# GH6 ALEX

EMOTIVE COLOR

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# Introduction

This guide is a simple walk-through that will allow you to realize the full potential of Emotive Color for your camera. Two display-ready variations of the color conversion (Theatrical and Full Scale) and one data format variation (LogC) are included. **Only one** of these three variations should be used per clip. The LogC variation must be followed by a LogC-intended display look-up table (i.e. those issued by Arri, or a LogC film conversion).

## Three Variations

### Full Scale

The default variation of Emotive Color, interchangeable with LogC+Rec.709. Scaled for bright contexts (white internet pages) and commercial content. The LogC conversion is at its core. It integrates an interpolated reconstruction of Arri Rec.709 (2018 Revised) which preserves far gamut (unlike Arri Rec.709), and introduces a subtle film-derived saturation envelope. **The direct, improved alternative to LogC+Rec.709.**

### Theatrical Scale

The theatrical variation of Emotive Color. **Scaled for theatrical context (darkened cinemas) and narrative content.** The LogC conversion is at its core. It integrates an interpolated reconstruction of Arri Rec.709 (2018 Revised) which preserves far gamut (unlike Arri Rec.709), and introduces a subtle film-derived saturation envelope. 100 IRE (maximum brightness) is scaled to 90 IRE, relative to Full Scale.

### LogC

The data format native to the Alexa; it is a standardized format created to efficiently store the full dynamic range and gamut of the sensor. Has a minimum IRE (black level) of 8 on the luma waveform. **It must be followed by a LogC-intended display look-up table** (such as those issued by Arri, or a film conversion meant for LogC). Acquire the current display look-up-tables directly from Arri, rather than using those built into NLEs.

# Supporting Files

In addition to the primary conversion files, supporting files are included which allow preparation of the camera profile, precise adjustment of exposure in post before the conversion is applied, highlight compression, and placement of black level following the conversion to conform black level to cinema luminance.

These are labeled according to their order of operations - whether they go **before** the conversion - **[PRE]** - or **after** it - **[POST]:**

| [PRE] | ➡ | Color **Conversion** | ➡ | [POST] |

The Exposure Conversion [PRE] **should be the final [PRE]** loaded in sequence before the color conversion (Theatrical/Full Scale or LogC). Any white balance corrective should precede the color conversion, and color grading should be at the end, following [POST].

## 65x / 33x

The conversions use two different resolution formats: 65x65x65 and 33x33x33. These resolutions affect the density of color gradient information stored in the conversion. 33x has a much smaller file size, and **is widely compatible.** It offers optimal stability in Premiere, which is prone to crashing with larger look-up files.

65x has the advantage of preventing poor gradient handling (banding) when the software has weaker interpolation of lookup tables (Trilinear rather than Tetrahedral), especially when converting from a log format to an intricate target format. 65x has eight times the density, or resolution, of 33x. These are for use **in post**. 65x is less stable in Premiere; frequent saving is recommended when loading into Lumetri.

FCPX features Tetrahedral interpolation by default, and 33x may be used without reservation (smooth gradients). Premiere Pro is now Tetrahedral (as of the July 2021 update). **DaVinci Resolve is set to Trilinear by default, but may be switched to Tetrahedral** in Project Settings > Color Management > Lookup Tables (recommended).

GH6 ALEX
E M O T I V E  C O L O R

Intro
# Camera Settings

These settings are recommended for reference performance - the original source conditions for the conversion input. Optics, Shutter, and Sharpness will not affect color accuracy; they are non-color settings which constitute a common Arri aesthetic.

**LIGHTING** — Natural sunlight and halogen are recommended for best color with their respective WB conversions. Use of a **softbox** to light talent is highly recommended.

**PROFILE**
(Photo Style) — V-Log — The conversion was made directly for V-Log. Natural is also supported with a [PRE] conversion to V-Log, however V-Log is highly recommended for best dynamic range.

**CODEC**
(Rec. File Format) — ProRes — The most robust codec, offering fluid editing and playback (the Alexa codec). Otherwise, **10 bit** is optimal. ProRes V-Log footage **must be prepared** with the included ProRes [PRE].

**D.R. BOOST** — Enabled — Offers significantly more dynamic range in V-Log highlights. Alexa's sensor also uses a dual gain composite architecture.

**ISO** — 2000
DR Boost Off: 250 — Best noise floor and DR. The core LogC conversion for VLog was measured at 2000 ISO, with DR Boost enabled (ideal for reference accuracy).

**WB** — Neutral — Accurate & neutral. WB from white card recommended when changing light/lens/ND (shade is cooler than direct sun, NDs require tint compensation). Store presets for known combos.

**ND** — Solid
Full-Spectrum — The filter type used for the Daylight conversion.
(Full-spectrum filters align UV & IR cutoffs between sensors).

