PART 9

Color

Chapter 112

Introduction to Color Grading

For over thirty years, DaVinci has pioneered the development of color correction hardware and software designed to enhance visual images acquired from film and video. This release of DaVinci Resolve possesses our newest and most evolved professional color correction tools yet. However, for all its technological sophistication, DaVinci Resolve is merely a tool that requires the hands of a skilled artist to realize its full potential.

Subsequent chapters of this user manual cover the DaVinci Resolve grading tools in the Color page in great detail, but before getting into the specifics of color balancing and contrast adjustment, Power Windows, and Custom Curves, it's important to step back and consider what these tools are for, and why you're learning to use this application in the first place.

This introduction is for those of you who are new to this process we call color correction, or color grading. If you're a veteran colorist then you might want to skip ahead, but if you're just starting out, the following sections are intended to describe the many goals of color correction, and how the DaVinci Resolve toolset has been designed to address them; making it fast and efficient to alter images in innumerable ways as we elevate raw footage to cinematic art.

Contents

The Goals of Color Correction

If reality is a fire hose of visual information, then digital cinema and broadcast would be represented by a garden hose. Color correction, therefore, could be considered the process of choosing which parts of the fire hose of raw image data to fit into the garden hose of our displays in order to create a pleasing image for the viewer.

Maximizing the Look of Your Media

Clearly, the most fundamental aspect of the color correction process is that of making every clip look its best. While the job of the cinematographer is to light and expose the image with an artistic intent, your job is to realize this intent by making adjustments to the color and contrast of the image, so that the final result is as close to what the director and cinematographer had in mind as is humanly possible. In the process, you have the opportunity to overcome inconsistencies with exposure and white balance that were, for various reasons, unavoidable. Furthermore, you can make subtle adjustments to add warmth or contrast that was not available during the shoot, but that the cinematographer would have liked.

Increasingly, color correction is seen as a critical stage in the post-production process. For example, the newer generation of digital cinema cameras are capable of shooting raw colorspace image data, or RGB image data with a log exposure, in order to preserve the maximum amount of image data for manipulation during the color correction process. However, when you acquire image data this way, it must be transformed into a viewable image via color correction in the same way that film negative must first be developed and printed to positive film.

Log encoded source

Normalized and corrected

Source footage courtesy of Gianluca Bertone DP, www.bertonevisuals.com

Of course, there are also situations in which you may find it necessary to attempt to fix source media with far more substantial problems in color and exposure. In these cases, the tools exist to make far more involved adjustments to the image; however, the quality of your results will depend heavily on the data quality and "latitude" of your source media.

For example, Blackmagic URSA, ARRI ALEXA, and RED DRAGON cameras record quite a bit of image data, making extreme corrections far more possible than more heavily compressed camera formats such as the Canon 5D. However, in either case, DaVinci Resolve provides the tools to process images in many different ways to adjust the image for a better look.


Underexposed source

Balanced and gain corrected

Whether clips need changes large or small, the primary DaVinci Resolve toolset adjusts the characteristics of hue, saturation, and contrast in a variety of ways. In the Color Wheels palette, Color balance wheels let you adjust all three color channels at once, altering the color temperature of the scene at specific ranges of tonal detail referred to as lift, gamma, and gain. Alternately, the slider-based Primaries Bars mode lets you make the same kinds of controls via independently adjustable red, green, and blue lift, gamma, and gain controls.
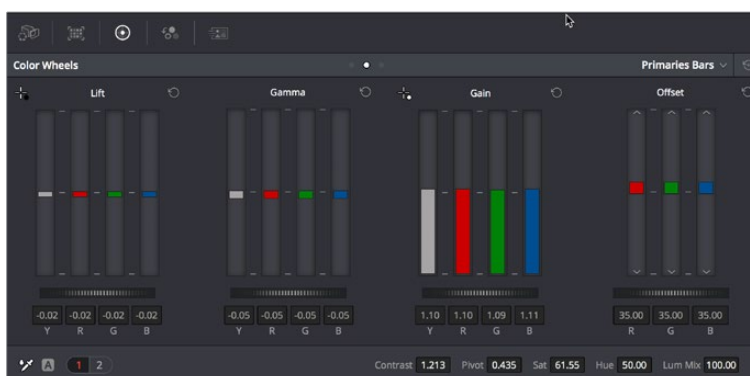
Primary correction wheels, Primary correction bars

All of these controls let you adjust the color tone of the shadows, midtones, and highlights independently from each other.
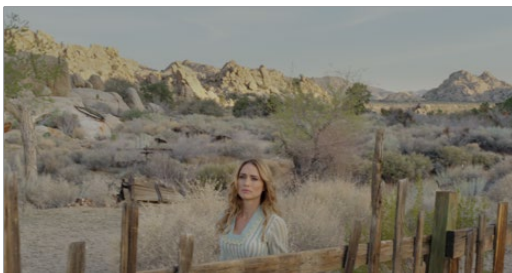

Cool look

Warm look

Meanwhile, the Master Lift, Gamma, and Gain wheels work together to let you alter image contrast in different ways: deepening shadows, lightening highlights, and brightening or darkening the midtones in between to create whatever image tonality you prefer for a given scene.

High contrast

Low contrast

Source footage courtesy of Gianluca Bertone DP, www.bertonevisuals.com

Separate saturation controls let you increase or decrease color intensity throughout the scene, while the Lum vs. Sat and Sat vs. Sat curves give you the ability to fine-tune saturation very specifically.

High Saturation

Low Saturation

For more information on these controls, which are essential to the color correction process, see Chapter 117, "Primary Grading Controls."

Emphasizing What's Important

Another important aspect of the color correction process is the ability to make adjustments to emphasize or de-emphasize specific elements within the frame. It's similar in concept to equalization in audio mixing, in that you're choosing which color values to boost or suppress using a variety of techniques.

This can be done to direct the viewer's gaze, for example by surrounding a specific part of the image with a Power Window, which lets you restrict specific adjustments made to the inside and outside of the Window's shape.

Drawing a window to isolate a region of the picture to highlight

Specific alterations can also be made to prevent audience distraction. For example, a low-saturation monochromatic tint may be a pleasing look overall, but in the soft wash of color, the viewer might lose track of the watch that's preoccupying the protagonist. Using tools such as the Hue curves and HSL Qualifier, you can quickly and easily tune the color of the woman's hands and of the watch to guide the viewer's eye, and bring some needed depth to the scene.

Source image

Curves and HSL qualification used to
distinguish hands and highlight watch

For more information on Power Windows, see Chapter 120, "Secondary Windows and Tracking."
For more information on Hue curves, see Chapter 118, "Curves."

Audience Expectations

There is another family of tools, the HSL, RGB, and Luma Qualifiers, that provide even more specific control, and they're useful for adjusting ranges of color to either play into or against the audience expectations for color in a scene. Substantial research into what has been termed "memory color" shows that people have finely tuned expectations for the hues of particular subjects, such as flesh tone, foliage greens, and sky blues. Deviation from these expectations can create a sense of something being not quite right, which can be either detrimental or beneficial, depending on your goals for a particular scene.

HSL Qualification is effectively a chroma keyer that lets you sample the image to create a key that's used to define where to apply a specific correction. For example, if you're happy with the rest of the image, but the skin tone of the actor has an unhealthy green tinge to it as a result, you can isolate the color of that actor's skin and adjust it to a healthier hue.

Source Image

HSL qualification on the skin

Skin now has warmer grade

Another common example is the adjustment of skies. If you're aiming for a gorgeous summer day, a washed out sky in the source media can be a bit of a bummer. However, using qualification it's easy to isolate that wedge of blue, then push and pull it into just the right amount of summertime joy.

Originally graded scene

HSL qualification of the sky

Corrected and sky enhanced

For more information on using qualifiers, see Chapter 119, "Secondary Qualifiers."

Balancing Scenes

It's rare when the uncorrected shots of a scene match one another perfectly. Even the most carefully exposed angles of coverage can have small variances that need to be evened out. On the other end of the spectrum, run-and-gun programs using available light often result in edited scenes with huge changes in lighting and color as each shot cuts away to the next.

Small or large, unintended variations from one shot to the next can call undue attention to the editing, and jar the audience's attention in ways that throw them out of the program. Evening out these differences and balancing the clips in each scene to match is another of the fundamental tasks of the colorist. You know you're finished when the color in the scene flows unnoticeably from one clip to the next.

DaVinci Resolve has a variety of tools that you can use to help you compare images with one another, the most important of which is the Gallery, in which you can save still images of clips that you can then compare to other clips using an adjustable split screen.
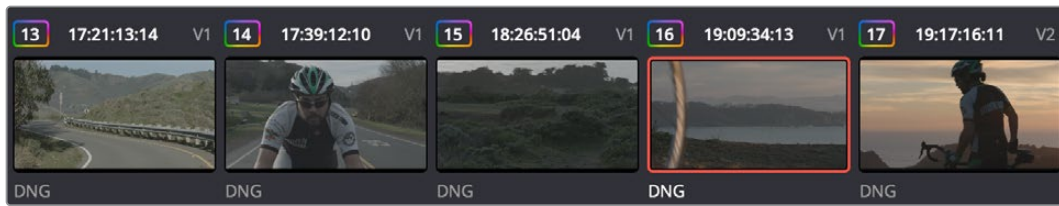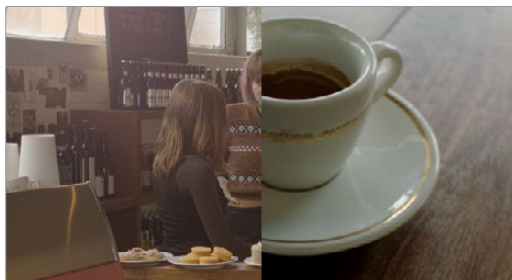
Timeline thumbnail view of unbalanced clips
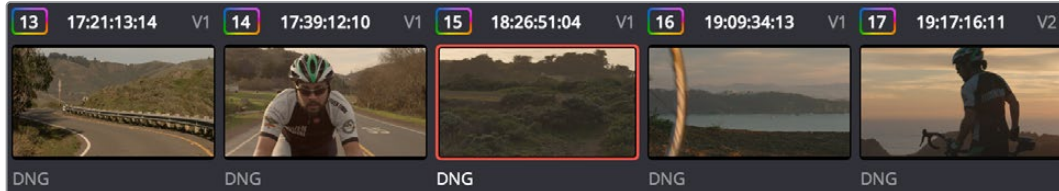
Thumbnail view of balanced clips

By using the Gallery to play stills, either split or whole (flipping back and forth between the clip you're adjusting and the still), it becomes easier to use the extensive DaVinci Resolve toolset to match the color and exposure of every clip in a scene.
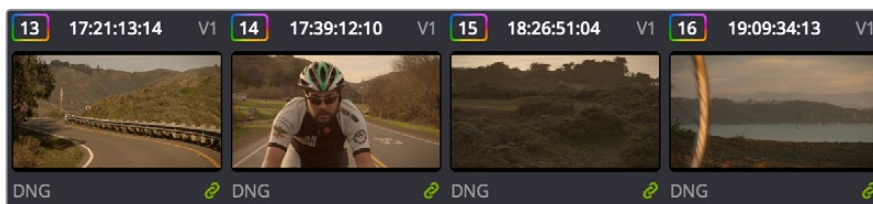

Split screen of two shots

Left image corrected to match right

An additional set of features let you manage grades by copying them from clip to clip, or by linking similar clips, either automatically, or manually using groups.

Link icon indicates clips are grouped for grading

For more information on using the Still Store, see Chapter 113, "Using the Color Page." For more information on grade management, see Chapter 123, "Grade Management."

Adding Style

Of course, it's not all about subtlety and correction. It's often appropriate, when grading music videos and commercials, for instance, to add some radical style to a piece. Here, too, DaVinci Resolve provides an abundance of features for manipulating unexpected aspects of the image; for example, by abusing the Custom Curves to create the illusion of chemical cross-processing.

Custom Curves controls
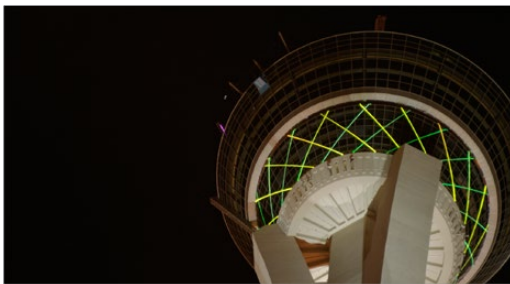

Original image

Image enhanced with Curves

DaVinci Resolve's node-based image processing makes it possible to use more exotic node structures to create effects using composite modes, such as a colored glow generated by adding two differently graded versions of the same image together using a Layer node.

Node tree adding two different treatments together
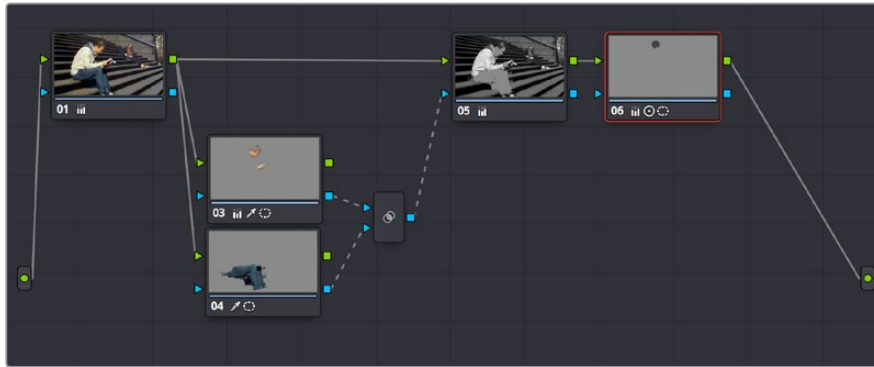

Original image
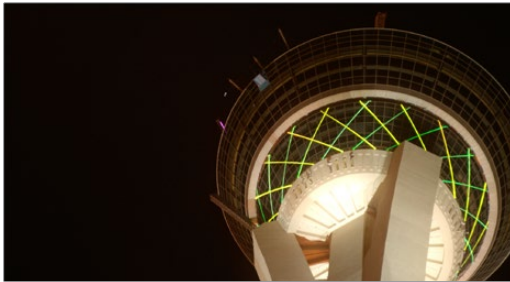
Enhanced and balanced final

You can also create complex node trees to build specific mattes, to use for isolating specific elements of the image. For example, if you wanted to isolate an actor in color against a background turned monochromatic, you can create multiple keys (pulled via HSL Qualification) and combine them using a Key Mixer node to build that effect.

Node tree to isolate the man's face and clothes

Original image

The final effect, desaturating everything except for the man

Finally, DaVinci Resolve doesn't just have tools governing color and contrast. A Blur palette provides controls over blurring, sharpening, or adding mist to all or part of the image. When combined with the other tools that are available for isolation and color adjustment, these are powerful additions to your creative arsenal.

Defocus effect created in real time

For more information on all of these features, see Chapters 106 through 124 of this manual.

Quality Control

Lastly, it's important to keep in mind that, for all the creative possibilities that DaVinci Resolve affords, it's still important that the final deliverables that you give to your client has appropriate signal levels relative to their requirements. In particular, programs destined for broadcast have specific outer boundaries of luma and chroma that you must not exceed, or you'll risk having a show rejected for QC (quality control) violations.

However, even if you're not delivering a show for broadcast, it's important to be aware of the mathematical limitations of a digital video signal to make sure you're not clipping or crushing image detail through overzealous adjustments that you may, in fact, want to preserve.

For example, if you take a look at the next two images, you can see the perils of overzealous adjustments when compared to a clip that, while graded creatively, has been adjusted with respect to the mathematical boundaries of image data.

Image graded to preserve detail in highlights

Image graded with highlight detail blown out

Here, too, DaVinci Resolve provides tools designed to help you exercise control over the fine-tuning of the image. A Video Scopes window provides the standard Waveform, Parade, Vectorscope, and Histograms that are used to analyze your image data. These scopes let you see the boundaries of what's possible, and make it easy to spot subtle problems, and compare the characteristics of one image to another.

Video scopes

When the time comes that you want to start clipping data in the highlights and shadows, as part of a creative look, the Soft Clip controls let you introduce a subtle or large roll-off, compressing the extremes of the signal so that what clipping you do is softer and more pleasing.

For more information about the video scopes and the Soft Clip controls, see Chapter 113, "Using the Color Page," and Chapter 118, "Curves."

Never Stop Experimenting

So now that you've gotten an extremely brief overview of the grading process as seen through the toolset of DaVinci Resolve, we invite you to use this manual to explore DaVinci Resolve more thoroughly. You may discover that, the more you work with the different features that are available, the more unexpected uses you'll find for different controls that you thought you knew well.

Have fun.

Chapter 113

Using the Color Page

Given the origin of DaVinci Resolve as a professional grading application, the Color page is at the heart of the DaVinci Resolve experience. Within the Color page are all of the controls available for manipulating color and contrast, reducing noise, creating limited secondary color corrections, building image effects of different kinds, adjusting clip geometry, and making many other corrective and stylistic adjustments.

In this chapter, you'll learn how to understand the Color page interface, how to customize it, and how to work within it to play through and navigate your project's timeline. You'll also learn how to analyze and compare clips in preparation for grading using stills, playheads, and DaVinci Resolve's own internal video scopes.

Contents

The Color Page Interface

The Color page is divided into seven main areas that work together to let you build a grade. This section provides an overview of what these areas are and how they function.
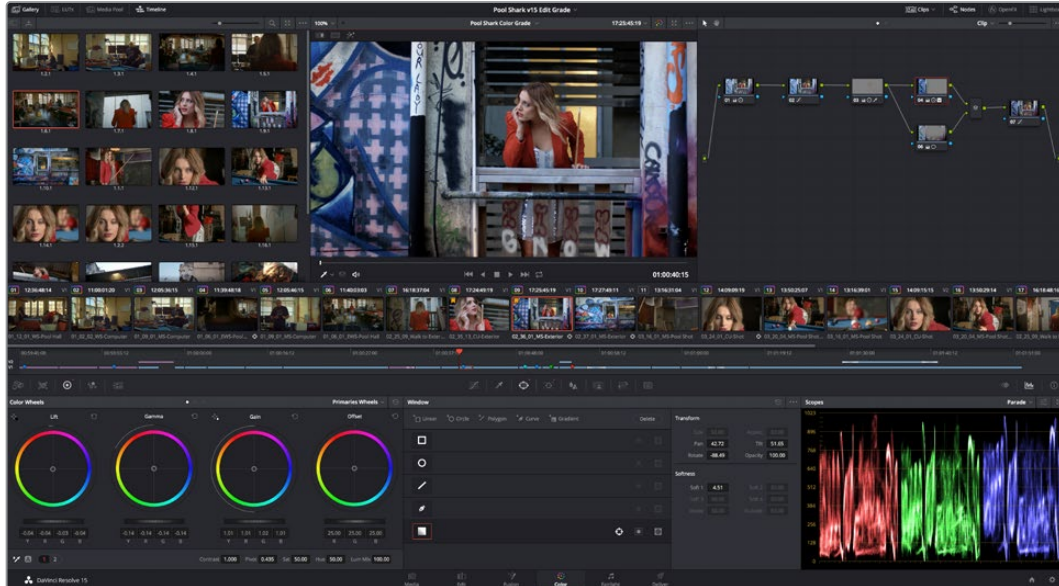
The default layout of the Color page

The Interface Toolbar

At the very top of the Color page is a toolbar with buttons that let you show and hide different parts of the user interface. These buttons are as follows, from left to right:


The Interface toolbar

- **Gallery:** Opens and closes the Gallery panel.
- **LUTs:** Opens and closes the LUT Browser.
- **Media Pool:** Opens and closes the Media Pool.
- **Timeline:** Opens and closes the Mini-Timeline.
- **Clips:** Opens and closes the Thumbnail timeline. To the right is a drop-down menu that lets you choose a timeline filtering option for the Thumbnail timeline.
- **Nodes:** Opens and closes the Node Editor
- **OpenFX:** Opens and closes the OpenFX panel.
- **Lightbox:** Opens and closes the Lightbox.

Showing Which Panel Has Focus

Whenever you click somewhere on the DaVinci Resolve interface using the pointer, or use a keyboard shortcut to "select" a particular panel (such as in the Edit page), you give that panel of the user interface "focus." A panel with focus will capture specific keyboard shortcuts to do something within that panel, as opposed to doing something elsewhere in the interface.

A highlight appears at the top edge to show you which panel has focus so that you can keep track of which part of the current page is taking precedence, and you can switch focus as necessary to do what you need to do. You can turn the Focus Indicator on and off in Preferences > User > UI Settings > Show focus indicators in the user interface.
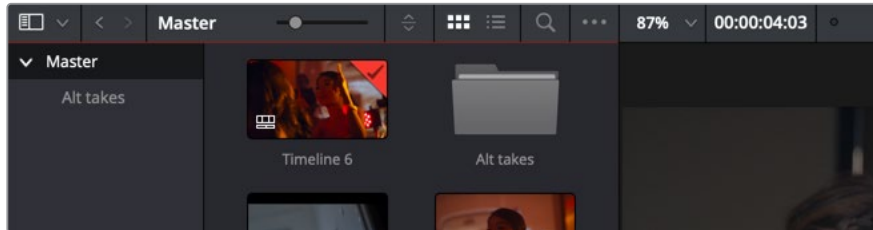
The focus indicator shown at the top edge of the Media Pool, shown next to a Viewer that doesn't have focus

Viewer

The Viewer shows the frame at the current position of the playhead in the Timeline. At the top of the Viewer is a header that displays the Project and Timeline names, as well as a Viewer Timecode display that shows the source timecode of each clip by default. The Timeline name is also a drop-down display that lets you switch to any other timeline in the project. A scrubber bar underneath the image lets you drag the playhead across the entire duration of the clip, while transport controls underneath that let you control playback. A toolbar at the top provides controls governing Image Wipes, Split-Screen controls, and Highlight display. Additional controls let you loop playback, switch Unmix mode on and off, turn audio playback on and off, and choose which onscreen controls are currently displayed. More information about using the Viewer appears later in this chapter.
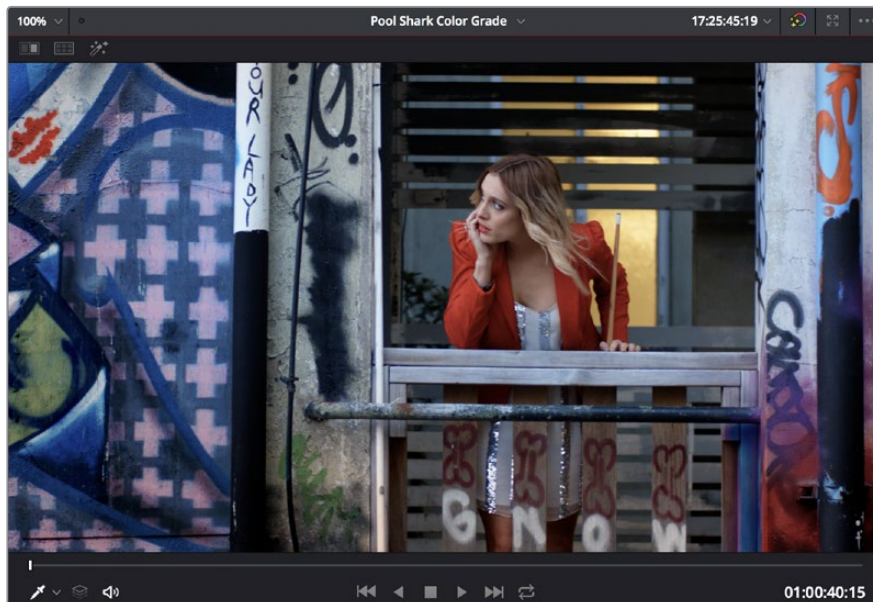

The default Viewer with transport controls

You can also put the Viewer into one of three alternate modes to be able to see a larger image as you work. All three of these modes are available from the Workspace > Viewer Mode submenu.

- **Enhanced Viewer** (Option-F to toggle this on and off) hides everything to the left and right of the Viewer, giving you a large working area for tasks such as window positioning and rotoscoping, while keeping the palettes and their controls visible as you work.

The Color page in Enhanced Viewer mode

- **Full Screen Viewer** (Shift-F to toggle this on and off) is available to provide more working area for tasks such as window positioning and rotoscoping. Full Screen Viewer also lets you display the OpenFX panel at full height, and you can turn the Node Editor on and off to access different effects controls while you work.
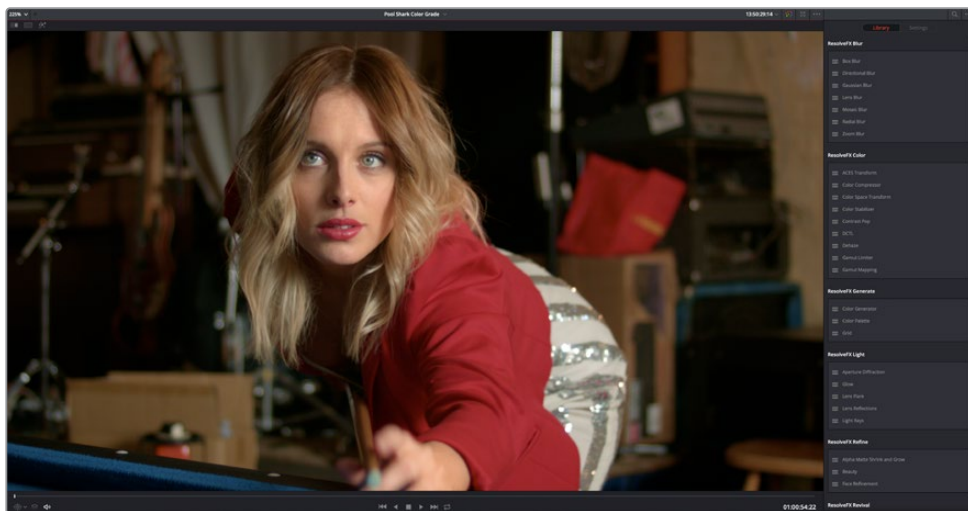
The Color page in Full Screen Viewer mode

- **Cinema Viewer** (P to toggle this on and off) expands the Viewer to fill your workstation's entire monitor. This is useful if you want to play the current Timeline without any distractions. When you move the pointer over the image, transport controls and a jog bar appear to let you control playback. For DITs, a contextual menu is available by right-clicking anywhere on the image with which you can turn on and customize a video scope overlay (which can be dragged to different locations on the Viewer).

The Color page in Cinema Viewer mode

Gallery

The Gallery is used for storing still frames to use as reference, and grades you might like to copy; stills and grades are stored together. A button lets you open up the Album browser, used for organizing your stills. At the bottom of the Gallery, Memories let you store grade information that you can apply using a control panel or keyboard shortcuts. The Gallery on the Color page mirrors the contents of the Gallery page. For more information on the Gallery page, see Chapter 122, "Using the Gallery."
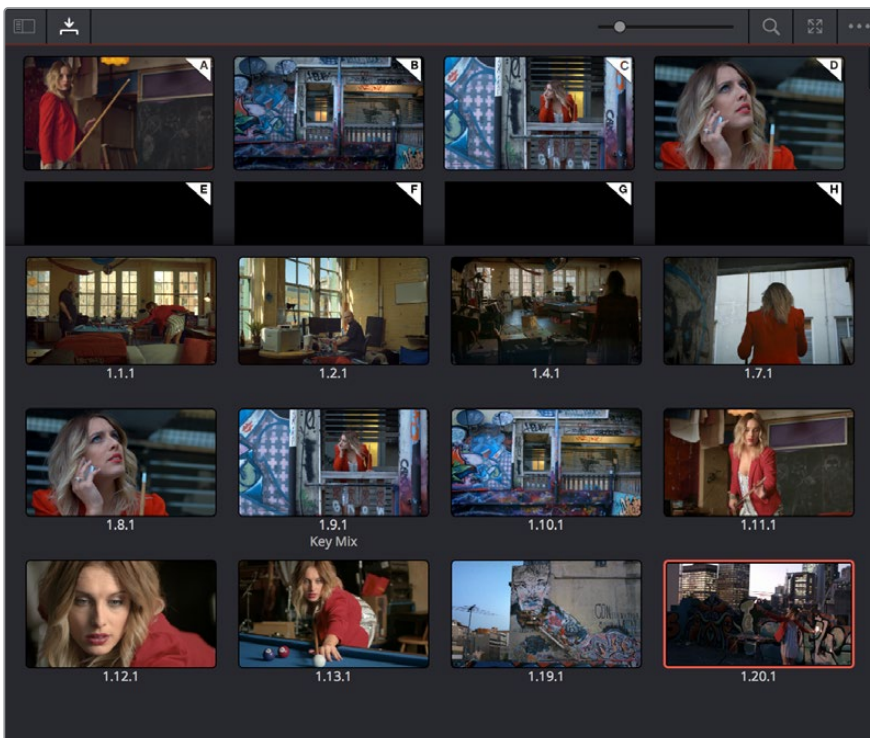
The Gallery has Memories, stills saved in albums and your PowerGrades

LUT Browser

The LUT Browser provides a centralized area for browsing and previewing all of the LUTs installed on your workstation. All LUTs appear in the sidebar, by category.

The LUT Browser

By default, all LUTs appear with a test thumbnail that give a preview of that LUT's effect, but you can also get a live preview of how the current clip looks with that LUT by hover scrubbing with the pointer over a particular LUT's thumbnail (this is described in more detail below).

To open the LUT Browser:

> Click the LUT Browser button in the UI Toolbar at the top of the Color page.

Methods of working with the LUT Browser:

- **To see the LUTs in any category:** Click on a LUT category to select it in the sidebar, and its LUTs will appear in the browser area.

- **To make a LUT a favorite:** Hover the mouse over a LUT and click the star badge that appears at the upper right-hand corner, or right-click any LUT and choose Add to Favorites. That LUT will then appear when you select the Favorites category.

- **To search or filter for specific LUTs:** Open a bin that has the LUT you're looking for, then click the magnifying glass icon to open the search field, and type text that will identify the LUTs you're looking for.

- **To see LUTs in Column or Thumbnail view:** Click the Column or Thumbnail buttons at the top right of the LUT Browser to choose how to view LUTs in the browser area.

