

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.



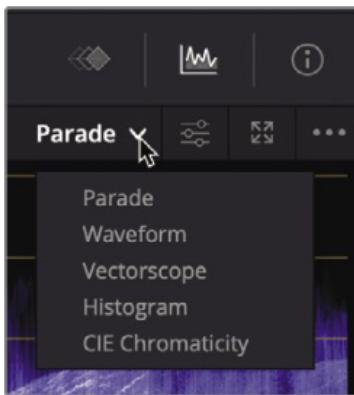
- 2 Just based on what you see in the viewer (or on your full-screen display, if you have one connected), adjust the Lift, Gamma, and Gain master wheels to set your shadows, midtones, and highlights until the contrast looks correct to you.
- 3 Adjust the Gain color balance control to remove any inaccurate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

- 4 Click the Video Scope button to the far right of the toolbar.



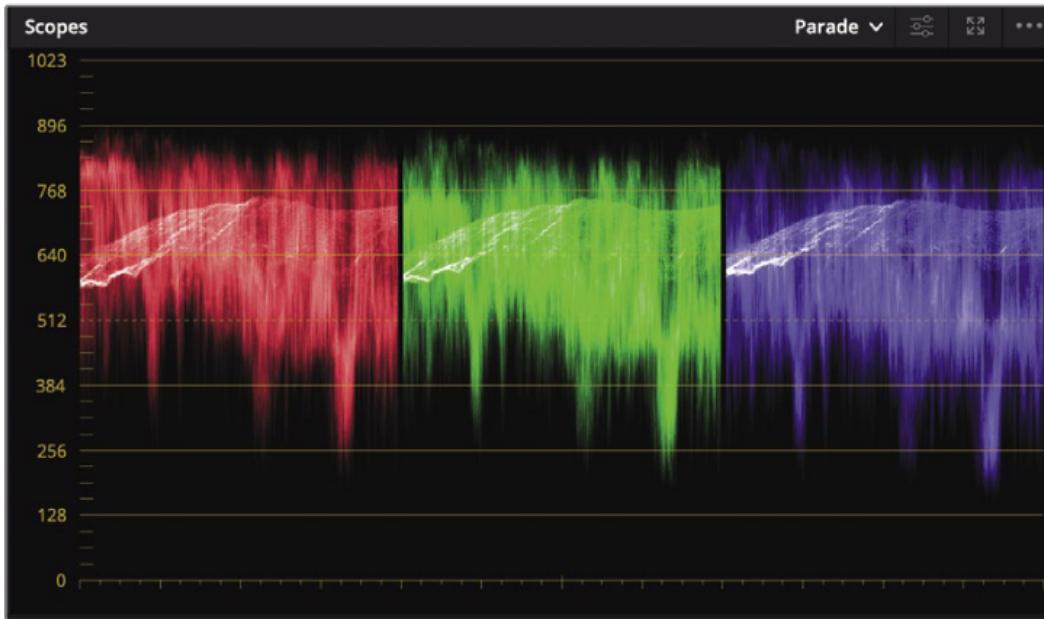
- 5 Click the disclosure arrow to open the Video Scope drop-down menu.



You can switch between the five different scopes using the menu, depending on what you want to monitor.

- 6 Choose Parade.

The Parade scope graphs each color channel individually. The graph is read from bottom to top with absolute black at line 0 and absolute white at line 1023. When balancing shots, the image in the parade, called the *trace*, should not go below 0 or above 1023. Otherwise, the image will clip—cut off parts of the image data—and lose detail.



NOTE Because you made different adjustments than I did, the parade scope in this picture may appear different than yours.

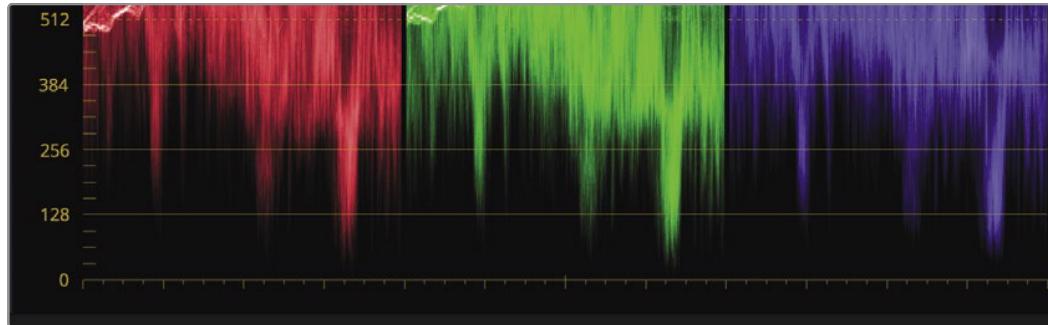
Reading the Parade from left to right, each channel corresponds to the image displayed in the viewer. For instance, the left part of the red, green, and blue trace corresponds to the image's left part. This layout makes it easy to look at the scope and know exactly which area you are evaluating.

TIP You can switch back to the Keyframes Editor and hide the video scopes to free up your graphics card's processor and improve playback performance.

Each region can be adjusted using color wheels and master wheels. When starting to color correct an image, you start with the master wheels to set the tonal range between your black and white points.

