Lesson 9

Performing Primary Color Corrections

Like editing, audio mixing, and visual effects, color correction is an art form that takes time to learn and master. Color is an incredibly powerful creative tool that can define the style and convey the mood of your film. If you give yourself the time to practice and learn, you'll be able to master this exciting skill and create images that look amazing!

These next three lessons provide a valuable overview of the most important color-correction tools to get you comfortable with how they work. You'll learn about the primary corrector, secondary adjustments, nodes, and even applying DaVinci Resolve FX for special effects. You'll use the same tools that Hollywood's top colorists use to correct and finish the biggest blockbuster films, episodic television shows, and commercials. Experience is key, and with so many controls at your fingertips, these lessons will give you the start you need toward learning this creative skill.

Time

This lesson takes approximately 90 minutes to complete.

Goals

Exploring the Color Page Interface

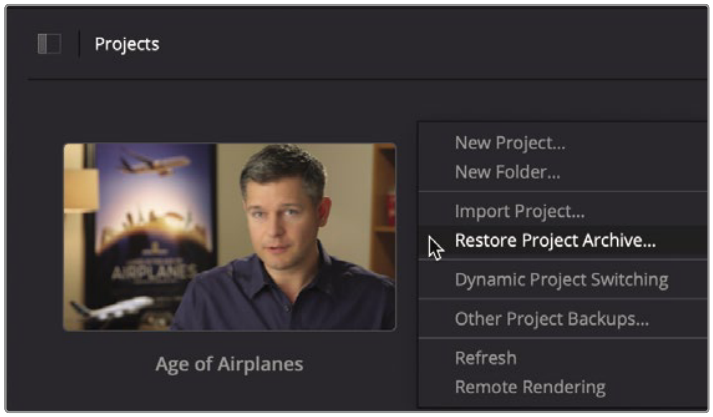
The exercises in this chapter will teach you how to make color adjustments on clips to correct commonplace issues like over exposure, low contrast, and incorrect white balance.

All these corrections, along with the creative process of color grading, take place within the color page in DaVinci Resolve. Let's start by examining the color page layout.

1 Open DaVinci Resolve to the Project Manager window.

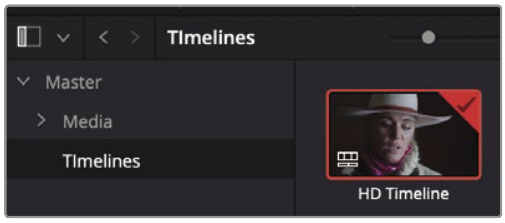
In these three lessons, you'll learn a color-grading workflow using a documentary about cattle ranchers in the U.S. state of Wyoming. The project you will use was archived using DaVinci Resolve. An archive is a self-contained project that includes all its media. All you need to do is restore the archive, and the project will be available with all the media already linked.