- **To sort LUTs in Thumbnail view:** Click the Thumbnail Sort drop-down menu and choose which criteria you want to sort LUTs by. The options are Filename, Type, Relative Path, File Path, Usage, Date Modified. There are also options for ascending and descending sort modes.

- **To sort LUTs in Column view:** Click the column header to sort by that column. Click a header repeatedly to toggle between ascending and descending modes.

- **To update the thumbnail of a LUT with an image from a clip:** Choose a clip and frame that you want to use as the new thumbnail for a particular LUT, then right-click that LUT and choose Update Thumbnail With Timeline Frame.

- **To reset the thumbnail of a LUT to use the standard thumbnail:** Right-click a LUT and choose Reset Thumbnail to go back to using the standard test image.
- **To refresh a LUT category with new LUTs that may have been installed:** Select a LUT category, then right-click anywhere within the browser area and choose Refresh to refresh the contents of that category from disk.

Methods of adding LUTs to a grade from the LUT Browser:

- **To apply a LUT to the current node:** Select a clip in the Thumbnail timeline, then right-click a LUT and choose Apply LUT to Current Node from the contextual menu.
- **To apply a LUT to a specific node:** Drag a LUT from the LUT Browser and drop it onto the node you want to apply a LUT to. If you drag a LUT onto a node that already has a LUT, the previous LUT will be overwritten by the new one.

Media Pool

The Media Pool is available in the Color page, making it easy to drag and drop clips you want to use as external mattes right into the Node Editor, for easy and fast connection to create various Color page effects. When opened, the Media Pool replaces the Gallery, fitting into the same area. In most respects, the Media Pool in the Color page works the same as the Media Pool on nearly every other page of DaVinci Resolve.
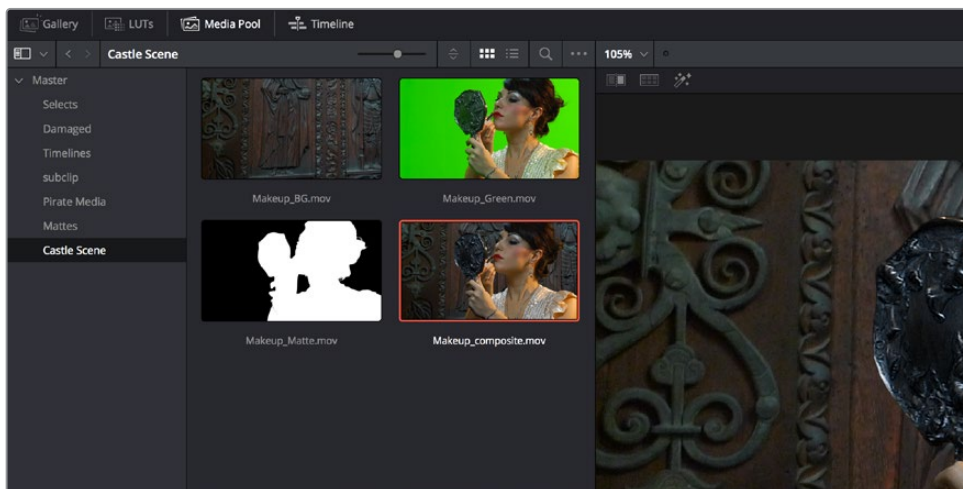
The Media Pool now appears in the Color page

When you drag a clip from the Color page Media Pool to the Node Editor, two things happen:

- That clip is turned into an external matte in the current grade, which you can use as a matte for secondary adjustments, or as a compositing layer (in conjunction with the Layer mixer) for mixing textures or images with your grade.
- That clip is also automatically attached to the Media Pool clip that corresponds to the clip you're grading as a clip matte, to help you keep track of which clips are using other clips as mattes.

For more information about the Media Pool, see Chapter 11, "Adding and Organizing Media with the Media Pool."

Node Editor

The Node Editor is where you assemble one or more individual corrections (nodes) together into a complete multi-correction grade (node tree). This is a powerful way of assembling grades, since different types of nodes let you create different combinations of corrections and very specific adjustments by reordering operations, combining keys, or changing the layer order of different adjustments. For more information about the Node Editor, see the "Node Editor Basics" section of Chapter 124, "Node Editing Basics."
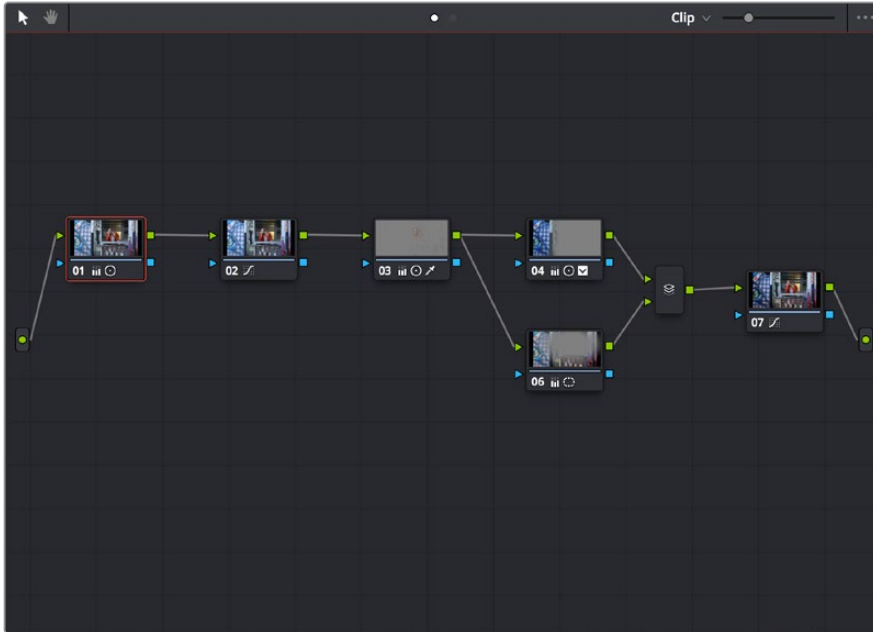
Node Editor to construct your grade processing signal flow

Timeline

The Timeline provides several ways of navigating the clips in your project, as well as keeping track of what has been done to which clips. The Timeline is divided into two parts, each of which shows different information and provides differing controls, and each of which can be opened or closed separately via the Clips and Timeline buttons on the Interface toolbar.
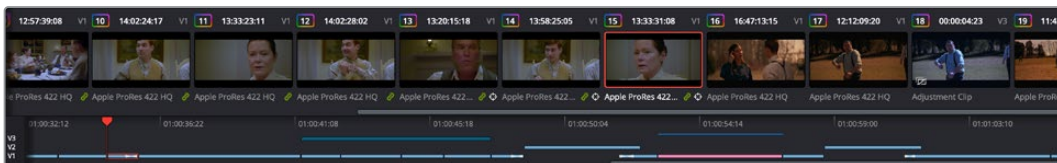
The Thumbnail timeline with a Mini-Timeline below

Thumbnail Timeline

At the top is the Thumbnail timeline, in which each clip is represented by a single frame. The Thumbnail timeline (or its alter-ego, the Lightbox) provides the easiest way of selecting which clip you want to work on and of making clip selections for various grade management operations. The currently selected clip that reveals its controls in the various palettes of the Color page is highlighted in orange.

Much valuable information appears above and below each thumbnail, such as each clip's clip number, source timecode, track number, whether it's been flagged, whether it's automatically linked or part of a group, whether it's been tracked, and so on.
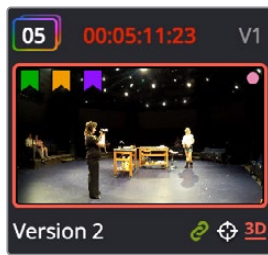
A clip thumbnail in the
Thumbnail timeline

What's displayed underneath each thumbnail can be changed by double-clicking the space underneath each thumbnail. There are several options; you can keep double-clicking to cycle among them:

- Clip format or codec (the default)
- Clip Name (clip name or file name, depending on what View > Show File Name is set to) or Multicam Angle (if you're working with multicam clips)
- Version name or number

Mini-Timeline

Underneath, the Mini-Timeline shows a small representation of the video tracks of the Timeline in the Edit page wherein each clip is as long as its actual duration. This provides the best representation of the structure of the current timeline, in which clip length shows duration and multiple tracks are displayed, so you can see which clips are superimposed. A Timeline Ruler lets you scrub the playhead across multiple clips and can be zoomed out enough to show every clip in your entire program.
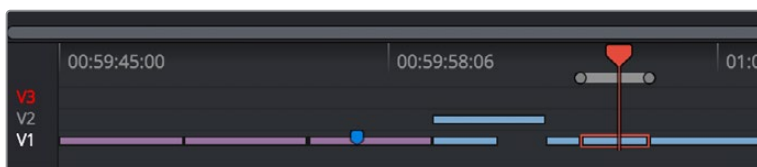
The Mini-Timeline lets you see timeline structure, and small track header controls let you enable tracks, disable tracks, and set the playhead to ignore specific tracks

Small track labels at the left of each track in the Mini-Timeline let you enable or disable tracks by clicking them (enabled tracks have white labels, disabled tracks have gray labels). Option-clicking one of these controls sets that track to be enabled but ignored by the playhead when you use the Next and Previous Clip commands, in the event you want to ignore clips you don't need to grade (tracks in this mode show a red label).

Within the Mini-Timeline the currently selected clip is highlighted in orange, and you can click any clip to select it. A scroll bar at the bottom lets you navigate to the left and right, while using the scroll wheel of your mouse zooms in and out. The Mini-Timeline shows at most six tracks of video. If your project has more tracks than that, you can scroll up and down to reveal the hidden tracks. Any markers that were placed on clips or the Timeline in the Edit page appear here, and you can click any marker to reveal and edit its color and notes.

As seen above, a colored outline appears around the clip number of shots that have been graded, and this outline is doubled if there are additional versions applied to that clip.

For more detailed information about the Color page Timeline, see Chapter 115, "Color Page Timeline and Lightbox."
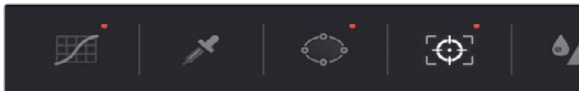
Palette Area

Most everyday tools and functions for grading are distributed among a series of palettes found in the palette area of the Color page. These palettes can be accessed via a series of palette buttons running along the Palette bar at the top of this area.

All palettes seen in the Palette bar

These buttons also give you feedback about which palettes have adjustments for the current selected node in the Node Editor. Palettes with adjustments show a small orange dot in the corresponding palette button.

An orange dot in a palette button lets you
know there are adjustments in that palette

Left Palettes

A series of palettes at the bottom left of the Color page provide access to different sets of grading tools, used principally for manipulating color, contrast, and raw media format settings. Each individual palette is opened by clicking the corresponding icon at the top of the Palette panel.

Left palette selection buttons

The five available palettes are the Camera Raw palette (for making metadata adjustments to raw media formats), the Color Match palette (automatic grading based using test charts), the Color Wheels (graphical color balance controls and master wheels, along with a Slider mode for adjusting YRGB Lift/Gamma/Gain), the RGB Mixer (for mixing color channels into one another), and the Motion Effects palette (with controls for noise reduction and artificial motion blur). These palettes can be used individually or together depending on what you're trying to accomplish. For more information on most of these palettes, see Chapter 117, "Primary Grading Controls." For more information on the Motion Effects palette, see Chapter 134, "The Motion Effects and Blur Palettes."

Center Palettes

At 1920x1080 resolution or higher, a second set of palettes is organized at the bottom center of the Color page. These palettes span a wide range of functionality, and the adjustments you make with them can be combined with those made using the Color palettes.


Center palette selection buttons

> **NOTE:** At lower resolutions, the Left and Center palettes are merged to fit the DaVinci Resolve interface into a smaller area.

The eight available Center palettes include the Curves palette, the Qualifiers palette, the Power Windows palette, the Tracker palette, the Blur palette, the Key palette, and the Sizing and Stereoscopic 3D palettes.

Keyframe Editor, Video Scopes, and Information

The bottom right of the Color page can be switched between one of three things:
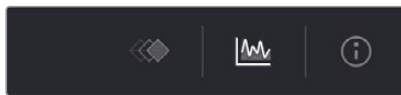
The three controls for displaying the Keyframe Editor, video scopes, or Information palette

- **Keyframe Editor:** Provides an interface for animating Color, Sizing, and Stereo Format adjustments over time. Each node in the Node Editor corresponds to a track in the Keyframe Editor, which lets you animate each node's adjustments independently. Furthermore, each node's track can be opened up to reveal parameter groups, so that you can animate subsets of an individual node's functions independently of other functions within the same node. For more information about keyframing, see Chapter 128, "Keyframing in the Color Page."

- **Video scopes:** Provides a docked area where you can expose one video scope at a time for reference while you work. You can also "undock" the video scopes into a stand-alone window, in which you can show four different scopes at a time. More information about using the video scopes appears later in this chapter.

- **Information:** Provides a way of seeing clip and system information while you work.

Dual Monitor Layout

The Color page has a dual monitor layout that provides maximum space for the Viewer, Node Editor, and Control palettes on the primary monitor, and a simultaneously displayed Gallery, Lightbox, Keyframe Editor, Metadata Editor, and Video Scope panel on the secondary monitor.

To enter dual screen mode:

>   Choose Workspace > Dual Screen > On.
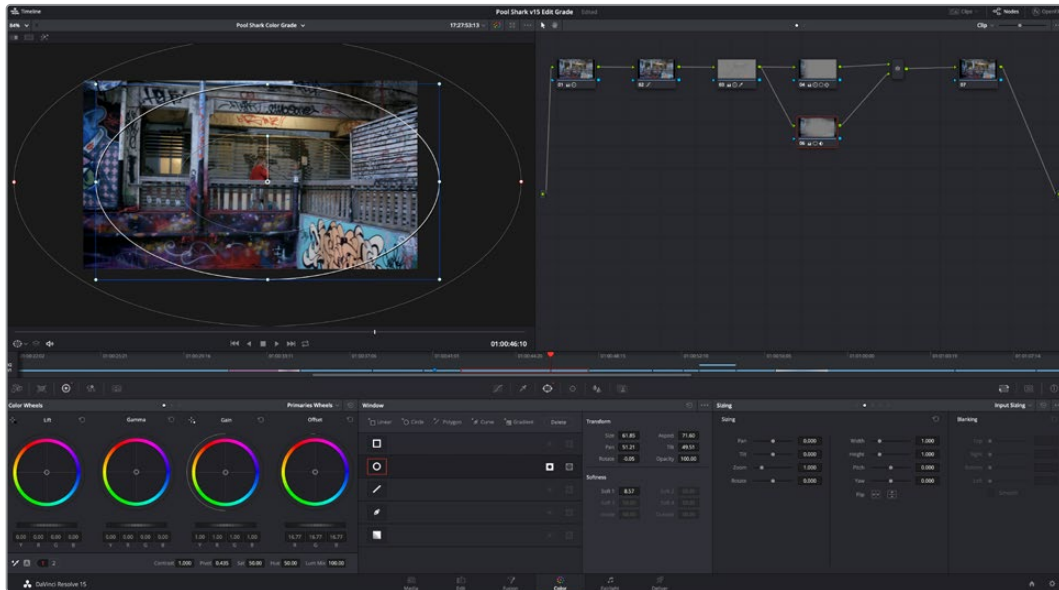
The Color page in dual screen mode

To switch which UI elements appear on which monitors:

>   Choose Workspace > Primary Display > (Monitor Name), which reverses the contents of
>   both monitors in dual screen mode.

The Info Palette and Clip Information

The Info palette is hidden by default. Clicking the Info palette button at the far right of the toolbar reveals it at the right of the Center palette. The Info palette has two tabs that display different information. There are no user-editable controls in the Info palette.
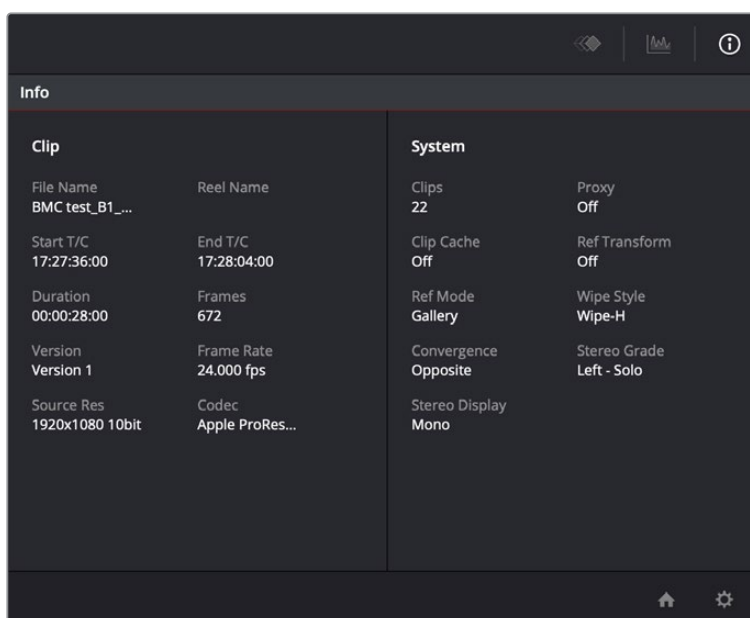
Info palette displaying Clip Info and System Status

Clip Info

The first tab displays information about whichever clip is currently selected in the Timeline. This information is not editable, but is provided for reference, and includes:

- **File Name:** The name of the media file on disk. If the current clip is a Multicam clip, this shows the name of the currently selected angle.
- **Reel Name:** The reel name of that clip, if one is being read properly.
- **Start T/C:** The source timecode value of the first frame in the clip.
- **End T/C:** The source timecode value of the last frame in the clip.
- **Duration:** The duration of the clip, in timecode.
- **Frames:** The duration of the clip, in frames.
- **Version:** The name of the remote or local version used by that clip.
- **Frame Rate:** The frame rate used by that clip.
- **Source Res:** The native resolution of the source clip.
- **Codec:** The codec or format used by the source clip.

System Info

The second tab displays information about operational modes currently in use by DaVinci Resolve. It's meant to provide the status of different DaVinci Resolve features that can be enabled, disabled, or cycled among various options. This information includes:

- **Clips:** The total number of clips in the Timeline.
- **Proxy:** The status of Proxy mode (On or Off).
- **Clip Cache:** The status of the Clip Cache mode (Off, All, Dissolves, User, User & D).
- **Ref Transform:** The status of Reference Still reposition.
- **Ref Mode:** The status of the Reference mode (Gallery, Timeline, Offline).
- **Wipe Style:** The currently selected Wipe Style for split screens (Wipe-H, Wipe-V, Wipe-M, Wipe-A).
- **Convergence:** The current Convergence setting (Linked Zoom, Opposite)
- **Stereo Grade:** The currently displayed Eye and Gang mode (Left or Right - Gang or Solo).
- **Stereo Display:** The current Stereo Display mode (Mono or Stereo).

Clip Details

You can right-click the currently selected clip in the Thumbnail Timeline and choose View Clip Details to show a small window with all of that clip's information available at a glance. You can drag this window anywhere you like, even to another display.
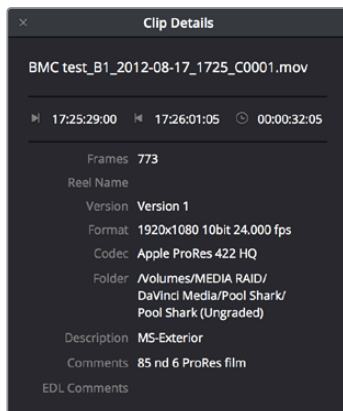
The Clip Details window

This information is not editable, but is provided for easy reference, and includes:

- **File Name:** The name of the media file on disk appears at top.
- **Start Timecode:** The source timecode value of the first frame in the clip.
- **End Timecode:** The source timecode value of the last frame in the clip.
- **Duration:** The duration of the clip, in timecode.
- **Frames:** The duration of the clip, in frames.
- **Reel Name:** The reel name of that clip, if one is being read properly.
- **Version:** The name of the remote or local version used by that clip.
- **Format:** The format used by the source clip, along with the frame size and bit depth.
- **Codec:** The codec used by the source clip.

- **Folder:** Which directory on disk the source media resides in.
- **Description:** The description field of the Metadata Editor.
- **Comments:** The Comments field of the Metadata Editor.
- **EDL Comments:** EDL comments for that event, if any exist.

Customizing the Color Page

The various sections of the Color page can be resized, hidden, and rearranged as needed to accommodate different working styles. This section covers all of the methods that are available for Color page customization.

You can easily resize the Viewer, Gallery, and Nodes Editor relative to one another to make the Viewer larger, expand the width of the Node Editor to have more workspace, or to create more or less room for stills in the Gallery.

To resize the Viewer, Gallery, and Node Editor:

Move the pointer over the vertical divider between any two areas. When the resize icon appears, drag the divider to the left or right to make one area larger while making the other smaller.

You can also fully expand the Gallery, the Memories, the Node Editor, and the Keyframe Editor to replace completely whichever interface area is adjacent.

To expand the Keyframe Editor, Viewer, and Gallery:

Click the Expand control at the upper right of whichever interface area you want to expand. Once expanded, clicking the Expand control again will collapse that interface area back to its original size, revealing whatever was hidden.

In Display mode, you can completely hide the Viewer, pushing the Gallery all the way to the right side of the DaVinci Resolve window, and expanding the Node Editor to take the rest of the space.

To toggle Display mode, do one of the following:
- Right-click in the empty area of the Node Editor, and choose Toggle Display Mode from the contextual menu. Do this again to toggle Display Mode off and return the interface to the way it was.
- Press SHIFT UP and DISPLAY/CURSOR, above the fourth trackball of the Center panel of the DaVinci control panel.

To show and hide the Mini-Timeline:

Click the Timeline button at the right of the palette button bar.

To show and hide the Color page Viewer upper toolbar:

Click the Viewer option menu and choose Show Viewer Options to uncheck it.

To return all pages to their default layout:

Choose Workspace > Reset UI Layout.

Undo and Redo in DaVinci Resolve

No matter where you are in DaVinci Resolve, Undo and Redo commands let you back out of steps you've taken or commands you've executed, and reapply them if you change your mind. DaVinci Resolve is capable of undoing the entire history of things you've done since creating or opening a particular project. When you close a project, its entire undo history is purged. The next time you begin work on a project, its undo history starts anew.

Because DaVinci Resolve integrates so much functionality in one application, there are three separate sets of undo "stacks" to help you manage your work.

- The Media, Cut. Edit, and Fairlight pages share the same multiple-undo stack, which lets you backtrack out of changes made in the Media Pool, the Timeline, the Metadata Editor, and the Viewers.
- Each clip in the Fusion page has its own undo stack so that you can undo changes you make to the composition of each clip, independently.
- Each clip in the Color page has its own undo stack so that you can undo changes you make to grades in each clip, independently.

In all cases, there is no practical limit to the number of steps that are undoable (although there may be a limit to what you can remember). To take advantage of this, there are three ways you can undo work to go to a previous state of your project, no matter what page you're in.

**To simply undo or redo changes you've made one at a time:**
- Choose Edit > Undo (Command-Z) to undo the previous change.
- Choose Edit > Redo (Shift-Command-Z) to redo to the next change.
- On the DaVinci control panel, press the UNDO and REDO buttons on the T-bar panel.

> **TIP:** If you have the DaVinci control panel, there is one other control that lets you control the undo stack more directly when using the trackballs, rings, and pots. Pressing RESTORE POINT manually adds a memory of the current state of the grade to the undo stack. Since discrete undo states are difficult to predict when you're making ongoing adjustments with the trackball and ring controls, pressing RESTORE POINT lets you set predictable states of the grade that you can fall back on.

You can also undo several steps at a time using the History submenu and window. At the time of this writing, this only works for multiple undo steps in the Media, Cut, Edit, and Fairlight pages.

To undo and redo using the History submenu:
1 Open the Edit > History submenu, which shows (up to) the last twenty things you've done.
2 Choose an item on the list to undo back to that point. The most recent thing you've done appears at the top of this list, and the change you've just made appears with a check next to it. Steps that have been undone but that can still be redone remain in this menu, so you can see what's possible. However, if you've undone several changes at once and then you make a new change, you cannot undo any more and those steps disappear from the menu.
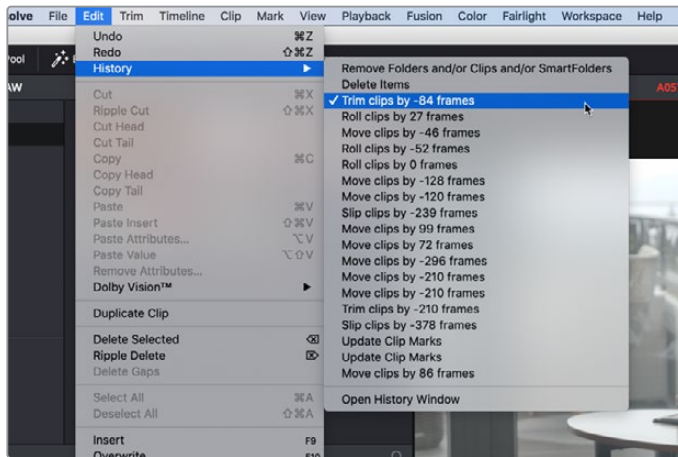
The History submenu, which lets you undo several steps at once

Once you've selected a step to undo to, the menu closes and the project updates to show you its current state.

To undo and redo using the Undo window:

1   Choose Edit > History > Open History Window.

2   When the History dialog appears, click an item on the list to undo back to that point. Unlike the menu, in this window the most recent thing you've done appears at the bottom of this list. Selecting a change here grays out changes that can still be redone, as the project updates to show you its current state.
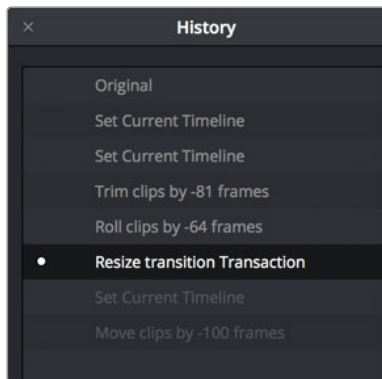
The Undo history window that lets you browse the entire available undo stack of the current page

3   When you're done, close the History window.

Chapter 114

Viewers, Monitoring, and Video Scopes

Viewers let you see what you're working on, provide a UI for transport controls and image comparison, draw windows and drag on-screen controls, and provide a variety of warnings and information not found anywhere else. However, at the same time, professional workflows require real time monitoring via supported video I/O devices on a calibrated display. Lastly, video scopes provide a more precise analysis of the state of the video signal you're viewing, and DaVinci Resolve has built-in scopes you can use for creative decision making and troubleshooting.

This chapter covers the Color page Viewer, external monitoring and display calibration, and video scopes in more detail.

Contents

Using the Viewer

The Viewer is your window into the Timeline. The clip and frame at the current position of the playhead appears in the Viewer. The Viewer also provides a workspace for picking colors, adjusting Windows, using split screen stills for reference, and many other display-oriented tasks. If you have a video out interface connected to a broadcast display or projector, then the contents of the Viewer are typically mirrored by the video output.

The Viewer Title Bar

The Viewer title bar has controls and indicators making it easy to control and keep track of what it is you're looking at.
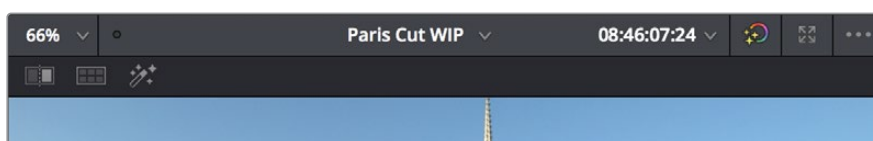
The Color page title bar with its controls

The Viewer title bar has the following controls:

- **Zoom and Fit menu:** Lets you zoom to a specific percentage, or choose Fit to fit the image to the total available area of the Viewer.

- **Playback frame rate indicator:** A dot shows green if playback performance matches the frame rate of the project, or red if playback performance drops below real time. To the right, the current frame rate is displayed.

- **Timeline name and selection drop-down:** The name of the currently open timeline is displayed. A drop-down to the right lets you open any other timeline in the current project to take its place.

- **Timecode viewer and drop-down:** A second timecode viewer lets you choose an alternate timecode/frame count/KeyKode value to display simultaneously to the timecode viewer next to the transport controls below. A drop-down lets you pick whether to display source (clip) or record (timeline) timecode.

- **Bypass Color and Fusion and drop-down:** Lets you disable grades and/or Fusion effects.

- **Expand Viewer drop-down:** Expands the Viewer to take up the full area of your workstation's display above the palettes.

- **Option menu:** Has options that affect the Viewer's functionality. Commands include: Gang timeline wipe with current clip, Gang viewer zoom with video output, Show clip flags on video output, Show Viewer Options, Show Marker Overlays, and the Marker list for navigating among all timeline markers in the currently open timeline.

Turning Grades and/or Fusion Effects Off

The Bypass Color Grades and Fusion Effects button/drop-down commands in the Viewer's title bar are also available via View > Bypass Color and Fusion menu commands. Turning off Fusion effects in the Color page is an easy way to improve playback performance on low power systems when you just need to make a quick set of grading adjustments. Toggling grades off and on is also a convenient way to quickly get a before-and-after look at a shot where the "before" goes all the way back to the source.

If you choose Toggle Bypass or click the Viewer control, you'll turn off whatever is checked in the optional menu, which lets you choose whether or not you want to bypass both Color and Fusion, or just one or the other.

(Left) Menu commands for bypassing Color and Fusion,
(Right) Edit page Timeline Viewer controls

> **TIP:** If you're giving your client a before and after look at work you're doing on a grade, a more effective technique is to select the specific nodes (one or more) that you want to toggle on and off, and press Command-D (Enable/Disable Selected Nodes.)

Viewing Isolated Channels

Use the View > Viewer Channels submenu to switch the Color page Viewer among RGB, R, G, or B channels. This can be useful when evaluating a single channel of an image for noise or other artifacts, or for doing color matching by comparing and adjusting the individual red, green, and blue channels of two different clips.

