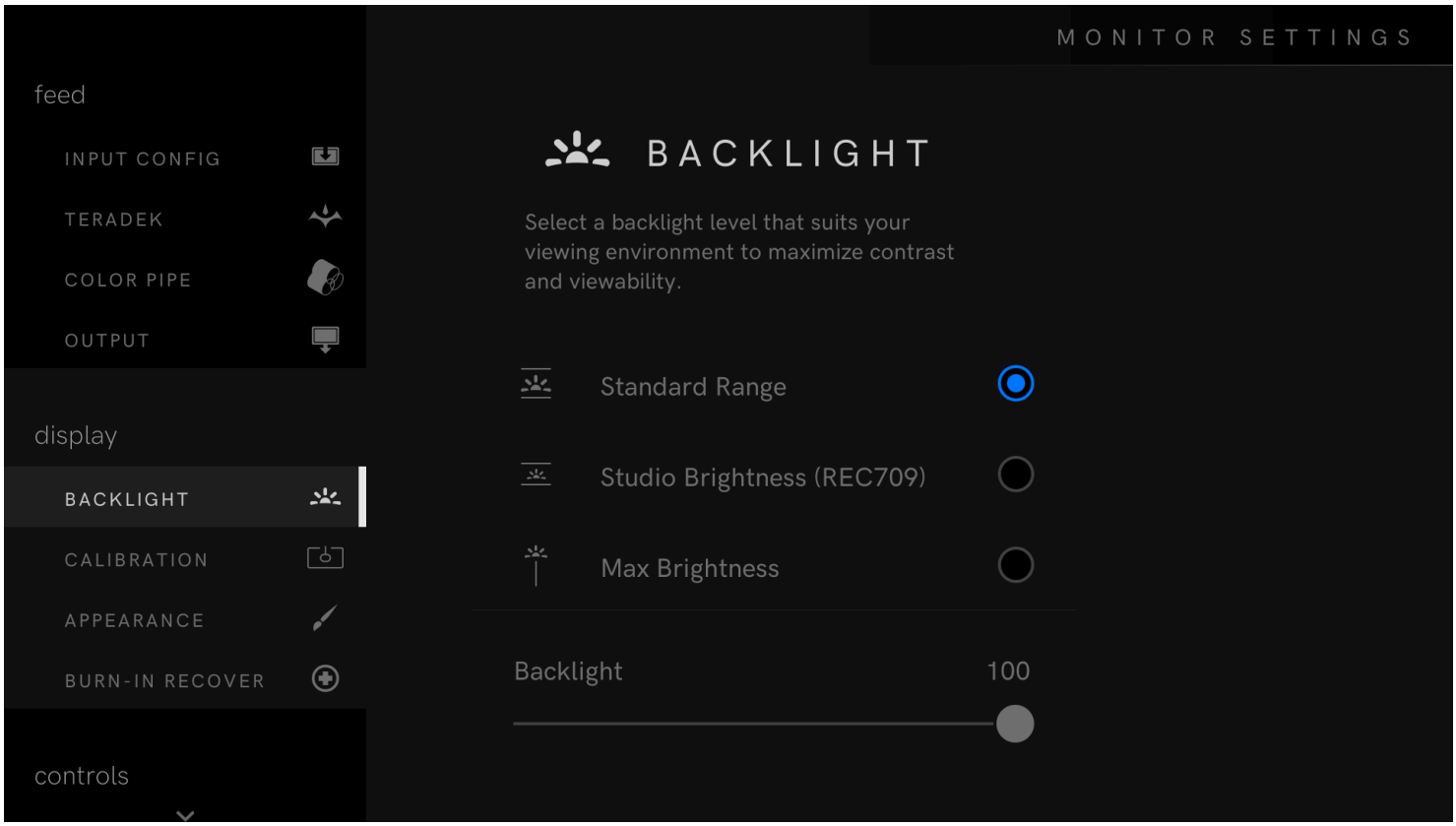
Settings that affect the output of the display, such as backlight adjustment and calibration, can be found here.

⚠ Individual options depend on monitor model.

- Backlight
- Calibration
- Appearance
- Burn-In Recover

Backlight

Select and fine-tune the brightness level of the LED backlight.



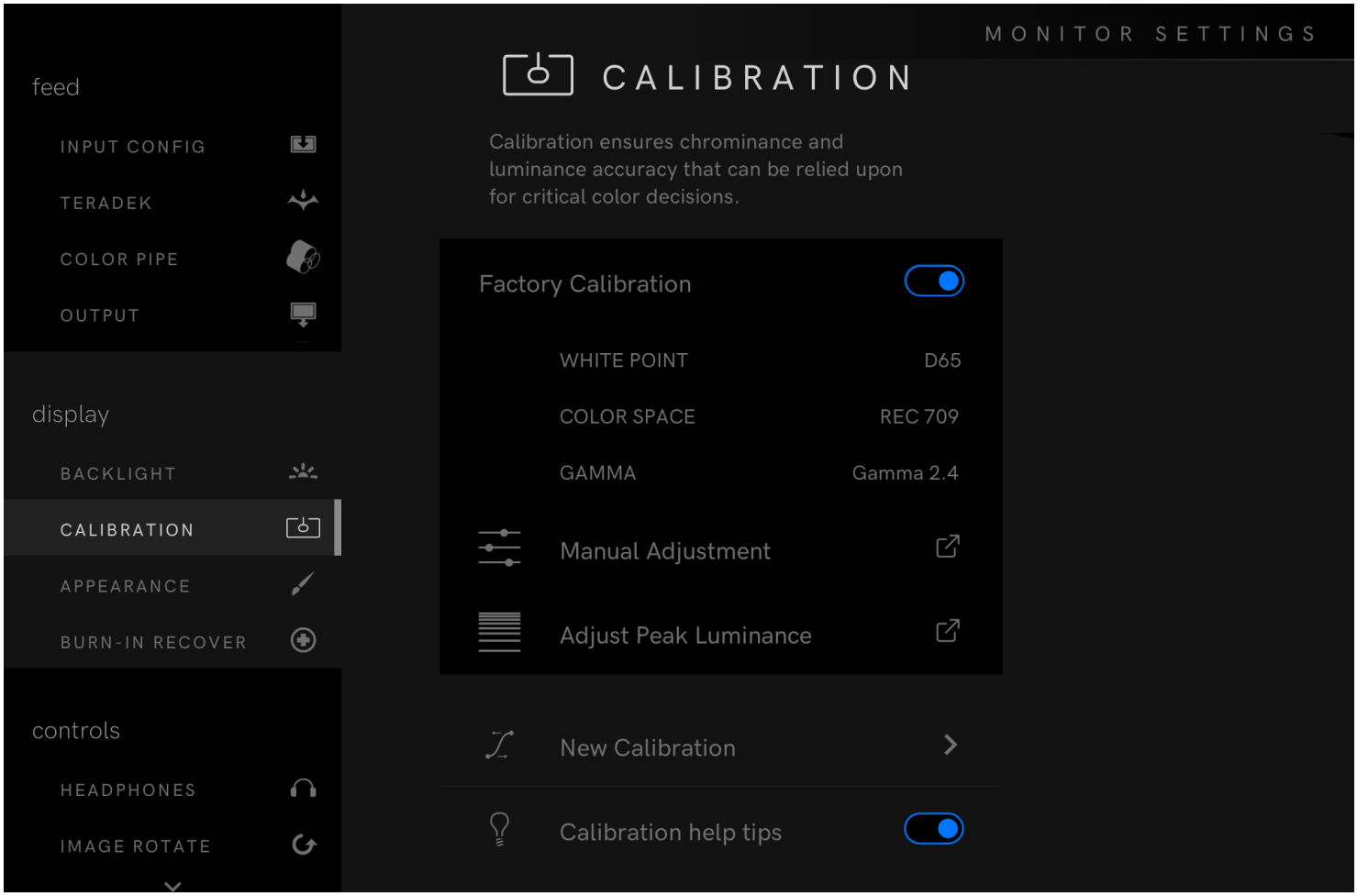
- **Standard Range** - This option enables backlight adjustment up to its maximum limit within the specified color space.
- **Studio Brightness** - If you are in a studio or other low-light environment, use this option to limit the backlight to 100 nits which enables a fine-tune adjustment within that range. **NOTE: 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.**
- **Max Brightness** - Provides the maximum brightness level possible. **NOTE: Max Brightness will disable the monitor's calibration to achieve maximum brightness. Do not rely on Maximum Brightness when performing color calibration.**
- **Backlight -** Adjusts the actual output of the backlight or in the case of OLED adjusts the maximum pixel brightness. **NOTE: OLED panels do not dim the same as an LCD. Be aware that changing the brightness of an OLED will affect its performance.**

Calibration

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

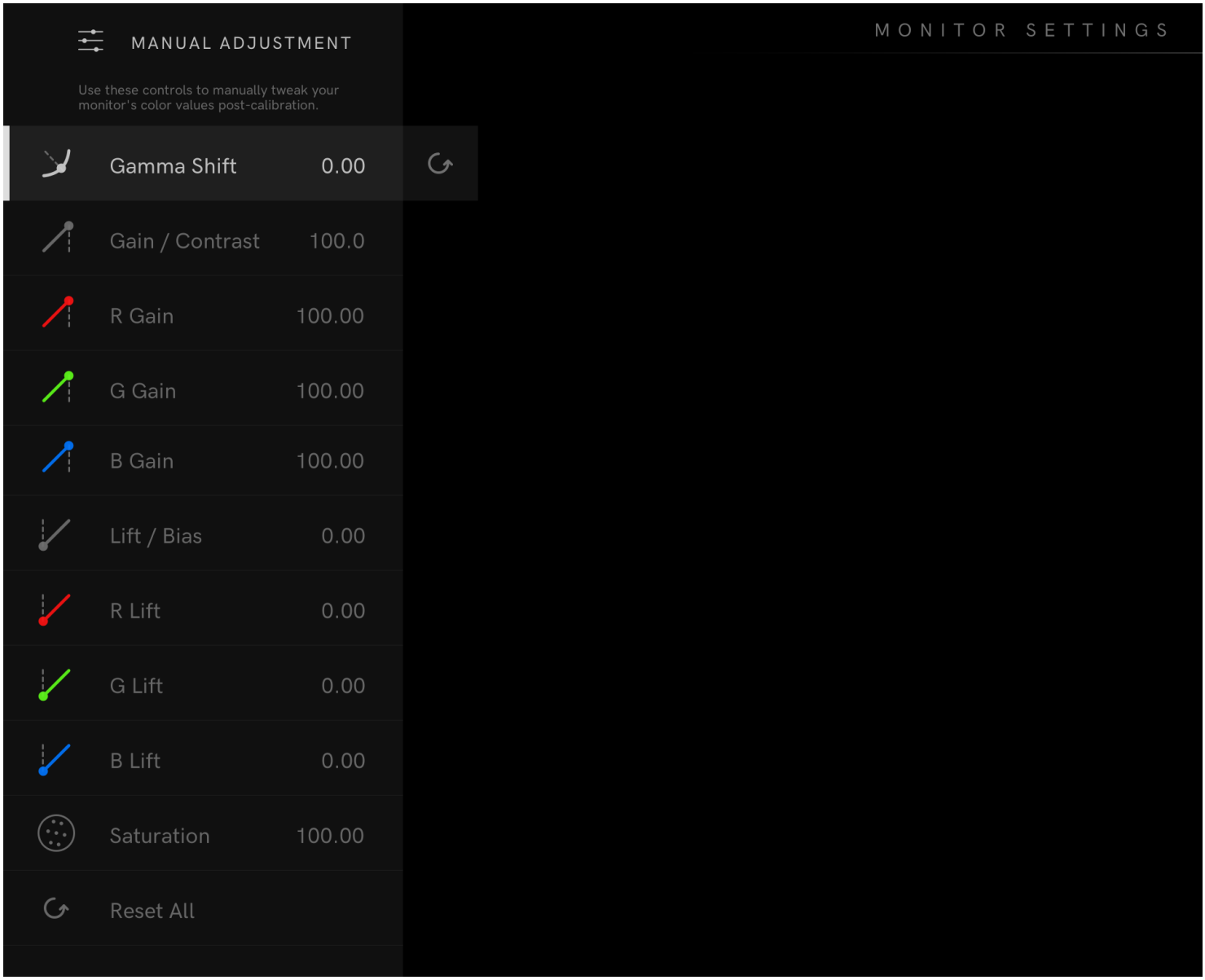
projection or Rec. 2020 for HDR production (available on select monitors).

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.

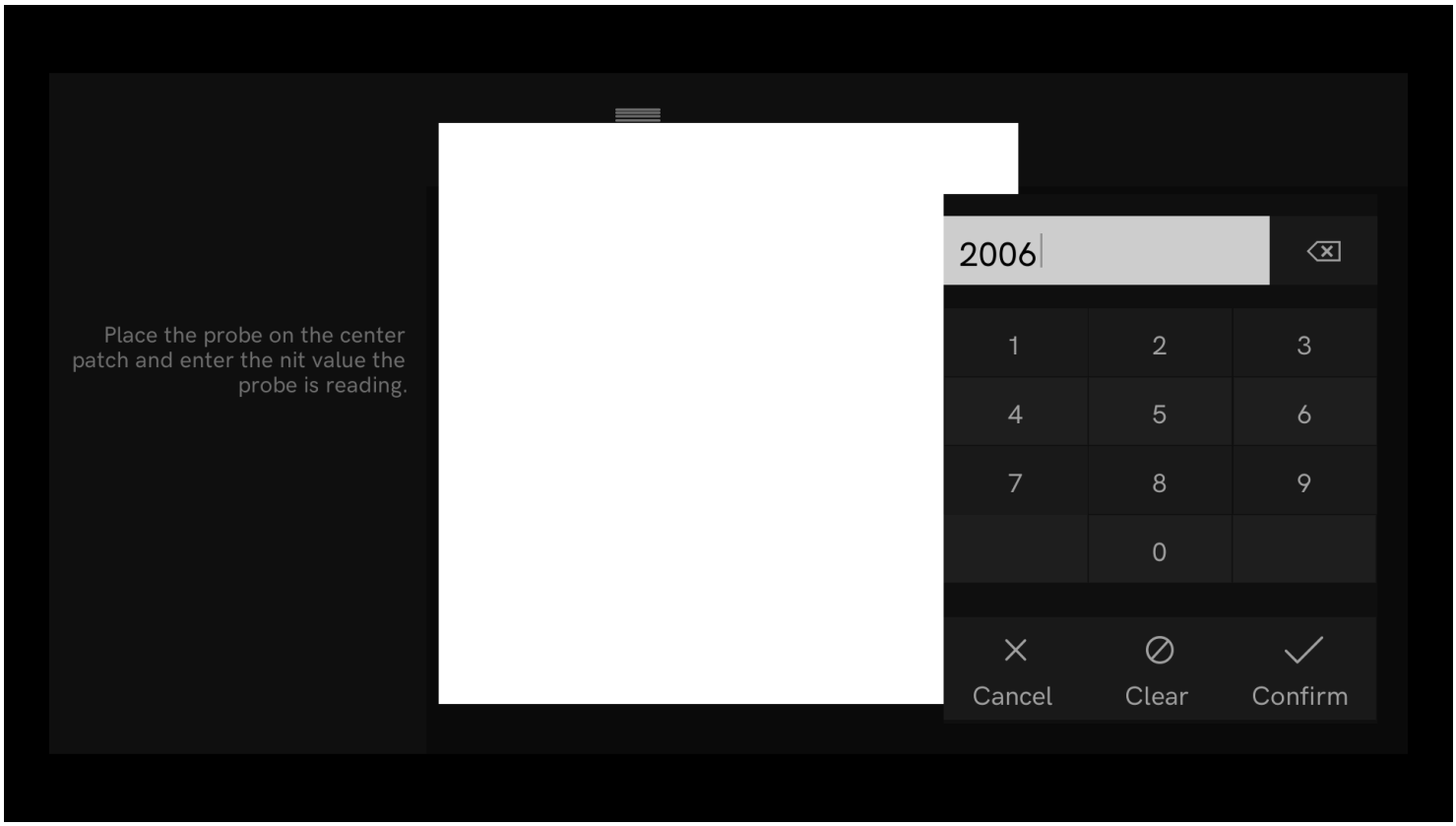


Settings

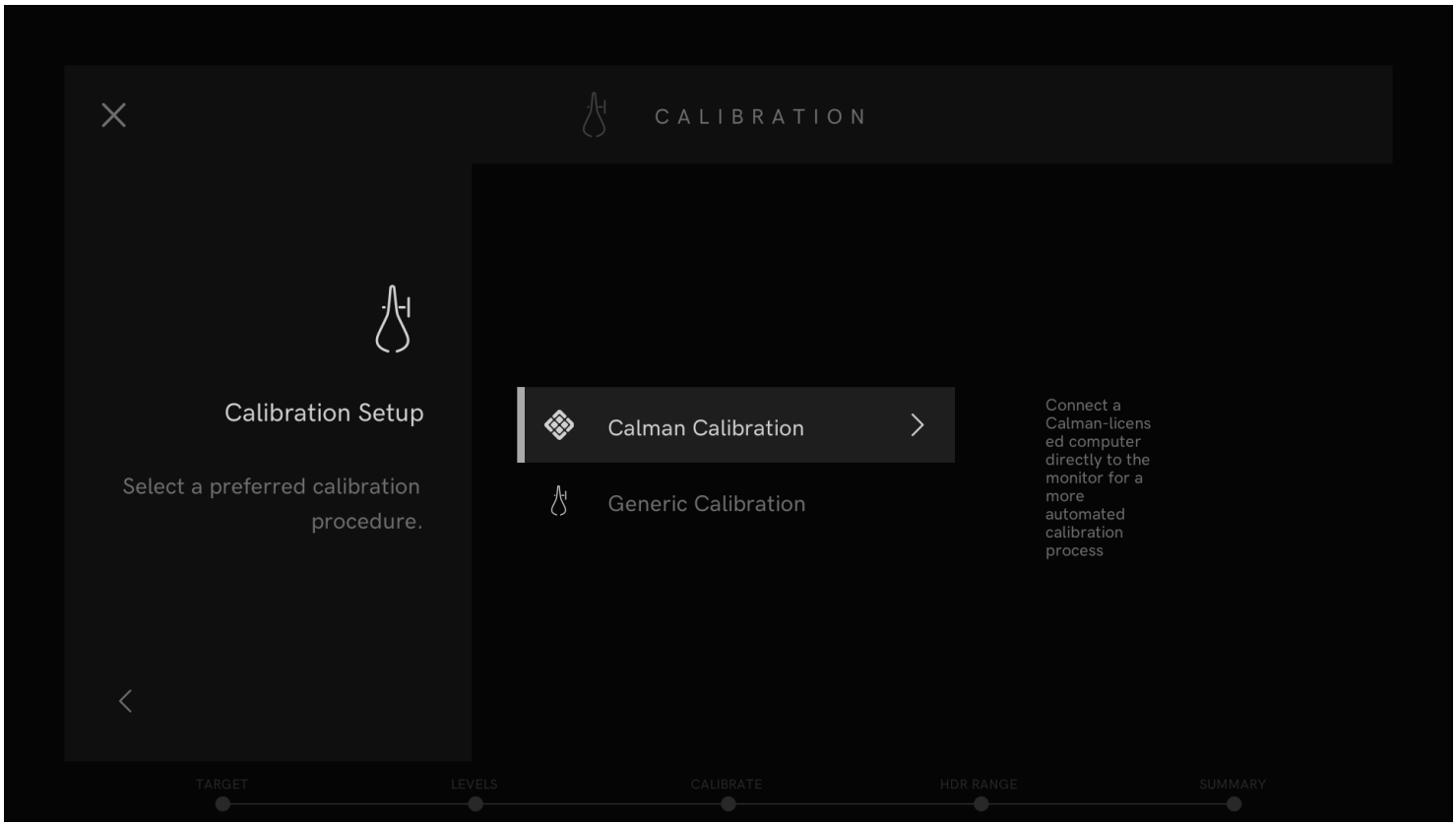
- **Manual Adjustment** - Manual Adjustment allows you to modify each of the monitor's individual color value, such as Gamma Shift, RGB Gain, RGB Lift (Offset), and Saturation.



- **Adjust Peak Luminance** - Allows you to adjust the nit count of your monitor and enhance your viewing experience. Lower nit counts are suitable for indoor use, while higher nit counts are recommended for outdoor use. **NOTE: Adjusting the luminance on your monitor requires the use of a calibration probe. 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).**



- **New Calibration** - Create a new **Calman** or **Generic** Calibration profile.

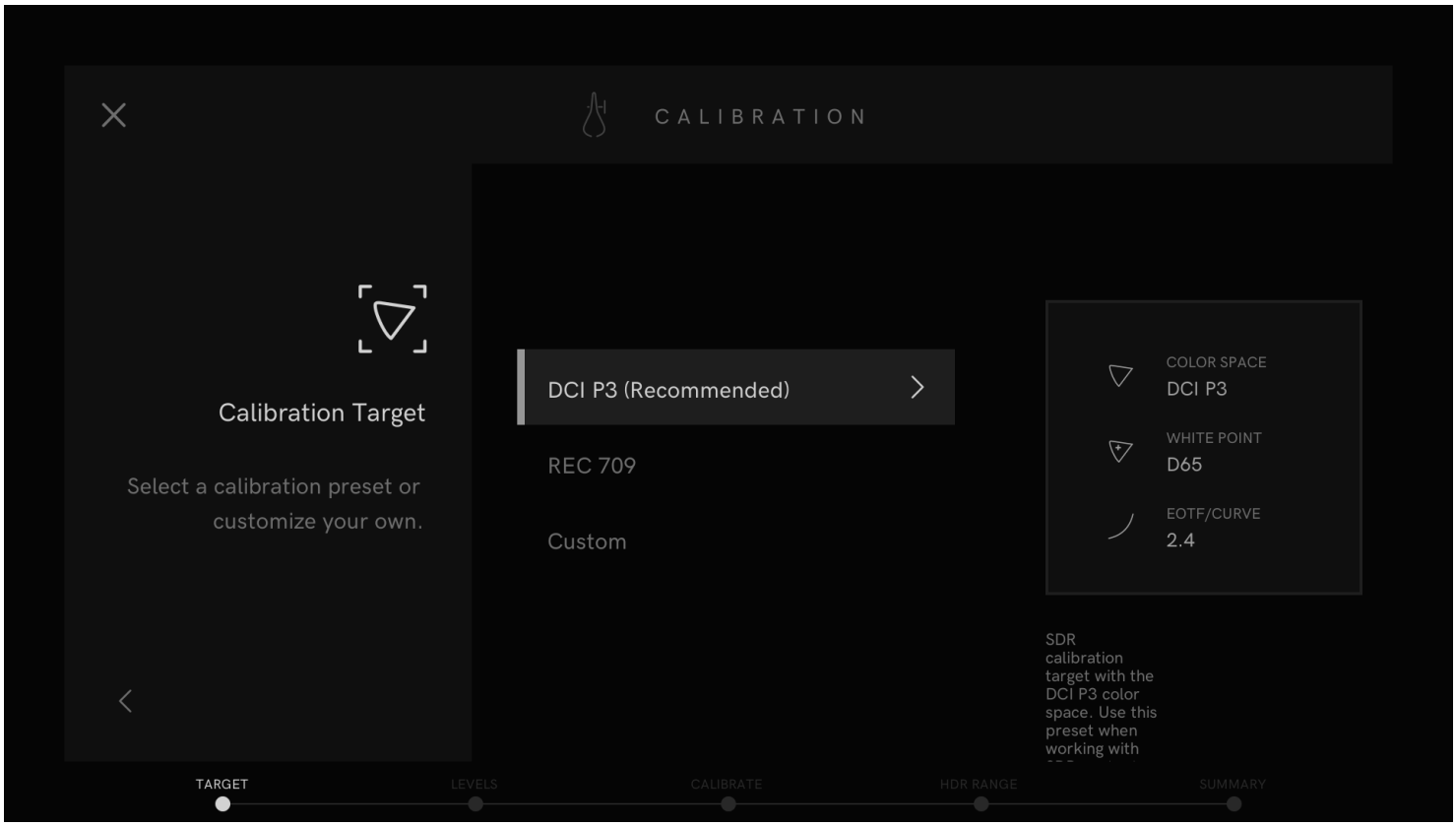


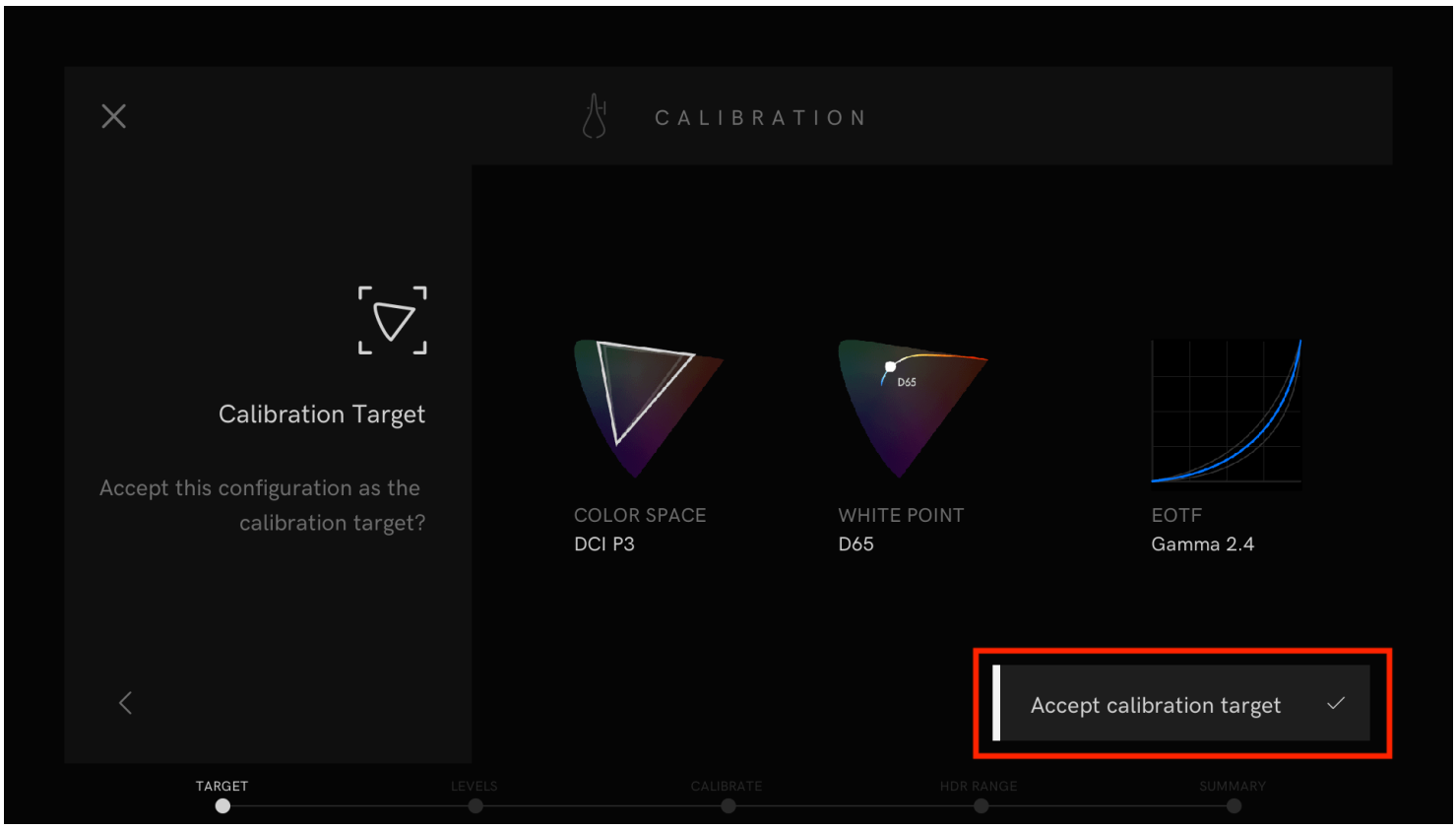
Calibrating Your Monitor

1. Power on and connect your SmallHD monitor to your computer via IP address. Ensure it's detected as a display and receiving a signal. **NOTE: Before you proceed, ensure that your monitor has been on for 45 minutes. You can run video or a test signal during this time.**
2. From the **Settings** page, navigate to **Feed > Calibration** and tap **New Calibration**.
2. Select a calibration procedure:

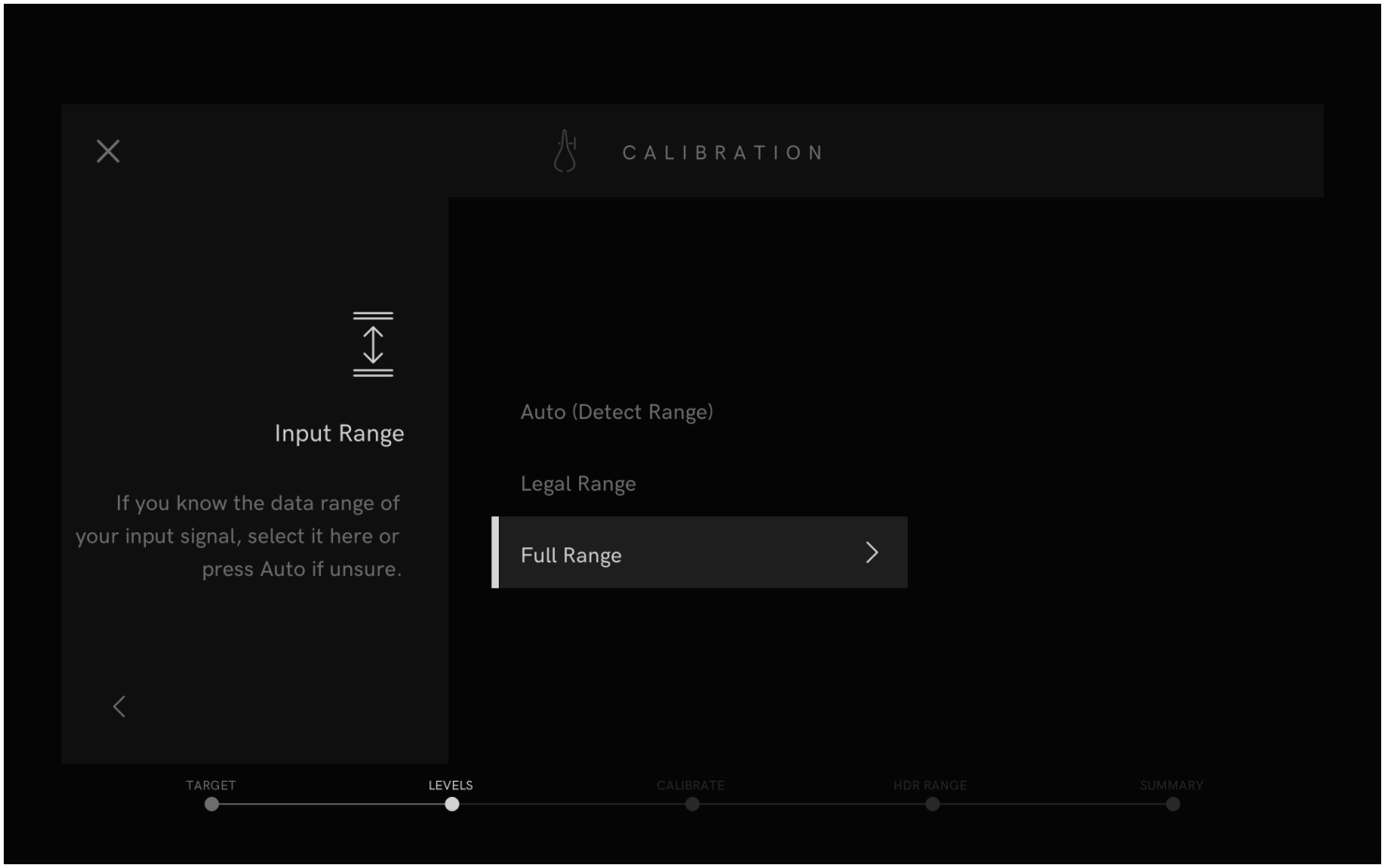
- For **Calman Calibration**, visit **this page** and download the **Calman Professional** (Version 5.14.0 or later)
- For **Generic Calibration**, proceed to the next steps.

3. Select your calibration target (DCI P3 is recommended), then tap **Accept Calibration Target** on the following screen.


CALIBRATION
Calibration Target
Select a calibration preset or customize your own.
DCI P3 (Recommended)
REC 709
Custom
COLOR SPACE
DCI P3
WHITE POINT
D65
EOTF/CURVE
2.4
SDR calibration target with the DCI P3 color space. Use this preset when working with
TARGET
LEVELS
CALIBRATE
HDR RANGE
SUMMARY

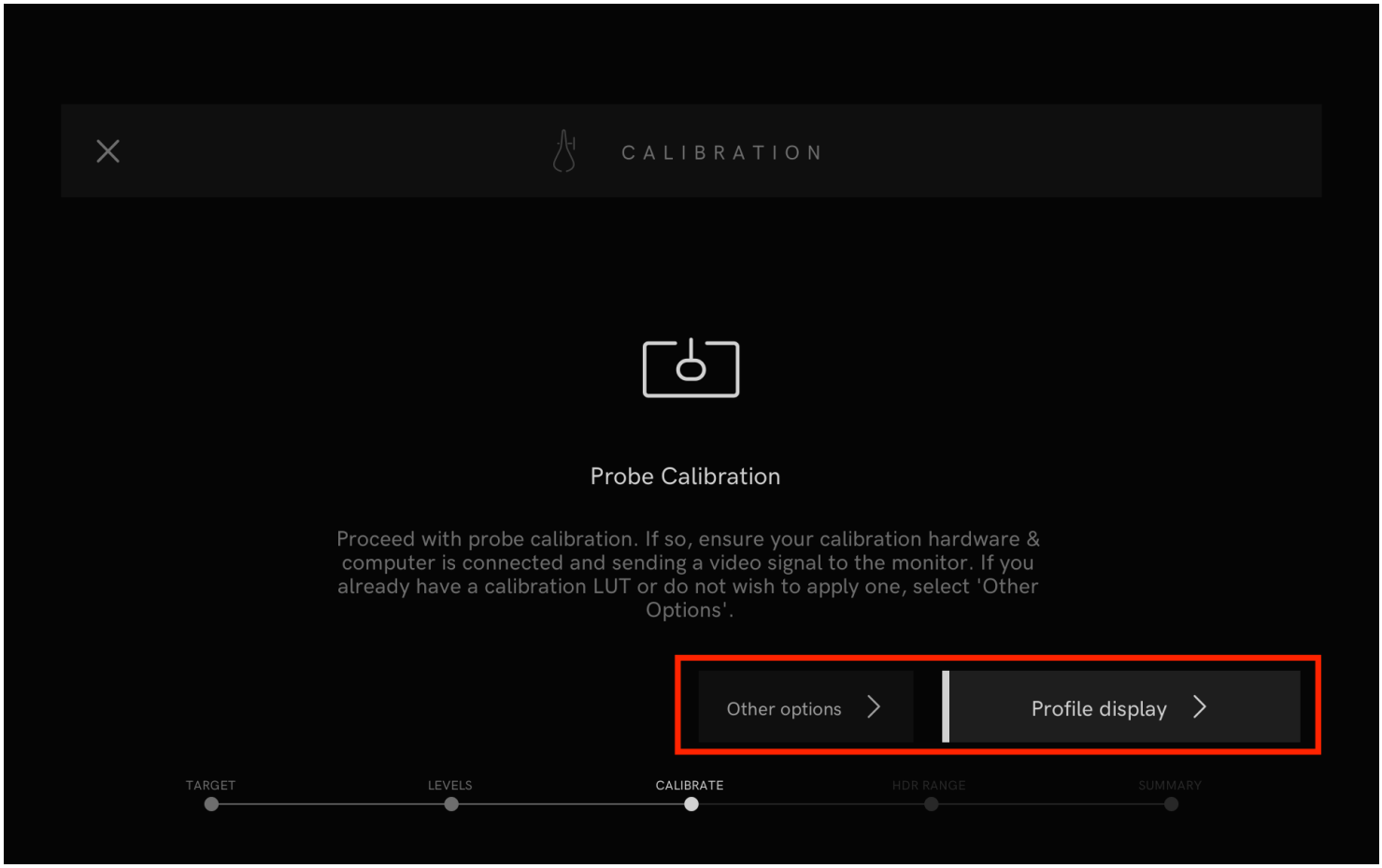

CALIBRATION
Calibration Target
Accept this configuration as the calibration target?
D65
COLOR SPACE
DCI P3
WHITE POINT
D65
EOTF
Gamma 2.4
Accept calibration target
TARGET
LEVELS
CALIBRATE
HDR RANGE
SUMMARY

4. Select an Input Range. Select **Legal Range** or **Full Range** (recommended), or select **Auto** if you are unsure of the data range.

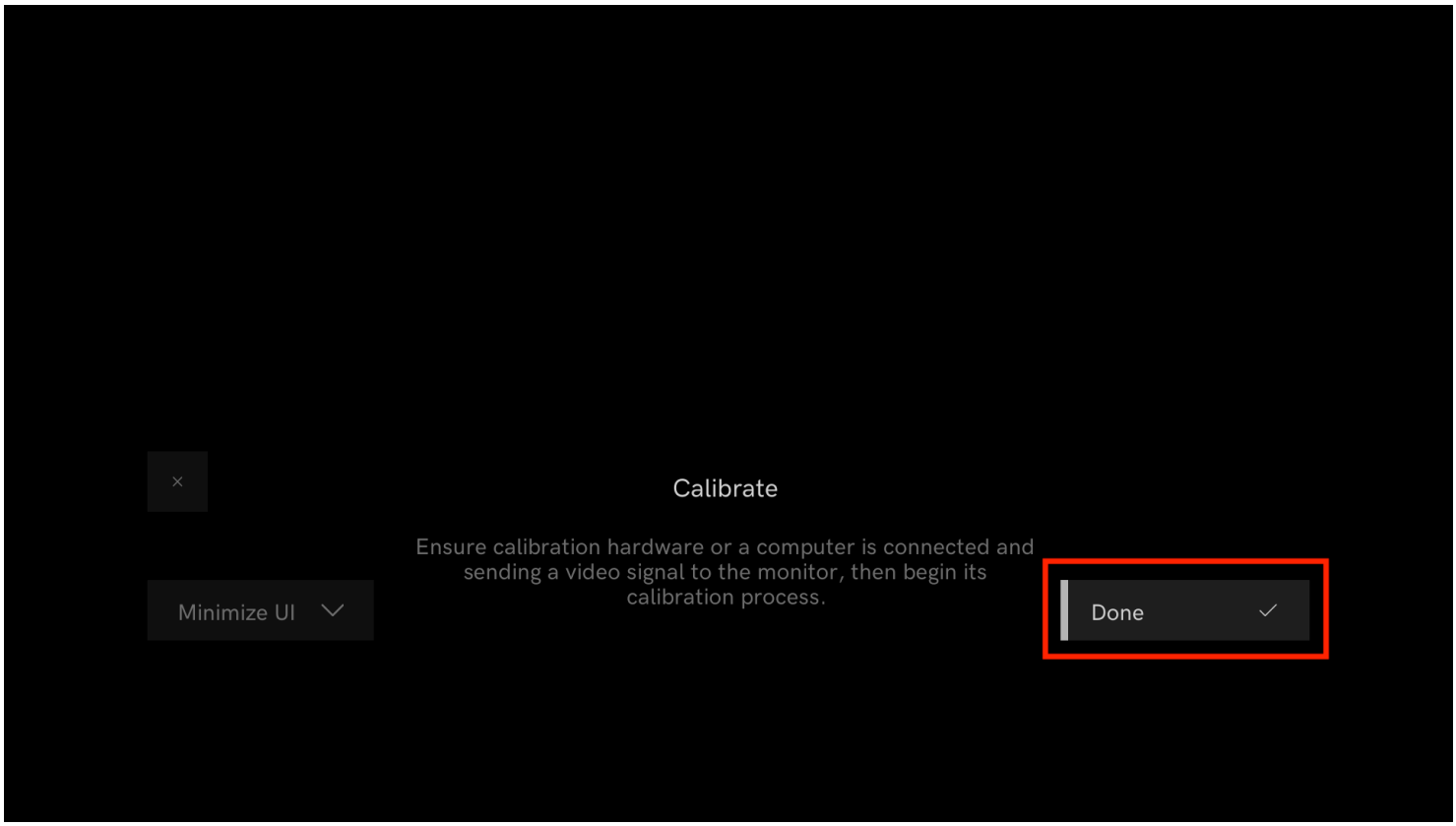


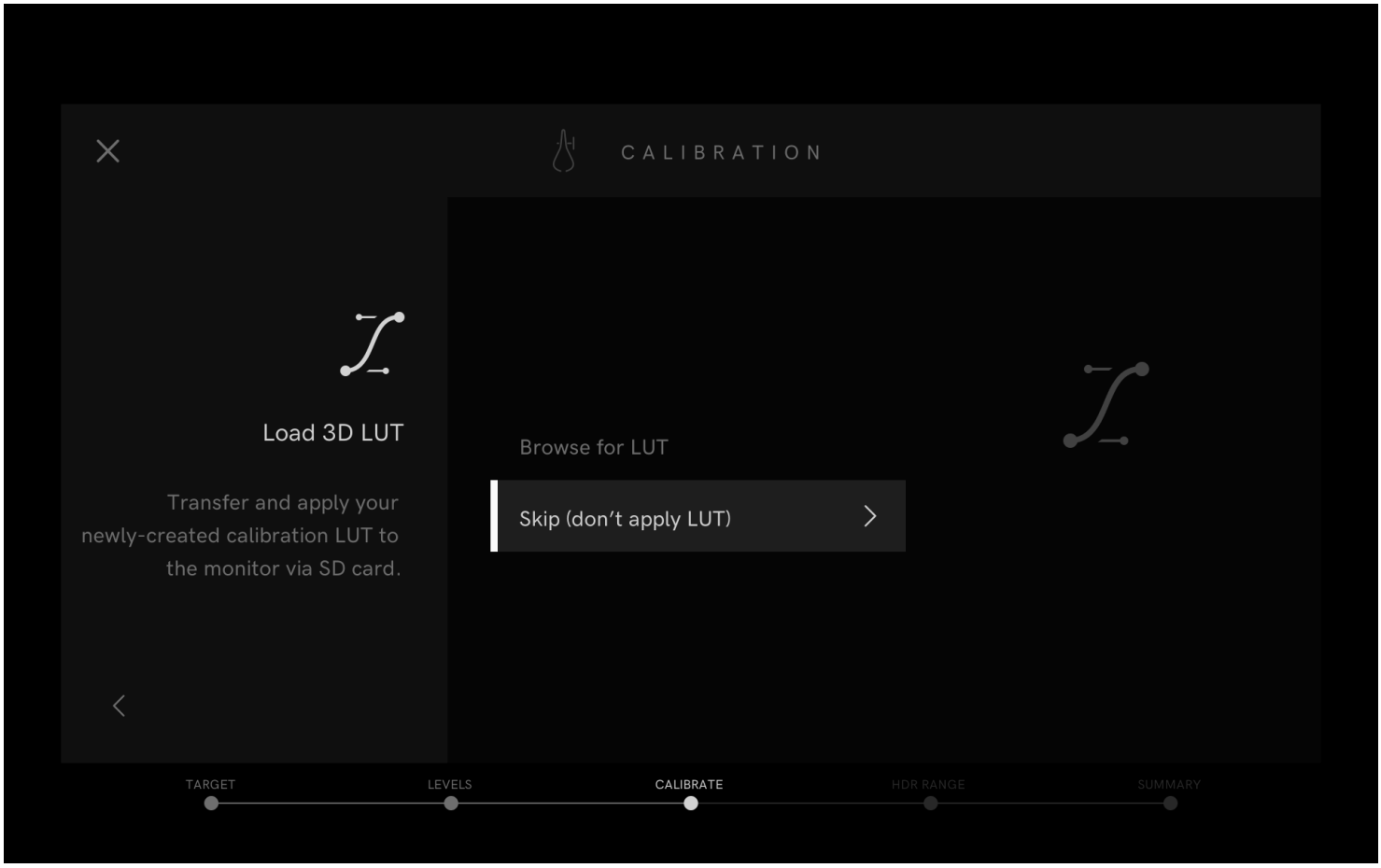
5. Tap **Profile display** to begin calibrating. Ensure your calibration probe and computer are connected and transmit a video image to the monitor without calibration.

If you already have a calibration LUT you would like to use, tap **Other options.**

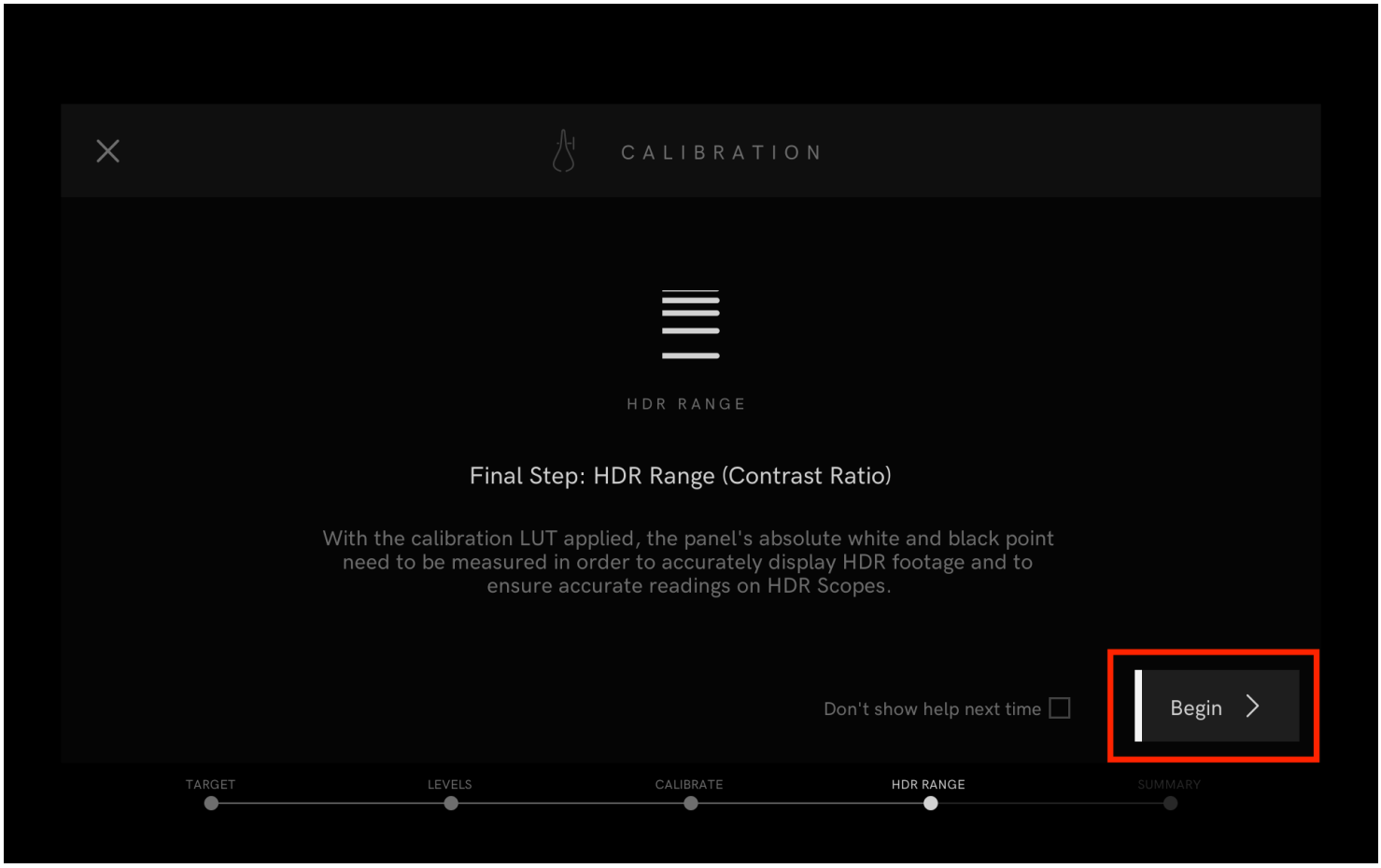


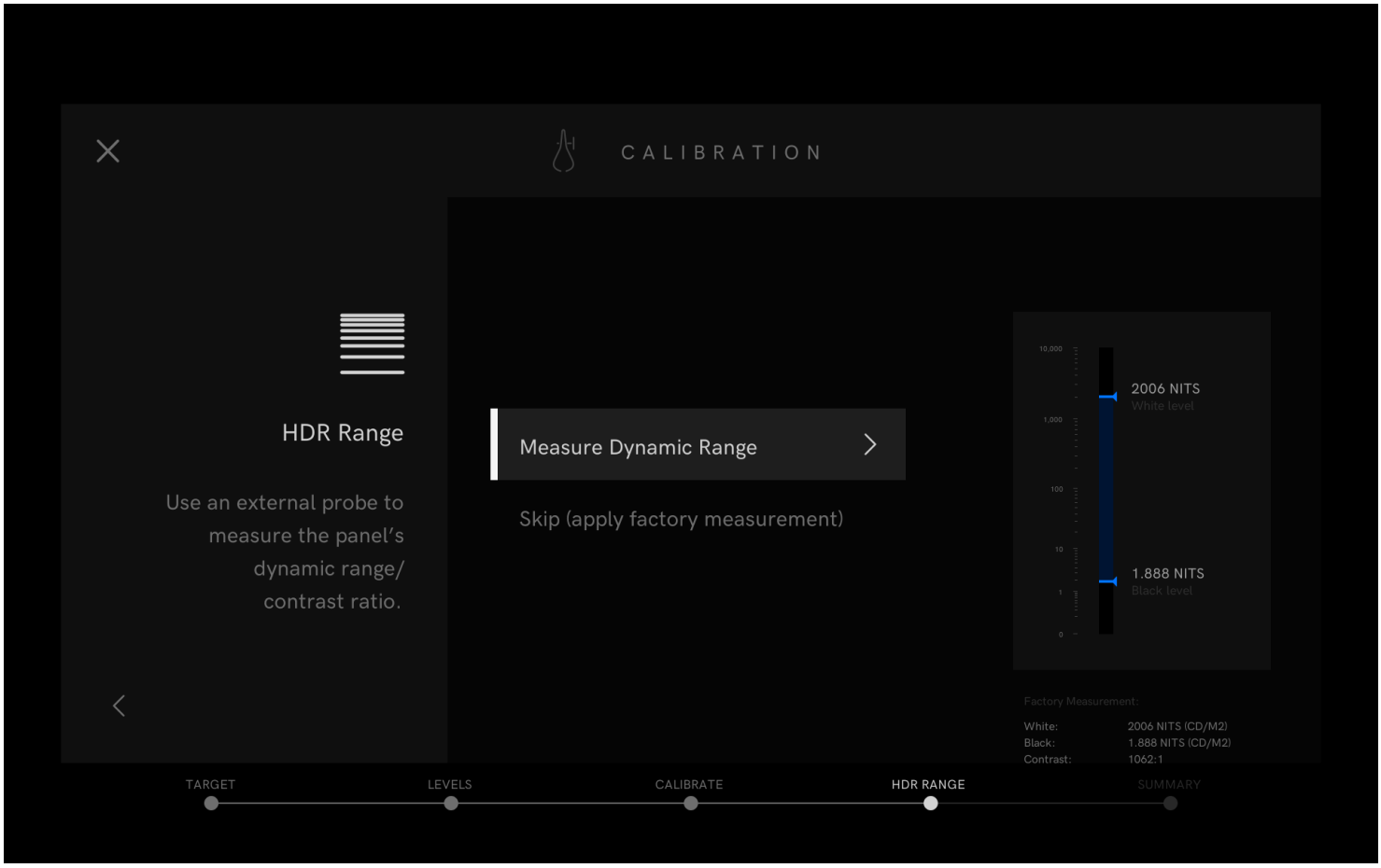
6. Position your probe against the monitor's screen according to the manufacturer’s recommendations. Tap **Done** to begin the calibration process. You will then be prompted to browse for and apply an LUT or to skip this step.


Calibrate
Ensure calibration hardware or a computer is connected and sending a video signal to the monitor, then begin its calibration process.
Minimize UI
Done

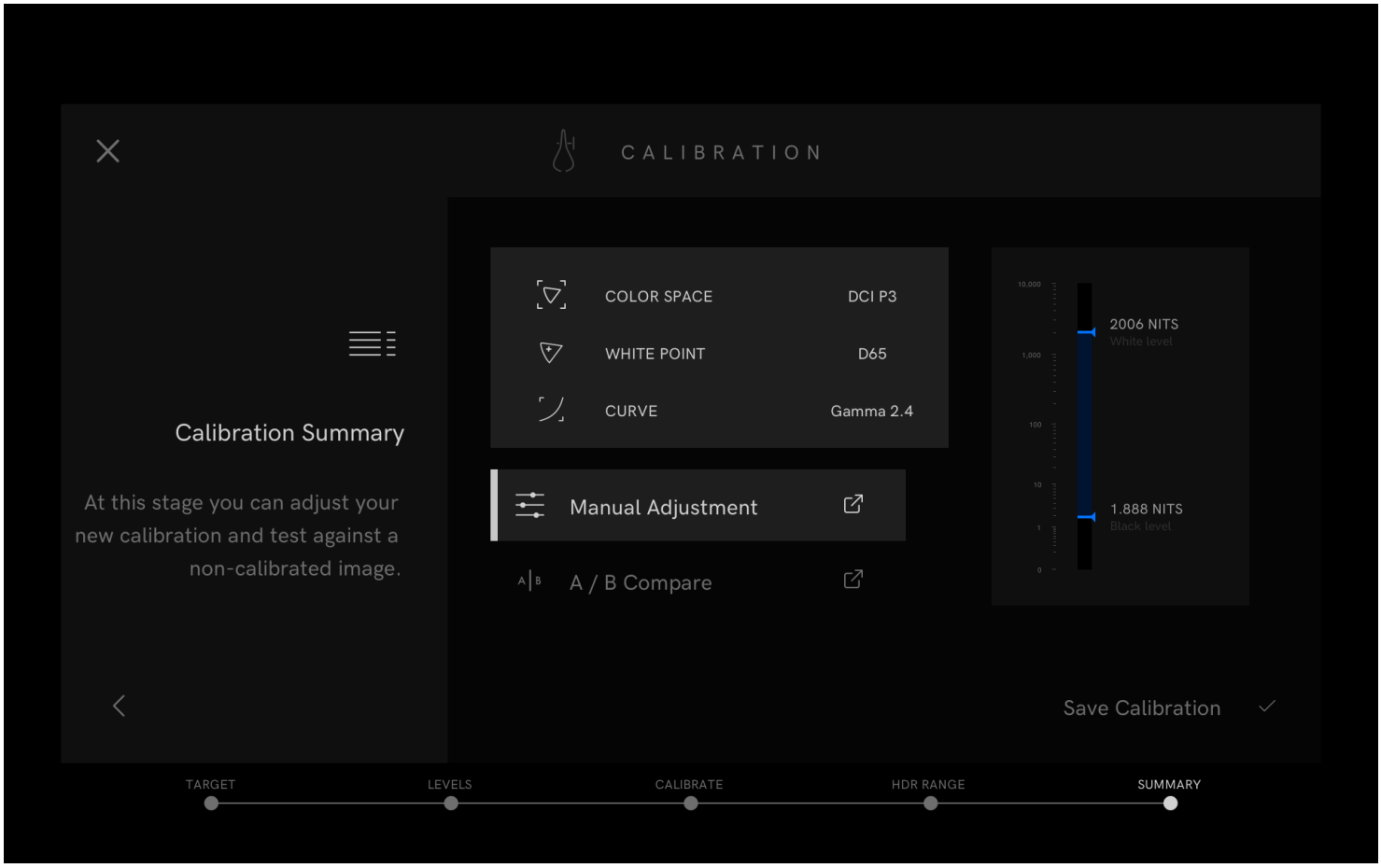


7. Measure the **HDR Range (Contrast Ratio)** by tapping **Begin.** Select **Measure Dynamic Range** to use the calibration probe to measure the monitor's dynamic range and values, or select **Skip** to apply factory measurements.

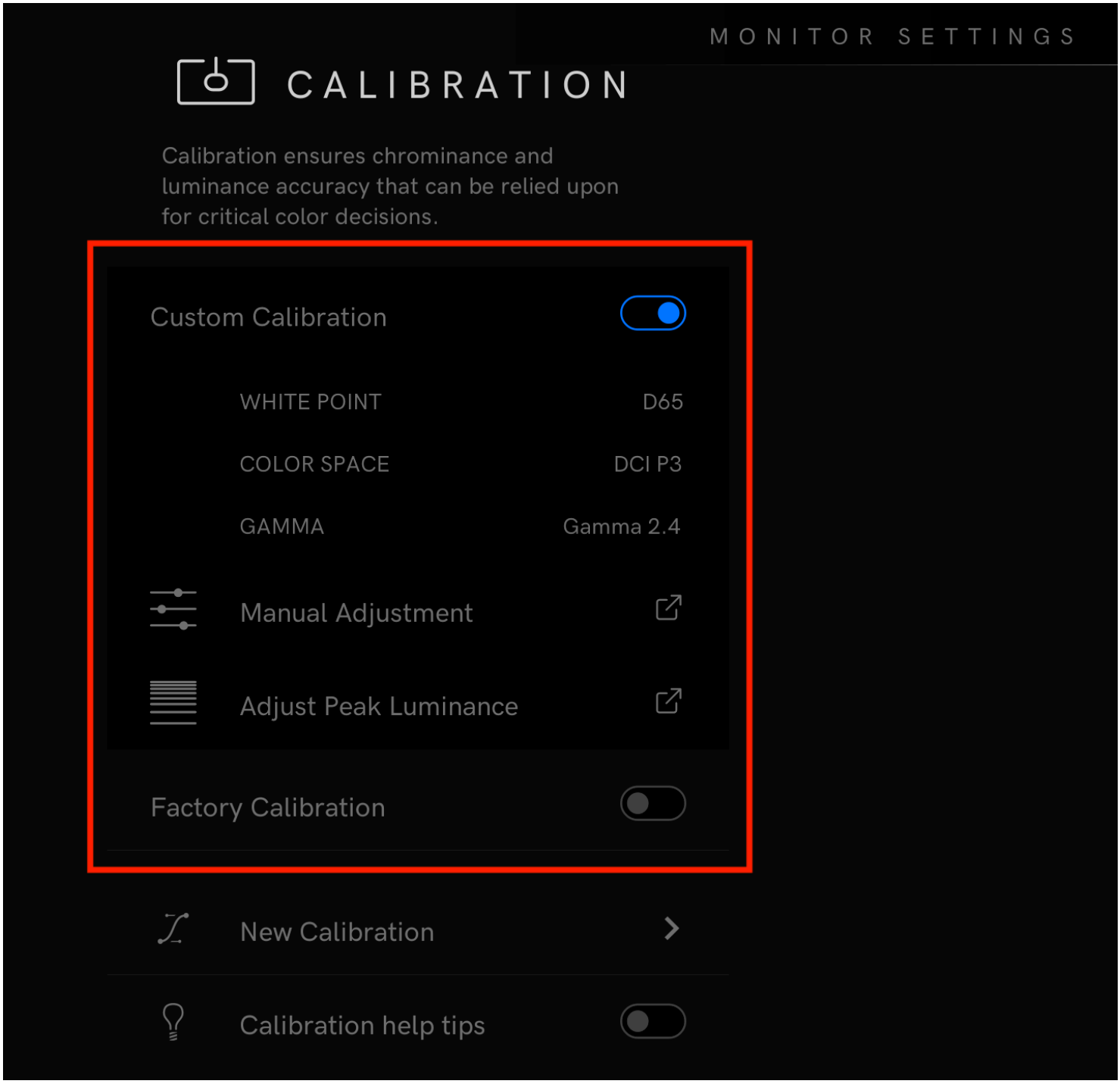

CALIBRATION
HDR RANGE
Final Step: HDR Range (Contrast Ratio)
With the calibration LUT applied, the panel's absolute white and black point need to be measured in order to accurately display HDR footage and to ensure accurate readings on HDR Scopes.
Don't show help next time
Begin
TARGET
LEVELS
CALIBRATE
HDR RANGE
SUMMARY



8. From the **Calibration Summary** screen, use **Manual Adjustment** to modify the calibration profile, or compare the profile against a non-calibrated imagewith **A/B Compare**. Tap **Save Calibration** to save your settings.