2 Right-click in the Project Manager window and choose Restore Project Archive.



3 Navigate to R17 Beginner Guide lessons > Lesson 9. Select the Wyoming Cattle Ranch. dra folder and click Open.

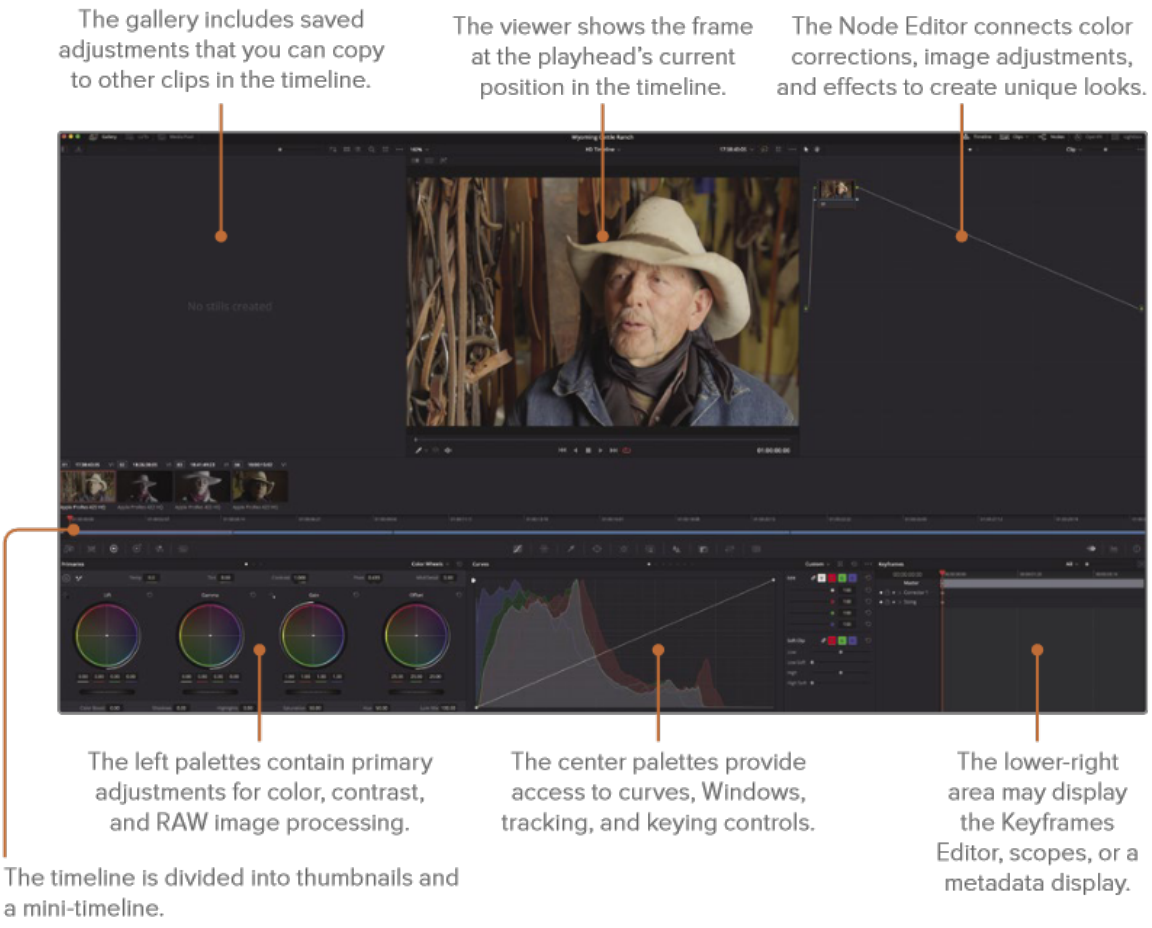
4 In the Project Manager, open the Wyoming Cattle Ranch project, and then from the edit page timelines bin, double-click the HD Timeline to load the timeline.



This timeline has only four interview clips. All the clips are from a single HD camera.

One of the best aspects of DaVinci Resolve is that editing and color grading are completely integrated into a single application, so you can easily move between the two with a single click.

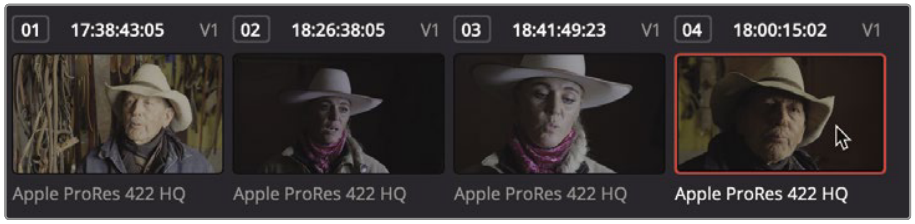
5 At the bottom of the DaVinci Resolve window, click the Color button to go to the color page.



NOTE When you're using DaVinci Resolve on a computer display with a resolution lower than 1920 x 1080, some panels and buttons will be consolidated and not look exactly like the images in this lesson.

When you switch to the color page, wherever the playhead was in the editing timeline remains the location in the color page timeline. The color page does not change or alter any cuts or transitions; it just provides a way of looking at your timeline that is more appropriate for color correction.