The Viewer Toolbar

The Color page also exposes a toolbar at the top of the image (underneath the title bar) that makes it easy to enable and disable image wipe, split screen, and highlight viewing by clicking one of these three buttons, which then expose additional controls relating to each of these modes of operation (described elsewhere in this chapter). This toolbar can be shown or hidden by clicking the Viewer option menu and unchecking Show Viewer Options.
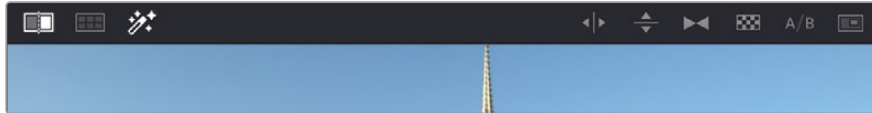
The Color page Viewer toolbar showing the Wipe, Split Screen, and Highlight controls

In the process, these buttons provide an easy reference for when a comparison mode is enabled. In each of these Viewer modes, the appropriate controls for customizing that view appear to the right of the Viewer toolbar.

The Onscreen Control (OSC) Menu

The Onscreen Control drop-down menu lets you choose which onscreen controls you want to display and adjust in the Viewer. Some palettes automatically enable corresponding onscreen controls when you open them. For example, opening the Window palette displays the Power Window onscreen controls, and opening the Qualifier palette displays the Qualifier onscreen controls.
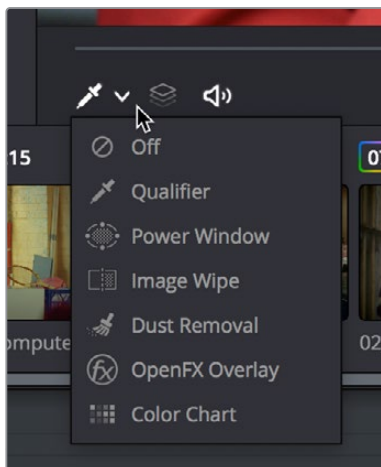
OnScreenControlMenu

The onscreen control menu for the Viewer

There are a variety of choices, each corresponding to different adjustments you can make:

- **Off:** All onscreen controls are hidden from view, giving you an unimpeded display of the image in the Viewer.

- **Qualifier:** Turns on the Color Sample cursor, which lets you choose a color using the fourth trackball of the DaVinci control panel. For more about using Color Sample controls, see Chapter 119, "Secondary Qualifiers."

- **Power Window:** Turns the Power Windows onscreen control on and off. For more about adjusting windows in the Viewer, see "Power Windows" in Chapter 120, "Secondary Windows and Tracking."

- **Image Wipe:** Toggles mouse control of dragging the split screen directly on the Viewer on and off. For more about working with split screens, see "Comparing Clips in the Viewer" later in this chapter.
- **Dust Removal:** Activates the interactive Dirt and Dust tool. For more information, see Chapter 135, "Dust Removal."
- **OpenFX:.** Shows and hides whatever onscreen controls are exposed by an OpenFX plug-in in the currently selected node.
- **Color Chart:** Shows and hides the color chart overlay that lets you identify a color chart in the picture that you want to use with the Color Match palette to create an automatic grade.

> **TIP:** As you work, you may find you want to temporarily hide or show the onscreen controls so you can get an uncluttered look at the image you're adjusting. You can toggle any set of onscreen controls off and on without selecting Off in the menu by pressing Shift-` (tilde).

Toggling Viewer Overlays On and Off

Pressing Shift-` (Tilde) turns the current Viewer overlay on and off. The View > Viewer Overlay submenu contains commands for showing, hiding, and switching different overlays in the Color page Viewer. While most of the options in this menu are unassigned by default, they can be assigned to keys using the Keyboard Customization window.

Onscreen Controls and External Displays

DaVinci Resolve has been designed for use with calibrated external displays connected to video output interfaces, and for most colorists working on broadcast or theatrical programs, this is the recommended way to work for color critical evaluation.

Because of this, many of the onscreen controls associated with tasks such as color sampling, window adjustment, and key manipulation are mirrored to your video output, making it possible to hide the Viewer on your computer's monitor and work with only an external display.

To choose whether onscreen controls are mirrored to video out or disabled:
Choose an option from the View > Window Outline submenu. There are three options:

- **Off:** Hides the window outline on both the external display and the Viewer.
- **On:** The default, shows the window outline on both the external display and the Viewer.
- **Only UI:** Hides the window outline on your external display, but leaves it in the Viewer.

To show or hide window onscreen controls using the DaVinci control panel:
Press SHIFT UP and then DISPLAY/CURSOR, above the fourth trackball on the Center panel. This command is a three-way toggle. The first use of this command hides the window outline on your external display, but leaves it in the Viewer. The second use of this command hides the window outline on both the external display and Viewer. The third use of this command shows the window outline on both the external display and Viewer.

Limitations When Grading With the Viewer on a Computer Display

Most computer displays do not operate at the color critical tolerances or specifications required for broadcast or theatrical delivery. An additional issue, however, is that the Viewer does not necessarily display each clip's image data as it is displayed by the calibration that your operating system applies to your computer display, depending on which OS you're running DaVinci Resolve on. This makes your computer display potentially unsuitable for monitoring projects destined for the sRGB standard of the web in its default state. For example, if you grade a project using the Color page Viewer on your computer display, the resulting clip may not look the same in the QuickTime player, or in other post-production applications.

You can address this in one of two ways:

- If you're using DaVinci Resolve on macOS, you can turn on "Use Mac Display Color Profile for viewers" in the Hardware Configuration panel of the System Settings. This lets DaVinci Resolve use one whichever of the color profiles you choose in the Color tab of the Displays panel in the macOS System Preferences, thereby taking advantage of ColorSync on macOS to let DaVinci Resolve display color the way your computer monitor does. This now works for all color profiles that ship with macOS, even ones generated by calibration software, such as that available from X-rite, Datacolor, or other applications. On supported computers, there's also an option to "Use 10-bit precision in viewers," if available, that you can turn on. With this option enabled, rendered output displayed in QuickTime Player will match what is seen in the DaVinci Resolve Viewer.

- Alternately, you can apply a dedicated Color Viewer LUT for calibration, using the 1D/3D Color Viewer Lookup Table drop-down menu that's found in the Color Management panel of the Project Settings. This lets you analyze your computer display for calibration in the same way you would calibrate an external display, using a probe and color management software, and apply the resulting calibration LUT in DaVinci Resolve. Keep in mind that monitor calibration can only make a high quality display standards compliant; it cannot make up for a display gamut that's too small. For more information, see the "Lookup Tables" section of Chapter 3, "System and User Preferences."

Strictly speaking, if you're doing professional work, you should restrict your grading to a calibrated, 10- or 12-bit class A external broadcast display of some type, connected via a Blackmagic Design video interface. Assuming everything is running properly, an image that is output to video from DaVinci Resolve should match an image output to video from any other post-production application you're using, and this should be your basis for comparison when examining the output of two different applications.

Zooming into the Viewer

When using the Viewer to sample tricky colors or draw a detailed PowerCurve, it can be advantageous to zoom into the image.

To zoom into or out of the Viewer, do one of the following:
- Move the pointer to within the Viewer, and then roll the scroll wheel to zoom in or out of the image.
- Press Command-Equal to zoom in, or Command-Minus to zoom out.

To pan around the Viewer:
- Move the pointer to within the Viewer, then middle-click and drag to pan around the image.

To reset the size of the Viewer image:
- Choose View > Viewer Actual Size (Option-Shift-Z).
- Choose View > Zoom > Zoom to Fit (Shift-Z).

To enable or disable image zoom being sent to video out:
- Choose "Gang viewer zoom with video output" from the Option menu of the Viewer to zoom the image shown on video out identically to the zoom level of the Viewer, enabling you to evaluate a zoomed-in portion of the image on your suite's hero display.

Using the Jog Bar and Transport Controls

One of the principal uses of the Viewer is to control playback. The jog bar, directly underneath the image in the Viewer, contains a playhead that you can drag to the left and right to navigate quickly through the currently selected clip as fast as you can move the pointer. The playhead in the jog bar is locked to the playheads found in the Timeline and Keyframe Editor. Moving one playhead moves all three.

How much of the Timeline the jog bar navigates depends on whether the Node Editor is set to Clip or Timeline mode. In Clip mode, the jog bar width equals the duration of the currently selected clip. In Timeline mode, the jog bar width equals the total duration of the entire Timeline.

A row of transport controls below the jog bar provides more specific control over timeline playback.
- **Previous clip:** Moves the playhead to the first frame of the previous clip.
- **Reverse:** Initiates 100% playback in reverse.
- **Stop:** Stops playback.
- **Play:** Initiates 100% playback.
- **Next clip:** Moves the playhead to the first frame of the next clip.
- **Loop:** Lets you restrict playback to the current clip, looping to the first frame if you're playing forward to the end of a clip, or looping to the last frame if you're playing in reverse to the beginning of a clip.

Two other buttons let you control audio playback and clip display in the Viewer:

- **Unmix:** Turning on Unmix disables all transitions, composited superimpositions, and effects that mix two or more clips together. Unmix allows you to judge the appearance of a clip without distraction whenever you need to make an adjustment based on how the clip looks on its own, or whenever you need to make changes based on frames that would otherwise be hidden underneath a transition such as a dissolve or fade from black. When you're ready to see how your grades work in context with transitions and composites again, turn Unmix off.

- **Mute:** Lets you turn audio playback off and on for your current timeline.

Navigating Using the Arrow Keys

You can use the Arrow Keys of the keyboard to navigate clips and the Timeline in different ways.

- **Up/Down Arrow:** Moves the playhead to the first frame of the previous or next clip.

- **Left/Right Arrow:** Moves the playhead back or forward one frame at a time.

- **Shift-Left/Right Arrow:** Moves the playhead back or forward one second at a time.

Controlling Playback Using the Spacebar and JKL Keys

You can also use the spacebar to start and stop playback, or the JKL keyboard shortcut convention for controlling playback, where J plays in reverse, K stops playback, and L plays forward. There are many additional uses of these keyboard shortcuts; for more information see "Using JKL to Control Playback" in Chapter 27, "Preparing Clips for Editing and Viewer Playback."

Navigating Using Timecode

You can also use absolute or relative timecode entry to move the playhead in the Color page Viewer. When entering timecode, type each pair of hour, minute, second, and frame values consecutively, with a period representing a pair of zeros for fast entry. The last pair of timecode values (or period) you enter is always assumed to be the frame number, with any untyped values assumed to be zero. It's not necessary to enter colons or semicolons. For more information, see "Moving the Playhead Using Timecode" in Chapter 27, "Preparing Clips for Editing and Viewer Playback."

Navigating Using the DaVinci Control Panel

It's also possible to navigate the Timeline using the DaVinci control panel. A set of buttons on the Transport panel include:

- **PREV/NEXT SCENE:** Moves the playhead among the first frame of each clip.

- **STEP REV/FWD:** Moves the playhead from frame to frame.

- **FIRST FRAME/LAST FRAME:** Jumps the playhead to the first and last frame of any given clip.

- **RWD/FFWD:** Moves the playhead in rewind of fast forward.

- **REV/STOP/FWD:** The standard play reverse, stop, and play forward commands.

Another set of navigation controls is available by pressing the MODE button above the fourth trackball on the Center panel, and then pressing the CUE MODE soft key.

You can also use the jog wheel and shuttle control on the Transport panel. The jog wheel lets you scrub frame by frame, while the shuttle control moves among preset rewind and fast forward speeds.

> **NOTE:** If a Gallery still is turned on for split screen comparison, the shuttle control will adjust the split screen center, and not the playhead position. Turning Reference Wipe off again frees up the shuttle control to affect playback again.

Finally, there are two additional methods of navigating using the DaVinci control panel that make it easy to jump to a specific clip or timecode value.

To move the playhead to the first frame of a specifically numbered clip:

On the Transport panel, enter a clip number using the number pad, then press TAKE ENTER.

To move the playhead relative to its current position:

1 Press + or – on the number pad.

2 Enter either a number of frames, or a timecode value using colons to divide each pair of digits (for example +01:00:23:12).

3 Press TAKE ENTER.

To move the playhead to an exact timecode value:

1 Using the number pad, enter a timecode value, using colons to divide each pair of digits (for example 01:00:23:12).

2 Press TAKE ENTER.

Viewer and Transport Timecode Displays

The Viewer has two timecode displays, each of which defaults to a different timecode setting.

A timecode display at the top, the Header timecode display, shows the Source timecode by default. The timecode display at the bottom, the Transport timecode display, shows the Record timecode by default.

The bottom timecode display can be changed to show one of four different options, which are similar to those found in the Data Burn-In palette.

To change a timecode display to a different setting:

The top timecode display is a drop-down menu that can be changed to whatever timecode, frame number, or KeyKode you want to display. The bottom timecode display can also be changed by right-clicking on it and choosing the type of value to show from the contextual menu that appears.

- **Timeline Timecode:** The timecode corresponding to the playhead's position in the overall Timeline.

- **Source Timecode:** The timecode corresponding to the playhead's position relative to the currently selected clip.

- **Timeline Frame:** The frame count corresponding to the playhead's position in the overall Timeline.
- **Source Frame:** The frame count corresponding to the playhead's position relative to the currently selected clip.
- **KeyKode:** The KeyKode number corresponding to the media's KeyKode track, if there is one.
- **Show Timecode at 30 FPS:** Displays 24 fps timecode, via 3:2 pulldown, as 29.97 fps timecode. Has no effect on video playback.

In the same way, the top timecode display can alternately be changed to show KeyKode, if it's available, within a DPX media file's header.

Enhanced, Full, and Cinema Viewing

You can expand the Viewer into Enhanced Viewing mode by choosing Workspace > Viewer Mode > Enhanced Viewer mode (Option-F), or by pressing CURRENT/VIEWER on the T-bar panel of the DaVinci control panel.

In Enhanced Viewing mode, the Viewer works exactly as it does at its regular size, but it expands to fill up the entire area of the screen above the palettes and Keyframe Editor. To exit Enhanced Viewing mode, press (Option-F) again.

This can be useful if you need a closer view of the image for purposes of making detailed corrections, examining noise patterns up close, making a tricky color selection, or drawing a complicated PowerCurve.
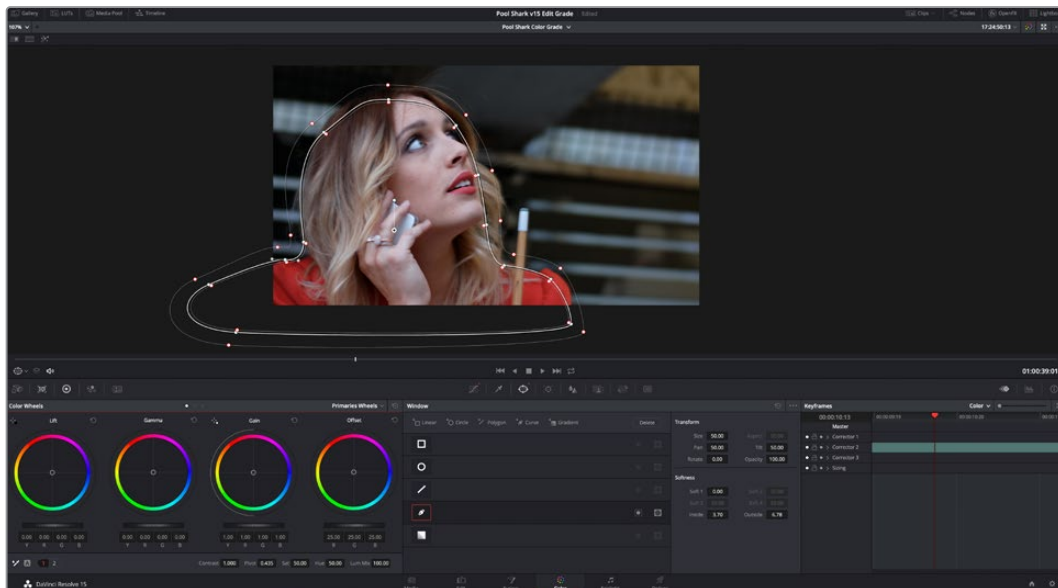
Color page in Enhanced Viewer mode

In Full Viewing mode (available by choosing Workspace > Viewer Mode > Full Page Viewer, pressing Shift-F, or Option-clicking the Enhanced Viewing mode button), the Viewer takes up even more room by hiding the palette controls, but leaves room for the transport controls, the Onscreen Control drop-down menu, the timecode display, and the page buttons along the bottom of the DaVinci Resolve UI. This mode is useful when you need an even closer look at the image, but you still want access to a minimal set of onscreen controls.

Color page in Full Viewer mode

Another option, Cinema mode, allows for full-screen viewing. Cinema mode is available by choosing Workspace > Viewer Mode > Cinema Mode Viewer (P). In Cinema mode, the menu bar is hidden, and the image is presented full screen without any of the ordinary onscreen controls. Moving the pointer over the screen reveals a set of hidden onscreen controls that include a play button, jog bar, mute button, and exit button (which lets you turn off Cinema mode).

You also have the option of superimposing scopes over the image, which can be valuable in on-set situations.
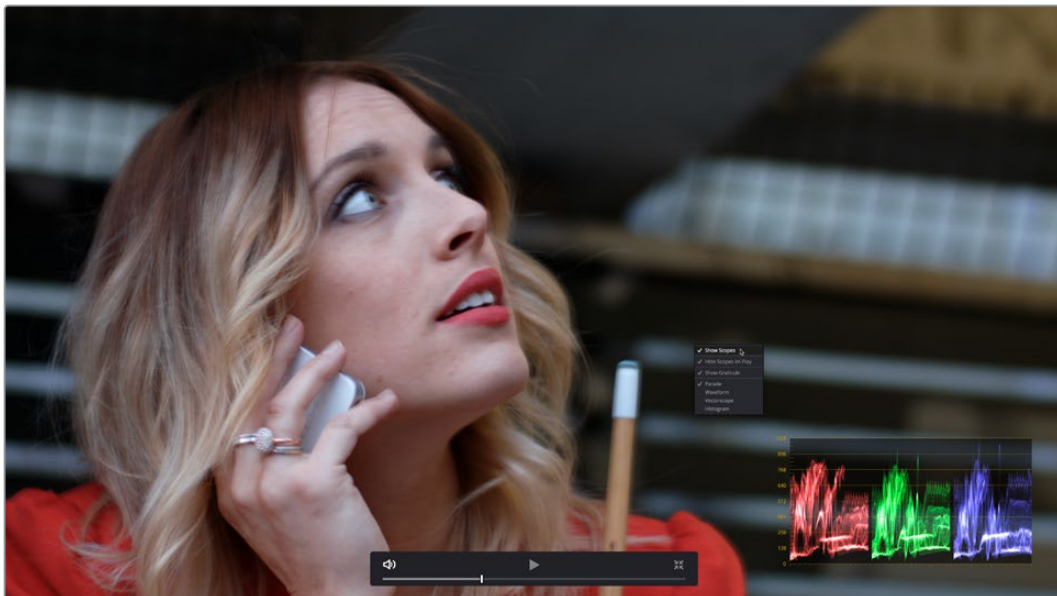
Color page in Cinema mode

Cinema mode is useful for doing detailed reviews of media in on-set and digital dailies workflows when working remotely without a secondary video display.

> **TIP:** If you'd like to superimpose timecode over the image in Cinema mode for reference, you can use the controls within the Data Burn-In window (Workspace > Data Burn-In) to set up whatever information you'd like to display during playback.

Safe Area Overlays in the Viewer

You can show or hide a series of safe area overlays in the Viewer. All safe area overlay options are found in the View > Safe Area menu. Each safe area overlay option can be individually enabled or disabled from this menu.

Viewer displaying extents, center, safe, action and title area overlays

- **On/Off:** Turns all currently selected safe area marker options on or off at once.
- **Extents:** An outline showing the exact outer edge of the frame. Especially useful when the safe markers are set to an aspect ratio other than that currently used by the Viewer.
- **Action:** An outline showing the outer 90% action safe area of the frame.
- **Title:** An outline showing the outer 80% title safe area of the frame.
- **Center:** A crosshairs showing the center of the frame.
- **Aspect:** Enables use of the View > Select Aspect Ratio submenu to change the aspect ratio of the safe area markers. You can choose among the following aspect ratios: 1.33 (a.k.a. 4:3), 1.66, 1.77 (a.k.a. 16:9), 1.85, and 2.35.

You can also access these options directly using the DaVinci control panel.

To customize safe area markers using the DaVinci control panel:

1. Press MODES, above the fourth trackball on the Center panel.
2. Press the SAFE AREA soft key. The Center panel soft keys are remapped with all of the available safe area options.
3. When you're finished, press EXIT.

Use Gray Background

Choosing View > Show Gray Backgrounds in Viewer sets the empty area of the Viewer (if there is any) to a lighter gray, making it easier to see which parts of the Viewer are black because of blanking, and which parts are simply empty because of the way the image is zoomed or panned.

Monitor Calibration

If you use Light Illusion's LightSpace CMS or SpectraCal's Calman for display calibration, you can now use DaVinci Resolve as a sync-able pattern generator. This means you can use DaVinci Resolve to output color patches, synchronized by LightSpace, to your display through whichever video interface is connected to your computer. These synchronized color patches will be analyzed by a monitor probe that's also controlled by LightSpace, which stores the probe data and compares it to the original color values of the output color values in order to characterize that display.

To use this feature, you must first have a licensed copy of LightSpace CMS, which is a Windows application. Synchronization depends on a wired or wireless LAN being available to connect the LightSpace application with DaVinci Resolve.

To synchronize LightSpace CMS to DaVinci Resolve as a pattern generator client:

1   Open LightSpace on the Windows computer that's running it.

2   When LightSpace is open, click the Network Manager button. A window appears displaying the two network IP addresses used by LightSpace. Note these, and click the Enable button.

The Network Manager dialog in LightSpace CMS

3   In DaVinci Resolve, choose Workspace > Monitor Calibration > LightSpace.

4   When the LightSpace dialog opens, enter the second of the two network IP addresses LightSpace lists into the Remote Machine field, and make sure the Port number matches. Then click the Connect button.
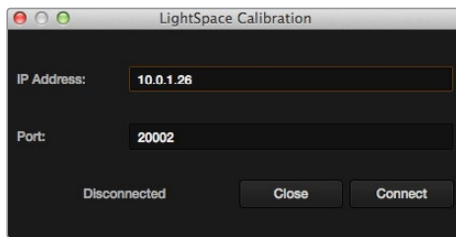
The Calibration dialog in DaVinci Resolve, connected to LightSpace CMS via WiFi

If everything is working correctly, the LightSpace dialog in DaVinci Resolve should show the word "Connected," and the Network Manager dialog in LightSpace should show that there is 1 available client/s.

You can now close the Network Manager dialog in LightSpace and follow the procedures outlined in the LightSpace CMS documentation for characterizing your display and building and exporting a display LUT (in the .cube format) that you can use as a display LUT in DaVinci Resolve. Alternately, you can export a display LUT from LightSpace that can be loaded onto an outboard video processing device.

5 When you're finished, click Disconnect in the LightSpace dialog, and then click Cancel to close the window.

Viewing Broadcast Safe Exceptions

Choosing View > Display Broadcast Safe Exceptions sets the Color Page Viewer to show a false-color overlay that indicates in blue the regions of the picture that violate the currently selected broadcast safe level in the Color Management panel of the Project Settings.
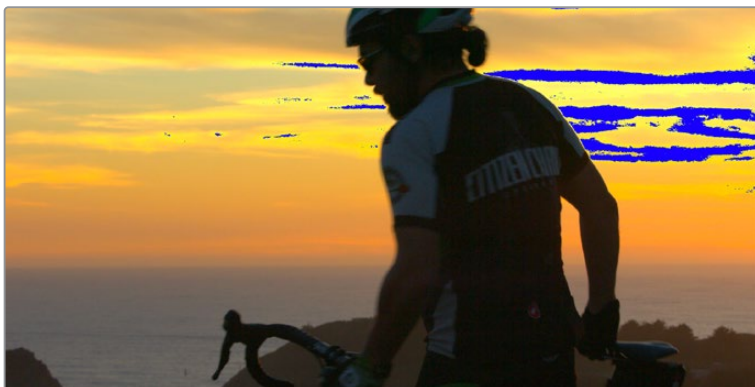
Areas of the image that violate broadcast safe are highlighted in blue

More information about broadcast safe limiting in the Color Management panel of the Project Settings appears in Chapter 116, "Automatic Grading Commands and Imported Grades."

Comparing Clips in the Viewer

The ability to compare different clips to one another is an important part of the color correction process. DaVinci Resolve provides three different ways of doing so. You can use the Gallery to display two clips for split screen comparison. You can also use different reference modes to see a timeline clip or reference movie directly as part of a split screen comparison. Finally, you can use the Split Screen controls to display multi-frame arrangements in the Viewer.

Saving and Wiping Stills in the Gallery and Timeline

The Gallery on the Color page provides fast access to stills that you've saved from various clips in the Timeline. While the dedicated Gallery page provides a more comprehensive interface for browsing presaved "looks," as well as for importing stills from other projects, you can save, organize, and browse stills directly within the Gallery of the Color page.

Stills are saved in the DPX file format. Once you've saved one or more stills, you can set up split screen wipes in the Viewer, which will be mirrored to your external display.
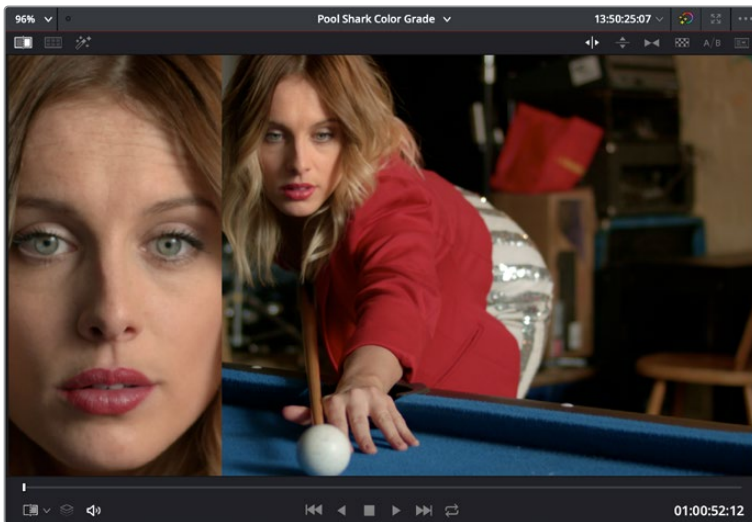
Stills from the Gallery can be compared to the current shot making it easier to match grades

This section provides an abbreviated summary of still store and split screen functionality to get you started quickly.

To save a still, do one of the following:
- Choose View > Stills > Grab Still (Option-Command-G).
- Right-click on the Viewer and choose Grab Still.
- Press GRAB STILL on the Transport panel of the DaVinci control panel.

To wipe a still, do one of the following:
- Select a still in the Gallery, and click the Image Wipe button on the top Viewer toolbar.
- Choose View > Stills > Play Still (Command-W), or right-click in the Viewer and choose Toggle Wipe.
- Double-click a still in the Gallery.
- Press PREV STILL or NEXT STILL on the Transport panel of the DaVinci control panel to select a still, then press PLAY STILL.

To adjust a wipe in the Viewer, do one of the following:
- Drag the pointer within the Viewer to move the wipe.
- Push the T-bar control up and down on the T-bar panel of the DaVinci control panel.

To customize a wipe in the Viewer:
- Click one of the Wipe mode buttons in the Viewer toolbar.
- Choose one of the following from either the View menu or the Viewer contextual menu;
  - **Wipe Style:** Cycles among the Horizontal, Vertical, Mix, Alpha, Difference, and Box modes.
  - **Invert Wipe:** Reverses each half of the wipe.

Hover Scrub in the Gallery

When Live Preview is enabled in the Gallery option menu, the Hover Scrub Preview submenu lets you choose how you want Live Preview to be shown by a thumbnail in the Gallery and in the Viewer when you hover the pointer over a still or LUT in the LUT Browser:

- You can choose to scrub both the thumbnail you're hovering over and the Viewer, letting you preview the current still's grade or a LUT over the duration of the current clip in both the thumbnail and Viewer.
- You can choose to scrub just the thumbnail, leaving the Viewer to show just the grade or LUT over the frame at the position of the playhead.
- You can disable scrubbing altogether, in which case both the thumbnail and the Viewer will only show the grade or LUT over the frame at the position of the playhead.

Copying Grades from Stills in the Gallery

Stills also store the grade from the clip they came from, and can be used to copy grades from one clip to another, or to store grades that you might want to use later.

To copy a grade from a still to a clip, do one of the following:
- Select one or more clips in the Timeline, then right-click a still in the Gallery and choose Apply Grade.
- Select one or more clips in the Timeline, then middle-click a still in the Gallery.

When you copy a still in this way, the saved grade completely overwrites the grade in the target clip, unless you've used the "Preserve number of nodes" option, found in the contextual menu of the Gallery. For more detailed information on using the Gallery, including options for organizing the Gallery browser, instructions for using Albums, Power Grades, and Memories, as well as other methods of copying grades and performing advanced grade management tasks, see Chapter 116, "Using the Gallery" and Chapter 117, "Grade Management."

Different Viewer Reference Modes for Wipes

While it's common to use the Gallery to wipe against reference stills, by changing the reference mode you can also create a wipe against a clip in the Timeline, or against an Offline Reference Clip or Timeline, if one has been assigned to the current Timeline.

To change the Viewer reference mode, do one of the following:
- Choose an option from the View > Reference Wipe Mode submenu.
- Right-click the Viewer and choose an option from the Reference Mode submenu of the contextual menu.
- On the T-bar panel of the DaVinci control panel, press REF ON/OFF to toggle the reference mode immediately to Offline mode and back again, in order to split screen the current clip against an offline video.

There are three reference modes:
- **Gallery:** The default reference mode. Lets you wipe the current clip against a Gallery still.
- **Timeline:** Lets you wipe the current clip against another clip in the Timeline using the Wipe Timeline Clip command (see below).
- **Offline:** Lets you wipe the current clip against an offline video that's been assigned to the current Timeline. For more information on assigning Offline References to a timeline for comparison, see Chapter 46, "Preparing Timelines for Import and Comparison."