**OPTICS** — Diffusion
Filters — Recommended stack: Lens > ND > Diffusion* > IR/UV Filter. Avoid shooting with the lens fully open, which often limits optical performance.

**SHUTTER** — 180
Degree — Framerate-aware shutter angle setting will match standard cinema motion blur and cadence.

**SHARPNESS** — 0 (-5 for Nat.) — Disabled in-camera sharpening. This is equivalent to the Alexa, which has no in-camera sharpening.

## SPECIAL NOTES

- **V-Log View Assist:** To monitor in camera, use the monitoring variations in the 'Supporting Files' folder.
  (No values exceeding 0-1, which cause View Assist artifacts in camera)
- **Natural Required Settings:** Contrast **-5**; Saturation **-5**;
  Keep at **Default**: Hue 0; Highlights/Shadows 0; Luminance Levels 64-1023 (16-255 for 8-bit)
- **Noise Reduction:** The Alexa has no noise reduction. Keep at 0 (or -5 for Natural equivalent).
- **\*Tiffen Digital Diffusion FX 1:** May be used for a smoother local texture. **Tiffen 1/8 or 1/4 Low Contrast:** May be used for a smoother light falloff, but a more distinct diffusion than the Alexa Olpf. Using at least a 2 stop ND closest to the lens cancels inverse reflections between clear filters and the lens/sensor.

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# Emotive Color

Emotive Color (integrated in Theatrical and Full Scale) features a computed recreation of Arri Rec.709 that projects edge gamut behavior to encompass the entirety of LogC gamut, while preserving this extreme gamut within the limits of Rec.709. **This allows a smooth film-like response to color leds** (unlike Arri's display tables, which clip far gamut at 0.0 - 1.0). Theatrical and Full Scale are recommended over LogC+Rec.709.



Arri Rec.709

Emotive Color

## Gradient Test

The included Gradient Test **allows testing for problems in a color workflow**. The chart simulates the entirety of recordable gamut and gamma, and gradient transitions therein. The center circles correspond to log profile gamut, and the outer (left and right) to display profile gamut. **Destructive workflows will reveal harsh edges in gradients** (which indicate clipped gamut and latent artifacts).

The chart below demonstrates **Emotive Color (Theatrical)**. Though its source format is LogC (center circles), EC is infinitely projected into theoretical gamut (left and right).



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# Essentials

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# White Balance

A **neutral** white balance is important for the accuracy of the conversion - the 'key' which aligns the color space 'lock'. It is best to white balance from a white card reflecting the key light in the scene, and record the white card reference. With a recorded neutral white or gray reference, one can easily ensure accurate white balance in post by adjusting WB temperature and tint controls until the white reference sits at the center of the Vectorscope. If no reference is recorded, neutral white/gray objects in the captured image can suffice as a white reference.

With no neutral reference under reference lighting, skin tone is often a strong indicator of the neutrality of the **tint** axis (green/magenta). Skin tone should fall on the skin tone line of the Vectorscope (not distinctly above or below it) when white balance is neutral. To isolate the skin tone or white card cloud on the Vectorscope, simply temporarily crop that area of the image with a crop tool in your post software.

Shaded daylight will have a distinctly cooler (and more magenta) balance than direct sunlight. NDs often introduce a distinct green tint for each filter strength. Lenses can introduce a shift along either axis.
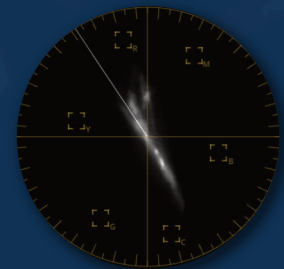
## Light Sources

The reference light sources are sun light for the Daylight conversion, halogen for the Tungsten conversion, and an average of the two responses for Averaged 4200K. These are the light sources that each conversion was measured under, and will allow complete accuracy when white balance is neutral.

When the light source deviates from reference (for example, leds and fluorescents), the accuracy of the conversion will be limited by the extent of the deviation. This is due to the unique 'spikes' in the color spectrum of each light, which will register on each sensor in a slightly different way. The color space will adhere to LogC, but won't be an exactly match to sensor results.

Light sources with poor color spectrums will result in sub par color - even on the Alexa. For example, skin tone may register toward green or magenta, even though white balance is neutral, or certain colors may appear under-saturated. This is an area for further exploration, to improve rendition of highly variable efficient lighting on all cameras.

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# Exposure

In combination with neutral white balance, **moderate** exposure will ensure quality imaging with both camera and color conversions. Unlike white balance, exposure does not affect the essential accuracy of the measured LogC at the core of each conversion - the resulting image will match that of an Alexa at that exposure. Rather, it determines the rendition of the Emotive Color 709 component or other display look-up combined onto LogC. It also determines the prominence of noise floor or highlight clipping.

