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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. Three display-ready variations of the color conversion (Main/Soft/Linear) and one data format variation (LogC) are included. **Only one** of these four variations should be used per clip. The LogC variation must be followed by a LogC-intended display look-up table (such as those issued by Arri, or a film conversion meant for LogC).

Four Variations

Main

Max IRE: **83**
Min IRE: **1**

The central variation of EC. it features a slightly lowered highlight ceiling, and film-derived saturation. Noise floor is placed at 1 IRE. The LogC conversion is at its core, and it includes the 2018 revised Arri RGB display primaries for LogC. It is a directly scaled step between Soft and Linear.

Soft

Max IRE: **76**
Min IRE: **1**

An alternate variation of EC. it features the lowered highlight ceiling of the film 'Sicario', lowered contrast and light film-derived saturation. Noise floor is placed at 1 IRE. The LogC conversion is at its core, and it includes the 2018 revised Arri RGB display primaries for LogC.

Linear

Max IRE: **92**
Min IRE: **1**

An alternate linear luma option of EC. it features linear highlight handling without a shoulder, increased contrast, and full film-derived saturation. Noise floor is placed at 1 IRE. The LogC conversion is at its core, and it includes the 2018 revised Arri RGB display primaries for LogC. A direct alternative to LogC+Rec709.

LogC

Max IRE: **79**
Min IRE: 7

The data format native to the Alexa; it is a standardized format that was created to efficiently store the full dynamic range and gamut of the sensor. **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.

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Intro

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, and placement of black level following the conversion to conform the image to cinema luminance.

These are labeled according to whether they go before the conversion or after it - their order of operations. These are the bracketed labels:

[PRE] Apply in sequence **before** the color conversion (Exposure Compensation)

[POST] Apply in sequence **after** the color conversion (Auto Black Level)

[PRE]s are included to convert Cine-D (Sat -5) and HLG to VLog ahead of the conversion. The Exposure Conversion [PRE]s **should be the final [PRE]** loaded in sequence before the Main/Soft/Linear/LogC color conversion.

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 is able to capture subtle nuance in color transitions, especially when converting from a log format and/or to an intricate target format. It has the advantage of preventing poor gradient handling when the software has weaker interpolation of lookup tables (trilinear rather than tetrahedral). 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, especially when loading into Lumetri.

Monitoring Variations: 33x Monitoring variations are included which allow direct monitoring of the conversion for each profile - Cine-D (Sat -5), HLG, or VLog being recorded externally to ProRes/DNx (combines levels corrective). Also, a **17x** .vlt is included to monitor VLog in-camera (rougher gradients are inherent to .vlt).

Intro

Camera Settings

These settings are recommended for reference performance with the color conversion. Neutral WB, ISO, Dynamic Range, and ND are the original source conditions for the conversion input. Optics, Shutter, and Sharpness will not affect the accuracy of the conversion; they are non-color settings which constitute the common Arri aesthetic.

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

ISO	400 **Cine-D:** 200	Ideal noise floor and DR (Pair with lighting as needed). The LogC conversion was measured at 400 ISO; other ISOs will decrease the accuracy of the conversion.
WB	Any	Accurate & neutral. WB from white card recommended when changing light/lens/ND (NDs require tint compensation; shade is cooler than direct sun). Stored presets for known combos.
CODEC	All-I 2K or 4K	A more robust codec with fluid editing and playback. The GH5's equivalent of Alexa ProRes.
PROFILE	VLog, HLG, or Cine-D (Sat -5)	The conversion was made directly for VLog. HLG and Cine-D are also fully supported with [PRE] conversions to VLog, and offer less codec banding. Use Cine-D for 8-bit.
ND	Firecrest Full-Spectrum	The reference filter used for the Daylight conversion. (A full-spectrum filter that aligns UV and IR cutoffs between the sensors).
OPTICS	Diffusion Filters	Recommended stack: Lens > ND > Tiffen Digital Diffusion 1* > 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	-5	Lowest in-camera sharpening available on the GH5. This is closest to the Alexa texture, which has no sharpening.