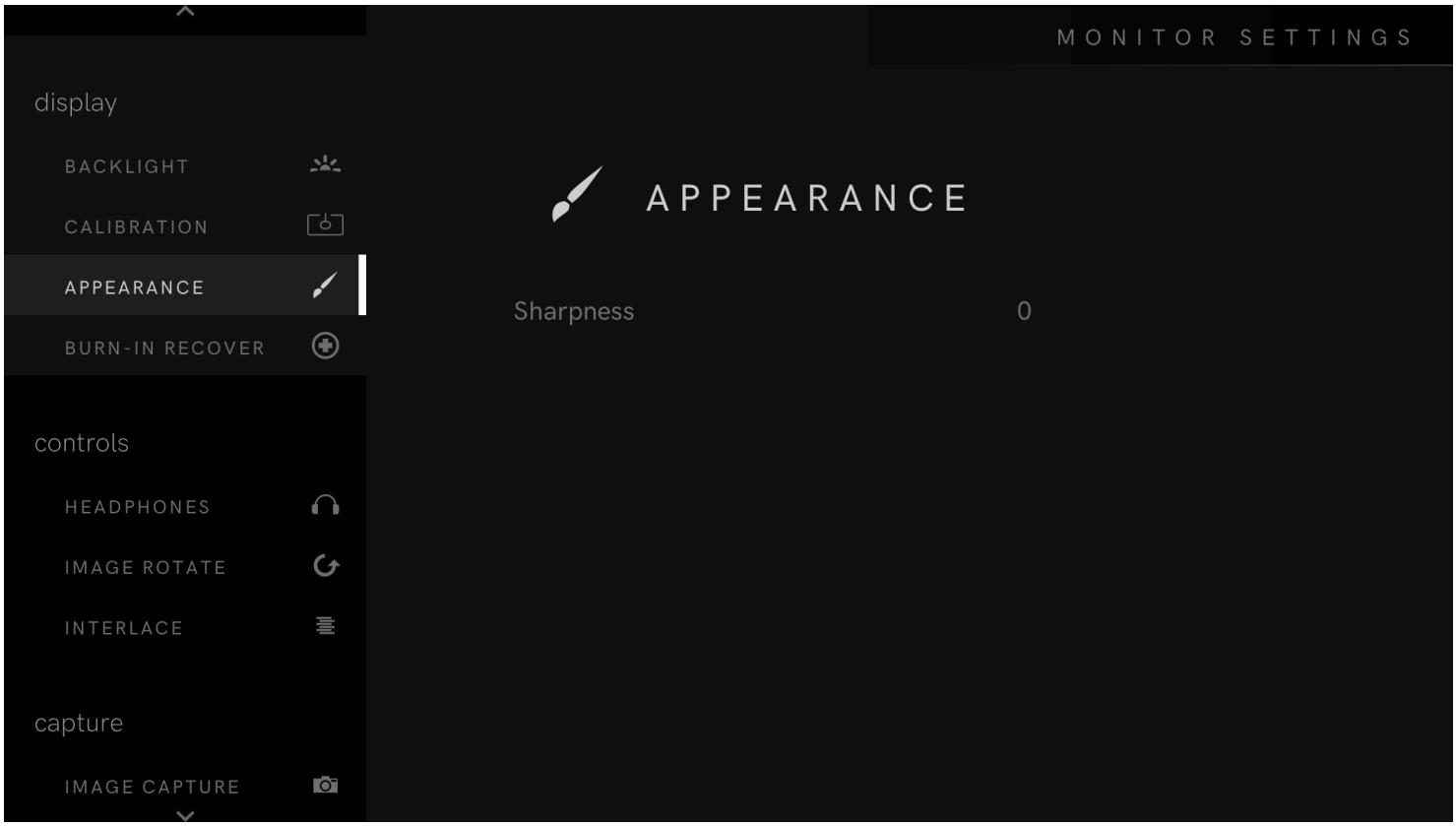


9. Your new calibration profile will automatically be applied and listed as **Custom Calibration** in the Calibration settings. You can toggle between **Custom Calibration** and **Factory Calibration** at any time.



Appearance

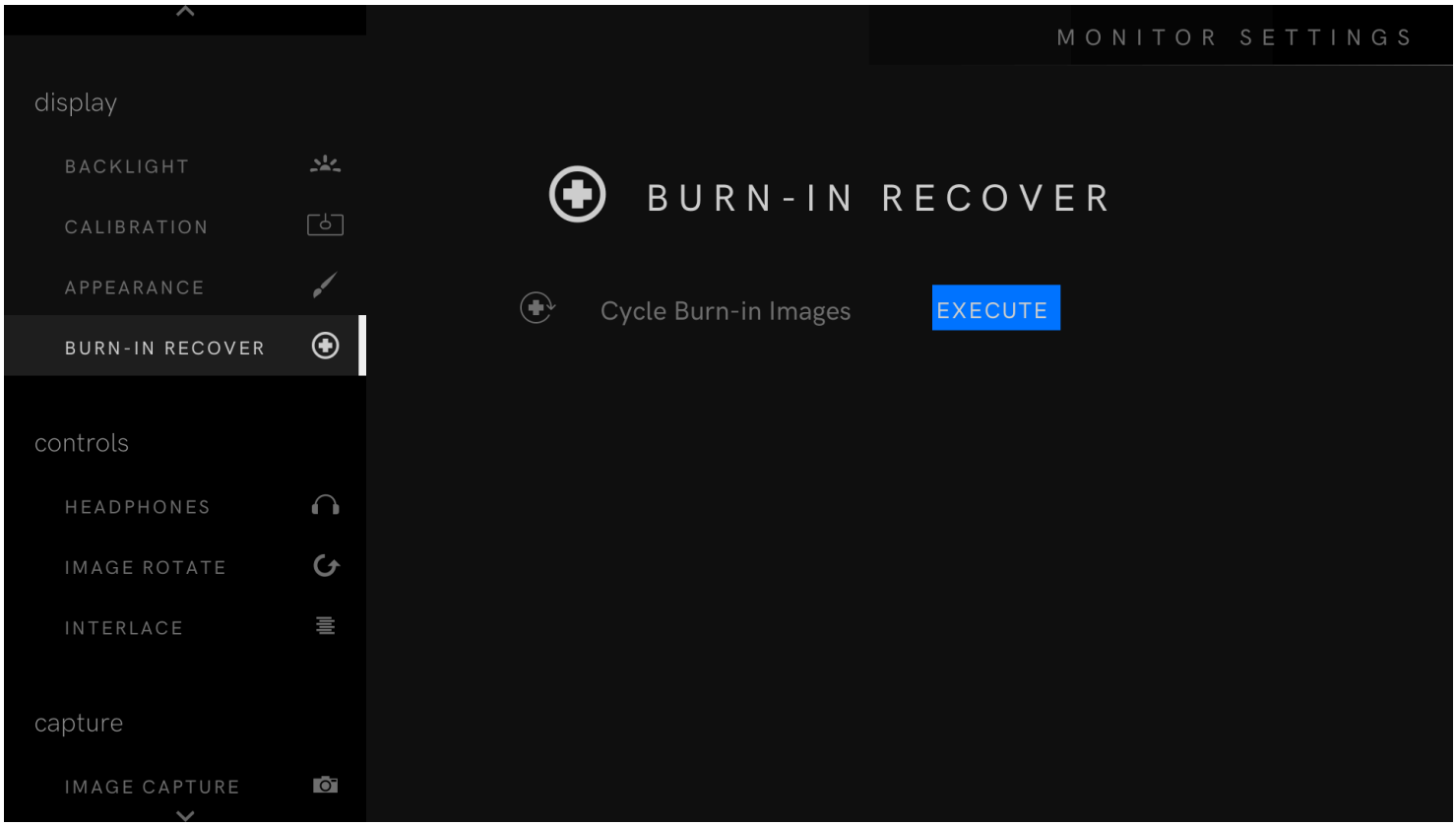
Use the slider to adjust the **Sharpness** from 0 to 5 to the video image.

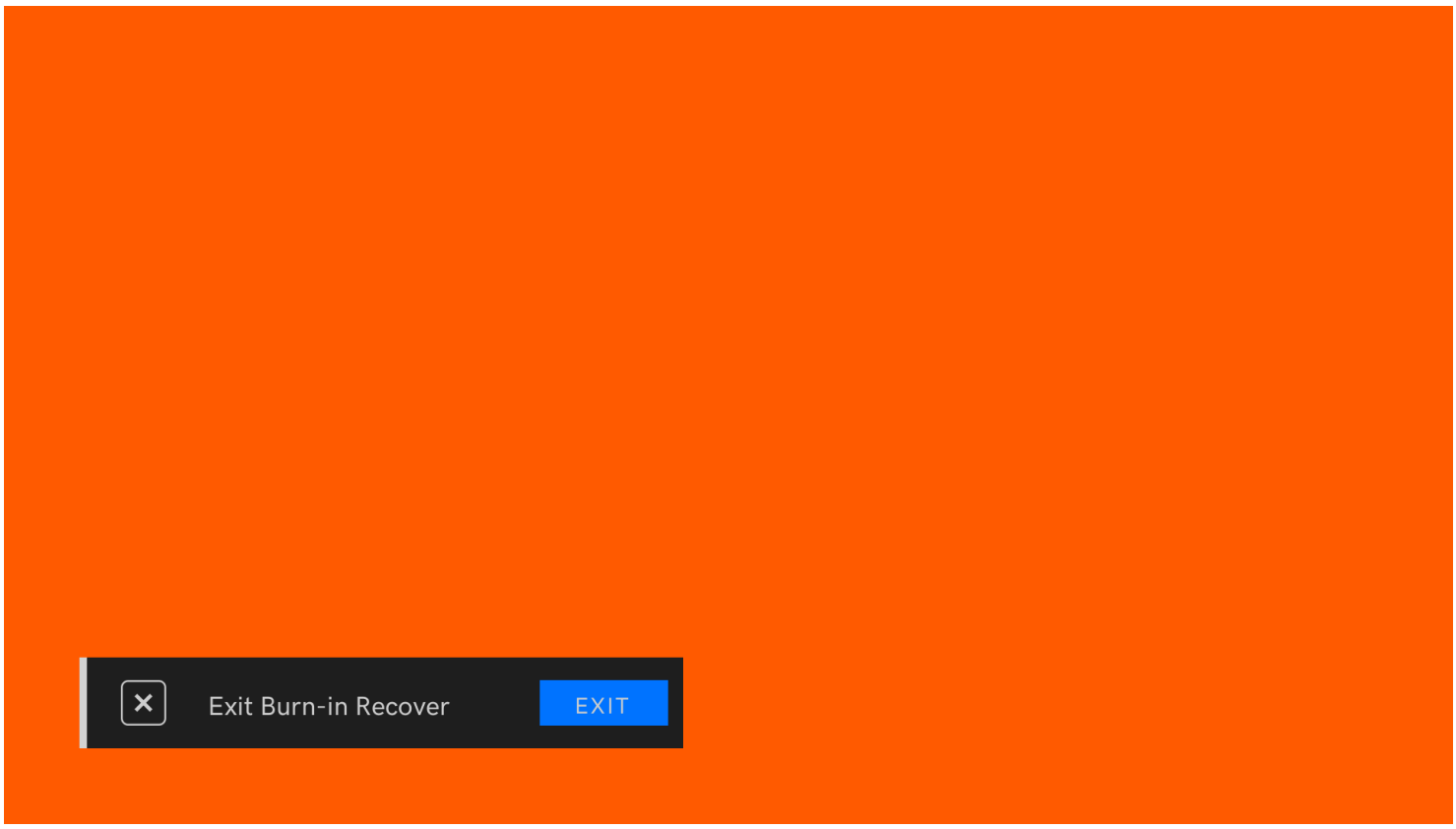


Burn-In Recover

Burn-In Recover displays and cycles through color patches to resolve burn-in/image retention issues.

1. Tap **EXECUTE** to begin the Burn-In Recover process.
2. Tap **EXIT** to end the Burn-In Recover process.


MONITOR SETTINGS
display
BACKLIGHT
CALIBRATION
APPEARANCE
BURN-IN RECOVER
controls
HEADPHONES
IMAGE ROTATE
INTERLACE
capture
IMAGE CAPTURE
BURN-IN RECOVER
Cycle Burn-in Images
EXECUTE


Exit Burn-in Recover
EXIT

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.

- User Buttons/Functions
- Pixel Zoom
- Status Display
- UI Lock
- Language

User Buttons/Functions

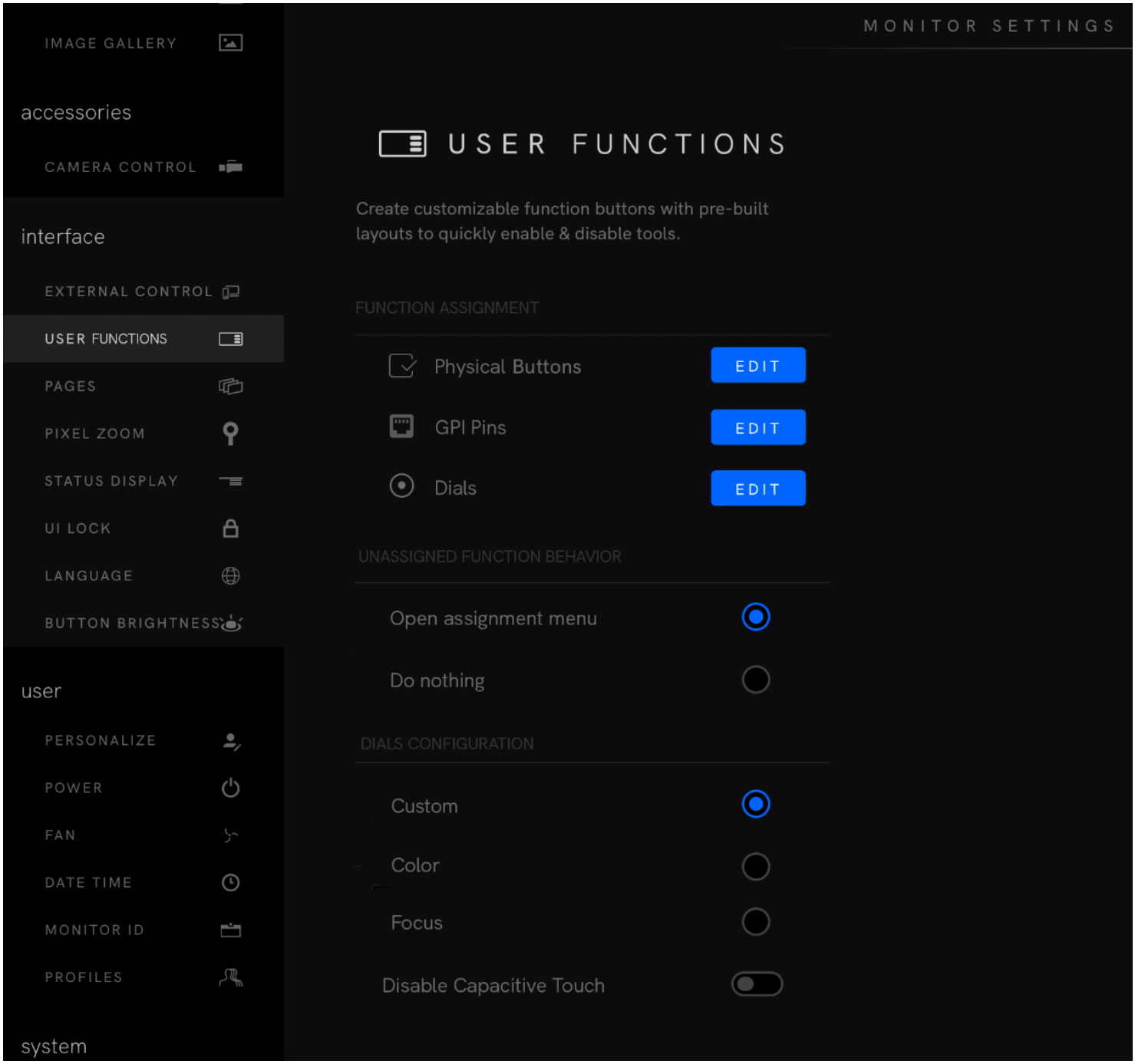
Create customizable function buttons with pre-built layouts to enable and disable tools quickly.

ACCESSIBILITY
Access customizable User Buttons via the Settings menu on any SmallHD touchscreen monitor by navigating to **Settings > Interface > User Buttons/Functions**.

GPI PIN CONFIGURATION (Production monitors only)
Using GPI pin configuration with a SmallHD production monitor enables you to remotely trigger monitor menus and functions, including controlling tally lights for live status indication. This setup streamlines operations and enhances workflow efficiency. **NOTE: Monitor firmware v5.5.0 or later is recommended to use GPI Pin configuration.**

DIAL ASSIGNMENT (Quantum 32 and Ultra 10 monitors only)
Some SmallHD production monitors feature capacitive touch dials, simplifying control and navigation within PageOS. These tactile knobs illuminate upon touch, identifying their programmed functions. With long-push, short-push, rotary, and capacitive-touch capabilities, you can quickly adjust tools, settings, and functions, offering more customization options than ever.

LAYOUT OPTIONS (Touch Screen monitors only)
You can adjust how the touch buttons are displayed via the **Touch Buttons** menu. There are **ON/OFF** toggles to enable the buttons, allowing them to be always present and showing function names. User Buttons have a 3-button and 6-button layout option.



Function Assignment

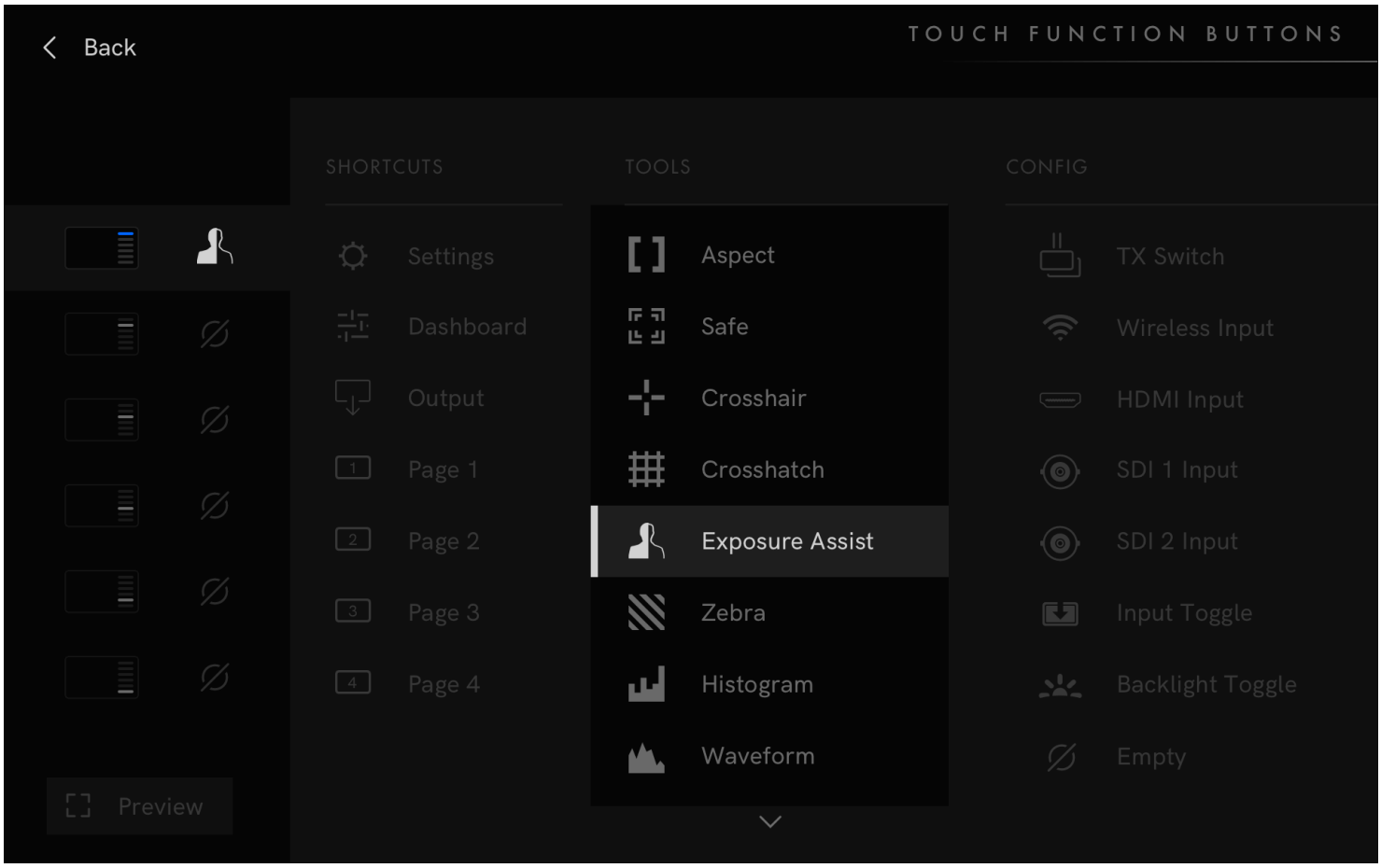
PHYSICAL/TOUCH BUTTON FUNCTION ASSIGNMENT

- **Physical Buttons:** From the **Button/Function Assignment** submenu, select **EDIT,** or press and hold the button you are configuring to display the functions menu.
- **Touch Buttons:** From the **Button Assignment** submenu, select **EDIT** to display the functions menu.

GPI PIN FUNCTION ASSIGNMENT:

- **Production monitors only:** Select **EDIT** from the **Button/Function Assignment** submenu.

The left column of the configuration page allows users to select which User Button to customize. **Shortcuts**, **Tools**, and other **Configurations** can be assigned to a user button/function or GPI pin by selecting the desired option from any category. Enabling a tool with a User Button/Function makes that tool a Global or Shared tool. This means that the tool is active on every page of the monitor.

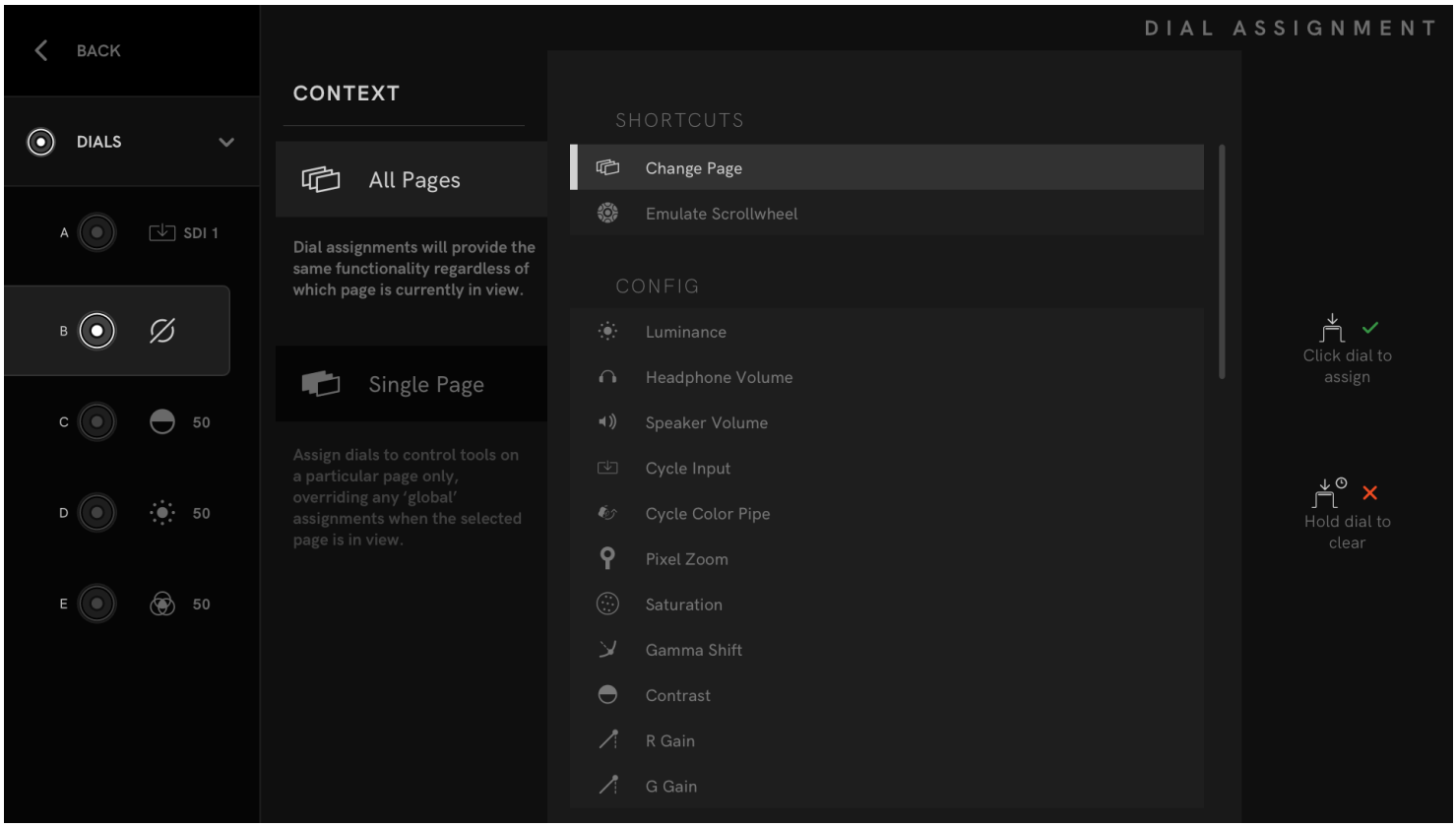


Notable configurations for User Buttons/Functions include Backlight Toggle, Backlight Custom, Input Select, and 4K TX Switch. Having different inputs on User Buttons/Functions allows the user to quickly switch sources, without having to navigate to the Monitor Settings menu.

DIAL FUNCTION ASSIGNEMENT:

- **Quantum 32 and Smart 10 monitors only:** From the **Button/Function Assignment** submenu, select **EDIT,** or press and hold the dial you are configuring to display the dial assignment menu, then press the dial again to select the desired function. Functions can be assigned to **All Pages** (by default), or a **Single Page**, which will assign the function to a specific tool within a page only.

The assigned tool-specific function icon will turn green to designate its selection for the specific page. The Dial LEDs follow the function color scheme found in the menu to help visually identify assigned tools (**Blue** indicates **ALL PAGES** and **Green** indicates **SINGLE PAGE** operation).



Pixel Zoom Settings



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



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.

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)

Status Display Settings

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

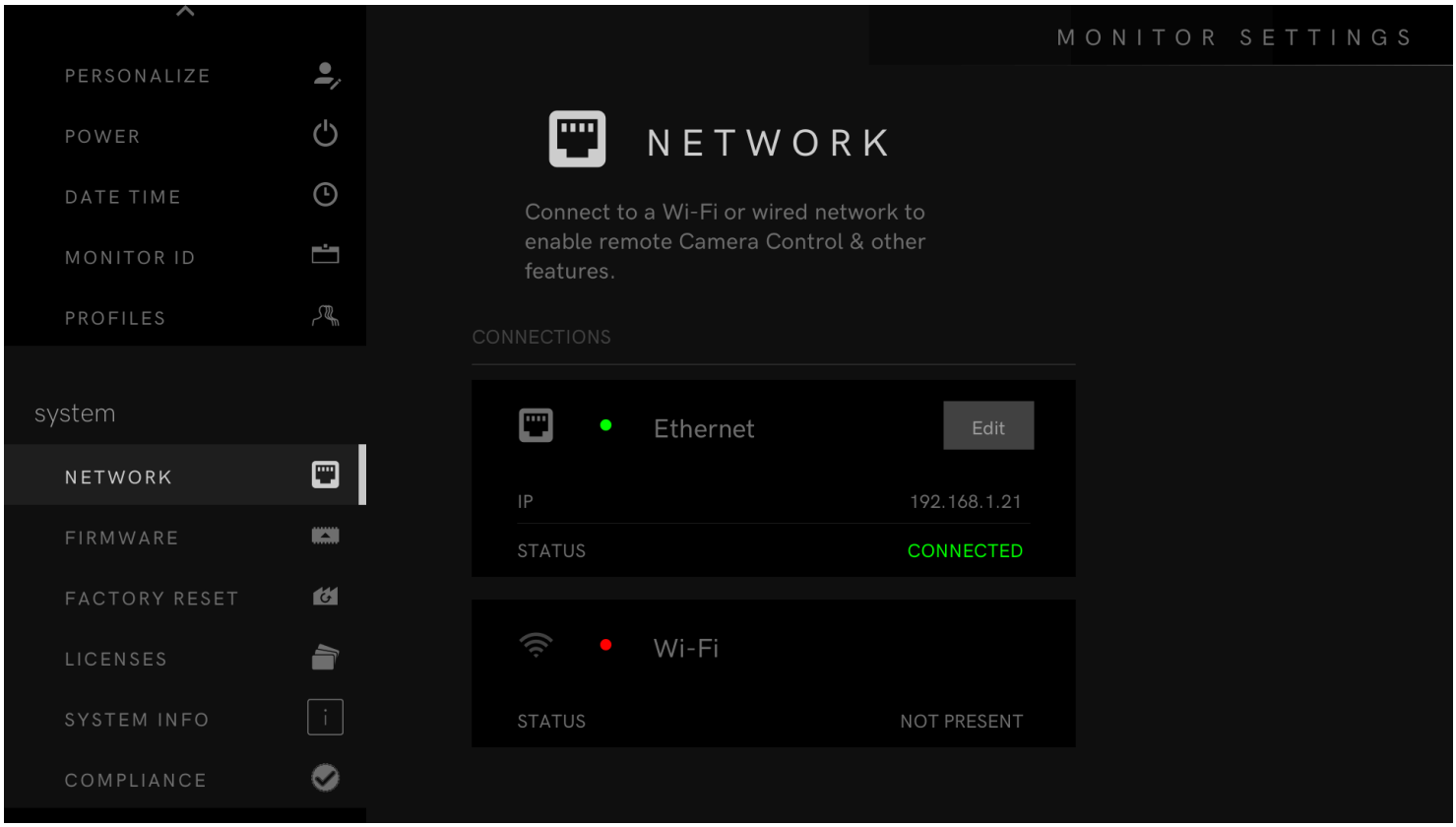
Load a saved profile from internal memory or SD card to keep from having to reconfigure all your settings, pages and tools if moving from monitor to monitor. To load a profile, select load profile, and then navigate to the file and select it.

System

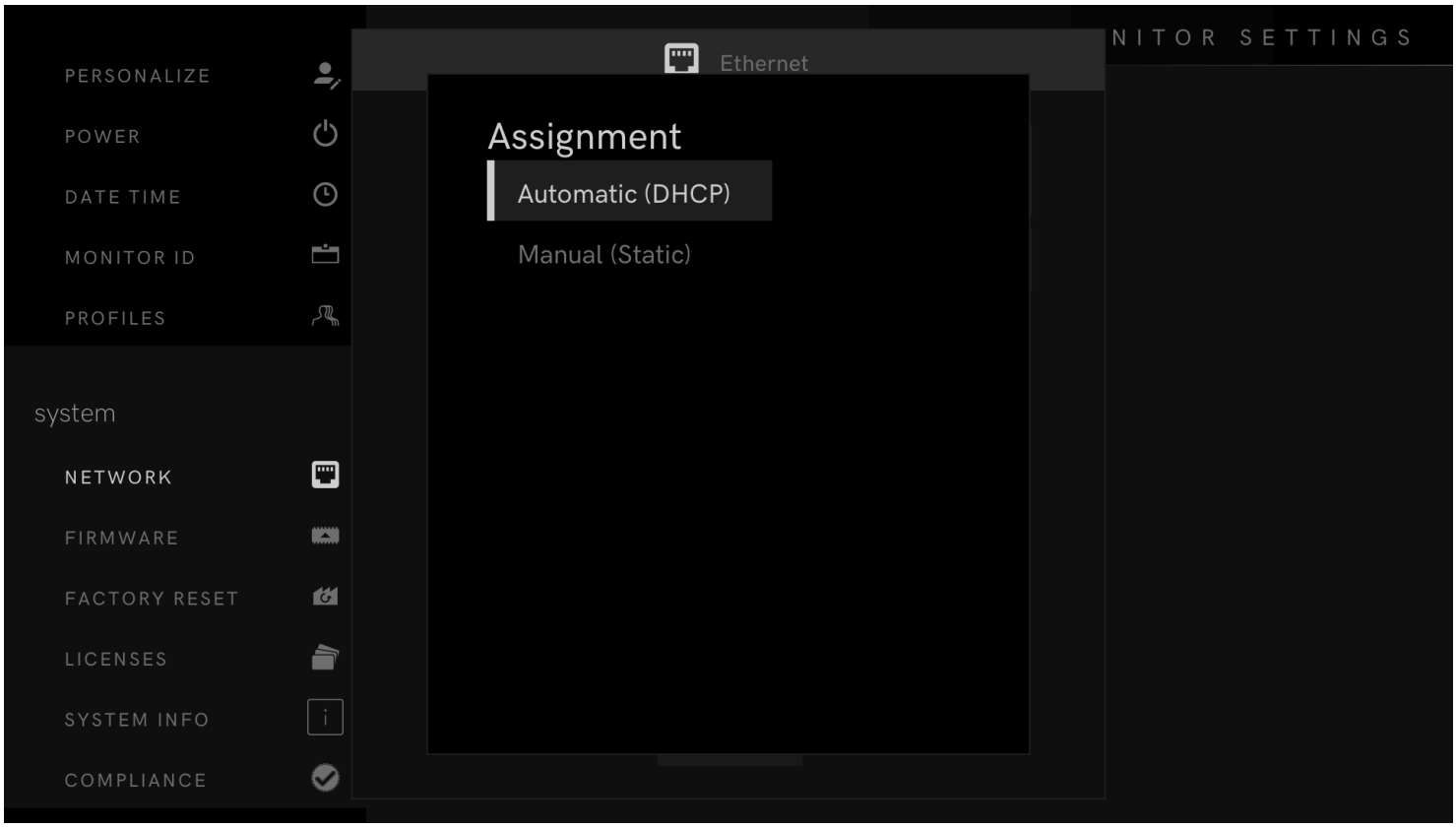
- Network Settings
- Firmware Settings
- Factory Reset Settings
- Licenses
- System Info

Network Settings

Configure the monitor's network interface and encryption option to enable certain features.

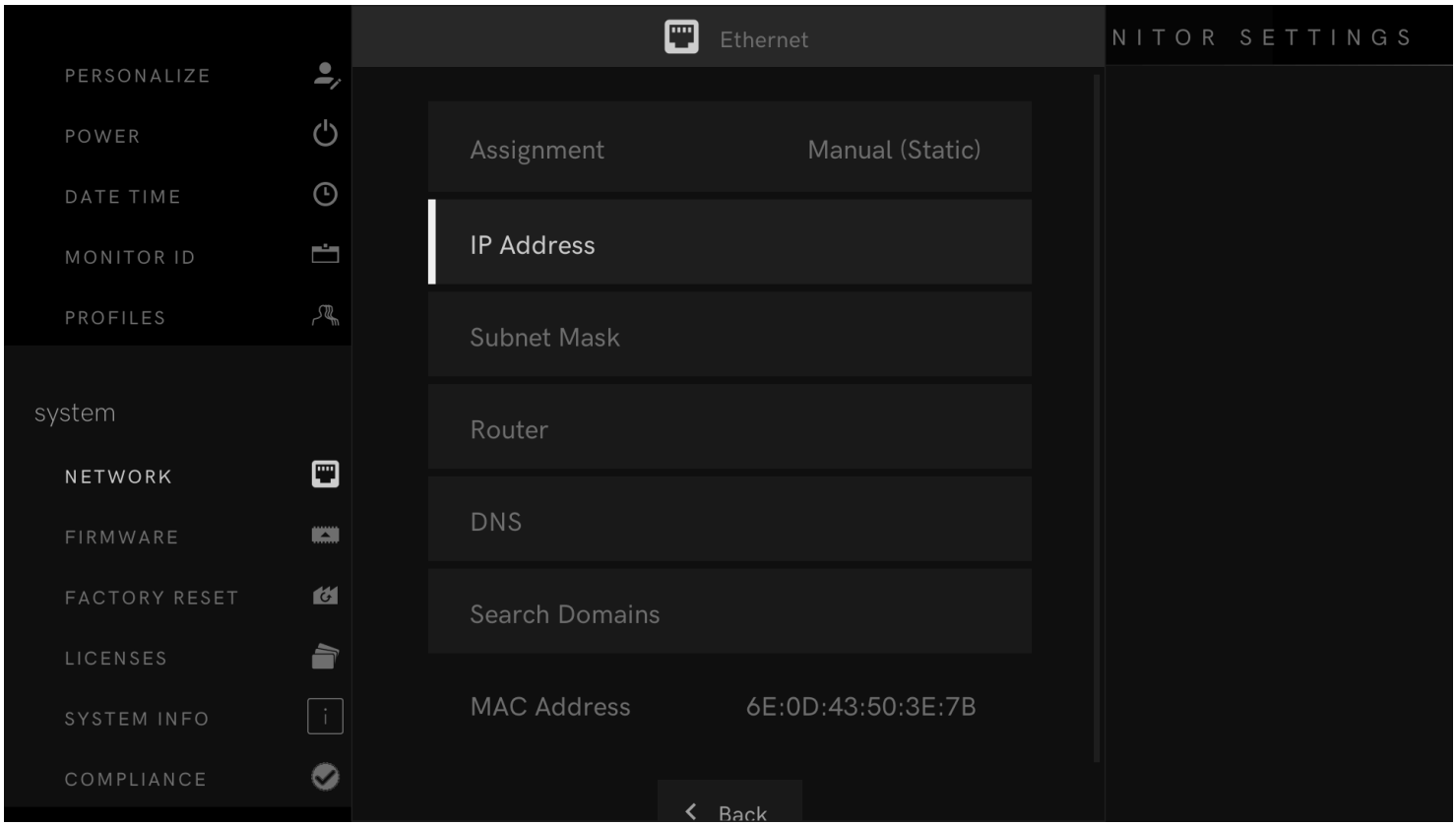


Ethernet



Tap the **Edit** tab to open the Ethernet settings.

- **Automatic (DHCP):** When set to DHCP, the monitor requests an IP address and configuration from the network's DHCP server.
- **Manual (Static):** When set to Static, you must manually configure the IP address, subnet mask, router, and DNS server to connect to the network.



Firmware Settings

Update system firmware or reset to factory defaults.

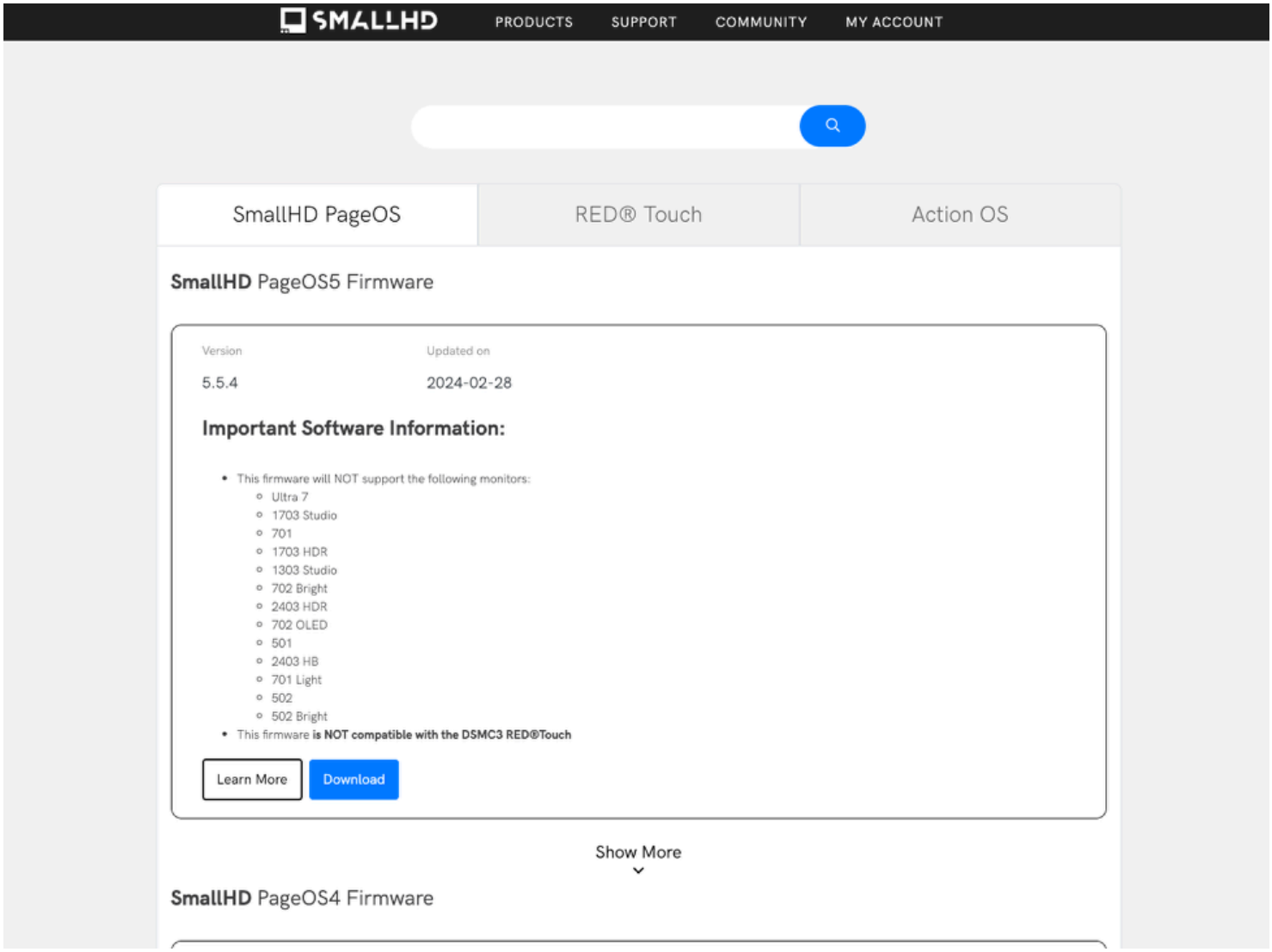
How to Update the Firmware

1. Attach a compatible SD card to your computer or a card reader attached to your computer.

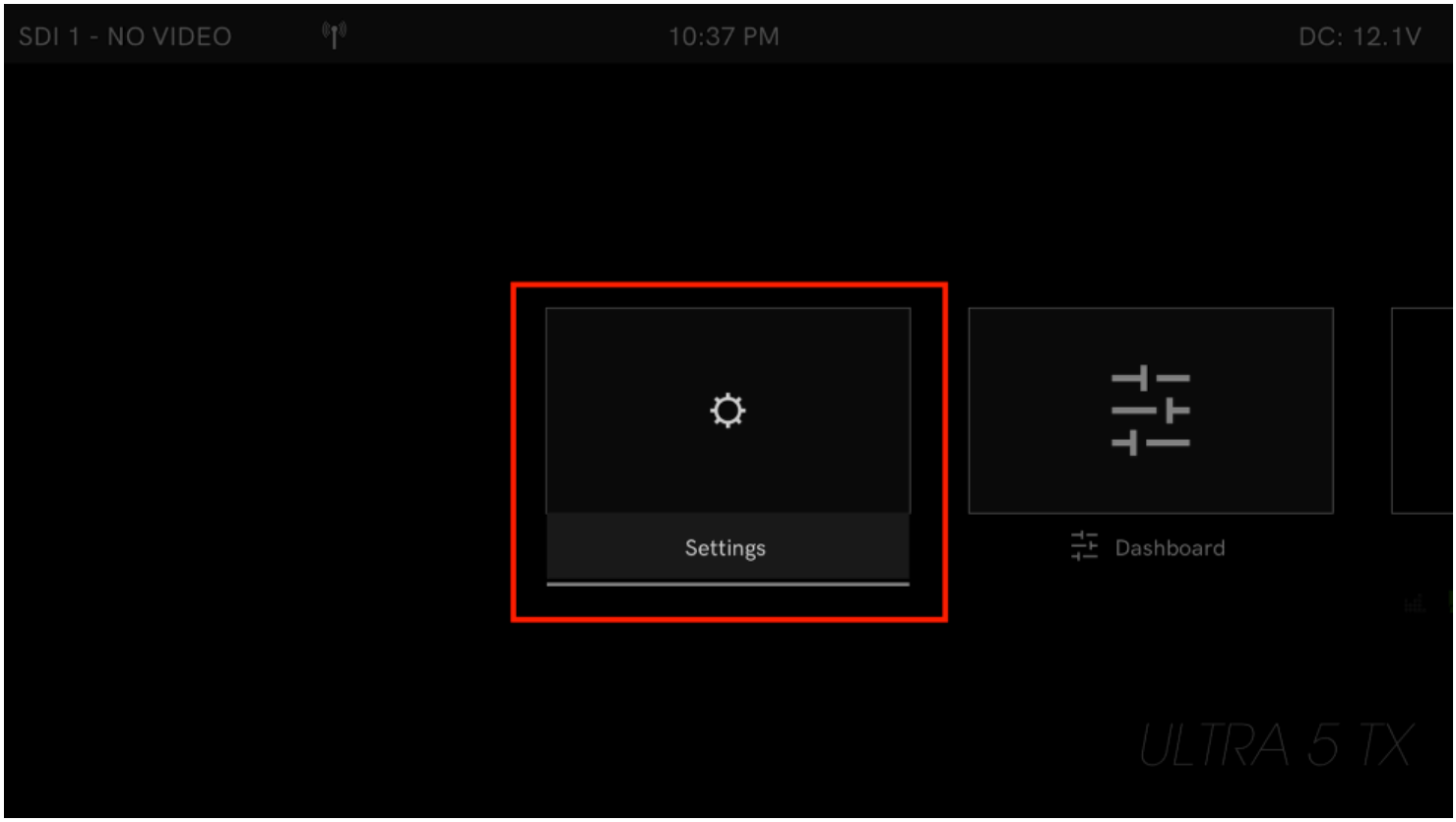
SD CARD CONSIDERATIONS

- Your SD 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)

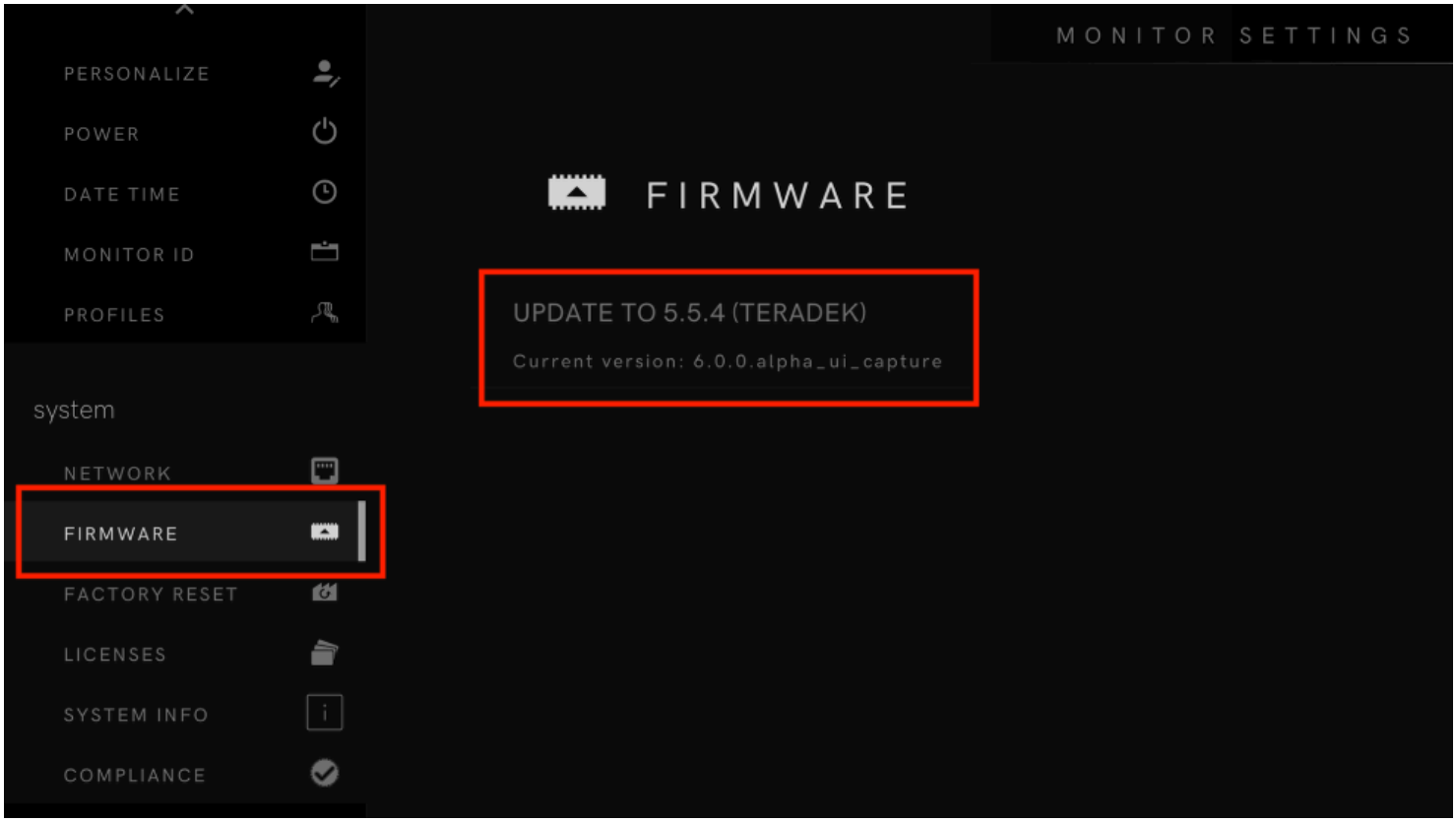
2. Visit **smallhd.com/pages/software** and download the latest firmware.



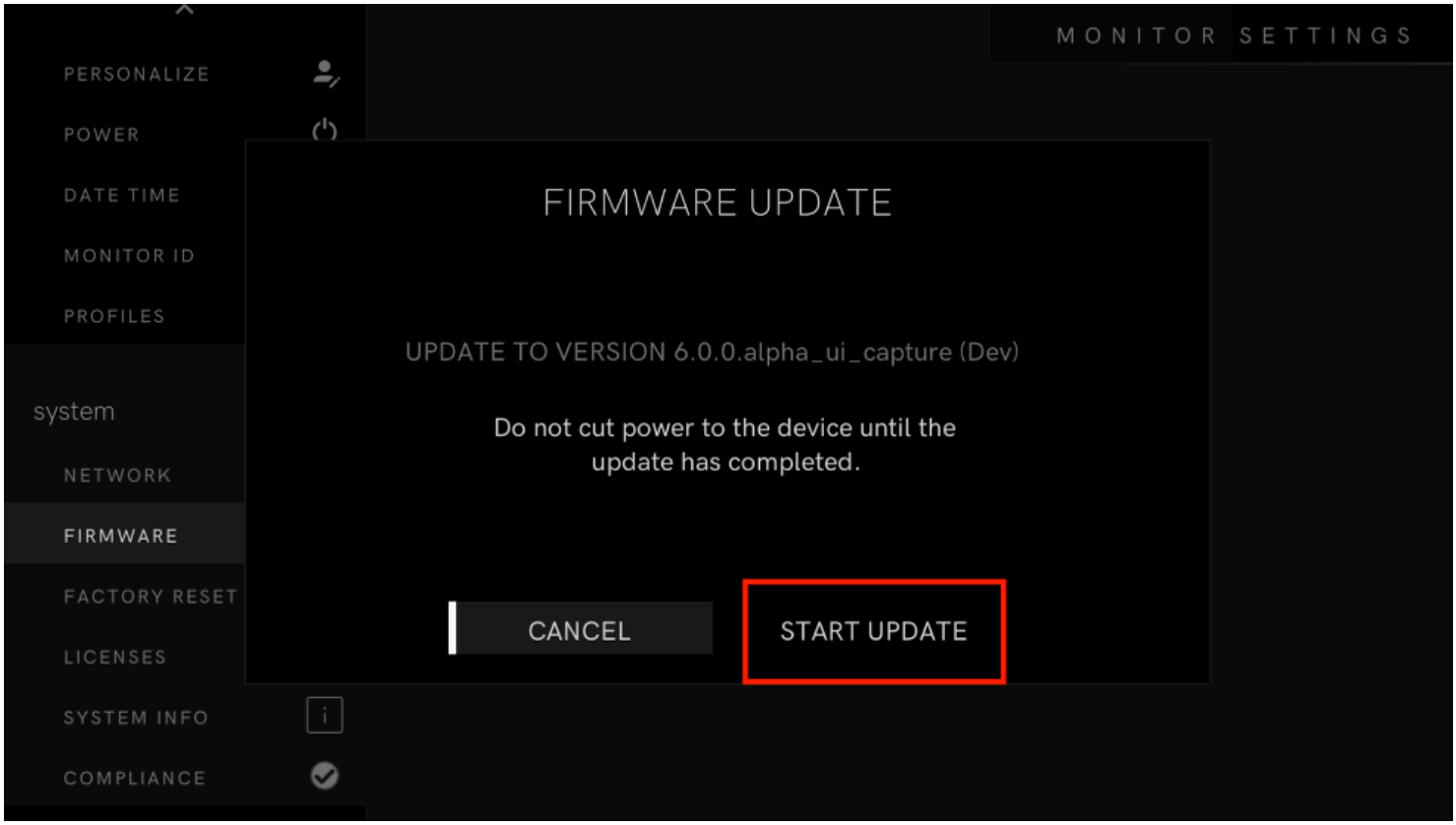
3. Click the **.zip** download file to extract the .bin (firmware file), then drag and drop the **.bin** file onto your SD card.
4. Remove SD Card, insert it into your SmallHD monitor, then turn on the monitor.
5. Swipe/toggle left, or tap the screen to access the monitor's **Settings Menu.**



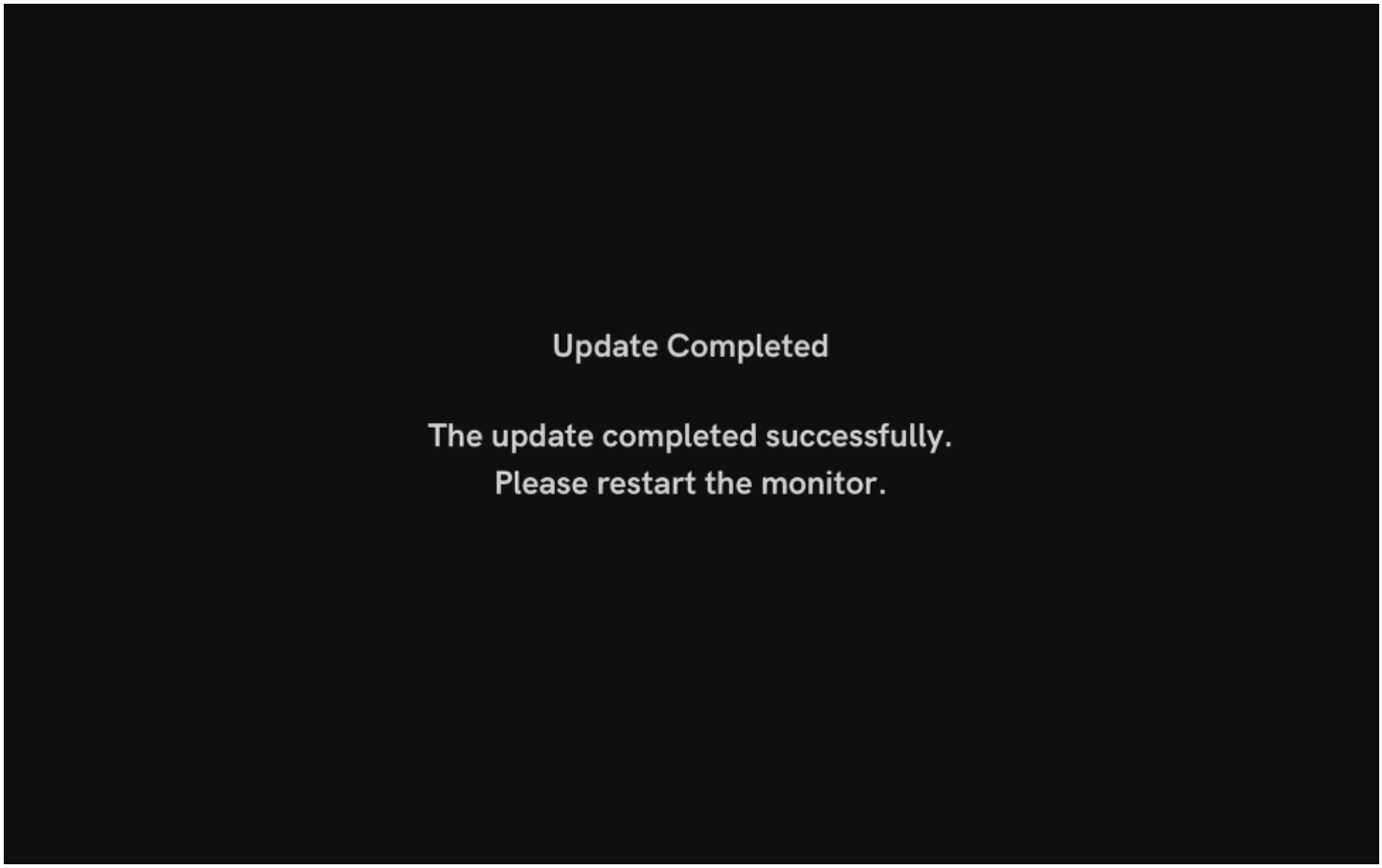
6. Scroll down and tap the **FIRMWARE** tab.
7. Tap the available firmware.



8. Tap the **START UPDATE** tab to begin the update process.



9. Once the firmware is installed, you will be prompted to reboot your monitor. Hold the power button for at least 5 seconds, then release it.