Exposing the image too brightly (just below clipping) will place important scene elements in the rolloff region of the Emotive Color 709 component (above 65 IRE). Underexposure should also be avoided - both to achieve ideal rendition of the scene with Theatrical and Full Scale, and to avoid excess noise.

Middle gray (18% gray) should be exposed around 50 IRE. Skin tone should fall roughly between 50 and 65 IRE. Avoid allowing skin tone below 45, or above 70. The rolloff occurs above 70 IRE - this is for over-bright elements. On a histogram, anchor the scene around the upper middle of the graph.

It is best practice, especially in direct sun light, to keep an eye on the histogram or use zebras to avoid extremes of exposure (or use false color/waveform when available to precisely place important scene elements). This is because the lighting context of one's surroundings can give a deceptive understanding of actual exposure when trying to expose visually from the screen.

## Exposure Conversion [PRE]s

The Exposure Conversion [PRE] files allow accurate adjustment of exposure in post before applying the conversion. These are much better than software exposure sliders or Iso adjustment because they are measured color conversions - they capture the color space behavior that results from sensor photosite response at a given exposure, rather than a blanket luma shift. This ensures complete accuracy of the conversion, with clipping compensation included.

It is as if changing the exposure in camera, with the caveat that noise floor and clipping point remain unchanged. When used in tandem with the conversion, they allow complete flexibility (between -2 and +2, with one-third stop increments) to achieve ideal EC component rendition of the image, without compromising conversion accuracy as luma adjustments before the conversion would. They may be used in combination; it is best to use larger sizes before smaller (i.e. -1, then -.5). Intensity/Mix/Gain sliders may be used to dial in an exact value between halves.

GH6 ALEX
EMOTIVE COLOR

# Cinema Luminance

To realize the full potential of Emotive Color, it is vital to have a grasp of **standardized luma placement** in cinema. That is, the brightness of scene elements are grounded in a consistent optical reality. Lit objects of a given type (such as a face in direct light) have a **consistent, defined brightness**. The black level is the baseline - it occupies the darkest tones that the projector or screen are capable of, and the brightness of all other scene elements are defined in relation to this (i.e. a brightness ratio).

Last, this optically grounded framework reflects an exponential brightness scale. The upper third of the waveform (above 67 IRE) is reserved for exponentially bright elements (such as bulb filaments and the sun), while the **majority of the scene will occupy the lower half of the waveform**. Carefully examine the supplemental waveforms provided alongside this PDF.

When placing luma **in post**, Directly key-lit indoor skin tone should anchor around 45 IRE (450 in Resolve) on the **luma** waveform; facial edge lighting and sunlit skin tone may place up to 67 IRE (more generally between 50-63 IRE, or 512-640 in Resolve). Bulbs and other extreme highlights should place between 63 and 100 IRE (640-1023 in Resolve). To implement the *Sicario* ceiling, a stylized highlight shoulder, compress this range between 63 & 73 IRE (640-750 in Resolve) using the Ceiling Modifiers.

Shaded areas of faces and indirectly lit faces will generally fall between 12 and 40 IRE (128-400 in Resolve), and faces in complete darkness will fall between black level and 12 IRE (128 in Resolve). Black level and the darkest points in the scene should place between 1-4 IRE (10-40 in Resolve), but never at or below 0.
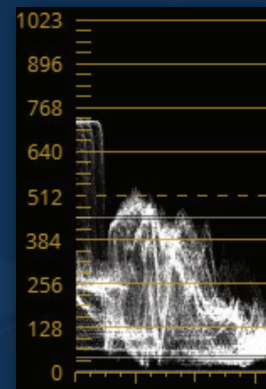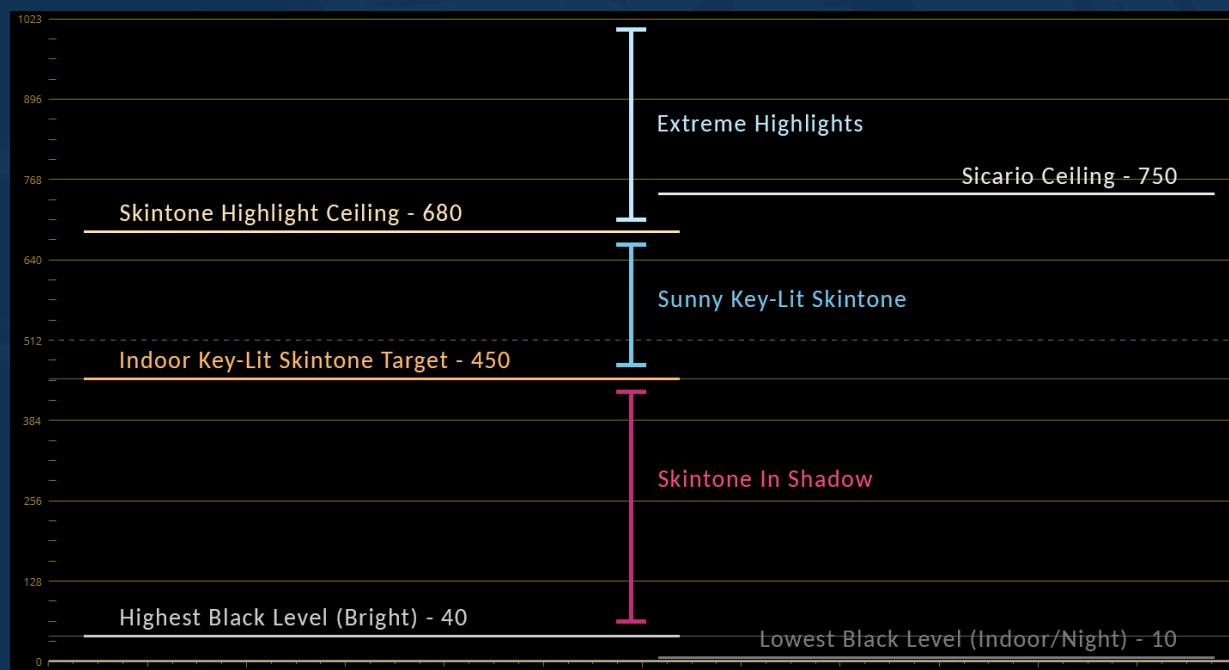
## Auto Black Level [POST]