In general, the bottom of the trace should fall somewhere between 0 and 128 on the graph. If some elements of the shot are absolutely black, then the trace should fall closer to 0. If the darkest part of your image is more of a dark gray, then it might fall closer to line 128 on the graph. You can fine-tune the Lift and Gain master wheels for this shot, so your trace stretches between just above 0 and just above 896.

- 7 Drag the Lift's master wheel until the bottom of the trace falls just above the 0 line.



- 8 Drag the Gain's master wheel until the top of the trace falls just above the 896 line.

Next, you'll fine-tune the color imbalance, or color cast, in this shot. However, let's discuss a little additive color theory before you evaluate the color. To create pure white using additive colors, you mix an equal amount of red, green, and blue. A white image would have the red, green, and blue traces completely level along the top of the Parade scope. Conversely, pure black would have the three color channels completely aligned at the bottom of the graph. That being the case, you'll use the scope to make color balancing easier.



- 9 If the trace is not even along the bottom, drag the Lift's color balance indicator in any direction until they are all aligned near the 0 line.

Aligning the trace for all three channels along the bottom removes any unwanted color tint that may be in your shadows.

- 10 If the trace is not even along the top, drag the Gain color balance indicator in any direction until they are all aligned just above the 896 line.

TIP Unless you have a completely black or white frame, a scope will always display uneven areas. Use the trace as a guide but use your eyes to make the final decision when performing manual white balance adjustments.

- 11 Gamma is much more subjective. If you feel the image appears too cool or warm, drag the Gamma color balance indicator in the opposite direction to balance the trees, grass, and dark clouds.
- 12 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.

You've quickly created a balanced, neutral color correction using the primary corrector and confirmed them using the scopes. However, some shots may require more specific adjustments. You may need more control over balancing the individual color channels in your shots. In either case, the primary corrector has deeper controls that can help solve these issues.

NOTE DaVinci Resolve's viewers are previews that are not intended to be color-critical displays, especially for projects intended for television broadcast or digital cinema. For those purposes, you can use a Blackmagic Design UltraStudio or DeckLink card to connect to a broadcast or digital cinema calibrated display.

Adjusting Individual Color Channels

A lot of the power in DaVinci Resolve comes from the flexibility of its toolset, which provides many ways to do the same thing. To learn more about the primary corrector toolset, you'll explore another method for creating a balanced correction on a new shot.

- 1 In the timeline, select clip 16.



As in the previous image, this one also requires a tonal and color balance, but instead of using the Color wheels and Master wheels, we'll use the individual number fields for luminance, red, green, and blue below the Lift, Gamma, and Gain to make fine-tuned adjustments..

These controls allow you to make color and luminance adjustments similar to the Master and Color wheels but provide explicit red, green, and blue controls and separate luminance adjustments in the Lift, Gamma, and Gain regions. That being the case, you may find them more effective tools for balancing specific color channels in different regions of a shot. For tonal adjustments, the Y, or luminance bar, allows you to adjust luminance without changing saturation.

This image has very washed out shadows. The scope confirms this by showing the trace very high in the graph. Yet, looking at the image, there are clearly areas that should have darker shadows even in a snowy setting like this. Let's start by setting our black point more appropriately.

- 2 Drag the Lift Y number field to the left until the bottom of the trace in the scope is around the 128 line.



Once again, the darkest areas in the image become darker. The luminance Gain control can be used to set the brightest part of this image.



- 3 To increase the highlights slightly, drag the Gain Y number field to the right until the top of all three trace channels falls just above the 896 line in the Parade scope.

This has added good contrast to our image. Let's now turn our attention to color balancing by balancing the shadows first and then the highlights.

Looking at the image, the shadows appear to have a blue tint. The scope also shows a blue tint in the shadows since the blue trace is higher than the other two channels.

- 4 To balance the shadows, drag the Lift blue number field to the left until the blue trace is more in line with the green and red traces' bottoms in the Parade scope.



- 5 Adjust the Lift red and green number fields until all three trace channels are even along the bottom in the Parade scope.
- 6 To color balance the highlights, drag the Gain red, green, and blue number fields until the tops of all three trace channels even in the Parade scope.

We can go a step further in balancing our shot by adjusting the midtones. Measuring midtones is very difficult on a scope, so it is more of a judgment call on your part.

- 7 If you see the image as too dark or too bright, adjust the Gamma's luminance number field appropriately.
- 8 If you see the image as too cool or too warm in the midtones, adjust the Gamma's red, green, and blue number fields until the image has the right midtone color balance to your eyes.
- 9 Choose View > Bypass All Grades or press Shift-D to see the original image, and then press Shift-D again to view your corrected clip.



Before (left) and after (right).

With these adjustments, the image now has a much better neutral balance and contrast. You did that quickly. Rarely do you set a control once, compare it to the original, and move on. Color correction is an iterative process—adjust, compare, adjust, compare. It takes time, but just like cooking or gardening, the more you explore, the more you find what works best.