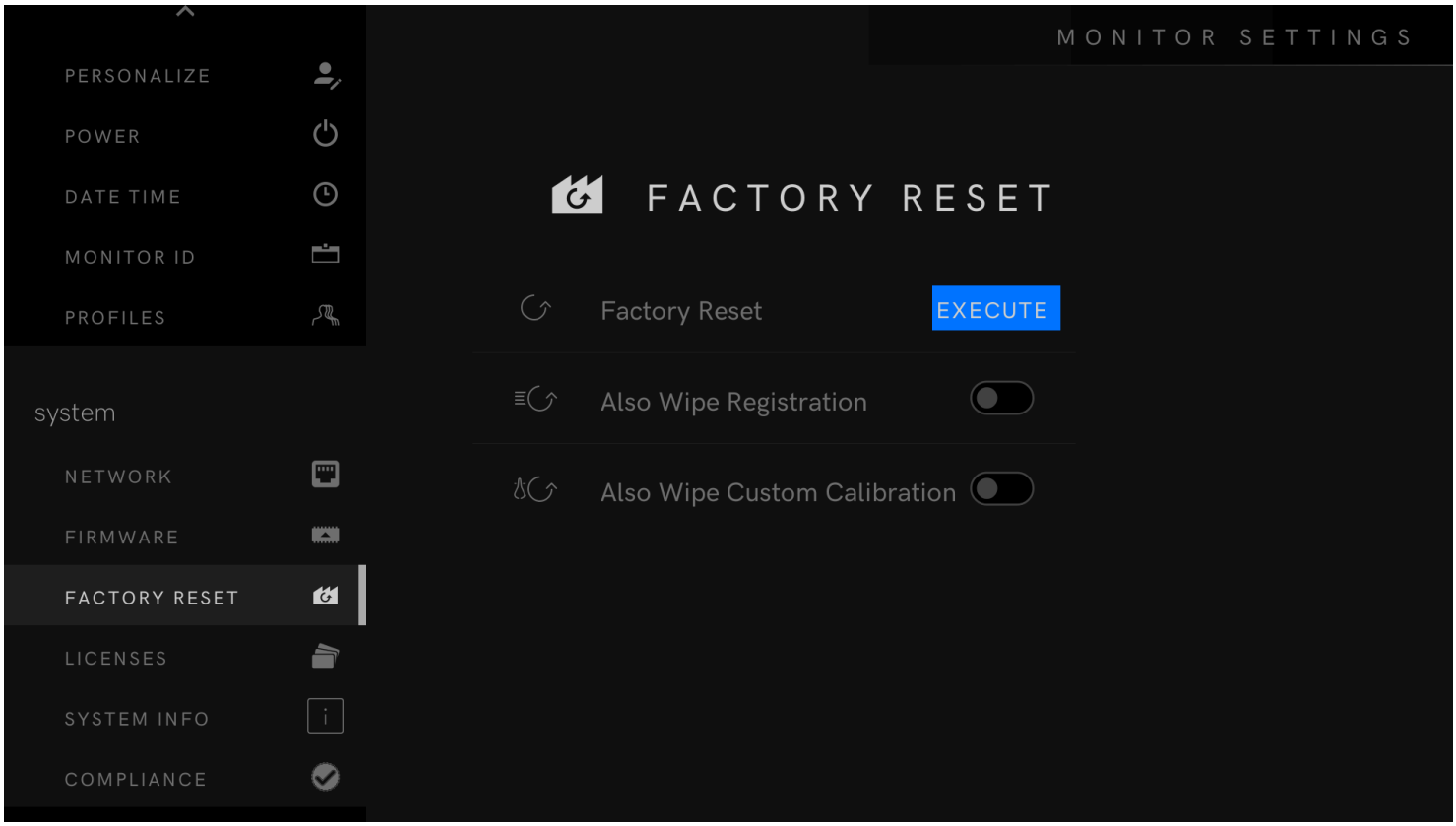


10. Press the power button again to begin operating your SmallHD monitor with the new firmware installed.

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

Factory Reset Settings

Reset the monitor’s pages & settings to the factory's default settings.



Execute Factory Reset

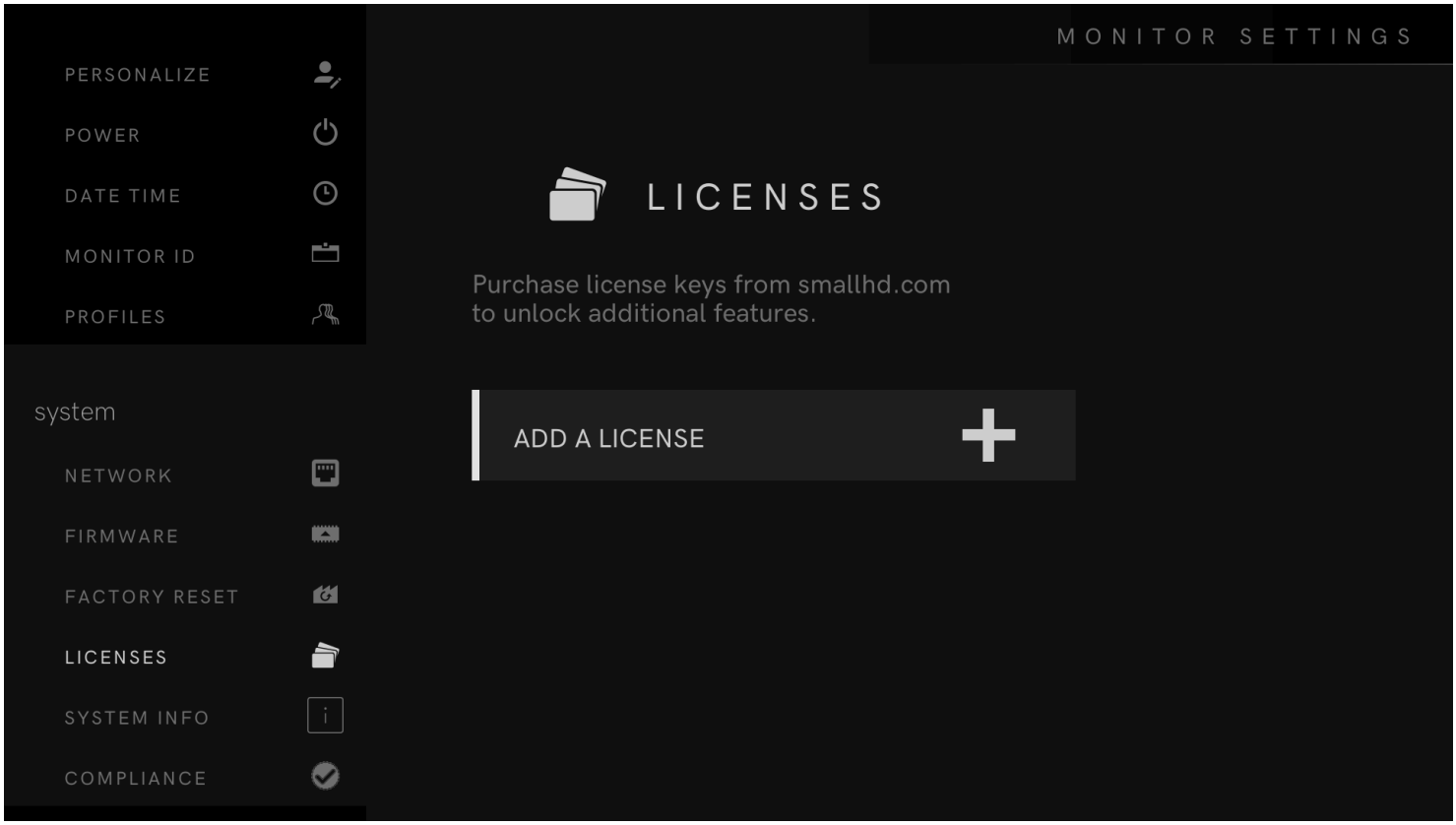
Select this option to reset the monitor to its factory default settings.

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. ;-)

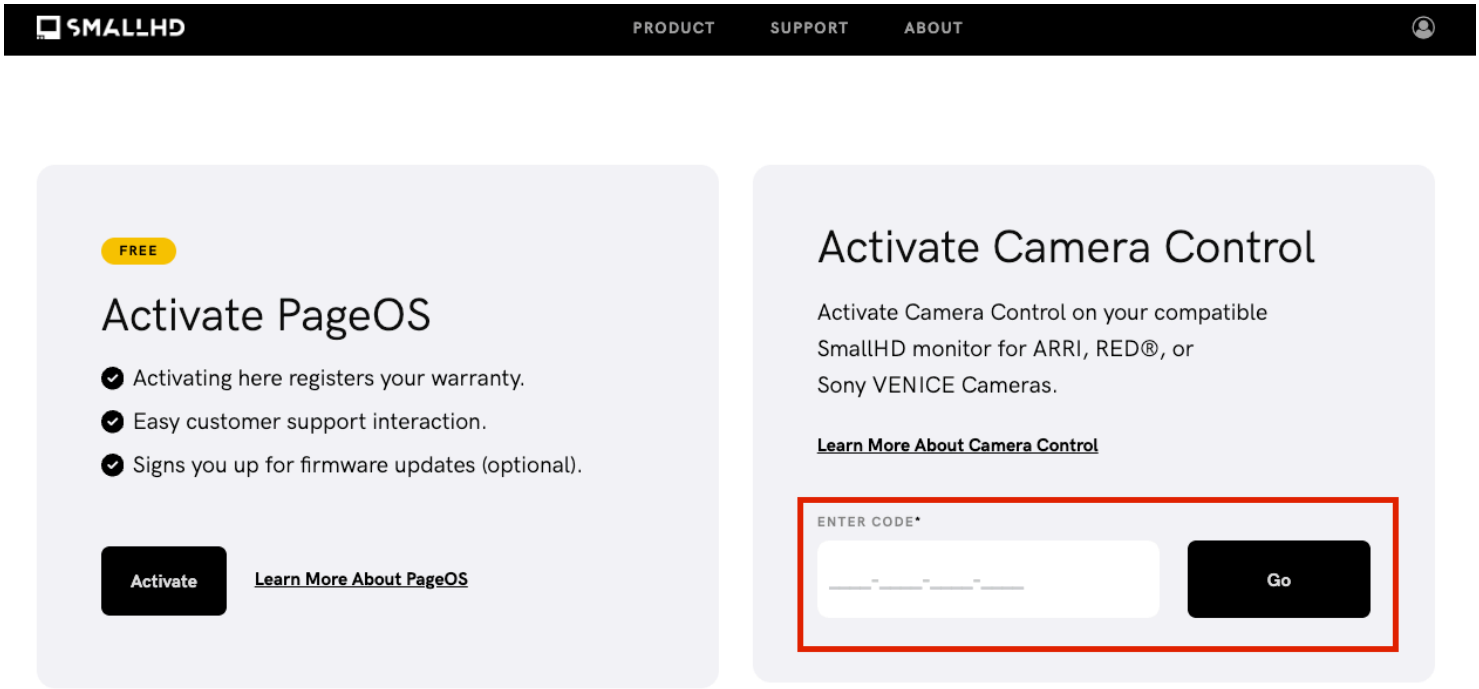
Licenses

Install Camera Control license keys from SmallHD to unlock additional features. Before you proceed, you must first purchase and install a Camera Control license for your camera from **smallhd.com**.

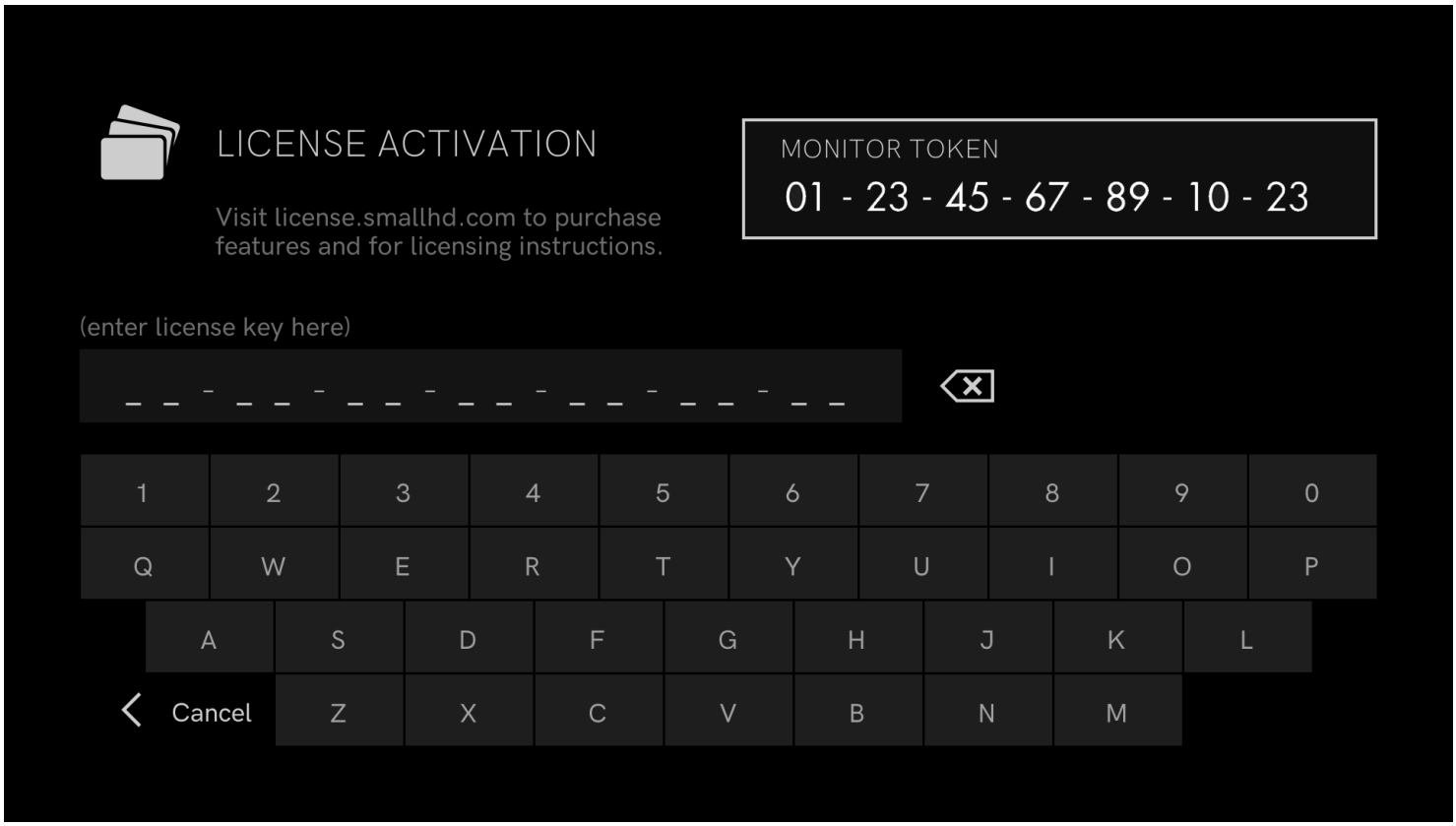


1. Go to **activate.smallhd.com**.

2. Enter the Activation Code you received with the purchase of your SmallHD Camera Control software in the **Activate Camera Control** section, then click **Go** (see below).



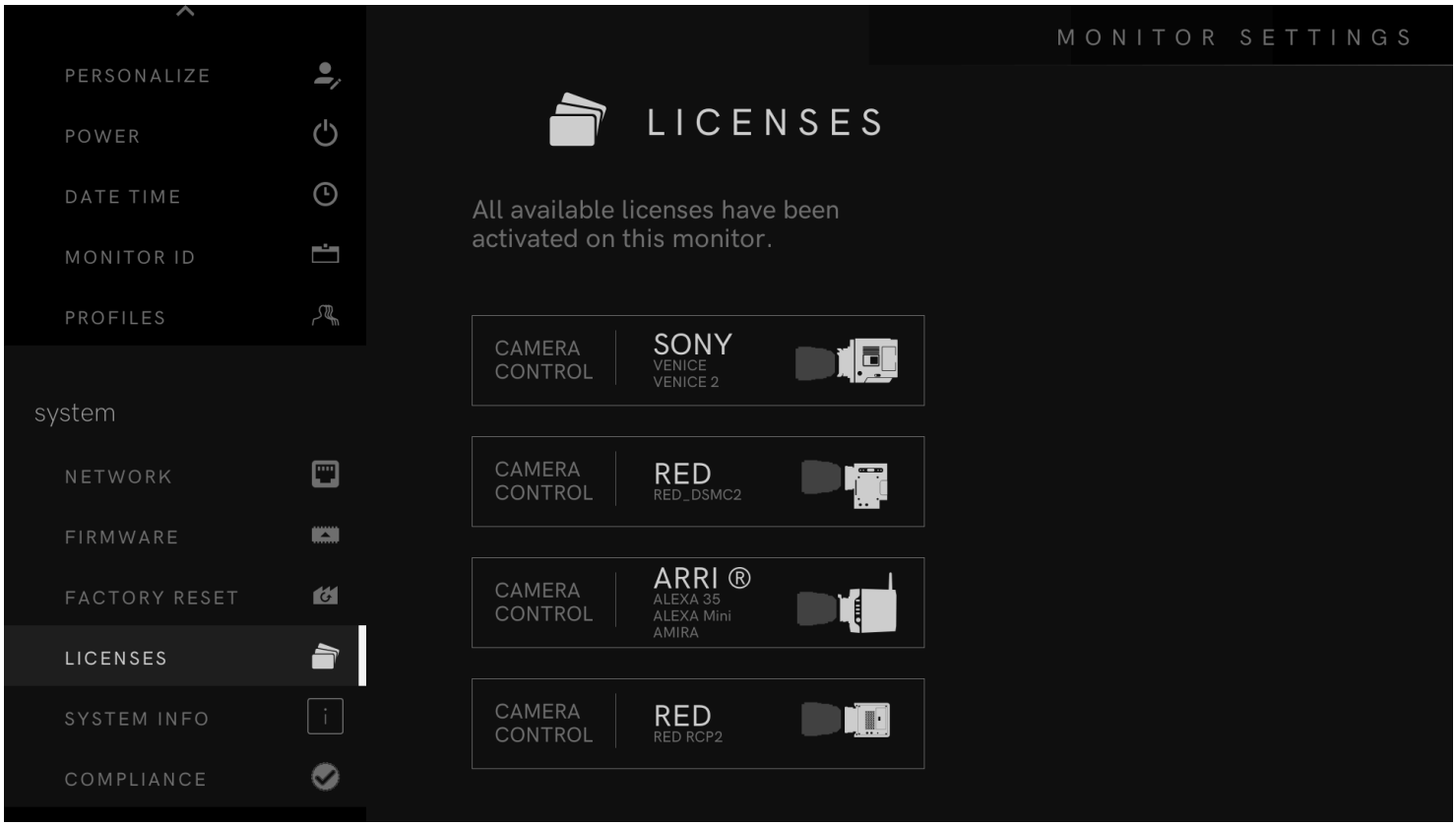
3. From the Settings menu on your SmallHD monitor, navigate to **SYSTEM > LICENSES > ADD A LICENSE**. In the upper right-hand corner, you will see your **Monitor Token** (see image).



4. Return to the activation website and enter your **Monitor Token**. You will be prompted to make sure the token is entered correctly. Click **Yes** to continue.
5. Enter your monitor's Serial Number in the field that appears and click **Submit**. Your monitor's serial is located alongside a barcode on the input/output port area or on the battery plate.
6. Enter your name and the email where you want to receive your License Key. Click **Send** to receive your License Key.
7. On the **ADD A LICENSE** page on your SmallHD monitor, enter your License Key and tap **Activate** (see image).



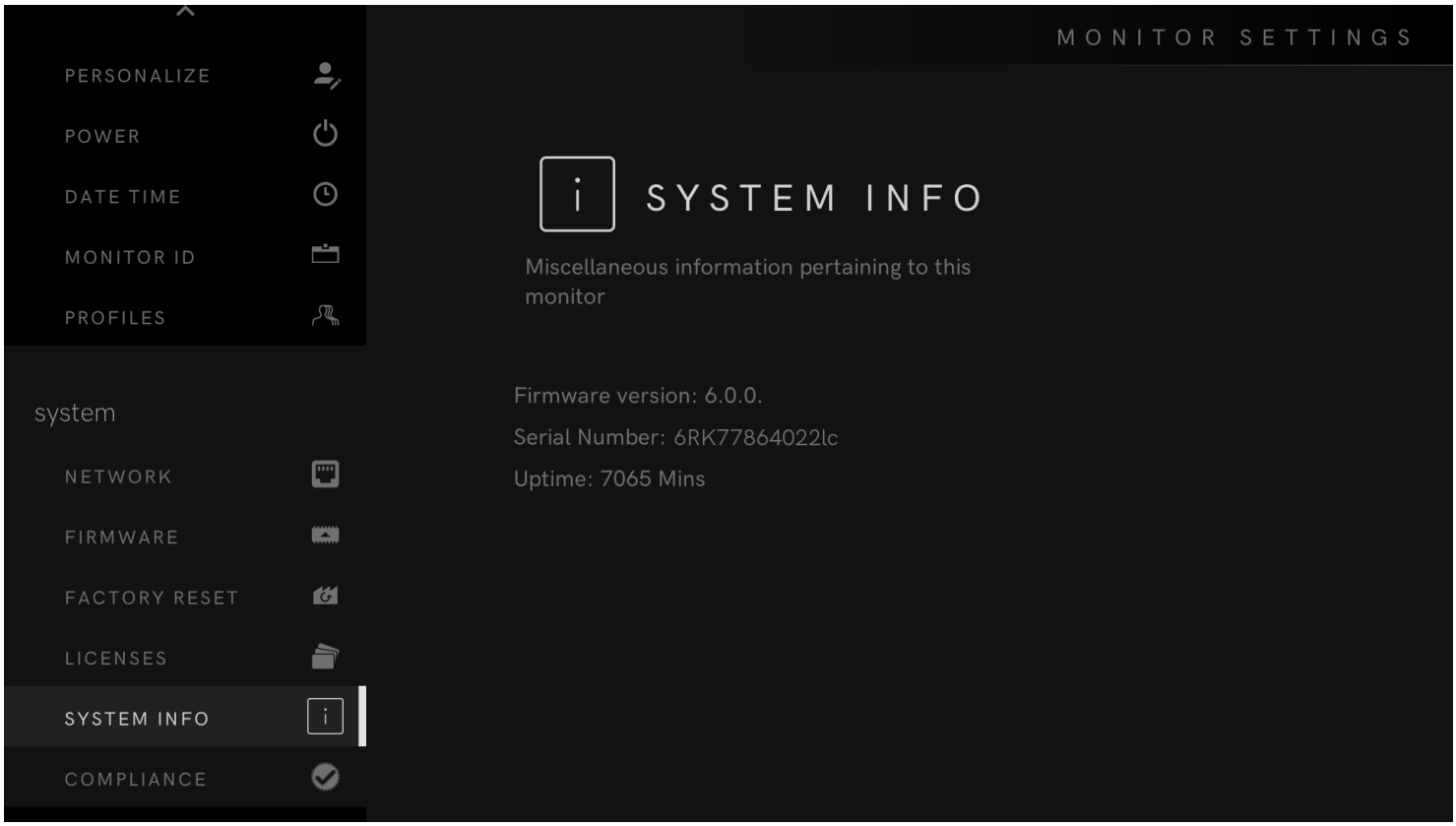
8. Once activated, Camera Control licenses will be listed in the **Licenses** page.



System Info

Review the following information about your SmallHD monitor:

- **Firmware version**
- **Serial Number**
- **Uptime**



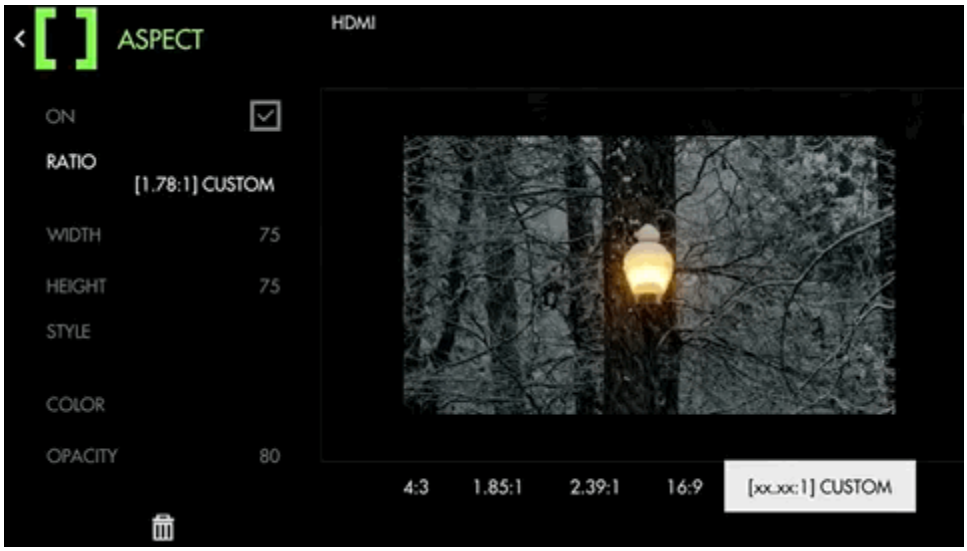
NOTE: SmallHD includes a panel burn-in process to ensure the monitor meets the standards of quality all our customers expect. You may notice a running time between 3000-7500 minutes on the monitor. This is part of the normal burn-in period.

- If your monitor does not show any **uptime** out of the box, this unit may not require the typical burn-in process and would be reset after quality testing.
- On some monitors, the average time for quality testing should be between 3000-7500 minutes of operation from the factory.

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.

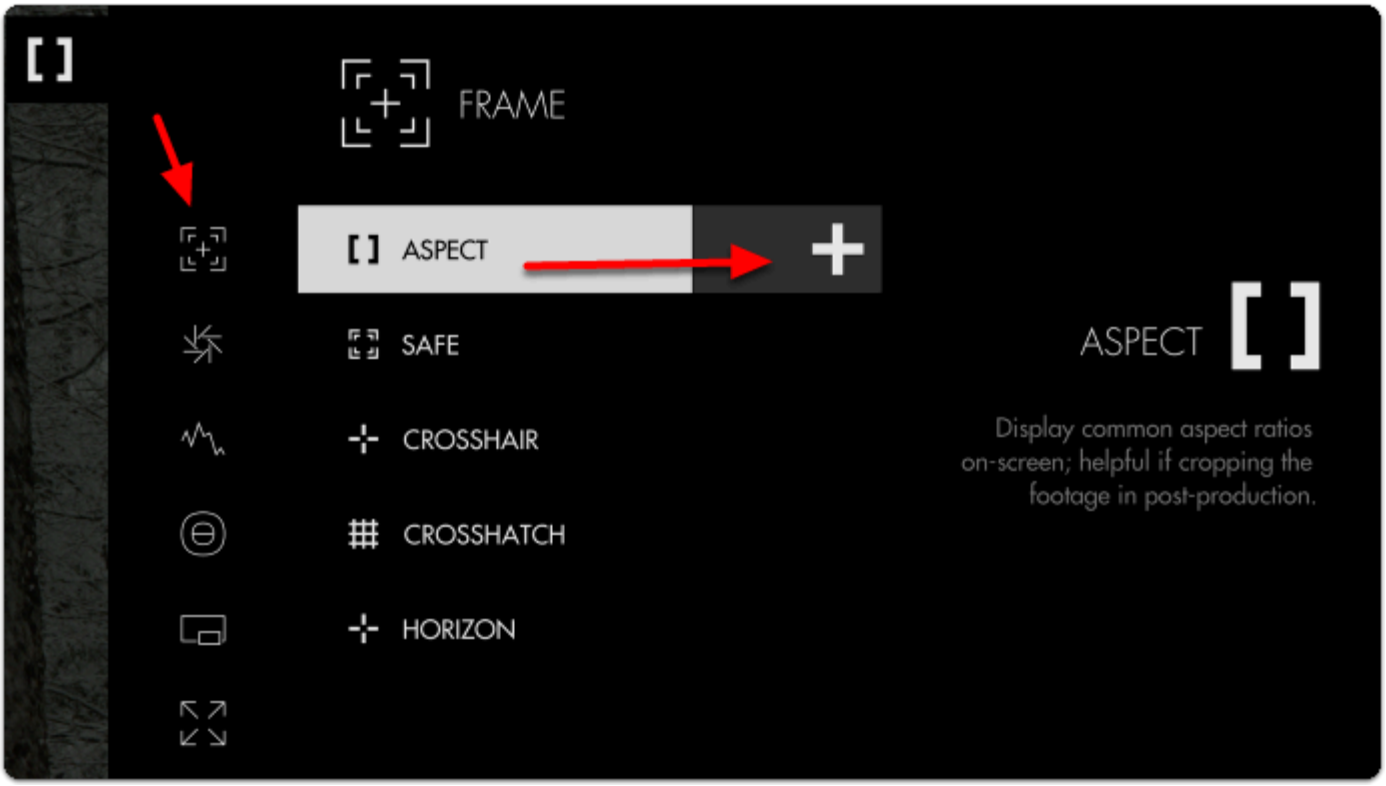
Aspect - Quick Start

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.


ASPECT
HDMI
ON
RATIO
STYLE
COLOR
OPACITY
80
0
80

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 activating or deactivating it. It will be green when active and grey when inactive.

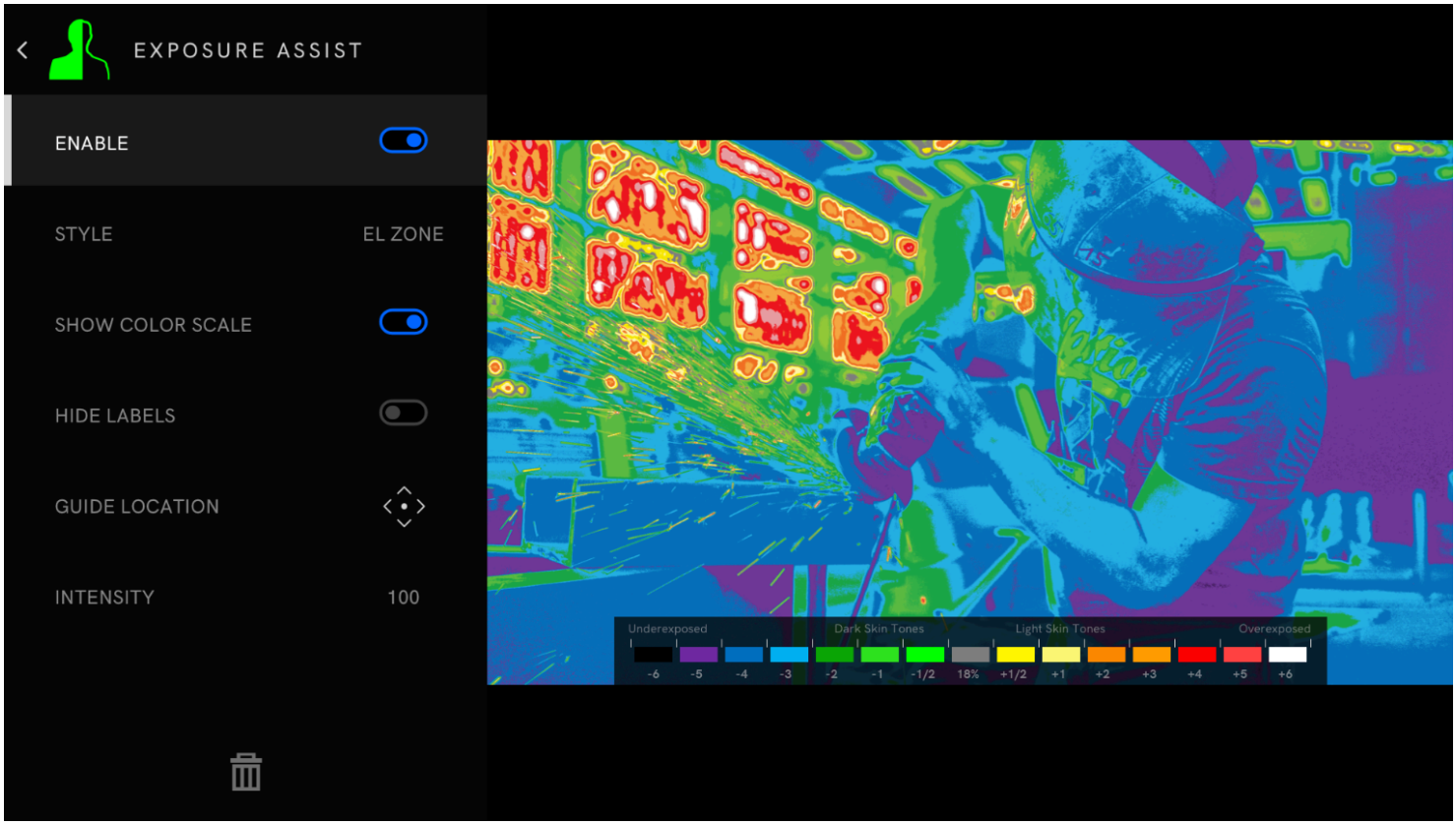
Style

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 (1,2) - Rainbow Gradient from Pink(0) to Red(0)
EL ZONE - Stops represented by color between Black (underexposed) and White (overexposed)
MAP (1,2,3) - Custom settings that you create

EL Zone



EL Zone is a stop-based exposure map tool—developed in collaboration with legendary cinematographer Ed Lachman, ASC that works like a virtual spot meter, replacing IRE exposure values with stops. Sensor data from the camera provides a reference point, and a false color represents each stop above and below 18% gray, allowing for easier, more intuitive on-set communication.

EL Zone requires a Log signal in order for the monitor to understand & display accurate stop values. If you wish to use a LUT, apply it to a monitoring page using the Look tool (instead of applying a LUT on the camera).

To enable EL Zone, make sure you create a color pipe in your monitor's settings menu. You will need to create and send the monitor a LOG signal and select the log signal you will send. Once the Color Pipe has been set to match the camera's LOG setting, the EL Zone Tool can be assigned to any Page. Below is an example of how to configure your Color Pipe settings and add the EL Zone tool.

Configure EL Zones with RED

1. Navigate to **Settings > COLOR PIPE > NEW COLOR PIPE +**, then enter the following:

- Input Type = **LOG**
- Camera = **RED**
- Color Space = **RED WIDE GAMUT RGB**
- Curve = **RED Log3G10**
- Range = **SDI FullDisplay** = **Do Not Convert**

2. Tap the screen of the page you're working on, then tap the plus (+) sign at the bottom of the toolbar.

3. Select **EXPOSURE ASSIST**, tap **STYLE**, then select **EL ZONE.**

NOTE: Make sure you select "Do Not Convert" in the Color pipe options.

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**.



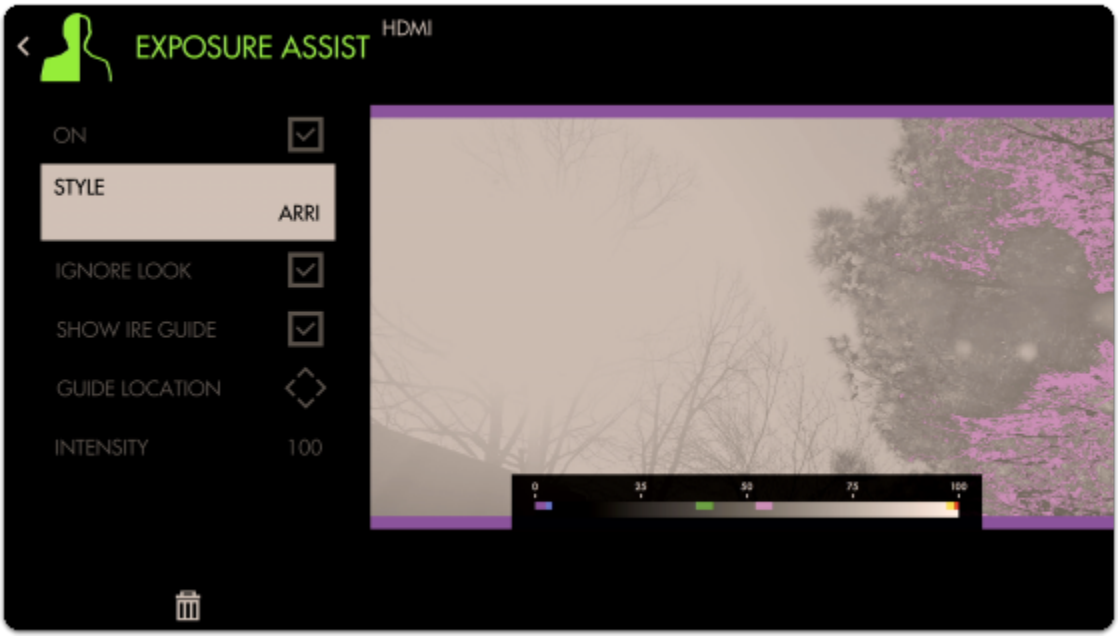
To begin setting the scale we need to first **find the limits**. For the following example I'm using a DVX200 set to V-Log gamma but this procedure applies to any camera or gamma.

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:



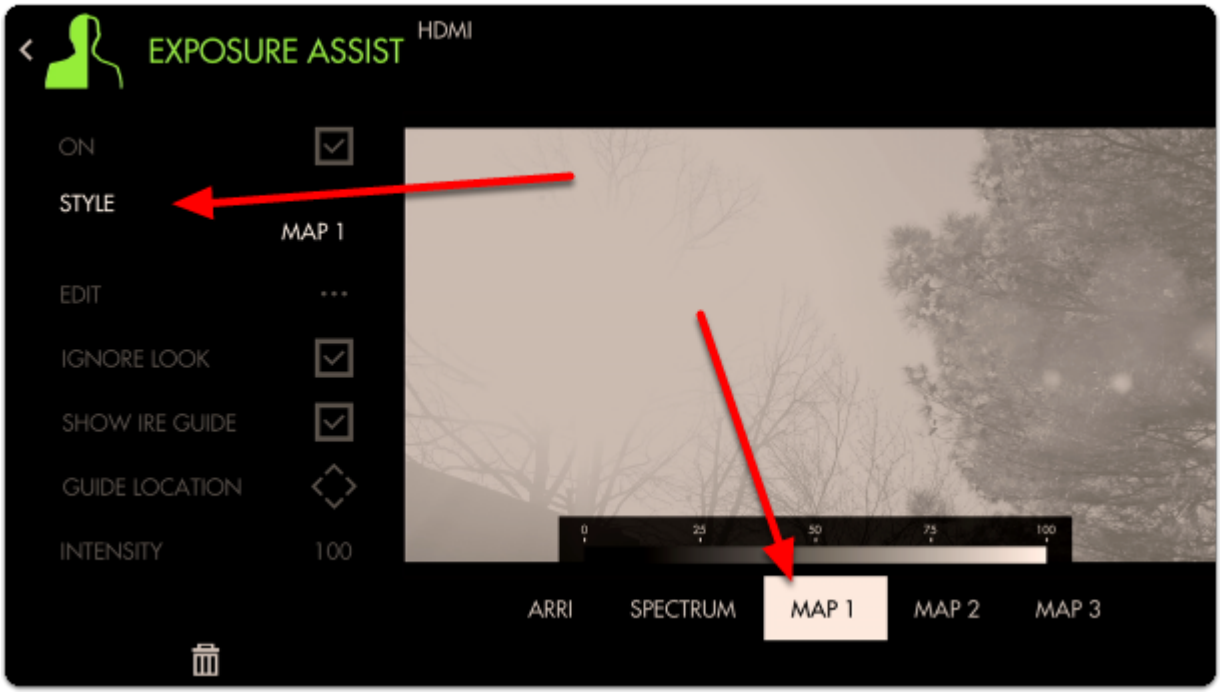
I briefly pointed the camera towards the sun during midday for this shot - this is generally not advisable to keep the sensor safe but I did it so you don't have to ;-)

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.



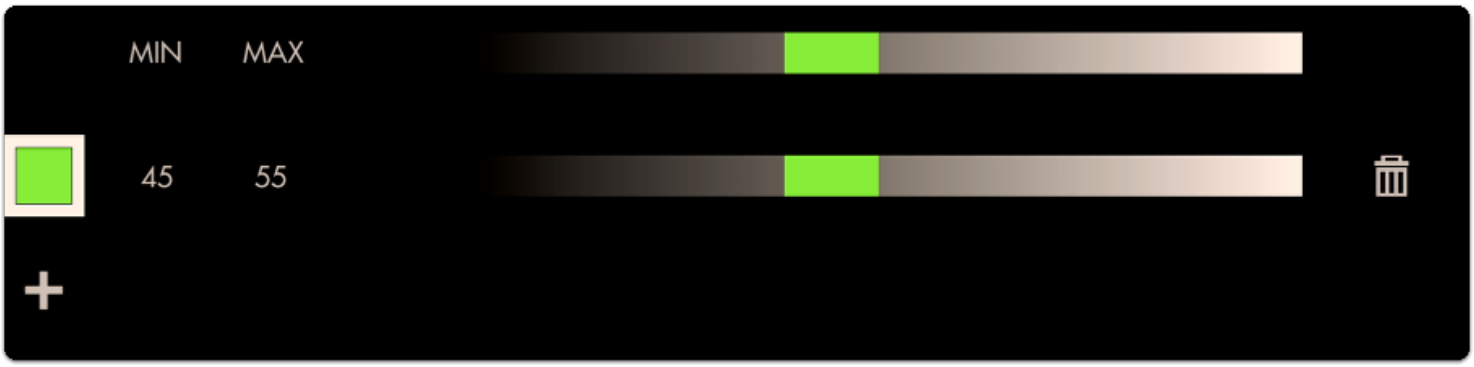
Select '**EDIT**' to begin customization



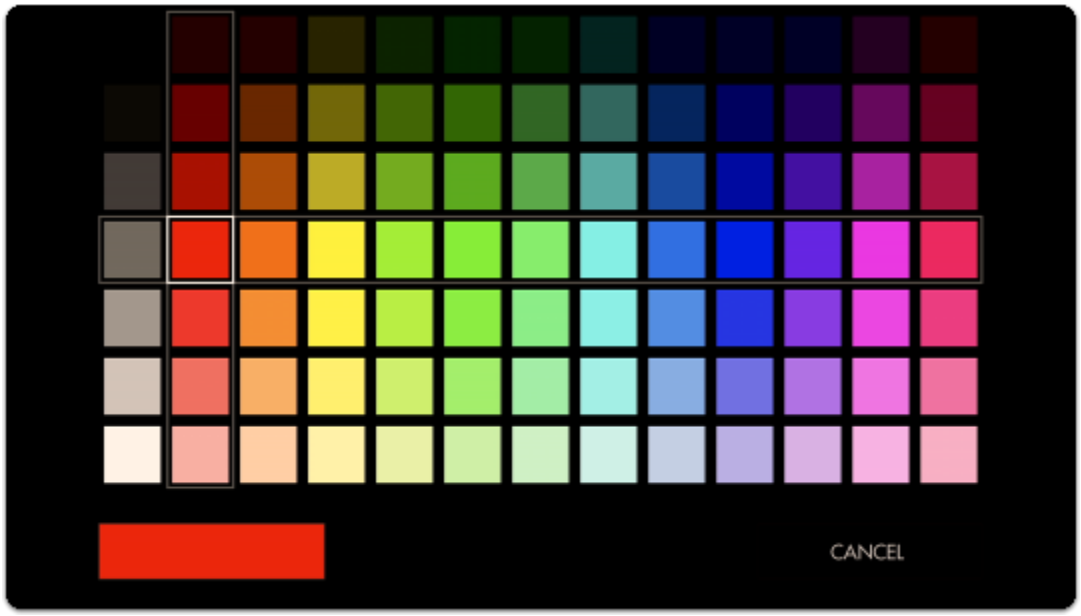
To begin adding a range, **select the '+'**



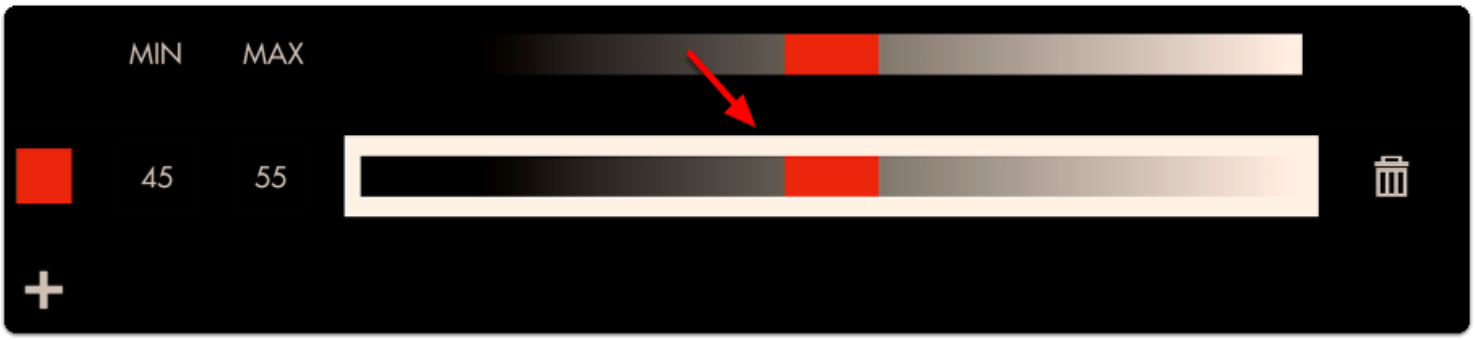
A default color and range is placed onto the scale; let's **change** this color by **selecting** it



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



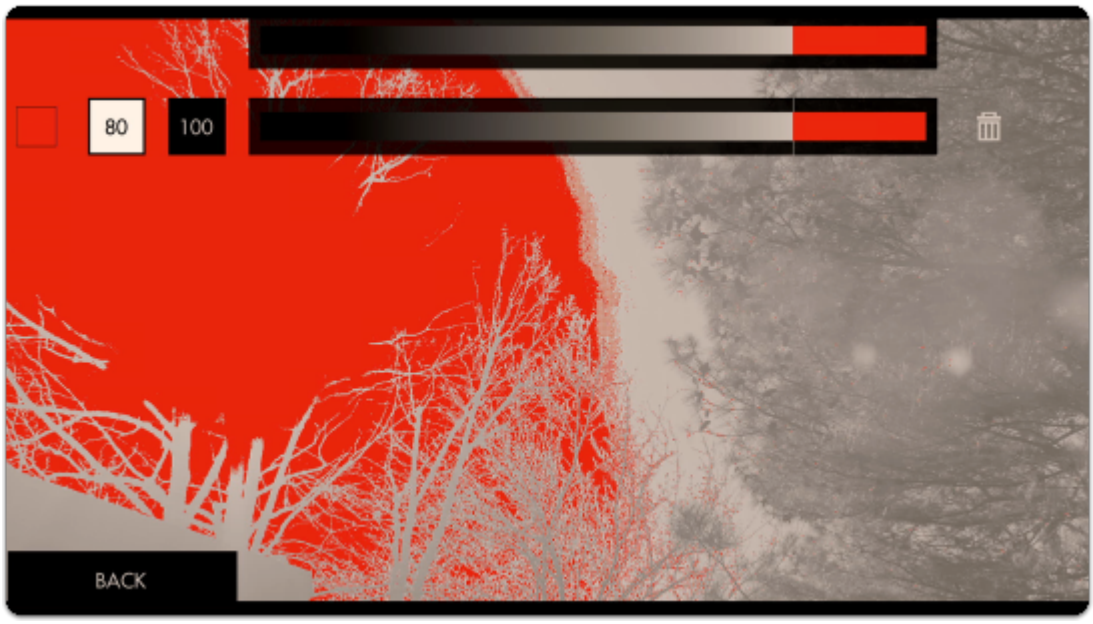
Next we can **edit the position** of this color on the luminosity scale by **selecting it** and dragging in either direction



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.



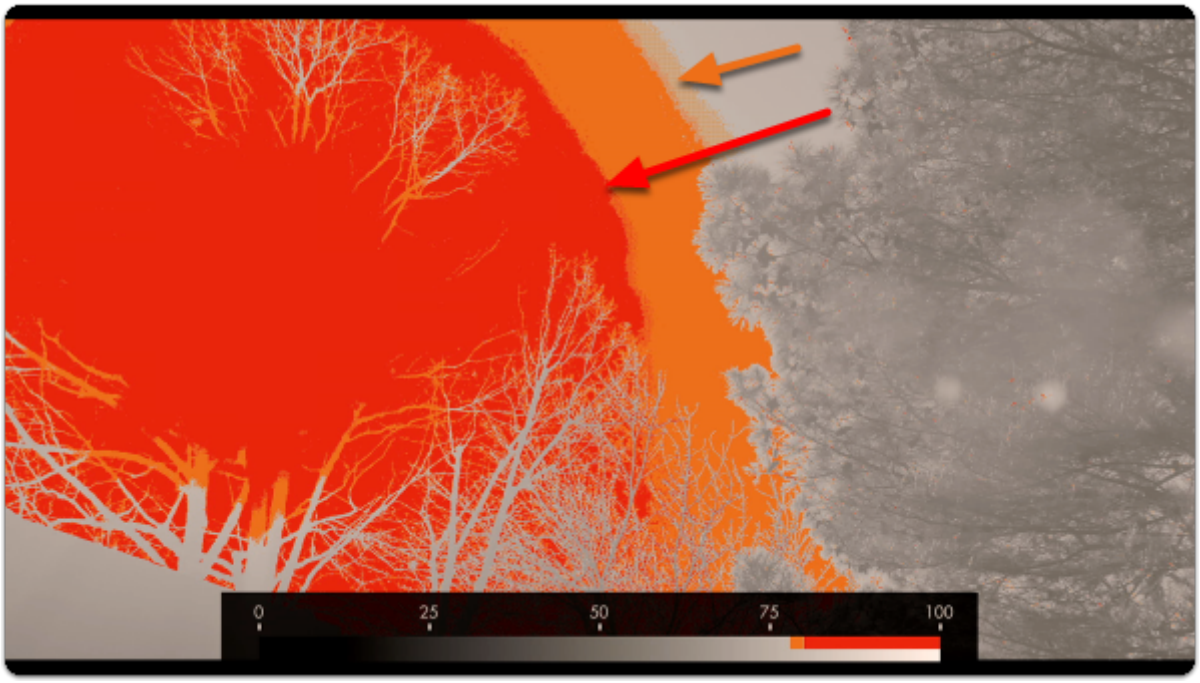
When decreased to **80%**, we have finally found the **limit** at which this camera **clips highlights**.



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:



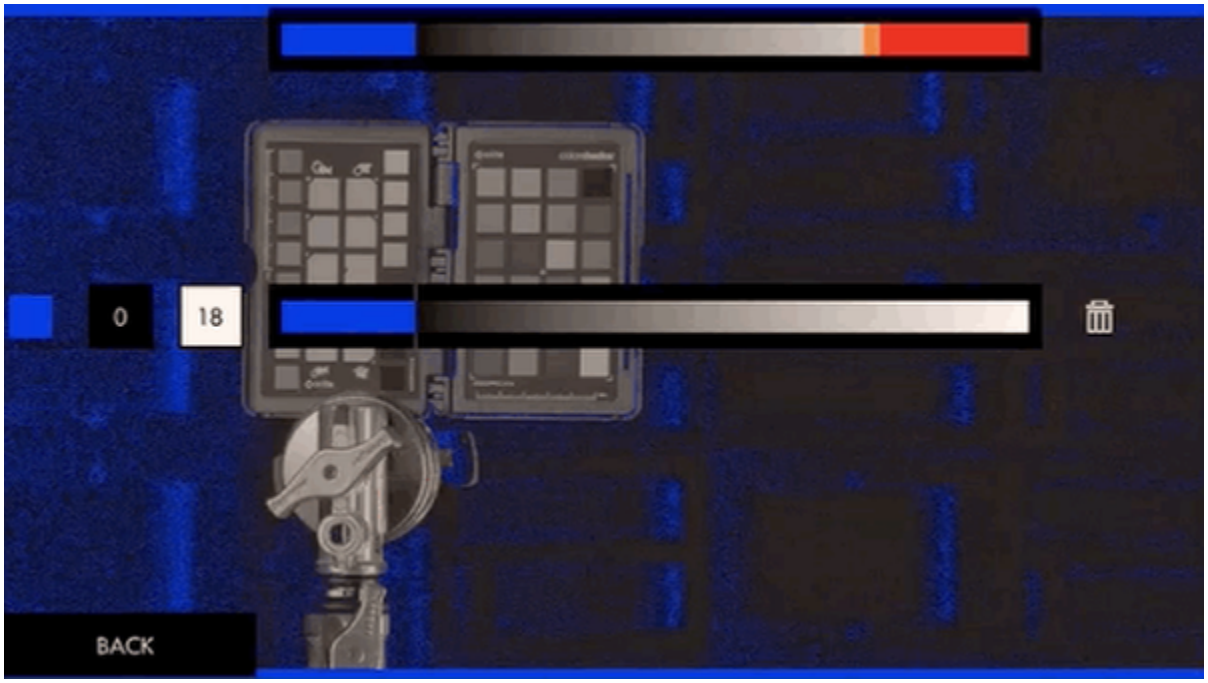
Now if you see orange it means you're **almost clipping highlights** and if you see red you **are clipping highlights**.



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**.



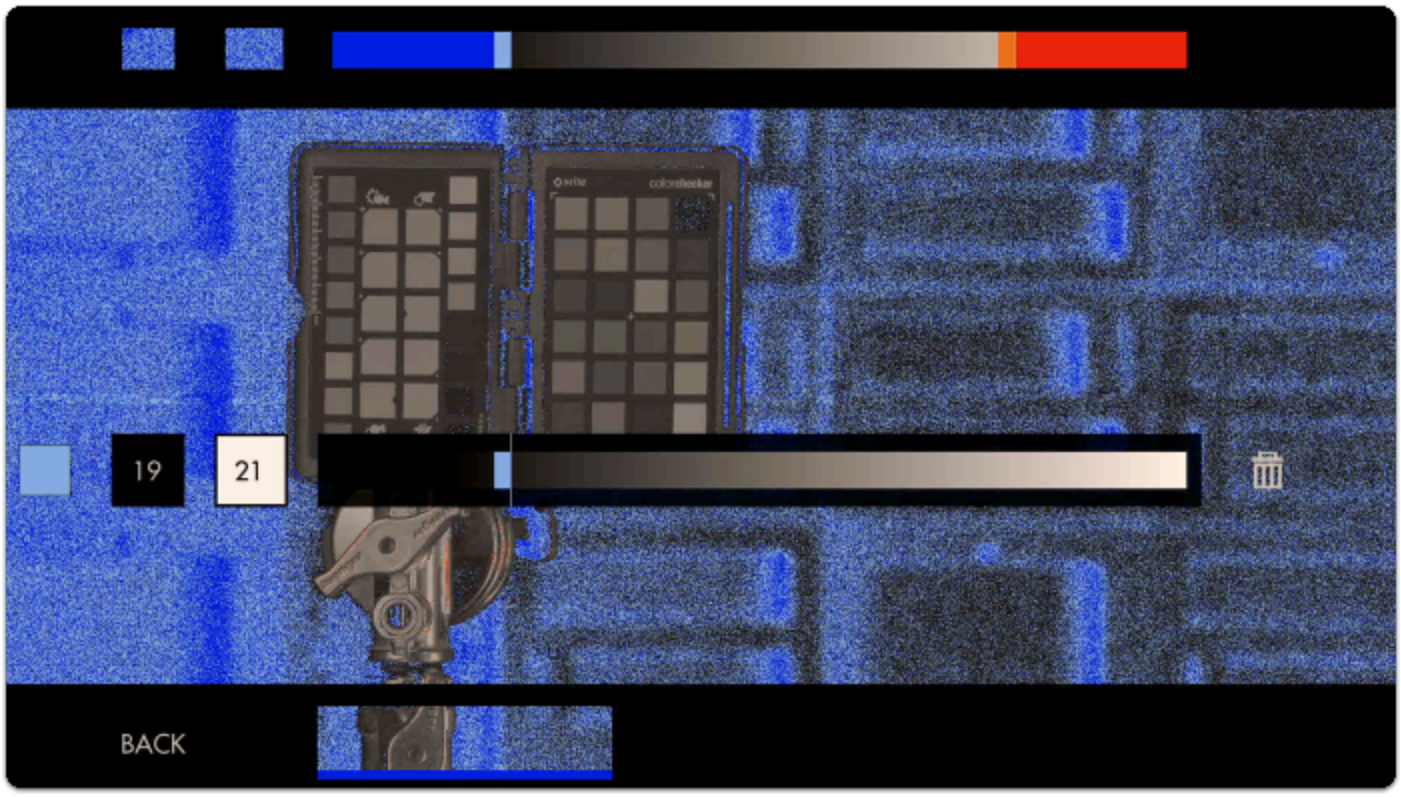
Create a new color band for the **shadows** - I prefer 'cool' colors for dark areas and normally set highlights to 'warm' colors to help me identify each zone quickly but feel free to use any configuration that makes sense to you!



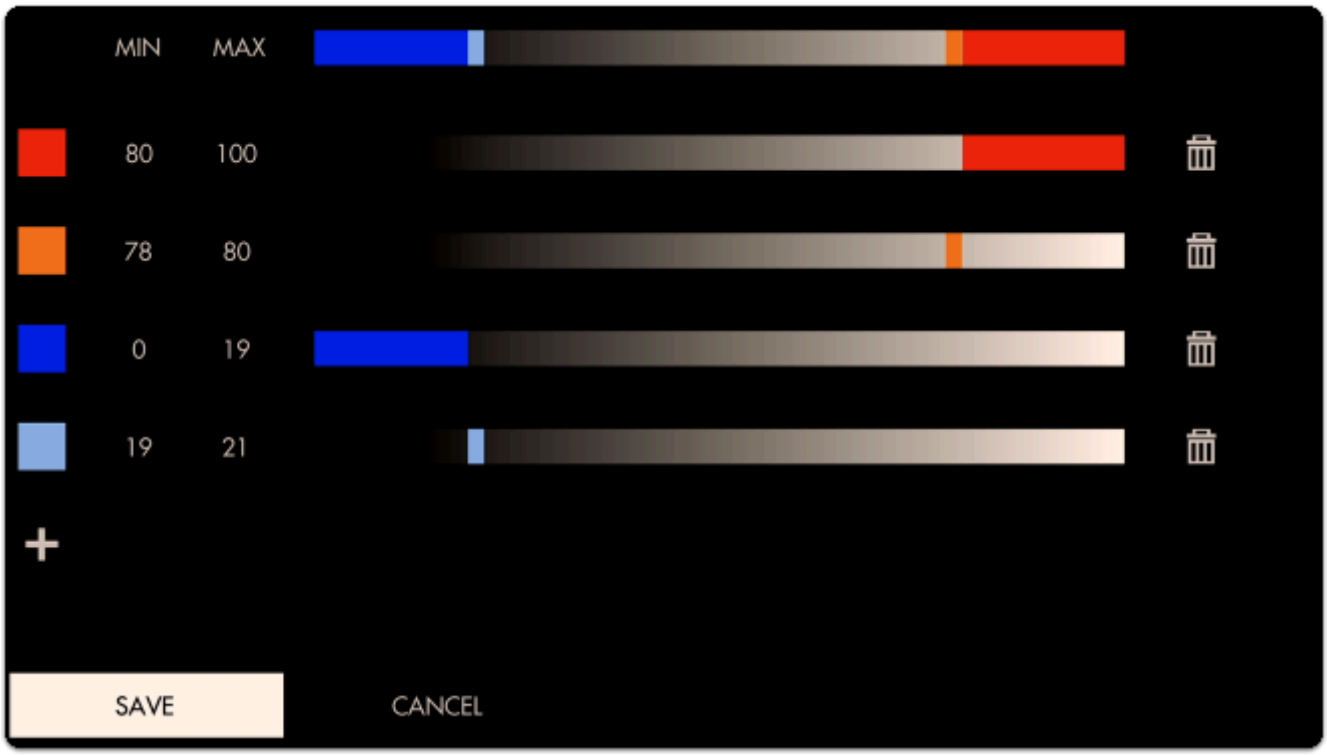
Set the **MIN** to **0** and adjust the **MAX** value to the point where color starts being introduced - You can customize this value until the **noise level** is acceptable to you (anything that gets painted blue is considered 'clipped', so increase the **MAX** to 'clip' more of the noise).