The Auto Black Level [POST] files (ABL) may be used to automatically conform black level after the color conversion is applied. These are preferable to the native luma tools of an NLE for doing initial levels placement, because they introduce no relative saturation or hue distortion (that luma tools are prone to). A sufficient amount of ABL should be used to place black level at or near 1-4 IRE (not too little, or too much).

When exposure is properly set in advance of the conversion, strength 4 should only be needed for low contrast lenses (i.e. ABL is not a corrective for bright exposure). When using the luma curve to follow & supplement ABL, it should retain a single, smooth, contiguous arc over the majority of its run, such that elements in the scene conform to intended ranges sans contortion.
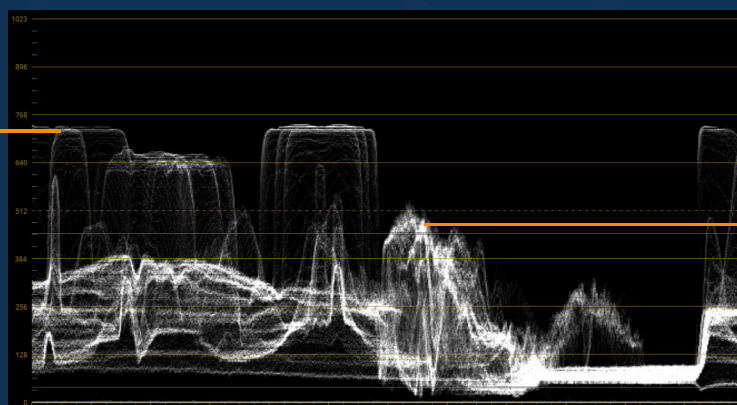
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EMOTIVE COLOR

# Waveform Guide

The following waveform guide is for use when placing luma in the final grade (in post) for theatrical context and narrative content. For brighter contexts (i.e. white internet pages) and commercial content, one may multiply these values by a given multiplier (i.e. 1.1) to find relative equivalents on a brighter scale.



Extreme Highlights

Sicario Ceiling - 750

Skintone Highlight Ceiling - 680

Sunny Key-Lit Skintone

Indoor Key-Lit Skintone Target - 450

Skintone In Shadow

Highest Black Level (Bright) - 40

Lowest Black Level (Indoor/Night) - 10



Fluorescent Office Lights

Indoor Key-lit Skin Tone

Waveform from *Sicario* (2015)

GH6 ALEX

EMOTIVE COLOR

# Post

# DaVinci Resolve

## 1 [PRE] Files

Load a [PRE] file on the first node as needed (to conform camera profiles or adjust exposure). When the conversion file is loaded onto a node following this one, different exposure compensation strengths may be directly tested for their impact on the final image in combination with the applied conversion. The Key Output Gain value under the Key tab can be used to dial in an exact exposure compensation amount.

## 2 White Balance Corrective

Add a new node following the [PRE] node(s) for the white balance corrective. One method to adjust WB is to use the eyedropper and Temp/Tint controls toward the bottom left corner of the Color page, in the 'Primaries' tab. The eyedropper tool may be used to select white balance from a neutral gray object lit by the key light in the scene. Pick a variety of points to get an idea for the average correction. This eyedropper may also be used to give a rough indication of needed WB adjustments for other methods as well.
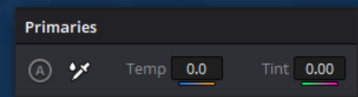
To verify white balance, select Vectorscope from the dropdown in the 'Scopes' tab on the bottom right of the Color page. In the Vectorscope settings, the skin tone line may be enabled, and the strength dialed up or down to reveal different elements of the image. Generally, a low saturation cloud should anchor at the center, and skin tone should fall on the skin tone line between yellow and red. Visually check the Vectorscope with the image - skin tone should not feel too magenta or green, and the image not too cool or warm.