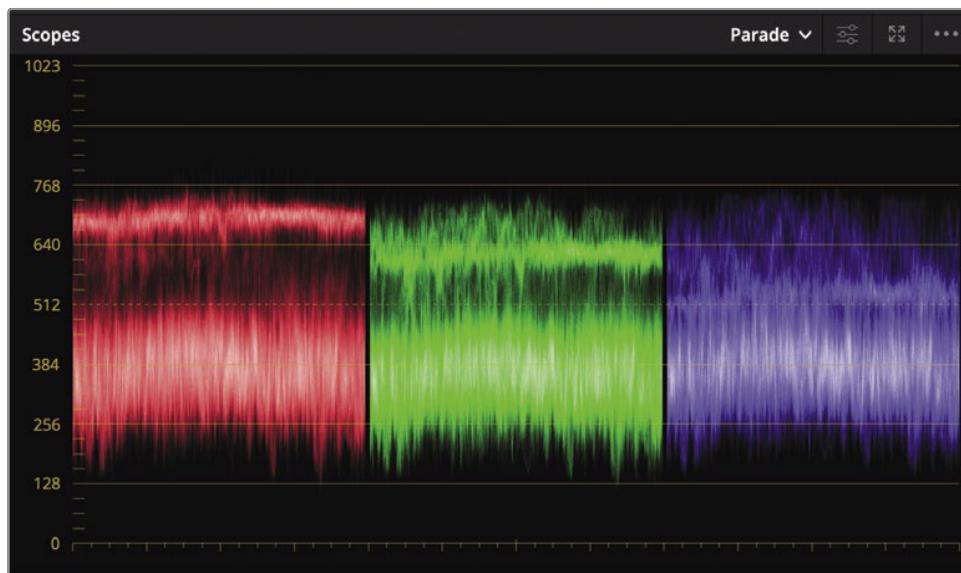
Using Curves for Primary Color Corrections

In this exercise, you'll look at the last method of creating a balanced shot. Using the custom curves, you'll have the greatest degree of flexibility for making tonal and color adjustments, but this also requires a bit more finessing.

- 1 Select clip 04.



Looking at the image, you might not be able to tell that there isn't a lot of contrast, but looking at the scope, you can see how the trace is all bunched up in the middle of the graph. That is a common trace appearance for low-contrast images.



You will approach this shot in the same way you did the previous shots: correcting black point, white point, and color.

NOTE On computers with lower screen resolution, you may have to click the Curves button to display the curves palette.

The custom curve graph is a plot graph in which you can perform incredibly flexible adjustments on specific tonal ranges of images. The X axis represents the image's tonal values going from the darkest shadows on the left to the brightest highlights on the right. Along the Y axis are the output, or offset, values with darker adjustments placed lower in the graph and brighter adjustments placed higher.



TIP In the color page, each clip has its own undo/redo history. Choosing Edit > Undo will undo different steps depending on which clip is currently selected.

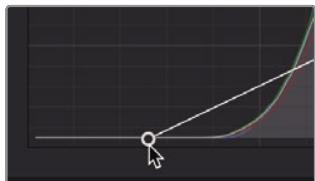
The trees' shadows should be fairly dark but arguably not completely black, so we will set the black point in the custom curve accordingly.



- 2** Position the mouse pointer over the control point located in the lower-left corner of the custom curve graph.

This point is the black point control. Like the Lift master wheel in the primary corrector, adjusting this point raises or lowers the black point in a clip.

- 3** Drag the point to the right until the trace in the Parade is midway between the 0 and 128 lines.



Moving the black point to the right darkens the darkest parts of the image.

- 4** Position the mouse pointer over the control point located in the custom curve graph's upper-right corner.

This point is the white point control. Like the Gain master wheel, adjusting this point raises or lowers the white point in a clip.

The highlights in this shot are fairly dull and could use some brightening.

- 5** Drag the point to the left until you have brighter snow, and the tops of the trace are just reaching the 896 line.



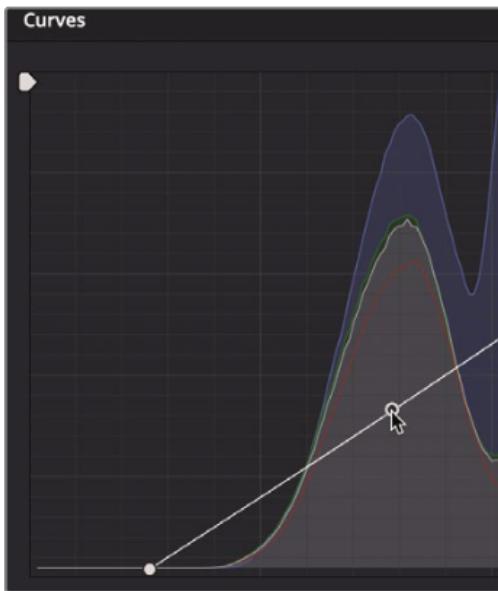
Dragging the control point to the left brightens the brightest parts of the image.

You can further increase contrast by darkening the darker midtones and brightening the brighter midtones. Stretching the distance between the two ranges will increase the contrast. This is one of the main areas where the curves interface gives a lot of flexibility.

You can precisely control the contrast by adding two control points to the curve line: one point in the lower shadows area and one in the upper highlights.



- 6 Click the curve line directly over the large hump on the histogram's left side, about one-third of the way up from the bottom.