SPECIAL NOTES

- **Cine-D Required Settings:** Contrast 0; Saturation -5; Hue 0; Luminance Levels; 64-940; Highlights/Shadows 0.
- **HLG:** Keep Saturation at the default of 0.
- **Noise Reduction:** The Alexa has no noise reduction. Use a value between -5 to 0 as preferred.
- **High Framerate:** Use 120/125 fps instead of 180; greatly improved sensor readout.
- **Tiffen 1/8 or 1/4 Low Contrast:** May be used for a smoother light falloff, but a more distinct diffusion than the Alexa OIpf. Using the ND closest to the lens cancels inverse reflections between clear filters and the lens/sensor.

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Essentials

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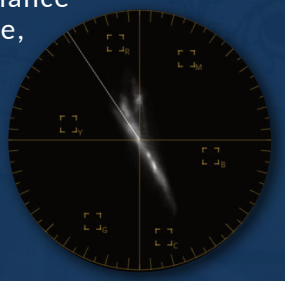
Essentials

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, skintone is often a strong indicator of the neutrality of the **tint** axis (green/magenta). Skintone should fall on the skintone line of the Vectorscope (not distinctly above or below it) when white balance is neutral. To isolate the skintone 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 tint for each filter strength. Lenses can introduce a shift along either axis.

Light Sources

The reference light source is sun light for the Daylight conversion and halogen for the Tungsten conversion. These are the light sources that each conversion was made 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, skintone 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 the color rendition of highly variable efficient lighting on all cameras.

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 EC component or other display look-up that is 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 EC component (above 65 IRE). Underexposure should also be avoided - both to achieve ideal rendition of the scene with Main, Soft, and Linear, and to avoid excess noise.

Middle gray (18% gray) should be exposed around 50 IRE for all profiles. Skin tone should fall roughly between 50 and 65 IRE. Avoid allowing skin tone below 45, or above 65. The rolloff occurs above 65 IRE - this is for over-bright elements. With a monitoring variation, one may expose visually in the moment for the desired end (color grading w/ exposure).

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

Compensation [PRE]s

The Exposure Compensation [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.

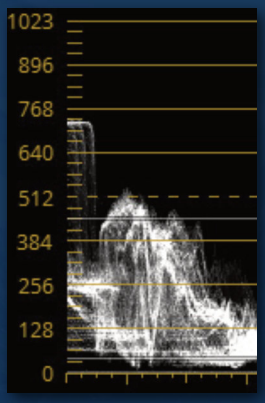
It is as if changing the exposure in camera, with the caveat that noise floor and clipping point remain unchanged. When used in tandem with the conversion, they allow complete flexibility (in one-third stop increments between -1 and +1) to achieve ideal EC component rendition of the image, without compromising 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 -.33). Intensity/Mix/Gain sliders can be used to dial in an exact value between thirds.

Cinema Luminance

To realize the full potential of EC, it is vital to have a grasp of **standardized luma placement** in modern 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 film-like highlight shoulder, compress this range to between 63 and 73 IRE (640-750 in Resolve). Soft incorporates this highlight ceiling natively]



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, strengths 3 and 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 without contortion.

Post

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DaVinci Resolve

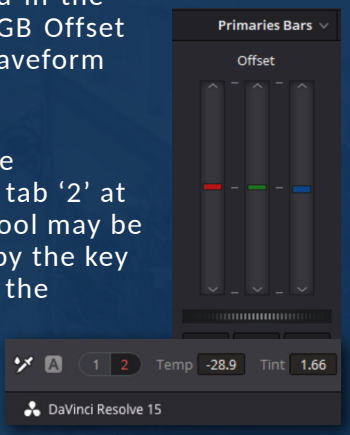
1 [PRE] Files

If you recorded to Cine-D (Sat -5), HLG, or VLog ***to ProRes/DnxHD*** on an external recorder, apply the appropriate [PRE] file to the first node to convert to normative VLog in advance of the color conversion.

Load an Exposure Compensation [PRE] file on the next node as needed. 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. The most accurate way to correct WB is by using the Primaries Bars Offset controls to adjust red, green and blue offsets until the WB is centered in the Vectorscope. Then use the luma offset wheel below the RGB Offset controls to correct for any luma shift seen in the Luma Waveform (disable/enable node with Ctrl+D to see any luma shift).