WB can also be accurately adjusted by using the 'Primaries Wheels' Offset control to center WB in the Vectorscope, or the 'Primaries Bars' Offset RGB dials to align red, green, and blue channels in the Waveform (**set to RGB** - a powerful alternative for visualizing WB). For larger adjustments, this node should be qualified out towards the noise floor to replicate normal WB behavior (no shadow color cast).

**Note:** Each step should remain on a separate node, as in the node breakdown image on the following page. Use default color settings (not ACES/color management).

GH6 ALEX
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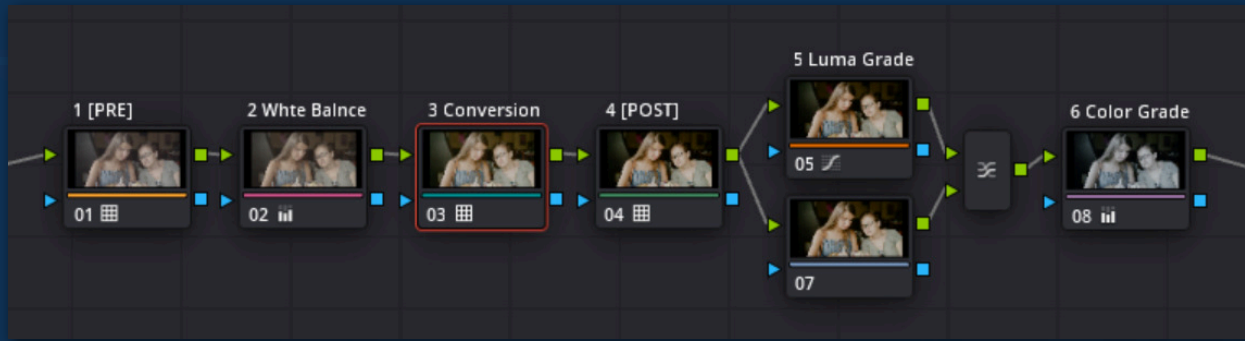
**3** **Conversion File**

On a new node (the third if there is a PRE and WB correction), load a core conversion - either Theatrical Scale, 'Full Scale' or 'LogC' for the matching light source. If you use the LogC variation, add a second node following this, and load the desired display look-up table (either Arri-issued, or a LogC-intended conversion).

**4** **Auto Black Level [POST]**

On the next node following the conversion, load an Auto Black Level [POST] file to conform the black level to standard cinema luminance. Use a sufficient strength (between 1-4) to bring black level at or near 10-40 on the luma waveform. From there the Key Output Gain value under the Key tab can be used to dial in an exact black level.

**Luma Waveform:** In the Scopes window at the bottom right corner of the Color page, select Waveform from the dropdown on the top right of the window (If Scopes is not visible, enable it with the wave graph icon on the right side of the screen). If the waveform is displaying in RGB, open the settings menu (the icon to the right of the dropdown) and select the 'Y' button to switch to luma mode. Check 'Show Reference Levels' and set Low to 40 (highest possible black level), and High to 450 (indoor key-lit faces). These reference lines will assist in conforming the image to cinema luminance.
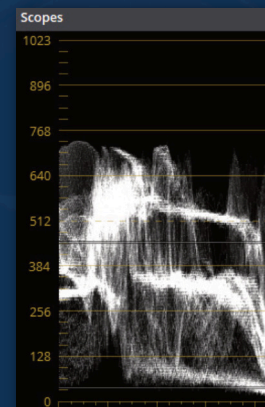


**5** **Luma Curve Placement**

The next node will use the luma curve to fine tune luma/black level after ABL as needed. To 'lock out' hue distortion from the luma curve tool, place the node at the top of a 'Layer Mixer' configuration (with node selected, press Alt+L). Right click on the layer mixer and choose 'Hue' as the 'Composite Mode'. The lower-routed node in this configuration will remain empty, acting as the hue pass-through.

GH6 ALEX
EMOTIVE COLOR

With the top node of the Layer Mixer structure selected, add a point just above the bottom of the luma curve and drag it right until black level sits between 10 and 40 on the **luma** waveform (granted no lens flare). This point should be separated enough from the bottom of the graph so that the rest of the curve remains linear.
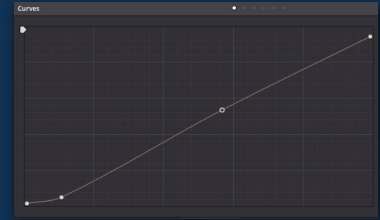
When black level is placed, another point may be added about half way up the luma curve to conform the image to scene context. Exactly where this point is placed along the curve involves a balancing between scene contrast and smooth highlight handling. Last, the top full-white point on the luma curve can be shifted downwards to conform the highlight range to a highlight ceiling.