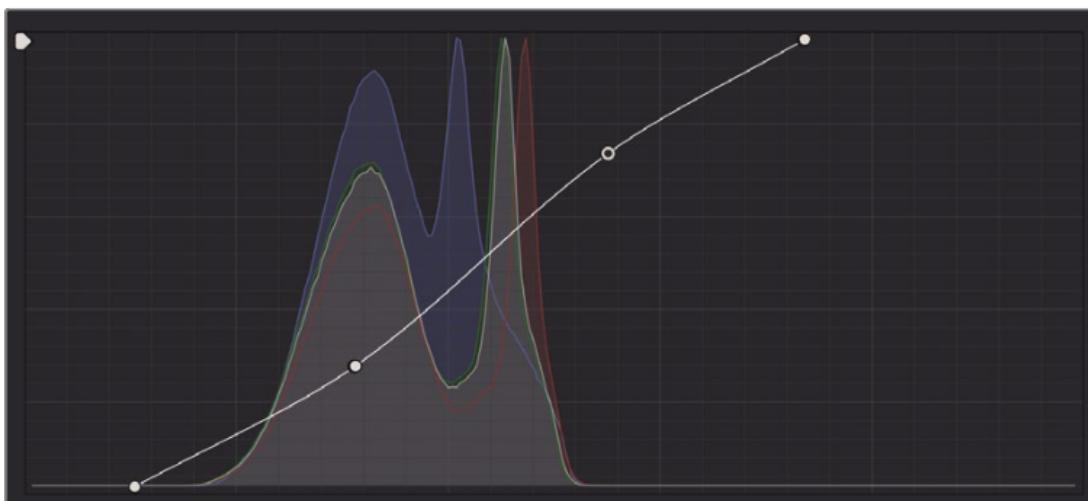
This adds a point to manipulate the shadows. The large hump in the histogram shows you where most of the pixels are in the lower shadow range of this image.

- 7 Add a point about a third of the way down from the top of the curve line.

This adds a point to manipulate the highlights like the snow on the ground.

- 8 Drag down the lower control point until the image's shadows look sufficiently dark but not crushed.

- 9 Drag up the upper control point until the snow is brighter but you do not lose the foreground grass.

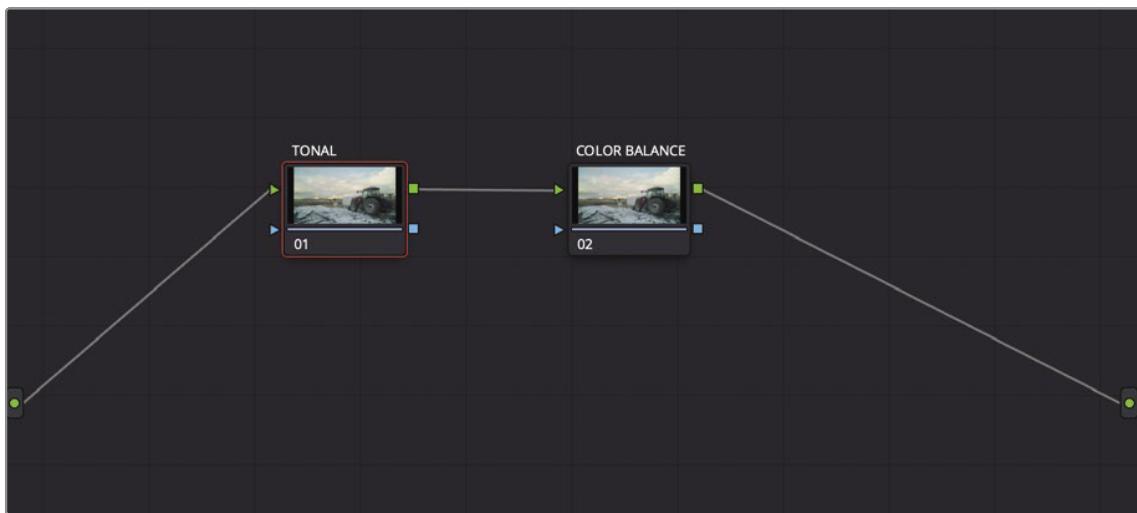


- 10** Choose View > Bypass All Grades or press Shift-D to see the original image, and then press Shift-D again to view your corrected clip.

Moving both points into this S-shaped curve is a typical form of adding contrast using a curve control. It offers more flexibility than the Contrast control or even adjusting the Lift and Gain master wheels. Using the custom curves, you can define how much shadows are modified and how much highlights are modified, independently.

Understanding Nodes

Like the Fusion page, the color page uses nodes for multiple color corrections. Instead of stacking color corrections and effects as layers, you can add as many color correctors and filter effects as you like using nodes. You can view the nodes as a color correction flowchart for each individual clip. The clip, or the input, starts at the left, flows through each node, and ends on the right side of the screen with the corrected image output. Unlike Fusion page nodes, however, each node in the color page is a full DaVinci Resolve color corrector and not an individual effect that performs only one type of image processing.



The adjustments you made in the preceding exercises were performed using the first node, which is provided for you automatically in the Node Editor. As you create more sophisticated corrections, you can add more nodes that target different parts of the image or add effects.

Using Nodes to Separate Corrections

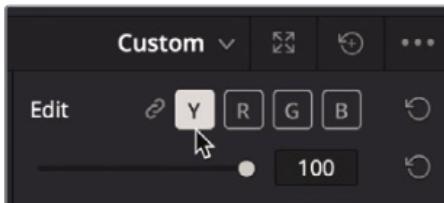
Sometimes, as you balance shots you may decide adjustments are best performed by isolating tonal problems from more complex color cast problems. You can separate the two parts of the balancing process using nodes.

- 1 Click on the clip 11 thumbnail to move to that shot in the timeline.



Like the primary corrector's number fields, you can adjust luminance separately from the RGB channels using the curves. We will start with tonal adjustments, but unlike the last exercise, we will keep color saturation separate.