A simpler, but less accurate way to adjust WB is to use the eyedropper and Temperature and Tint controls in the small tab '2' at the bottom left corner of the Color page. 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 the previous method as well.

To check white balance, select Vectorscope from the dropdown in the Scopes window on the bottom right of the Color page (If Scopes is not visible, enable it with the wave graph icon on the right side of the screen). 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, 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 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.

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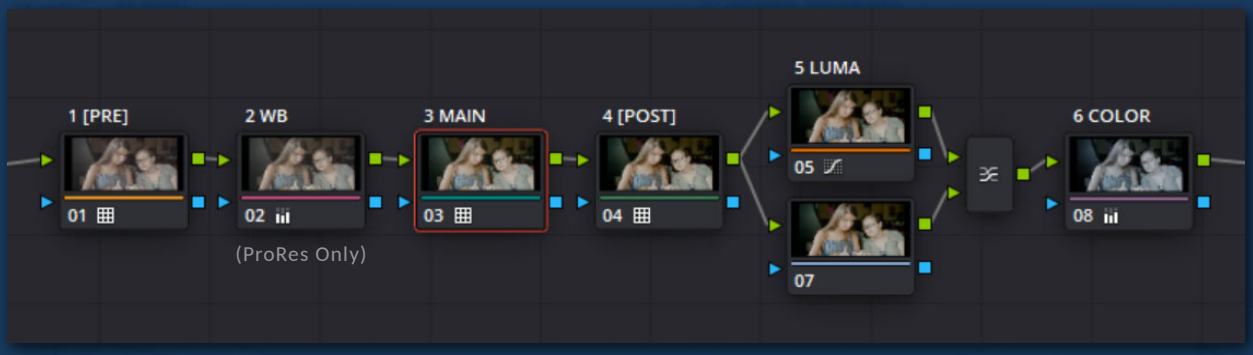


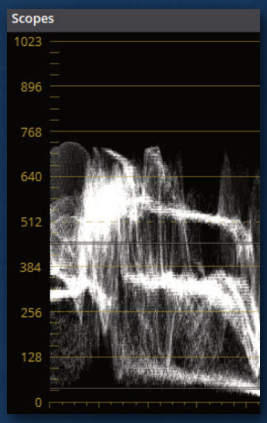
3 Conversion File

On a new node (the third if there is a PRE and WB correction), load a core conversion variation - either 'Main', 'Soft', 'Linear', 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 color, 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.

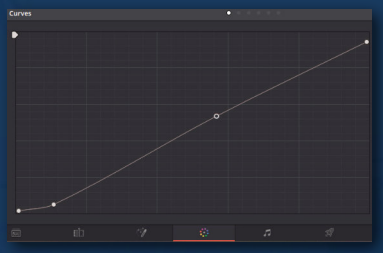


5 Luma Curve Placement

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.

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 is between 10 and 40 on the 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.



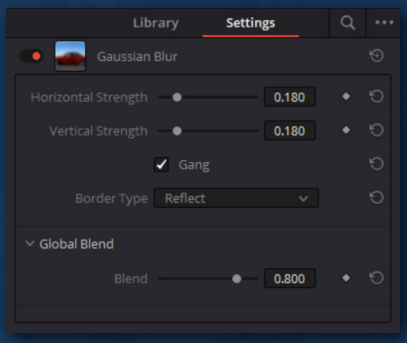
6 Color Grading

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

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 0.19 and 0.22. Set the Border Type dropdown to 'Replicate'. Last, change Blend to 0.800.



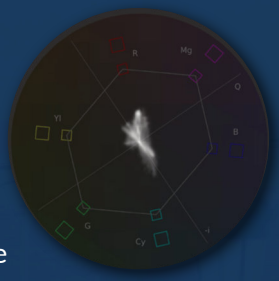
Note: Each step should remain on a separate node, as in the node breakdown image. Use default color settings (i.e. DaVinci YRGB; not ACES/color space transform).