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:

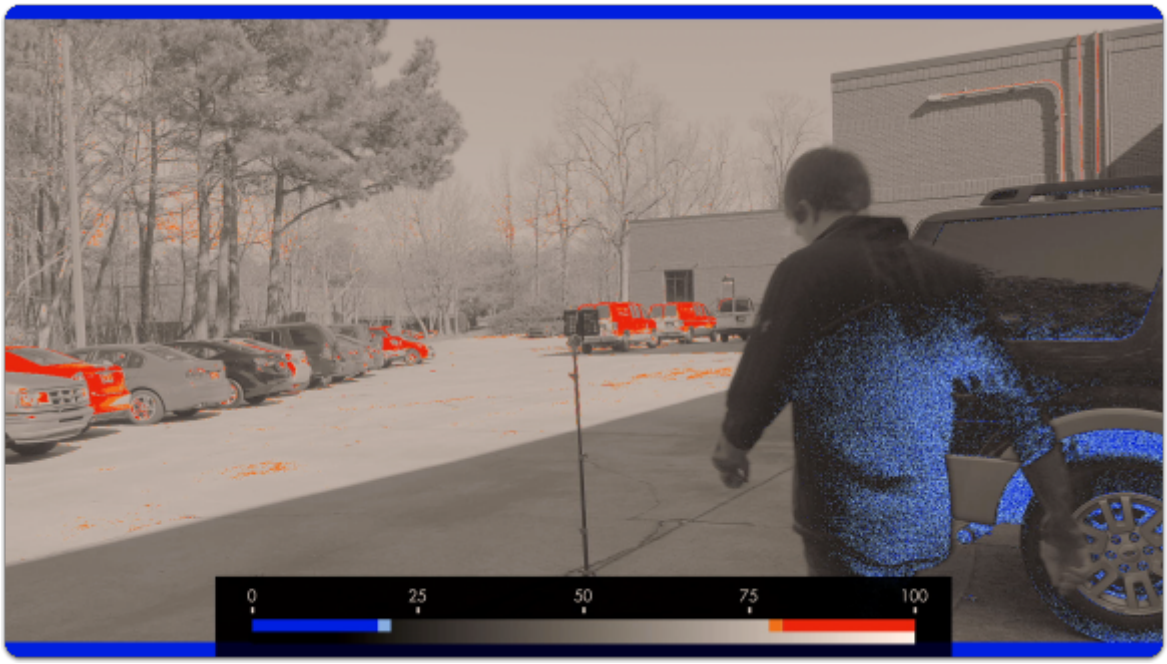


This is what our scale looks like with the upper and lower ranges applied:



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**.

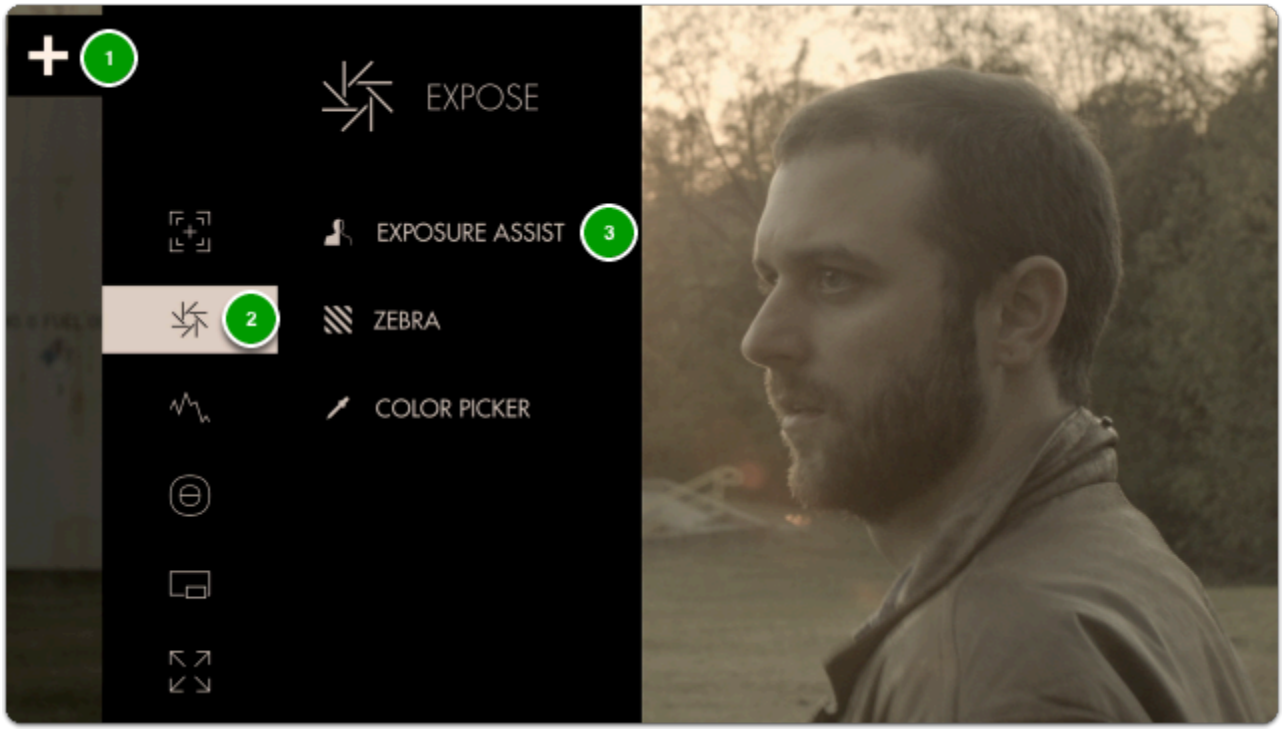
Red areas are clipped highlights, blue areas are noisy/clipped shadows.



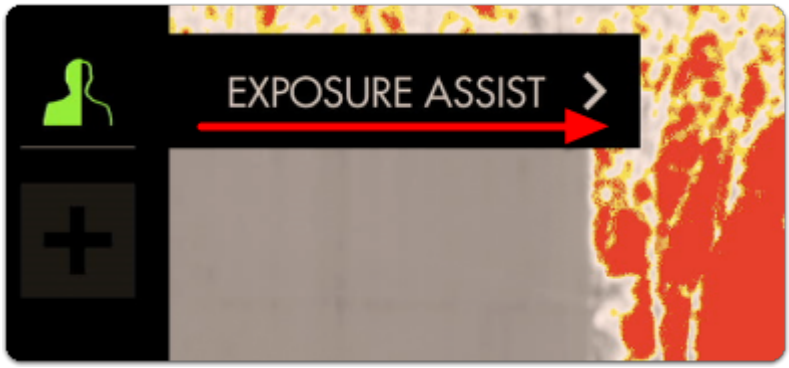
You may continue to add colors to the scale, for example a **midpoint** to represent **skin tones** or an 18% grey card/chart.

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.
Another scale is the **Spectrum** False color, which is a gradient of color from Pink-Blue-Green-Yellow-Red. This is easily seen on the Guide bar.
EL Zone replaces IRE exposure values with stops. The stops are represented by color between Black (underexposed) and White (overexposed)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

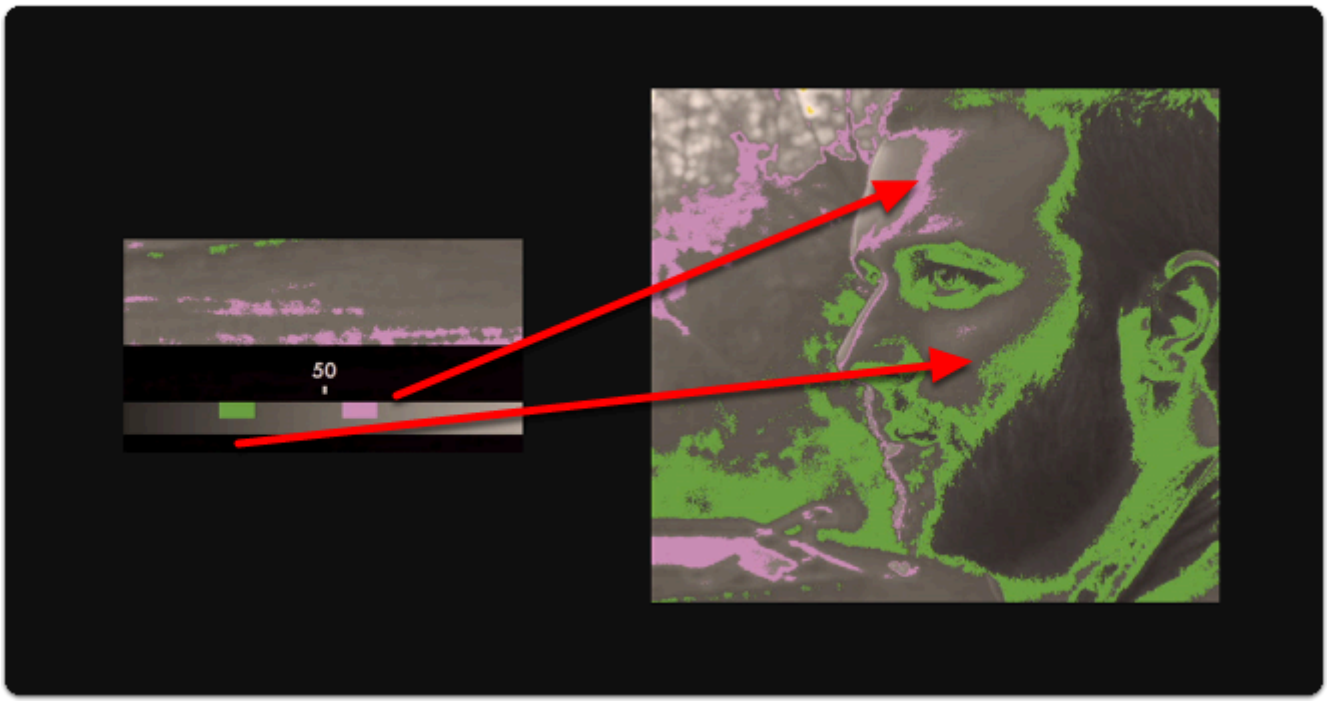
(ARRI FALSE COLOR SCALE)

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.

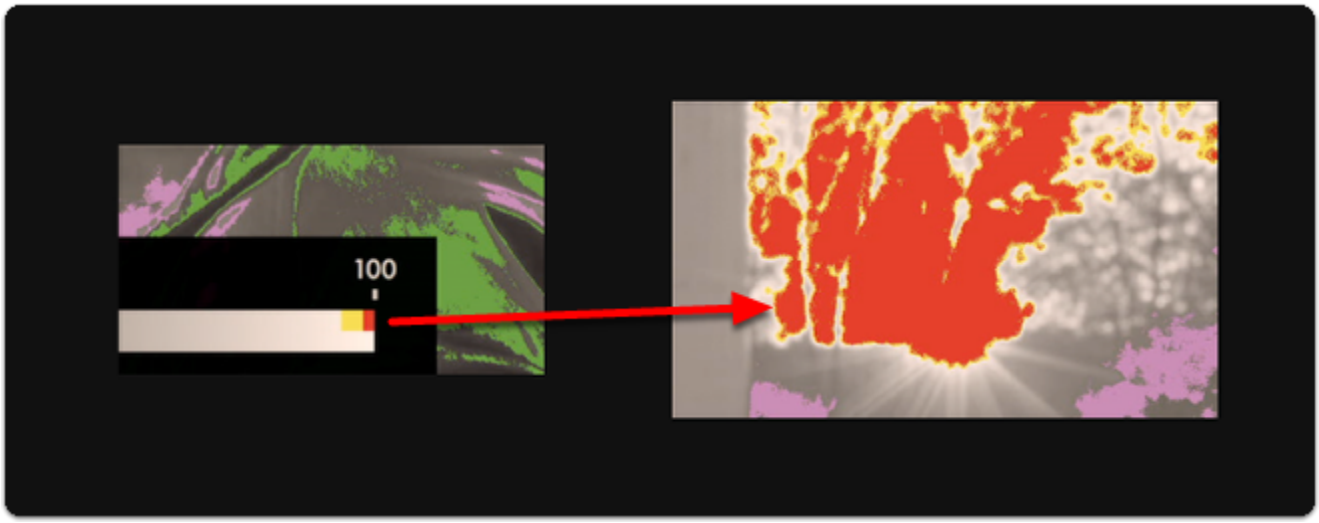
Enable **'SHOW IRE GUIDE'** to get an on-monitor view of which **values** are getting **mapped** to the colors on the scale.



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.

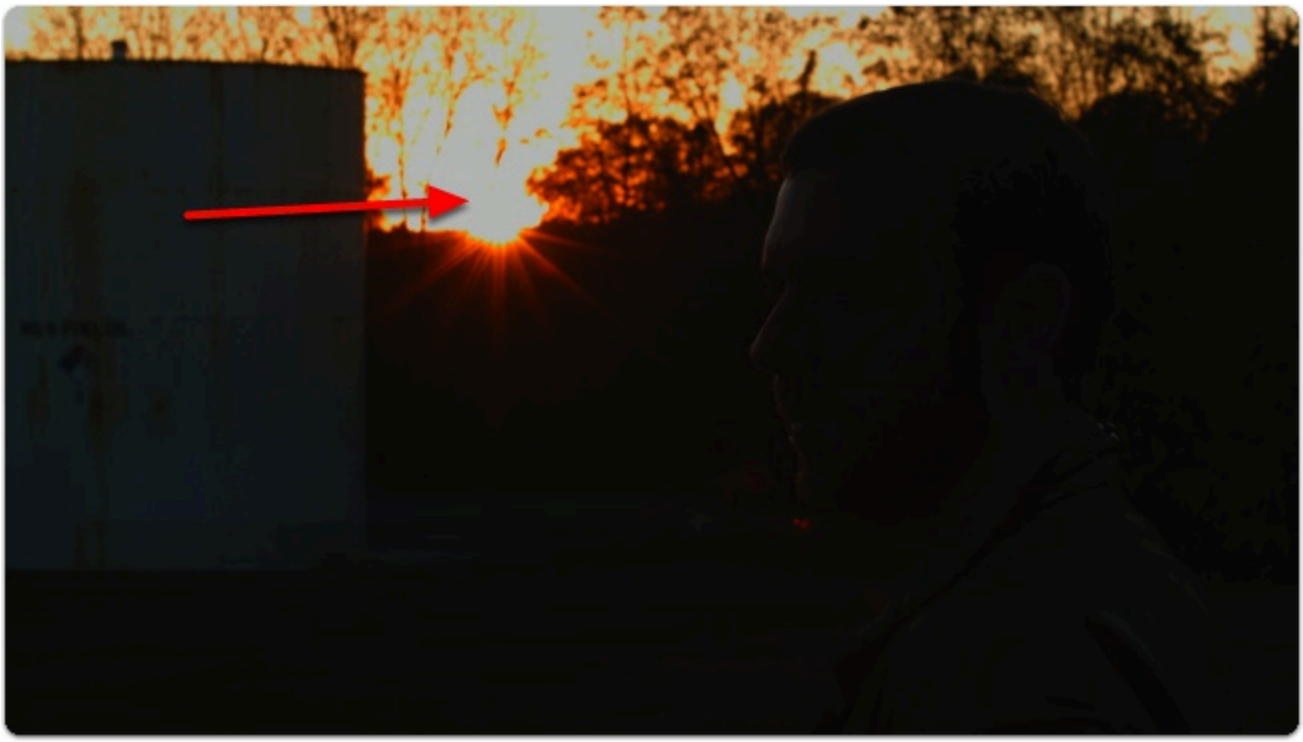


Sticking with this exposure value means we'll be **clipping** a portion of the sky & sun - Exposure Assist makes it clear which areas will be clipping/losing detail as a result of overexposure by painting such areas **red**.



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:



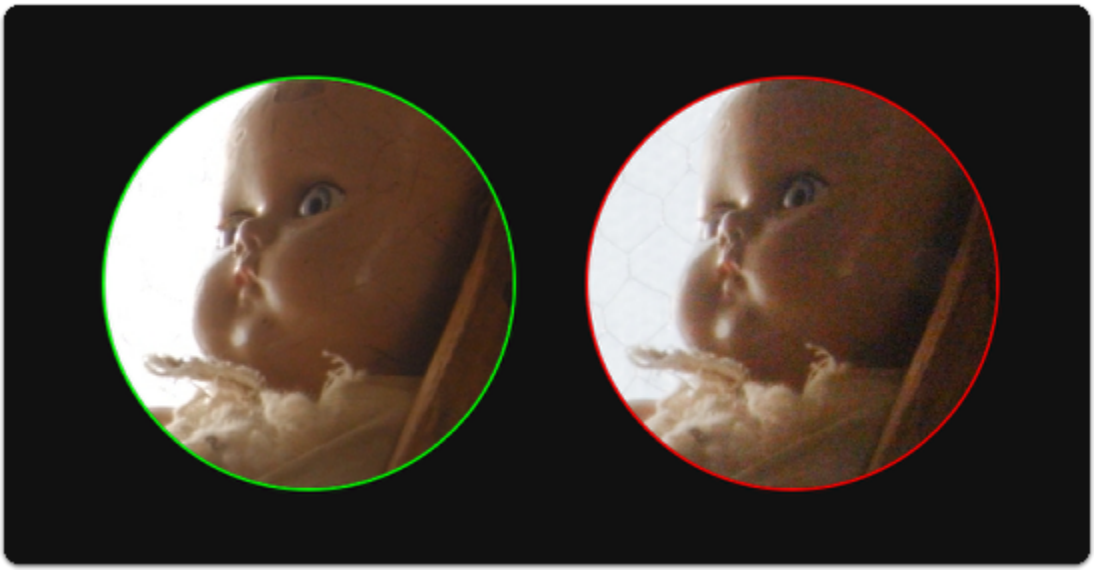
If I darken **everything but** the sky/sun, they each appear much more acceptable:



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’

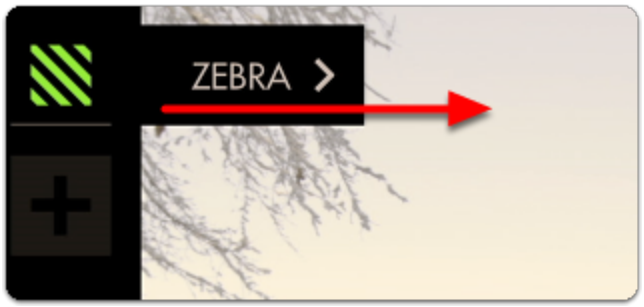
Navigate to **Expose > Zebra** and select the '**+**' to add it to the current page.



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.

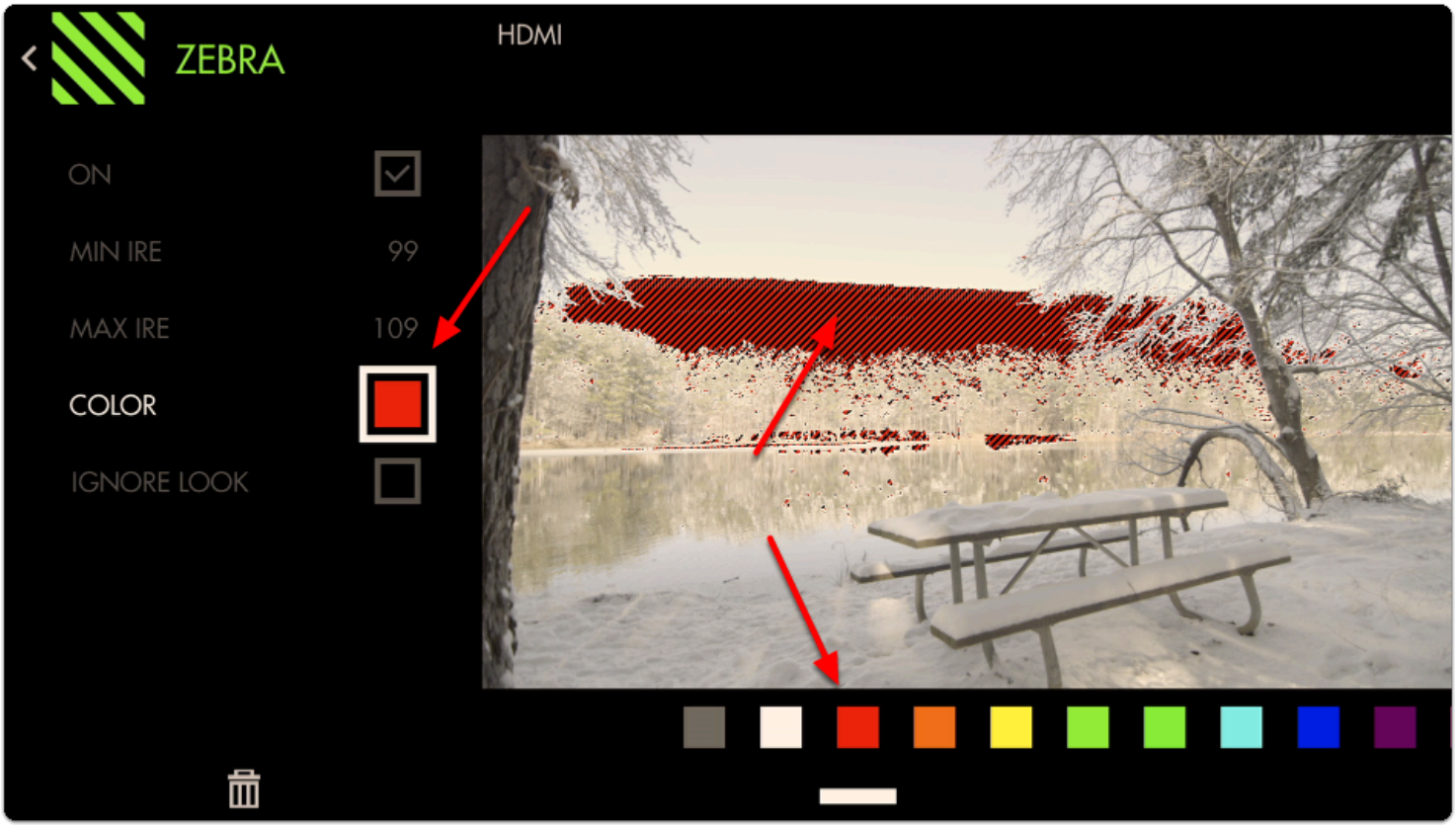
This adjustment will vary between cameras/gammas.



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**.



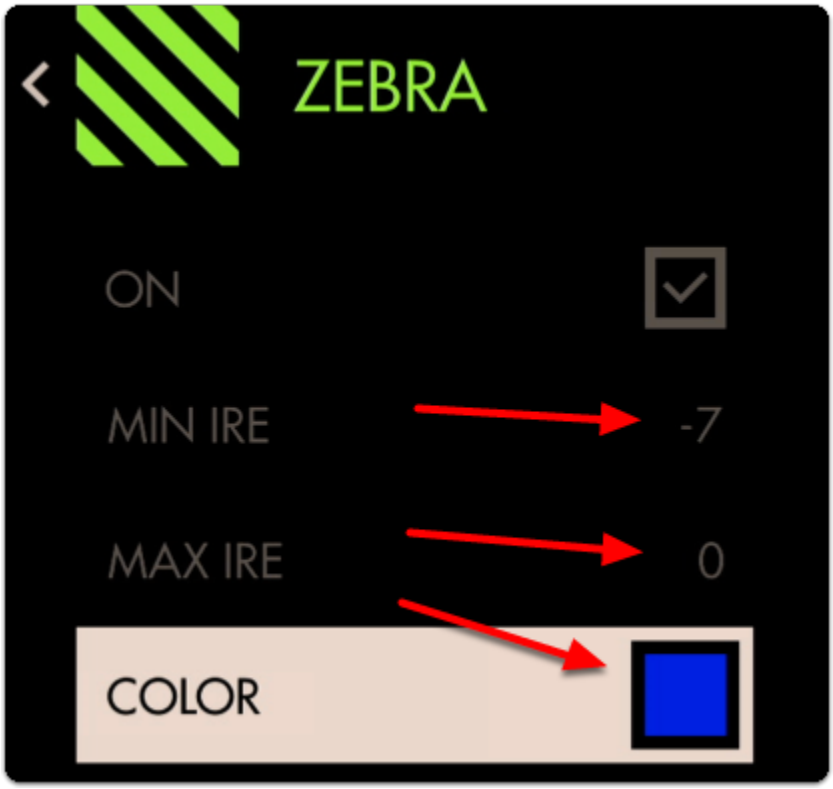
At this stage we can roll **exposure down**, add an **ND filter**, **decrease ISO** or **increase shutter speed** to **darken** the image until the zebra pattern is no longer visible to get **highlight detail back**.



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.



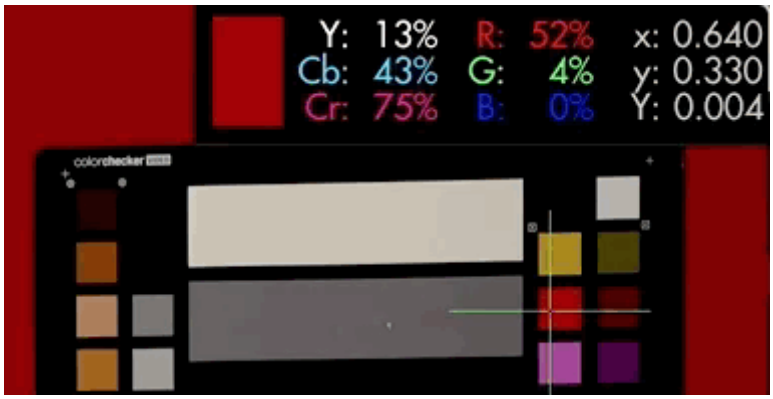


Now we have a page configured to warn us when we are **overexposing** and when **underexposing** our footage. Anything in these areas will be clipped so you can now adjust for these limits consistently and precisely.

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

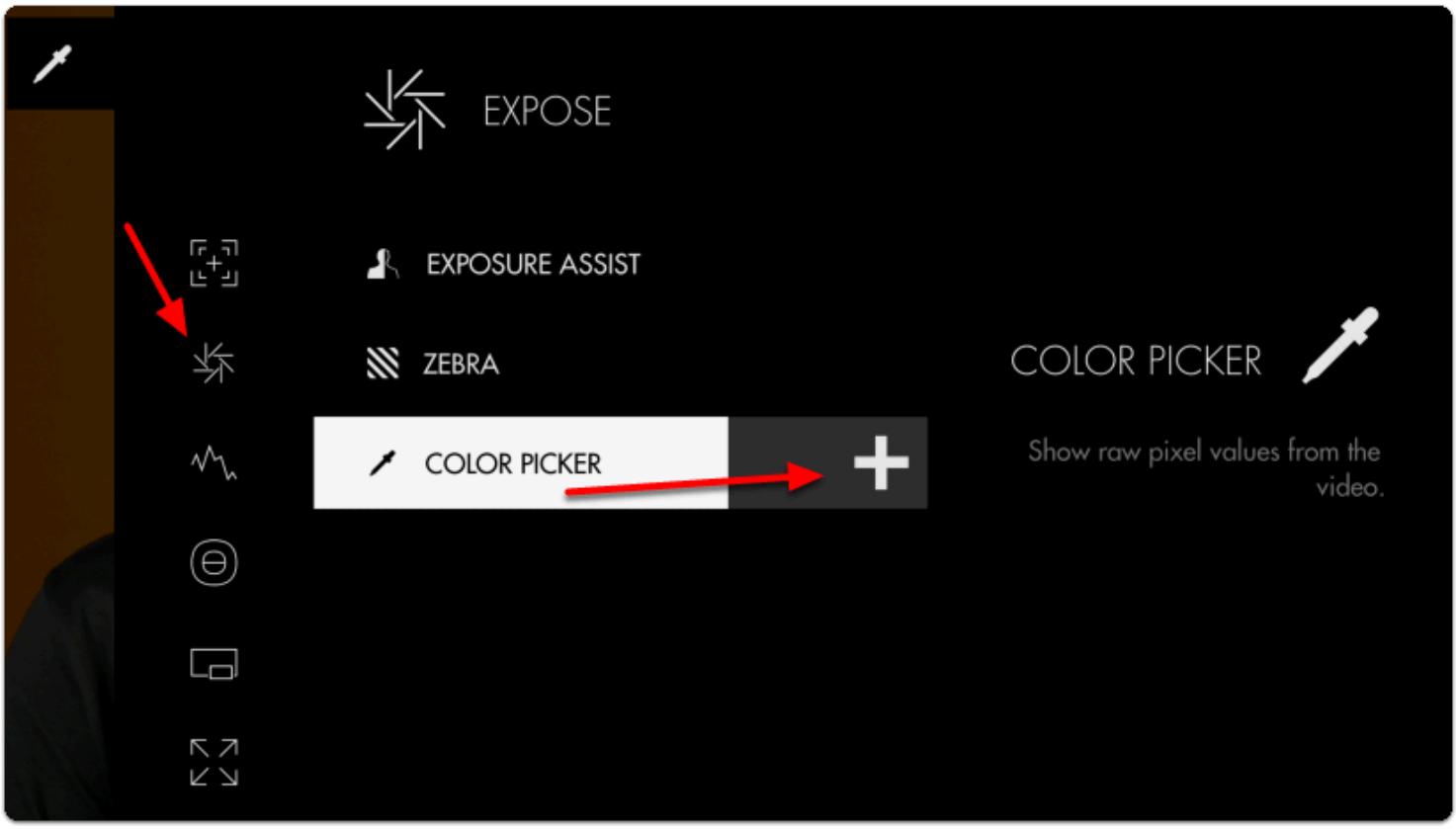
Adjusts the speed at which the color picker crosshair will glide across the screen when moved.

Color Picker - Quick Start

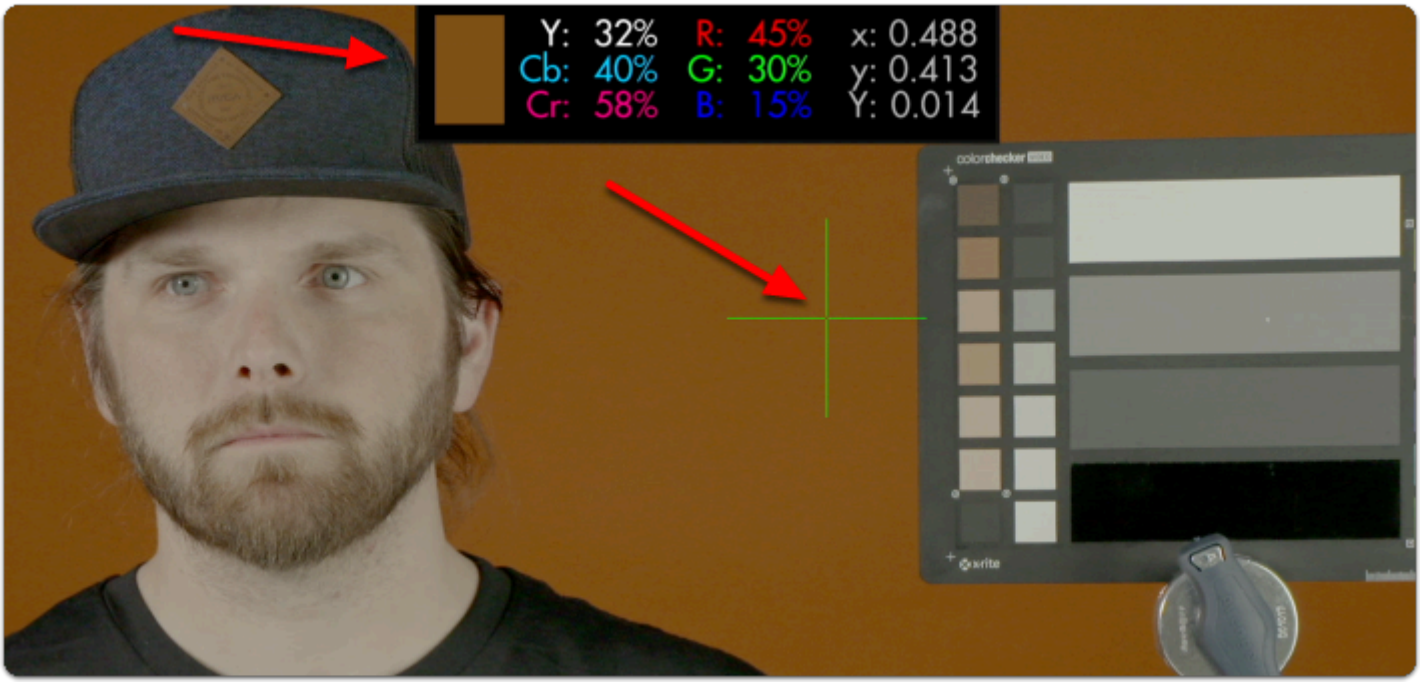
In this section we will add a Color Picker to a page and use it to set exposure in **differing lighting conditions** using a calibration chart.

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.

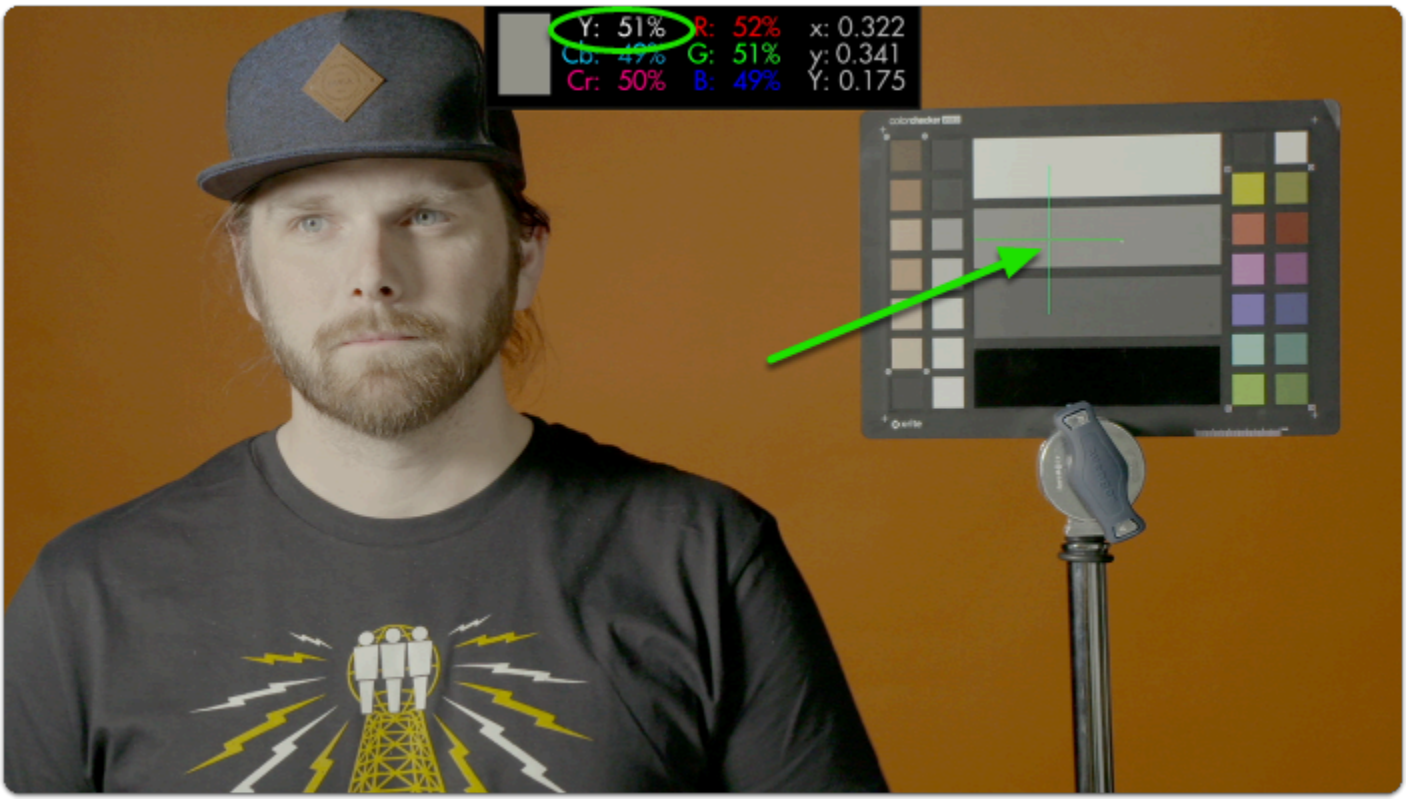


A **stats window** and **crosshair** populate the window; if we **move the joystick** or **tap the screen** we can **change the point** currently being sampled.



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**.



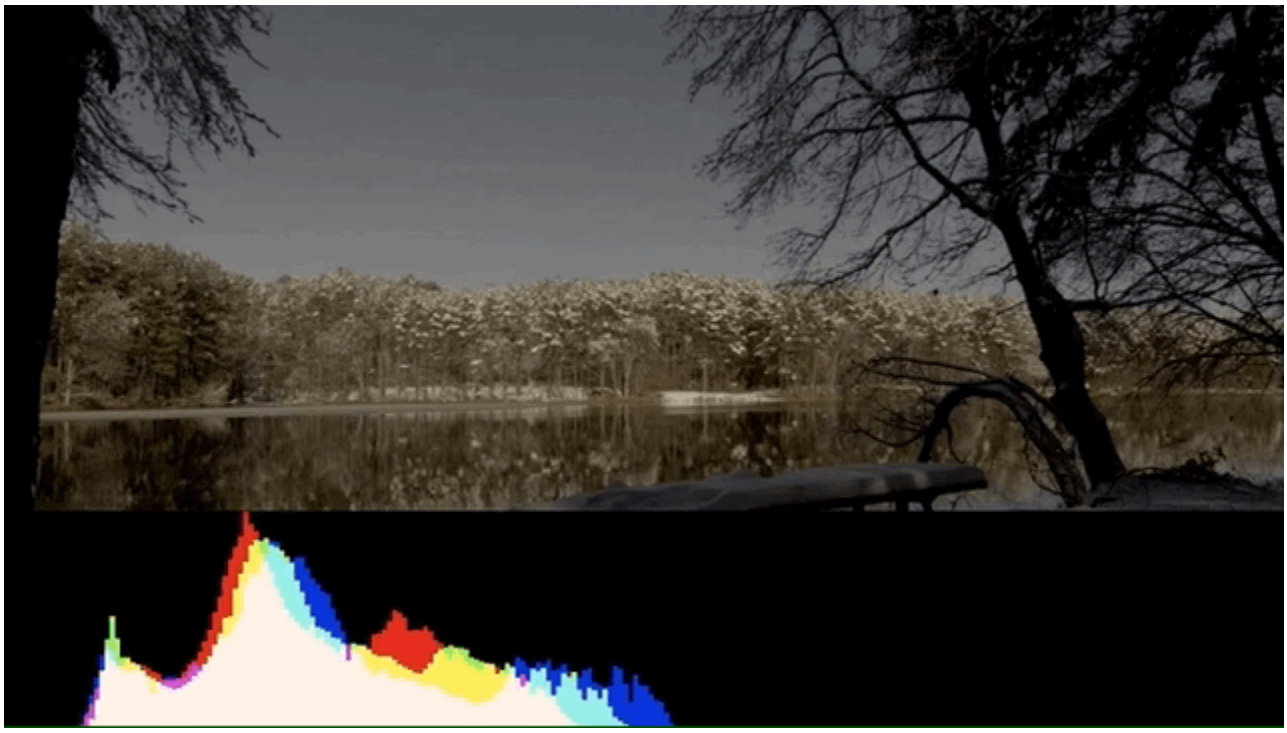
Using the same technique we can adjust for exposure under any lighting condition and arrive at a clean result that will give us **consistent, gradeable footage!**


Y: 51% R: 51% x: 0.313
Cb: 50% G: 52% y: 0.333
Cr: 50% B: 51% Y: 0.189

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.

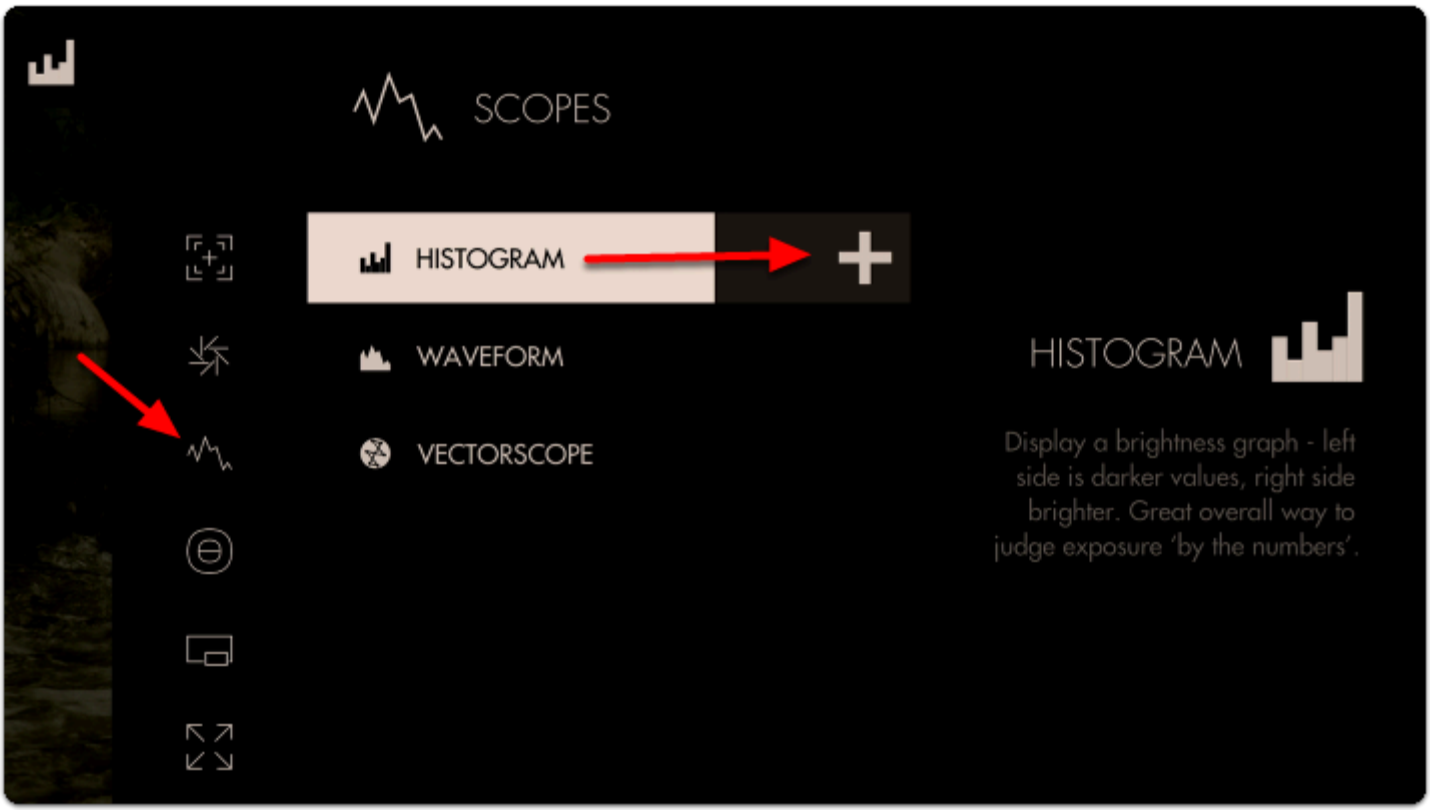
> We recommend leaving this on for most shooting scenarios unless you are baking a LUT into your footage on set and do not intend to color grade in post.

Histogram - Quick Start

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

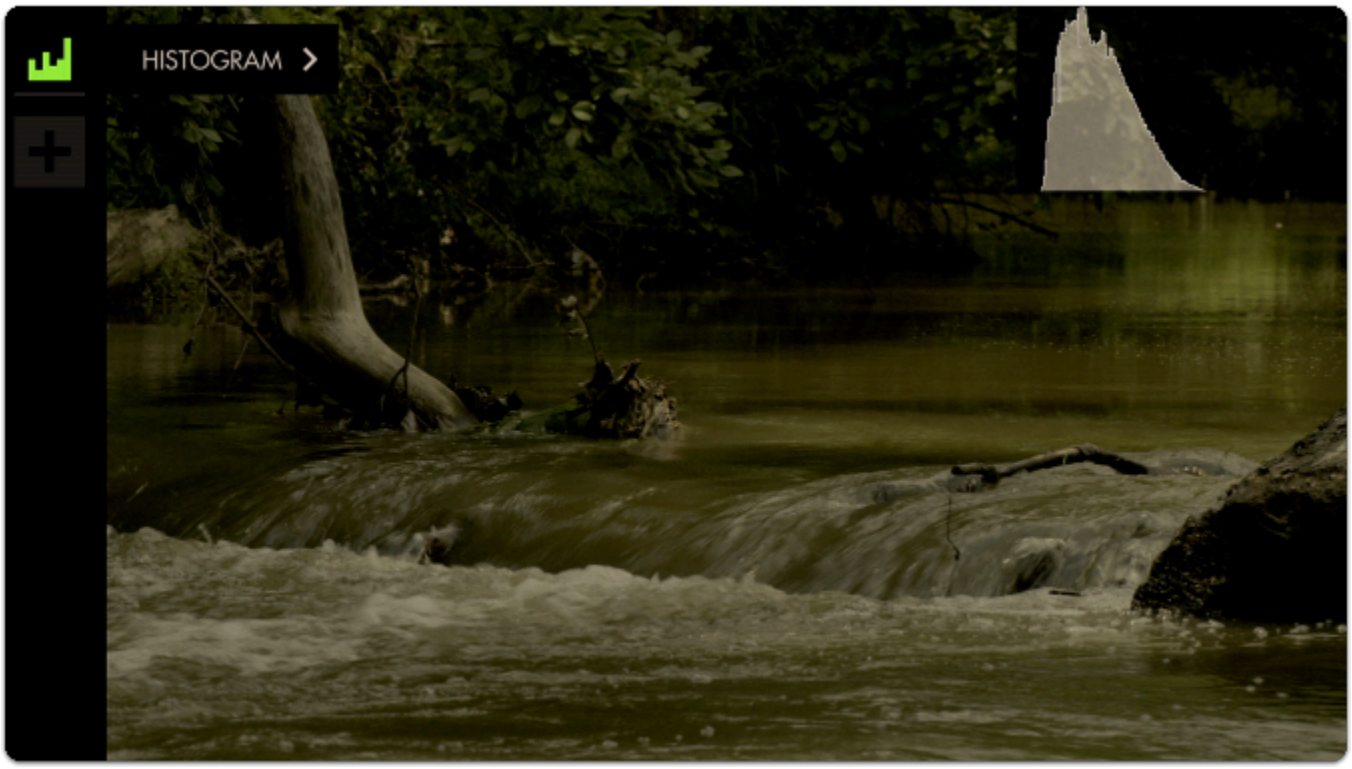
From any page with a feed, **click the joystick** or **tap the screen** to bring up **'Add New Tool'**

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.

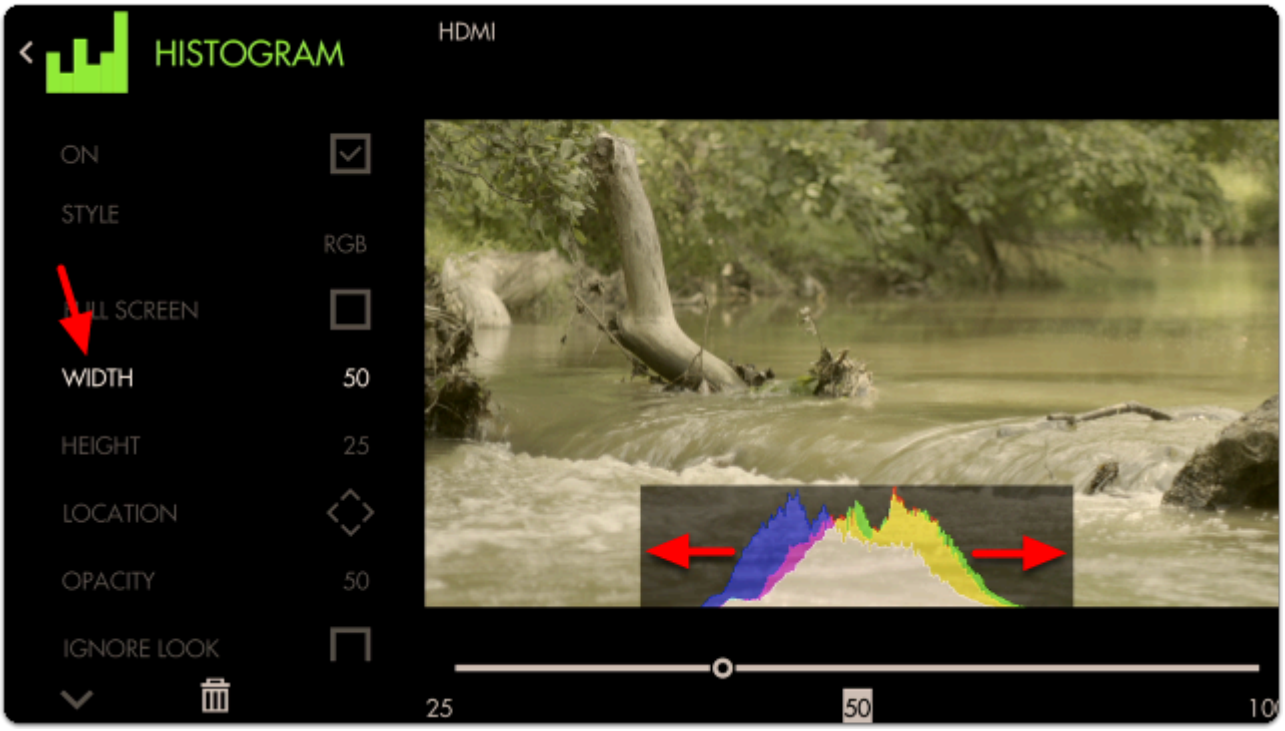


Just as with Waveform, using RGB mode lets you see the individual luma values of red, green and blue that make up your image - If you see a distinct separation of colors on the graph you will notice more colorization/saturation.

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

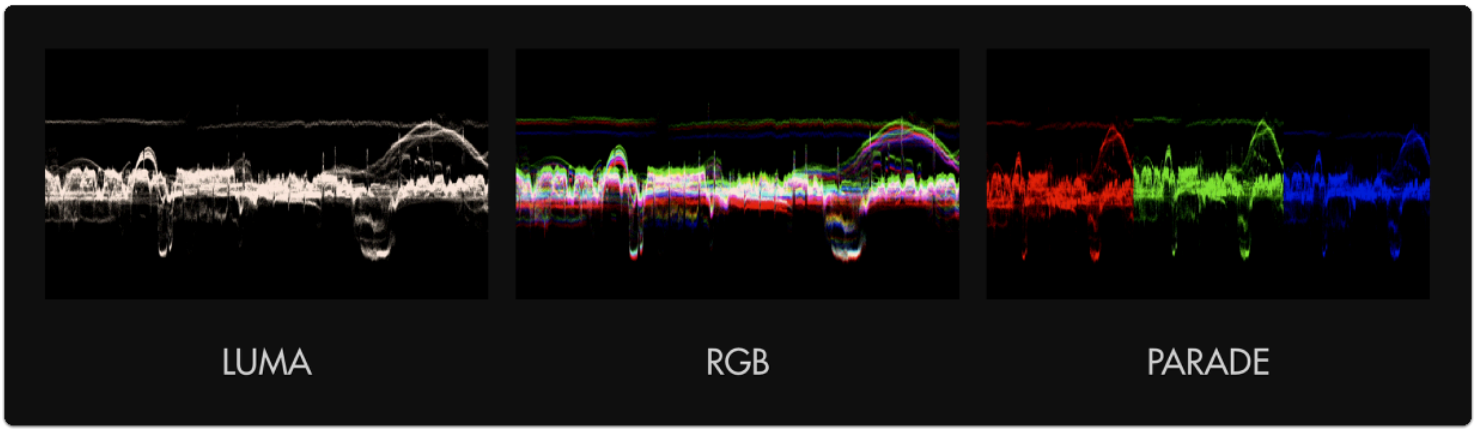
Toggles the Waveform On/Off. This can also be done on the tool bar by selecting the tool and activating or deactivating it. It will be Green when active and Grey when inactive.

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.

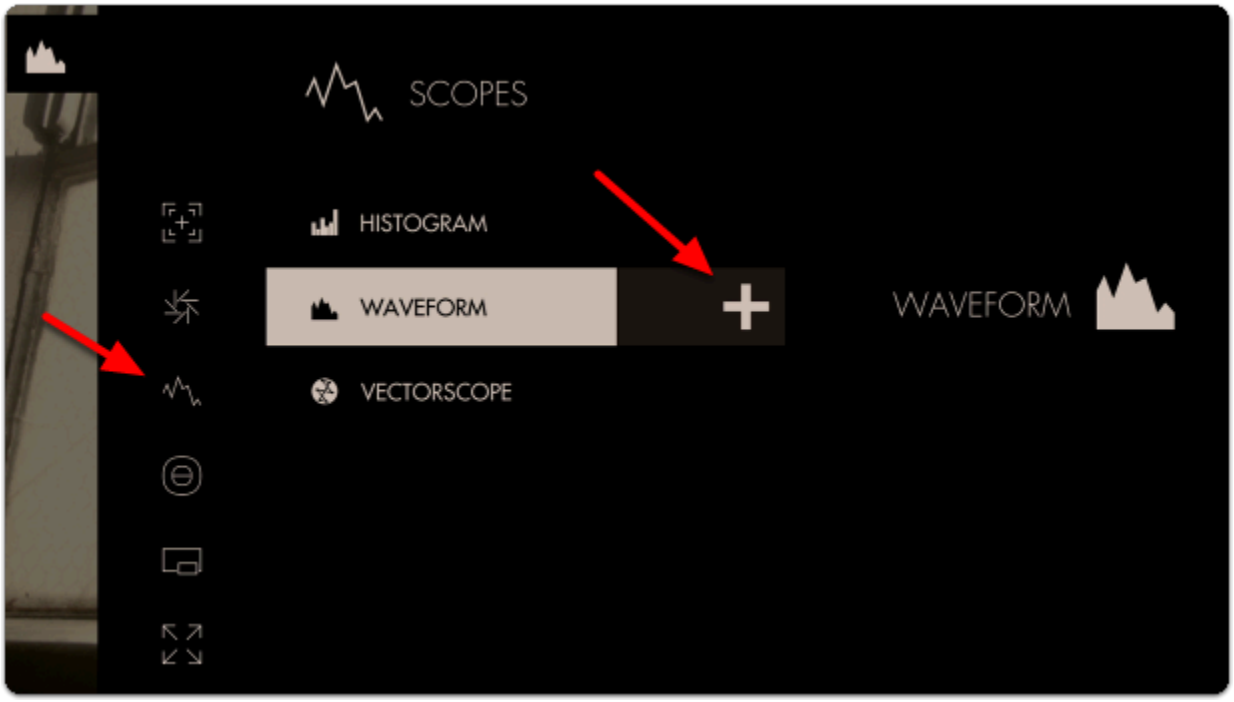
Adjusts the opacity of the graph lines to make them stand out - or invisible to improve graph visibility.

Adjusts the thickness of the graph lines for readability.

Pixel 0-5.

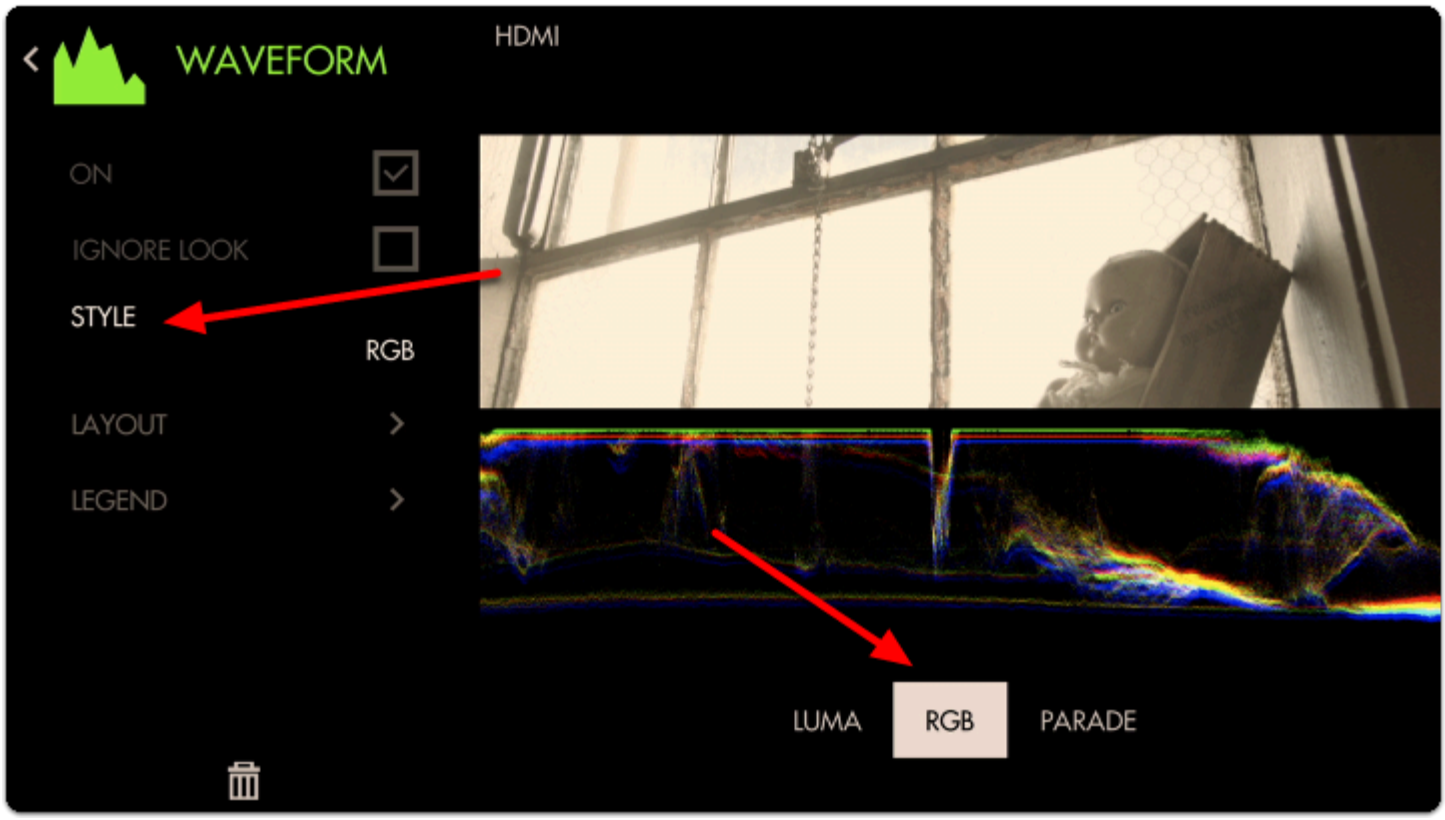
3. Waveform - Quick-Start

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.