6 Click thumbnail number 04, the last clip in the timeline.



An orange outline appears around the selected thumbnail, and the playhead jumps to the first frame of that clip.

7 Below the thumbnail, double-click the Apple ProRes 422 HQ name to switch to viewing clip names.

The mini-timeline below the thumbnails displays thin bars to represent each clip. A bar's width is proportional to a clip's duration. Like the cut page, the mini-timeline shows all the clips in a timeline.

8 Drag the mini-timeline playhead to the left to scrub through the timeline until you reach the first clip.

As you scrub through the timeline, the clip under the playhead highlights in orange to show that it is selected, a behavior like the thumbnail display outline. The transport controls under the viewer, as well as all the playback keyboard shortcuts, are the same as you used on the edit page.

TIP If a track is disabled in the edit page, it will be dimmed in the color page's mini-timeline.

Now that you have a basic understanding of the color page layout, you're ready to make some adjustments.

Using the Primary Corrector

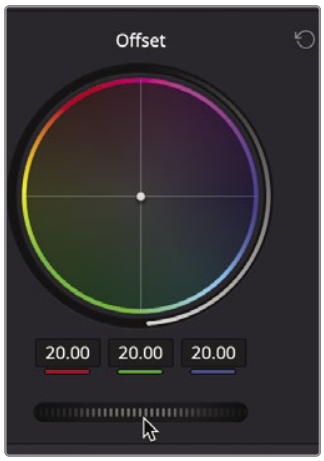
The most popular controls for creating different looks and balancing your shots are found in the primary corrector. Because DaVinci Resolve includes many controls in the primary corrector, you will find that you spend much of the time using this palette of tools while you're on the color page. In this first exercise, you'll make a few adjustments just to get a feel for the controls.

1 In the timeline, make sure thumbnail 01 is the selected clip.

The primary corrector is divided into five regions: Lift, Gamma, Gain, and Offset. Each region is split into the color balance controls for adjusting the tint of the image and the master wheels for adjusting the tonality or brightness.

The Offset adjusts the overall picture. In this first clip, it is a bit bright on the rancher's face and hat, and the darker shadows do not appear very dark. To make an entire image brighter or darker, you use the master wheel, located under the color wheel.

2 Drag the Offset master wheel to the left until the image is not as bright and the darkest shadows appear to be black. The red, green, and blue number fields above the master wheel should end up around 20.00.



This improves the tonal range, but the clip also has a very orange tint to it.

> **TIP** When you encounter the terms *tonal values* or *tonal range*, we are talking about brightness values as if the image were black and white, with no color.

3 Drag the color indicator at the center of the Offset color wheel toward blue/green until the Rancher's hat and skin appear less red.

Adjustments made in the color balance controls are subtle. In most cases, you are just moving the indicator a few pixels away from the color you want to reduce.

You can target areas more precisely by making color balance and master wheel adjustments to specific tonal regions in an image, like the shadows, midtones, and highlights. These three regions roughly correspond to the Lift, Gamma, and Gain primary controls.

4 In the timeline, click thumbnail 02 to move the playhead to that clip.

This clip appears too dark overall, so you can start by brightening it with the Offset master wheel.

5 Drag the Offset master wheel to the right until the image is brighter. The red, green, and blue number fields above the master wheel should end up around 40.00.

Although the image is brighter, it lacks contrast, which means the darks are not very dark and the highlights are not very bright.

The master wheel under the Lift's color balance control sets the black point for the image. When dragging it to the left, the darker areas in the image become darker.

6 Drag the Lift's master wheel to the left until you think the shadows in the picture appear dark without being crushed. The luminance, red, green, and blue values above the master wheel should end up around -0.05.

Let's look at the other end of the spectrum by adjusting the Gain control.

The master wheel under the Gain's color balance control sets the white point for the image. When dragging it to the right, the brightest areas in the image become brighter.

7 Drag the Gain's master wheel to the right until you think the highlights in the picture appear bright enough. The luminance, red, green, and blue values above the master wheel should end up around 1.40.