Post

Premiere Pro

1 White Balance Corrective

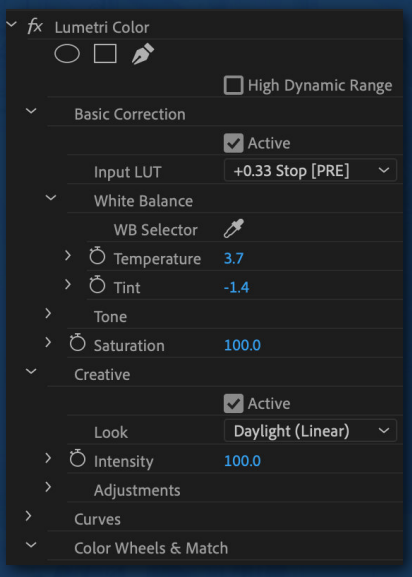
To correct white balance, use the WB eyedropper or Temperature/Tint controls in the Basic Correction section of Lumetri. The ideal way to do this is to pick white balance from a neutral gray/white object lit by the key light in the scene. Pick a variety of points from it to get an idea for the average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



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.

2 [PRE] Files

Load the relevant **Premiere-specific** [PRE] file in the 'Input LUT' dropdown of the Basic Correction section to convert to normative VLog in advance of the color conversion (Cine-D to VLog, HLG to VLog, VLog 8/10 bit Corrective or the ProRes/DnxHD VLog Levels Corrective, which is not Premiere-specific).



Load an Exposure Compensation [PRE] file as needed in the 'Look' dropdown of the Basic Correction 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).

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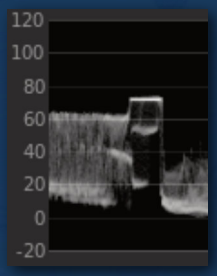
3 Conversion File

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 'Main', 'Soft', 'Linear', or 'LogC' for the matching light source (if using the Creative dropdown, 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 a value at or below 100).



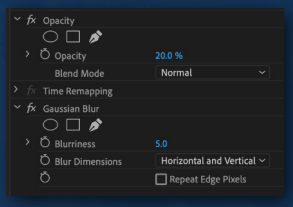
5 Color Grading

Following application of the Auto Black Level [POST] file, use the Color Wheels section of Lumetri to fine tune luma levels with the sliders and add a color cast with the wheels. Heavy color casts pair well with a steep desaturation using the Saturation field in the Creative section.

Use 'Waveform (Luma)' in Lumetri Scopes and the Shadows slider to fine tune black level to between 1-4 IRE (granted no lens flare). Use the Midtones and Highlights sliders to conform to cinema luminance and scene context as needed (see 'Cinema Luminance'). Avoid the Lumetri Luma Curve, which distorts the color space (Use the 'Obsolete RGB Curves' instead if needed, or use the Advancing routing detailed on the next page).

6 OLPF Adjustment Layer

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 5.2 and 6.0.



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Premiere Pro
Advanced Color Routing

Premiere's Luma correction tools introduce hue twists to the color space that shift throughout the grayscale. This causes a subtle distortion that compromises the fidelity of the footage. This is especially a problem with the Lumetri Luma Curve.

There is a technique which allows this hue distortion to be bypassed, preserving the luma corrections and their accompanying saturation shift. This allows the Lumetri Luma Curve and any other luma correction tool to be used without affecting hue continuity.

To do this, create an adjustment layer in the project bin. Place this adjustment layer above the clip(s) to be adjusted. On this layer, add a new instance of Lumetri Color. Make all luma adjustments (Lumetri luma curve included) on this layer, and all color adjustments in the normal (EC conversion) Lumetri. When finished the luma adjustments, duplicate the luma adjustment layer above itself. Set the Opacity 'Blend Mode' to Luminosity on the top adjustment layer, and to 'Saturation' on the lower adjustment layer.

This will effectively 'lock out' the hue changes of the luma tools. Should further adjustments to the luma be needed, delete the top layer, and return the original adjustment layer Opacity to 'Normal' again. then make the luma adjustments needed and repeat the previous steps.

Post

Final Cut Pro X

1 [PRE] Files

If you recorded to Cine-D (Sat -5), HLG, 8-bit VLog or VLog ***to ProRes/DnxHD*** on an external recorder, apply the appropriate [PRE] file to convert to normative VLog in advance of the color conversion. Use the 'Custom LUT Utility' from the Effects browser, which can be opened on the right side of the timeline (CMD+5). 8-bit VLog and HLG have FCPX-specific [PRE] variations. **Avoid the MotionFX mLut plug-in,** which doesn't handle Luts in sequence correctly.