## 6  Color Grading

Should an additional color cast be desired, add a new node after the layer mixer. Use the Color Wheels (Primaries Wheels - especially Gamma - and Log) and RGB Curves to add a color cast. Heavy color casts pair well with a steep desaturation. To do this, lower the Saturation value at the bottom of the Color Wheels window ('Sat' in tab '1'). This value should be set lower (minimum of 15) as the strength of the color cast increases.

## 7  OLPF Diffusion

The Alexa features an optical low-pass filter which softens texture across neighboring pixels without compromising detail. This local diffusion may be simulated in post to impart an organic texture to the image. The following describes the technique, should experimentation be desired.

Before export, switch 'Clip' to 'Timeline' in the dropdown at the top right corner of the node window. Add a new node here (Alt+S). This node will apply to the entirety of the timeline. Click the OpenFX tab in the top right corner of the Resolve Color page. From the ResolveFX Blur list in the OpenFX side panel, drag Gaussian Blur onto the node.
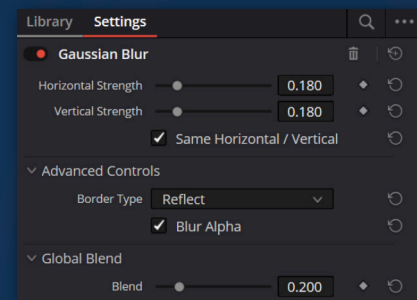
In the new Settings tab that appears for the Gaussian Blur effect in the side panel, set Horizontal/Vertical Strength to between 0.0 and 0.180. Last, change Blend to 0.200.

# Final Cut Pro X

## 1   [PRE] Files

Load a [PRE] file as needed (to conform camera profiles or adjust exposure). Use a 'Custom LUT Utility' effect (Keyboard Shortcut: CMD + 5) from the Effects browser (located to the right of the timeline). **Avoid the MotionFX mLut plug-in,** which doesn't handle Luts in sequence correctly.

When the color conversion is loaded in a new Custom LUT Utility following this one, different exposure compensation strengths may be tested visually for the resulting final image with the applied conversion. Use the Mix slider to dial in an exact exposure value.

## 2   White Balance Corrective

To neutralize white balance, use the Temperature and Tint sliders at the bottom of the Color Wheels effect in conjunction with the Vectorscope. Avoid the Balance Color feature (which does more than just WB). To access the Color Wheels panel, add the Color Wheels effect from the Effects browser or click the triangular icon (Color Inspector) between the film strip and sound/info icons at the top right of FCPX, and select Color Wheels from the dropdown. To access the Vectorscope, enable Scopes (CMD+7), and click the graph icon below 'View' in the top right corner of the Scopes panel to choose 'Vectorscope'.

Color lines point, or lead back to, the center target of the Vectorscope, with a low saturation/grayscale cloud at the center, and skin tone falling on the skin tone line between yellow and red. Visually cross-check the Vectorscope with the converted image - skin tone should not feel too magenta or green, and the image not too cool or warm.

Use Crop or a temporary 'Draw Mask' effect (added from the effects browser) to crop an area of the image (such as neutral white or skin tone), to easily see where it places on the Vectorscope.

Another powerful alternative to the Vectorscope when correcting WB is the '**Waveform + RGB Overlay**' scope. This allows easy alignment of the red, green and blue channels when using white balance controls.



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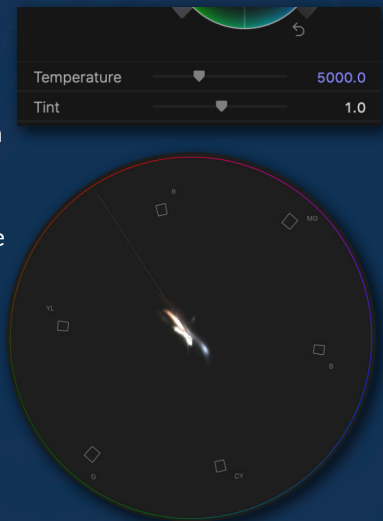
## 3 Conversion File

Add a new Custom LUT Utility (below the previous steps in sequence), and load a core conversion variation - either Theatrical Scale, Full Scale, or LogC for the matching light source. Keep Mix at 1.0. If using the LogC variation, add another Custom LUT Utility instance following this, and load the desired display look-up table (either Arri-issued, or a 3rd party LogC intended conversion).