By adjusting the Lift master wheel and the Gain master wheel, you have effectively adjusted the clip's contrast. Instead of using a simple contrast control, you have exercised greater control over the black point and white point using the Lift and Gain master wheels.

Now let's look at Gamma.

The master wheel under the Gamma color balance control adjusts the brightness while maintaining the black and white points that you set previously. In general, once you set your black and white point, if you feel the image is too dark or too bright, you can try to correct it using the Gamma master wheel. We will darken this image a bit.

8 Drag the Gamma's master wheel to the left to darken the wall to the left of the woman. The luminance, red, green, and blue values above the master wheel should end up around -0.05.

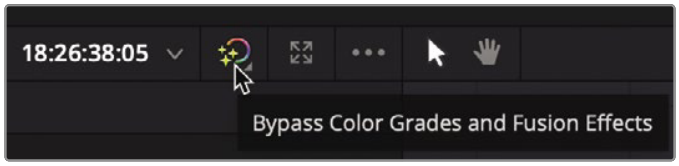
When dragging this control to the left, the image becomes darker. Gamma is sometimes referred to as midtones because it adjusts the middle tonal range of an image.

The Gamma's color balance control tints the midrange of your image. Let's add some magenta into the midrange.

9 In the Gamma's color balance control, drag the control slightly toward magenta to add that tint to the midrange area of the picture.

Let's compare the corrected image you've made to the original image.

10 Click the Bypass button in the upper right of the viewer or press Shift-D, to see the original image. Then click the Bypass button again, or press Shift-D to view the corrected image.



This last adjustment applied too much magenta to the midrange and was made only to give you more experience with the feel of the controls. It clearly didn't produce anything worth keeping. You can reset each control or the entire primary corrector using the Reset buttons.

TIP On the color page, each clip has its own undo/redo history. Choosing Edit > Undo will undo previous changes depending on which clip is the current clip. The edit page also has its own undo history, which is separate from the color page. The Edit and Fairlight page Undo/Redo commands operate on the entire timeline, not on each clip.

11 In the upper-right corner of the Gamma's color balance control, click the Reset button.

12 In the timeline, click thumbnail 04 to move the playhead to that clip.

13 On your own, adjust the Lift master wheel to set the shadows where you think they look best, then do the same using the Gain master wheel for the highlights, and finally use the Gamma master wheel to give the image a darker, moodier feel.

Let's compare the corrected image you've made to the original image.

14 Click the Bypass button in the upper right of the viewer or press Shift-D, to see the original image. Then click the Bypass button again or press Shift-D to view the corrected image.

If you want to make refinements, go ahead and adjust the master wheels until you are happy with the image.

Now, with the tonal adjustments made, you can adjust color using the color wheels. The actor's dirty white hat has a very reddish tint. We can shift the highlights clip towards blue/green using the Gain's color balance control.

15 In the Gain's color balance control, drag the color balance indicator very slightly toward blue/green to offset the reddish tint.

To add a bit more red back into his skin tone, you can use the Gamma color balance control.

16 In the Gamma's color balance control, drag the control slightly toward orange to offset the blue/green tint you added in the highlights.

The Gamma's color balance control tints the midrange of your image.

Let's compare the corrected image you've made to the original image.

17 Click the Bypass button in the upper right of the viewer or press Shift-D to see the original image. Then click the Bypass button again or press Shift-D to view the corrected image.

> **TIP** The Reset button for Lift Gamma, Gain, and Offset resets both the color balance and master wheel controls. To reset just the color balance controls, double-click the color indicator.

The Lift, Gamma, and Gain controls are not narrow adjustments that change only the dark, midrange, or bright areas. In fact, their ranges overlap by a considerable amount. This overlap helps you make more natural, smoother-looking adjustments, but it also means that you'll need to move among the three color balance controls to achieve best results because adjusting one control visibly impacts the others.