- 2 On the right side of the custom curves, click the Y button to isolate the luminance channel.



The tractor's shadows are fairly bright, so we will set the black point in the custom curve accordingly.

- 3 In the lower-left corner of the custom curve graph, drag the black to the right until the shadows are more black than gray, and the scope has the trace just barely above 0.

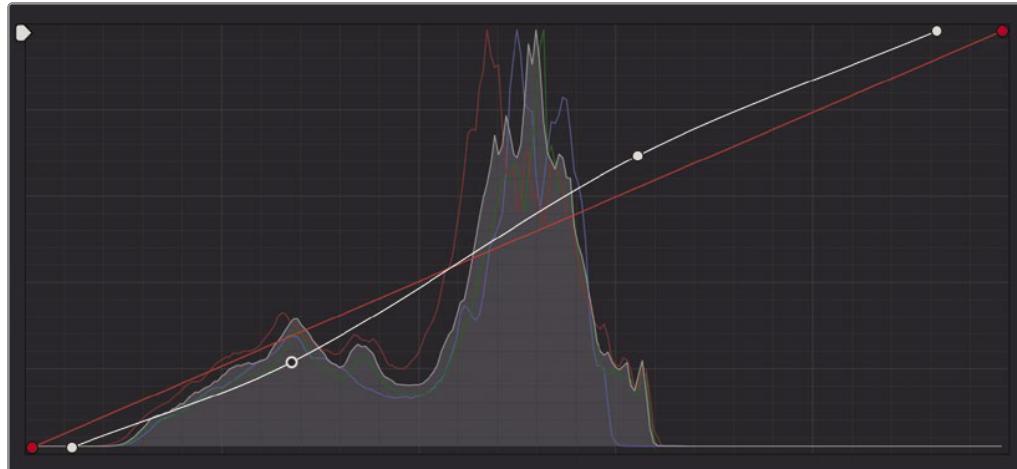
Like the Y number field in the Lift primaries corrector, adjusting this point raises or lowers the black point in a clip without modifying the shadow's saturation.

- 4 In the upper-right corner of the custom curve graph, drag the white point to the left until the clouds are a bit brighter without losing detail. The trace in the Parade scope should end up just below the 1023 line.

Like the Y number field in the Gain primaries corrector, adjusting this point raises or lowers the white point in a clip without modifying the highlight's saturation in the highlights.

Lowering the black point and raising the highlights has increased the contrast in this shot. We can increase contrast a bit more by separating the lower midtones from the higher midtones.

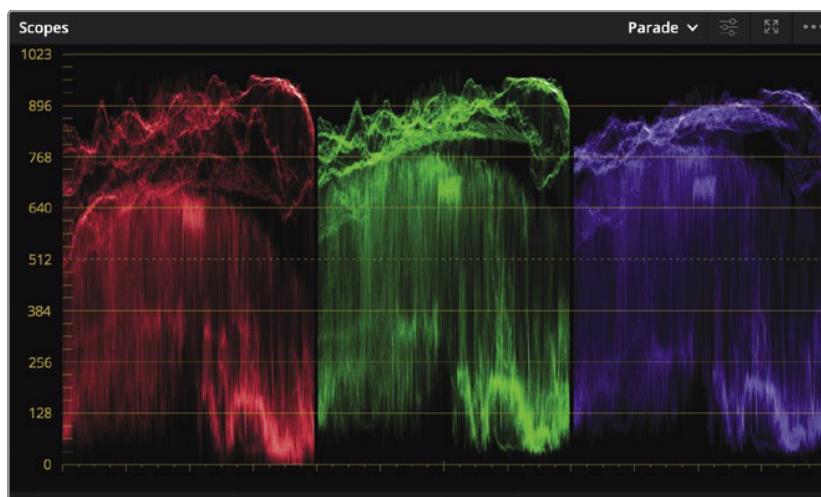
- 5 Add a point along the curve line, about a third of the way up from the bottom. Then add another about a third of the way from the top.
- 6 Create an S-curve using the two new control points you added until you have added more contrast into this shot but not blown out the clouds or crushed the dark areas in the tractor shadows.



- 7 Choose View > Bypass All Grades or press Shift-D to see the original image, and then press Shift-D again to compare your corrected clip to the original.

Now you can work on color balance by adjusting the curve for the individual channels.

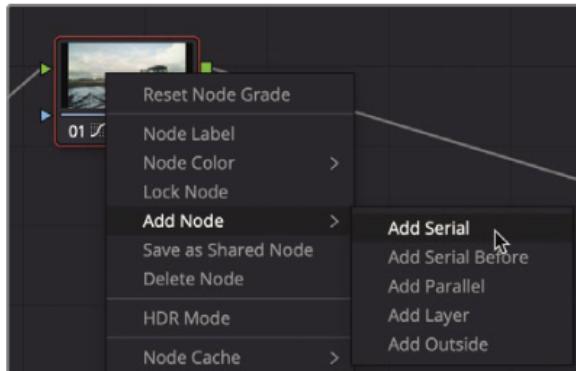
Looking at the Parade scope, you can see that the shadows in the red channel trace appear slightly lower than the blue and green channels. This indicates that there is a blue/green tint in the shadows.



At the top of the scope, the red and green traces appear higher than the blue trace. This indicates there is a red/green tint in the highlights.