## 4 Auto Black Level [POST]

Load an Auto Black Level [POST] file in a new Custom Lut Utility (placing beneath the others in sequence) to conform the black level to standard cinema luminance. Use a sufficient strength to bring black level at or near 1-4 on the luma waveform (enable in Scopes window). The Mix slider can be used to dial in the amount - it is best to get close with ABL strength choice before fine tuning with Mix.
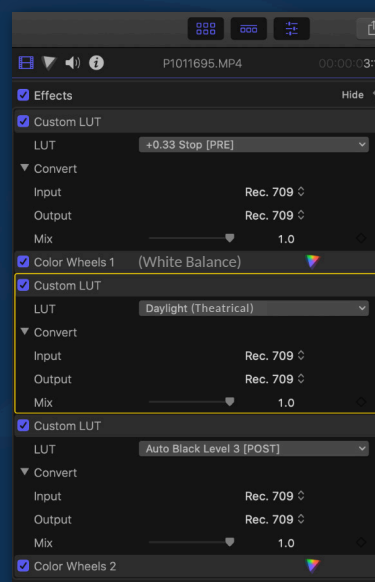
## 5 Color Grading

Add a second Color Wheels below the ABL Custom Lut Utility. With the grayscale slider on the right side of the Shadows, Midtones and Highlights wheels, one can fine tune luma in conjunction with the luma waveform.

Color casts pair well with an initial steep desaturation - to add a color cast, use the saturation slider on the left of the Master wheel to bring down saturation considerably. Then drag the center point of the Master wheel (or other color wheels) towards the preferred cast color. **Avoid the Hue/Saturation effect** - its saturation slider does not handle saturation correctly.
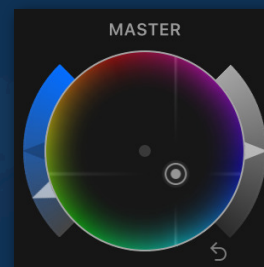
## 6 OLPF Diffusion

The Alexa features an optical low-pass filter which softens texture across neighboring pixels without compromising detail. This local diffusion may be simulated in post to impart an organic texture to the image. The following describes the technique, should experimentation be desired.

Before export, highlight all clips on the timeline and create a compound clip. Duplicate the compound clip directly above itself (Alt+Click+Drag). Under the Compositing section of the Video Inspector panel, change the Opacity of this upper clip to 20%. Place a Gaussian Blur from the Effects panel on the layer, and set its 'Amount' to between 0.0 and 6.0.

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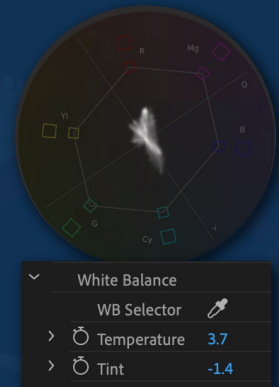
# Premiere Pro

## 1 [PRE] Files

Load a profile [PRE] file as needed (to conform camera profiles) in the 'Input LUT' dropdown of the Basic Correction section of Lumetri. Load an Exposure Compensation [PRE] file as needed in the 'Look' dropdown of the Creative section of Lumetri.

When the color conversion is loaded into the next instance of Lumetri, different exposure compensation strengths may be directly tested for their impact on the final image in combination with the applied conversion. The Intensity setting may be used to dial in an exact exposure value (use a value at or below 100).

## 2 White Balance Corrective

To correct white balance (WB), use the WB eyedropper or Temperature/Tint controls in the Basic Correction section of Lumetri. The ideal way to do this is to pick white balance from a neutral gray/white object lit by the key light in the scene. Pick a variety of points from it to get an idea for the average correction.

To check the accuracy of the WB without a neutral reference, use the 'Vectorscope YUV' (Window > Lumetri Scopes). For optimal visibility, you can hide other scopes with the right-click context menu. Generally, color lines should point, or lead back to the center of the overlayed cross, with a low saturation cloud at the center, and skin tone falling on the line of the cross between yellow and red. Visually check the Vectorscope with the image - skin tone should not feel too magenta or green, and the image should not feel too cool or warm.

The Waveform scope (set to '**RGB**' type) may also be used to align the red, green and blue channels using the WB controls, as a powerful alternative to the Vectorscope.

| Lumetri 1 | | | Lumetri 2 | |
| --- | --- | --- | --- | --- |
| **Basic Correction** Profile [PRE] + WB | **Creative 'Look LUT'** Exposure [PRE] | ⮕ | **Basic Correction** Color Conversion | **Creative 'Look LUT'** Auto Black Level [POST] |

**Note:** It is highly recommended to install the latest Premiere Pro. The color engine has been improved in recent releases to reduce color distortion of camera codecs and Lumetri luma handling.