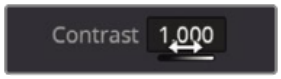
Making Quick Adjustments

The primary corrector controls that you have used are adjusted mainly to achieve an overall look by controlling Lift, Gamma, Gain, and Offset within the image. You can also make a few primary corrector adjustments that you may be more familiar with from other video or photo applications. The adjustment controls are located across the top and bottom of the primary corrector panel. Any modifications to these controls affect the entire image, not just the Lift, Gamma, or Gain.

1 In the timeline, click thumbnail 03 to move the playhead to the start of that clip.

The initial impression given by this clip is that it lacks some contrast—meaning that the shadows are not very dark, and the highlights are not very bright. Instead of using the Lift and Gain master wheels to add contrast, you can simultaneously expand the range between the shadows and highlights by increasing the Contrast control.

2 In the adjustment controls above the color wheels, position the pointer over the Contrast number field.



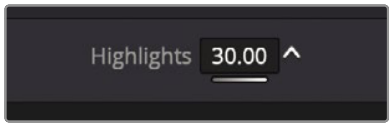
> **NOTE** Depending on your screen resolution, the names of each adjustment control may be slightly truncated.

Number fields in DaVinci Resolve can be used as sliders or for typing in a numeric entry.

3 Drag the Contrast control to the right, until the number reaches around 1.2. This will increase the range between the shadows and highlights.

The contrast adjustment works by increasing the shadows and highlights by an equal amount. However, the rancher's's face and her hat still don't seem bright enough. You can modify the highlights using the Highlights number field located in the row of adjustments below the primary corrector. This will brighten the highlights without affecting the shadows, similar to the Gain master wheel.

4 In the adjustment controls below the primary controls, drag the Highlights number field to the right to brighten the highlights until the face and hat appear correct to you.



With the tonal balance set, you can now work on color adjustments. This clip appears too cool or blueish in her skin and on her hat. You can balance the color in a clip for different lighting situations. This is often labeled as white balance in cameras. The temperature control above the primary corrector adjusts a clip to be warmer or cooler.

5 To remove the subtle cool tint in this clip and introduce warmer tint, drag the Temperature (Temp) value to the right until her hat appears more neutral than blue, somewhere around 250.

Finally, you can adjust the overall color intensity.

6 To decrease the color intensity, drag the Saturation value to the left until it reaches around 40.

> **TIP** You can reset any adjustment by double-clicking the name next to the number field.

As always, when you make a significant adjustment, you should compare it to the original image.

7 Click the Bypass button or press Shift-D to see the original image. Click the Bypass button again or press Shift-D to return to the corrected image.

Before (left) and after (right).

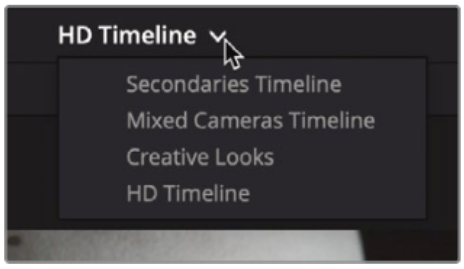
In most color-correction situations, you would likely bounce between the original and corrected image a few times while refining your adjustments. Rarely do you set a control once, compare it to the original, and move on. Color correction is an iterative learning process. It takes time, but the more you explore your options, the more you'll find the adjustments that work best for you.

Using DaVinci Resolve Color Management

So far, we've had it fairly easy in our color-grading process. We worked with a few controls and made the HD clips look better. In your projects, if all you ever deal with is HD clips and output them as HD masters, then you can essentially continue with the process we started in this lesson.

However, filmmaking is technical and at times complicated. Few aspects of the process illustrate this as well as cameras and their various file formats. Each camera manufacturer tries to give you the best-looking image possible by customizing the color palette (Gamut) and tonal range (Gamma). You'll often hear these types of clips referred to as *log clips* due to their logarithmic contrast profiles. The result of recording log clips is that they don't look great on your HD monitor. When using different log clips from different cameras in a single project, you need to manage various gamuts and gamma ranges more efficiently to achieve consistency in your final output. That's where DaVinci Resolve's color management system (RCM) helps.