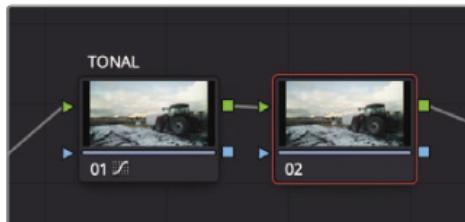
Instead of combining the color adjustments with the tonal adjustments, we can separate them into two nodes. This will allow us to compare the color adjustments without bypassing the tonal correction we have made.

- 8 In the Node graph, right-click node 01, and in the menu, choose Add Node > Add Serial.



You can think of a node as a transparent layer stacked on top of your clip. When you make any color adjustment, those adjustments are applied to the node, and not to the clip. As a result, every adjustment in DaVinci Resolve is nondestructive because you can enable and disable a node at any time. We'll use the first node for our tonal adjustments and the new second node for color cast issues. Let's start by naming the nodes appropriately.

- 9 Right-click over node 01, choose Node Label, and then type **TONAL**.



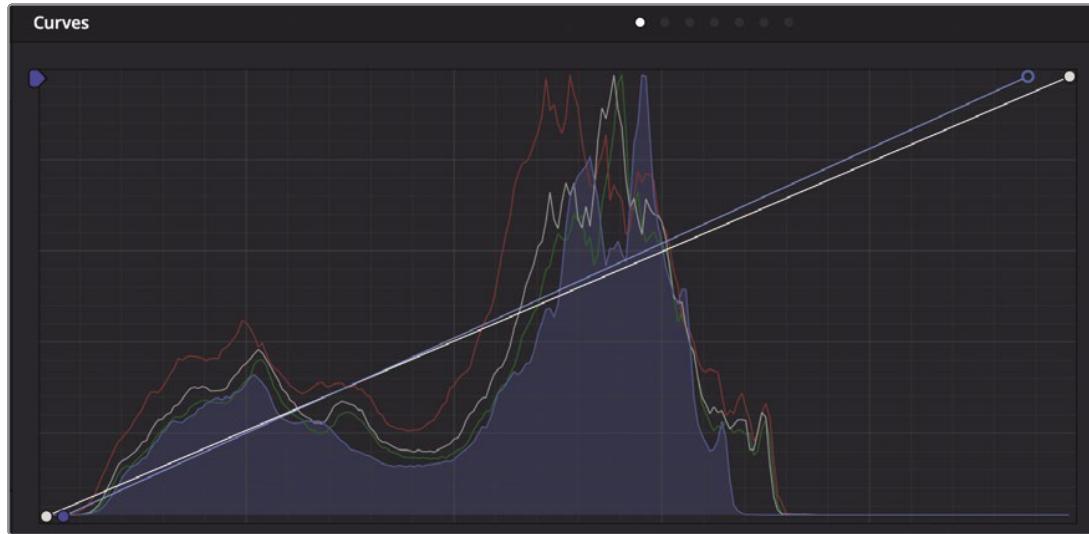
- 10 Right-click over node 02, choose Node Label, and then type **COLOR BALANCE**.

Since node 02 is the highlighted node, any adjustments you make will be contained in that node.

- 11 In the curve controls area, click the B button to activate the blue curve.
- 12 Drag the blue channel's black control point to the right just a hair until the tractor's shadows have less of a red tint. The bottom of the blue trace in the Parade scope will drop to align with the red trace.

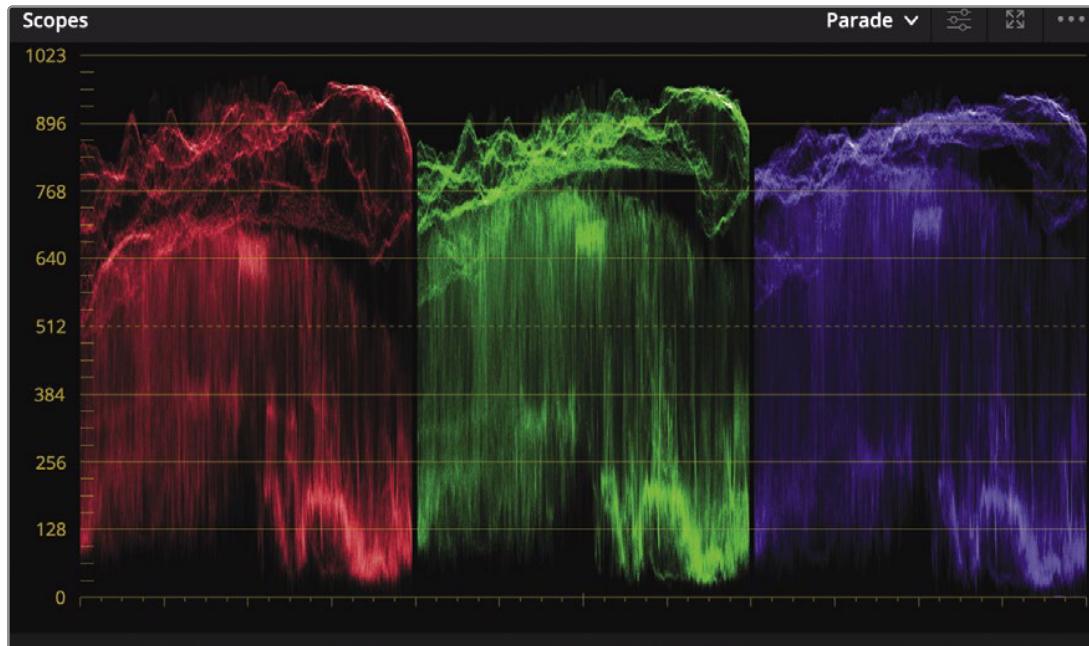


- 13** Drag the blue channel's white control point to the left until the blue trace in the Parade scope aligns at the top of the graph with the red trace.