Wiping Between Clips in the Timeline

If you want to wipe the current clip against another clip in the Timeline without saving a still to the Gallery first, there's a special procedure you can follow.

To wipe between two clips using the Timeline reference mode:
1 Click the thumbnail of the first clip you want to compare.

2 (Optional) A "Gang timeline wipe with current clip" option, available from the Viewer option menu, lets you maintain the offset between the current clip and a timeline clip you're wiping against when you move the current clip selection to other clips. With this option enabled, the offset between the timeline wiped clip and the current clip is maintained when you move the clip selection. You can step the timeline reference clip forward one frame by pressing Command-Option-Right Arrow, and back one frame by pressing Command-Option-Left Arrow. This allows for precise positioning. When this option is disabled, the timeline wiped clip stays where it is regardless of what clip you select.

3 Right-click the thumbnail of the second clip you want to compare against, and choose Wipe Timeline Clip from the contextual menu.

   Both clips appear split screened against one another.

> **NOTE:** Wipe Timeline Clip only appears in the contextual menu if you right-click on a thumbnail in the Timeline that has not been selected.

Change a Timeline Wipe Using the Timelines Album of the Gallery
While you're using the Wipe Timeline Clip to show a wipe of the current clip against any other clip in the Timeline, you can open the Timelines album of the Gallery and click different clips to change which timeline clip you're wiping against (outlined in blue) without changing the current clip (outlined in orange).

Using Split Screen Modes

A set of split screen modes provides additional ways of comparing multiple images in the Viewer at the same time. These provide side-by-side and grid comparisons of multiple shots and multiple versions, all of which are output to video for monitoring on your external video display. For example, you can use the Split Screen Versions mode to display every single version that's applied to the current clip in a grid, for easy evaluation. The currently selected clip in the Timeline is highlighted in gray, so you can keep track of what you're doing.

To enable a split screen mode, do one of the following:

- Click the Split Screen button on the top Viewer toolbar, and choose a split screen method from the drop-down menu that appears in the Viewer toolbar at the right.

- Choose an option from the View > Split Screen submenu.

- Press Option-Command-W to turn Split Screen on and off, using the last selected option.

- Right-click the Viewer and choose an option from the Split Screen submenu in the contextual menu.

> **NOTE:** When any of the split screen modes are selected, you cannot see any other onscreen controls in the Viewer, such as Power Window shapes, until you first disable split screen.

Four shots shown in a grid using the Split Screen > Selected Clips mode

Viewing and Choosing the Current Selection

In any of the split screen modes, the current selection is indicated by a gray outline. This outline can be disabled for a more direct comparison by choosing View > Split Screen > Show Outline to toggle the outline off and on.

In certain modes, you can also double-click a particular frame of the split screen view to change the current clip, choose the active version, or apply a gallery grade.

Available Split Screen Modes

You can choose from among the following split screen modes:

- **Current Group:** Shows up to 16 clips that share the same group as the current clip. Double-clicking a frame does nothing in this mode.

- **Highlight Modes:** Shows a four-up display that lets you simultaneously see (clockwise) the clip's RGB image, the gray matte, the high contrast matte, and a difference matte generated by the node's input compared against its output. Double-clicking a frame does nothing in this mode.
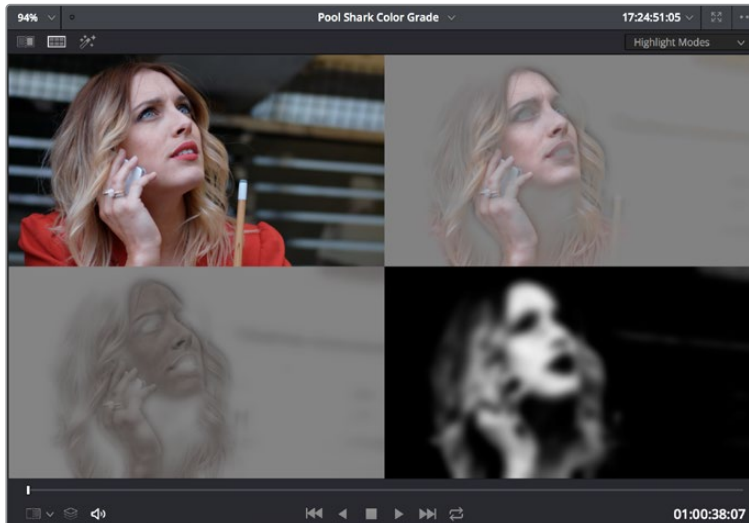

Viewing a key using the Split Screen > Highlight Modes

- **Neighbor Clips:** Shows four clips that immediately surround the current clip. The previous two clips appear as the upper left- and right-hand clips, the current clip appears at the lower left-hand corner, and the next clip appears at the lower right. Double-clicking a frame does nothing in this mode. The "Neighboring Clips in Split Screen" parameter in the Color panel of the User Preferences lets you customize how many neighboring clips appear in this mode.

- **Selected Album:** When you choose this option, a split screen of the grades of every still in that album are shown in the Viewer as they appear applied to the current clip. Double-clicking a frame applies that gallery grade to the current clip. Up to 16 grades will be shown.

- **Selected Clips:** Shows all currently selected clips in the Timeline, up to 16 at one time. Clicking a clip moves the playhead to the first frame of that clip.

- **Selected LUTs:** Lets you simultaneously display previews of different LUTs effect on the current clip as a split screen in the Viewer by using the LUTs browser to Command-click up to 16 LUTs you want to preview.
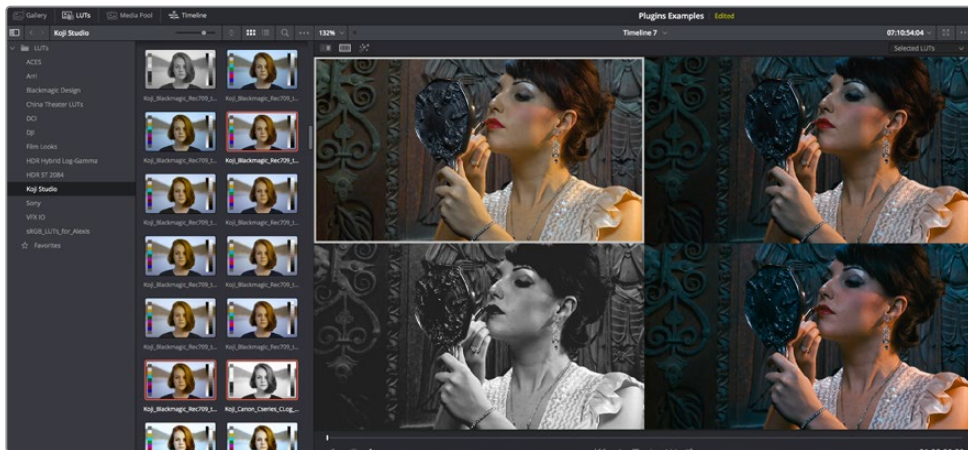
The Selected LUTs split screen option lets you preview a bunch of LUT looks at once

- **Selected Still Grades:** When you choose this option, the act of selecting stills in the Gallery of the Color page shows each of the grades associated with those stills as they appear applied to the current clip, in a split screen arrangement. Double-clicking a frame applies that gallery grade to the current clip.
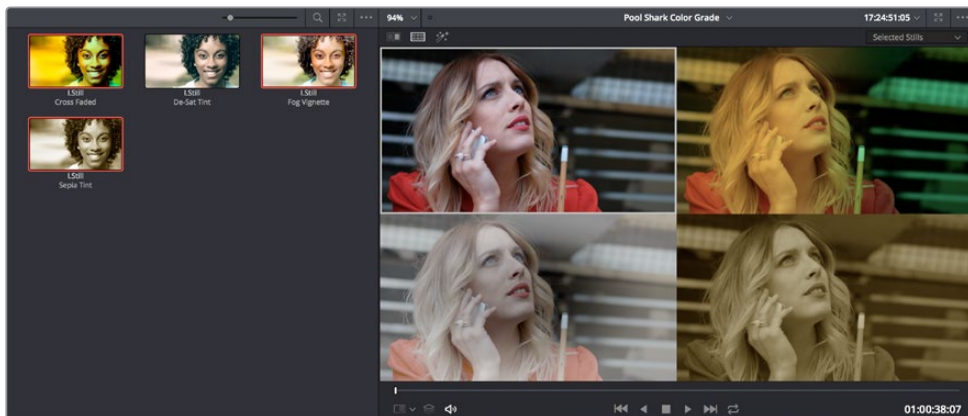
Previewing four gallery grades using the Split Screen > Gallery Grades mode

- **Selected Still Images:** Lets you view the current clip against a variety of other stills in the Gallery that you select. This is not a grading preview, you're actually doing a split screen of the selected still images in the Gallery.

- **Version:** Shows up to 16 versions for the current clip, all at once, making it easy to evaluate a series of different versions in relation to one another. If you have more then 16 versions, you deserve some manner of award. Double-clicking a version changes the active version.

- **Versions and Original:** Shows up to the first 15 versions for the current clip, along with the original ungraded clip at the upper left-hand corner. Double-clicking a version changes the active version, but you cannot double-click to select the original.

Marker Overlays and Navigation

If you part the playhead on top of a marker in the Timeline of the Color page, that marker's information appears in a Viewer overlay, just as in the Edit page, making it easier to read notes and see what information is available. These overlays can be easily hidden by clicking the Viewer option menu and turning off "Show marker overlays."

Timeline Marker List Available in Color Page Viewer Option Menu

The Option menu of the Color page Viewer has a submenu that lists all Timeline Markers in the currently open timeline. This makes it easy to run down client notes.
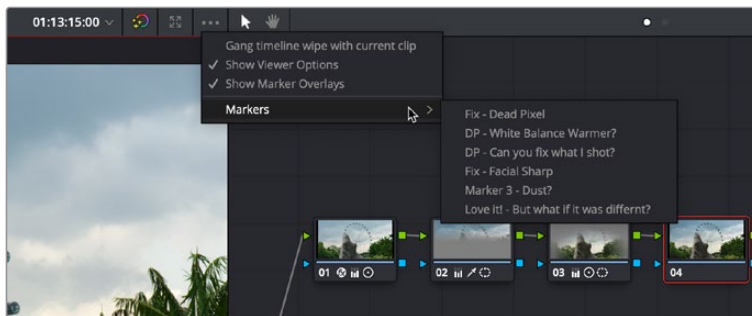

Timeline markers list available for quick access in the Viewer's Option menu

Using Video Scopes

While not directly tied to use of the Viewers, video scopes nonetheless work hand in hand to help you evaluate the images you're working on. DaVinci Resolve has a set of five real-time video scopes that you can use to monitor the internal data levels of clips in your project as you work. Each scope provides an unambiguous graphical analysis of different characteristics of the video signal, showing you the relative strength and range of individual color components including luma, chroma, saturation, hue, gamut, white point, and the red, green, and blue channels that, together, comprise the color and contrast of the images in your program.

Video Scope Location

By default, you can view any one of these scopes at a time at the bottom right corner of the Color page, by clicking the Video Scope button in the palette button bar.
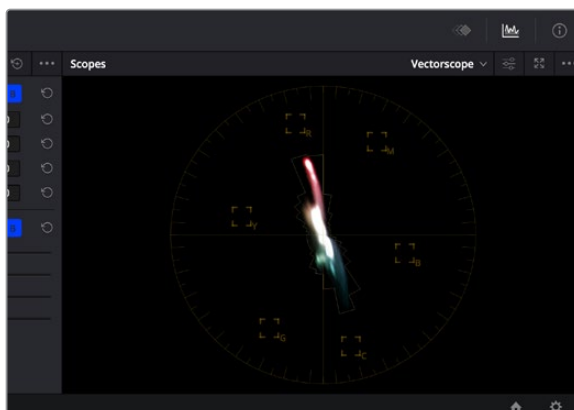
The video scope, docked next to the other palettes at the bottom of the Color page

Optionally, you can click the Expand button at the top right of the video scope to open the video scopes into a floating window, within which you can display all four video scopes together, or individually, on any monitor connected to your workstation.

Video scopes in a floating window

Additionally, the video scopes are available in many of the dual-screen layouts available in DaVinci Resolve. The video scopes aren't just available in the Color page. They're also available in the Media and Deliver pages for whenever you need to evaluate the video signal more objectively, such as when you're setting up to capture from tape or scan from film, or when you're setting up for output.

To open video scopes from the Media, Color, or Deliver pages, do one of the following:
- Choose Workspace > Video Scopes > On/Off (Command-Shift-W) to open video scopes into a floating window.
- Choose Workspace > Dual Screen > On to open video scopes as part of a dual screen layout.

Video Scope Measurement

Because you're evaluating the internal state of the image data, by default the scales of the WFM and Parade scopes always reflect 10-bit full range data from 0–1023, regardless of the Video/Data Level setting you've selected in the Master Settings panel of the Project Settings. This gives you a window into how the image is being processed by DaVinci Resolve prior to being output via your computer's video I/O interface.

If you're working on an HDR (High Dynamic Range) grade, you can open the User Preferences and turn on Enable HDR Scopes for ST.2084 and HLG (this feature is only available in Studio version). This replaces the 10-bit scale of the Waveform, Parade, and Histogram video scopes with a scale based on nit values (or cd/m^2) instead.
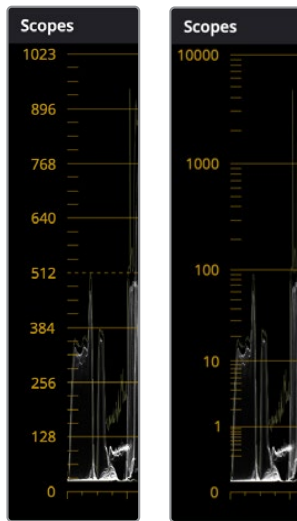
(Left) The Parade scope showing the data range scale, (Right) The Parade scope showing the HDR "nit" scale

Video Scope Performance and Detail

All video scopes were updated for DaVinci Resolve 16 to show more detail with faster performance than in previous versions. While they're GPU-accelerated, the video scopes require a certain amount of video processing power to operate. Depending on which combination of video scopes and scope options you have selected, you may notice your real time processing capabilities ever so slightly affected. Closing the video scopes frees up all processing for color correction and effects. On high-powered workstations, you probably won't notice a difference, but on less powerful computers, closing the scopes might make a small difference.

Two global settings in the video scope option menu affect the performance and detail of all video scopes equally.

- On slower workstations, a quality submenu lets you choose High, Medium, or Low quality scope drawing, to trade off legibility for performance. High quality shows you the most information about the video signal, while an Auto option makes a selection based on your workstation's capabilities.
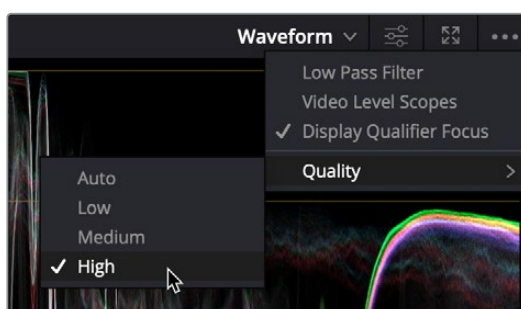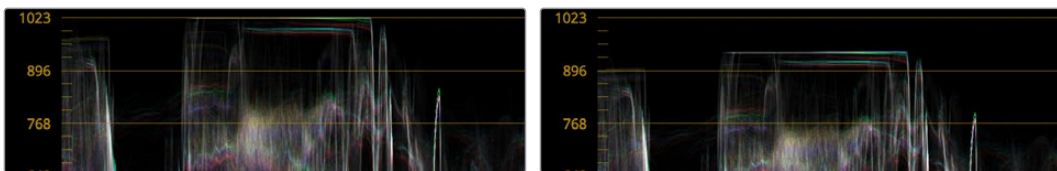

The Quality setting in the video scope option menu

- All video scopes have a Low Pass Filter setting in the Scopes Option menu that filters out a signal's noise to make the scope graphs clearer to read. While this can act as an "x-ray" to better see detail in the scope graph interiors, it can make the highlight and shadow excursions on the graph seem a bit shy of where they actually are, so it's recommended to enable the "Extents" option of whichever scope you're using to get an unambiguous look at the maximum excursions in your scopes. Extents draws an outline highlighting all graph excursions to show you the true level of all overshoots and undershoots in the video signal, even when the Low Pass Filter is on.

(Left) The Waveform scope with Low Pass Filter turned off,
(Right) The Waveform scope with Low Pass Filter turned on

Displaying Scopes With Data or Video Levels

For project being worked on at video levels, a setting in the video scope option menu lets you toggle between displaying video scopes scaled to either Data Levels (the default) or Video Levels (by turning on Video Level Scopes). This only affects how your scopes are displayed; it has no effect on monitored or rendered output.

(Left) The Waveform scope shown at default Data Levels,
(Right) The same waveform shown with Video Level Scopes turned on

Display Qualifier Focus in Video Scope Graphs

The Display Qualifier Focus setting in the video scope option menu helps you identify which features in the video image correspond to which parts of the video scopes. With Display Qualifier Focus turned on, choosing the Qualifier mode of the Viewer and moving the eyedropper around the image draws circles around the sampled pixels as they appear in the currently visible video scope graph. If multiple video scopes are visible, each scope will have an indication of the location of the sampled pixels that's specific to each scope.
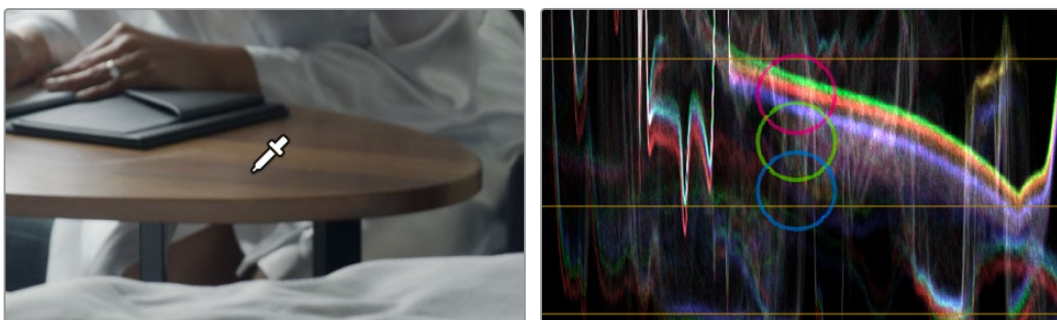
(Left) Hovering the eyedropper over a feature in the Viewer, (Right) The region of those pixels analysis shown in the overlaid red, blue, and green waveforms of the Waveform scope.

Explanation of Each Video Scope

There are five available video scopes, each of which shows a different analysis of the video signal you're adjusting.

Waveform Monitor

Overlays waveform analyses of the Y (luma/luminance), CBCR (the color difference channels of Y'CBCR), or RGB (red, green, and blue) channels over one another so that you can see how they align.

The Y option presents a true Luma scope that can have Colorize enabled to show false color, which lets you see which colors in the Viewer image are where in the video scope graph.

For the RGB scopes, the relative heights of the red, green, and blue graphs indicate is identical to the description seen for the Parade scope below, and with color enabled the red, green, and blue graphs are tinted with the color they represent. This makes it easy to see where all three graphs align, by looking for where parts of the waveform monitor appear in white, which is the result of the red, green, and blue graphs lining up and adding their color together.
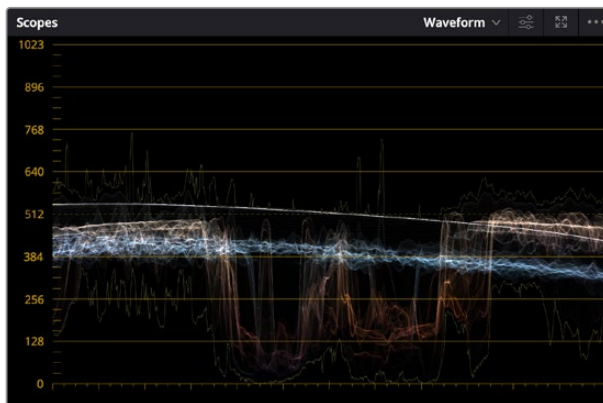

The Waveform scope showing Y' (luma) only, with colorization and extents enabled

Parade

The Parade scope shows separate waveforms side by side that analyze the strength of individual video signal components. The Parade scope can be set to analyze RGB, YRGB, and Y'CBCR.

By showing a comparison of the intensity of the luma, red, green, and blue channels, the Parade scope makes it possible to detect and compare imbalances by comparing the relative heights of the RGB graphs in the highlights (the top of the R, G, and B graphs), shadows (the bottom of the R, G, and B graphs), and midtones (the middle of the R, G, and B graphs) for the purposes of identifying color casts and performing scene-by-scene correction.

When the YRGB channels are taken altogether, the bottom of all graphs indicates the black point of the image, while the tops of all graphs indicate the white point. It then follows that the difference between the height of the bottom and top of all graphs indicates the overall contrast ratio of the image you're evaluating. Tall parade graphs indicate a wide contrast ratio, while short parade graphs indicate a narrow contrast ratio.
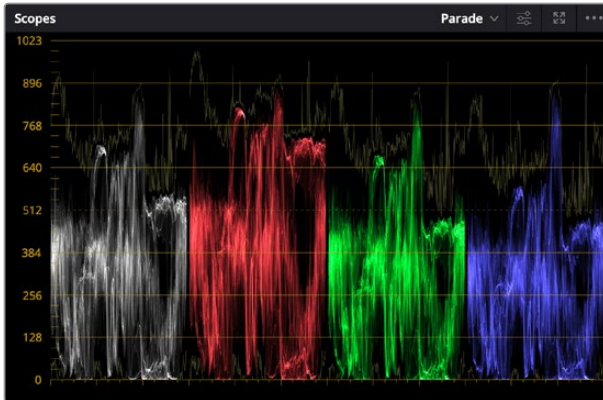
The Parade scope showing YRGB waveforms,
with colorization and extents enabled

Vectorscope

Measures the overall range of hue and saturation within an image. Measurements are relative to a centered graticule that you can enable that's overlaid on the scope, which provides a frame of reference via crosshairs. DaVinci Resolve has a traditional vectorscope, the graph of which emulates a trace-drawn graph, with 75 percent color bar targets indicating the angle of each of the primary and secondary colors around the edge of the graph, and an optional skin tone reference graticule (otherwise known as the In-phase reference).

The Vectorscope can have Colorize enabled to show false color which lets you see which colors in the Viewer image are where in the video scope graph.

More saturated colors in the frame stretch those parts of the graph farther toward the edge, while less saturated colors remain closer to the center of the vectorscope, which represents 0 saturation. By judging how many parts of the vectorscope graph stick out at different angles, you can see how many hues there are in the image, with the specific angle of each part of the graph showing you which hues they are. Furthermore, by judging how well centered the middle of the vectorscope graph is relative to the crosshairs, you can get an idea of whether there's a color imbalance in the image. If the vectorscope graph is off-centered, the direction in which it leans lets you know that there's a color cast (tint) in the image.
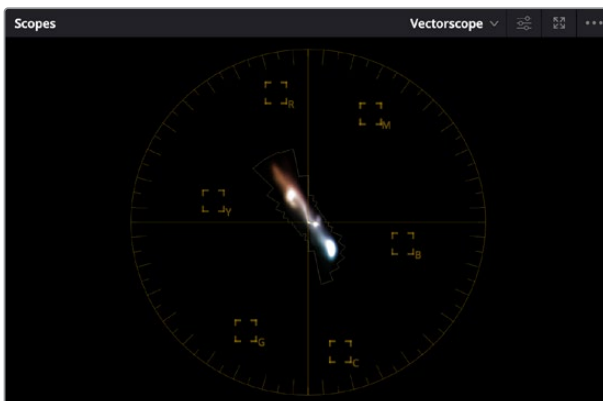

The Vectorscope shown in 2x mode, with combined
highlights, mid-tones, and shadows extents

Histogram (RGB/YRGB parade histogram)

Displays a statistical analysis of how many pixels of each color channel lie at each percentage of tonality, plotted along a digital scale from 0 percent (black) to 100 percent (white). Comparing the left, middle, and right parts of the Y, R, G, and B graphs (Y is optional) lets you evaluate the color balance in the shadows, midtones, and highlights of the image.

Taken altogether, the left of all graphs indicates the black point of the image, while the right of all graphs indicate the white point. It then follows that the difference between the width of the left and right of all graphs indicates the overall contrast ratio of the image you're evaluating. Wide histogram graphs indicate a wide contrast ratio, while narrow histogram graphs indicate a narrow contrast ratio.
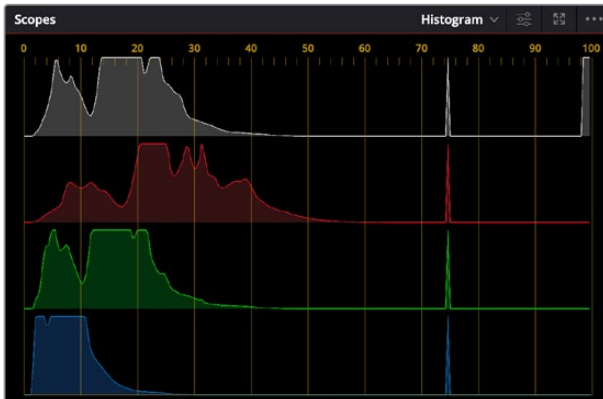

The Histogram scope set to YRGB

CIE Chromaticity Scope

DaVinci Resolve contains CIE 1931 xy and CIE 1976 uv scopes, which let you see the current image analysis as a graph superimposed against a triangle that represents the tristimulus values of the color gamut you're working within, along with an indication of the current white point. A label shows the currently selected gamut, with the specific coordinates of these Red, Green, and Blue values as well as the White point, while the overall "horseshoe" shape represents the entire range of visible light, all plotted against an xy graph.

You also have the option of showing a second gamut triangle, in cases where you want to compare the current analysis to two different gamuts. This can be useful when you need to create deliverables in multiple gamuts, and you want to see which parts of the video signal are safe in all gamuts and which parts are exceeding the smaller of the two. When you do this, both gamuts are labeled, and the coordinates of the Red, Green, and Blue values of both gamuts are listed to the side.
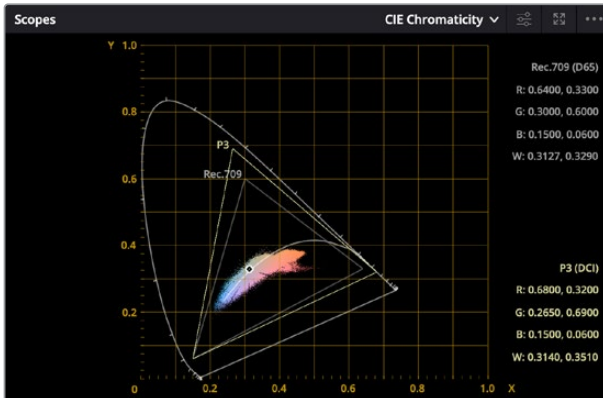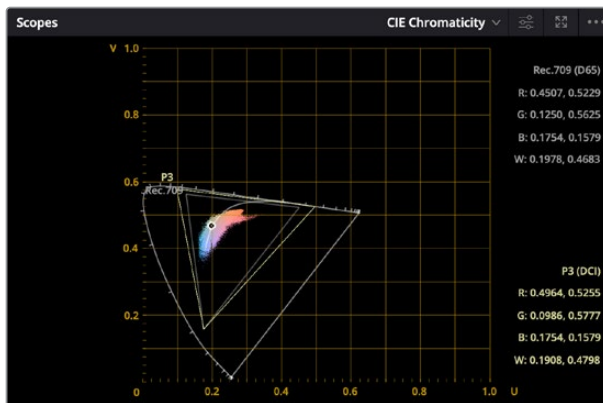

The CIE 1931 xy scope showing both P3 and Rec.709 gamuts

In a way, the Chromaticity scope is a 3D scope, but it's drawn as if you're looking down at the top of a 3D shape that plots every color value in an image in X, Y, Z space, but you can only perceive the 2D outline around the widest parts of this shape drawn on an X, Y plot. The graph does indeed represent every single value found within a 3D plot of the image data, but the triangle only indicates the widest "slice" of the current gamut and of this 3D shape within the mid-tones.

What this means is that while the Chromaticity scope's graph gives you a rough idea of whether or not the current image is within gamut relative to your delivery spec, it's not exact and it's not foolproof, as part of the image data could fall within this wide triangle and yet overshoot the required gamut elsewhere in the highlights at the top or the shadows near the bottom of the 3D shape you're looking down on. On the other hand, if any part of the graph does extend past the boundaries of the gamut triangle, then that definitely indicates a gamut violation. You can add an additional gamut triangle in the scope settings in order to compare the color space you're working in to another color space, for reference.

Most people who've had any exposure to color grading concepts are familiar with the traditional CIE 1931 horseshoe graph, which plots the portion of the spectrum visible to the human eye according to studies done in the late 1920s (subsequent studies have confirmed this analysis). The optional CIE 1976 uv graph is based on an updated color space (CIELUV) that was an attempt by the International Commission on Illumination (CIE) to create a more perceptually uniform graph of color. Whereas the CIE 1931 analysis visually exaggerates certain parts of a color graph, the CIE 1976 graph draws all parts of a color graph more or less proportionally to one another. Overall, neither analysis is more "correct" than the other, it's simply a matter of what you prefer to look

The CIE 1976 scope showing both P3 and Rec.709 gamuts

Panning and Zooming the Video Scope Graphs

If you want to examine any part of a video scope's graph in more detail,
you can do the following:

- **To zoom into a graph:** Hold the Option key down, and roll the scroll control.
- **To pan around a graph:** Click and drag with the middle pointer button.

Customizing the Video Scopes

Once you've opened the video scopes, there are a variety of ways you can customize how the scopes look, and expose additional onscreen graticule information to help you measure what you need.

Methods of customizing the Scopes window:

- **To change the size of the Scopes window:** Drag the lower right-hand corner to resize the Scopes window to the desired size.

- **To change how many scopes are displayed at once:** Click one of the buttons in the upper right-hand corner of the Scopes window to set 1, 2, or 4 up arrangements of the video scopes. You can also choose how many scopes are simultaneously displayed by choosing Workspace > Video Scopes > 1-Up, 2-Up, or 4-Up.