1 Above the viewer, click the drop-down arrow next to the timeline name to reveal all the project's timelines.



2 Choose Mixed Cameras Timeline.

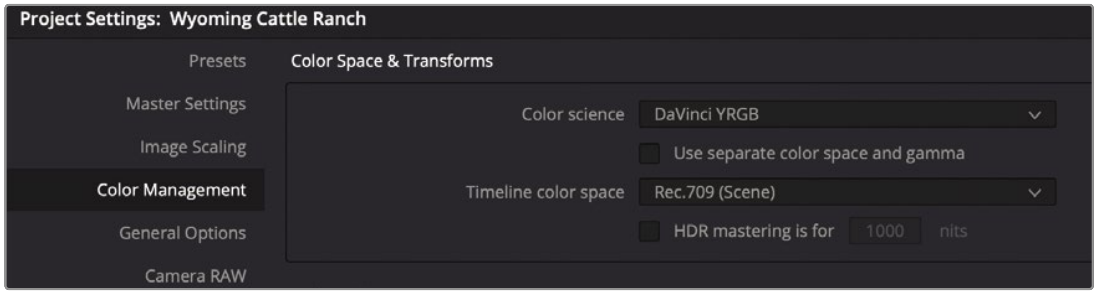
This project contains the HD clips we had in the previous timeline and adds new Wyoming scenery clips. The new scenery clips have HDR gamut and gamma, having been shot with a digital cinema camera.

> **NOTE** These clips were originally captured with a Blackmagic Pocket 4K digital cinema camera but have been modified for downloading and teaching purposes.

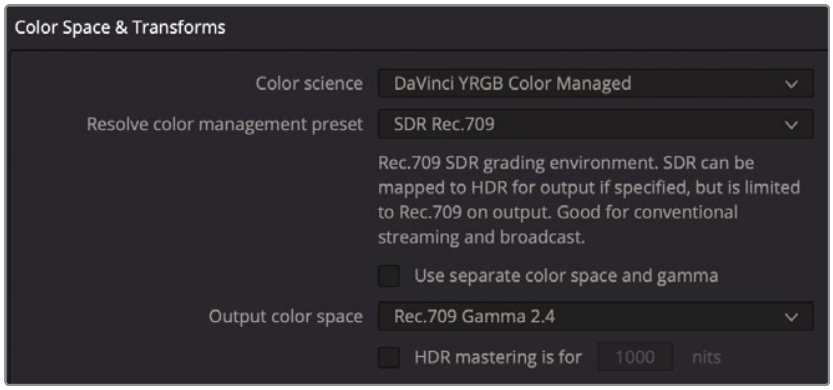
3 In the timeline, click the second thumbnail.

Like many clips from digital cinema cameras, these scenic log clips are not intended to look perfect on an HDTV. Although they have a wide tonal range and a wide color gamut, they look flat and undersaturated. Your HD monitor (or computer monitor as it may be) is expecting HD clips, so it has no idea how these digital cinema camera clips should look. Resolve color management (RCM) is the easiest and most accurate way to unify different clips from different cameras, so they all match your desired output.