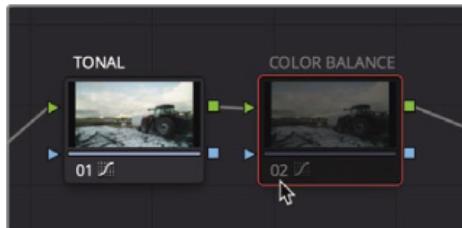
This image still has a green tint in the shadows that need to be removed.

- 14** Click the G button in the custom curves and drag the black point to the right until the shadows have no color tint, and the bottom of the green trace in the scope aligns with the red and blue traces.



Since you have two nodes, you can disable the color balance node without disabling the tonal balance. This will give you a better idea of how each node is changing the image.

- 15** Click the number 02 in the lower-left corner of the node or press Command-D (macOS) or Ctrl-D (Windows) to see the image without the hue curves adjustment. Press Command-D (macOS) or Ctrl-D (Windows) again to view the corrected clip.



Sometimes balancing the white point, black point, and color casts for shadows and highlights is not enough. Often, you will come across color casts in midtones as well. The curves are distinctly capable at correcting color casts in midtones because you can add control points anywhere along the line to pinpoint specific tonal regions that need correcting. You can even pinpoint the area you need to adjust by selecting it in the viewer.

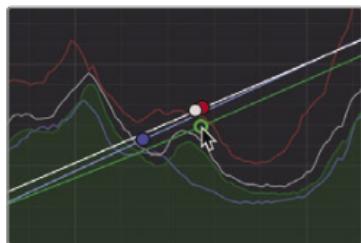
- 16** In the viewer, click on the grass area on the left side of the image.



The grass in this shot has a green cast to it that needs to be corrected. Although you are not specifically isolating the grass in the shot by clicking in the viewer, you are placing the control point precisely along the curve line where the color for that grass is located.

Adding a point here adds a point to all the curve lines, not just the green. However, you can drag just the green point to adjust the green channel in the darker midtones where most of the grass color is located.

- 17** Drag the green control point down very slightly until the image no longer has a significant green tint in the grass.



Dragging the point lower in the graph decreases the green in the midtones by adding more red/magenta.

To compare the changes you just made, you can disable node 02, the node in which the changes were made.

- 18 Click 02 in the lower-left corner of the node or press Command-D (macOS) or Ctrl-D (Windows), to see the image without the hue curves adjustment. Press Command-D (macOS) or Ctrl-D (Windows) again to view the corrected clip.



Before color balance (left) and after color balance (right).

Nodes allow you to organize your color adjustments in flexible ways. On some simple grades, you may use only one node. For complete grades, you may add a dozen nodes. Using nodes, you can quickly navigate to the exact adjustment you are looking for and monitor your changes.

Copying Corrections between Similar Shots

Color correcting moving images gets very challenging the moment you edit multiple angles together into a single timeline. Not only does each shot need to look correct on its own, but it also needs to look correct when compared to the shots immediately before and after it. This process of blending the look and feel of two or more shots is called shot matching.

The point of shot matching, or scene balancing, is simple: in real life, as you glance around, perhaps while having a conversation, you'll notice a consistency to what you see. Color saturation, skin tone hues, and brightness levels don't dramatically alter from glance to glance unless some external event forces the lighting to change. (For example, a light is turned on or clouds cover the sun.) If you want to maintain the illusion that your stories are real, then you need to mimic this consistency by matching shots and balancing your scenes.

In this exercise, you'll explore a few of the simplest tools that DaVinci Resolve provides for moving a correction from one clip to another. You'll use these tools to create a seamless flow of sequential shots.

- 1 In the thumbnail timeline, select clip 06.



This wide shot of a snowy field already has a balanced correction applied to it.

- 2 In the thumbnail timeline, select clip 07.



This is the second shot of the snowy field with the barn. One of the simplest shot matching situations is when you have clips that were recorded at the same time using the same camera. That's the situation you have with clips 03 and 04. Because clip 06 is already balanced, you can apply the same correction to the close-up shot on clip 07.

- 3 Select clip 06 and choose Edit > Copy or press Command-C (macOS) or Ctrl-C (Windows) to copy the node's settings.

- 4** Select clip 07 and press Command-V (macOS) or Ctrl-V (Windows) to paste the node's settings.

Copying and pasting works with one node, so the selected node's adjustments from clip 06 is copied and ready to be pasted onto the selected node in clip 07.

As long as you are only dealing with a single node, then copy and paste is quick and easy. Now let's look at a method that can handle more than a single node.

- 5** Select clip 11.



This is the shot of the tractor that you balanced using two nodes. If you want to copy and paste an entire grade, there is an equally simple method.

- 6** Select clip 12.



- 7 Move your mouse pointer over clip 11's thumbnail and click with the middle mouse button.