- **To change which scopes appear in which pane:** Click the Name drop-down at the upper left corner of each scope's pane, and choose a different scope.

Once open, you can resize the Scopes window to make it as large or small as you require, positioning on a second display if you want to make it even larger.

To customize each video scope's display options:

1. Click the Option button to the right of the Scope drop-down menu to expose the current scope's Custom Controls window.
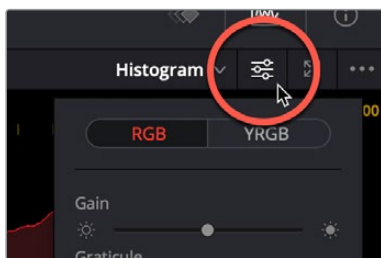
Clicking to open the current scope's custom controls

2. Adjust any of the available controls to customize the look of that particular scope.

3. Click anywhere outside of the Custom Controls window to make it disappear.

Parade Scope Display Options

The Parade scope has the following options:

Options in the Parade scope

- RGB, YRGB, and YCbCr modes, allowing you to evaluate more channels than before.
- A colorize checkbox lets you view graphs in monochrome or false-color (indicating red, green, and blue).
- An Extents checkbox draws an outline highlighting all graph excursions, to unambiguously show you all overshoots and undershoots in each waveform.
- The Parade slider makes that scope's graph brighter or dimmer. Brighter graphs make it easier to see fine detail, but harder to see which parts of the graph are stronger and weaker.
- The Graticule slider makes that scope's scale brighter or dimmer, making it more or less visible (or distracting) relative to the graph.
- The Show Reference Levels checkbox lets you turn on adjustable Low and High reference level markers by setting the low and high sliders to something other than their defaults. This is especially useful for HDR grading where you're working within a specific peak luminance threshold.

Waveform Scope Display Options

The Waveform scope has the following options:
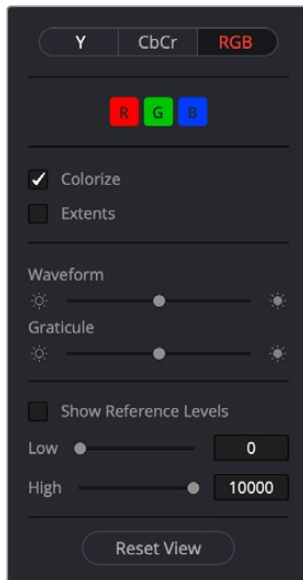
Options in the Waveform scope

- Y (luma) and CbCr (chrominance) modes to show you the true luma or chroma signals in isolation, and RGB to show you only an RGB analysis.
- In RGB mode, R, G, and B buttons that can be individually toggled on and off to see any combination of graphs.
- A colorize checkbox lets you view overlaid graphs in monochrome or false-color (indicating red, green, and blue). If you're only enabling the Y or C scopes, the different areas of these graphs are drawn with color taken from the image being analyzed, which makes it easier to see which part of the scope graph corresponds to which part of the image.
- An Extents checkbox draws an outline highlighting all graph excursions, to unambiguously show you all overshoots and undershoots in each waveform.

- The Waveform slider makes that scope's graph brighter or dimmer. Brighter graphs make it easier to see fine detail, but harder to see which parts of the graph are stronger and weaker.
- The Graticule slider makes that scope's scale brighter or dimmer, making it more or less visible (or distracting) relative to the graph.
- The Show Reference Levels checkbox lets you turn on adjustable Low and High reference level markers by setting the low and high sliders to something other than their defaults. This is especially useful for HDR grading where you're working within a specific peak luminance threshold.

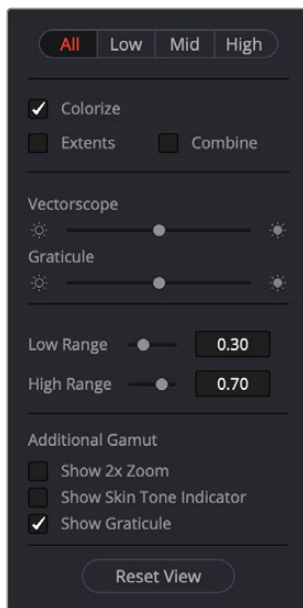## Vectorscope Display Options

The Vectorscope has the following options:

Options in the Vectorscope

- Choose ALL to view the entire tonal range of the image as a Vectorscope graph analysis, or to selectively view just the shadows (Low), mid-tones (Mid), or highlights (High) of the image as a vectorscope graph analysis.
- A Colorize checkbox draws the different areas of these graphs with color taken from the image being analyzed, which makes it easier to see which part of the scope graph corresponds to which part of the image. With colorize turned off, graphs only appear white.
- An Extents checkbox draws an outline highlighting all graph excursions to unambiguously show you all overshoots and undershoots.
- A Combine checkbox lets you see simultaneous overlapping extents for the highlights, mid-tones, and shadows overlaid on one another.
- The Vectorscope slider makes that scope's graph brighter or dimmer. Brighter graphs make it easier to see fine detail, but harder to see which parts of the graph are stronger and weaker.
- The Graticule slider makes that scope's scale brighter or dimmer, making it more or less visible (or distracting) relative to the graph.

- Low Range and High Range sliders let you manually define the boundaries separating shadows from mid-tones and highlights. Low Range defaults to 0.30, and High Range defaults to 0.70.
- Show 2X Zoom zooms the vectorscope graph by 200%, making it easier to see fine detail and use the vectorscope with charts.
- Show Skin Tone Indicator checkbox shows a line at the traditional Inphase angle that is useful as a general guidepost for average skin tone hue.
- Show Graticule checkbox lets you show or hide the circular degrees indicator surrounding the outer edge and the cross hairs that indicate the center of the vectorscope.

Histogram Display Options

The Histogram has the following options:

Options in the Histogram scope

- You can view either RGB or YRGB histograms.
- Gain slider scales that scope's graph taller or shorter. Taller graphs expand to show greater detail in the histogram's peaks, shorter graphs reduce the apparent detail.
- Graticule slider makes that scope's scale brighter or dimmer, making it more or less visible (or distracting) relative to the graph.
- The Show Reference Levels checkbox lets you enable adjustable Low and High reference level markers by setting the Low and High sliders to something other than their defaults. These reference markers are especially useful for HDR grading where you're working within a specific peak luminance threshold.

CIE Chromaticity Display Options

The CIE Chromaticity scope has the following options:
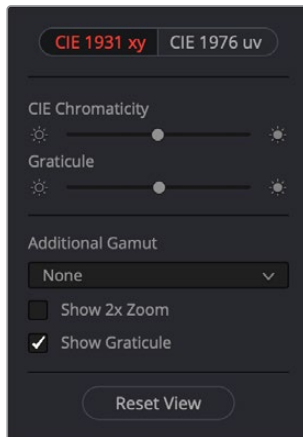
Options in the Chromaticity scope

- You can view a chromaticity analysis in either a CIE 1931 xy graph, or a CIE 1976 uv graph.

- CIE Chromaticity slider makes that scope's graph brighter or dimmer. Brighter graphs make it easier to see fine detail, but harder to see which parts of the graph are stronger and weaker.

- Graticule slider makes that scope's scale brighter or dimmer, making it more or less visible (or distracting) relative to the graph.

- Additional Gamut drop-down menu lets you expose a second gamut triangle, for instances where you want to compare how an image fits into two different gamut ranges.

- Show 2X Zoom zooms the CIE graph and graticule by 200%, making it easier to see fine detail and use the vectorscope with the charts.

- Show Graticule checkbox lets you show or hide the circular degrees indicator surrounding the outer edge and the cross hairs that indicate the center of the vectorscope.

Chapter 115

Color Page Timeline and Lightbox

The Timeline in the Color page, consisting of the Thumbnail Timeline and the Mini-Timeline, is primarily used for navigating the current arrangement of clips, and for keeping track of clip properties such as whether they're graded and ungraded, whether they use tracking, which version they're using, and so on. It can also be used for quickly copying grades from one clip to another, for creating groups, and for comparing clips in the Viewer.

The Lightbox is the twin sibling of the Thumbnail Timeline, and provides an image-based method of comparing clips, managing grades, and performing a wide variety of organizational tasks.
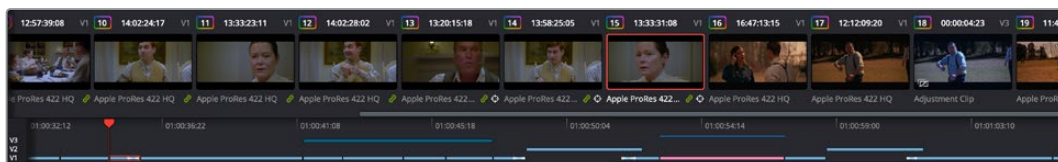
This chapter covers the use of the Timeline and Lightbox.

Contents

Navigating Using the Color Page Timeline

The Color page Timeline consists of two parts that work together, the Thumbnail Timeline and the Mini Timeline. These work together to let you examine and navigate the Timeline of your program in different ways.
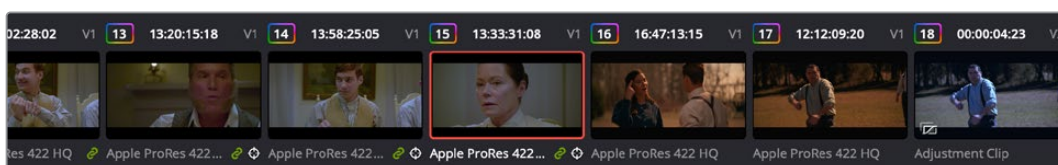

The Color page Timeline

The scroll bar for the Mini-Timeline is independent of the scroll bar for the Thumbnail Timeline, and both can be set to show different ranges of clips. Using the scroll control of your pointing device lets you zoom into or out of the Mini-Timeline. When zoomed all the way out, the Mini-Timeline displays the entire timeline within the available width of the screen, making it a fast way of navigating the entire program from the beginning to the end. However, you can zoom into a particular section when you need more information about how an intricate arrangement of superimposed clips are organized while you're grading.

Thumbnail Timeline

Provides a concise visual representation of your project where each clip is a single numbered thumbnail, regardless of its duration. Clicking a thumbnail moves the playhead to the first frame of that clip, while using the Up/Down Arrow keys moves the selection to the previous or next clip. Whichever clip is at the current position of the playhead appears with its thumbnail outlined in orange. The scroll wheel of your pointing device lets you scroll backward and forward through the thumbnail timeline.

The Color page Thumbnail Timeline

Each thumbnail displays a variety of information above and below it, including a rainbow outline around the number of graded clips, the clip format, file name, or grading version text below each thumbnail, tracking or stabilization badges, flag badges, and link badges to indicate clip groups or automatic remote grade linking, where existent.

Mini-Timeline

Shows a miniature representation of the Timeline in the Edit page, where each clip's width is proportional to its duration, and superimposed clips are shown on top of one another. The Mini-Timeline can show a maximum of six video tracks; if your edit uses more, a scroll bar lets you change which tracks are displayed. Clicking a clip in the Mini-Timeline selects that clip and moves the playhead to its first frame.
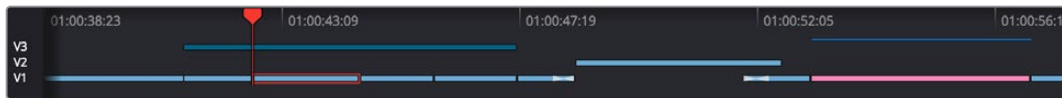
The Color page Mini-Timeline

Scrolling, Zooming, and Navigation

A Timeline Ruler contains the top handle of the playhead, displays the record timecode of the current edit, and acts as a scrubber bar that typically spans a longer section of the Timeline. The scroll wheel of your mouse lets you zoom in and out of your edit, and if you zoom all the way out you can fit every clip in the Mini-Timeline into the available width of the ruler, letting you scrub through every clip in the Timeline quickly. Clicking anywhere within the ruler instantly jumps the playhead to that frame.

Enabling/Disabling Tracks

The far left of the Mini-Timeline shows numbers for each track, and hovering the pointer over the track number of any track in the Mini-Timeline of the Color page reveals a tooltip showing the name of that track. Clicking a track number enables/disables that track along with all clips on that track, similarly to using the Timeline > Enable/Disable Video Tracks submenu commands (Shift-Command-1 through 9). Clips on disabled tracks are not rendered in the Viewer or video output, and are hidden from the Thumbnail Timeline. If a track has been disabled in the Edit page, it will appear dimmed in the Mini-Timeline.

Option-clicking a track number in the Mini-Timeline turns that track number red, letting you hide clips from the Thumbnail Timeline without actually disabling the video in your program. This is useful in situations where you want to prevent clips in a particular track (such as motion graphics or titles rendered from another application) from intercepting the playhead when using the next/previous clip commands.

Setting In/Out Points for Looping

You can use the I and O keyboard shortcuts to set custom In and Out points in the Timeline. Once set, turning on Loop in the Viewer transport controls enables this range to be looped, whether it's a partial range of one clip, or a range spanning multiple clips together.

Using Multiple Timeline Playheads

DaVinci Resolve supports creating up to four separate playheads in the Mini-Timeline, that you can use to jump back and forth among different parts of your timeline. Only one playhead can be selected at any given time, and the currently selected playhead corresponds to the current clip, highlighted in orange. Each playhead in the Mini-Timeline is labeled with a letter, A through D.
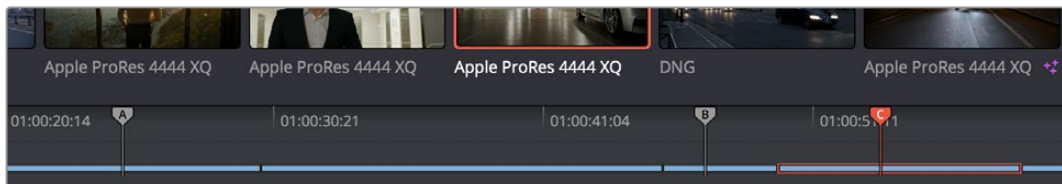
Multiple playheads in the Mini Timeline for multi-region navigation

To add a new playhead to the Mini-Timeline:

> Choose a playhead from the Color > Active Playheads submenu. That playhead will be placed at the same position as the original playhead, but it is now the one that is selected, so dragging the new playhead to a new position of the Mini-Timeline will reveal the original playhead you were using.

To select another playhead to view:

- Click on the top handle of any playhead to select it, making that the currently active playhead controlled by the transport controls. By default, no keyboard shortcuts are mapped to the four playheads that are available, but you can create a custom keyboard mapping that you can use to quickly switch among them.

- Using the DaVinci Advanced Control Panel, you can use the A, B, C, and D buttons on the jog/shuttle panel to switch to the playhead you want to control.

To eliminate all additional playheads from the Mini-Timeline:

> Choose Color > Active Playheads > Reset Playheads.

Show Current Clip With Handles

If you're working on a project that's part of a round-trip workflow, and you know you'll be rendering handles for each clip, it can be useful to temporarily expose these handles for the current clip that you're grading, so you can easily apply tracking or keyframing effects to the full frame range of each clip.

To show or hide clip handles in the Mini-Timeline of the Color page:
Choose View > Show Current Clip With Handles.

(Left) The current clip in the Mini-Timeline,
(Right) The same clip shown with Show Current Clip With Handles enabled

While this mode is enabled, Unmix is turned on and cannot be disabled, in order to let you view the overlapping handles of each clip clearly. The duration of handles that are exposed is defined by the Default Handles Length parameter of the Editing panel in the User Preferences. Clip Handles can be shown or hidden at any time.

Thumbnail Info

The thumbnails make it easy to find the clips you're looking for visually, and they always show the media as it's currently graded. The most obvious piece of information is the frame that's used for each clip's thumbnail. If you feel that a particular clip's thumbnail isn't representative of its content, you can change it.

To change the current thumbnail:

> Move the pointer over a thumbnail, drag to the left or right to scrub through the clip, and stop when you find a frame you want to use as the new thumbnail.
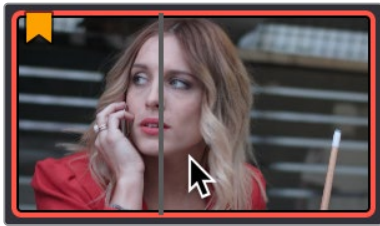
Dragging a thumbnail to change
the representative image

If media is replaced in the middle of a color correction timeline, or if you copy or ripple a grade to a range of clips, the thumbnails may not immediately update to accurately represent the current state of each clip. In this case, you can manually refresh the thumbnails.

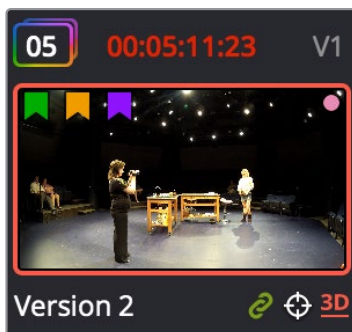**To refresh all thumbnails in the Timeline:**

- Right-click anywhere in the Thumbnail timeline and choose Update All Thumbnails.

You can also choose to display the codec, clip names, and version used by each clip in the Timeline.

To switch the Thumbnail timeline between showing clip names, codecs, and versions:

Double-click the thumbnail clip name of any clip to cycle through each clip's codec, clip name, and version.

Additional information appears above and below each thumbnail, providing a way of keeping track of which clips have been graded, which clips are using different versions, which clips have been cached, and so on.

Each clip thumbnail has a number of
valuable indications permitting quick
comparison to other shots.

The following list explains each piece of information that can appear above, within, or below the thumbnails in the Timeline.

- **Clip number:** (top left) Each clip's number appears above its thumbnail. Clips are numbered in ascending order according to the position of their first frame, from left to right, regardless of the video track in which they appear.
- **Grade indicator:** (top left) If a clip has been graded, a thin rainbow indicator surrounds the clip number.
- **Source Timecode:** (top center) The source timecode from the first frame of each clip appears above each thumbnail.
- **Cache indication:** (red timecode) Any clip that's marked for caching, whether automatically via the Smart cache, or manually, has its timecode turn red to indicate that it will be cached. After it's been cached, the timecode turns blue.

- **Track number:** (top right) The video track in which a clip is edited appears above the thumbnail.

- **Clip Color dot:** (upper right) If a clip has a clip color assigned to it, a colored dot appears on top of its thumbnail.

- **Flag icon:** (upper left) If a clip has been flagged, a flag icon of the appropriate color appears on top of its thumbnail. If a clip has multiple flags, as many as can be drawn appear along the top.

- **Linked media or group icon:** (bottom right) If clips are set to use remote versions, and if multiple clips share the same source media file, then by default their remote version 1 grade will be automatically linked. If the current clip is linked, a small link icon appears below the thumbnail of every clip in the Timeline that's also linked to that clip. When you select another clip that's not linked, the linked clip icons disappear.

- **Tracker icon:** (bottom right) If any node within a particular clip's grade has been tracked, a small crosshairs tracker icon appears below the thumbnail.

- **3D indicator:** (bottom right) All stereo 3D clips in the Timeline appear with this icon below the thumbnail. The color indicates which eye you're monitoring; red for the left eye, blue for the right eye.

- **Version name/Source format:** (bottom left) What text is displayed below each thumbnail can be changed by double-clicking the space underneath each thumbnail. There are several options; keep double-clicking to cycle among them:

  - **Clip format or codec:** This is what's displayed by default.

  - **Clip Name:** Depending on what View > Show File Name is set to, the clip name or file name is displayed. If you're working with multicam clips, the multicam angle or name is displayed.

  - **Version name or number:** Provides information about whether a clip is using a remote version, or a local version, indicated by an (L). If you've given the current version a name, it appears; otherwise the version will be labeled "Version" with its number.

Thumbnail Contextual Menu Commands

Right-clicking a clip's thumbnail in the Thumbnail Timeline reveals a contextual menu with many media and grade management commands that are available in the Color page. The available options are divided into the following rough categories:

- Commands for managing grade versions

- Commands for managing groups

- Commands for editing flags, markers, and clip colors

- A command for displaying the Node Graph of a clip's grade

- Options for controlling the render cache

- Resolve Color Management clip assignments

- LUT Management commands

- A command to fix Black Sun artifacts

- Commands for viewing clip details, editing Clip Attributes, and finding clips in the Media Pool

- A command for updating clip thumbnails that are slow to update on their own

These capabilities are described in more detail in the other chapters of this manual, but it's important to know that artists working on the Color page have many clip management options available to them, without needing to go to other pages.

# Sorting and Filtering Clips in the Thumbnail Timeline

By default, the Thumbnail Timeline displays every clip of the currently selected edit in the Edit page, sorted in A mode (the record order of your edit). However, the sort order and contents of the Timeline can be changed and filtered to make it easier for you to find specific groups of clips for grading.

Changing Timelines

If you're working on a project that has more than one timeline, you can switch timelines right from within the Color page.

To switch timelines in the Color page:
Choose another timeline from the Timelines drop-down menu at the top of the Viewer.
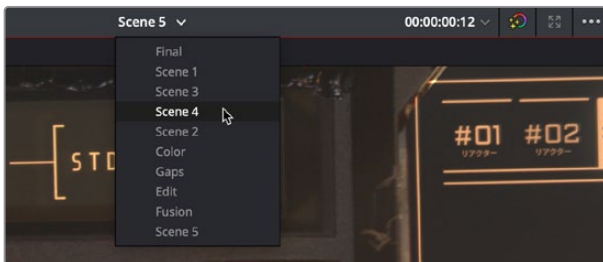
Timeline selection at the top center of the Viewer

To switch among timelines using the DaVinci control panel:
Press the MODES button above the fourth trackball on the Center panel, then press the SWITCH TIMELINE soft key. Press MODES to return to the main page of controls when you're done.

A and C Mode Sorting

By default, the Timeline is set to Record mode sorting, otherwise known as A mode sorting. In this mode, clips appear in the Timeline according to the order in which they were edited. This lets you see the order of clips as they'll appear in the final program.
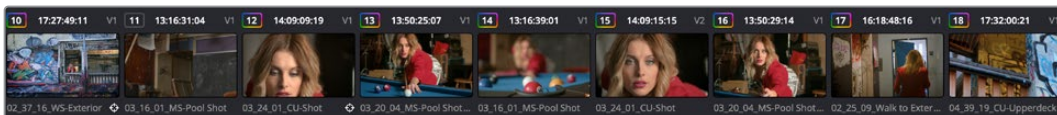
A Mode sorting, i.e., record order

However, you can change the sort order of the clips in the Timeline to Source mode, or C mode sorting. In C mode sorting, all clips are rearranged in ascending order from left to right according to their source timecode, and their record timecode is temporarily ignored.
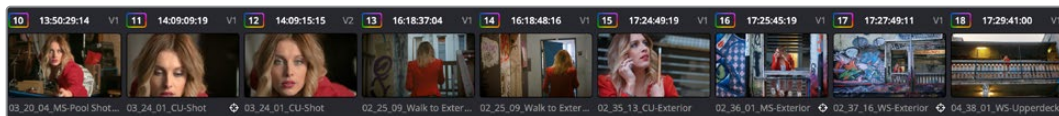
C Mode sorting, i.e., source clip order

Sorting by C mode makes it easy to identify a range of similar clips. For example, if you're working on a narrative project, clips from each angle of coverage in the scene will naturally cluster together. In another example, sorting by C mode in a documentary will arrange all of a particular subject's head shots from a specific interview contiguously, one after another, since they all come from the same range of timecode on the same source tape. In both examples, the close proximity of similar clips to one another that C mode creates makes it easy to copy grades among them, ripple changes, or group them.

When you're finished, you can switch the Timeline back to A sort mode, and all of the clips will go back to being arranged in the order in which they were edited.

To toggle between A and C mode sorting, do one of the following:
- Choose an option from the View > Timeline Thumbnail Mode submenu.
- Press Command-Page Down to toggle to C mode sorting.
- Press A/C MODE on the T-bar panel of the DaVinci control panel.

While in C mode, the word "SOURCE" appears at the right in the Timeline Ruler of the Mini-Timeline.
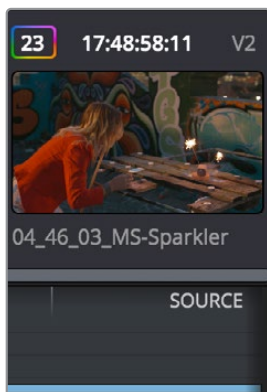
Source mode indicated at the right of the Timeline ruler

A checkbox in the Conform Options group in the General Options panel of the Project Settings lets you change the behavior of C mode sorting. Opening the Settings window and clicking the General Options panel of the Project Settings reveals the Sort Timeline Using Reel Name and Timecode checkbox.
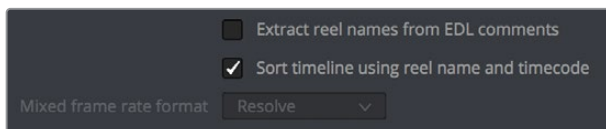
General Options panel of the Project Settings

With this checkbox turned on (the default), all clips in the Timeline are sorted by reel name first, and then by source timecode. This way, clips with similar timecode from the same reel will appear next to one another in C mode.

If you turn this checkbox off, reel name is ignored, and all clips in the Timeline are sorted only by source timecode. This may result in clips from multiple sources being mixed together, but it is useful in specific situations.

For example, when grading dailies from a three camera shoot, you may want to see consecutive clips from all three cameras lined up one after the other on the Timeline, so that Cam1_Shot1, Cam2_Shot1, and Cam3_Shot1 appear first, followed by Cam1_Shot2, Cam2_Shot2, and Cam3_Shot2, and so on. In this situation, you don't want clips from cameras 2 and 3 to be placed at the end of the Timeline simply because of their reel name.

Flags, Clip Colors, and Markers

You have the option of flagging or marking clips in the Color page just like you can in the Edit page, in order to keep track of specific media or frames that you may need to do something to later. For example, you could flag every closeup of a particular actor with a blemish that you want to spend some time fixing with a green flag.

Methods of flagging, changing colors, and marking clips in the Color page:

- **To add a flag to a clip:** Move the playhead to a clip in the Mini-Timeline, and choose a color from the Mark > Add Flag submenu, or Right-click any clip's thumbnail, and choose a flag color from the Flags submenu. Flags are not frame-specific, so flagging one clip will result in flags also being placed on all other clips that share the same source media in the Media Pool.

- **To remove all of a clip's flags:** Move the playhead to a clip in the Mini-Timeline, and choose Mark > Clear Flags, or right-click a clip's thumbnail and choose Flags > Clear All.

- **To change the clip color:** Move the playhead to a clip in the Mini-Timeline, and choose a color from the Mark > Set Clip Color submenu, or Right-click any clip's thumbnail, and choose a color from the Clip Color submenu. Clip Colors are clip-specific.

- **To remove a clip's color:** Move the playhead to a clip in the Mini-Timeline, and choose Mark > Set Clip Color > Clear Color, or right-click a clip's thumbnail and choose Clip Color > Clear Color.

- **To mark a frame of a clip:** Right-click a clip's thumbnail and choose a marker color from the Marker submenu.

- **To remove a single marker:** Right-click a clip's thumbnail and choose Delete Marker from the Marker's submenu. Alternately, you can select the marker in the Mini-Timeline, and press the Delete key.

- **To remove all of a clip's markers:** Right-click that clip and choose Clear All from the Markers submenu.

Timeline Filtering

A drop-down button to the right of the Clips button at the top right of the Color page Interface Toolbar presents preset options for dynamically filtering which clips are shown in the Timeline. This allows you hide all the other clips in the Timeline except for the subset on which you want to focus.
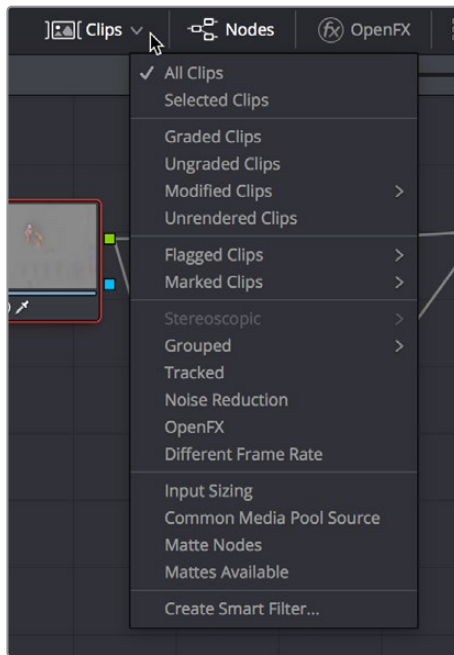
Timeline filtering options

For example, once you've added flags or markers to clips, it's easy to hide every other clip in the Timeline that doesn't fit the criteria; for example, hiding clips that don't have a green flag. This does nothing to alter the original edit, and you can return the Timeline to its original state at any time.

To filter the Timeline:
Click the Timeline Filtering drop-down button to the right of the Clips button at the top left of the DaVinci Resolve UI, and choose an available option. While the timeline is filtered, an orange line appears underneath the Clips button in the UI toolbar at the top of the page.

To return the Timeline to normal:
Click the Timeline Filtering drop-down button, and choose All Clips.

You can use timeline filtering in conjunction with A or C mode sorting to arrange clips in whatever way is best for the task you're trying to accomplish. Clip filtering can also be used in the Lightbox, and a currently selected clip filtering method will simultaneously isolate clips in the Timeline and Lightbox as you switch back and forth.

Preset Timeline Filters

DaVinci Resolve comes with several preset criteria by which you can filter the Timeline, which cover many common organizational workflows:

- **All Clips:** No clips are filtered, and every clip in the current edit is shown.
- **Selected Clips:** Filters all currently selected clips.
- **Graded Clips:** Filters all clips that have been graded.
- **Clips with Fusion Composition:** Clips with Fusion page effects applied to them.
- **Ungraded clips:** Filters all clips that have not yet been graded.
- **Modified clips:** Submenu, filters all clips that have been modified within a specified time.

- **Unrendered clips:** Filters all clips that have not yet been rendered.

- **Flagged Clips:** Filters all clips that have a particular flag, a submenu presents each color.

- **Marked Clips:** Filters all clips that have a particular mark, a submenu presents each color.

- **Keywords:** Filters all clips that have a specific keyword assigned. A submenu presents a list with each keyword that's used in the Media Pool of the current project.