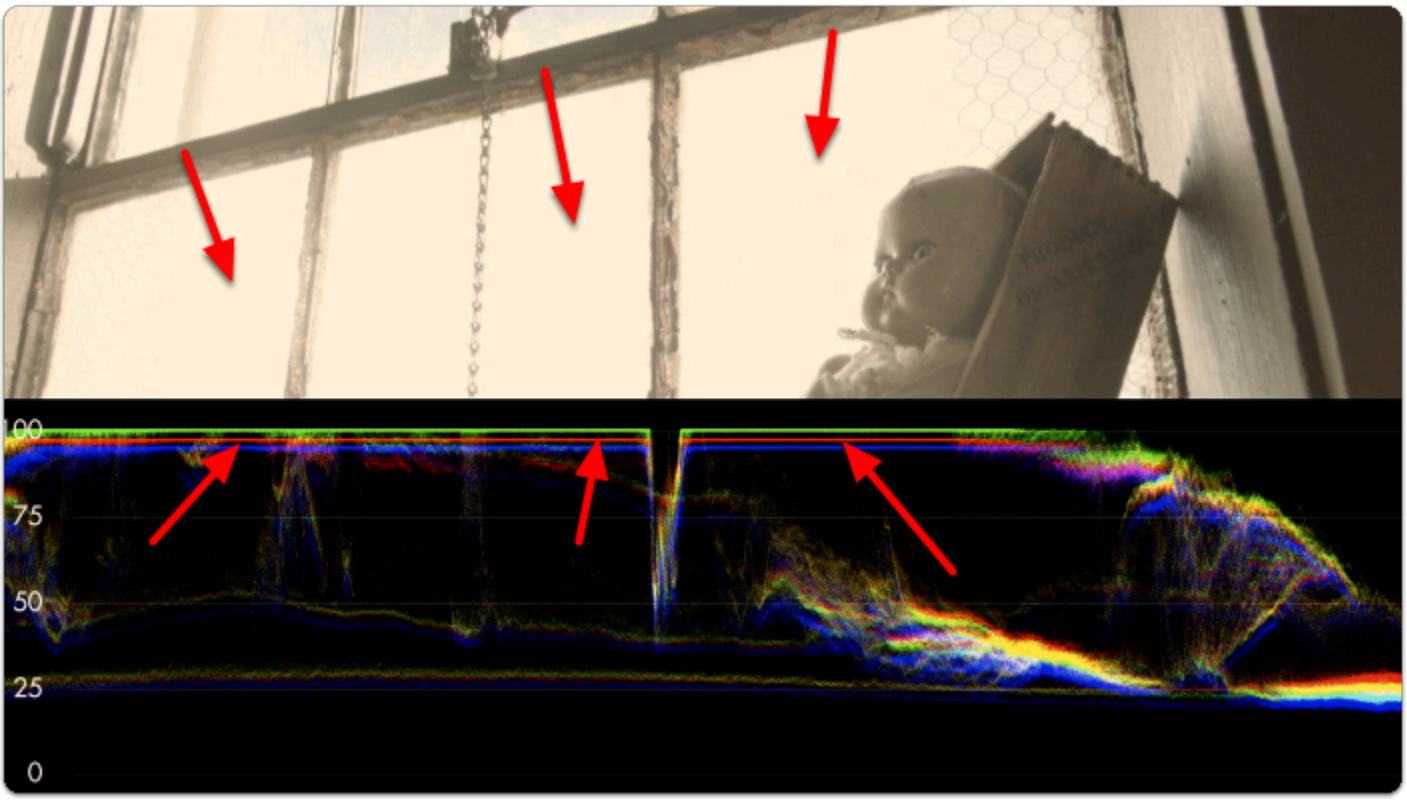
Once added you can **edit the settings** by **navigating right** when 'Waveform' is highlighted.

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.

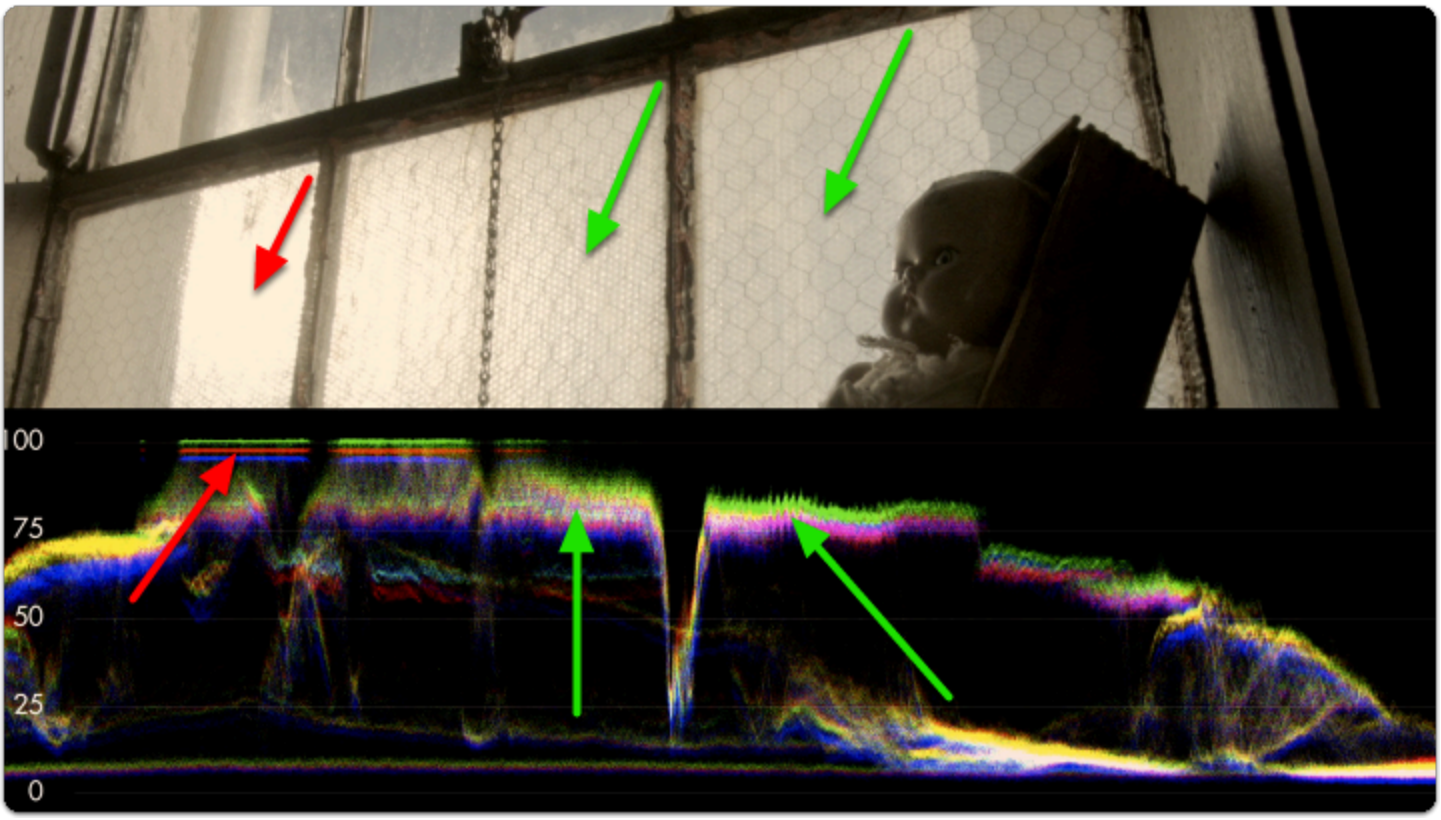


Back out of the Edit Tool menu to observe the waveform in action and to accurately expose your footage.

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.

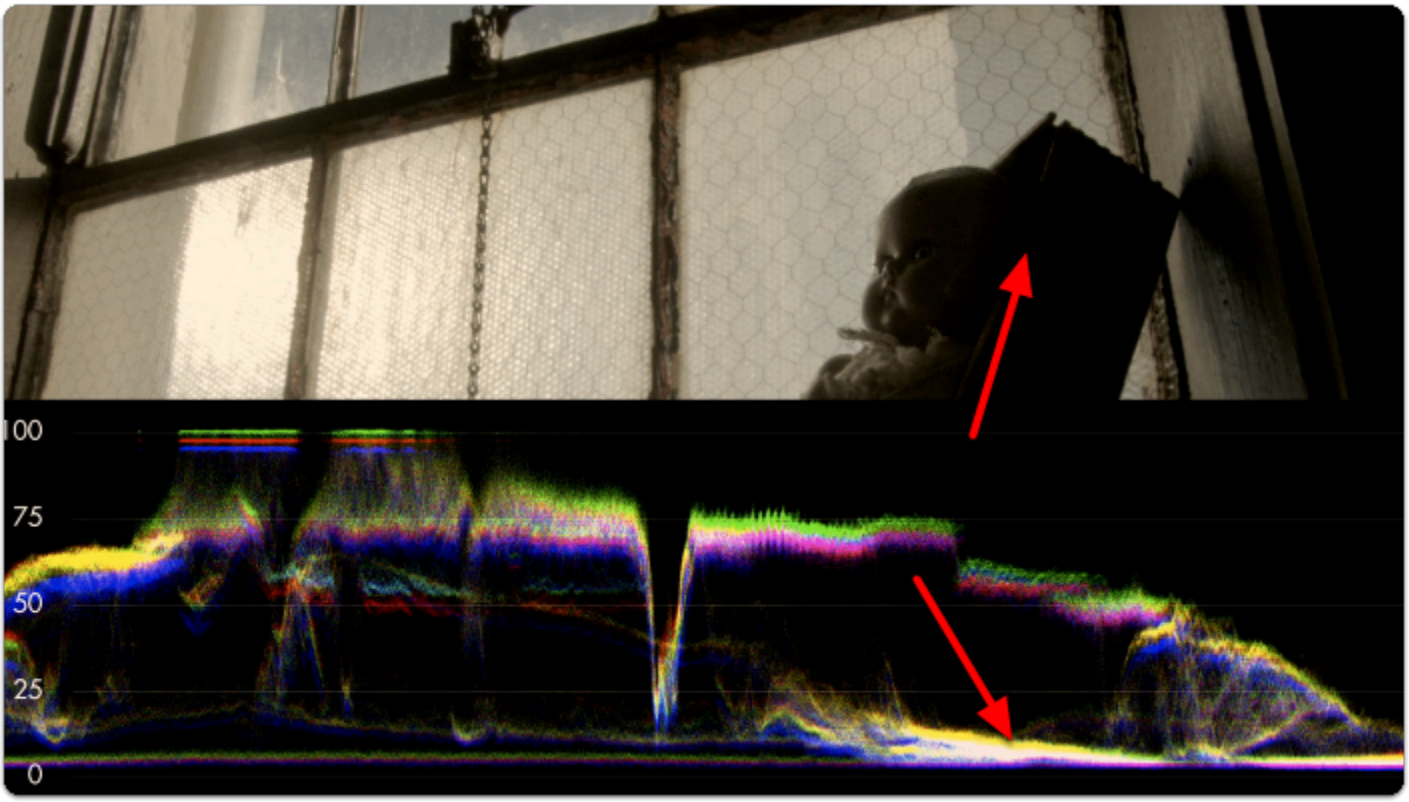


Rolling exposure downwards, the lines **'un-flatten'** and much more of the window can now be **manipulated in color grading** while some areas **remain overexposed.**



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).

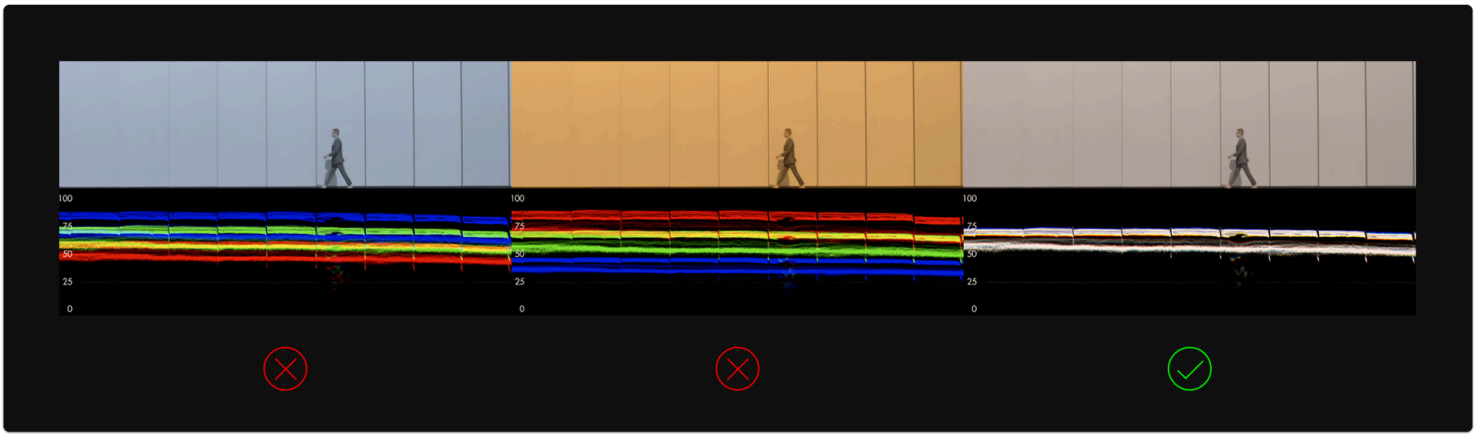


The **difference** between the **darkest** and the **brightest** areas that a camera can effectively see detail is known as its **dynamic range** - this is why high dynamic range is a highly sought after feature among cameras; you are able to capture and therefore **manipulate more of your image**.

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

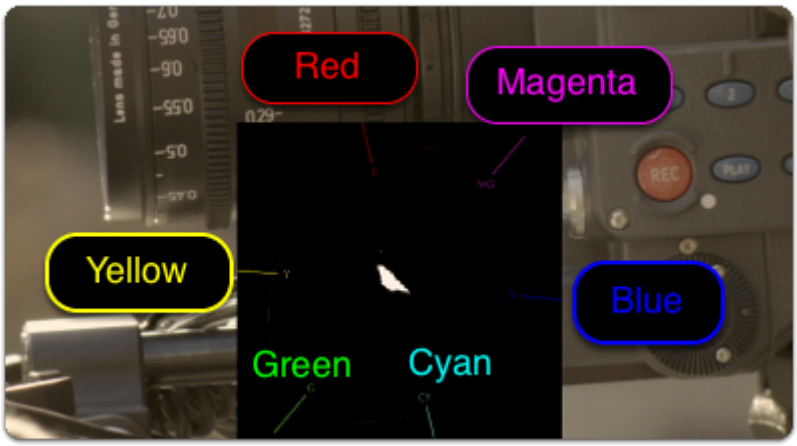
In this section we will add a Vectorscope to a page and use it to light a scene with complimentary colors.

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

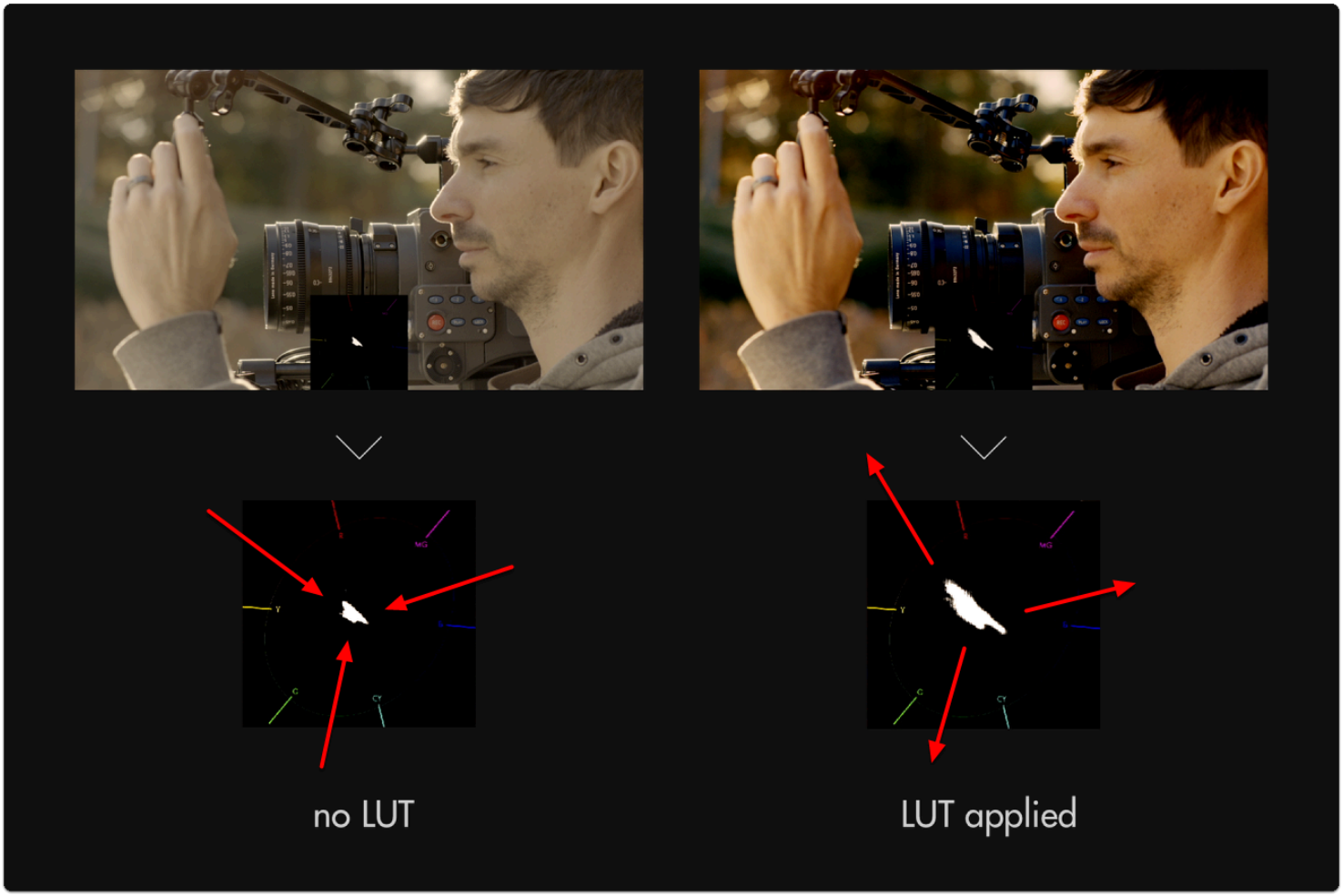


A **Vectorscope** appears at the bottom of the image. The **'blob'** is largely contained in the **center** of the graticule/crosshairs which means the colors of the current image are **not very saturated** (which is especially true as this footage is using log-based gamma).

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

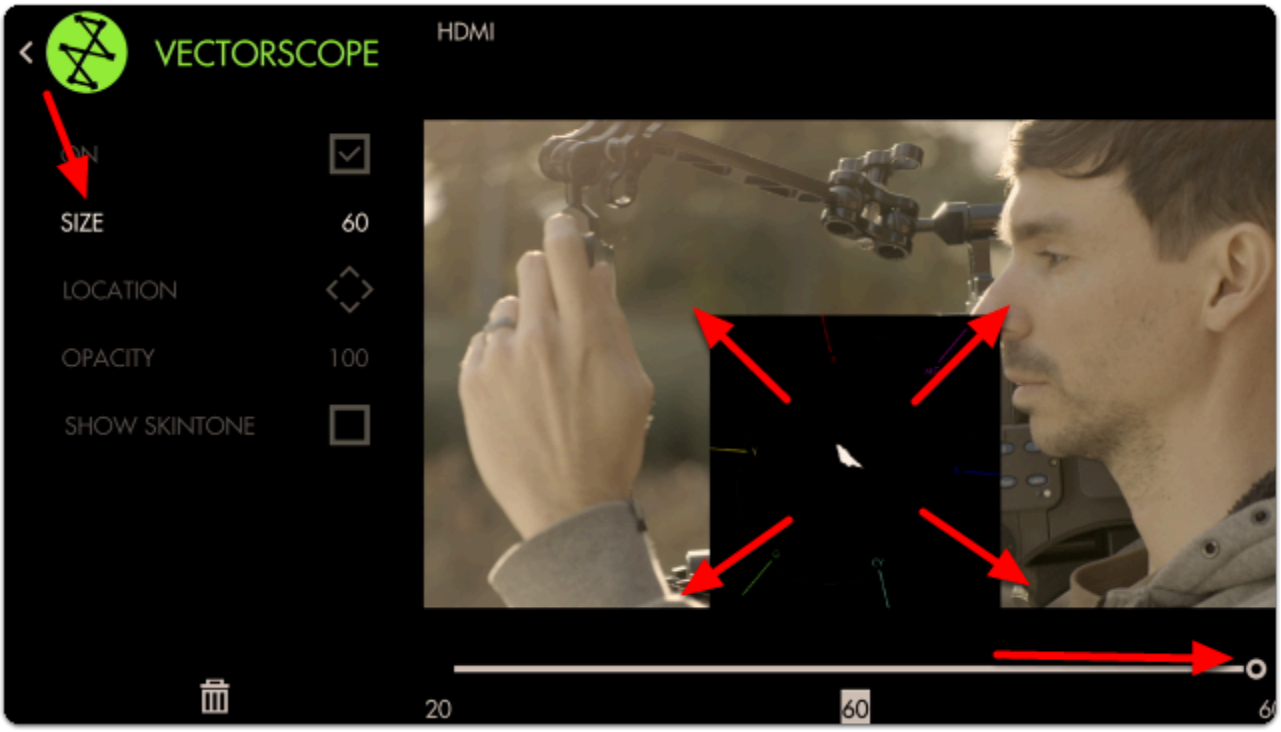


If we **apply a LUT** to this page, the Vectorscope reacts by **expanding** its plotted area. The scope confirms that we are viewing a more heavily saturated image after applying the look.



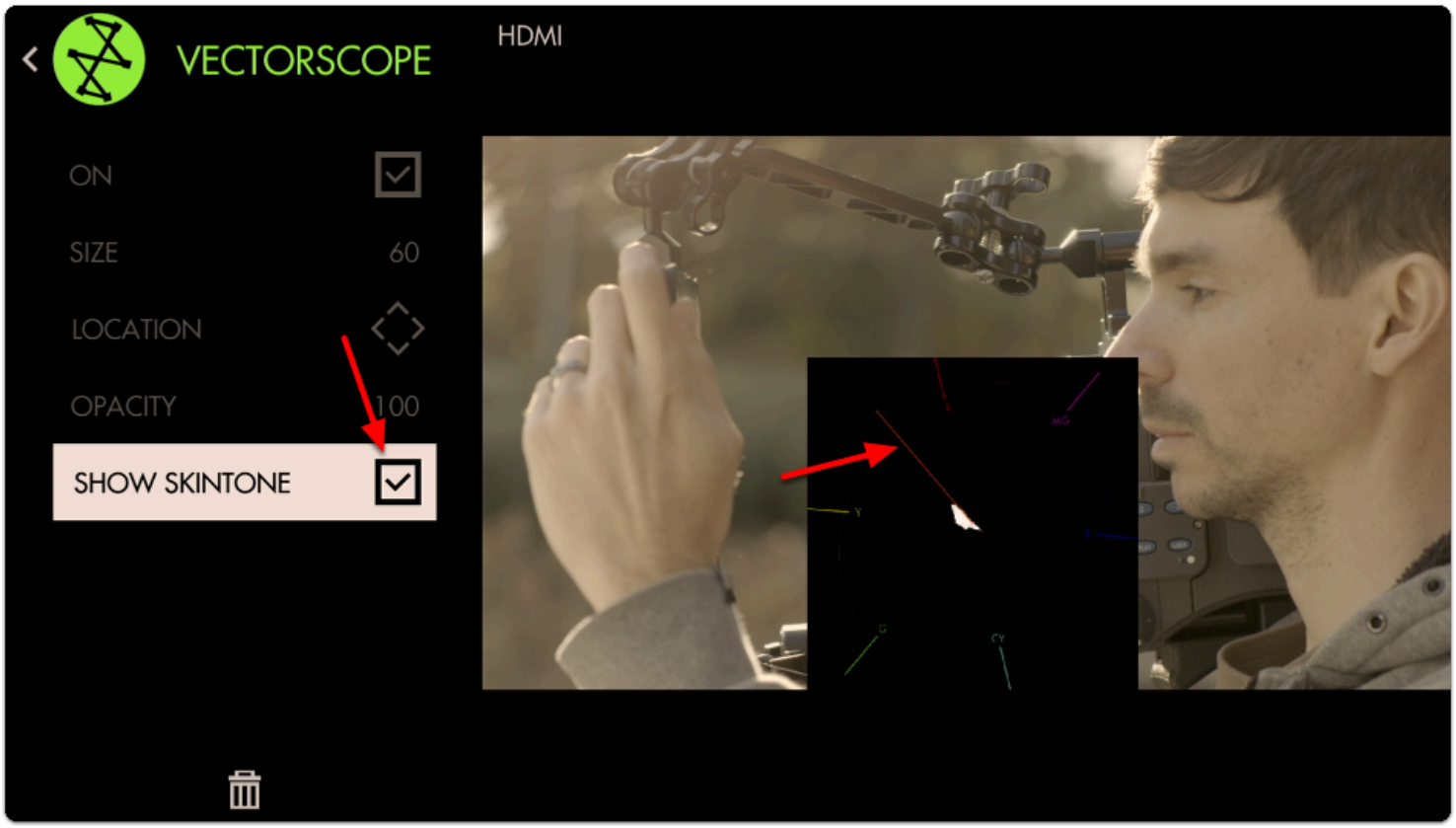
The Vectorscope uses the same layout as a **color wheel** and therefore principles of **color theory** apply - for example we can achieve **complimentary** colors by ensuring our scene plots to the graph on **exactly opposing sides**. Perhaps the most common example of this is the famous/infamous 'teal/orange'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



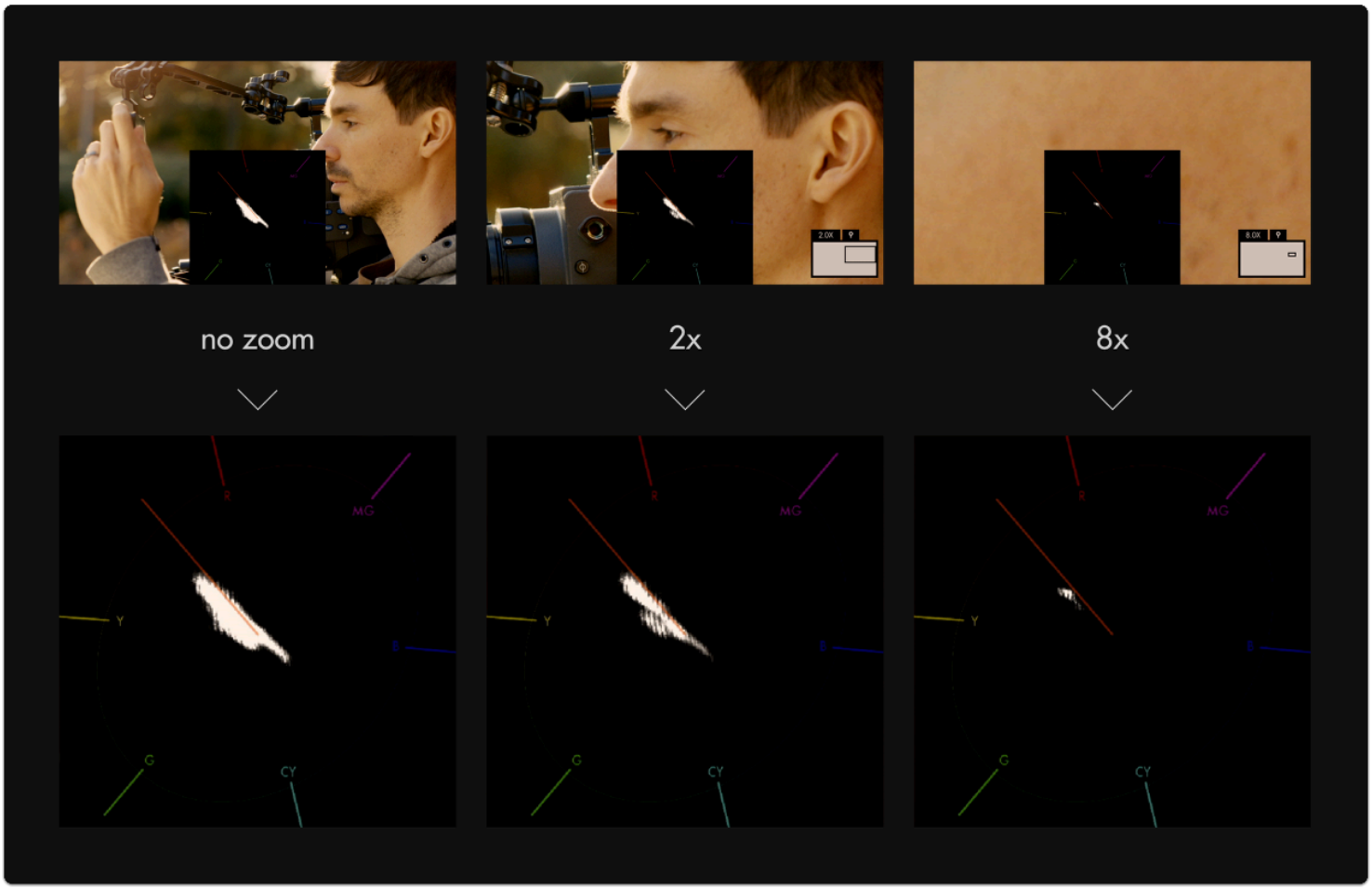
You can adjust the **SIZE** of the graph for better visibility. At this stage feel free to use **Size & Position** or **Crop & Scale** to **arrange** the image and scope so that they **don't overlap**.

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.

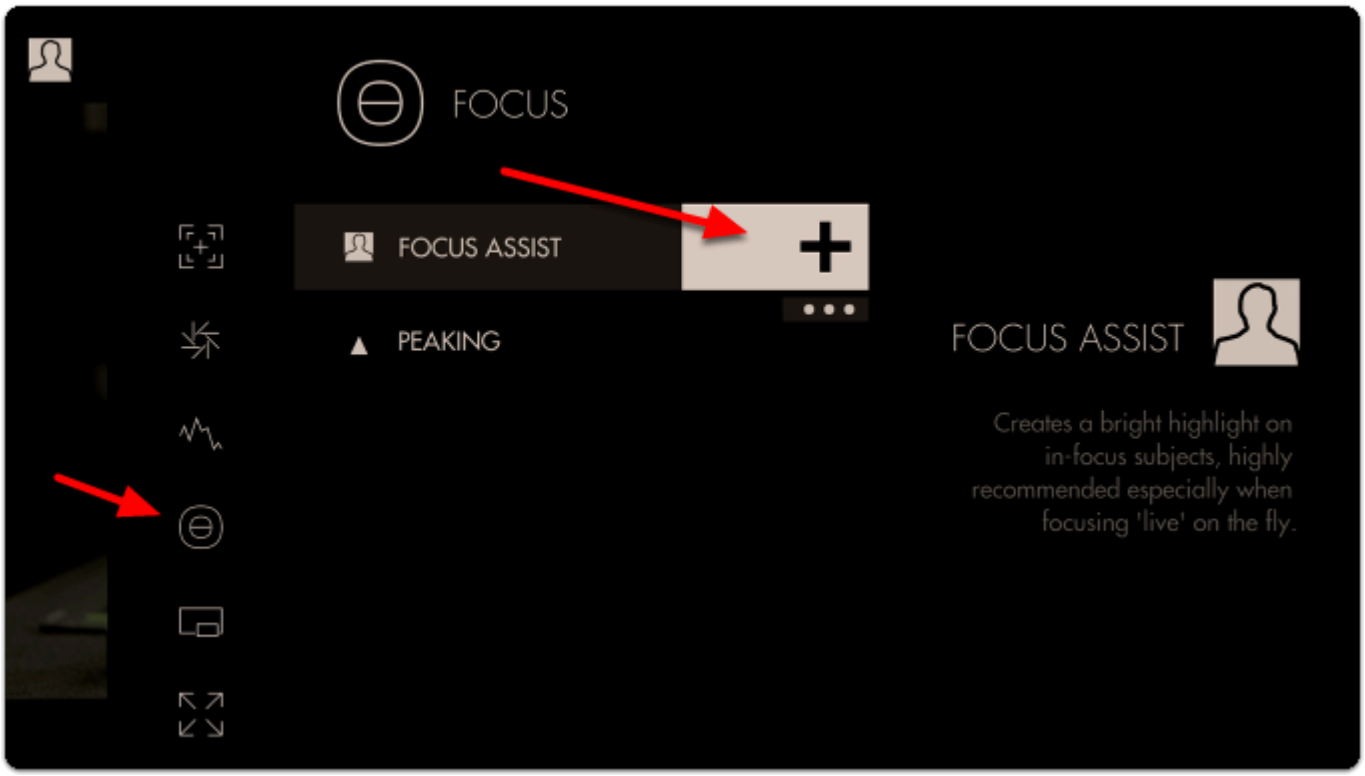
Contrast

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.



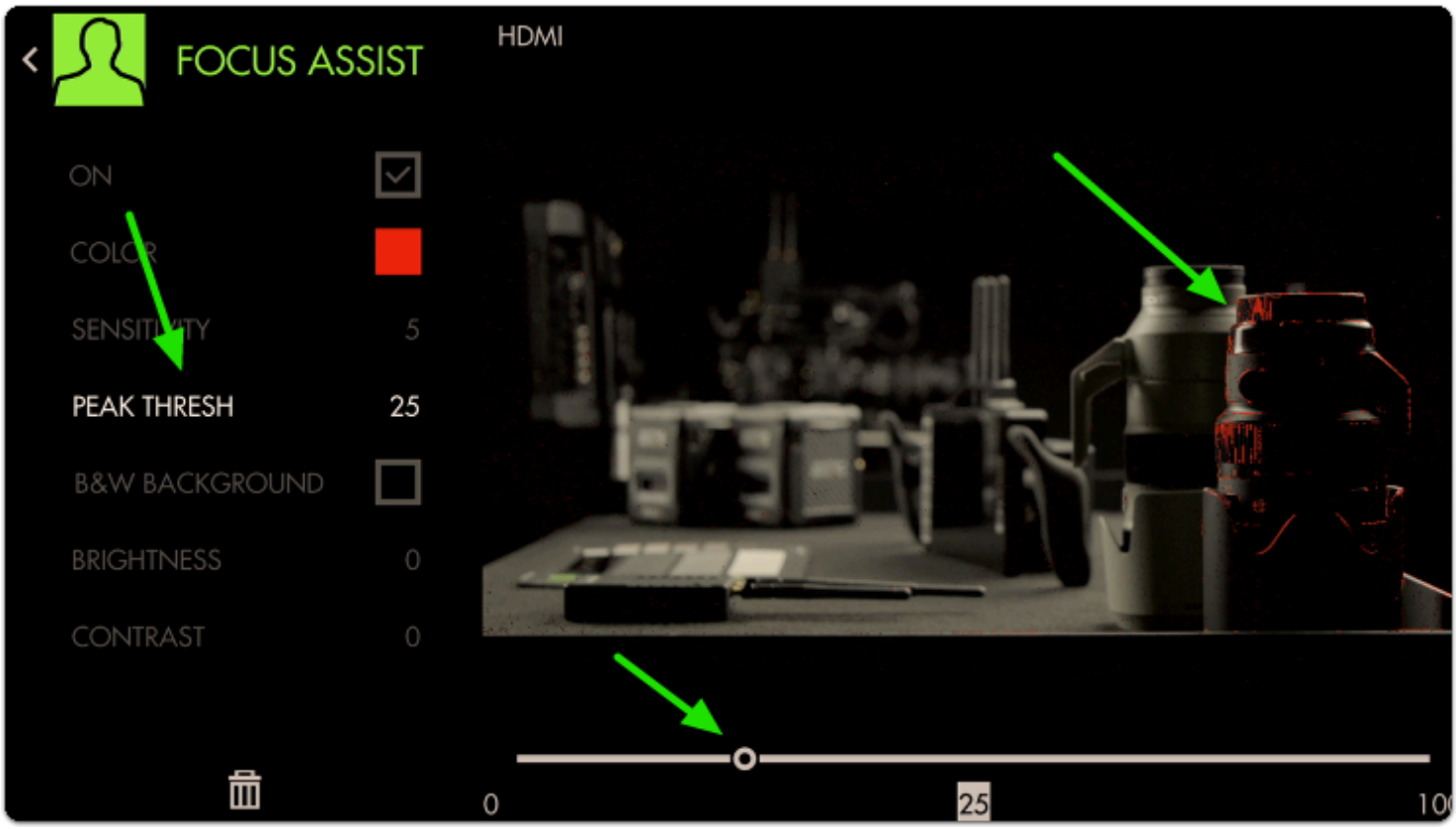
Once added you can **edit the settings** by **navigating right** or **tapping the right arrow** when ‘Focus Assist’ is highlighted.

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

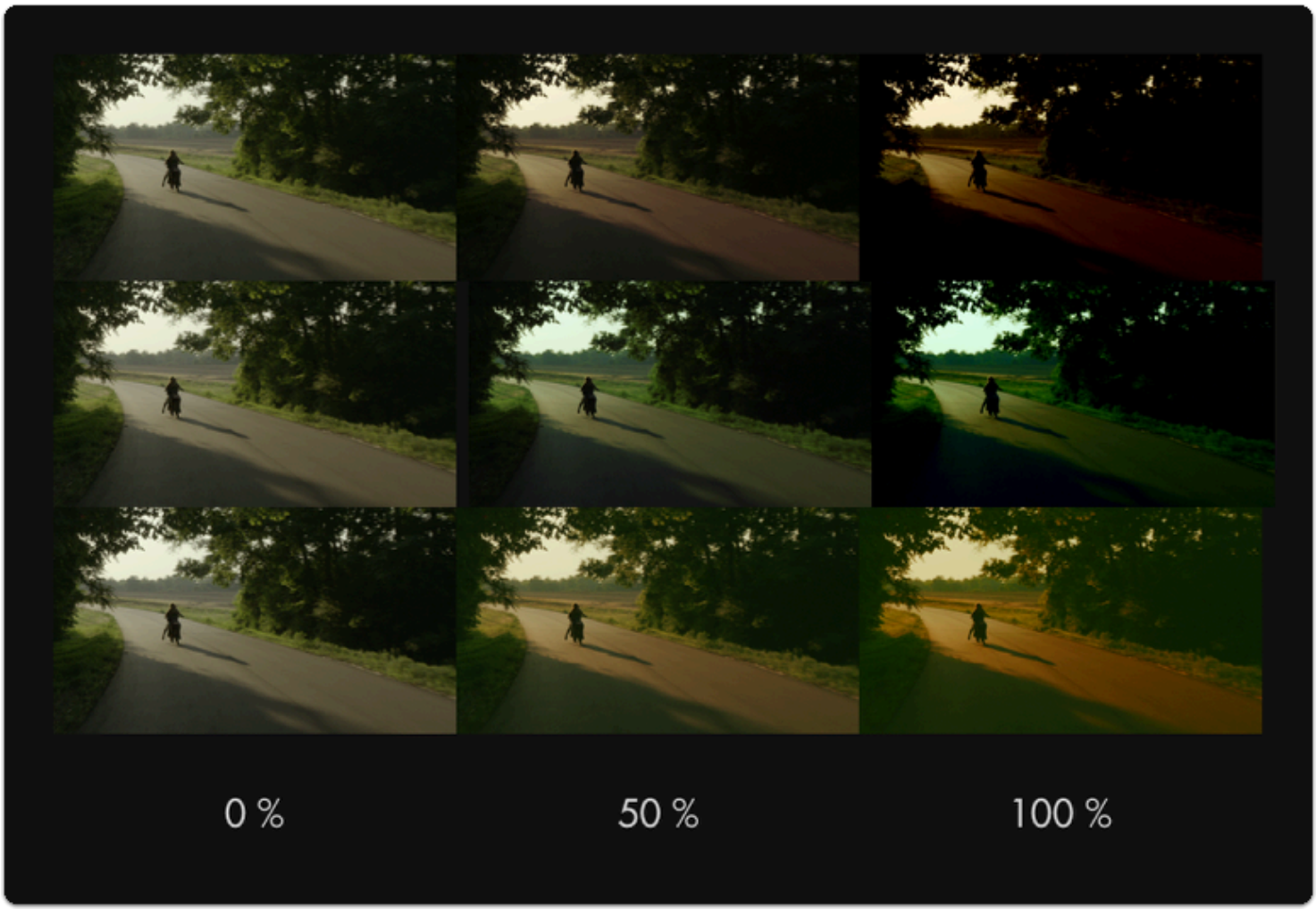
This will list the LUT file associated with this too. To add a LUT, Select this option and it will open a browser for your SD card. There should be some default Internal LUTS that we have provided as a base, but we always recommend that you use one that is ade for your production by either your DIT or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

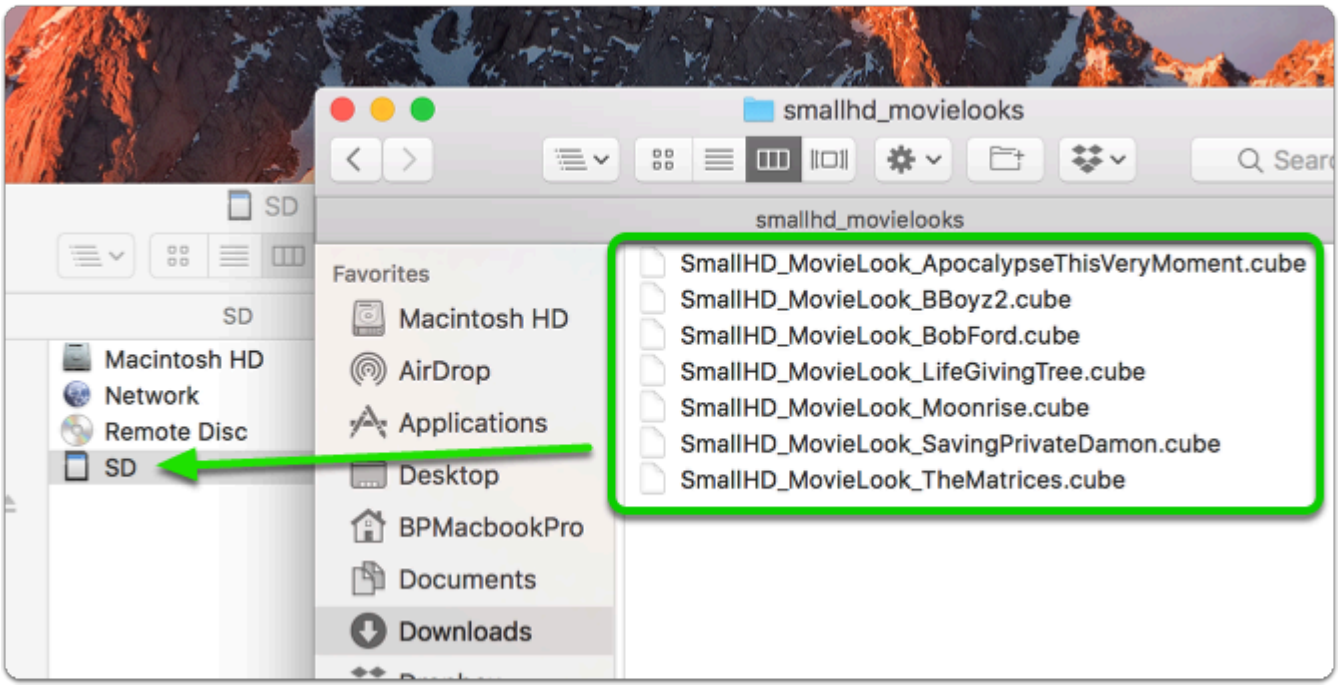
Converting a LUT using Davinci Resolve

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



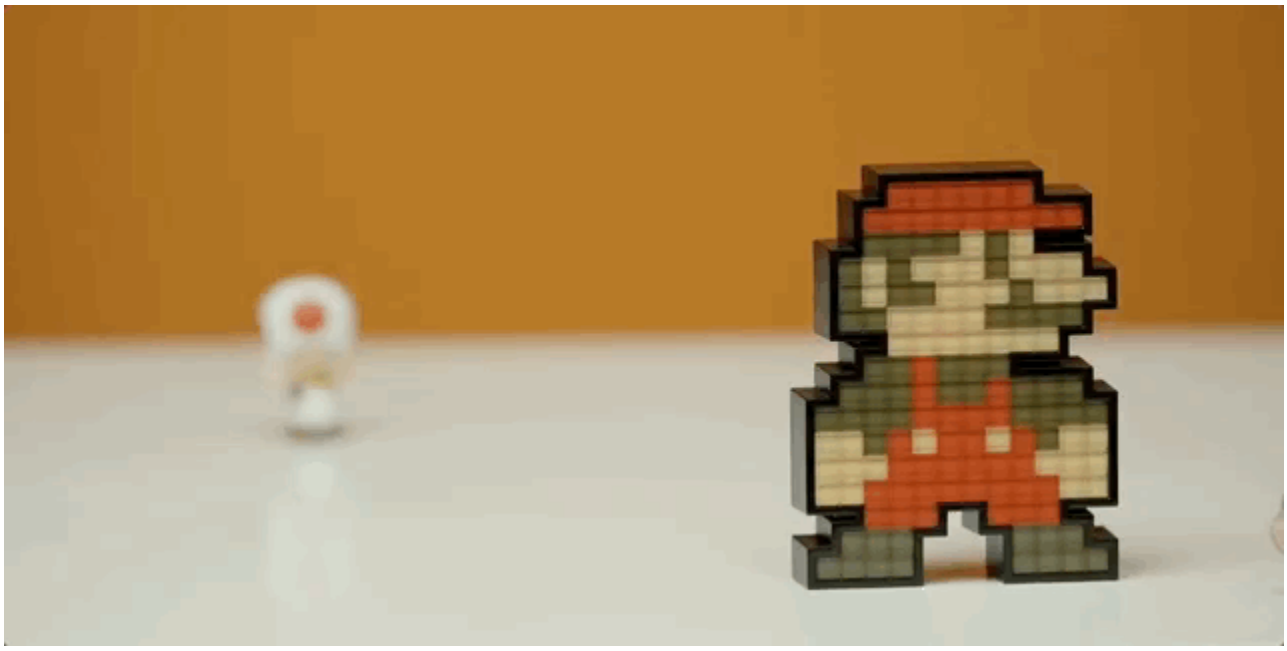


Image Overlay places an image (taken with the **Image Capture** function or manually placed from a computer onto the SD card) directly on top of your footage - very useful for judging **shot continuity**, particularly when using the built-in **'blink'** feature.

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'**

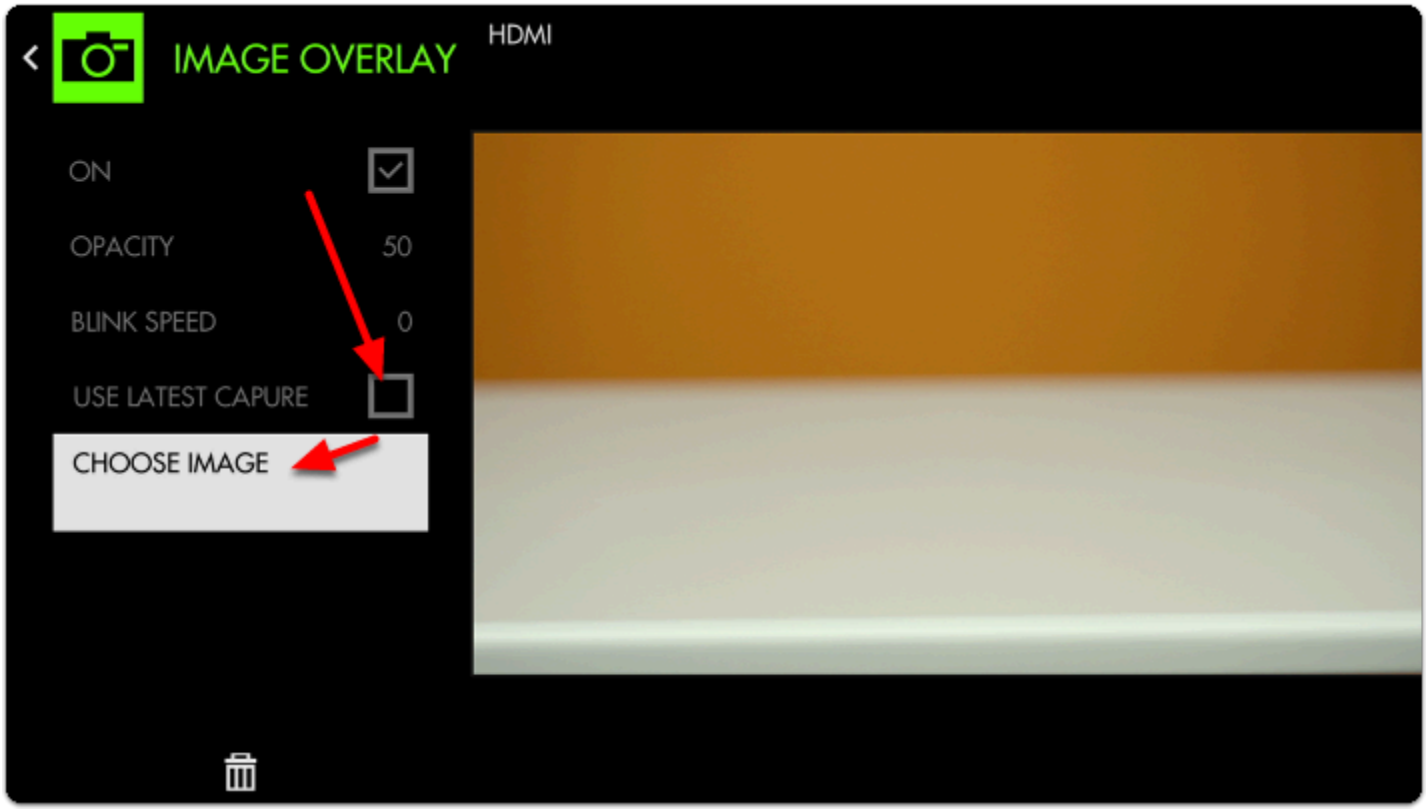
Navigate to **Overlay** > **Image Overlay** and click on the **'+'** to add it to the current page.



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

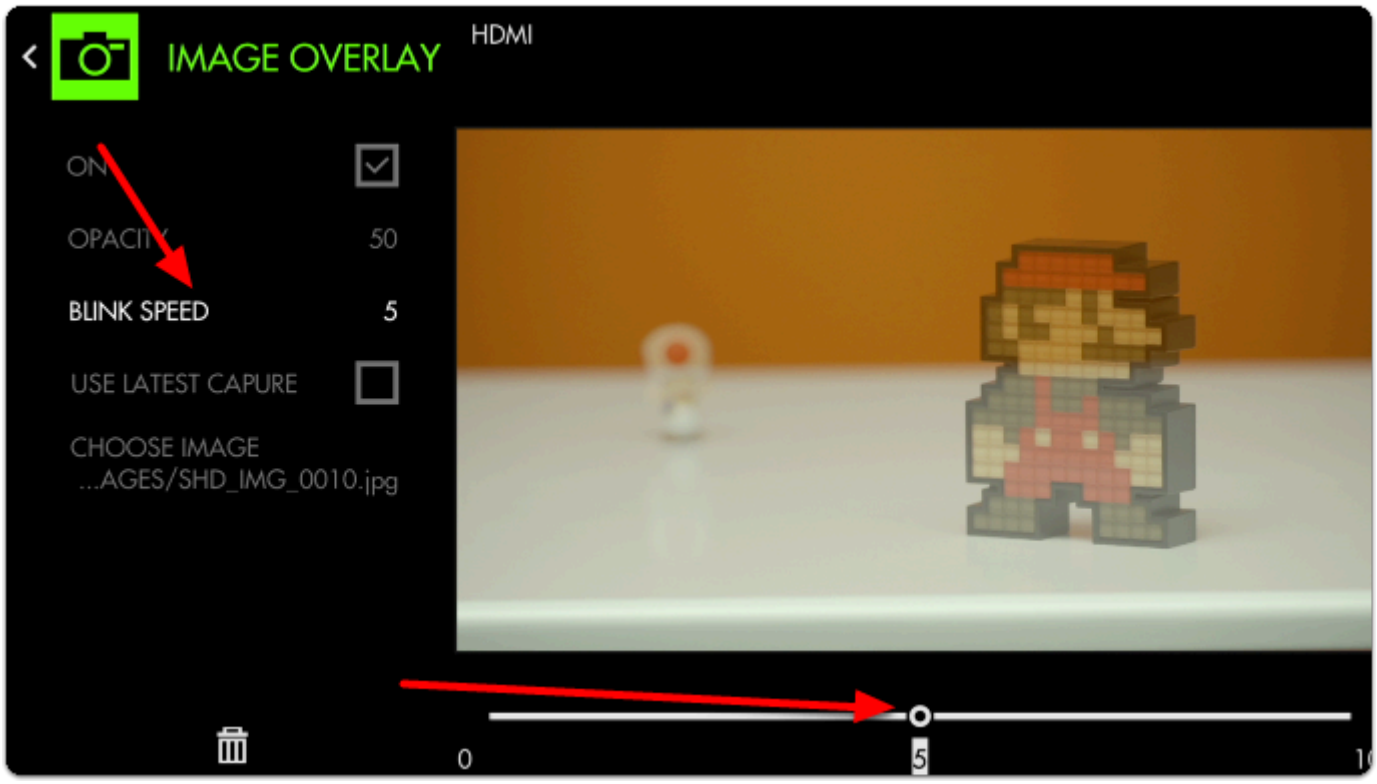
You can edit the settings by **navigating right** with a joystick or **tapping the right arrow** on a touchscreen when **'Image Overlay'** is highlighted.

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

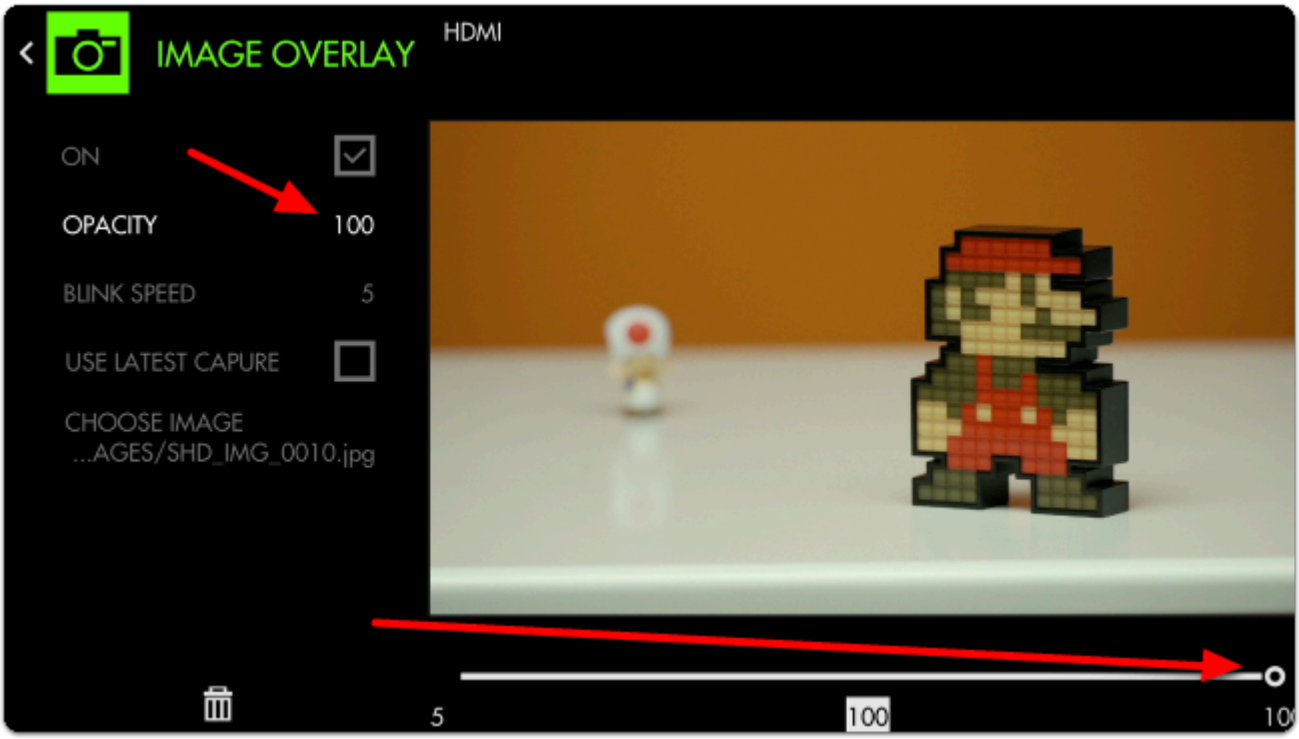


If you wish to overlay an image from a computer, first ensure it is in .jpg format and save it anywhere to the SD card. You can select it with **CHOOSE IMAGE** [above]

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!

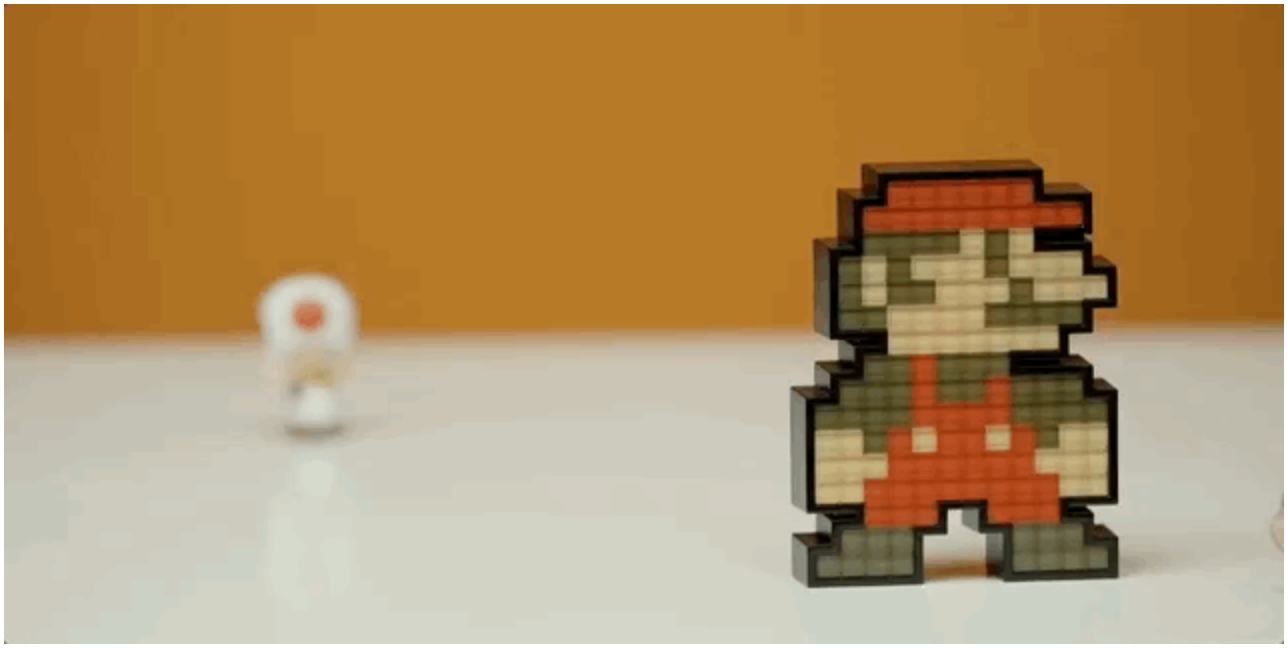


Image Capture





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**.