When a clip is selected, clicking over another thumbnail using the middle mouse button copies the entire grade from the clicked thumbnail onto the selected thumbnail. The two nodes used to grade clip 11 are copied onto clip 12.

Saving and Applying Stills

Instead of copying and pasting nodes from one clip to another right on the spot, you can save your grades into the gallery and recall them whenever you need them. Saving stills into the gallery has a few benefits over simple copy and paste. Most importantly, it allows you to compare the saved graded still with any clip in your timeline.

- 1 Select clip 08, which shows the two ranchers already balanced.



You can save the grade created on this shot by saving a still into the gallery.

- 2 Right-click in the viewer and choose Grab Still.



A reference still image is saved into the gallery. The still image also contains all the instructions to rebuild the correction for that shot. It's helpful to name these stills, so you will know later exactly what they do.

- 3** Right-click the still, and choose Change Label, and name the still **RANCHER BALANCED**.



Gallery stills make it easy to apply an entire correction to one or more clips.

- 4** Click clip 14.



This is another shot of the two ranchers, possibly in the same setting, so it should receive the same balance treatment as the first.

Before applying the grade, you can preview it on any clip in the timeline using the still in your gallery.

- 5** To preview the grade from the still on clip 14, hover your mouse pointer over the still thumbnail and move it back and forth.

The viewer will show you the currently selected clip in the timeline using the grade of the still you are hovering over. If you like what you see, you can apply the grade.

- 6 In the gallery, right-click the RANCHER BALANCE still and choose Apply Grade.



The grade represented by the still in the gallery is applied to the current clip. If only getting consistency across multiple clips were that easy! These two clips could have been captured in the same room with the same people, but it may have been on two different days and at two other times. The lighting can be totally different between these two clips, which would make the grade appear different. You need to compare the two clips, and you need to do it more efficiently than clicking back and forth between them.

- 7 In the gallery, double-click the RANCHER BALANCE still to create an image wipe.



After double-clicking a still in the gallery, by default, a vertical split appears in the viewer. The shot from the timeline (thumbnail 16) is on the left. The selected still in the gallery is on the right.

- 8** Choose Workspace > Viewer Mode > Enhanced Viewer or press Option-F (macOS) or Alt-F (Windows) to expand the viewer.

This gives you a better view when you do not need access to the Node Editor or gallery.

- 9** In the viewer, drag to the left to position the wipe over the woman rancher's hat.



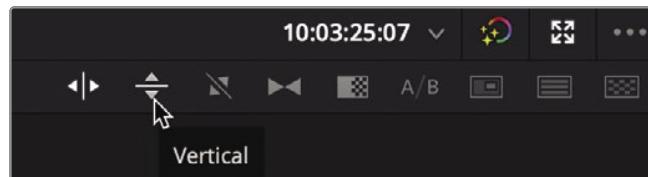
By dragging the image wipe back and forth, you will see that the timeline clip appears darker and a bit cooler.

Also, notice that the Parade scope shows the black levels fairly even but the highlights being much lower in clip 16. Because the timeline clip has lower highlights than the reference still, you can use the Gain master wheel in the color wheels to brighten them up.

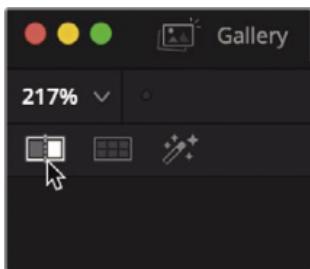
- 10** Using the Gain's master wheel, drag to the right until the hat in the clip matches the brightness of the hat in the reference still. Use the Parade scope to guide you as you match the brightness.

Now that the clip's overall tonality matches the reference, it is noticeable that the clip is cooler. You can match their skin tones a bit more by introducing some red into the midtones. You get a better view by switching from the horizontal wipe.

- 11** Above the viewer, click the Vertical Wipe button.



- 12** In the viewer, drag the wipe so that you can see the male rancher's face from both the clip and the reference still.
- 13** Drag the Gamma's color balance indicator toward red until their skin tones match the reference.
- 14** To disable the image wipe, click the Image Wipe button in the viewer's upper-left corner.



- 15** To exit the enhanced viewer, choose Workspace > Viewer Mode > Enhanced Viewer or press Option-F (macOS) or Alt-F (Windows).

Shot matching is made easier when you start using the gallery and reference stills to help your analysis and inform your color-correction moves. You should also use the scopes to minimize any visual quirks because your visual perception naturally tends to force the shots to match. The combination of reference stills and scopes will make the shot-matching process more accurate, giving your entire project perfect color continuity.

Lesson Review

- 1** In the color page, what does the 1023 line on the Parade scope represent?
- 2** True or false? Custom curves can adjust only the red, green, and blue channels.
- 3** How do you save a still to the gallery?
- 4** True or false? By adjusting the Lift master wheel, you are primarily modifying the shadows tonal region of the picture.
- 5** What does double-clicking a gallery still do?

Answers

- 1 The 1023 line on the Parade scope represents pure white. Anything above the 1023 line is clipped and loses detail.
- 2 False. You can adjust luminance as well as the red, green, and blue channels using the custom curves in the color page.
- 3 You can save a still to the gallery by right-clicking the viewer and choosing Grab Still.
- 4 True. Adjusting the Lift master wheel primarily modifies the shadows tonal region of the picture.
- 5 Double-clicking a gallery creates a split screen in the viewer, with the timeline clip on the left and the still image on the right.