- **People:** Filters all clips that have a specific person assigned from the People Management Window. A submenu presents a list of each person that's been identified.

- **Stereoscopic:** Filters stereo 3D clips, a submenu presents options for filtering All Stereo Clips, or just Stereo clips that have been Autoaligned, those with Convergence adjustments, those with Floating Windows adjustments, or stereoscopic clips with swapped media for the left and right eyes.

- **Grouped:** Filters all clips belonging to a particular group, a submenu shows the available groups.

- **Tracked:** Filters all clips with motion tracking.

- **Noise Reduction:** Filters all clips using noise reduction.

- **OpenFX:** Filters all clips using OpenFX.

- **Different Frame Rate:** Filters all clips with frame rates that don't match that of the project.

- **Edit Sizing:** Filters all clips that have had any Edit Sizing parameters adjusted.

- **Input Sizing:** Filters all clips that have had any Input Sizing parameters adjusted.

- **Common Media Pool Source:** Filters all clips sharing the same source in the Media Pool as the current clip.

- **Matte Nodes:** Filters all clips with an exposed Matte node in the Node Editor.

- **Mattes Available:** Filters all clips with a matte assigned to them, whether they're used or not.

- **Collaborative Update Available:** (Only available in Collaborative Mode) Filters all clips that have been flagged as having been updated during a collaborative workflow.

Creating and Using Smart Filters

If none of the preset filters does what you need, you can create your own custom Smart Filter in order to sift out clips based on any of the intrinsic or user-entered metadata that's available in the Metadata Editor, Media Pool, and Color page timeline. Smart Filters work much the same way as Smart Bins, and they're created and edited using the same procedures. For more information on Smart Bins, see Chapter 11, "Adding and Organizing Media with the Media Pool."

In fact, Smart Filters can be very sophisticated, allowing you to filter the contents of the Thumbnail timeline by multiple criteria, and using multiple groups of multiple criteria for situations where you need to find clips that match all of one set of criteria, but only one of a second set of criteria. In this way, you can create Smart Filters to solve a wide variety of workflow needs as you work in the Color page.

It's important to point out, however, that as much intrinsic metadata is available to every clip in DaVinci Resolve (clip properties including frame rate, frame size, codec, file name, and so on), the more time you take entering extra metadata in the Metadata Editor to prepare your project for work for editing and grading (for example, entering scene and take information, and keywords for things like character names, day and night, interior and exterior, framing, and so on), the more powerful Smart Filters can be in helping you to sift and sort through the contents of a program you're grading.

Imagine being able to filter out all the closeups associated with a particular person in a program, or finding all the establishing shots corresponding to a particular location. If you or an assistant can take the time to enter metadata for the source material in a project that identifies these characteristics, you'll be able to work even more quickly to match shots together and find the clips you need for any given situation.

To create a Smart Filter:

1 Click the Timeline Filtering drop-down button to the right of the Clips button at the top right of the DaVinci Resolve UI, and choose Create Smart Filter.

2 In the Create Smart Filter dialog, enter a name for the filter, and use the following controls to create one or more filter criteria (you can have as many filter criteria as you like):
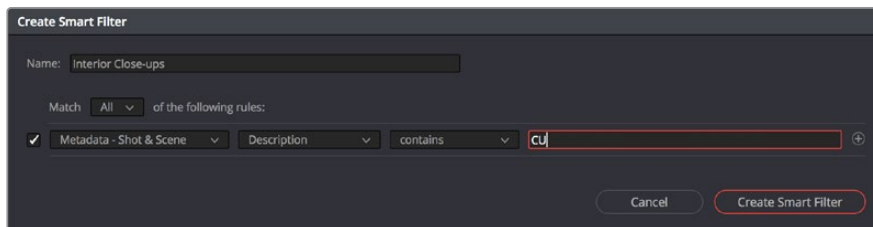
The Create Smart Filter dialog

- **Match options:** For multi-criteria filtering, choosing All ensures that every single criteria you specify is met for a clip to be filtered. Any means that if only one out of several criteria is met, that clip will be filtered.

- **Filter criteria enable checkbox:** Lets you enable or disable any criteria without having to delete it.

- **Metadata category drop-down:** Lets you choose which category of metadata you want to select a criteria from. Each category of metadata that's available in the Metadata Editor is available from this drop-down menu. Additionally, Color Timeline Properties (containing many properties unique to the Color page timeline) and Media Pool Properties (containing every column in the Media Pool) provide access to additional metadata you can use for filtering.

- **Metadata type drop-down:** For choosing which exact type of metadata to use, of the options available in the selected metadata category.

- **Metadata criteria drop-down:** Lets you choose the criteria by which to filter, depending on the metadata you've selected. Options include "true/false," integer ranges, date ranges, string searches, flag and marker colors, and so on.

- **Add filter criteria button:** Lets you add additional criteria to create multi-criteria filters. You could use multiple criteria to, for example, find all clips from Scene 2, that also contain the keyword "Diana," that also have the keyword "CU" in order to find all the Scene 2 close-ups of Diana. Additionally, if you Option-click this button, you can add a nested match option in order to create even more sophisticated filters, where the filter must match all of one set of criteria, and any of another set of criteria.
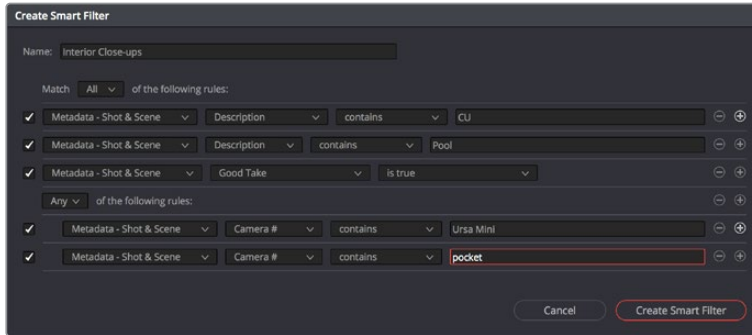
A complicated Smart Filter with multiple criteria and a second match option setting

As you're editing the filter criteria, the Thumbnail timeline automatically updates to show you how the Smart Filter you're creating is working.

3 When you're done editing the filter criteria, click Create Smart Filter. The resulting Smart Filter appears at the bottom of the Filter drop-down menu, and is turned on by default.

Methods of modifying existing Smart Filters:

- **To rename a Smart Filter:** Click the Timeline Filtering drop-down and choose the Smart Filter you want to rename from the Rename Smart Filter submenu, then change the name in the Smart Filter Name dialog, and click OK.

- **To edit a Smart Filter:** Click the Timeline Filtering drop-down and choose the Smart Filter you want to edit from the Edit Smart Filter submenu, then edit the filter criteria, and click OK.

- **To delete a Smart Filter:** Click the Timeline Filtering drop-down and choose the Smart Filter you want to delete from the Delete Smart Filter submenu. It's immediately deleted.
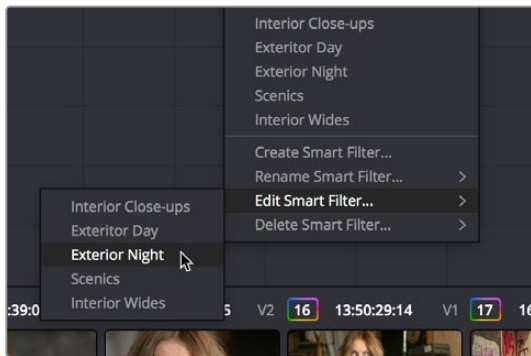
Submenus available for modifying Smart Filters

Using the Lightbox

The Lightbox shows you all clips in the Timeline as a grid of thumbnails, arranged in rows from left to right and top to bottom. This lets you quickly evaluate, compare, and search for clips you want to use when making selections, creating groups, flagging clips, or when scanning for a particular scene or looking for an individual clip.


The Color page Lightbox displays all the clips in the Timeline

At the right of the Lightbox is a vertically oriented Timeline Ruler letting you know the timecode value at the beginning of each row of clips. At the top right is a Zoom slider that lets you change the size of the thumbnails.

Selecting a clip in the Lightbox is the same as selecting a clip in the Timeline, and right-clicking a clip in the Lightbox shows the same contextual menu items you'd see if you right-clicked a clip in the Timeline. Furthermore, you can also grade the current clip in the Lightbox using a control panel, or by exposing the color controls to grade the current clip using a mouse or other input device.

Methods of using the Lightbox:

- **To show or hide the Lightbox:** Click the Lightbox button in the toolbar.

- **To show color controls in the Lightbox:** Click the Show Color Controls button in the UI control bar above the Lightbox.
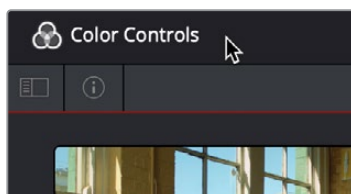
The Color Controls button, with the sidebar and Thumbnail Info buttons below

- **To show thumbnail info in the Lightbox:** Click the Clip Info button, which is the second control at the upper left-hand corner of the Lightbox, to turn each clip's thumbnail Info off and on.

- **To resize clips in the Lightbox:** Drag the Zoom slider to the right to increase thumbnail size, or to the left to decrease thumbnail size.
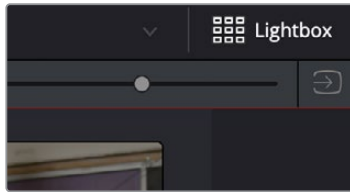
The Lightbox button, Zoom slider, and Monitor Output buttons

The contents of the Lightbox can be filtered using the same options that are available for filtering the Thumbnail timeline.

To filter the Lightbox:

1   Click the Show sidebar button at the upper left-hand corner of the Lightbox. This reveals all of the filtering options that are available in the Lightbox, including custom Smart Filters you've created.

2   Click one of the options appearing in the sidebar. The Lightbox should immediately update to show just those clips that match the selected criteria.

3   To go back to seeing every clip in the Timeline, click All Clips.

The Lightbox can also be output to video, in order to see its contents on a broadcast display or projector.
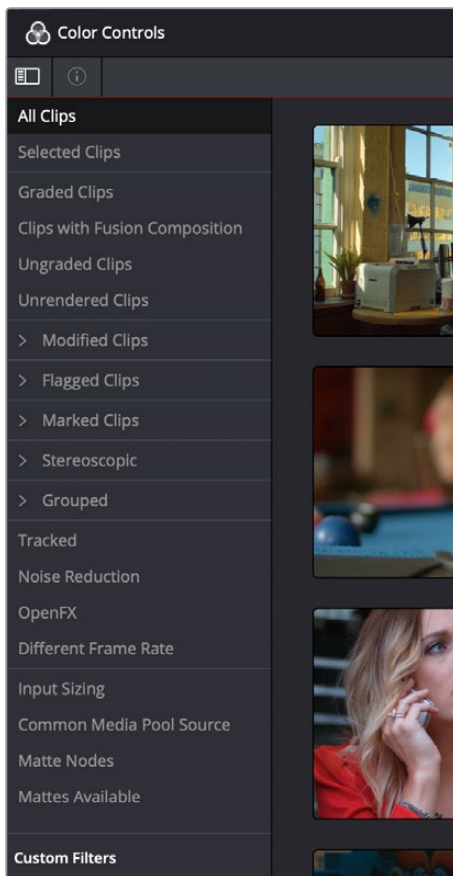
The Lightbox sidebar, with controls for filtering the Lightbox

To output the contents of the Lightbox to video:

Click the Output Lightbox to Video button at the upper right-hand corner of the Lightbox.
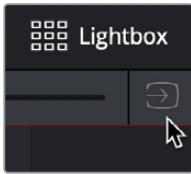
The button for outputting
the Lightbox to video

For more information about clip selections, groups, and grade management, see Chapter 123, "Grade Management."

Chapter 116

Automated Grading Commands and Imported Grades

While DaVinci Resolve has a wide variety of manual grading controls that afford you control over just about every component of digital imagery, DaVinci has spent a lot of time investigating ways of increasing colorist efficiency by creating automated grading tools. Furthermore, with integrated editing bringing professional editors into the world of editing, grading, and finishing in DaVinci Resolve, the same automated tools being developed to help colorists go home earlier can also be used to give non-colorists a hand in taking care of simple grading tasks.

Contents

Color Match Palette

If the camera and lighting departments had the foresight to shoot a color test chart for each of the major lighting setups in the project you're grading, DaVinci Resolve lets you superimpose a sampling grid over a chart in a clip and mathematically analyze the sampled colors to generate an automatic correction. Using controls in the Color Match palette, you can specify the Source Gamma, Target Gamma, and Target Color Space to make sure that the resulting correction is correct for the camera you used, and the project you've set up.

The Color Match palette works with several standardized color charts:

- Datacolor SpyderCheckr 24
- DSC Labs ChromaDumonde 24+4
- DSC Labs SMPTE OneShot
- X-Rite ColorChecker Classic
- X-Rite ColorChecker Classic - Legacy
- X-Rite ColorChecker Video
- X-Rite ColorChecker Passport Video

The X-Rite ColorChecker, Datacolor SpyderCheckr, and DSC Labs SMPTE OneShot charts compared, all of which are supported by the Color Match palette

The result is analyzed to generate an automatic color correction to use to create a neutral grade for the image, to use as a starting point for the rest of your grade.

Tips for Properly Shooting a Color Chart

The results you get using Color Match are completely dependent on how the charts were shot in the field. If the charts were properly shot, you'll get great results. If the charts were improperly shot, the results will be unpredictable.

To get the best results using Color Match, adhere to the following guidelines:

- The chart must be lit evenly such that the lighting on each patch is the same intensity (level) and color. Any shadows or changes in lighting color across the chart will result in Color Match trying to compensate for these changes, and an inaccurate match will result. When viewing a chart being lit prior to a shoot shooting via a waveform monitor, the top of each individual patch as seen on the scope should appear as a rectangle with a "flat top."
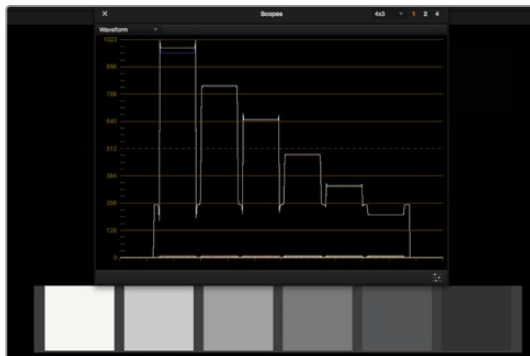
(Left) Poorly lit chart with irregularly topped waveforms,
(Right) Well lit chart with flat-topped waveforms

- No patches on the chart should be clipped in any of the RGB color channels. A clipped channel will force Color Match to use incorrect RGB values, and the resulting match will be inaccurate.

- The white patch on the recorded chart should be captured between 70–95 IRE. Correct exposure is essential to getting a good result, and while Color Match does allow for some adjustment via the White Level option, this will only give accurate results if the original chart is shot so that the white patch sits within the 70–95 IRE range when viewed on a waveform monitor. It is not recommended that a white patch be shot with a signal level above 95 IRE, since this usually means that one of the RGB channels is close to or actually clipping which will cause an inaccurate match.

- The Source Gamma setting must be set to match the encoded OETF (opto-electrical transfer function, or gamma) of the recorded image. To be able to create an accurate adjustment, the Color Match function requires image data that is scene linear (linear to light). Most captured or recorded image data is encoded with a tone curve (gamma

curve) to maximize the efficiency of the bit depth being used, and different cameras use different gamma curves to maximize the image data from different sensors. Since the Color Match algorithm converts image data into a scene linear space before creating an adjustment, it needs to undo the gamma curve created by the camera or debayering process. If the wrong Source Gamma setting is selected in the Match Color palette, then the data will not be linearized correctly and the resulting match will be inaccurate.

- Lighting in the scene with an unusual spectral response or a strong color cast can cause an inaccurate match. Scenes lit with lights that have an unusual spectral response (such as cheap fluorescent bulbs, or mercury vapor fixtures that exhibit a very narrow or spiky spectral power distribution) can cause metameric errors in both the camera's response and the Color Match function, resulting in the creation of an inaccurate adjustment. The most accurate results are obtained when the scene uses lighting with a chromaticity that is close to the black body locus (with a highly correlated color temperature) and a relatively smooth spectral power distribution. In other words, use high-quality lighting that doesn't have spikes in specific parts of the spectrum.

- Large differences between the color temperature of the lighting shining directly on the chart and ambient lighting elsewhere in the scene can cause perceptual errors. Often the problem is one of perception and not an incorrect color adjustment. For example, outdoor scenes being artificially lit with instruments shining extremely warm light (low color temperatures of 3200K or less) but that have cooler ambient lighting may appear overly blue if matched with a Target Color Temp of 6500K. This happens because the chart under direct lighting is lit at the lower (yellower) color temperature, but areas of the scene in shadow are much cooler because of the ambient "blue" light from the sky; the result is an automatic color adjustment that's correct for the chart, but exaggerated in the background.

How to Use Color Match

The following procedure shows how to use the Color Match palette and overlay to create a color correction.
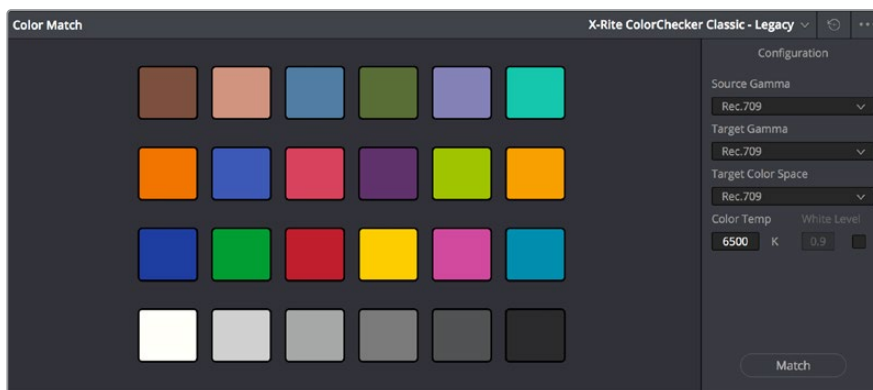
The Color Match palette

To sample a color chart to make an automatic correction:

1   Select the clip with a chart you want to sample. If necessary, you can use the View > Show Current Clip With Handles option to show additional frames at the beginning of the current clip to reveal a color chart in the leader of your media.

2   If necessary, choose an option from the Source Gamma drop-down menu that corresponds to the gamma with which the media was recorded.

3 Then, choose a target gamma and color space that corresponds to the format you want this clip to be matched to.

4 Click the Viewer tool drop-down, choose the Color Chart overlay, and use its corner-pinning controls to line the sampling boxes up with the color patches of the chart.
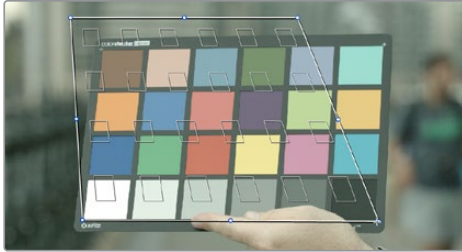
Aligning the Color Match target with the chart in the video

5 When you're finished, click the Match button, and the clip will be automatically corrected.

A clip before and after automatic color matching

> **TIP:** Keep in mind that not every shot needs to have a chart. If the lighting of the location used in a scene is consistent, you really only need a single chart analysis to generate a correction that you can copy to all other clips in the same scene. Of course, if you are using multiple cameras in a scene, you should have a chart analysis for each separate camera if you want to try and match them more closely together.
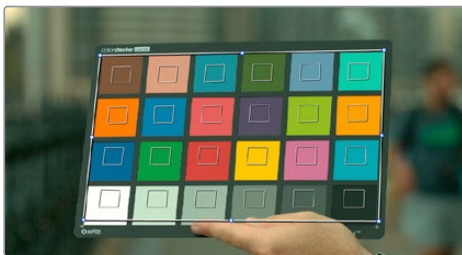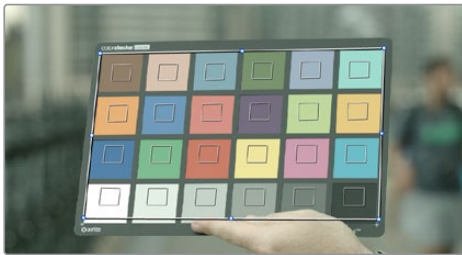
Configuration Controls

Here's a more detailed explanation of each of the parameters found in the Color Match palette.

- **Source Gamma:** Defines the source gamma the media was recorded with. You must select the correct gamma or the results will not be as accurate.

- **Target Gamma:** Lets you select a target gamma that you want the corrected clip to use. While this will most likely be the gamma you're outputting the finished program at, you can choose other target gamma values for specialized workflows.

- **Target Color Space:** The color space you'll be outputting the finished program with.

- **Color Temp:** An adjustable color temperature control that lets you manually adjust the target color balance of the resulting correction to be warmer (lower values) or cooler (higher values). The default is 6500K.

- **White Level:** A checkbox that's disabled by default, which lets you manually choose the target white point that the automatic correction should use. Raising or lowering this value will stretch or compress the contrast of the final correction.

- **Match button:** Once you've chosen the appropriate settings, and aligned the color match target with the chart that was recorded, click to execute the match.

- **Chart type drop-down menu:** You can choose from among the supported chart types in this drop-down. At the time of this writing, these include the Datacolor SpyderCheckr24, theChromaDuMonde 24+4, the DSC Labs SMPTE OneShot, the X-Rite ColorChecker Classic, the X-Rite ColorChecker Classic - Legacy, the X-Rite ColorChecker Video, and the X-Rite ColorChecker Passport Video.

- **Reset All button:** Resets all controls and adjustments in this palette.

Reset Controls

The Color Match option menu has a variety of commands you can use to reset your work in the Color Match palette.

- **Reset Match Configuration:** Resets the Configuration parameters described above.

- **Reset Applied Match:** Resets the matching operation without resetting the Configuration controls.

Automatic Adjustments in the Color Wheels Palette

There are four controls found in the Color Wheels palette that can be used for automatically making different color adjustments, in order to give you a head start whenever you're trying to neutralize a color cast in the image or choose better black and white points for exposure.

White Balance Eyedropper

The White Balance eyedropper, found at the bottom-left corner of the Color Wheels palette next to the Automatic Correction button, provides an automated way of neutralizing a color cast in your image that you can guide by manually selecting a feature in the image that is supposed to be white.

To auto white balance an image with an undesirable color cast or tint:

1   Click the White Balance eyedropper button. The pointer turns into the White Balance eyedropper.
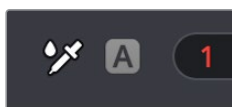
The White Balance eyedropper

2 In the Viewer, click on any feature that is supposed to be white such as a white wall, white trim around a window, white blinds, a white shirt, and so on. As you drag the eyedropper around, the RGB values appear as a tooltip to give you a better idea of what the color is of the feature you're about to click on. Make sure the feature you click on is (a) supposed to be white, and not off-white, and (b) that it corresponds to an image detail that's not clipped, because that can make parts of the image seem white that aren't really.

As a result, the white balance of the image should appear much more neutral than before. Note that this adjustment is not applied via any of the controls in the Color Wheels palette; it's an invisible, self-contained adjustment.

Pick Black Point and Pick White Point

The Pick Black Point and Pick White Point eyedropper controls, found at the upper left-hand corner of the Lift and Gain controls of each mode of the Color Wheels palette, let you both adjust contrast by lowering the black point or raising the white point of the image, and also corrects for unwanted color casts in the shadows or highlights of the image.

Note: It's easy, using the Pick Black and White Point controls, to inadvertently boost the highlights or lower the shadows so much that you end up clipping part of the image. To give these controls the best chance of succeeding, it's advisable to find the absolute brightest or darkest parts of the image to sample, according to the following instructions.

To automatically adjust the black point of an image:

1 Click the Pick Black Point control. The pointer turns into the Black Point tool.
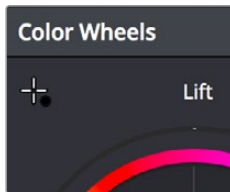
The Auto Pick Black Point control

2 In the Viewer, click on any feature that is supposed to be black such as the deepest part of a shadow in the background or within a fold of clothing, black fabric, or something painted black. As you drag the Black Point tool around, the RGB values appear as a tooltip to give you a better idea of what the color is of the feature you're about to click on. Make sure the feature you click on is (a) supposed to be black, and not some very dark hue, and (b) that it corresponds to an image detail that's not clipped, because that can make parts of the image seem black that aren't really.

As a result, the darkest parts of the image should appear much darker than before, and any color imbalance in the shadows should be neutralized. Unlike the White Balance eyedropper, this adjustment is applied via the Lift controls in the Color Wheels palette, which should appear with some manner of adjustment as a result.

To automatically adjust the white point of an image:

1 Click the White Point control. The pointer turns into the White Point tool.

The Auto Pick White Point control

2 In the Viewer, click on any feature that is supposed to be white such as a white wall, white trim around a window, white blinds, a white shirt, and so on. As you drag the White Point tool around, the RGB values appear as a tooltip to give you a better idea of what the color is of the feature you're about to click on. Make sure the feature you click on is (a) supposed to be white, and not off-white, and (b) that it corresponds to an image detail that's not clipped, because that can make parts of the image seem white that aren't really.

As a result, the lightest parts of the image should appear much lighter than before, and any color imbalance in the highlights should be neutralized. Unlike the White Balance eyedropper, this adjustment is applied via the Gain controls in the Color Wheels palette, which should appear with some manner of adjustment as a result.

Auto Color

The Auto Color command provides a quick way to automatically balance the blacks and whites of a clip based on the current frame at the position of the playhead. As of DaVinci Resolve 16, the A button in the Color Wheels palette and the Shot Match command available from the Thumbnail Timeline contextual menu both now use advanced algorithms, based on the DaVinci Neural Engine, to provide superior results when automatically adjusting color balance and contrast. These controls have been developed to provide optimal results when working in the Rec.709 color space, and at a gamma of 2.4, so they work well in conjunction with using Resolve Color Management (RCM) to normalize media first.

- The A button performs an automatic analysis of the current frame at the playhead to give a more consistently useful neutral starting point for further adjustment.

- The Shot Match command matches one or more clips to the color and contrast of a graded or ungraded target clip. This updated version of Shot Match has been designed to be used after you've used the A button on each clip in the operation, the clips you're matching and the clip you're matching to.

If you're in need of a fast neutral starting point for a range of clips, you can also use these commands together, grading a target clip using the A button, and then using Shot Match to match a range of clips in the same scene to the automatically graded example. Please note that these commands are intended to provide you with a reasonably neutral starting point for continued grading; they're not meant to create creative or artistic grades.

The Auto Color button

To make an automatic correction, do one of the following:

- Open the Color Wheels palette to any mode, and click the A button in the lower left-hand corner.
- Choose Color > Auto Color (Option-Shift-C).
- Press the AUTO COLOR button on the T-bar panel.

The advantage of Auto Color is that it gives you an immediate result for any clip without the requirement for sampling the image or having a specific test pattern to analyze, but the disadvantage is that this lack of guidance makes the usefulness of this command somewhat hit-or-miss. When it works, it can work very well to give you a neutral starting point for further grading. When it fails, you're better off resetting the resulting adjustment and grading the old fashioned way.

Legacy Auto Color

The previous methods for doing Auto Color and Shot Match are available from the Color panel of the User Preferences, via two checkboxes named "Use Legacy Auto Color/Shot Match." With these enabled, DaVinci Resolve looks for the darkest levels in the image to neutralize the RGB color balance in the blacks, and the brightest levels to neutralize the RGB color balance in the highlights. Furthermore, Master Lift and Master Gain are adjusted to maximize image contrast at the outer boundaries of 0 and 100 percent. Using this control with the Primaries Bars mode open makes it easier to see what's been changed after these automatic adjustments are made.

Auto Color Using the DaVinci Control Panel

If you crave a bit more control over how the automatic color adjustment is made, and you have a DaVinci control panel, you can use the cursor to choose which color values to sample when making an automatic color balancing and contrast adjustment. It's like a cross between the Auto Color control and the White and Black Point controls found in the GUI. This additional bit of guidance can make the results a lot more predictable.

To use Auto Grade to sample a feature using the DaVinci control panel:

1 Press the CURSOR button, on the trackball panel.

2 Use the fourth trackball to move the cursor to a feature you want to use to define the automatic correction. Whichever color you move the cursor over will be sampled to form the basis of the resulting color and contrast adjustment. Ideally, you should place the cursor over a feature that's supposed to be neutral, such as a black shadow, gray wall, or white T-shirt. Don't place the cursor over a feature that actually consists of saturated color, or that's overexposed, as DaVinci Resolve will overcompensate and you'll get poor results.

3 With the cursor placed over the desired neutral feature, press AUTO COLOR on the T-bar panel.

   DaVinci Resolve calculates an appropriate correction, which is applied to the selected node.
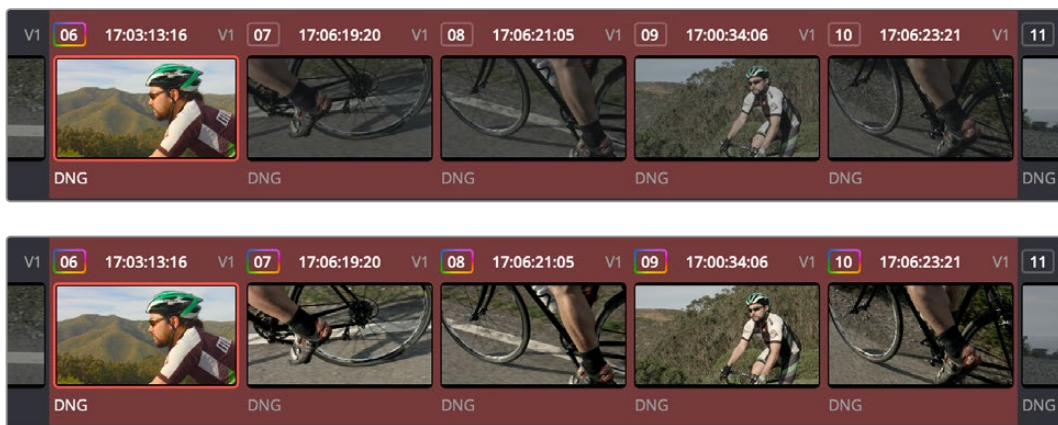
Shot Match

The previously available automated color correction commands, Auto Color and Color Match, are both useful for adjusting a selected clip to give it a clean, neutral starting point when you're either in a hurry, or if you're having trouble manually working out a solution. However, this is only the first step in grading a scene.