4 Choose File > Project Settings and select the Color Management category.

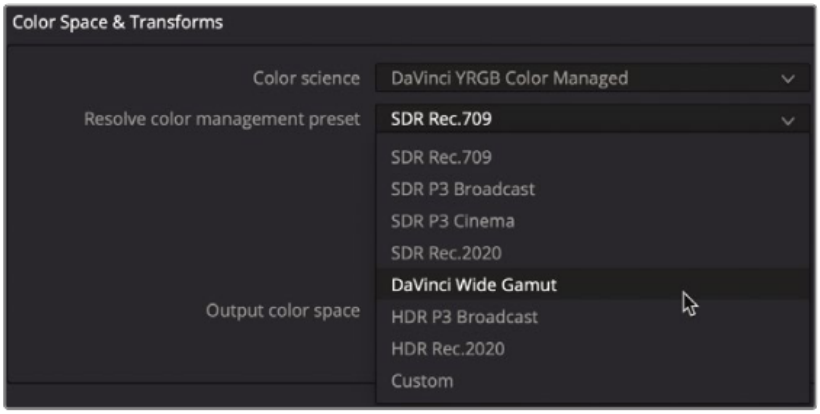


5 In the Color Science drop-down menu, choose DaVinci YRGB Color Managed.



Enabling color management presents a new drop-down menu below the Color Science menu. This preset menu contains several configurations for color management based on your source content and eventual output. The default SDR Rec.709 is the choice for standard dynamic range, HD source media, and output. The media in our timeline is a mix of log HDR (high dynamic range) source media and HD media.

6 In the Resolve Color Management Preset drop-down menu, choose DaVinci Wide Gamut.



Although this preset is still targeting HD output, it is the best choice when using a mix of log and HD clips because it preserves the super bright highlights contained in HDR source media.

The output color space should be set for your final output delivery. Because our project will be output to HD, we'll leave this menu set to REC.709 Gamma 2.4. This is the standard setting for HD video.

7 Click Save to close the settings but keep an eye on the viewer.

> **TIP** You can change the output color space at any time when you are delivering to different display devices. This is one of the main benefits of using a color-managed workflow.

When using DaVinci Resolve color management, some source clip formats like RAW files, as well as some QuickTime and MXF wrapped files include information about the color gamut and gamma. If these metadata tags are present in the files, RCM can automatically read it and automatically apply the correct settings for the source clips.

This is the case with the clips we have now. They are all tagged and color managed, so now they look brighter and more colorful on our HD monitor or computer screen.

However, you will likely have some content that does not include the metadata tags, so let's walk through how you might manually set the Input Color Space for source clips that are not set automatically.

> **TIP** Adding the Input Color Space as a media pool column will display the currently assigned color profile for each clip, whether it is assigned by you manually or automatically by metadata.

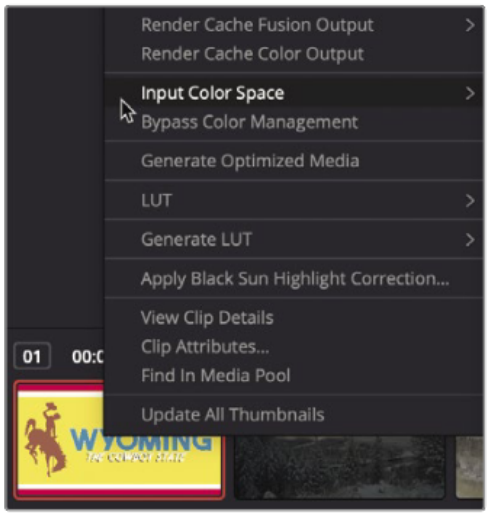
Typically, you want to change the Input Color Space value to match the device that recorded the imported clips. By default, a REC.709 Gamma 2.4 setting is applied to clips without metadata. This is probably suitable for your HD recorded clips, but you will come across other formats.

When you have clips without metadata tags, you can manually set those clips individually from the timeline or in groups from a bin.

8 Click on the first clip in the timeline.

Graphics are usually created using the sRGB color space. You can set the Input Color Space for any clip directly from the color page timeline.

9 Right-click the thumbnail in the timeline and choose Input Color Space > sRGB.



Note that you have not color corrected these clips, although they may appear better. If the clips were shot overexposed, they will appear overexposed. If they were shot with the incorrect white balance, they will display incorrect white balance. All you have done is correct the different gamma curves and color gamuts, so they are uniformly set to suit your HD display device and file output. With that done, you can now begin a more structured color correction process.

Making Automatic Corrections

With a good understanding of how some of the tools operate and our color management in place, let's take a step back and start to look at how you might truly approach color grading one of your projects.