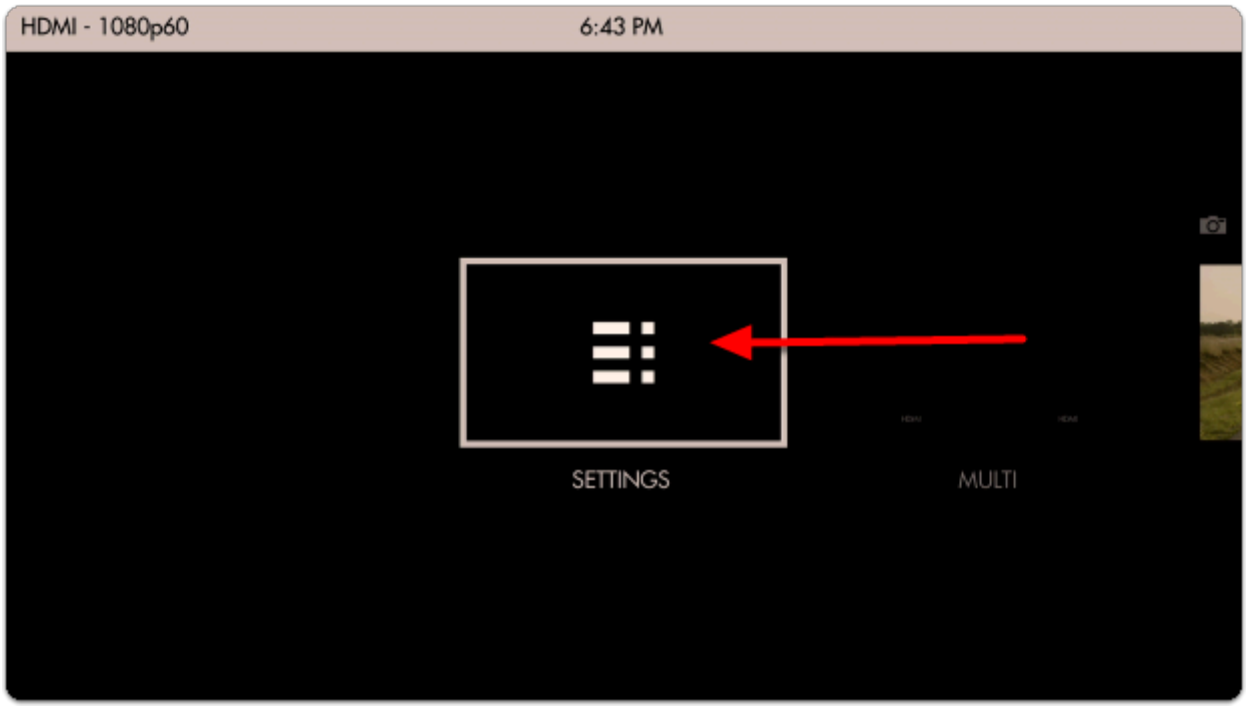
Next let's enable the **capture of LUTs** so that we can take **color-graded snapshots.**

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

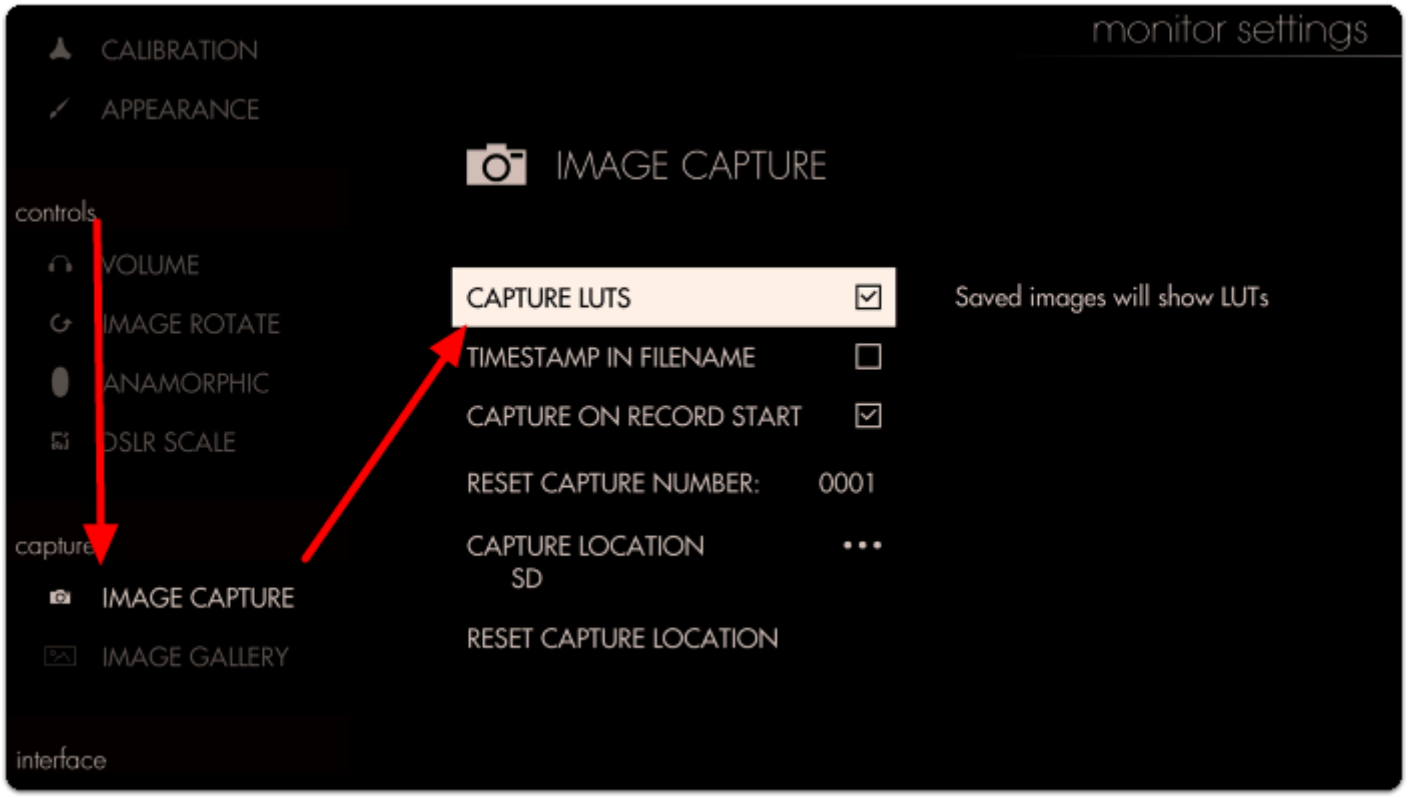


Move left until you reach the **global Settings menu**.

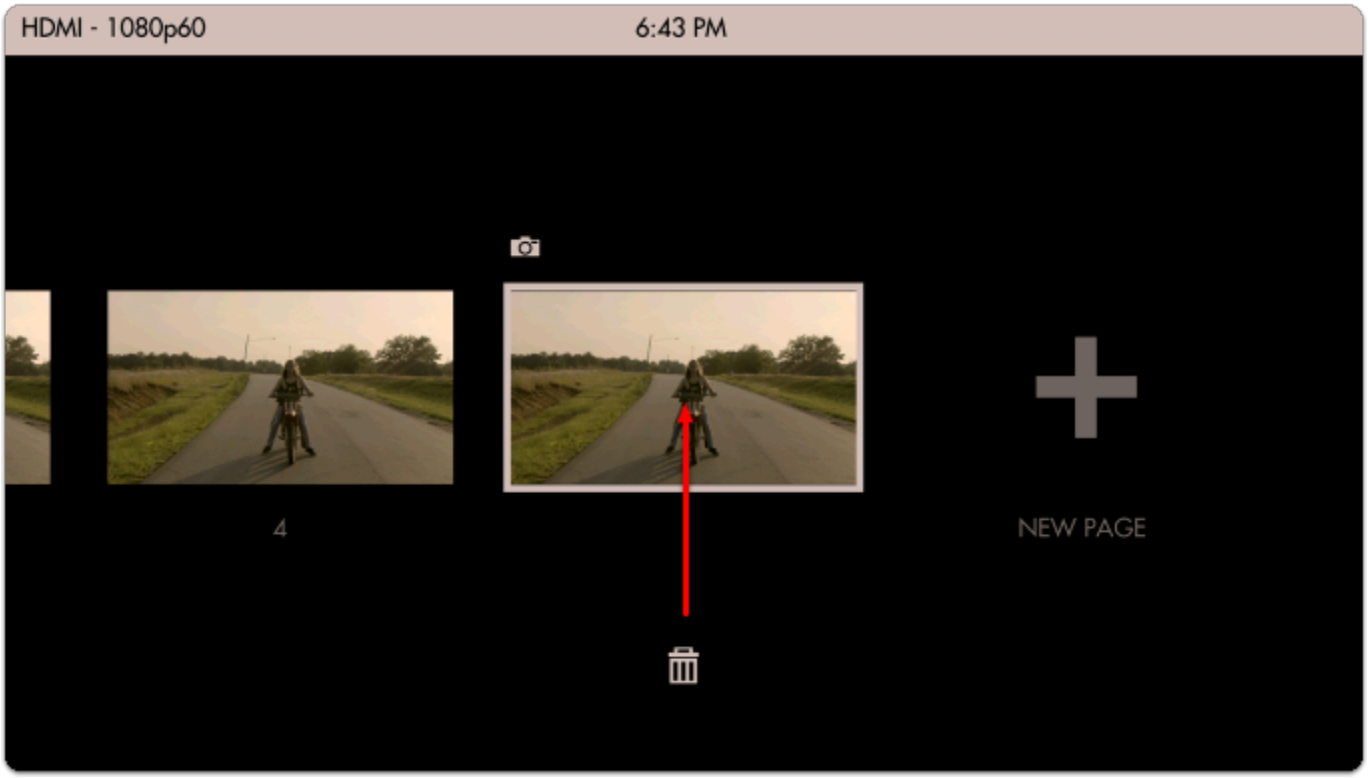
> **Image Capture settings** are located in the **far-left Settings menu** since they affect the way images are captured **globally** across the monitor.



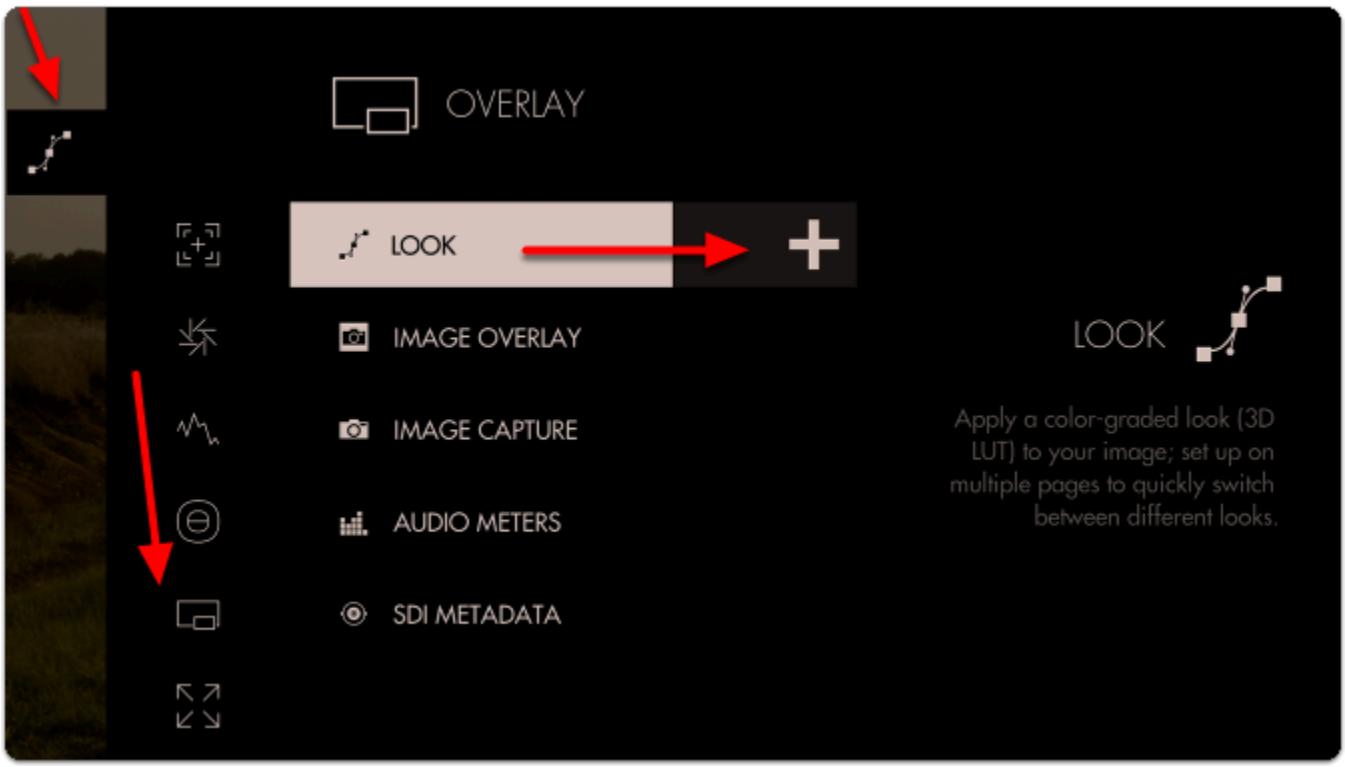
Navigate to **Capture > Image Capture** and select **'CAPTURE LUTS'** to automatically apply any active Look/3D LUT to the saved image.



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

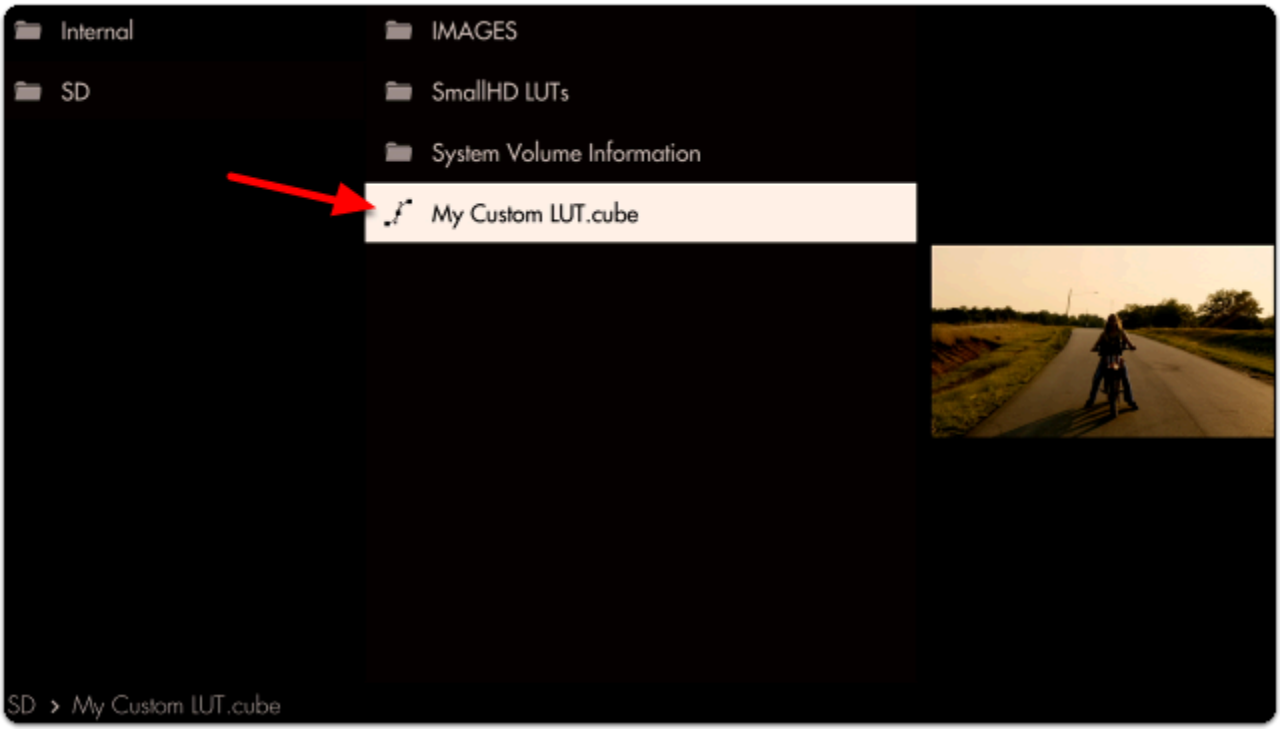


Let's add a Look (3D LUT) to the page via **Add Tool** > **Overlay** > **Look**

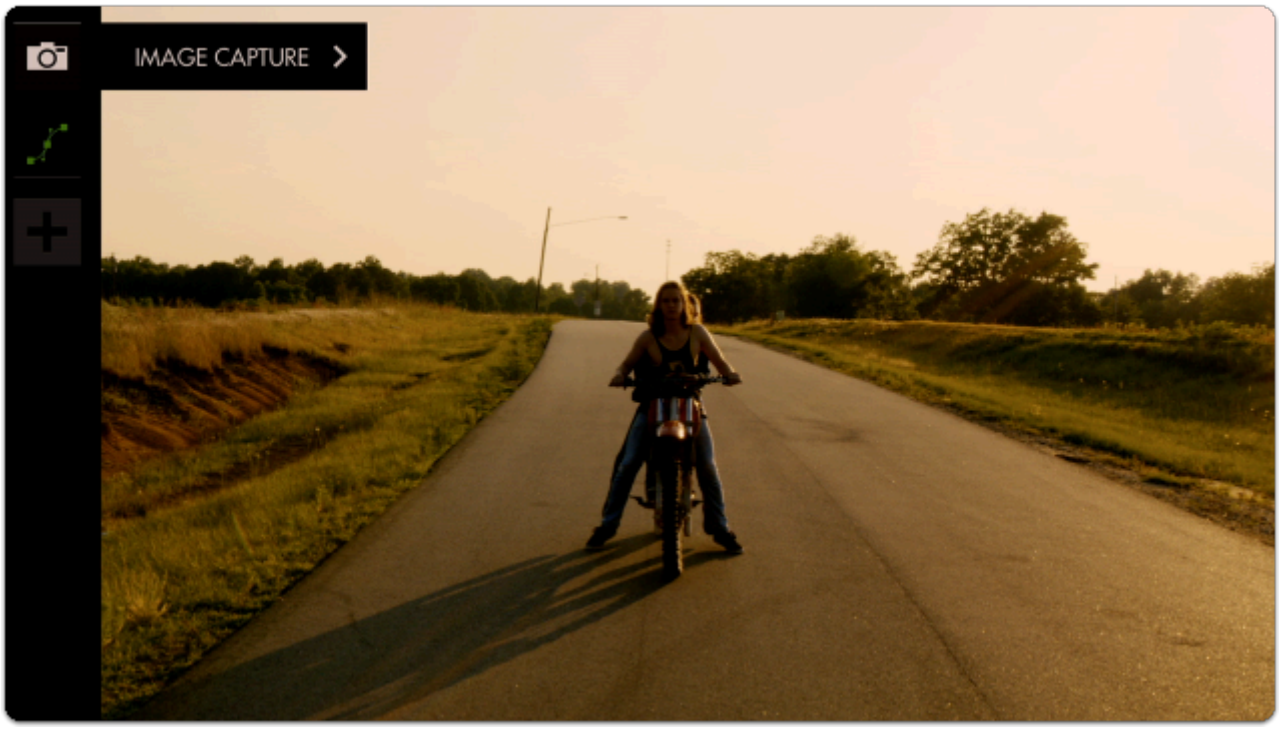


Next **select a Look/3D LUT** from an SD card or the internal memory.

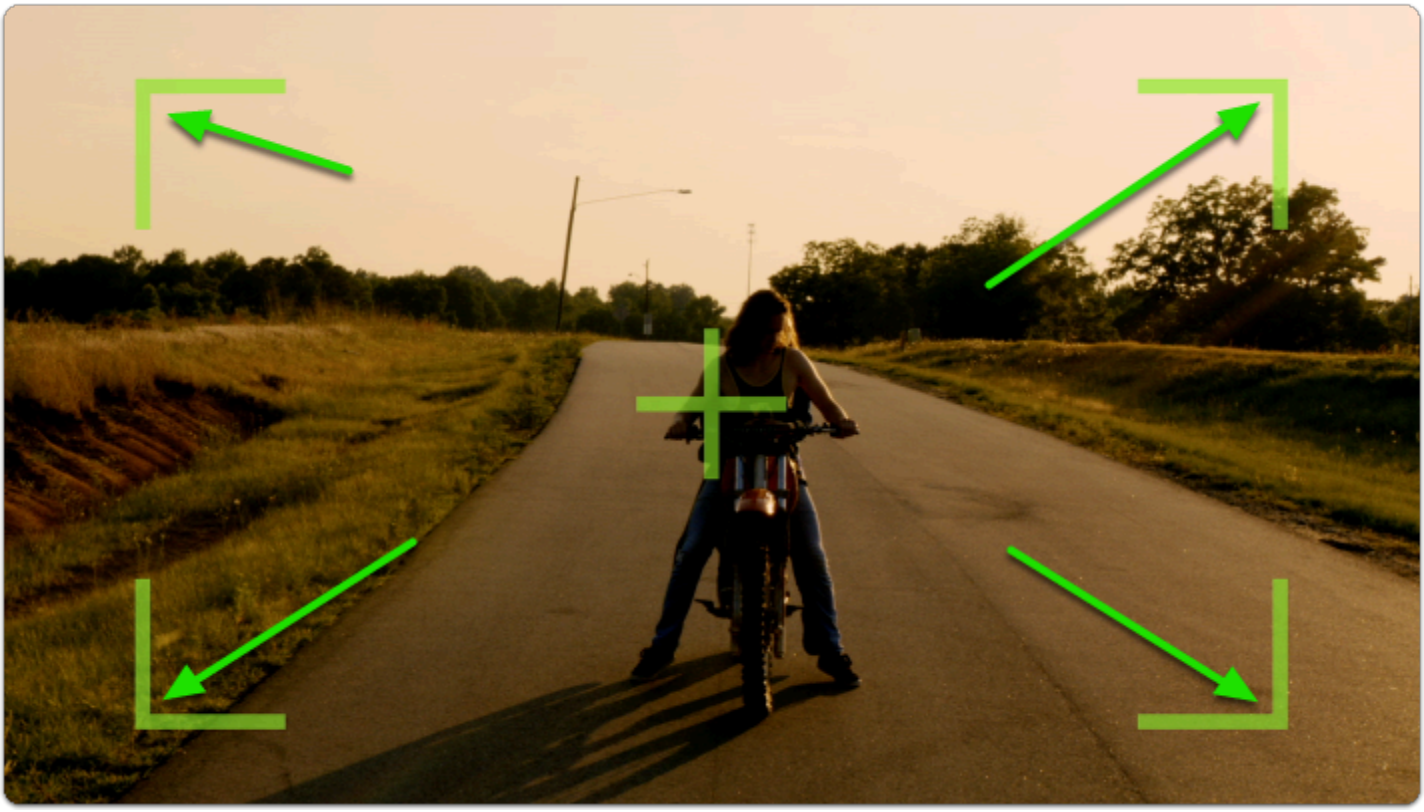
If you wish to learn how to create your own Look/3D LUT in Davinci Resolve, follow our video tutorial!



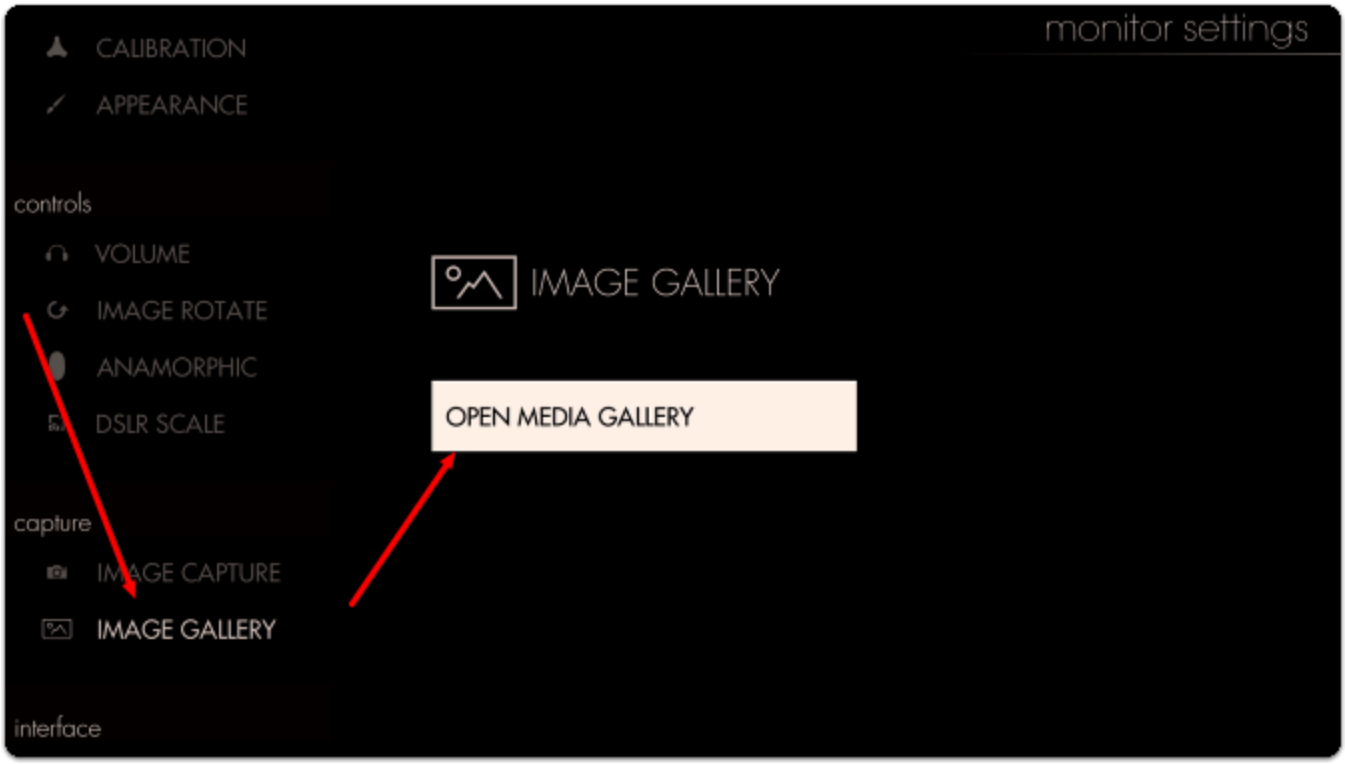
We're finally ready to take a snapshot! Select **Image Capture** that's already in the toolbar.



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.

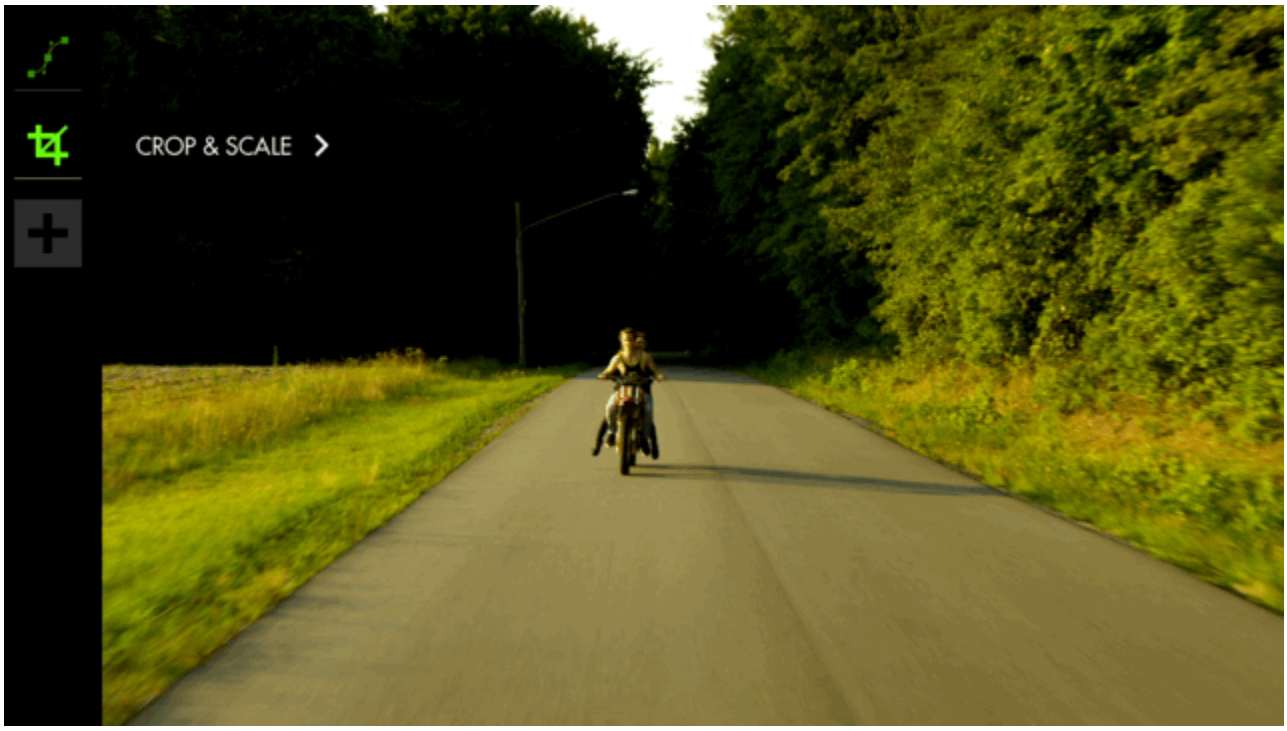
From any page displaying an SDI signal, click the joystick or tap the screen and select Add New Tool > Overlay > Metadata.

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

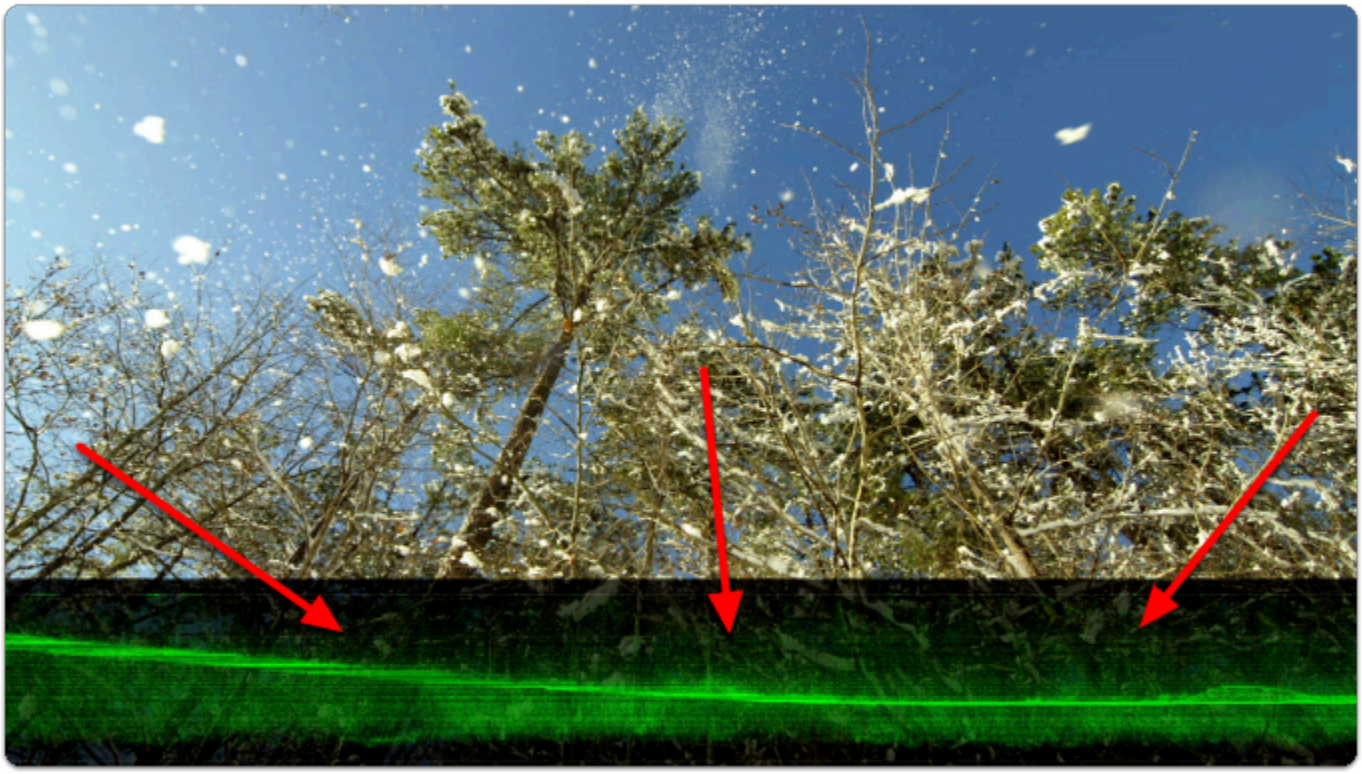
When ‘Center Crop’ is unselected, this will adjust the amount of cropping being applied to the top of the image.

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’.**



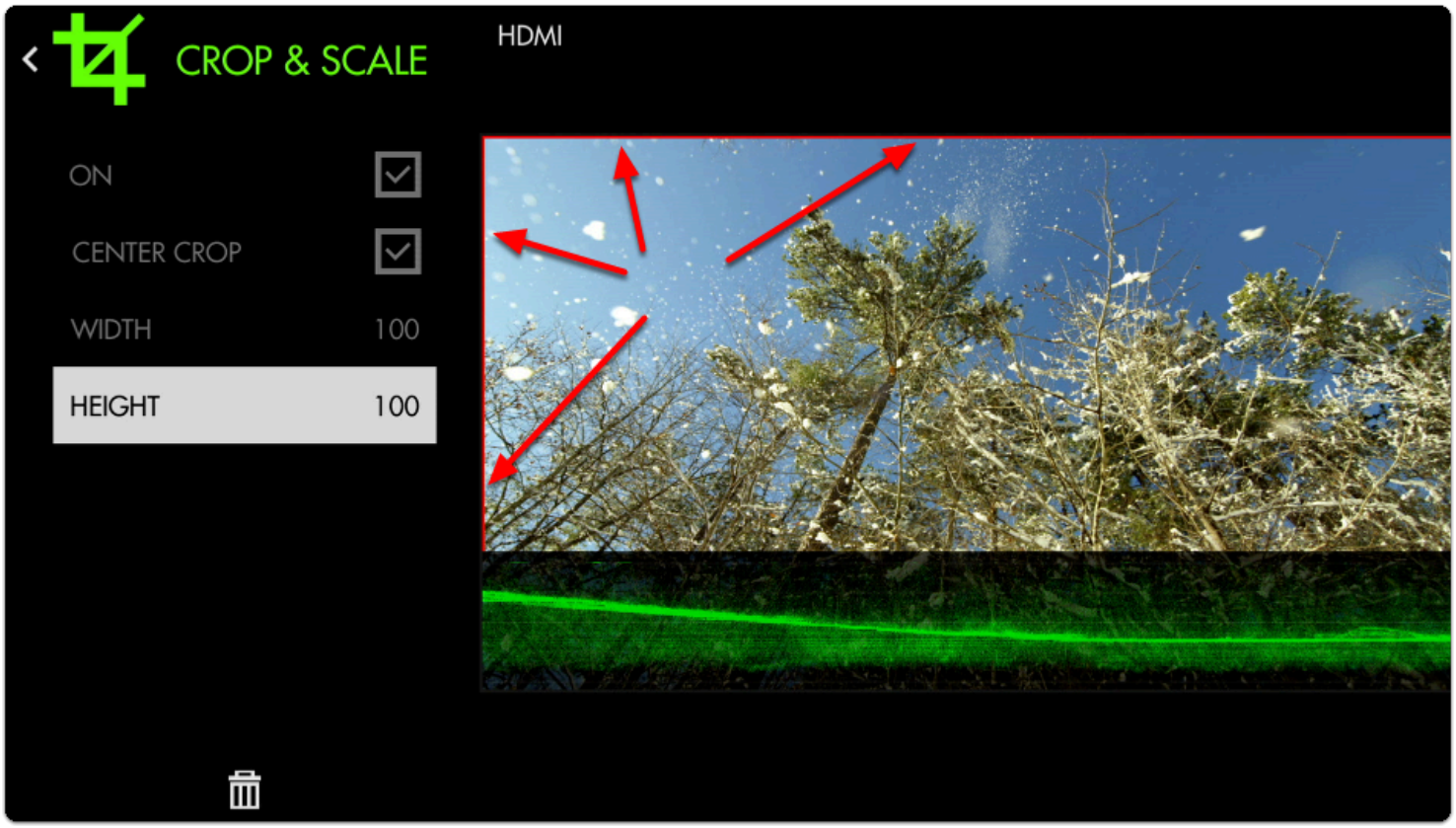
Navigate to **Scale** > **Crop & Scale** and select the **'+'** to add it to the current page.



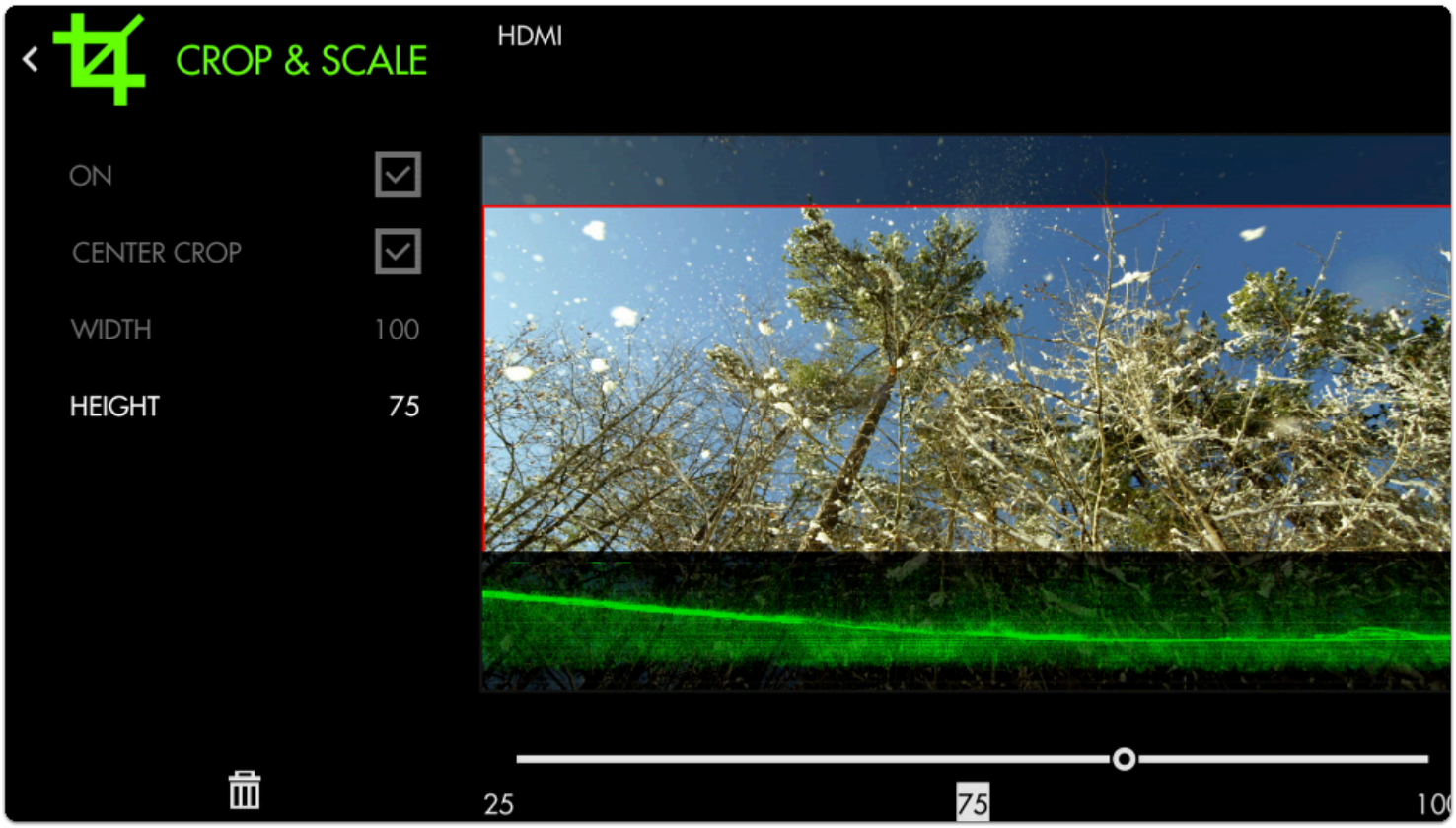
Once added you can **edit** the settings by **navigating right** or **tapping the right arrow** when **'Crop & Scale'** is highlighted.

Navigate to **HEIGHT**.

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

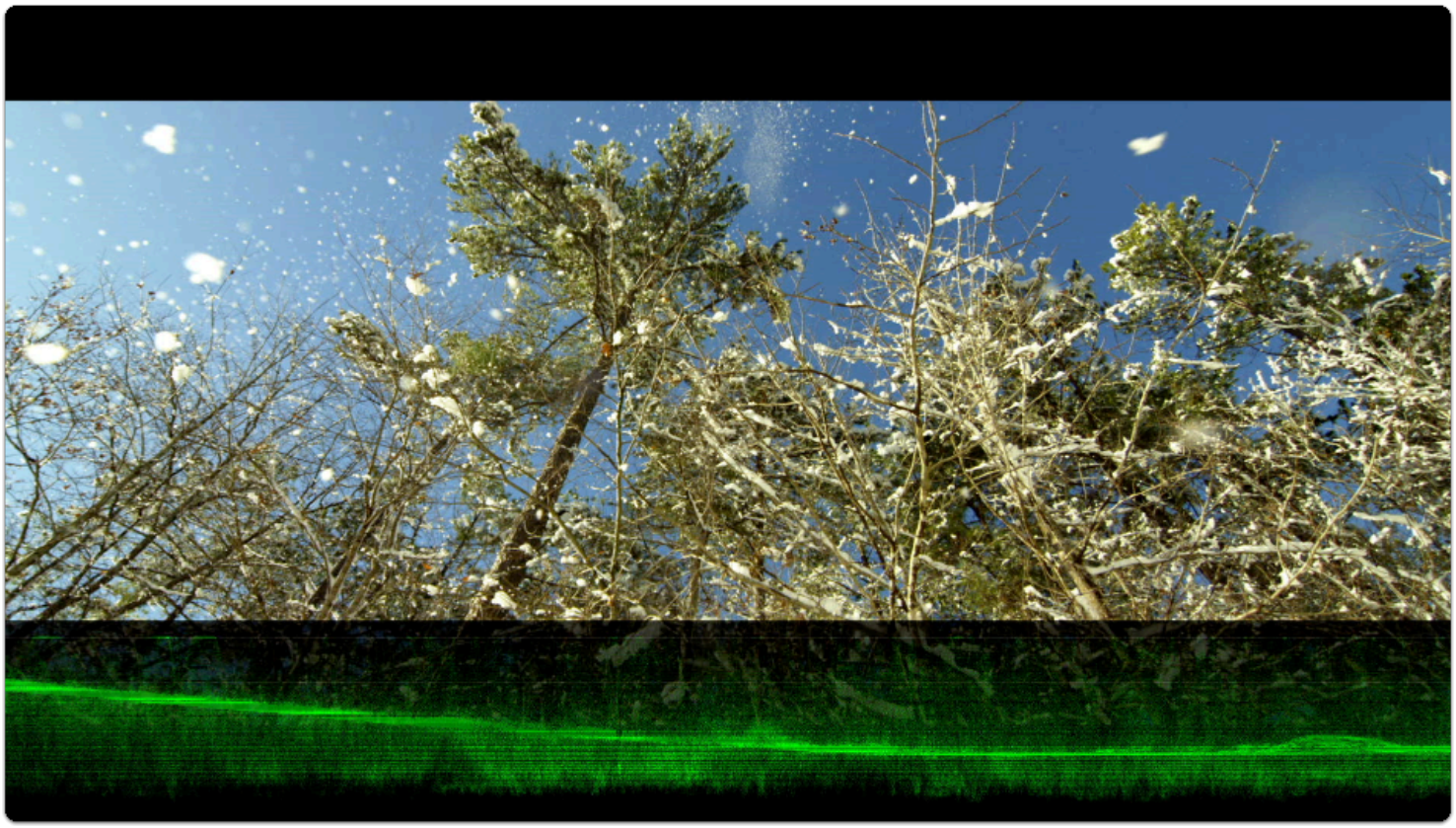


Decrease the **HEIGHT** to **75%** which simulates the same cropped area as a **2.39:1 aspect ratio**.



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.

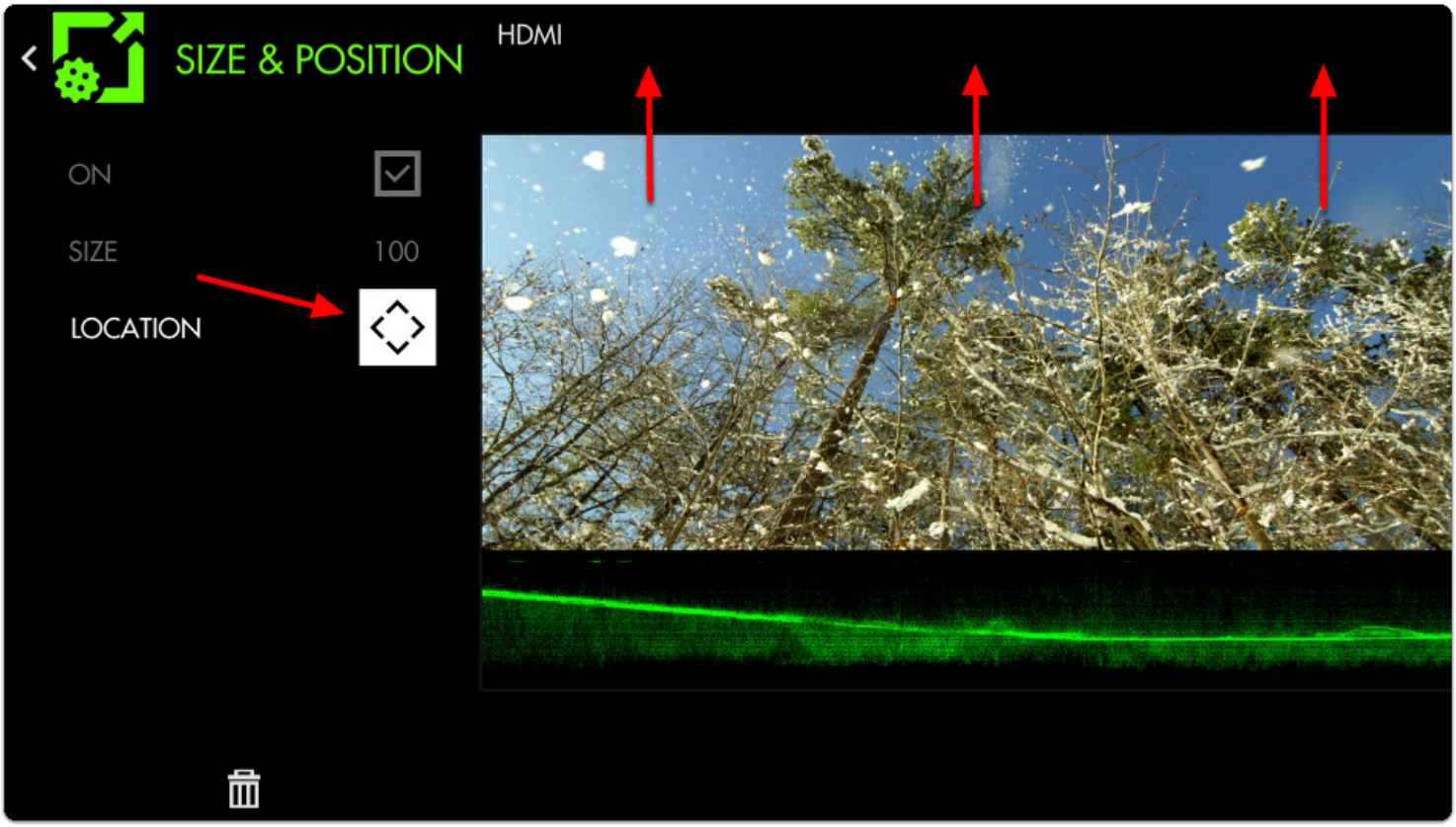


Add Size & Position via **Add New Tool** > **Scale** > **Size & Position**.



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

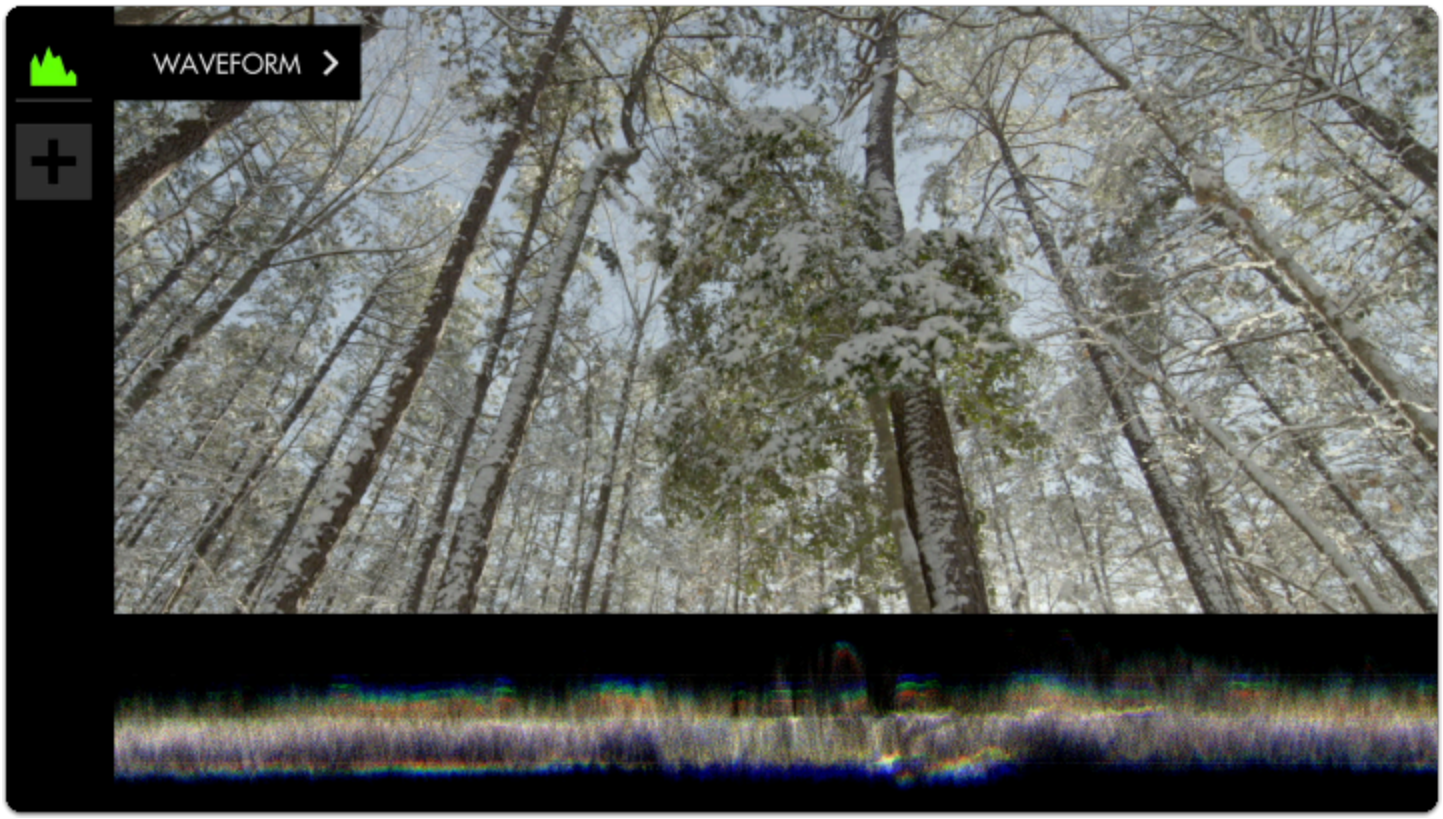
Adjusts the size of the image proportionally within a page compressing toward the center of the selected location.

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%.

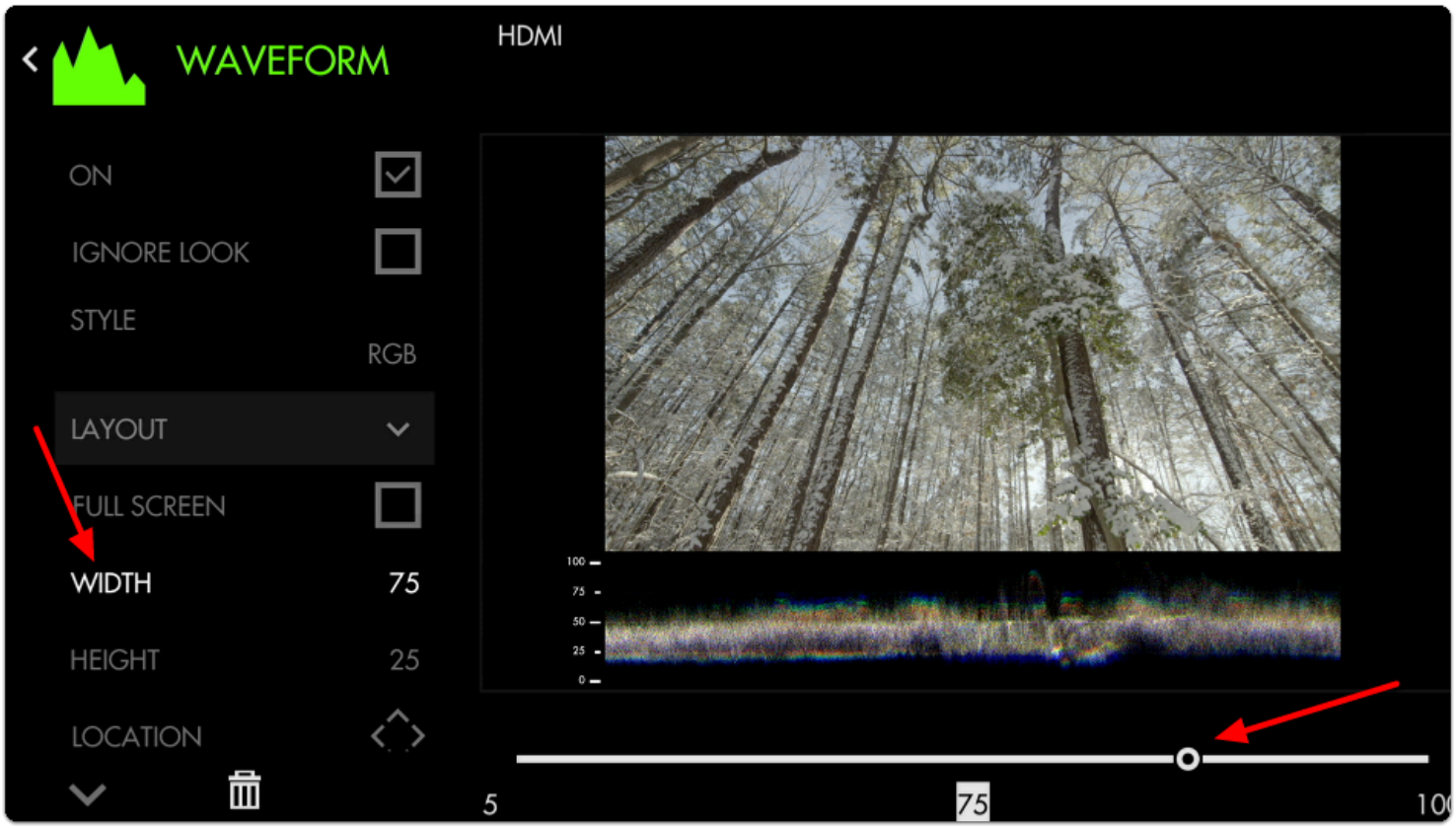


Now move the image to the top of the frame by selecting **LOCATION** and pressing **up on the joystick** or **tapping the top portion of the image**. This leaves us with an unobstructed view of the **Waveform**.