After you make a general adjustment to improve the color of a clip in a scene, one of the other principal tasks of the colorist is to adjust all of the clips in that scene so that they match the clip you started with, such that they all look like they were shot at the same time and in the same place. This is called scene-to-scene color correction, scene balancing, or shot matching. While there are abundant tools in DaVinci Resolve to ease the process of doing this manually, wouldn't it be nice if you could just select a series of clips that you want to match, and have the software do the work?

That's exactly what Shot Match has been designed to do. Whether you're a colorist in a hurry, trying to blast through a low-budget feature with an absurd schedule, a DIT making best light dailies who just wants to make them match a little more closely before sending media off to editorial, or an editor who isn't fast at color correction who needs to give a rough cut a quick color balance before showing the project to the client for the first time, the Shot Match feature of DaVinci Resolve has been created to quickly make different clips in a timeline match one another more closely, with a minimum of steps.

As of DaVinci Resolve 16, the Shot Match command available from the Thumbnail Timeline contextual menu uses an advanced algorithm, based on the DaVinci Neural Engine, to provide superior results when automatically adjusting color balance and contrast. This control has been developed to provide optimal results when working in the Rec.709 color space, and at a gamma of 2.4, so they work well in conjunction with using Resolve Color Management (RCM) to normalize media first.

The updated version of Shot Match has been designed to be used after you've used the A button on each clip in the operation, on both the clips you're matching and the clip you're matching to.

(Top) Original scene, (Bottom) After using shot match to match all selected clips to clip 62

Legacy Auto Color

The previous methods for doing Auto Color and Shot Match are available from the Color panel of the User Preferences, via two checkboxes named "Use Legacy Auto Color/Shot Match." With these enabled, DaVinci Resolve looks for the darkest levels in the image to neutralize the RGB color balance in the blacks, and the brightest levels to neutralize the RGB color balance in the highlights. Furthermore, Master Lift and Master Gain are adjusted to maximize image contrast at the outer boundaries of 0 and 100 percent. Using this control with the Primaries Bars mode open makes it easier to see what's been changed after these automatic adjustments are made.

Shot Match Guidelines

Keep in mind that Shot Match isn't supposed to make your clips look good, it's supposed to make them look the same as the clip you choose to match to, or to at least get as close as possible without creating a color correction that will do harm to the image. The purpose of Shot Match is to make it easier for you to match a scene's worth of clips together so you have a starting point for building the rest of the look you want for that scene, on top of this initial match.

The clip you choose to match to may have a correction applied to it, but for the best results, you should limit yourself to simple Lift/Gamma/Gain primary adjustments. If you make Custom curve or secondary adjustments to the image, it will be much more difficult for Shot Match to give you a good result.

Shot Match works best with normalized clips. If you've got a timeline edited with log-encoded clips, you may want to use DaVinci Color Management to normalize all the clips in the Timeline before you use Shot Match, to get the most accurate results. It's certainly possible to use Shot Match with log-encoded media, but the flat color signal of log-encoded media may make it harder to get good results, depending on the scene.

Furthermore, Shot Match is not the right tool to use to try and match un-normalized log-encoded clips that use different types of log encoding, such as LogC and RedLogCine, or to try and match normalized and un-normalized clips. Because log-encoding is similar to a set of red, green, and blue curve operations, Shot Match is not equipped to achieve a successful result in this situation.

Shot Match is not designed to apply corrections to clips that already have node adjustments. The results will be unpredictable, and probably won't match. While the clip you're matching to may have simple primary adjustments applied to it, the other selected clips that are being matched should be completely ungraded.

Lastly, Shot Match has been designed to do no harm to the image. This means if you use Shot Match to try and match an underexposed interior shot to an exterior shot exposed at high noon on a sunlit day, the Shot Match algorithm will do its best to "split the difference" in order to make the difference between these two clips less jarring, while at the same time taking care not to stretch the color and contrast adjustments being made to the underexposed clips to the point where the image falls apart.

How to Use Shot Match

There's no way to easily describe what Shot Match does. It's a complex algorithm designed to try and deal with an impossibly varied number of different situations. As a result, Shot Match doesn't apply adjustments to any of the user-editable controls in the Color page. Instead, the image adjustment created by Shot Match is applied invisibly, as the very last adjustment to the node that was selected when Shot Match was used, similar to a LUT.

A Shot Match adjustment applied to a clip

The procedure for using Shot Match is deceptively simple. However, getting a good result requires some careful thought in terms of choosing which clips to match to one another.

**To match one or more selected clips to a specific clip:**

1   Following the guidelines presented in this section, Command-click or Shift-click one or more clips that you want to be matched. The clip you want to match to may or may not be part of the selection. You may select as few as one clip, or as many as you like.
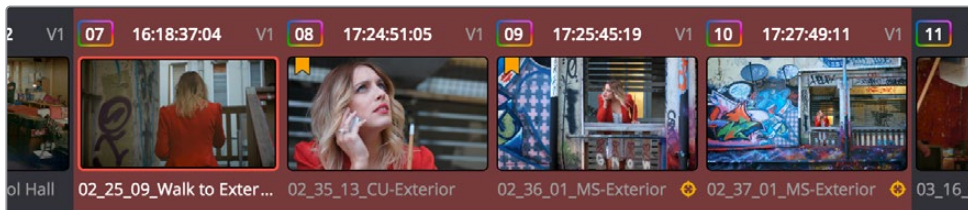
Selecting clips you want to be matched

> **TIP:** If you want to make it easier to notice the before and after, you can turn on Split Screen, and choose Selected Clips from the mode drop-down in the Viewer Options. This lets you see all the clips you're about to match in a grid.

2   Next, right-click the clip you want to match all of the selected clips to, and choose Shot Match to This Clip.
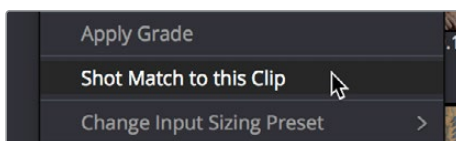
Shot Match command used on the clip you want to match the other selected clips to

If the resulting automated match looks good and plays well, then congratulations, you've got an excellent starting point for additional grading. However, keep in mind that even if the resulting match isn't perfect, it may have taken care of enough inconsistencies between the clip you're matching to and the clips that are being matched, that you need only make smaller, easier-to-spot adjustments in order to nail the final match between the shots in a scene. Either way, you can save time.

Suggestions for Using Shot Match

It's certainly possible to select every clip in a scene and use Shot Match, and the results may be wonderful depending on what kind of visuals are in the scene. However, for other scenes, this may not always get you the best results.

Be strategic about which clips you select to match to one another. Don't use Shot Match on shots that you know already have the same lighting, as you'll risk having Shot Match make a minor adjustment that may actually make the shots match less well. Think of Shot Match as a tool for matching clips that look different.

It can also help to use Shot Match an angle at a time, and to do a small test before committing yourself to matching a bunch of clips. For example, suppose you have a scene consisting of angle A (an over of character 1), angle B (an over of character 2), and angle C (a master shot), and you want to match the scene entire scene to angle C since it has the best lighting. First, match one shot from angle B to your favorite shot from angle C, and see how you like the result. If it's good, then go ahead and select every angle B clip and match them to angle C, before moving on to test one shot from angle A. This way, if there's ever an angle that doesn't work well using Shot Match, you can try matching it to one of the other angles in the scene that you've already matched to see if you get a better result.

> **NOTE:** Keep in mind that, since each clip in the Timeline has its own undo stack, you cannot undo a shot match operation applied to multiple clips all at once.

Beware of clips with large areas of color in the background that don't match any of the other angles in a scene, such as a shot-reverse-shot sequence that cuts between someone standing in a back yard and someone standing against a purple wall. You can try it to see what happens, but this kind of color distribution can often throw Shot Match results off.

Broadcast Safe

If you regularly deliver to restrictive QC standards, then you can enable Broadcast Safe in the Color Management panel of the Project Settings while you grade to limit both the luma and chroma of the video signal to one of three levels of acceptable overshoots and undershoots.
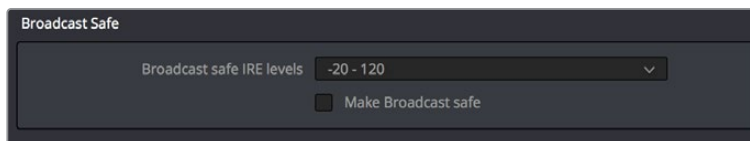

The Broadcast Safe parameters in the Color Management panel of the Project Settings

- **Broadcast safe IRE (mV) levels:** A drop-down menu for choosing one of three levels of aggressiveness when limiting the signal. Choose the range that corresponds to your QC requirements. The options are "–20 - 120" (permissive), "–10 - 110" (conservative), and "0 - 100" (very conservative).
- **Make Broadcast Safe:** A checkbox that turns broadcast safe limiting on and off.

> **NOTE:** The clipping imposed by Broadcast Safe itself does not have an inherently soft roll-off. For best results, Broadcast Safe should be used in conjunction with the Soft Clip controls in the Color page, or a Soft Clip LUT (for more information see Chapter 3, "System and User Preferences").

Black Sun Highlight Correction

If your project uses media shot with one of the Blackmagic Cinema, Production, Pocket, or Ursa cameras, and you have clips that exhibit so-called "black sun" artifacts, where bright onscreen highlights appear with a dark magenta spot, a command exists to quickly and easily remove these artifacts.
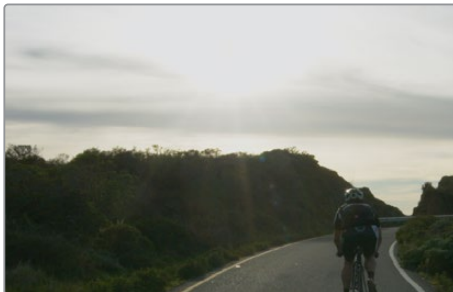
(Top) Black Sun artifact seen in image; (Bottom) Artifact removed using Black Sun Highlight Correction

To remove black sun artifacts from Blackmagic camera footage:

Right-click the affected clip's thumbnail in the Thumbnail timeline of the Color page, and choose Black Sun Highlight Correction from the contextual menu.
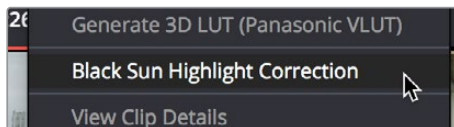
The command for removing black sun artifacts

Using CDL Grades

Only available in DaVinci Resolve Studio.

There are two instances where primary grading adjustments may be applied to a clip outside of adjustments that you make within the Node Editor of the Color page. If you import a CDL (Color Decision List), then the CDL adjustment for each clip is made available to you via a contextual menu command in the Thumbnail timeline of the Color page. For more information, see Chapter 129, "Copying and Importing Grades Using ColorTrace."

Using ARRI Looks

Only available in DaVinci Resolve Studio.

If you've ingested ARRIRAW media or QuickTime-wrapped Apple ProRes from an Amira, Alexa SXT or Alexa LF, or MXF-wrapped Apple ProRes from Alexa Mini LF with embedded ARRI Look metadata (CDL + LUT), the embedded look can be copied to the currently selected node in the Color page.

To copy an ARRI look from the source media to the current node:

1 Select a node in the Node Editor to which you want to apply the look data.

2 Right-click that clip's thumbnail and choose Apply ARRI CDL and LUT. A LUT and Color Wheels adjustment will be applied to the selected node.
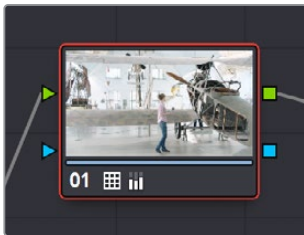
Using the Apply ARRI CDL and LUT command copies a look from the source media to a node in the Node Editor

Chapter 117

Primary Grading Controls

This chapter focuses on the core color adjustments that you'll be making to create "primary" corrections that alter the overall color and contrast of the image. These include clip-specific Camera Raw adjustments and the Lift/Gamma/Gain/Offset adjustments available in the Color Wheels palette, as well as more esoteric adjustments such as mixing colors between channels using the RGB Mixer.

Contents

Color Controls Covered in This Chapter

The Left Palette panel contains four palettes that relate to color and contrast adjustments in different ways. The controls found within these palettes provide the foundation for any grade, and this chapter covers how you use the Camera Raw, Color Wheels, and RGB Mixer palettes. For more information on the Motion Effects palette, see Chapter 134, "The Motion Effects and Blur Palettes."

Primary color adjustment palettes in the Left Palette panel

> **NOTE:** If you're using DaVinci Resolve with a computer monitor that's smaller than 1920x1080, then the Left and Center Palette panels are consolidated into a single panel, and all the buttons in the Palette toolbar appear together.

Camera Raw

When a timeline uses clips that are linked to camera raw source media recorded from cameras from Blackmagic Design, RED, ARRI, Sony, and Vision Research, all clips in raw media formats are initially debayered using the settings found in the Camera Raw panel of the Project Settings.

However, if there are individual clips that you want to apply different raw settings to, for example altering the ISO to pull more detail out of the highlights or shadows, then you can use the controls found in the Camera Raw palette to individually alter the parameters found within.
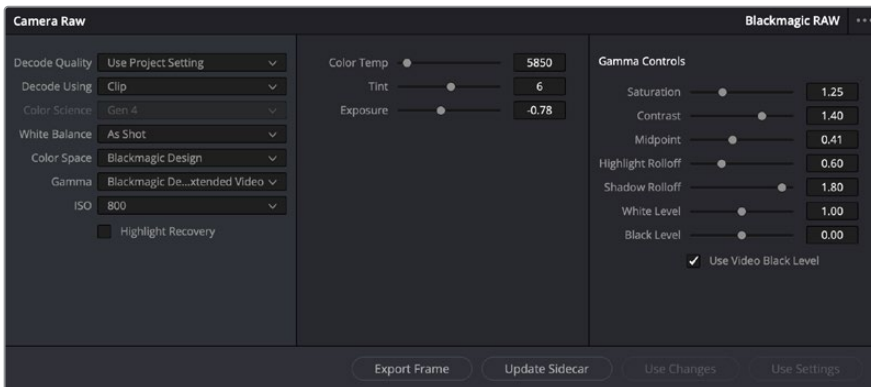
The Camera Raw palette showing the available parameters for Blackmagic RAW media.

The Camera Raw palette is automatically set to the mode (seen within the Mode drop-down menu) that is appropriate to the clip that's currently selected. If the current clip is not in a raw format, then the parameters within the Camera Raw palette are disabled.

All settings that currently populate the Camera Raw palette are also accessible from the DaVinci control panel.

To access camera raw settings on the DaVinci control panel:

1 Press the CAMERA RAW soft key on the Center panel.

2 Use the Center panel knobs to make camera raw parameter adjustments.

3 When you're finished, press the MAIN soft key to return to the main page of controls.

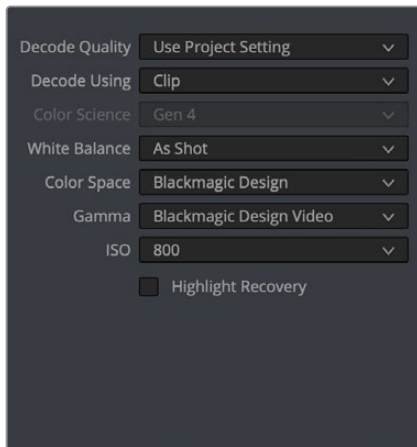This section covers general use of the Camera Raw palette. For in-depth documentation about specific camera raw parameters, see Chapter 5, "Camera Raw Settings."

Copying, Versioning, and Protecting Camera Raw Settings

Ordinarily, a clip's camera raw settings are copied along with its grade, or saved inside stills grabbed from that clip, when you use the various grade management techniques covered in Chapter 123, "Grade Management."

When you create new versions, you copy the current Camera Raw settings to the new version, but any changes you make are specific to that version, so each version can have individual Camera Raw adjustments. For example, you could compare the results of two different camera raw adjustments on the same clip.

Decode Quality	Use Project Setting ∨
Decode Using	Clip ∨
Color Science	Gen 4 ∨
White Balance	As Shot ∨
Color Space	Blackmagic Design ∨
Gamma	Blackmagic Design Video ∨
ISO	800 ∨
	☐ Highlight Recovery

Camera Raw master settings for BRAW media

If you're copying and rippling grades among multiple clips, you can also protect each clip's camera raw settings from being overwritten using the "Copy Grade: Preserve Camera Raw Settings" option found in the contextual menu of the Gallery. For more information on the Copy Grade settings, see Chapter 123, "Grade Management."

Making Changes to Clip Camera Raw Settings

If you want to make individual adjustments to a particular clip's camera raw settings, choose "Clip" from the Decode Using drop-down menu in the Camera Raw palette. This makes all the parameters in the Camera Raw palette editable, and changes you make override the project-wide camera raw settings.

Changes to the parameters in the Camera Raw palette can also be rippled across multiple clips at once.

To ripple camera raw adjustments across multiple clips:

1 First, you must select a range of clips in the Color page timeline.

2 Open the Camera Raw palette, and make whatever adjustments are necessary to the current clip. The name of each parameter you adjust changes to amber, showing you which parameters have been modified, and which have not.

3 To ripple your changes, do one of the following:

   – Click the Use Changes button to ripple only the altered parameters (in amber) to the other clips you've selected in the Timeline. This preserves differences between clips in the parameters you haven't adjusted (in gray).

   – Click the Use Settings button to ripple every parameter of the current clip to the other clips you've selected, overwriting all the camera raw settings at once.
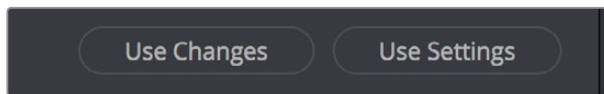
The Use Changes and Use Settings buttons in the Camera Raw palette

Clip Decoder Settings

There's much more information on the various format-specific Master settings, as well as the occasionally format-specific Clip Decoder settings, in Chapter 5, "Camera Raw Settings." However, with the exception of the RED Clip Decoder settings that appear for R3D clips, most other formats share a set of DaVinci Resolve-specific controls that provide wide-latitude access to the raw image data for purposes of making different kinds of adjustments.

Camera Raw Clip Decoder settings for BRAW media

While specific raw formats have individual controls, the standard controls include:

- **Color Temp:** Designed to alter the "warmth" of the image. Adjustable in degrees Kelvin. Lower values correct for "warmer" lighting, while higher values correct for "cool" lighting. +6500 is unity. The range is +2000 to +50,000.

- **Tint:** Color balance correction for images with a green or magenta color cast, such as fluorescent or sodium vapor bulbs. 0 is unity. The range is –150 to +150.

- **Exposure:** Increases or lowers image lightness in units relative to f-stops. If your intended exposure adjustment lifts image data above the maximum white level, don't worry; all image data is preserved and can be retrieved in subsequent adjustments. 0 is unity. The range is –5 to +5.

- **Sharpness:** A debayer-specific sharpness filter applied to provide the appearance of enhanced image detail. 20 is unity. The range is 0 to 100.

- **Highlights:** Makes it easy to selectively retrieve blown-out highlight detail in high-dynamic-range media by lowering this parameter, and achieves a smooth blend between the retrieved highlights and the unadjusted midtones for a naturalistic result. 0 is unity. The range is –100 through +100.

- **Shadows:** Lets you selectively lighten or darken shadow detail. Raising this value retrieves shadow detail recorded below 0 percent, while leaving the midtones alone. 0 is unity. The range is –100 through +100.

- **Color Boost:** A non-uniform saturation operation that affects regions of low saturation more than regions of high saturation. This is sometimes referred to as a vibrance operation. 0 is unity, showing the original color values. Raising color boost from 0-100 increases color intensity, but low-saturation parts of the image are raised more aggressively. Lowering Color Boost from 0 to -100 decreases color intensity, but low-saturation parts of the image are lowered more aggressively. 0 is unity, showing unaltered saturation. The range is –100 through +100.

- **Saturation:** A uniform saturation operation that raises (above 50) or lowers (below 50) the color intensity of every color value within the image. 50 is unity, showing unaltered saturation. The range is -100 (completely desaturated) through +100 (saturation is doubled).

- **Midtone Detail:** When this parameter is raised, the contrast of regions of the image with high edge detail is raised to increase the perception of image sharpness, sometimes referred to as definition. When this parameter is lowered to a negative value, regions of the image with low amounts of detail are softened while areas of high-detail are left alone. 0 is unity. The range is –100 through +100.

- **Lift:** Adjusts the black point of the media, raising it or lowering it while scaling all midtone values between it and the white point. Regardless of how you adjust this control, all image data is preserved and can be retrieved in subsequent adjustments. The range is –100 to +100.

- **Gain:** Adjusts the white point of the media, raising or lowering it while scaling all midtone values between it and the black point. Regardless of how you adjust this control, all image data is preserved and can be retrieved in subsequent adjustments. 0 is unity. The range is –100 to +100.

- **Contrast:** Raising contrast reduces shadows and raises highlights, while leaving midtones at 50 percent unaffected. Regardless of how you adjust this control, all image data is preserved and can be retrieved in subsequent adjustments. 0 is unity. The range is –100 to +100.

Resetting Camera Raw Settings

If you've made changes to the parameters of the Camera Raw palette and you decide you need to reset them, there are two options, found in the Options menu.

- **Reset:** Resets all parameters in the Camera Raw palette to their default settings.

- **Revert:** Similar to the "Original Memory" command, Revert changes all camera raw parameters back to the state they were at when you first selected the current clip.

Updating Sidecar Settings for Blackmagic RAW (BRAW) Clips

Blackmagic RAW clips support both embedded look metadata within the .braw media clip and external look metadata in .sidecar files. Ordinarily, these files travel in pairs whenever you manage BRAW media, and whenever a .sidecar file is present, its settings override those of the embedded metadata within the actual .braw clip. Since the .sidecar metadata is in human-readable JSON formatted text, it's easy to edit and accommodates a wide variety of onset to post-production workflows.

A057_08251041_C056.braw   A057_08251041_C056.sidecar

The .braw and .sidecar files as seen in the file system

If you like, you can make changes to the raw look metadata of a .braw clip and upgrade the .sidecar metadata from within the Color page of DaVinci Resolve, so the media on disk reflects these changes in any other BRAW compatible application.

To update the .sidecar raw look metadata:

1   Open the Color page, select a .braw clip in the Thumbnail timeline, and open the Camera Raw palette.

2   Set Decode Using to Clip to enable the palette controls.

3   Make whatever adjustments you want to make using the controls of the Camera Raw palette.

4   When you're done, click the Update Sidecar button.

The Update Sidecar button in the Camera Raw palette for .braw media

Color Wheels Palette

If you've had any exposure to color correction tools in any application, the controls found within the Color Wheels palette should look familiar. These controls correspond to the most basic color correction functionality available in DaVinci Resolve, and are designed to let users without control panels have easy access to color balance and YRGB contrast manipulation using a mouse, tablet, or trackpad.

Color Wheels for primary grading, in Primaries mode

The Color Wheels palette has three distinct modes of operation:

- Primaries Wheels mode contains the traditional DaVinci Lift/Gamma/Gain/Offset controls that allow tonally specific yet widely overlapping regions of adjustment.
- Primaries Bars mode affects the same Lift/Gamma/Gain/Offset controls as the Primaries Wheels mode, but the bars interface lets you make vertical slider-driven adjustments to YRGB lift, YRGB gamma, and YRGB gain, as well as providing a slider-driven interface for Offset.
- Log mode contains Shadow/Midtone/Highlight/Offset controls that offer more restrictive yet customizable regions of adjustment intended for making adjustments to log-encoded image data.

Which mode you use depends entirely on what kinds of adjustments you need to make.

Opening the Color Wheels Palette Using the DaVinci Control Panel

You can open any mode of the Color Wheels palette by doing one of the following:

- **To open the Primaries Bars:** Press SHIFT DOWN and then PRIMARY.
- **To open the Color Wheels:** Press SHIFT UP and then PRIMARY.
- **To open the Log controls:** Press SHIFT DOWN and then PRIMARY. Alternately, you can open any of the other Color Wheels palette modes, and then press the LOG soft key on the Center panel of the DaVinci control panel. Press the MAIN soft key to return to the more traditional Lift/Gamma/Gain mode of adjustment.

HDR Grading Using Color Wheels Palette Controls

When using various grading controls in the Color page to grade wide-latitude images for HDR output, you may find it useful to enable the HDR Mode of the node you're working on by right-clicking that node in the Node Editor and choosing HDR Mode from the contextual menu (only available in Resolve Studio).
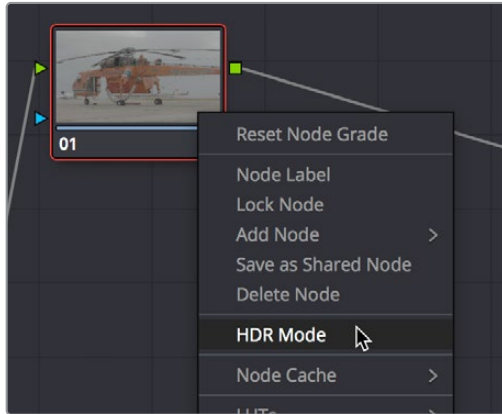
Using a node's contextual menu to put that node into HDR mode

This setting adapts that node's controls to work within an expanded HDR range. Practically speaking, this makes it easier to work with wide-latitude signals using controls that operate by letting you make adjustments at different tonal ranges such as Lift/Gamma/Gain, Custom Curves, Soft Clip, and so on.

How to Use Color Balance Controls and Master Wheels

Each of the modes in the Color Wheels palette use the same controls, albeit in different ways. This section explains, in a generic way, how to use these controls to make adjustments.

Color Balance controls provide a way to adjust all three color channels simultaneously with a single move of the pointer, according to the mode that's currently selected. These controls correspond to the trackballs found on the DaVinci control panel, but there are a variety of keyboard modifiers that let you make specific adjustments via the GUI.

To make adjustments using the Color Balance controls:

- **Click and drag anywhere within the color ring:** Moves the Color Balance indicator relative to its previous position, and rebalances the three color channels in whatever range of image tonality is governed by that control. You don't need to drag the Color Balance indicator itself. This simulates the kind of relative control you get when using a trackball to manipulate these parameters. As the Color Balance indicator moves, the RGB parameters underneath change independently to reflect the independent adjustments being made to each channel.

- **Shift-click and drag within the color ring:** Jumps the Color Balance indicator to the absolute position of the pointer, letting you make faster, more extreme adjustments to the color balance governed by that control.

- **Double-click within the color ring:** Resets the color adjustment without resetting the corresponding contrast adjustment for that control.

- **Command-click and drag within the color ring:** Adjusts YRGB contrast identically as if you were dragging that control's master ring.

- **Click the reset control at the upper-right of a color ring:** Resets both the Color Balance control and its corresponding master ring.

The Master Wheels, located below the Color Balance controls, let you adjust the YRGB channels together to adjust Lift, Gamma, and Gain by individually adjusting the black point, the white point, and distribution of midtones that fall in-between. This has the practical effect of letting you adjust image contrast when you manipulate any two of these wheels together.

Lift, Gamma, and Gain master wheels to balance the grades

The Master Wheels correspond to the rings surrounding the trackballs on the DaVinci control panel, which let you modify image contrast via YRGB adjustment (as opposed to modifying image contrast via Y-only adjustment, covered later in this chapter).
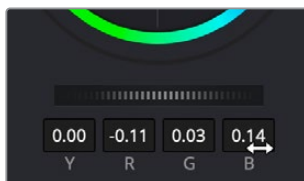
To adjust a Master Wheel:

> Dragging a Master Wheel to the left makes the corresponding tonal region of the image darker, and dragging it to the right makes that tonal region of the image lighter. The effect will vary according to the Color Wheels mode you're in. As you make an adjustment, the YRGB parameters located underneath all change together to reflect the simultaneous adjustment you're making to all channels.

Each Color Balance Control and Master Wheel pair also have a set of four YRGB number fields underneath that display the YRGB adjustment being made by both controls. These fields can be edited like any other parameter on the Color page. Even though these values display two decimal places of precision because of space restrictions in the interface, they really contain three decimal places of precision since these are floating point operations; you just can't see the third decimal place.

To edit YRGB values directly:

- You can double-click on a field to edit its value numerically
- You can cut, copy, and paste values among fields
- You can click on the field and drag left or right to adjust its value with a virtual slider.

The number fields for each Color Balance Control and Master Wheel are editabl

Understanding the Primaries Wheels Controls

The Color Wheel palette's Primaries Wheels mode lets you rebalance color and adjust contrast via the traditional DaVinci controls, which govern three overlapping tonal ranges referred to as Lift, Gamma, and Gain. The Lift/Gamma/Gain color balance and Master Wheel controls are tied to the YRGB Lift/Gamma/Gain sliders found in the Primaries palette; adjustments made to one set of controls are mirrored in the other.
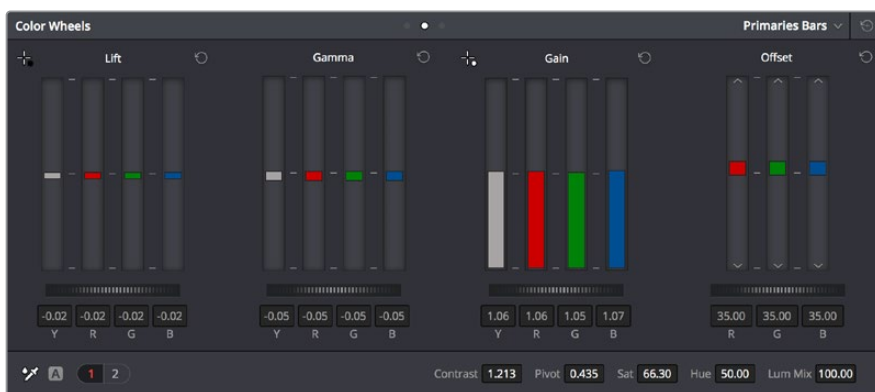
Though they may look different, the Primaries Wheels and Primaries Bars
actually adjust the same components, but in different ways.