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E M O T I V E  C O L O R

## 3  Conversion File

Add a **second** instance of Lumetri (as only two .cubes may be applied in each instance of Lumetri). In the 'Input LUT' dropdown of the Basic Correction section of this new Lumetri, load a core conversion variation - either Theatrical Scale, 'Full Scale', or 'LogC' for the matching light source (if using the Creative dropdown for this step, keep Intensity at 100). If you use the LogC variation, load the desired display look-up table (either Arri-issued, or a 3rd party LogC intended conversion) in the subsequent Creative dropdown.
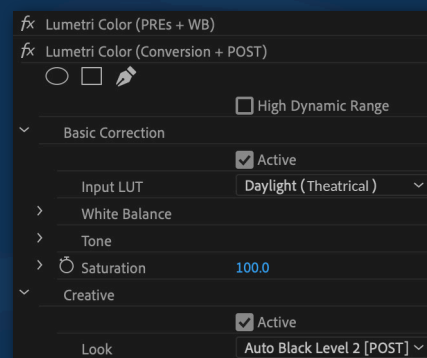
## 4  Auto Black Level [POST]

Load an Auto Black Level [POST] file (in the Creative dropdown or third Lumetri) to conform the black level to standard cinema luminance. Use a sufficient strength to bring black level at or near 1-4 IRE on the luma waveform (Window > Lumetri Scopes). From there, the Intensity value can be used to dial in an exact black level (use value at or below 100).
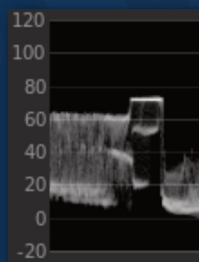
## 5  Color Grading

Following application of the Auto Black Level [POST] file, use the Lumetri luma curve to conform levels to cinema luminance and scene context as needed (see 'Cinema Luminance'). Additionally, one may add a color cast with the Color Wheels or color curves. Heavy color casts pair well with a steep desaturation using the Saturation field in the Creative section. Use 'Waveform' (set to Luma type) in Lumetri Scopes to fine tune black level to between 1-4 IRE (granted no lens flare).

## 6  OLPF Adjustment Layer

The Alexa features an optical low-pass filter which softens texture across neighboring pixels without compromising detail. This local diffusion may be simulated in post to impart an organic texture to the image. The following describes the technique, should experimentation be desired.

Before export, create a new Adjustment Layer matching the sequence settings. Place this on a layer above the video, spanning the entire length of the sequence. Change the Opacity of this Adjustment Layer to 20%. Place a Gaussian Blur on the layer, and set 'Blurriness' to between 0.0 & 6.0.
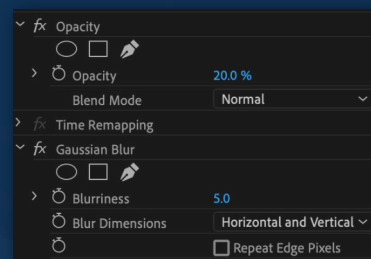
# Known Limitations

This section is intended to document problems inherent to camera footage, so that they may be mediated when filming. These are beyond the scope of what is correctable by contiguous color conversion, and arise from limitations of codec and sensor.

## Far Gamut Clipping



There is a region of far gamut in which the RGB channels of the sensor clip, and the remaining signal shifts to an area inseparable from legitimate color range (blue becomes cyan or purple, red becomes yellow). These clipped regions are unable to be completely corrected without introducing significant distortion to the surrounding color space, precluding universal correction. This is fairly rare to encounter, and requires filming mono-color lights at a bright exposure. It is more prominent at tungsten WB, similar to far red channel clipping (with red leds) on the Alexa.

## Codec Banding and Macroblocking



Compressed codecs (h.264) may be susceptible to macroblocking and banding, especially when paired with log or 8 bit (For example, the GH5's 4K 150mbps 10 bit VLog can break down into an alternating red/green pattern on gradients falling into shadow, and Sony's 8 bit SLog can result in banding). Intra codecs (with sufficient bitrate), higher bitrates, and higher contrast camera profiles will perform better with compressed formats.
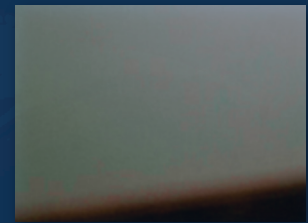
## Sensor Filtration & Noise



The filter stack built into the sensor can introduce optical complications. For example, there can be insufficient IR/UV filtration, which can skew some hues. This is common with Blackmagic cameras, and may be mitigated with the use of additional IR/UV filtration on the lens. Optical attifacts can also result. For example, sensor filter stacks can introduce a stair-stepped light falloff (visible with a light bulb in a dark room), and the Ursa G2 sensor has an inherent subtle vignette that slightly shifts color rendition towards the corners of the image. High ISO noise may exhibit a banding pattern along CMOS readout lines (GH6).

GH6 ALEX
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