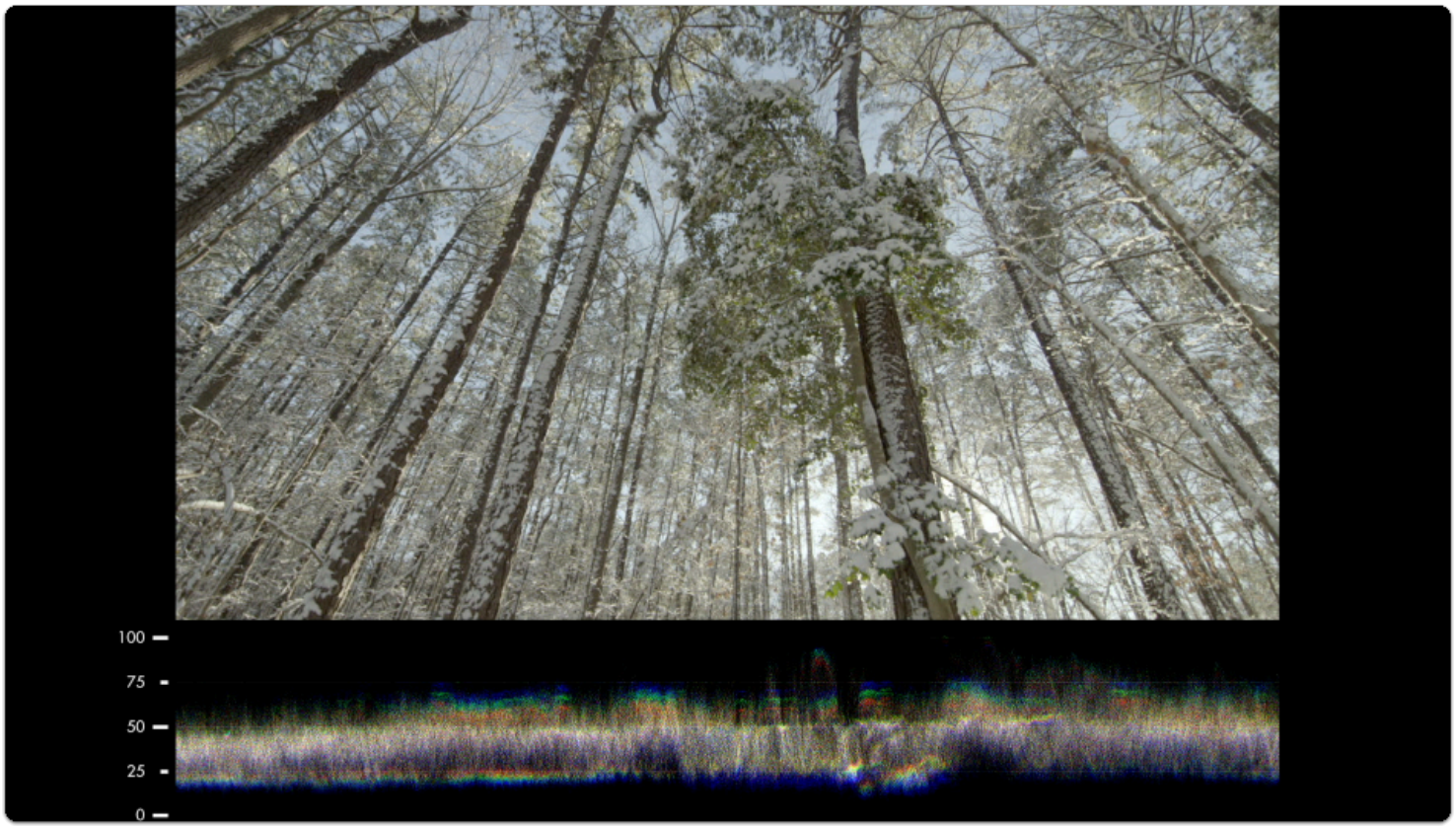


Press **Back** or tap the left arrow at the top right hand corner to **exit.**

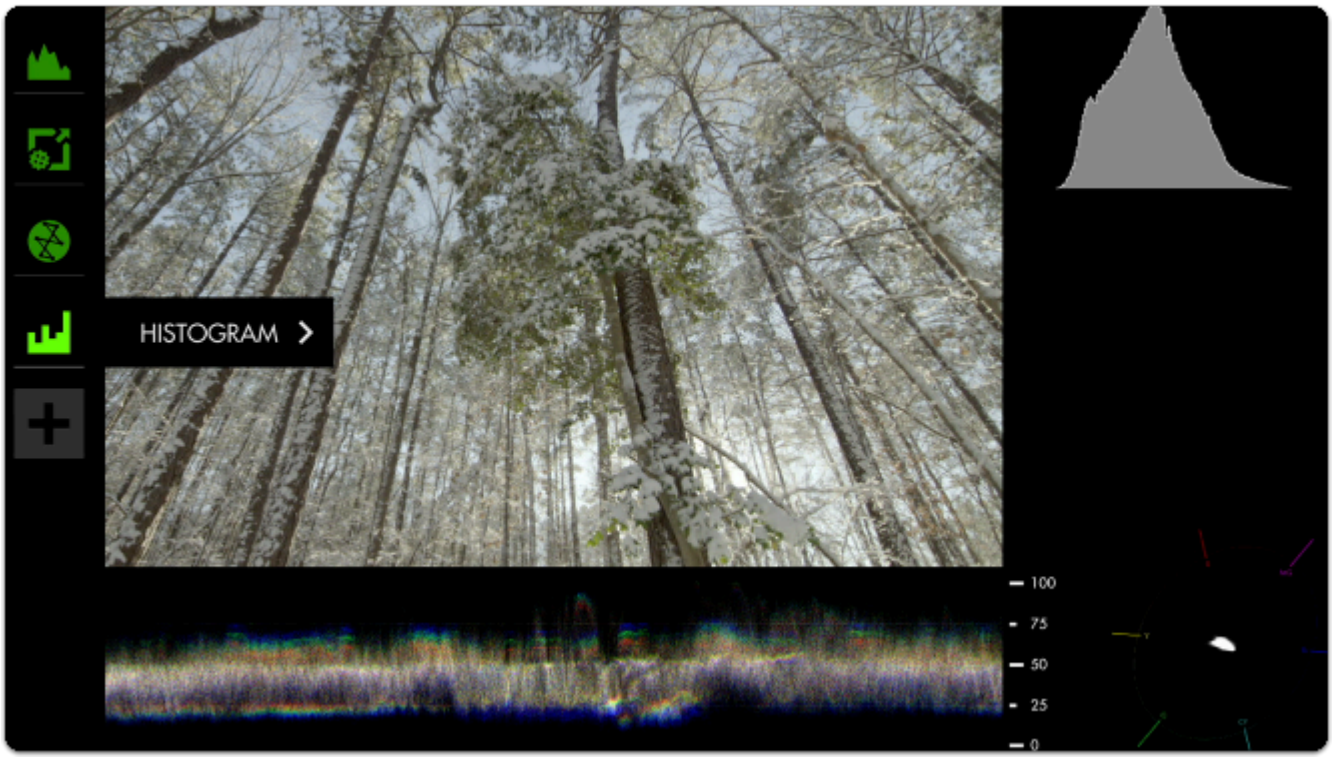
Next we **edit** the Waveform and scale its **WIDTH** to **75** to match the width of the image.



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.


HISTOGRAM
100
75
50
25
0

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. No information will be displayed on the monitor if no lens map is selected.
- 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.

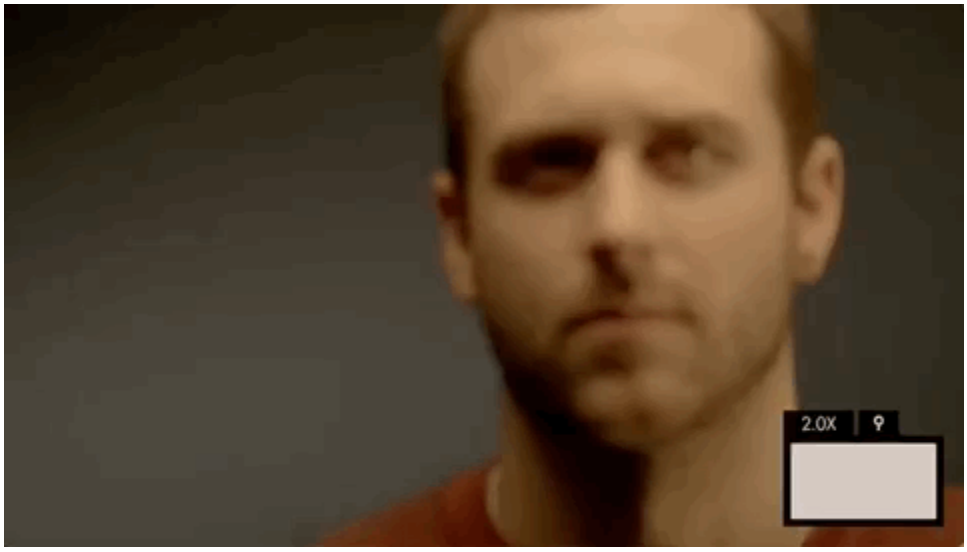
*Please be aware that the SmallHD branded i1 Xrite probe has been discontinued. (2019)

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



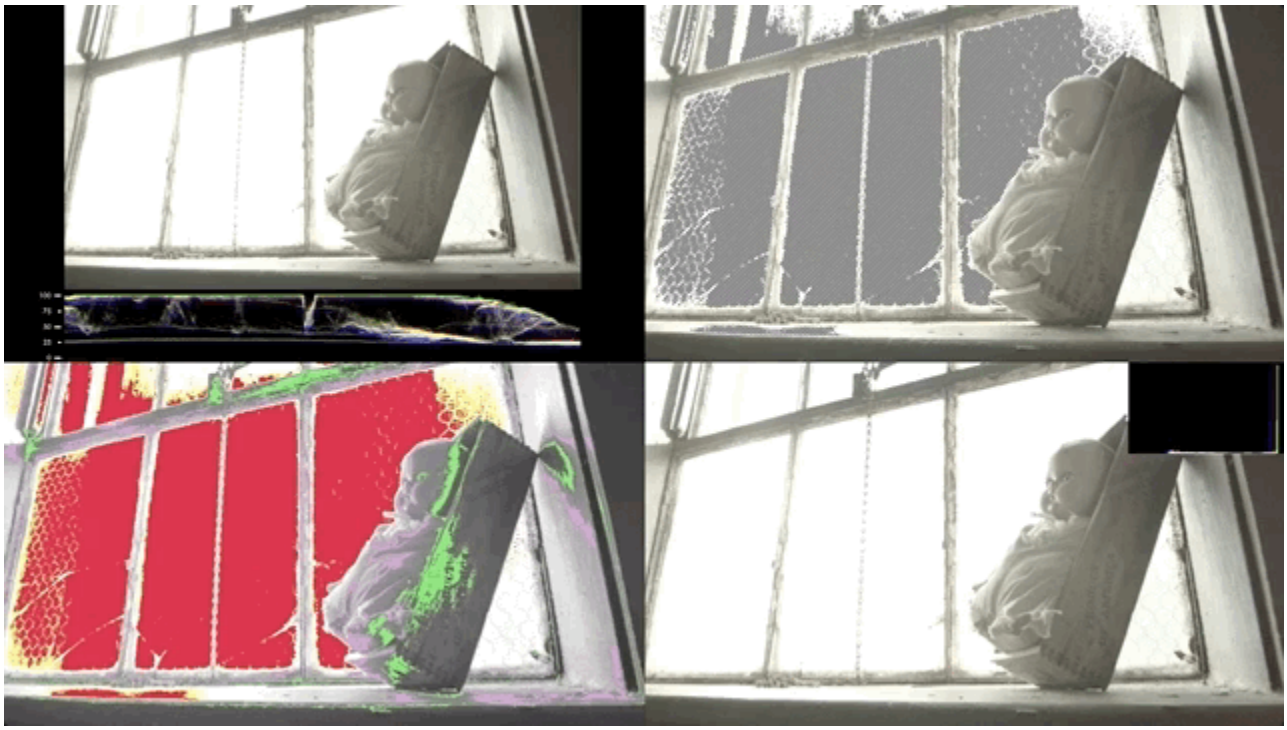
Peaking is essentially the **'sharpness' filter** turned all the way up -- meaning in-focus edges highlight similarly to Focus Assist, but it **doesn't alter the image as drastically** which can be helpful when used in combination with other tools.



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.

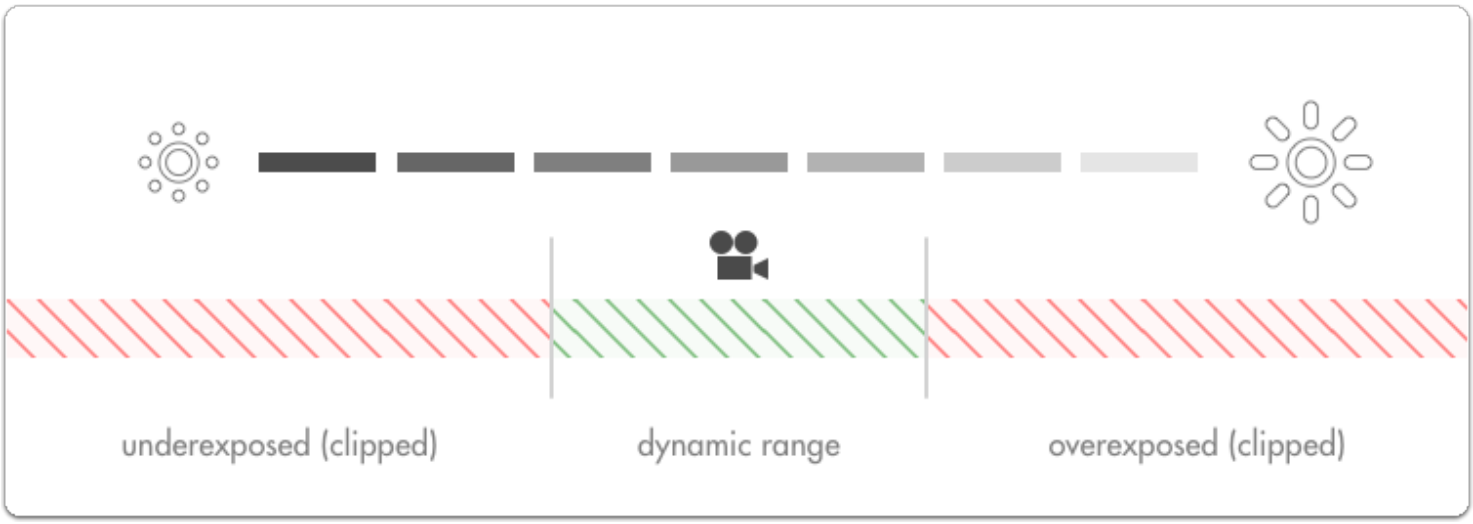


The Dynamic Range 'bucket'

Cameras have a limited **dynamic range**; this is the range between the **darkest dark** and the **brightest bright** a camera can simultaneously see and retain detail. If this range is set incorrectly, it can mean important details get lost or **clipped**.

The philosophy of the SmallHD toolset has always been to help free up the operator's mental burden - combined with pages, SmallHD's tools are designed to promote a level of confidence in the technical aspects of a shot to help free up creative energy. We haven't performed a formal study but we'd wager shooting with SmallHD monitors decreases stress on set.

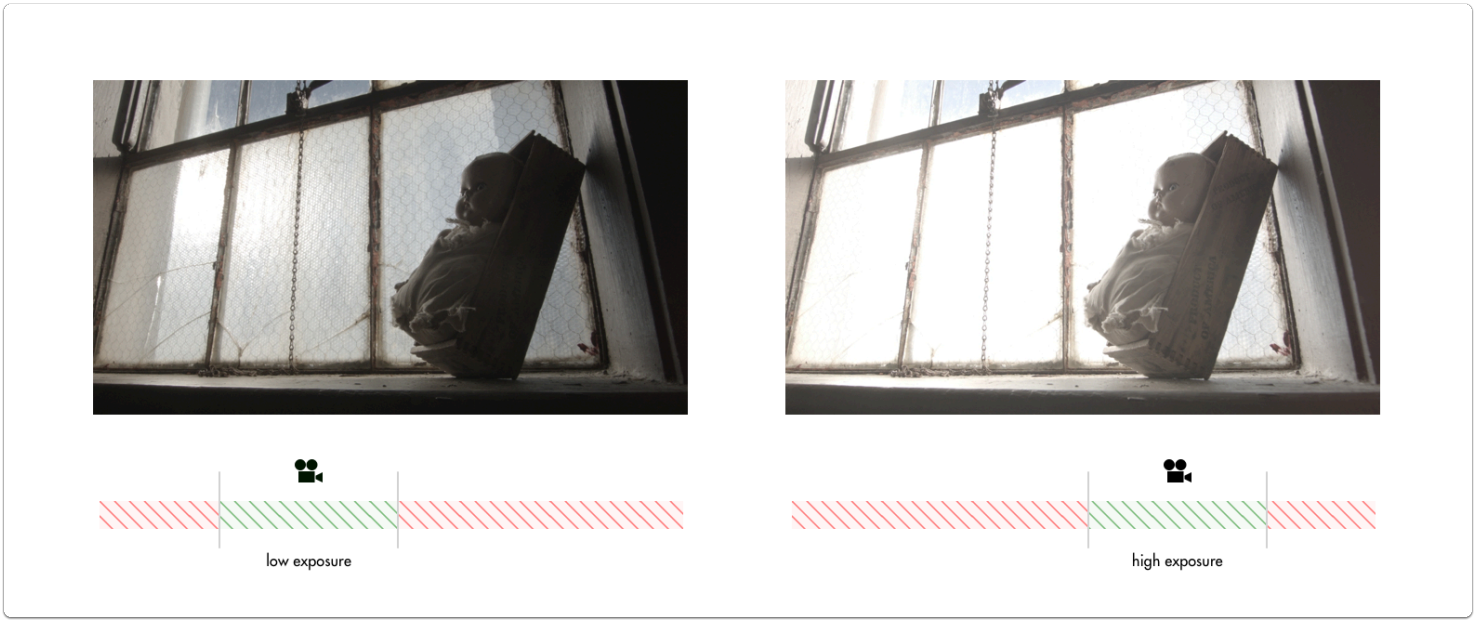
Ambient lighting conditions change human **perception** of on-screen images so drastically that **eyeballing the exposure range** without aid can be **highly risky**; tools that present the range clearly are generally considered critical for consistent footage gathering.



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

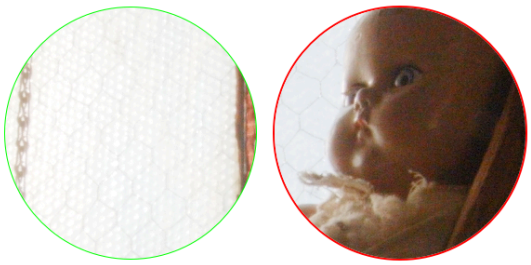
Let's look at the problems we face with a shot with a relatively **low exposure (underexposed)** and one with a relatively **high exposure (overexposed).**



For an easier direct comparison these shots have been color graded to roughly match one another:

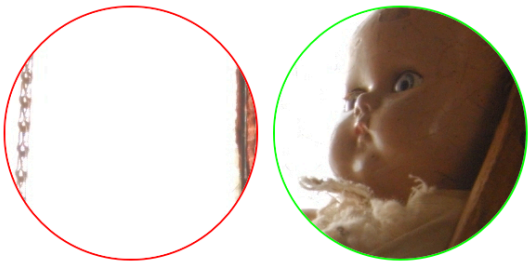


(Low exposure - brightened)





(High exposure - darkened)



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)
2. Shadow tones reveal noise when boosted (bad)	**4.** The face of the doll is exposed well and contains minimal image noise (good)

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

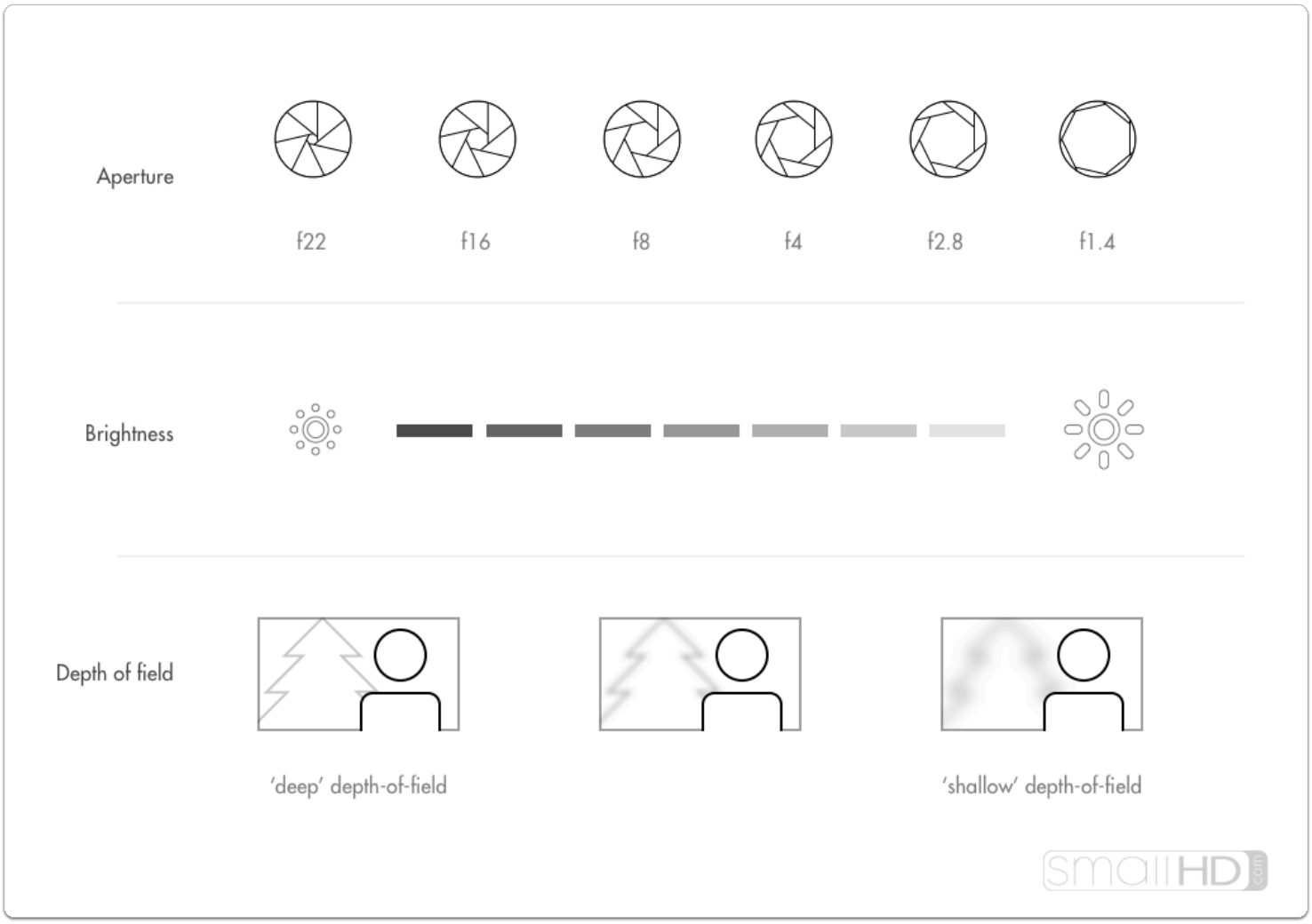
There are several ways to control exposure on a camera and it is critical when operating to have a firm grasp of the benefits and trade-offs of each. Let's have a look at them:

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

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.

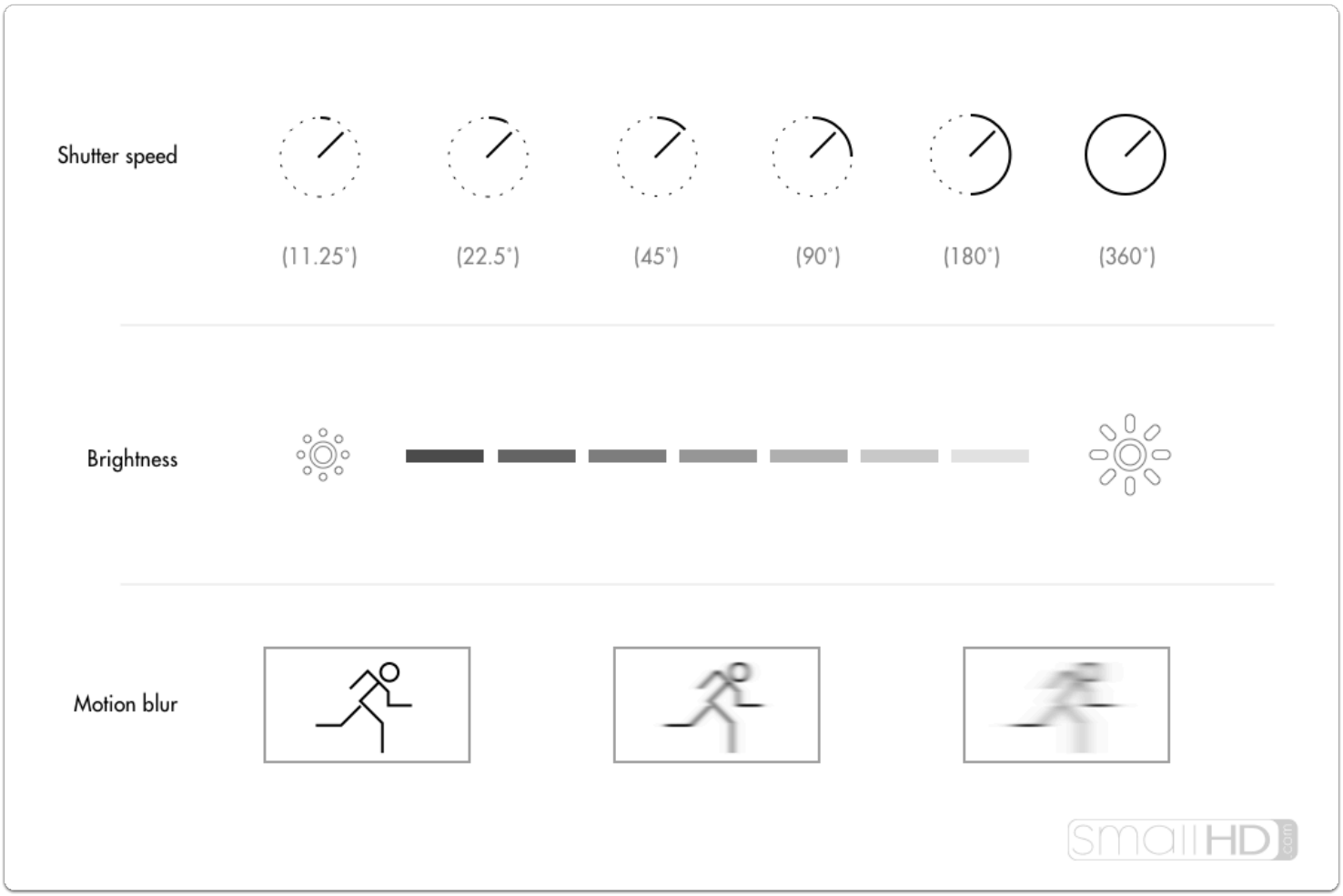


Notes on adjusting ISO for exposure
Flexibility/Night Shooting - Some cameras have incredibly low-noise sensors and effective noise processing that can allow for high ISO values without noticeable artifacting meaning easier shooting in the dark. Mileage varies greatly and older cameras tend not to fare as well in this respect.
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.



Notes on adjusting shutter speed for exposure
Controls perceived 'smoothness' of motion - if footage motion appears too smooth for the intended

Notes on adjusting shutter speed for exposure
style, increasing shutter speed will increase a ‘strobing’ effect, think the ‘Saving Private Ryan’ look where action appears frozen in time.
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
Shallow depth of field on bright days - dense ND (neutral density ie darkening) filters make shallow

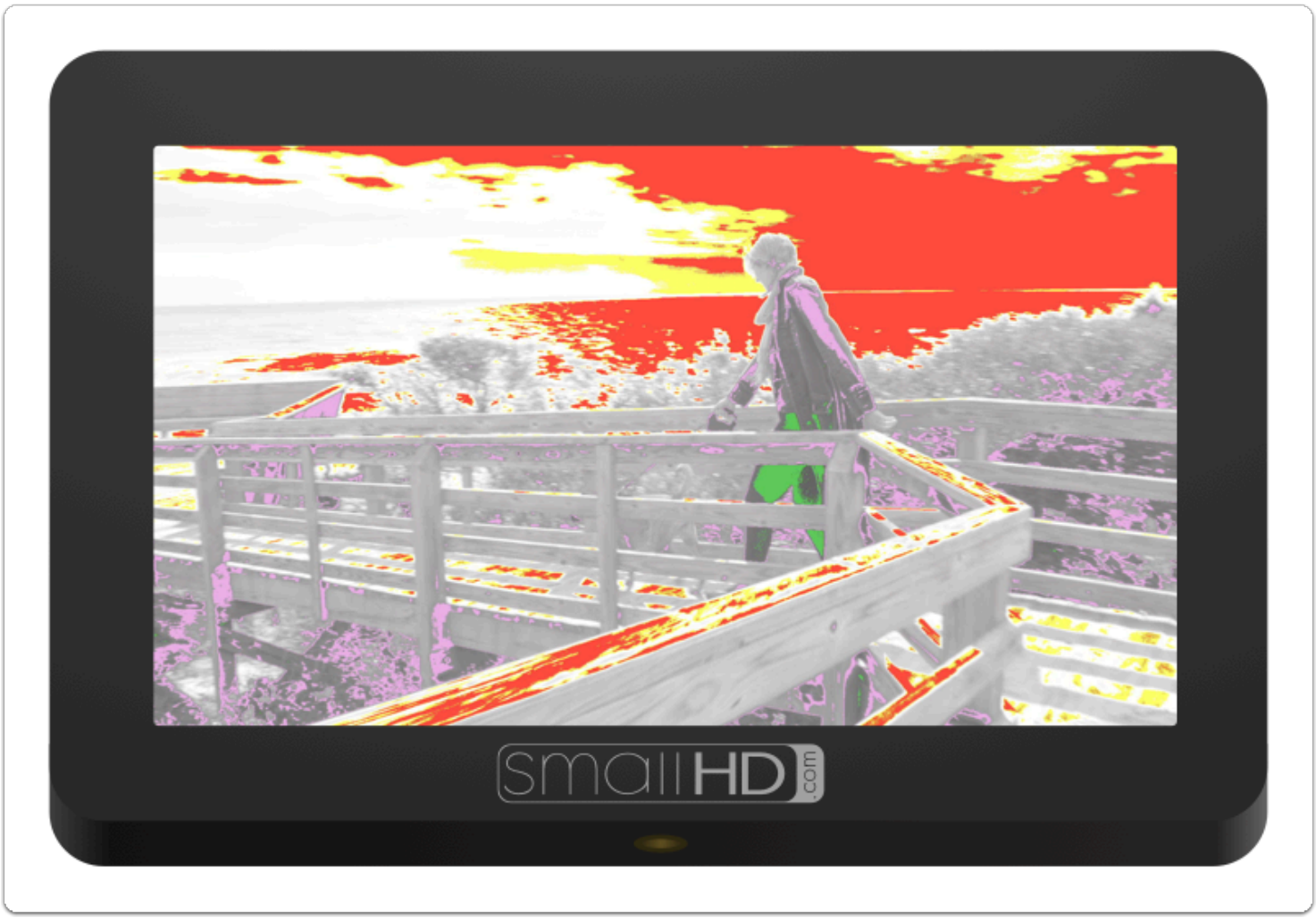
Notes on adjusting lens filtration for exposure
depth-of-field possible on very bright days - other options are to close down the iris (resulting in deep depth of field) or increasing shutter speed (resulting in stuttery motion).
Localized Adjustments - ND filters often have a graduated (dark to light) 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.

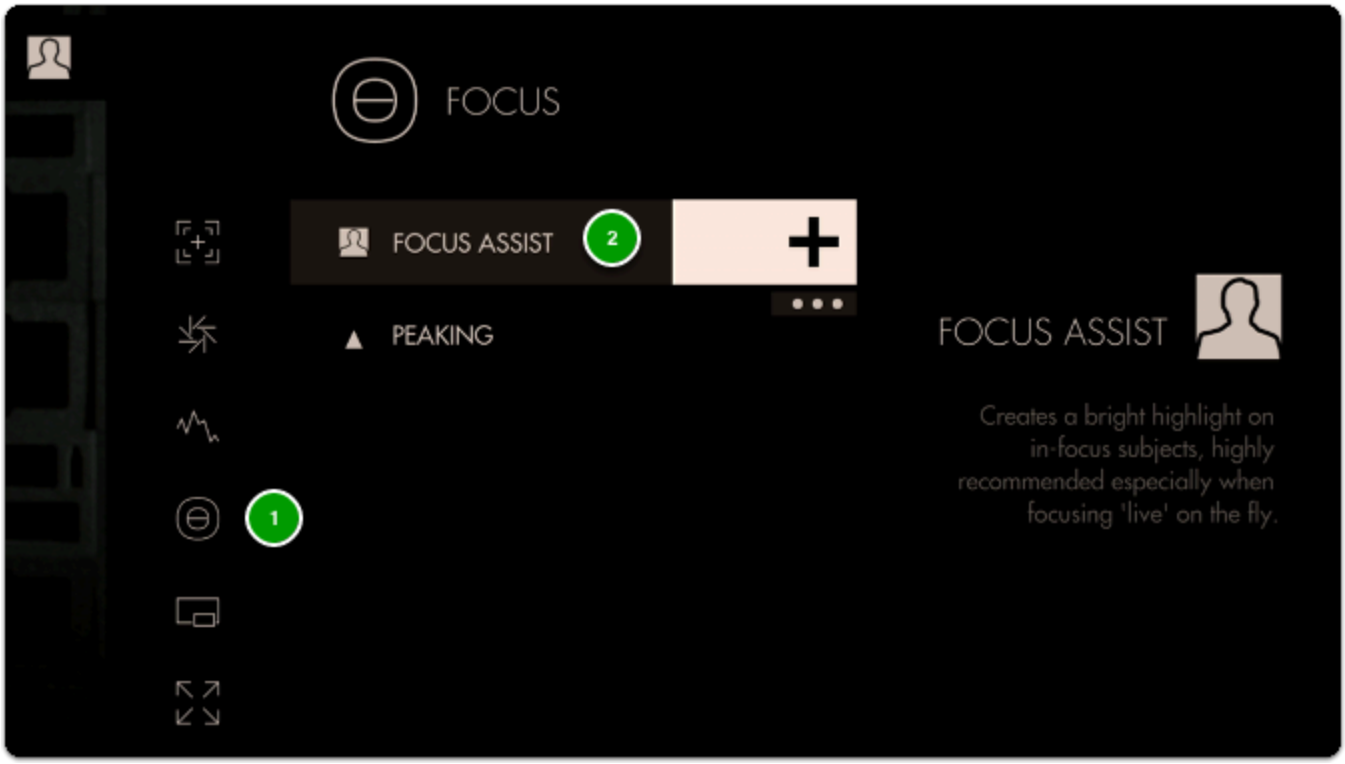
How to use Tools - Case Study (Joystick)

USING TOOLS - CASE STUDY

Below we will walk through an example of using tools.

Let's make 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. We will also go over adding a LUT to a new page and show the benefit of using the page system.

Open the TOOL bar. From here **press right** or click the joystick to select, and navigate to **(1) Focus > (2) Focus Assist** and select the **'+'** to add **Focus Assist** to this page.

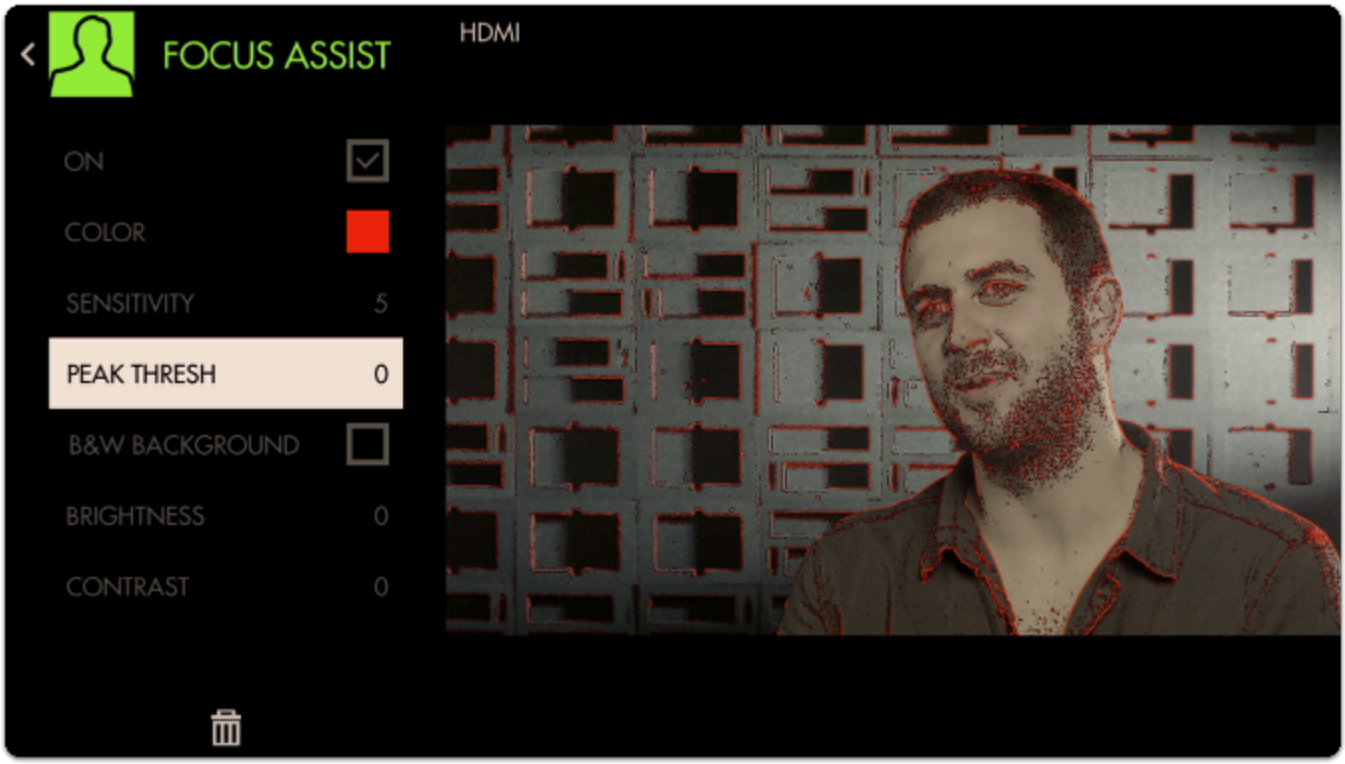


Focus Assist will paint a **highlight** around areas it determines to be in focus based on small/harsh changes in contrast.

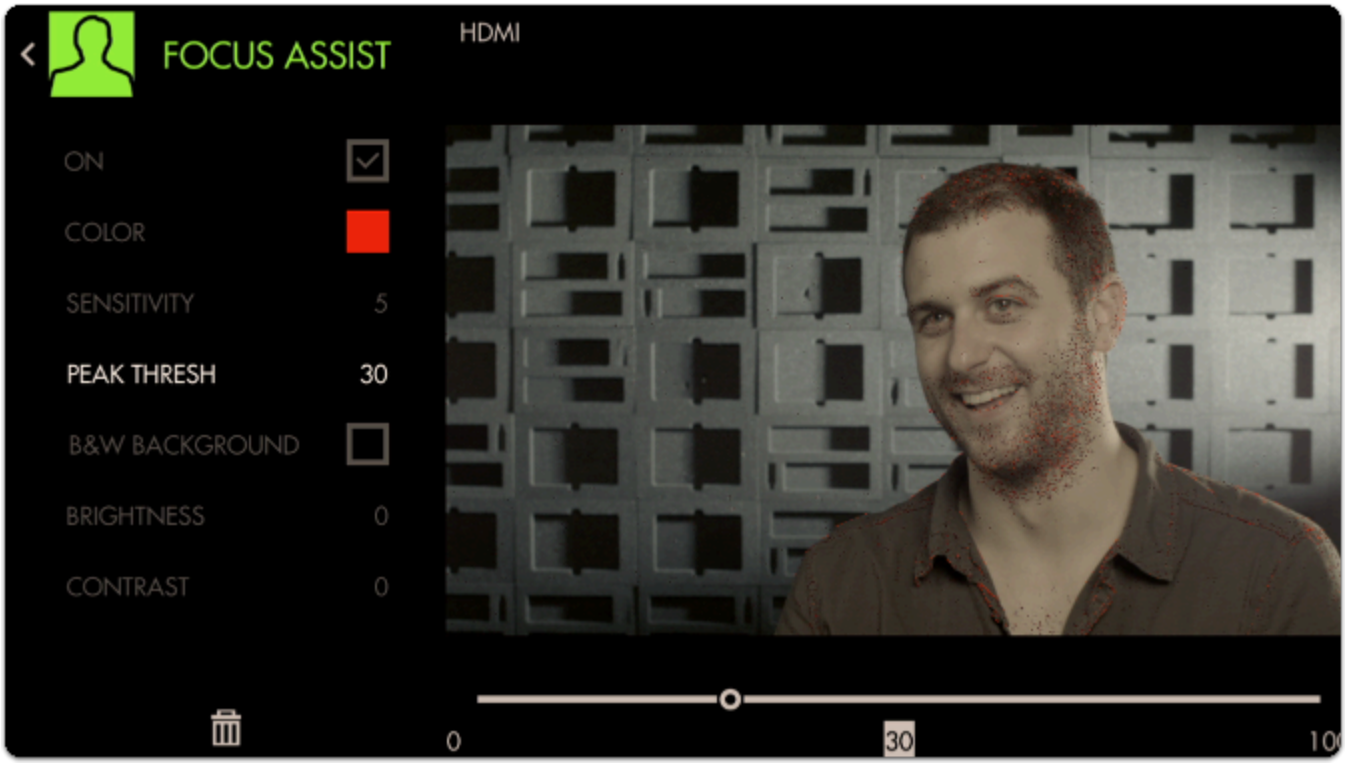
The **Peak Threshold** is a bit high, meaning we are picking up extraneous edges on the back wall which are not quite in focus.



To fix this, **edit Focus Assist** by **pressing to the right** when it is highlighted in the tool bar, and navigate to **Peak Threshold**.

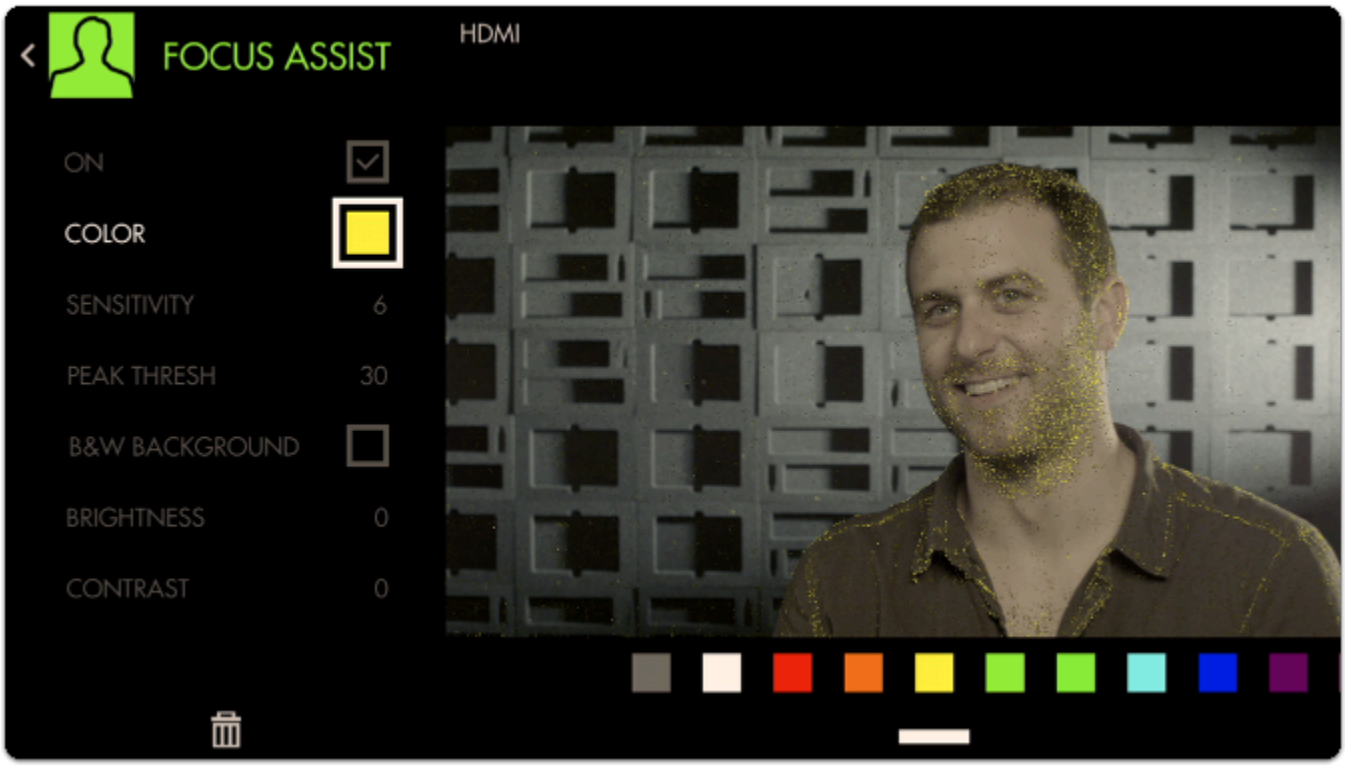


Bringing **Peak Threshold** up to around 30 does a better job of causing **only in-focus areas to activate the filter** but this is ultimately a balance that may need tweaking depending on the camera/shot.

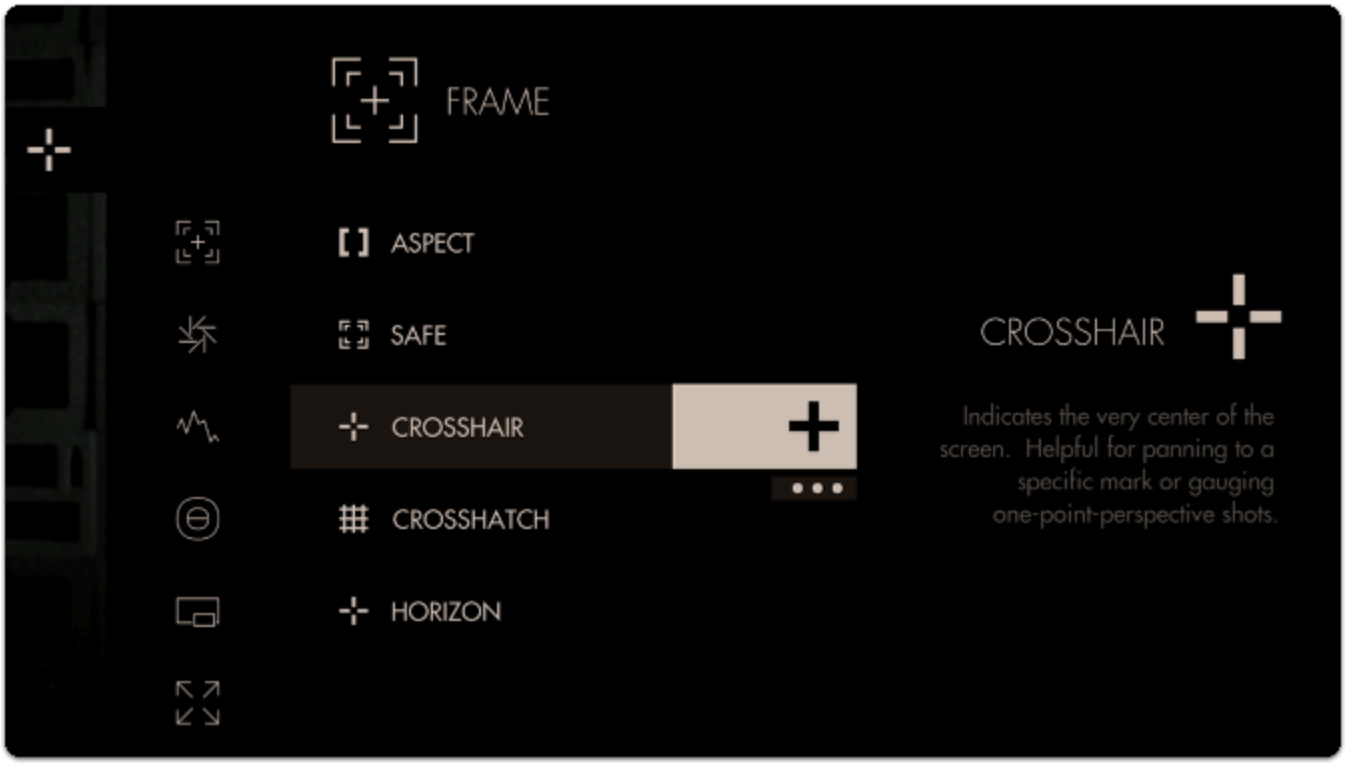


To make the effect more visible we can boost up the **Sensitivity** and **change the Color.**

Click here for an in-depth look at **Focus Assist**



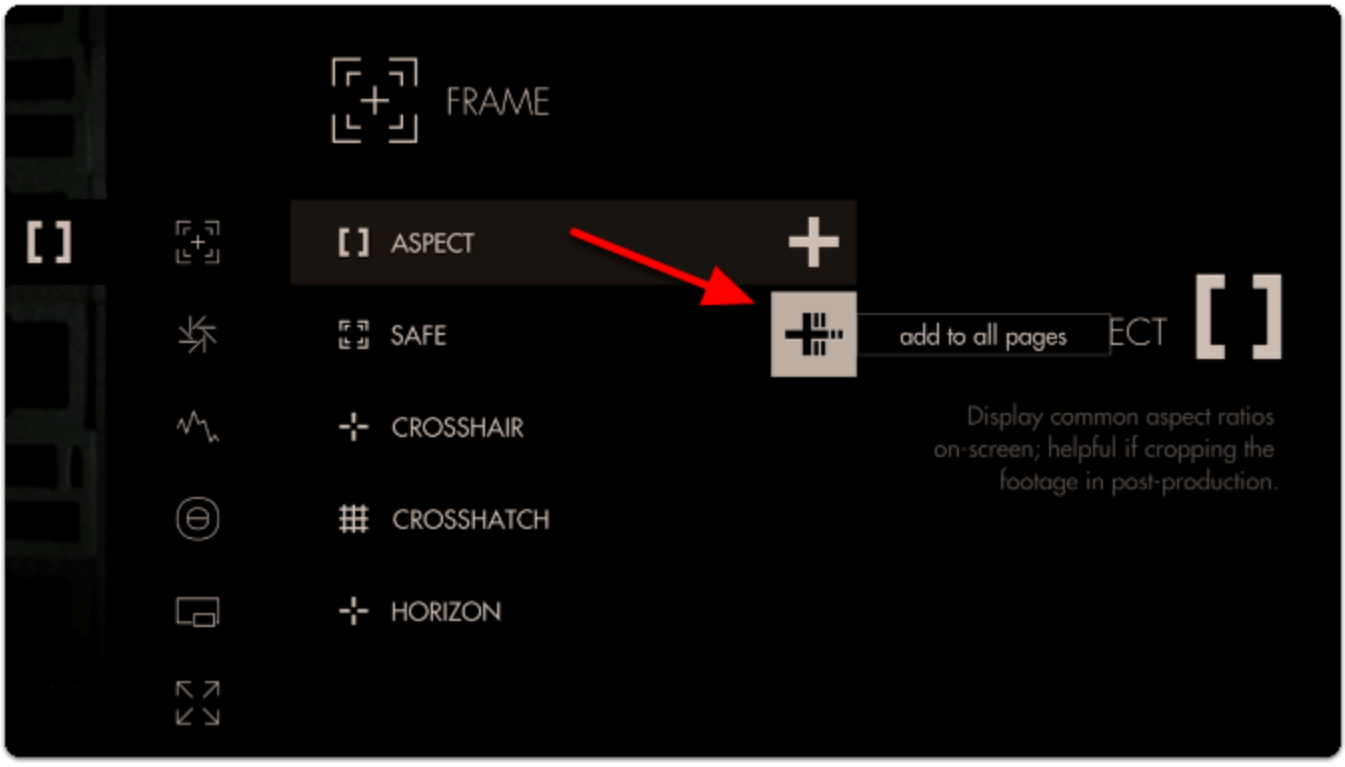
Next **Add a Crosshair** to the page by going through **Add Tool > Frame > Crosshair**



Finally we can add an **Aspect Guide** by going to **Add Tool** > **Frame** > **Aspect**.



This time **when highlighting the '+'**, **press down once** and click to add **Aspect Guides** to **all pages**.

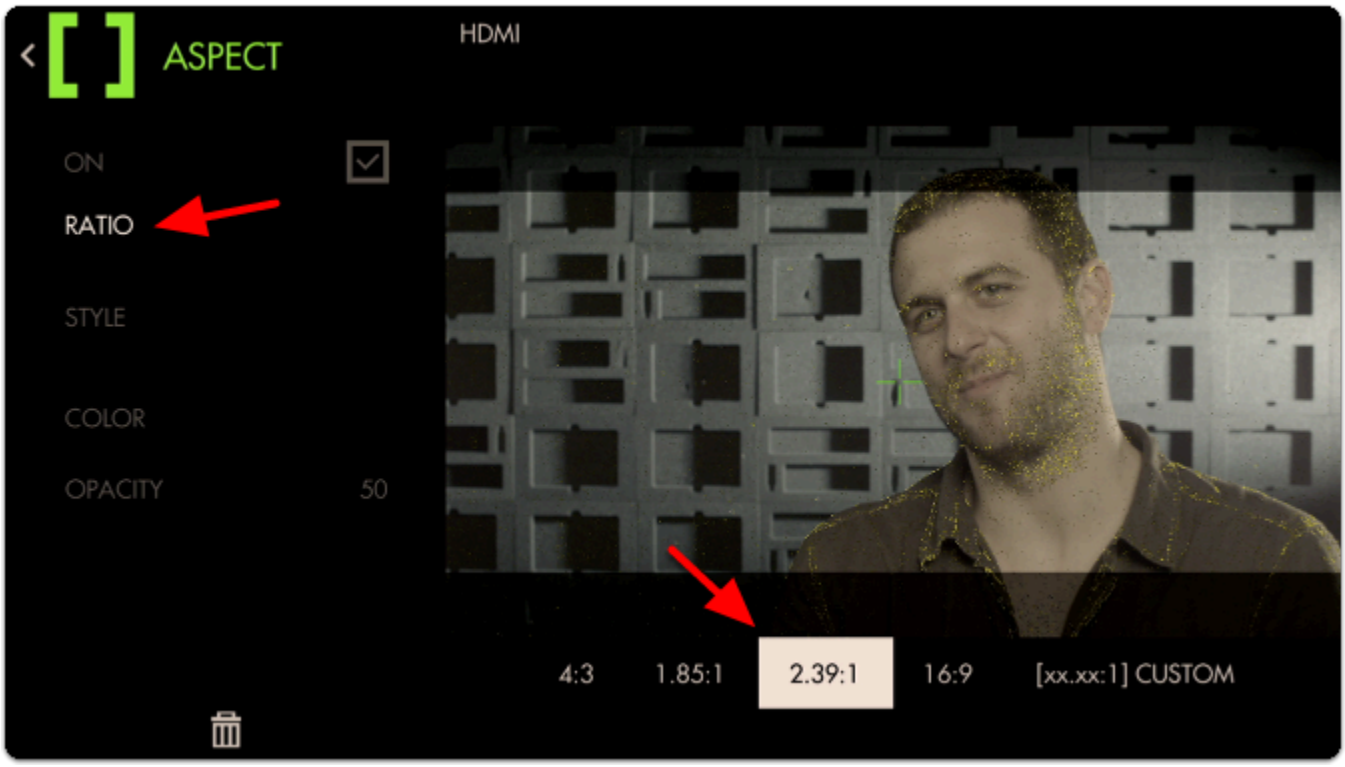


This will ensure you are able to **view this tool** on **every page** of the monitor, and any edits to it are made globally. Any tool can be added to all pages, including scaling adjustments and **Look (3D LUT)** files.



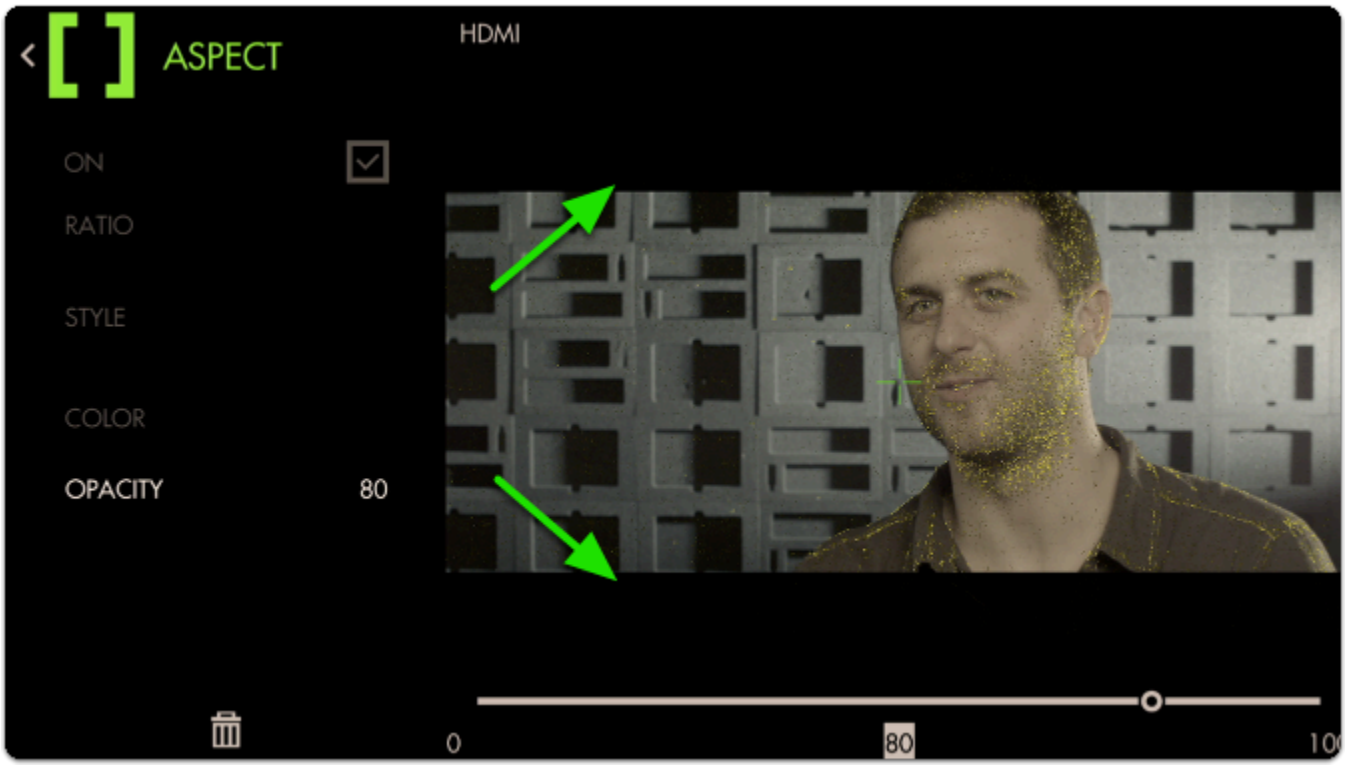
By default the Aspect Guide is set up for a 4x3 aspect ratio for times when you're needing to preview the cutoff area of an old-school monitor.

Press right to edit the **Aspect Guide**.



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.

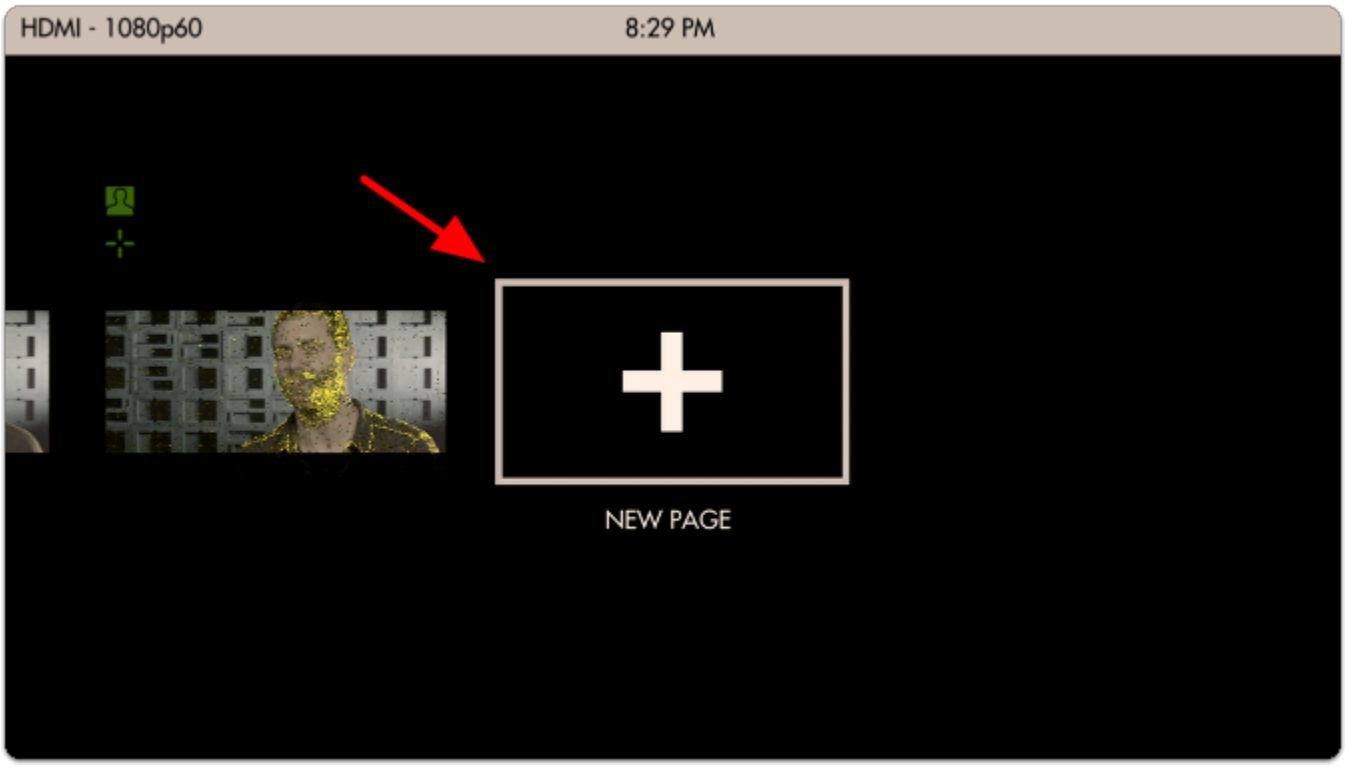


Now we have a page that lets us **focus our shot** and **frame it up** properly for the common **2.39 aspect ratio**.