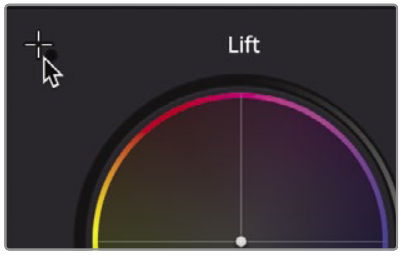
The first phase of color grading a project is to *balance* or *normalize* every shot in your program. Because unforeseen or unavoidable situations occur during production, clips can be recorded with an incorrect color tint, have highlights that are dull, or muddy shadows. Balancing, or normalizing, clips is the process of removing these inaccuracies and inconsistencies from each clip.

Doing so unifies your shots for the creative look you may later apply to them. You can color balance shots using some of the primary controls we've used earlier in this lesson, but let's look at an even easier method: a method that makes DaVinci Resolve's Neural Engine do the heavy lifting.

1 In the color page timeline, click clip 02 again.

You typically start color correction by adjusting the contrast in a shot, setting the darkest and brightest points and removing any color tints. Using the black point picker and white point picker in the color wheels palette, you can make this process more automatic.

2 In the upper-left corner above the Lift color wheel, click the black point picker.



Using this control, you will locate and select the darkest point in the image. It should be in an area that you think represents absolute black in the shot.

3 Move the mouse pointer over the viewer.

An RGB tooltip appears next to the point, giving you a brightness value for the pixel you are hovering over. The values range from 0 (black) to 255 (white). When selecting a black point, you want the red, green, and blue values to be as near to 0 as possible without all displaying 0. If all the values display 0, then there is a chance that there is no brightness information there.

4 Click the darkest area on the left where the RGB tooltip reads just above 0,0,0.

TIP If you need to zoom in to the viewer, position the mouse pointer over the viewer, and scroll the middle mouse wheel.

Clicking the shadow area identifies it as your darkest black point and adjusts other pixels accordingly. It also corrects any tint in the black so that no single color channel dominates in the shadow regions.

Our image will shift slightly darker and slightly warmer. Now, you will do the same for the white point.

5 At the upper left above the Gain color wheel, click the white point picker.

In the viewer, you will locate a bright point in the image and select it. The point should not be the absolute brightest point, but an area you think should be soft white. In other words, you do not want to pick the sun in every outdoor shot but rather the white t-shirt someone is wearing or a white car. In our shot, that might be the white clouds at the top of the frame.

6 Move the mouse pointer over the viewer, and then click somewhere over the white clouds where the red and green tooltip displays 160 or above.

> **TIP** The RGB values that appear next to the pointer have a maximum level of 255. Pixels with red, green, and blue displaying 255 will often be clipped and not contain any information.

Assuming we clicked on the best soft-white pixels, this shot now has good contrast and is also color balanced. You can compare it with the original image by disabling the changes you have made.

7 Click the Bypass button or press Shift-D to see the original image. Click the Bypass button again or press Shift-D to return to the corrected image.

Before (left) and after (right).

When using the black and white point pickers, it's important to click areas you know should be near black and soft white in the image or you risk making the image worse. You also do not want to select areas that are already clipped in the highlights since you'll find there is no image data there. That tends to be the problem with automatic tools. They work perfectly on optimal images but can be less effective when a shot lacks an appropriate white or black point. But how do you know if you selected the right pixels? In most cases, you need some way to check the adjustment more objectively.

Checking Adjustments on Scopes

As an objective way to evaluate adjustments made while color correcting, DaVinci Resolve includes five video signal scopes. You can use the Waveform, Parade, Vectorscope, Histogram, and CIE scopes to check a clip's luminance, exposure, hue, saturation and color space. We'll start by making a few adjustments to a clip based on our eyes and the monitor we are using. Then we'll look at our adjustments on a scope.

1 Click the clip 03 thumbnail to move to that clip.

2 Just based on what you see in the viewer (or on your full-screen display, if you have one connected), adjust the Lift, Gamma, and Gain master wheels to set your shadows, midtones, and highlights until the contrast looks correct to you.

3 Adjust the Gain color balance control to remove any inaccurate color tint that appears in this shot's white highlights (if you think there are any).

Now, we'll look at our adjustments more objectively by using a scope. The scope will also guide us with any additional adjustments we make.