HLG Special Note: Choose 'Rec 709' in the **Color Space Override** dropdown for each HLG clip, located in the clip info panel (selected with the i icon at the top right corner of FCPX).

Load an Exposure Compensation [PRE] file as needed, using the 'Custom LUT Utility' from the Effects browser. 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 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 Basic WB eyedropper 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 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 in the Viewer (CMD+7), and click the little graph icon below 'View' in the top right corner of the Scopes panel and 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 skintone), to easily see where it places on the Vectorscope.

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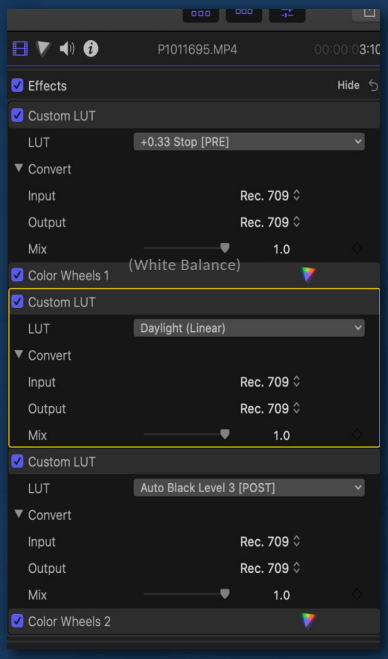
3 Conversion File

In the ‘Look’ dropdown of the Creative section of Lumetri, load a core conversion variation - either ‘Main’, ‘Soft’, ‘Linear’, or ‘LogC’ for the matching light source. Keep Intensity at 100. If you use the LogC variation, add a second Lumetri Color instance following this, and load the desired display look-up table (either Arri-issued, or a 3rd party LogC intended conversion) in Basic Correction (to use ABL [POST] in Creative).

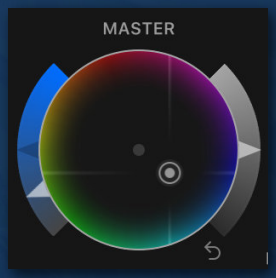


4 Auto Black Level [POST]

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 (between 1-4) 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

Before export, highlight all clips on the timeline and create a compound clip. Duplicate the compound clip directly above itself (Alt+Click+Drag). In the Inspector panel, change the Opacity of this upper clip to 20%. Place a Gaussian Blur from the Effects panel on the layer, and set ‘Blurriness’ between 5.0 and 6.0.

Known Limitations

This is an evolving section intended to document problems inherent to the camera's footage, so that they may be avoided or mediated when filming. These problems are beyond the scope of what is correctable by contiguous color conversion, and can be categorized into two areas: limitations of codec, and limitations of sensor data.

Codec Banding and Macroblocking

All internal codecs in the GH5 are occasionally susceptible to macroblocking and banding in an alternating red/green pattern on gradients falling into shadow. The most problematic codec in this regard is 150Mbps 4K, especially when combined with VLog. This is why the All-I codecs are recommended. FHD 100Mbps Long is also a quality option, on par with the All-I codecs.

Cine-D and HLG perform better with the internal GH5 codecs, because of the higher contrast and saturation inherent to these profiles (allowing greater bit depth separation). When shooting to 8-bit, Cine-D is the best profile to use (VLog 8-bit is especially prone to these artifacts in shadow, pictured above).

Blue Far Gamut Clipping

There is a region of far gamut blue in which the blue channel of the sensor clips, and the remaining signal shifts to an area inseparable from legitimate cyan range. This region of clipping is unable to be meaningfully corrected without introducing significant distortion to the surrounding cyan color space. It may be completely hidden via precision color work on a per shot basis, however a universal color space correction is precluded by the nature of the clipping.

This is a fairly rare form of clipping to encounter, and requires filming blue led lights at a bright exposure. It is more prominent at tungsten white balance, and is very similar to far red channel clipping (with red leds) on the Alexa at tungsten white balance.