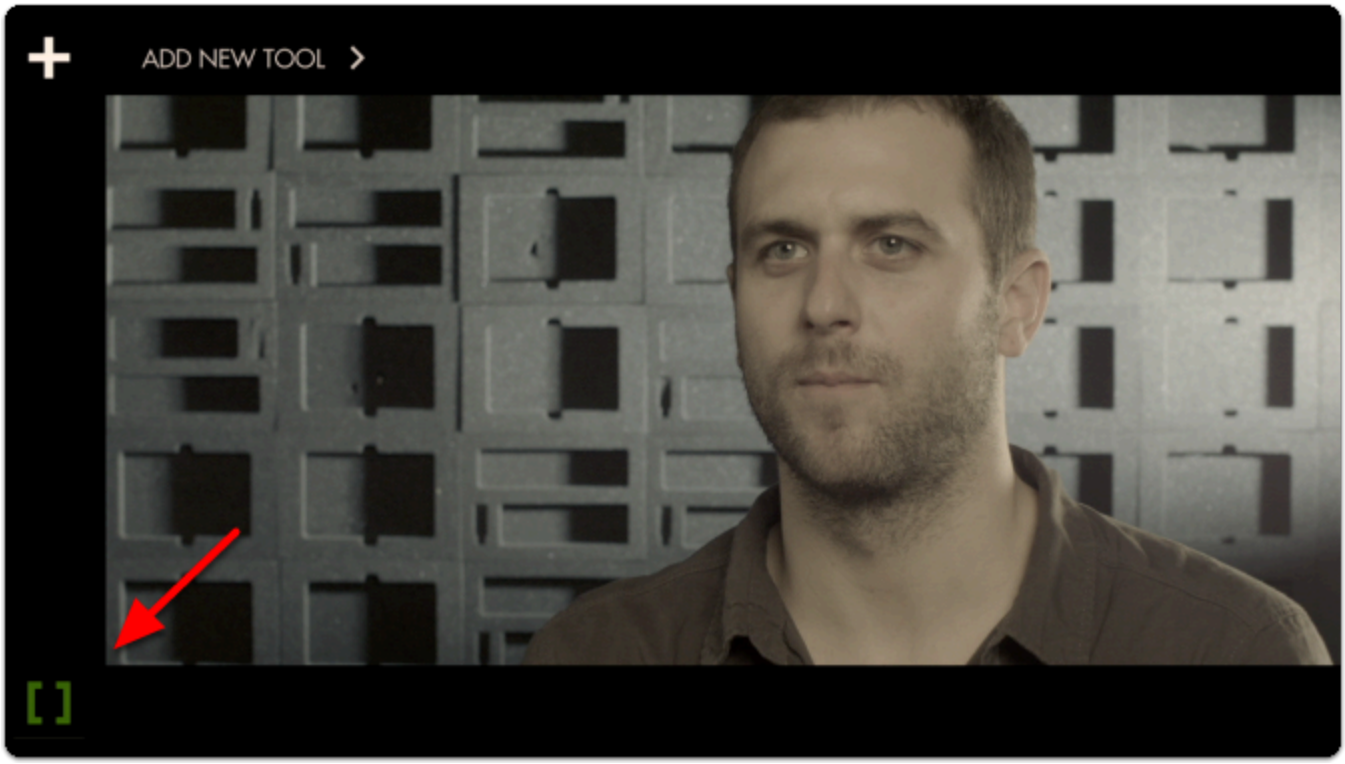
Adding a Look (3D LUT) file to a page

Look 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 navigating back to the zoomed-out view, moving to the far right and selecting **'New Page'** once more.



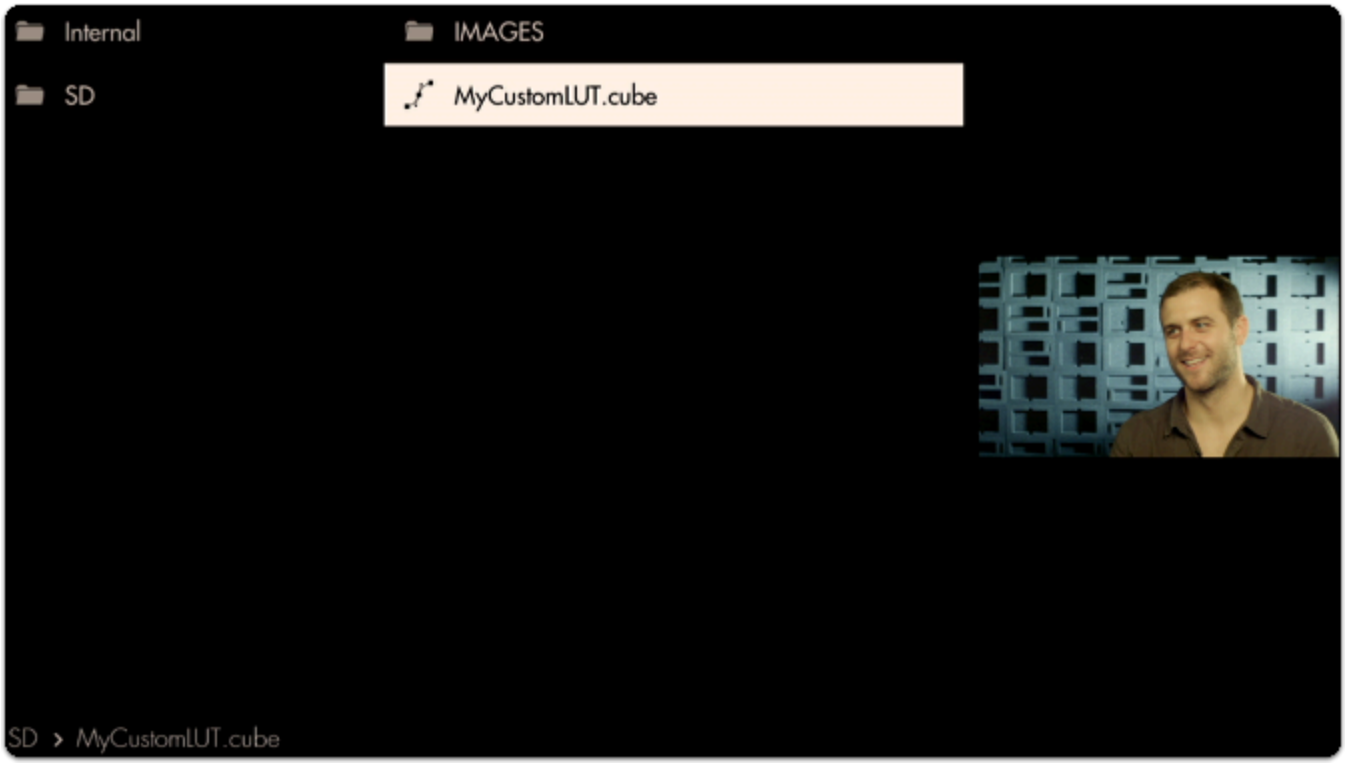
Notice how when you add a new page, the **Aspect Guide** that was set for 'all pages' **shows up automatically**.



Click to add a new tool and this time navigate to **Overlay > Look** and select the '**+**'.



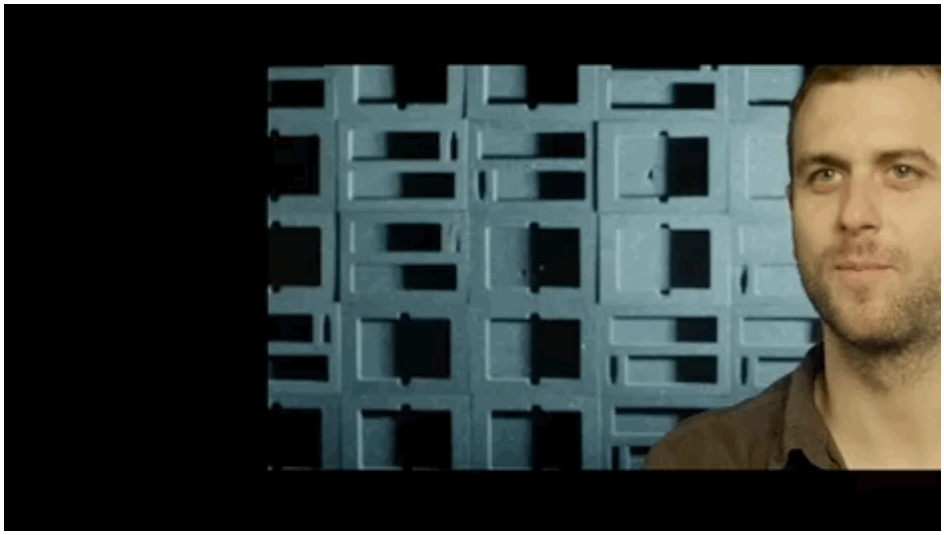
You will immediately be presented with a file browser to **select a 3D LUT file**.



Selecting it will apply 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

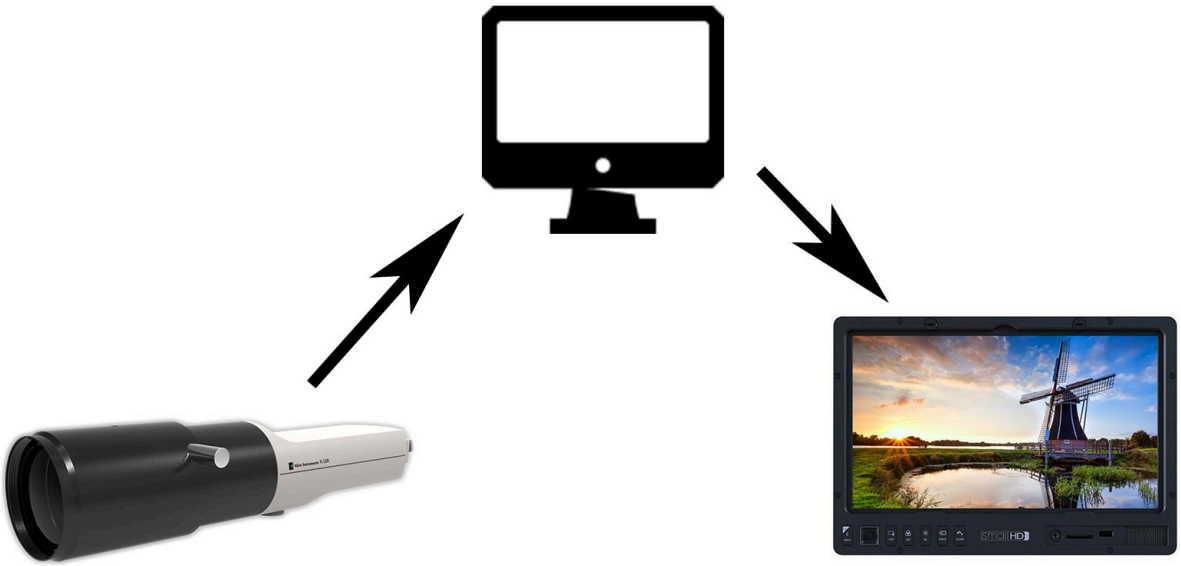
As you can see Pages can take very different roles depending on your needs. Don't be afraid to experiment to find the best setups!

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:

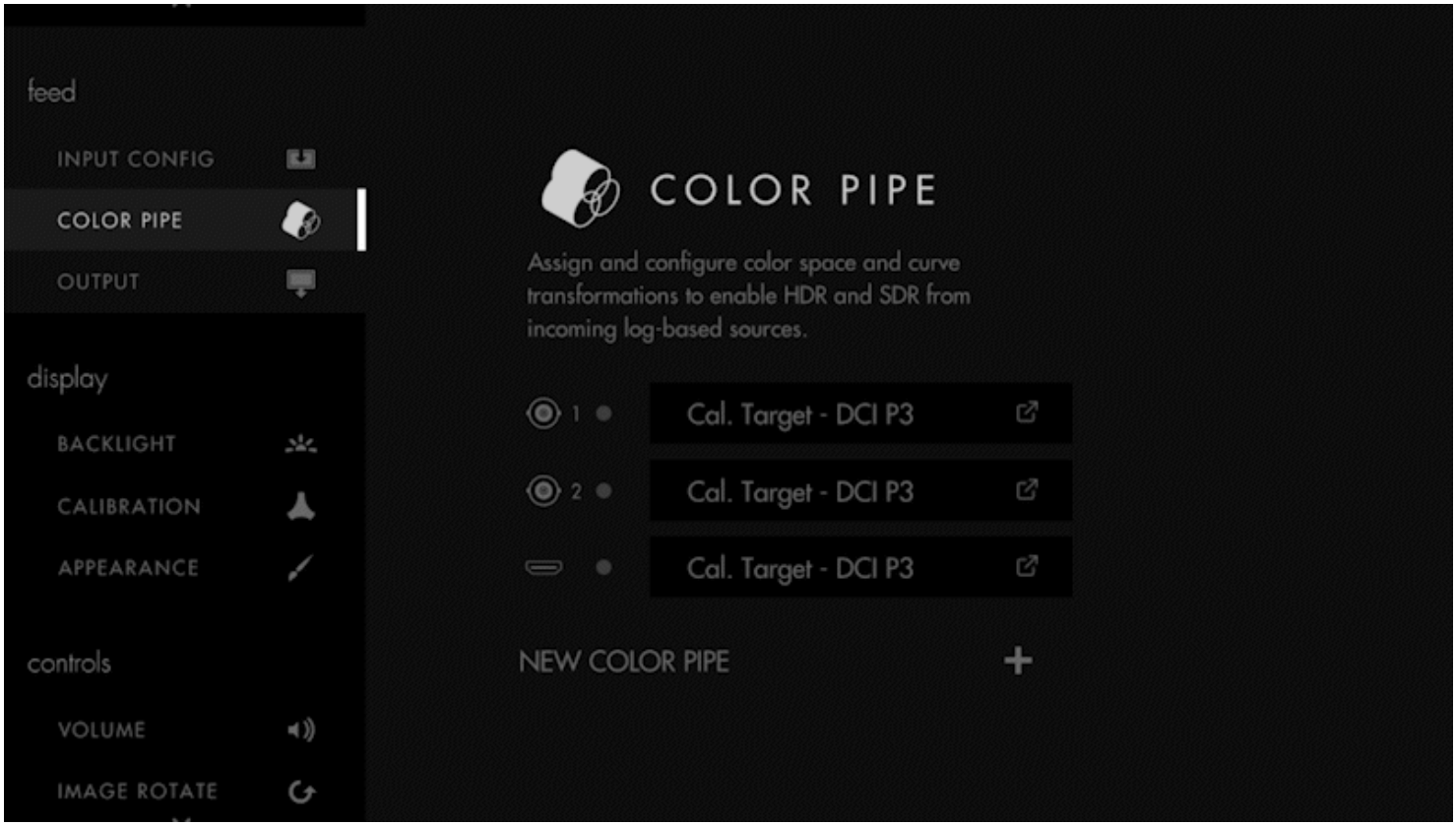
- Monitor
- Computer
- Software
- SmallHD OS4 or later (in this example)
- SD Card 2,4,8,16 GB properly formatted

WORKFLOW:

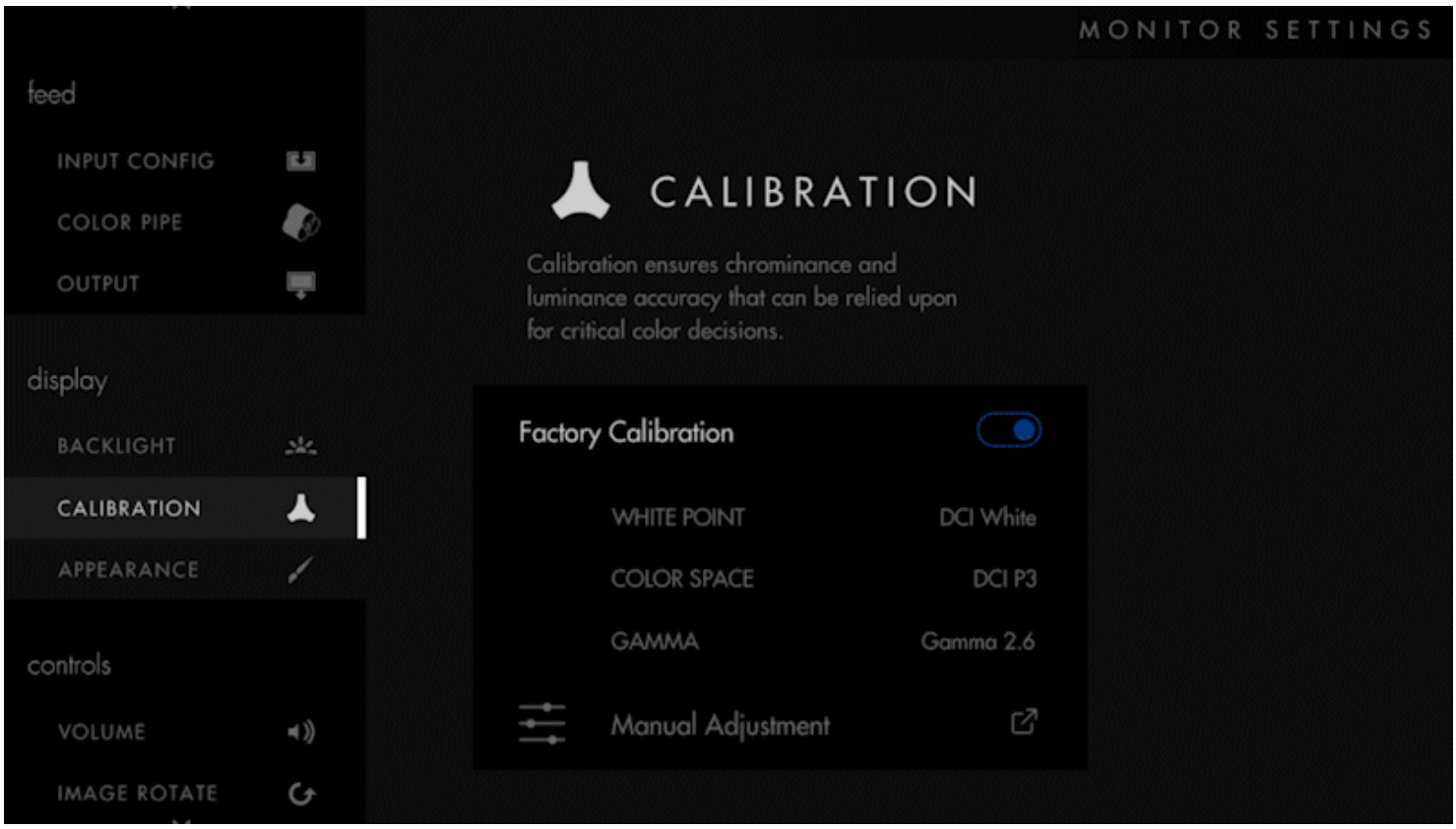
First, power on and connect your SmallHD monitor to your computer via HDMI and make sure it's detected as a display and receiving a signal.

Turn on the monitor allow it to warm up at least 45 minutes. You can run video or a test signal during this time.

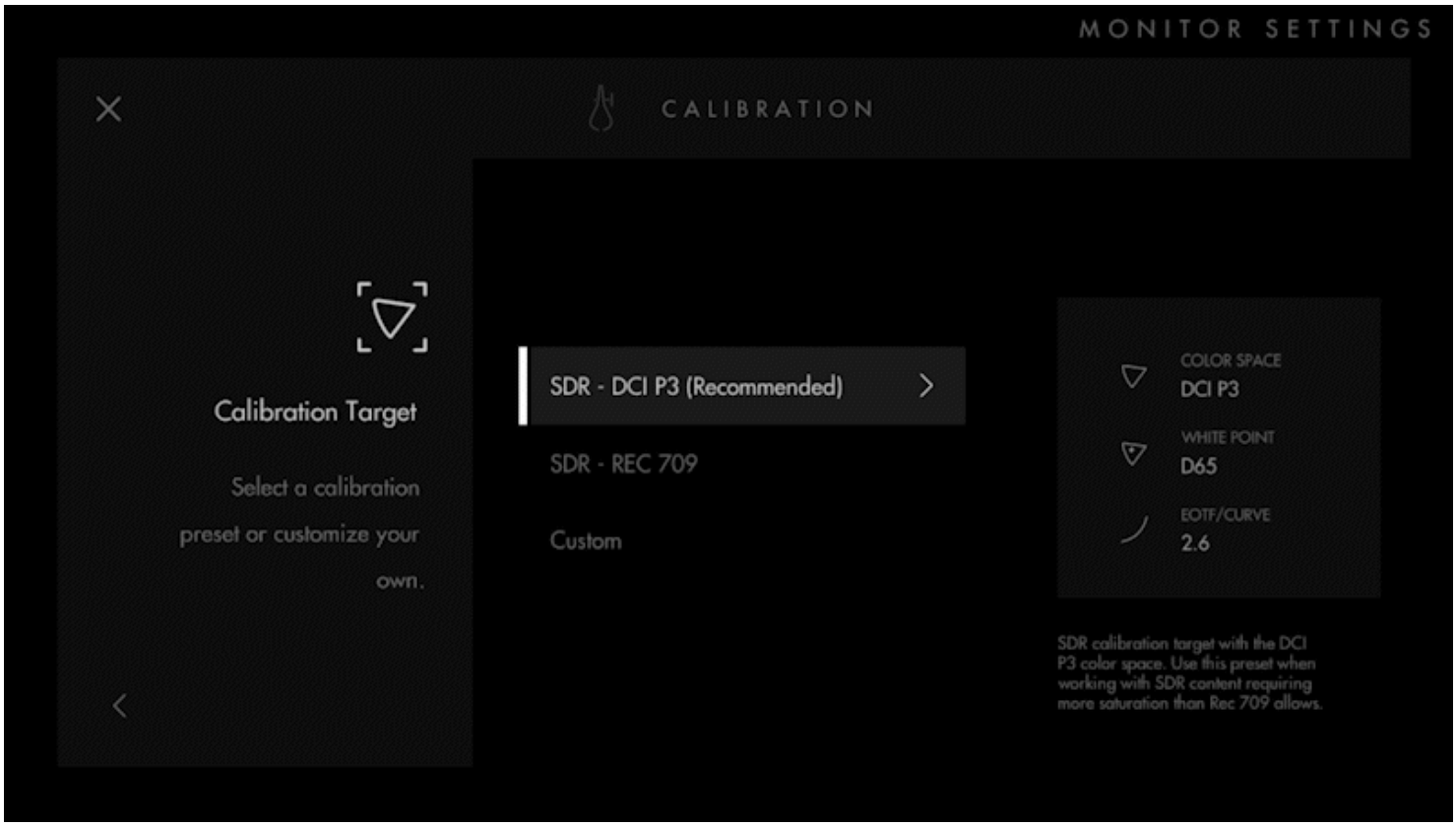
Enter your monitor's settings page and select Calibration.



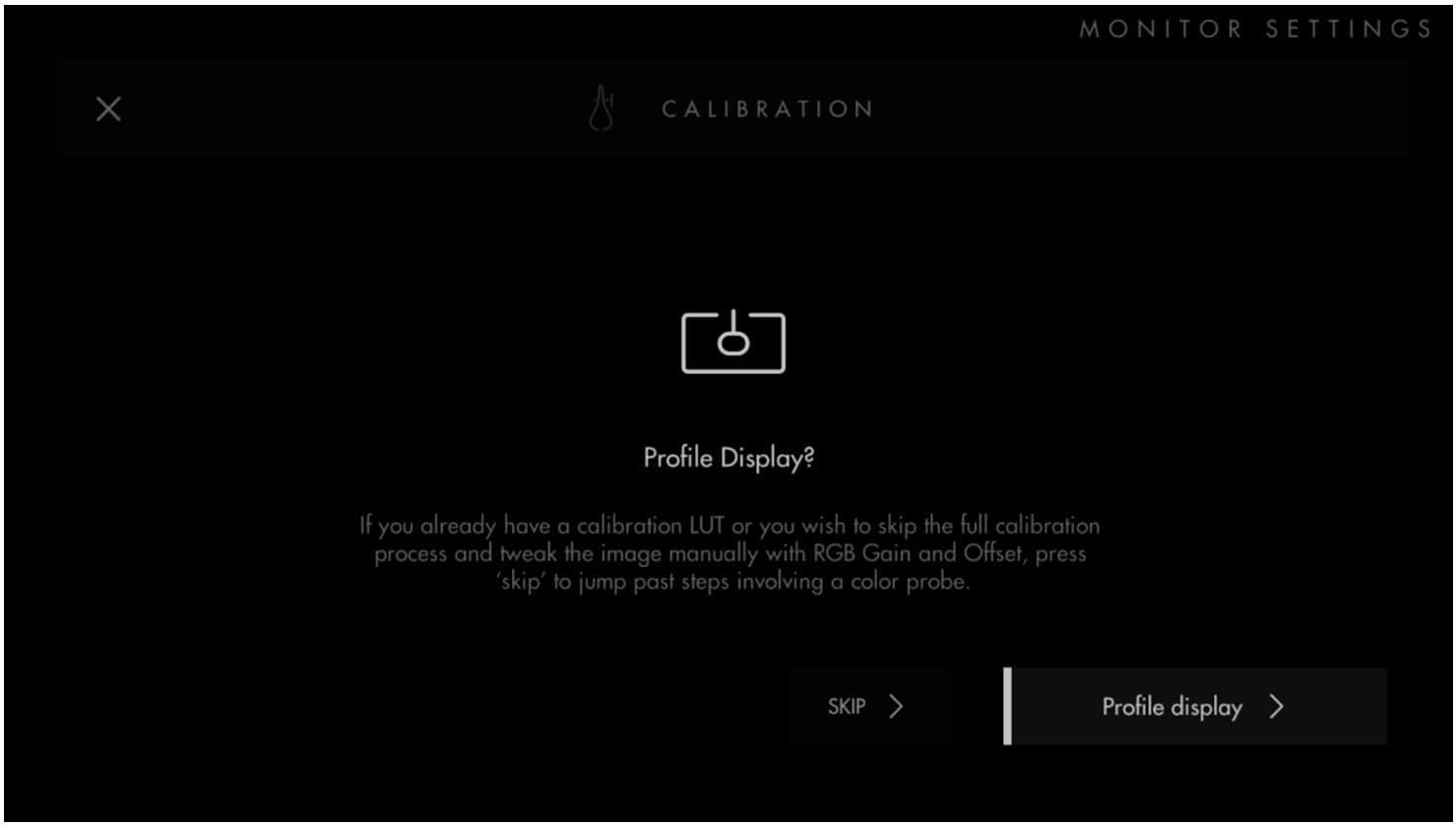
Scroll down to reveal additional options and select Create New Calibration. You will enter a calibration wizard with introductory pages to the calibration process.



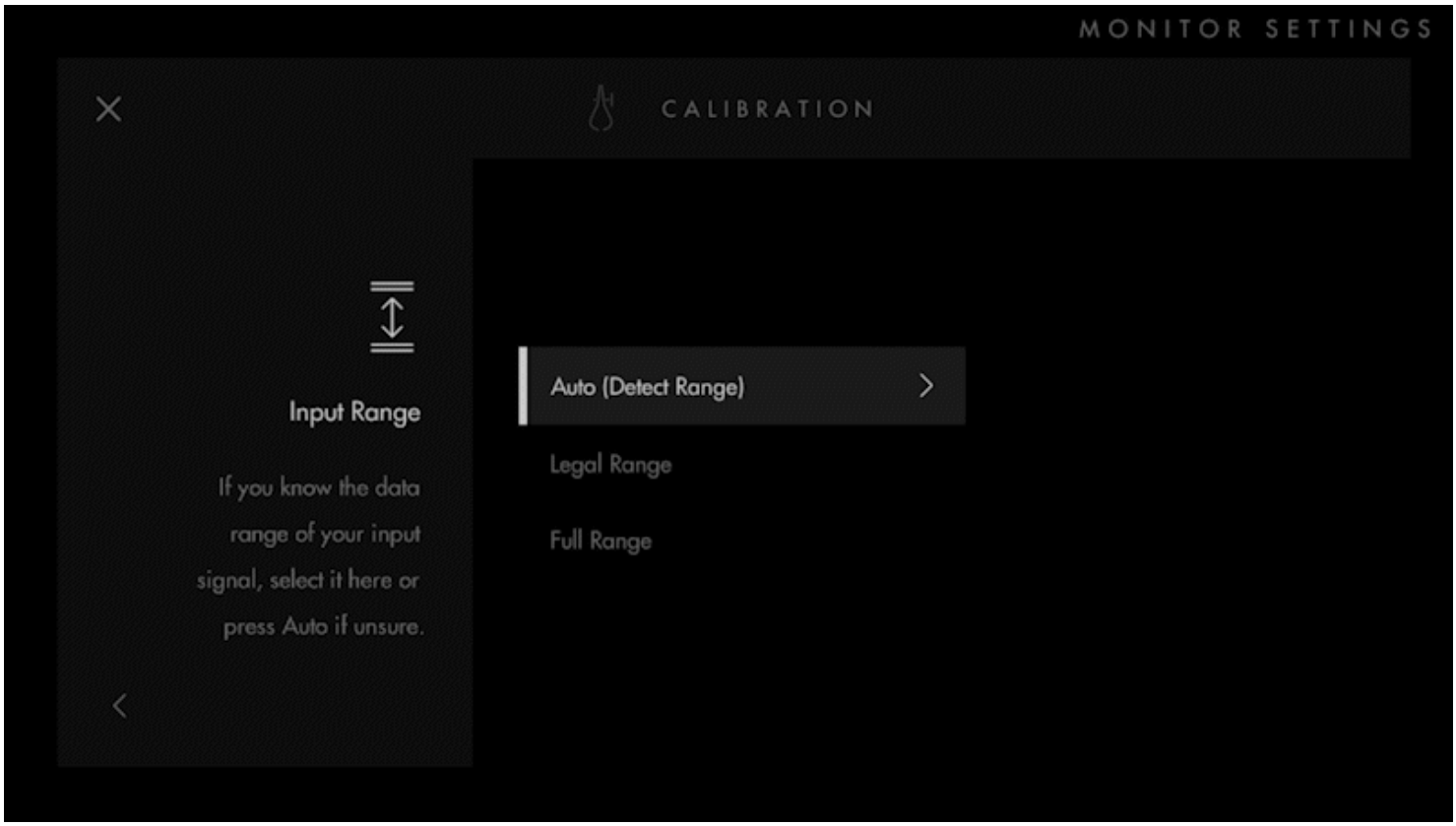
After clicking through the introduction, you will choose your calibration target. For non-HDR monitors, SDR - REC709 will be the recommended calibration. Select your calibration target and in the next screen, select Accept Calibration Target.



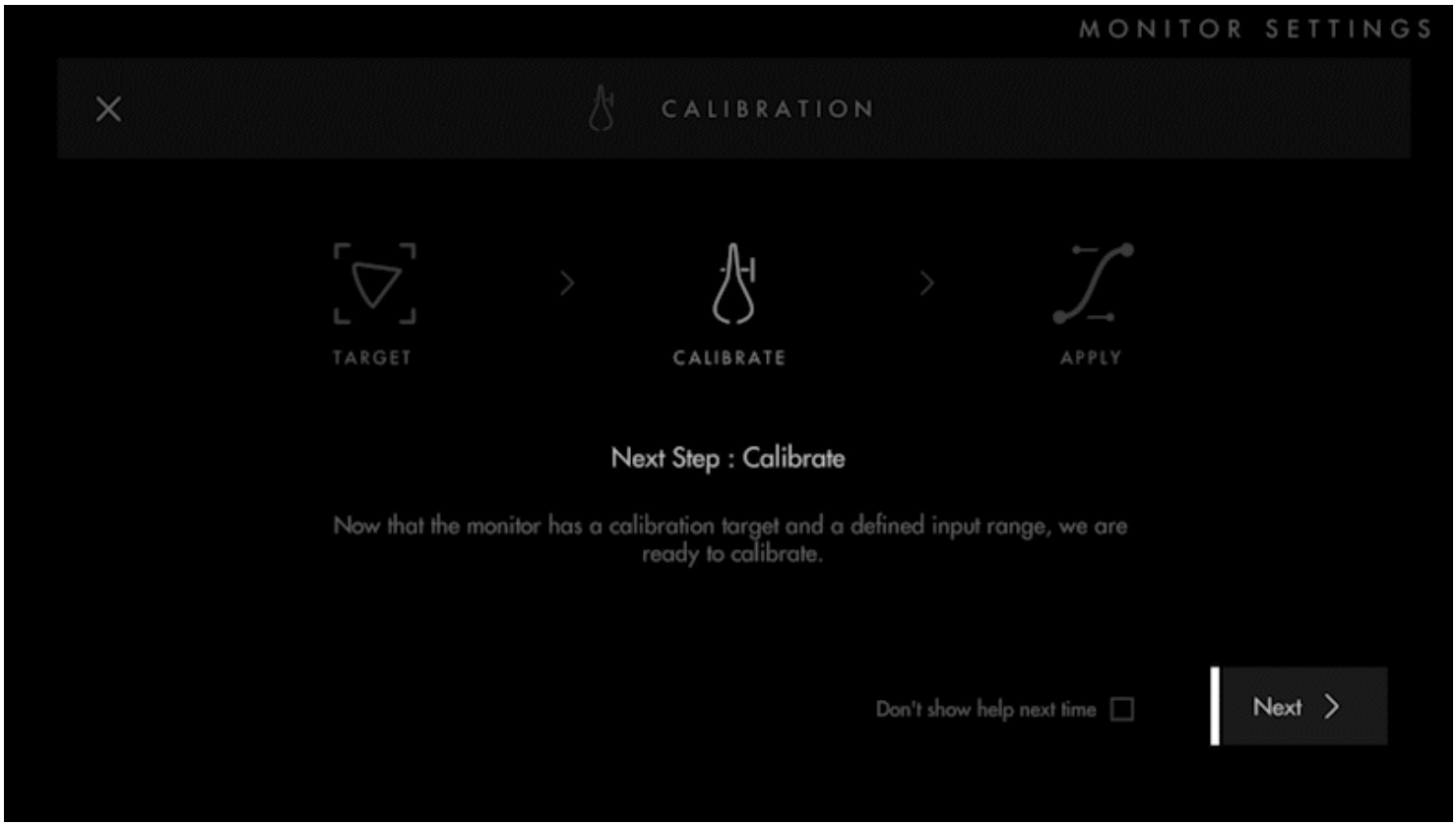
In the Profile Display? Page, select Profile Display if a new calibration LUT hasn't already been created.



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.



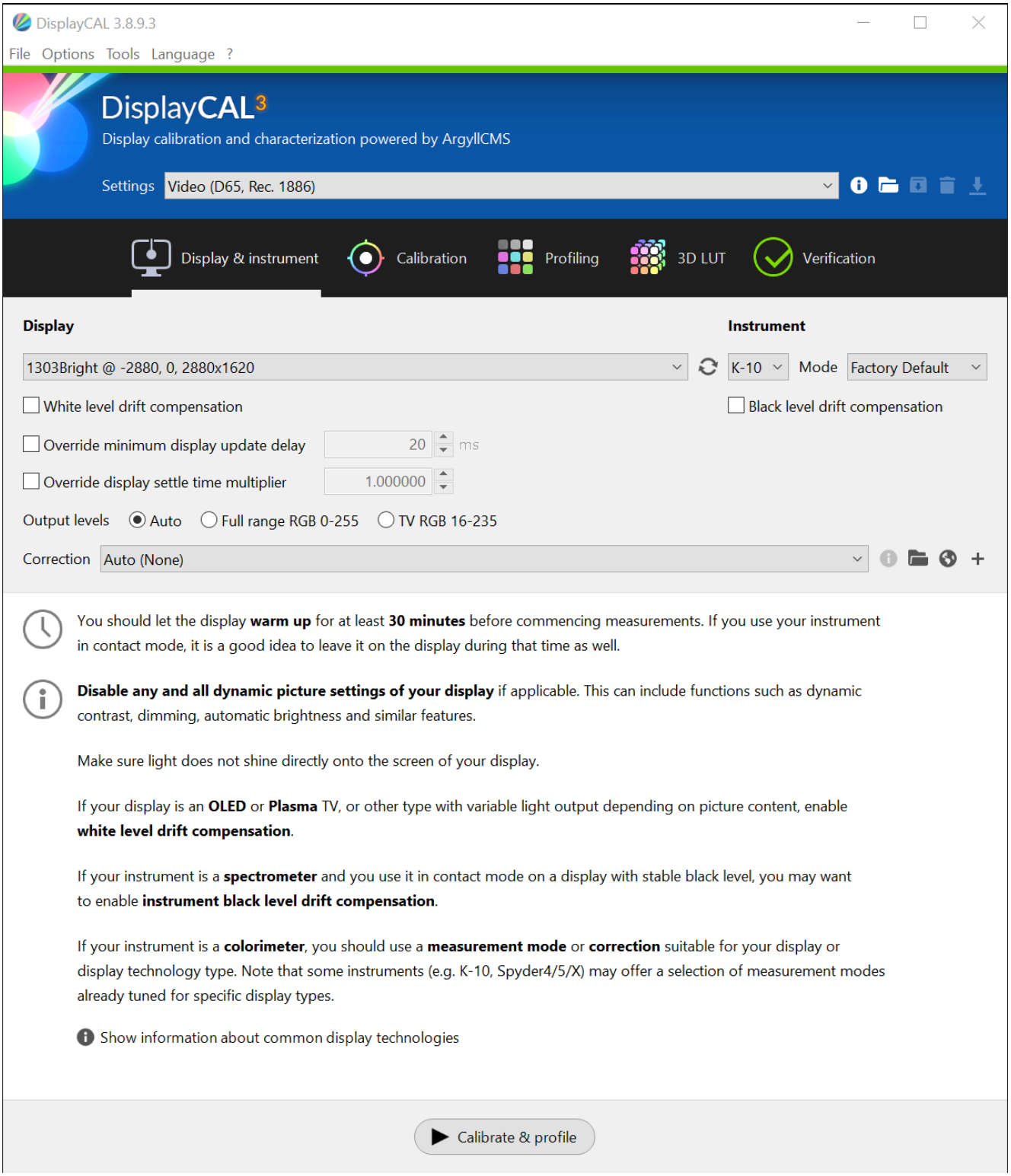
Position your probe according to the manufacturer’s recommendations.



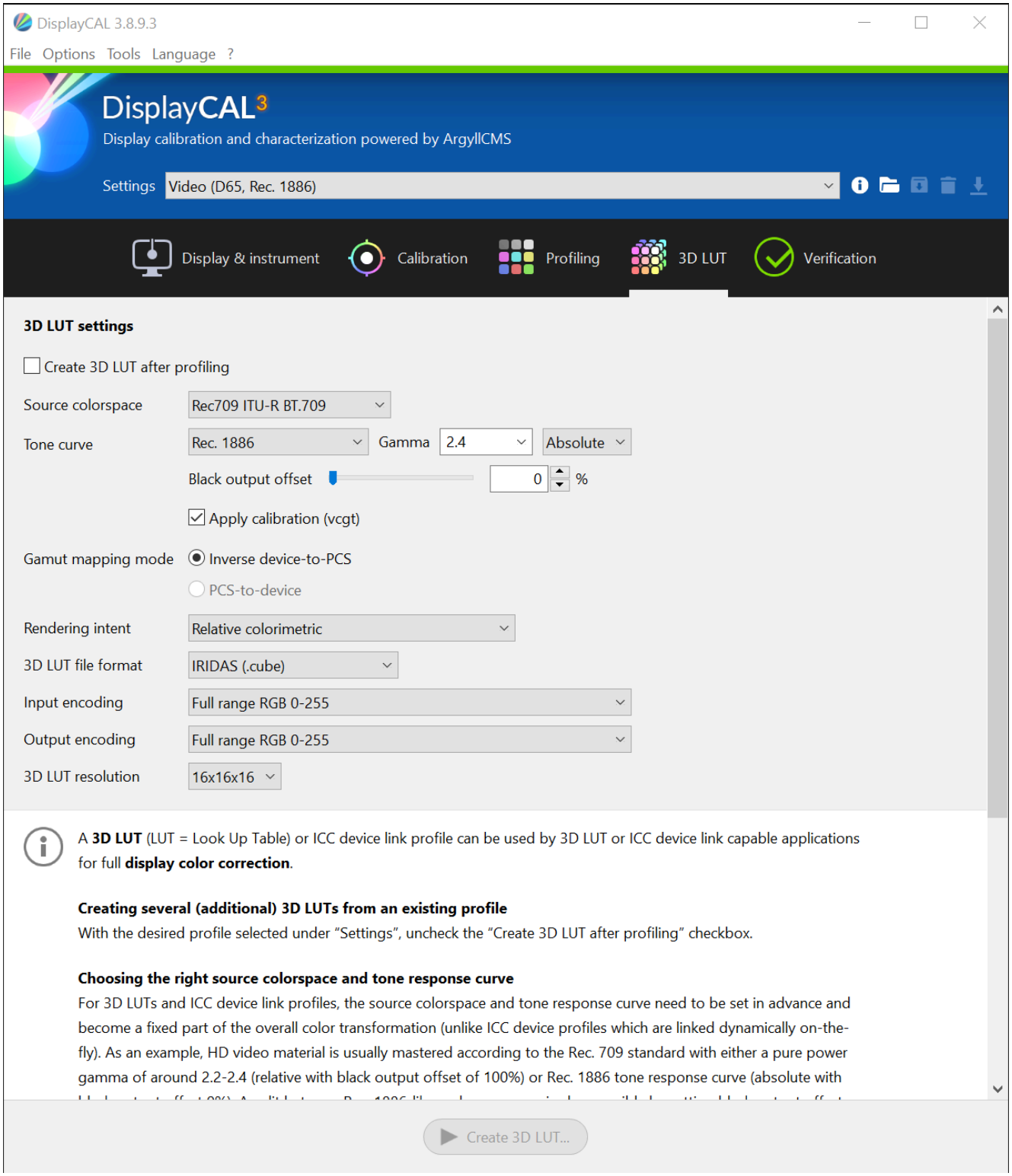
Follow the DisplayCal instructions, making sure that you have the correct monitor and probe selected. Also make sure that your calibration settings match the calibration target. We are not affiliated with DisplayCal so please refer to the documentation and support from DisplayCal for operating the software.

Be sure to select the correct color space (rec.709 etc) and white point to match what you chose in the menus.

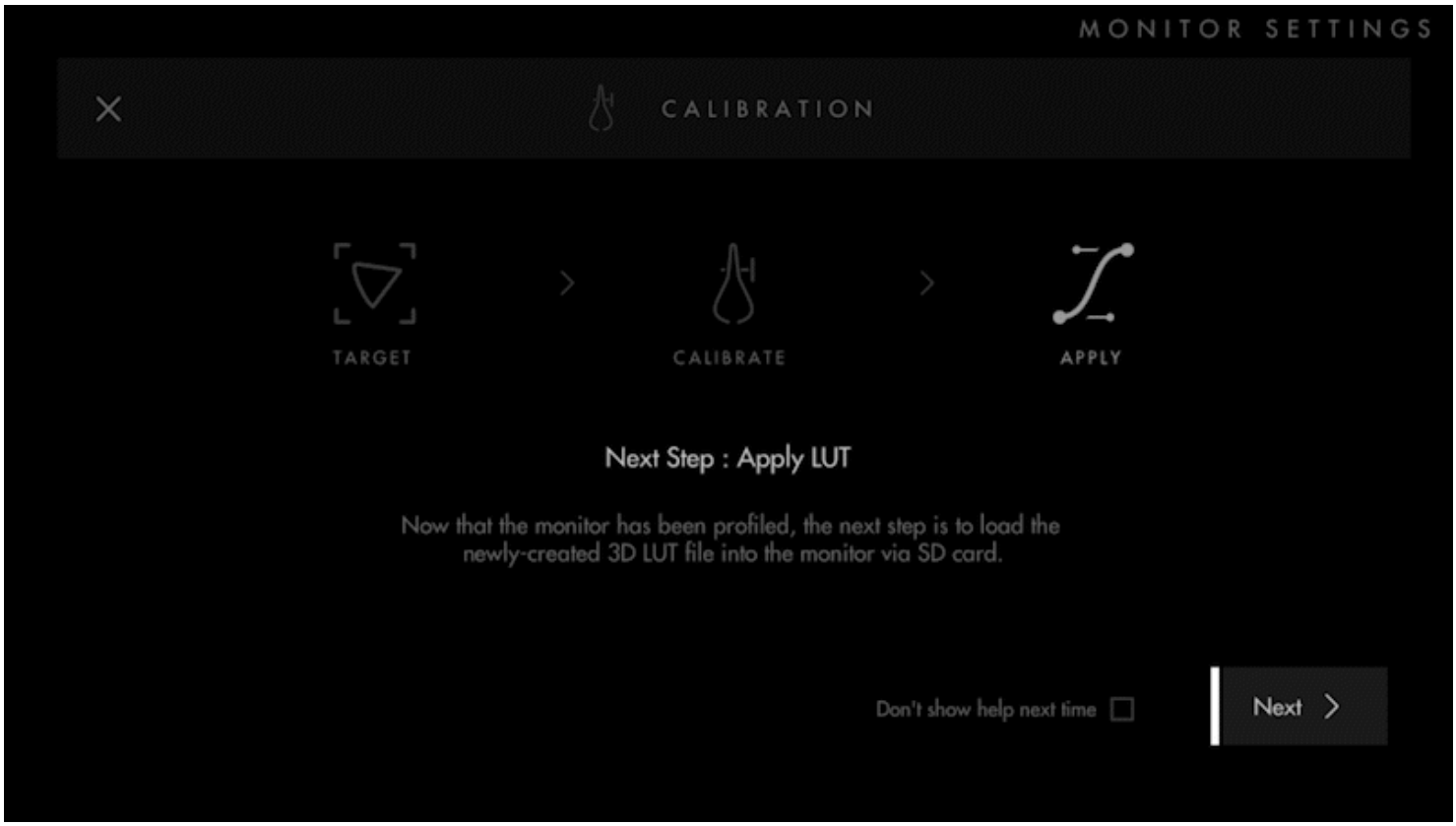
You will have an option to test this calibration to be sure its correct. Cheaper probes will possibly not be accurate so they should be checked, it may take a second or third run to get the unit the way you want it to be. Showing true white.



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

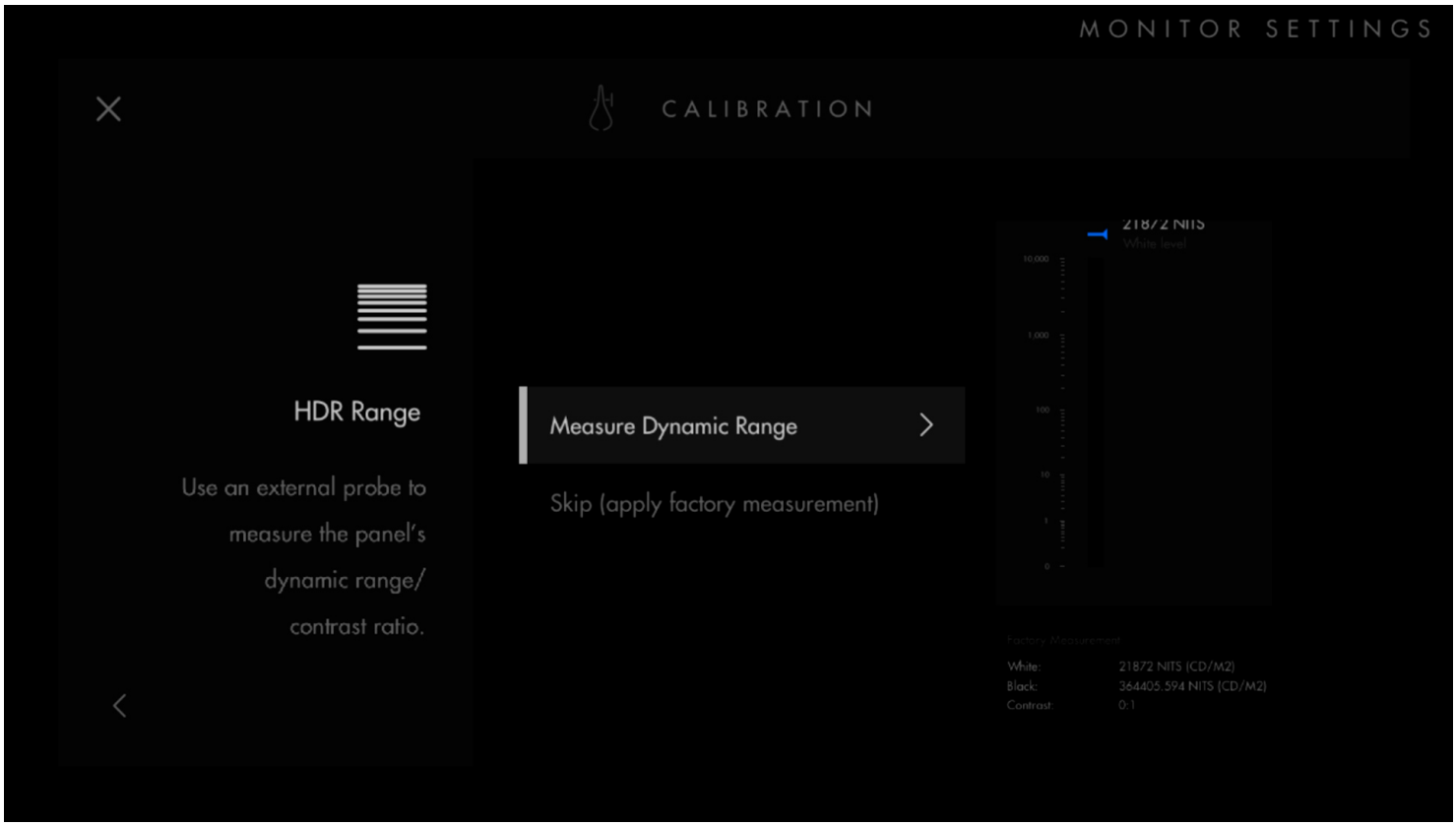


Select the LUT file you created and select Select. In the confirmation window, you can see your applied LUT affecting the screen. Our new calibration is more natural compared to the blue shifted old calibration. Select Keep to continue.

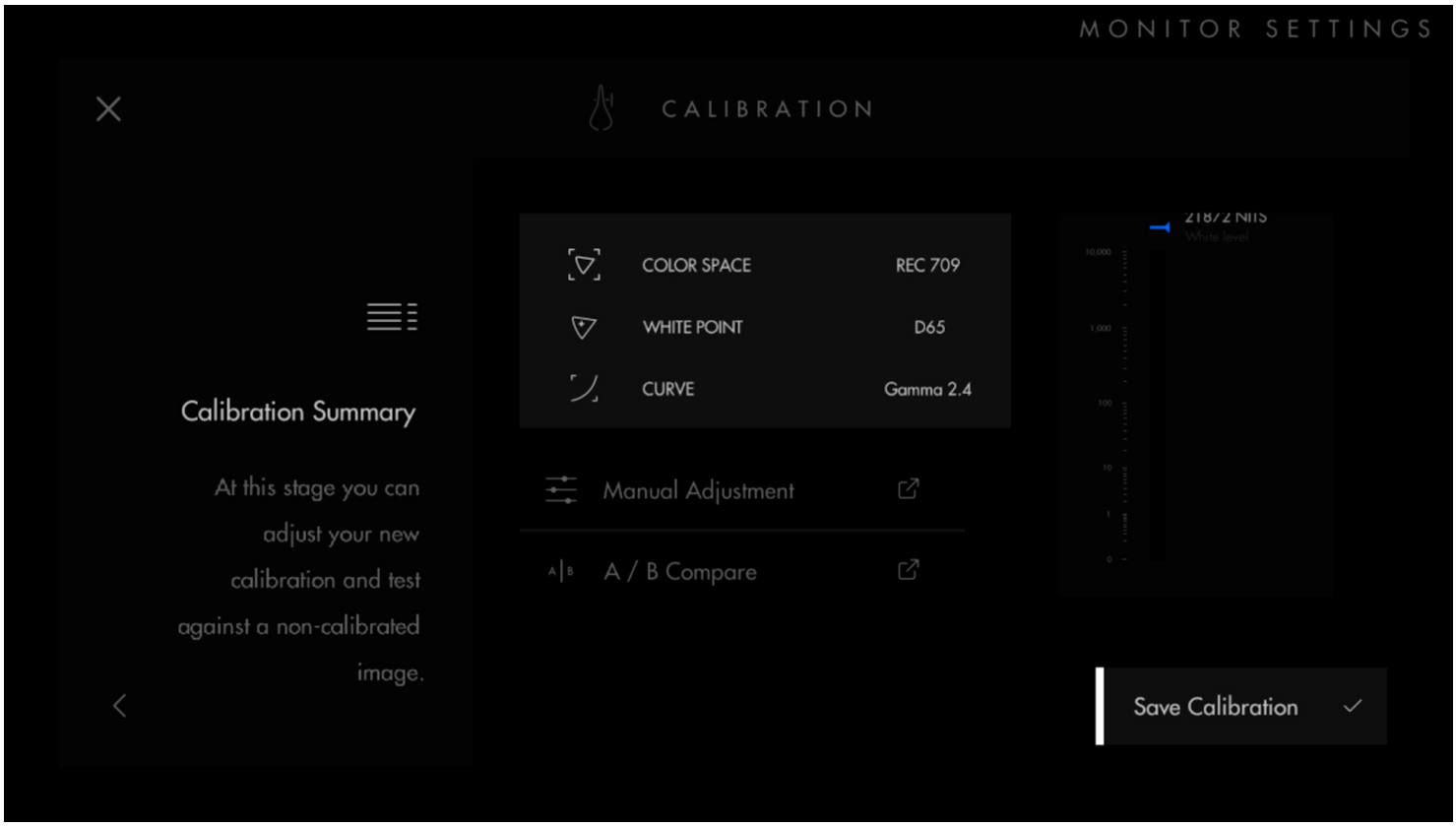

Read-only Storage
SD Card
AVF_INFO
System Volume Information
1301 1.cube
1303 2.cube
SHD K10-A 2.cube
SHD K10a 1.cube
SHD LUT 1-2.cube
SHD LUT 1.cube
SD Card › 1303 2.cube
BACK
CAP
LUT
BL
INPUT
SCOPE
smallHD



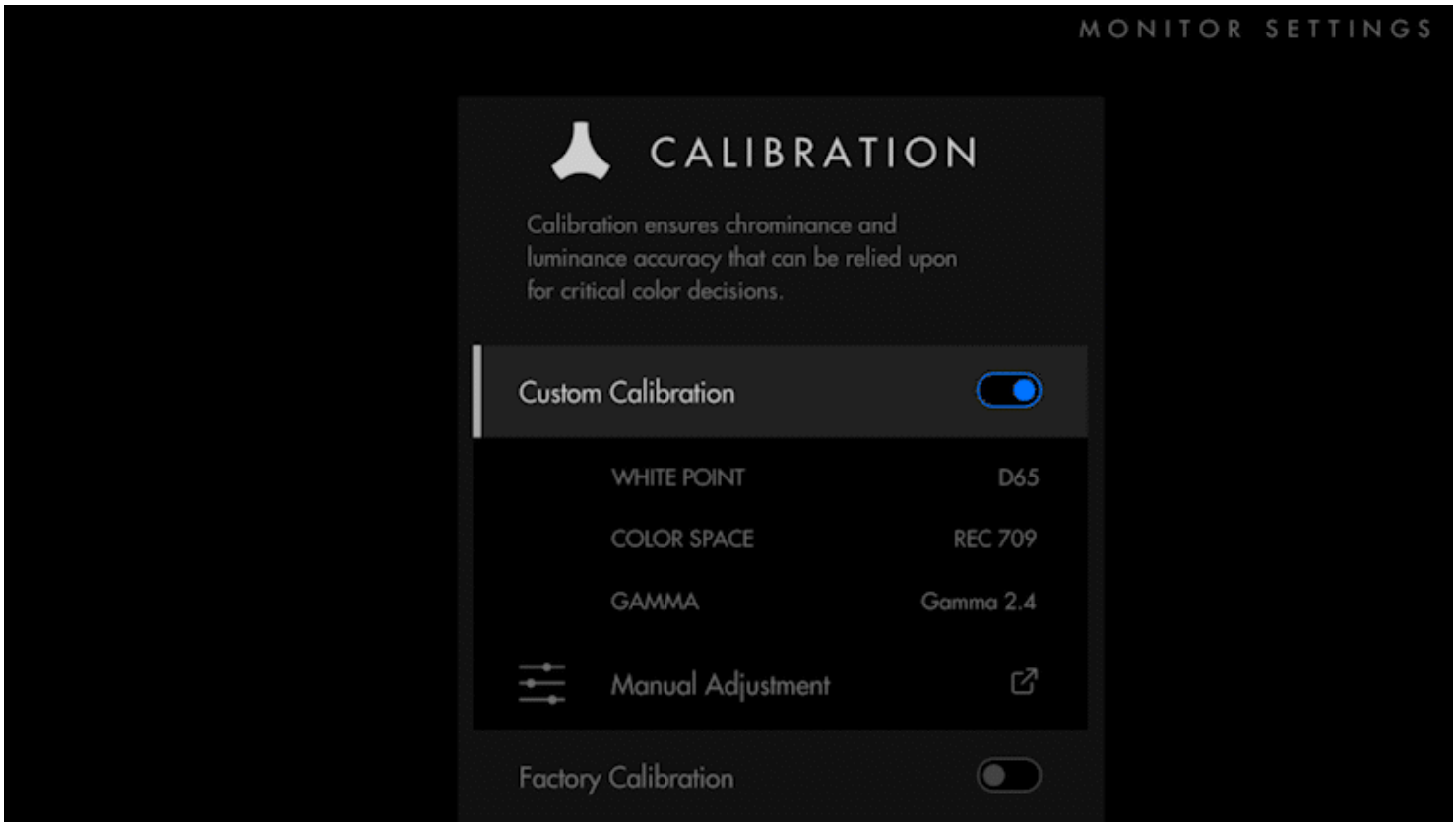
Next you will be prompted to select your HDR Range option. You can use your probe to measure the monitor's dynamic range and enter the values, or select Skip to apply factory measurements. We will skip in this example.



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.


MONITOR SETTINGS
CALIBRATION
Calibration ensures chrominance and luminance accuracy that can be relied upon for critical color decisions.
Custom Calibration
WHITE POINT
D65
COLOR SPACE
REC 709
GAMMA
Gamma 2.4
Manual Adjustment
Factory Calibration