These tonal ranges are defined by image lightness, on a scale where 0 is absolute black and
1023 is absolute white. The following illustration shows an approximation of how the Lift,
Gamma, and Gain tonal zones broadly overlap, and how each zone's influence falls off towards
the opposing extremes of image tonality.
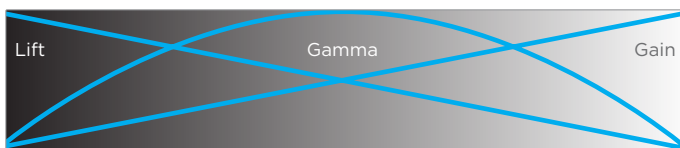
Graphic displays the relationship of the Lift, Gamma, and Gain
controls over the image brightness range that they control

The Lift color balance control region of influence starts at black, and then falls off through the
middle grays to diminish to no influence at white. Meanwhile, the Gamma color balance control
has its greatest influence over the image in the middle grays, and its influence diminishes
towards black and white. Lastly, the Gain control is the inverse of Lift, having its greatest effect
on the image at white, with its influence falling off to diminish at black.

Because these tonal ranges overlap so broadly, you can make very soft, subtle, naturalistic
adjustments using these controls. Furthermore, you can capitalize on their overlap by moving
an adjacent color balance control toward a color that's complementary to an adjustment you've
just made to restrict further how much of the image is affected.

The following image shows the interaction of extreme corrections made to a grayscale image using all three Color Balance controls. Lift has been pushed toward green, Gamma has been pushed toward blue, and Gain has been pushed toward red.

Extreme adjustments showing the overlap of the Lift, Gamma, and Gain color balance controls

Notice how, even though these corrections are extreme, the colors blend smoothly. This is the reason for the broad overlap among all three controls, and why Lift, Gamma, and Gain are so effective in making corrections to the ambient color temperature of a scene to account for inconsistencies in lighting or camera settings.

3-Way Master Wheel Adjustments

The Master Wheels located below the Color Balance controls let you precisely modify image contrast by YRGB adjustments, which individually alter the black point, the white point, and distribution of midtones that fall in-between.

These controls correspond to the rings surrounding the trackballs on the DaVinci control surface.

- **Lift:** Lets you adjust the perceived shadow density of the image by altering the black point of the image. Dragging the Lift master wheel to the left makes the darkest values in the image darker, increasing the distance between the black and white points of the image, and stretching all the midtone values in-between. Dragging the Lift master wheel to the right makes the darkest values in the image lighter, reducing contrast and squeezing all the midtone values between the black and white points.

- **Gamma:** Lets you adjust the overall perceived lightness of the image by altering the distribution of midtones that fall between the Lift and Gain master wheel settings. Dragging the Gamma master wheel to the left darkens the overall image, while dragging it to the right brightens it. Most Gamma contrast adjustments have a minimal effect on the black and white point of the image, but large adjustments may push either boundary of image lightness farther out. This interaction is described in more detail below.

- **Gain:** Lets you adjust the lightness of the highlights by altering the white point of the image. Dragging the Gain master wheel to the left makes the lightest values of the image darker, squeezing the midtones between the white and black points of the image. Dragging Gain to the right makes the lightest values even lighter, eventually clipping at maximum white.
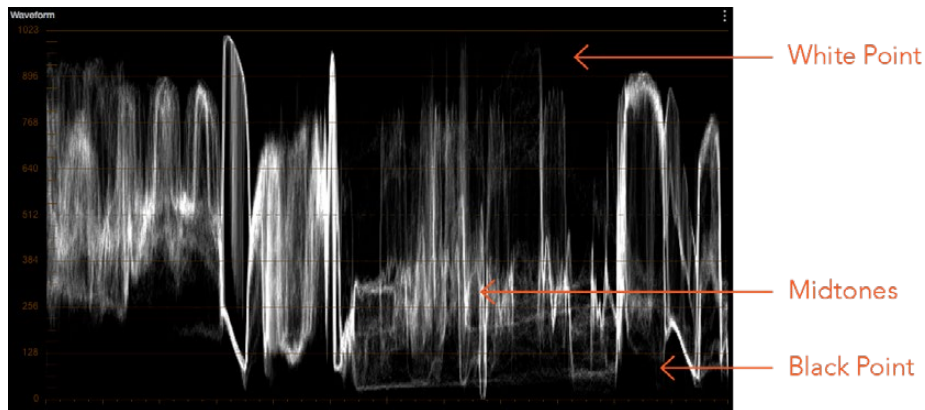
Waveform display shows the clips contrast range

These contrast adjustments are not limited by one another. For example, raising or lowering the Gamma master wheel by a large amount may push the highlights of the image higher or the shadows of the image lower, regardless of the current Lift or Gain contrast setting.

As a result, these controls are somewhat interactive, and you may find yourself going back and forth between controls as you make your final contrast adjustments. This is one of the reasons a control surface is valuable, as it allows you to adjust all three settings simultaneously.

Offset Color and Master Controls

The fourth set of Color Balance and Master Wheel controls is actually shared with the Log controls and with the Offset sliders in the Primaries palette. These are the Offset controls, which let you make linear adjustments to rebalance the entire tonal range of the RGB channels.

- **The Offset color balance control:** Works as a simultaneous adjustment to all three Offset sliders located in the Primaries palette; adjustments made to the Offset color balance control also alter the Offset sliders. Used subtly, this makes it easy to neutralize color imbalances in the darkest part of the image, while simultaneously rebalancing every other part of the image. Used more dramatically, this control makes it easy to add a color wash throughout the entire image.

- **The Offset master wheel:** Acts as a global adjustment to image lightness, an operation sometimes referred to as setup, raising or lowering all YRGB channels together.

When using a DaVinci control surface, the Offset color balance control is adjusted in either Lift/Gamma/Gain or Log modes via the fourth trackball, while the Offset wheel is adjusted via the ring surrounding the fourth trackball.

Shared Adjustment Controls

The three modes of the Color Wheels palette all share two pages of controls for making more specific adjustments to different aspects of the image such as Contrast, Saturation, Hue, Highlight retrieval, Color boost, and so on.

Page 1 Adjustment Controls

The shared Contrast, Pivot, Saturation, Hue, and Lum Mix controls are located in a set of "Page 1" controls found at the bottom of the Color Wheels palette.
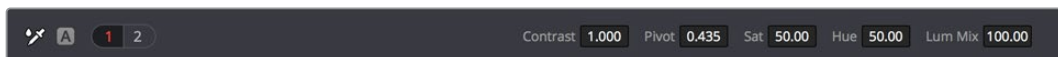
The Page 1 adjustment controls

The Contrast parameters let you quickly narrow or widen image contrast about a user-definable pivot point. Regardless of which mode you're in, these parameters are identical. Contrast and pivot can also be adjusted using the DaVinci control surface via the CONTRAST and PIVOT knobs on the Center panel's default page, regardless of whether you're in Lift/Gamma/Gain or Log mode.

- **Contrast:** This one parameter lets you increase or reduce the distance between the darkest and lightest values of an image, raising or lowering image contrast. The effect is similar to using the Lift and Gain master controls to make simultaneous opposing adjustments. Bright and dark parts of the image are pushed apart or brought together about a center point defined by the Pivot parameter. The "Use S-curve for contrast" setting in the General Options panel of the Project Settings (on by default) sets the contrast control to apply an "S-curve" to the image, such that the shadows and highlights of a signal will not be clipped when you increase the value. If you would prefer for these contrast adjustments to be made linearly, and for the signal to be allowed to clip when you reach the upper and lower boundaries of the video signal, you can turn this checkbox off.

- **Pivot:** Changes the center of tonality about which dark and bright parts of the image are stretched or narrowed during a contrast adjustment. Darker images may require a lower Pivot value to avoid crushing the shadows too much when stretching image contrast, while lighter images may benefit from a higher Pivot value to increase shadow density adequately.

The Saturation, Hue, and Lum Mix parameters mirror the three knobs found at the right of the Center panel of the DaVinci control surface.

- **Saturation:** A uniform saturation operation that raises (above 50) or lowers (below 50) the color intensity of every color value within the image. 50 is unity, showing unaltered saturation. The range is 0 (completely desaturated) through +100 (saturation is doubled).

- **Hue:** Rotates all hues of the image around the full perimeter of the color wheel. The default setting of 50 shows the original distribution of hues. Raising or lowering this value rotates all hues forward or backward along the hue distribution as seen on a color wheel.

- **Lum Mix:** Lets you control the balance between YRGB contrast adjustments you've made using the Master Wheels or ganged Custom curves, and Y-only adjustments to contrast made using the Y channel Lift/Gamma/Gain controls of the Primaries palette or the unganged Luma curve. At the default of 100, YRGB and Y-only adjustments to contrast contribute equally. Reducing this value diminishes the effect of Y-only contrast adjustments until, at 0, Y-only contrast adjustments are turned off.

  Additionally, you'll notice that at the default Lum Mix setting of 100, individual adjustments to R, G, or B using the RGB sliders or unganged Custom curves result in automatic adjustments being made to the other two color channels in order to maintain constant Luma levels. At a Lum Mix setting of 0, individual color channel adjustments have no effect on the other color channels.

Like most parameters in DaVinci Resolve, clicking and dragging a parameter's name or value to the left or right lowers and raises that parameter with a virtual slider, while double-clicking that parameter's number lets you edit it numerically, and double-clicking that parameter's name resets the parameter to its default position.

Page 2 Adjustments Controls

The "Page 2" section of the Color Wheels palette has the same kind of highlight and shadow recovery, Color Boost, and Midtone Detail controls that are found on the Camera Raw palette. If you're grading a camera raw format, then these controls on the Camera Raw palette will give you greater latitude for adjustment. However, the identically named controls in the Color Wheels palette can be used for any media format you like.

The Page 2 adjustment controls

Even though you won't have the kind of wide latitude that you do when using these controls with raw clips, you can still accomplish quite a lot, depending on the format you're adjusting.

- **Temperature:** A specifically constrained Gain color balance adjustment that lets you adjust the image along a warm/orange to cool/blue axis corresponding to the naturalistic spectrum of color temperatures used for lighting. Raising this parameter performs a Gain color balance adjustment toward orange, while lowering this parameter to a negative value performs a Gain color balance adjustment toward a blue/cyan split. 0 is unity. The range is –4000 to +4000.

- **Tint:** A specifically constrained Gain color balance adjustment that lets you adjust the image along a magenta to green axis corresponding to the unnatural spectrum of color temperatures found in artificial lighting sources such as fluorescent and sodium vapor lighting fixtures. Raising this parameter performs a Gain color balance adjustment toward magenta (sometimes referred to as "minus green" to correct for fluorescent lighting), while lowering this parameter to a negative value performs a Gain color balance adjustment toward green ("plus green" to correct for other kinds of lighting). 0 is unity. The range is –100 to +100.

- **Midtone Detail (MD):** When this parameter is raised, the contrast of regions of the image with high edge detail is raised to increase the perception of image sharpness, sometimes referred to as definition. When this parameter is lowered to a negative value, regions of the image with low amounts of detail are softened while areas of high-detail are left alone. 0 is unity. The range is –100 through +100.

- **Color Boost:** A non-uniform saturation operation that affects regions of low saturation more than regions of high saturation. This is sometimes referred to as a vibrance operation. 0 is unity, showing the original color values. Raising color boost from 0-100 increases color intensity, but low-saturation parts of the image are raised more aggressively. Lowering Color Boost from 0 to -100 decreases color intensity, but low-saturation parts of the image are lowered more aggressively. 0 is unity, showing unaltered saturation. The range is –100 through +100.

- **Shadows:** Lets you selectively lighten or darken shadow detail. Raising this value retrieves shadow detail recorded below 0 percent, while leaving the midtones alone. 0 is unity. The range is –100 through +100.

- **Highlights:** Makes it easy to selectively retrieve blown-out highlight detail in high-dynamic-range media by lowering this parameter, and achieves a smooth blend between the retrieved highlights and the unadjusted midtones for a naturalistic result. 0 is unity. The range is –100 through +100.

Auto Correction in the Primaries Mode Controls

The Auto Color command provides a quick way to automatically balance the blacks and whites of a clip based on the current frame at the position of the playhead. As of DaVinci Resolve 16, the A button in the Color Wheels palette and the Shot Match command available from the Thumbnail Timeline contextual menu both now use advanced algorithms, based on the DaVinci Neural Engine, to provide superior results when automatically adjusting color balance and contrast. These controls have been developed to provide optimal results when working in the Rec.709 color space, and at a gamma of 2.4, so they work well in conjunction with using Resolve Color Management (RCM) to normalize media first.

For more information on using these, see Chapter 116, "Automated Grading Commands and Imported Grades."

The Log Mode of the Color Wheels Palette

The Shadow/Midtone/Highlight color balance and Master Wheel controls operate independently of the Lift/Gamma/Gain color balance and Master Wheel controls found in the Primaries mode. While the Log mode uses the same types of controls as the Primaries mode, the way each control affects the image is very different.

To switch between the Primaries and Log modes of the Color Wheels:
Choose an option from the mode drop-down, click the right mode button, or press Option-Z.

Log color wheels, with behavior that is very different from the Primaries mode color wheels

There are two ways of using the Log mode controls. The first takes advantage of the way these controls work to make fast, filmic adjustments to log-encoded media while it's being normalized or " de-logged" by operations that are performed using nodes appearing after it in the image processing pipeline of your node tree. Normalizing or de-logging the image can be done via Color Space Transform operations, LUTs, and manual adjustments if you're grading using DaVinci YRGB color science. If you're using color management, they can be done via the Output Color Space setting of Resolve Color Management (RCM), or via the ACES Output Device Transform (ODT).

The other way of using the Log controls is to take advantage of the more restrictive, but adjustable tonal range of the Shadow/Midtone/Highlight controls to stylize normalized clips by tinting or adjusting the contrast of tonally-specific regions of the image.

Whether or Not to Use Legacy Log Grading Ranges and Curve

DaVinci Resolve 12.5 introduced a modification to the Log grading controls that provides smoother, more pleasing results using the same controls. To maintain backward compatibility with older projects, a "Use legacy Log grading ranges and curve" checkbox in the General Options panel of the Project Settings lets you switch your project between the older Log control behavior and the newer one. Older projects that are opened in DaVinci Resolve have this checkbox turned on by default, while new projects have this turned off by default.

Using the Log Mode Controls to Grade Log-Encoded Media

The Log controls are so named because they're designed to work specifically with media with Log-C or similar gamma and color encoding, derived from the Cineon Log gamma curve, developed by Kodak to digitally store flat-contrast, wide-gamut image data that preserves image detail with a wide latitude for adjustment.
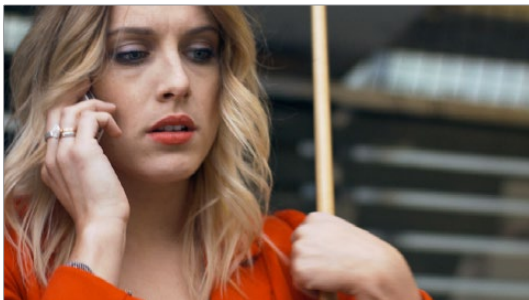
An example of a log-encoded clip (Top), and the same clip after being normalized (Bottom)

You can debayer most raw formats to a log-encoded image in order to derive the maximum amount of image data and adjustable latitude from that source (for more information, see Chapter 5, "Camera Raw Settings"). However, the resulting image needs to be normalized to occupy the final range of color and contrast that you intend for the final result. You can do this one of two ways:

- You can make a very careful curves adjustment in a second node to stretch the log-encoded image out to fit the contrast profile you want. By making this adjustment in Node 2, you make room for a customizing adjustment made using the Log controls in Node 1, prior to the normalization adjustment. This is key.

- You can also apply a 1D Output or 3D LUT to the first node of a clip to normalize the image. This is a faster, if less flexible operation, but a smooth tonal range may be easier to obtain. Since a LUT applied within a node is always the last adjustment within that node's order of operations, you can also use Node 1's Log controls to customize the look of the footage.

In either case, it's important that the normalizing adjustment happens after your Log control adjustments, for the Log control adjustments to work as they should. With your node tree set up in this way, you'll be monitoring an ordinary-looking image, but taking advantage of the Log mode controls' unique tonal ranges to manipulate the log-encoded image data with great specificity.

When using the Log mode controls, here's a workflow to consider as you learn how they work:

- **First,** use the Offset master wheel to set the black point, and use the Contrast and Pivot parameters to stretch or compress contrast as necessary to achieve the tonal range you require.

- **Second**, use the Offset color balance control to adjust the overall color balance of the image to your liking.

- **Third,** use the Shadow/Midtone/Highlight color balance and Master Wheel controls to make specific, targeted adjustments to the color and contrast of the image in tonal ranges that match where that data is in the log-encoded image.

Working in this way, you'll find that adjustments made with the Offset color balance and Master Wheel controls and Contrast controls control the log-encoded image very nicely to create an overall adjustment, while the Shadow, Midtone, and Highlight controls allow you to fix specific issues, such as shadow balance and density, after your main adjustment has been set.

The following illustration shows an approximation of how the default ranges of the Shadow, Midtone, and Highlight controls divide the tonal range of a log-encoded image.

This graphic shows the tonal range of each of the Log controls when used with a log-encoded image

As you can see, when used with a log-encoded image the color interactions between each adjustment overlap very softly, while still allowing more specific adjustments than those made by the Lift/Gamma/Gain controls.

Furthermore, the boundaries of the Shadows, Midtones, and Highlights Log controls can be customized using the Low and High Range parameters. This gives you added flexibility to apply more specific contrast and color adjustments.

Once you've made an adjustment using Log mode controls along with a normalizing LUT or curve adjustment, you can always apply additional nodes and use the Primaries mode of the Color Wheels palette to make further alterations to the now normalized image, working as you normally would with any of the other tools in DaVinci Resolve.

Using the Log Mode Controls to Stylize Normalized Media

You can also use the Log mode controls on normalized images. Although the results you get will be somewhat different, this can be a fast way to create interesting stylizations. Whereas the broadly overlapping tonal ranges of the Lift, Gamma, and Gain color balance controls allow subtle adjustments to be made very easily, the Log palette's color balance controls affect much more restrictive tonal zones that overlap much less when used on normalized images.

The following illustration shows an approximation of how the Shadows, Midtones, and Highlights, by default, divide the tonal range of the image into non-overlapping thirds. As you saw in the previous section, these divisions were originally intended to map to log-encoded media. However, with normalized media these divisions provide a different, and potentially useful, set of ranges from the Primaries mode controls.
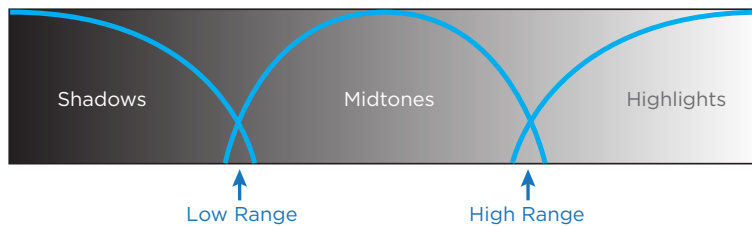
This graphic shows the tonal range of each of the Log controls with the additional low and high range to expand or contract the range

With normalized media, the Shadows really do only affect the darkest shadows, falling off at approximately the bottom third of image tonality. The Midtones affect only the middle third of grays, and the Highlights affect the brightest top third of image values. However, these default ranges of image tonality can be adjusted using the Low Range and High Range controls, which are described in more detail later.

The following image shows the default interaction of extreme corrections made to a grayscale image using the Log mode controls. The Shadows have been pushed toward green, the Midtones have been pushed toward blue, and the Highlights have been pushed toward red.

Extreme adjustments showing the overlap of the Shadow, Midtone, and Highlight color balance controls

As you can see, with normalized media the color interaction between each adjustment is very subtle. The darkest shadows end up bright green, the midtone values are vivid blue, and the highlights are almost pure red. This restrictiveness is useful when you want to limit a correction to a specific tonal range within the image without needing to use a Luma qualifier. It's also quite useful for making bold, stylistic color adjustments when creating a non-naturalistic look.

Adjusting Tone Ranges in Log Mode

Two parameters let you modify the range of Shadows and Highlights that each Color Balance control affects, in turn narrowing and widening the range of Midtones. Keep in mind that while the ranges can be customized, the amount of overlap between each range cannot.

- **Low Range:** Moves the border where the Shadows and Midtones meet. Lowering this parameter widens the range affected by the Midtones, and narrows the range affected by the Shadows. Raising this parameter narrows the Midtones and widens the Shadows.

- **High Range:** Moves the border where the Midtones and Highlights meet. Lowering the High Range parameter narrows the range affected by the Midtones, and widens the range affected by the Highlights. Raising this parameter narrows the Highlights and widens the Midtones.

There are also Saturation and Hue parameters which mimic these settings found within other palettes and modes.

Adjusting Contrast in Log Mode

When using the Log mode controls, your primary tools for adjusting image contrast will usually be the Offset master wheel and Contrast and Pivot parameters. Using these three controls, you can set a black point and adjust the overall contrast very quickly.

The Shadow, Midtone, and Highlight master wheels let you adjust image lightness within the same restrictive ranges of image tonality that are defined by the Low Range, High Range, and Pivot parameters. These adjustments should appear smooth, if somewhat narrower then the Lift/Gamma/Gain controls, when used with log-encoded media. However, when used with normalized images, severe adjustments made with one master wheel may not always make a smooth transition to the next adjacent range of image lightness.

> **NOTE:** Because these controls are so restrictive when used with normalized images, it's easy to create solarization effects by raising the shadows to be higher than the Midtones, or lowering the Highlights to fall below the Midtones, to give two examples.

Log Offset Color and Master Controls

The Log controls also share the same Offset color balance and Master Wheel controls that appear in the Lift/Gamma/Gain mode of the Color Wheels palette (which are tied to the Offset controls of the Primaries palette).

- **The Offset color balance control:** Works as a simultaneous adjustment to all three Offset sliders located in the Primaries palette; adjustments made to the Offset color balance control also alter the Offset sliders. Used subtly, this makes it easy to neutralize color imbalances in the darkest part of the image, while simultaneously rebalancing every other part of the image. Used more dramatically, this control makes it easy to add a color wash throughout the entire image.

- **The Offset wheel:** Acts as a global adjustment to image lightness, an operation sometimes referred to as setup, raising or lowering all YRGB channels together.

Switching to Log Mode Using the DaVinci Control Surface

You can switch to the Log grading mode of the currently selected node by doing one of the following:

- Press SHIFT DOWN and then PRIMARY.
- Press the LOG soft key on the Center panel of the DaVinci control surface. Press the MAIN soft key to return to the more traditional Lift/Gamma/Gain mode of adjustment.

The Primaries Bars Mode of the Color Wheels Palette

The Primaries Bars palette contains the original set of DaVinci Resolve color adjustment sliders. These sliders serve two uses. First, they're highly visible indicators of the individual YRGB channel adjustments that are made using the trackballs, rings, and knobs of a control surface. Second, they provide control of individual YRGB Lift/Gamma/Gain parameters using a mouse, tablet, or trackpad.
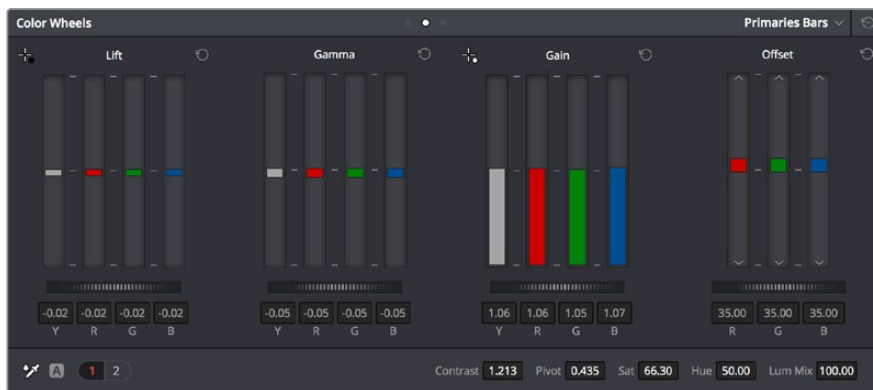
Primary grading controls

RGB Lift/Gamma/Gain Sliders

The main controls of the Primaries Bars mode are the individual Luma (or Y), Red, Green, and Blue sliders, four each for Lift, Gamma, and Gain. These sliders correspond to a set of knobs on the POTS page of the DaVinci control surface, and provide precise Lift/Gamma/Gain style control over each of the YRGB channels of the image. When used in conjunction with a Parade Scope video analysis of the image, these controls can enable you to fix irregular color imbalances in specific channels quickly.

Additionally, the Luma (Y) Lift/Gamma/Gain sliders correspond to the three knobs arranged vertically to the left of the Center panel of the DaVinci control surface. These three controls allow easy Y-only adjustments to contrast, where an increase in contrast results in perceptually diminished color saturation.

Making Y-only adjustments to contrast is a great way to increase contrast when you're going for muted saturation or a gritty look. This kind of adjustment is also useful in situations where you're trying to increase shadow density without increasing image colorfulness.

Four Master Wheel controls appear underneath each group of Lift/Gamma/Gain sliders. The first three of these controls are identical to the Lift/Gamma/Gain master wheels in the Primaries mode of the Color Wheel palette, and control YRGB contrast, while the fourth is identical to the Offset master wheel found in the Log mode of the Color Wheel palette.

Finally, each group of Lift/Gamma/Gain sliders has its own reset button. To reset individual channels, double-click the single-letter label underneath that slider.

To adjust RGB Lift/Gamma/Gain using the DaVinci control surface:

1   Press the POTS soft key on the main page of the Center panel.

2   Use the variously identified LUM/RED/GREEN/BLUE and OFFSET/BLACK/GAMMA/ GAIN knobs to make the required adjustments.

3   Press the MAIN soft key to return to the Center panel's main page.

Offset Sliders, Offset Wheel, and Printer Points

These vertical sliders mirror the settings of the Offset color balance controls in the Color Wheel palette, except that they provide individual control over the Red, Green, and Blue color channels. When you drag one of the Offset sliders up or down, you raise or lower that color channel in its entirety, which can be useful for adjusting color channels that are particularly problematic, or for imposing the kind of traditional linear color adjustments that color timers of film have employed for decades. In fact, many colorists consider the simplicity of these controls a virtue, and embrace the slight shadow or highlight contamination that can result from color balancing in this linear way as a creative hallmark of traditional cinema color adjustment.
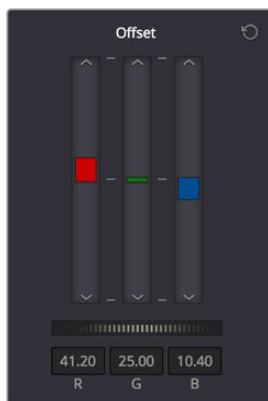

Offset RGB and master controls

NOTE: Unlike the other Color Wheels control adjustments described in this chapter, the Offset controls do not use the Lum Mix parameter to control whether individual adjustments to the R, G, or B channels result in automatic adjustments being made to the other two color channels in order to maintain constant Luma levels. All Offset and printer points adjustments made to a specific color channel affect only that color channel.

Adjusting Printer Points in the Primaries Bars Palette

Each Offset slider also has a pair of arrow buttons, one at the top and one at the bottom. These buttons provide "Printer Point" adjustment of these values, which let you adjust each Offset channel in discrete increments. Printer Points can be useful for projects that have tight integration with a film lab, and are designed to emulate color adjustments made using optical printers.
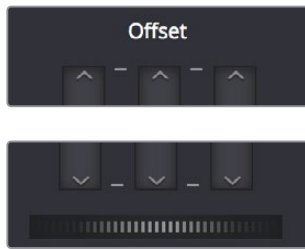
The "plus" and "minus" red, green, and blue buttons for making printer point adjustments

The Offset wheel control underneath the Offset sliders lets you adjust all three sliders at once, performing a setup adjustment. The Offset sliders, Printer Point buttons, and Offset wheel can be adjusted using the DaVinci control surface.

Adjusting Printer Points Using the DaVinci Control Panel

The DaVinci Resolve Advanced and Mini color grading panels have support for adjusting printer points using rotary controls for the Red, Green, and Blue channels, as well as All channels together.

To adjust the Offset sliders individually using the DaVinci Resolve Advanced or Mini panels:

Use the MASTER OFFSET, RED OFFSET, GREEN OFFSET, and BLUE OFFSET knobs on the main page of the Center panel.

If you have the DaVinci Resolve Advanced panel, there are dedicated printer points buttons you can use.

To adjust Offset Printer Points using the DaVinci control surface:

1   Press the PRINTER LITES soft key on the main page of the Center panel to display the Printer Points controls page on the Transport panel.

2   Use the + and – MASTER, RED, GREEN, and BLUE buttons that appear on the Transport panel.

3   Press PRINTER LITES again to return the Transport panel controls to their previous state.

There's also a special set of keyboard shortcuts, mapped to the numeric keypad of an extended keyboard, that lets you make Printer Point adjustments in discrete increments, adding or subtracting a point at a time.

Adjusting Printer Points Via Keyboard Shortcuts

One of the best ways of using printer points if you don't have a color control panel that supports them is to enable the numeric keypad to use dedicated keyboard shortcuts just for printer points.

To use the Printer Lights Hotkeys:

Choose Color > Printer Lights Hotkeys, or press Option-Command-Grave Accent (`)

When you enable Printer Lights Hotkeys, there are two sets of shortcuts you can use to manipulate printer points. First, if you want to directly manipulate RGB in whole increments, there's one set for that.

Red	Green	Blue
7 - Plus Red	8 - Plus Green	9 - Plus Blue
4 - Minus Red	5 - Minus Green	6 - Minus Blue

However, if you want to work in the classic way by manipulating cyan, magenta, and yellow in whole increments, there's another set of shortcuts for that, using the remaining keys on the numeric keypad.

Cyan	Magenta	Yellow
1 - Plus Cyan	2 - Plus Magenta	3 - Plus Yellow
Minus (–) - Minus Cyan	0 - Minus Magenta	Period (.) - Minus Yellow

The increments used by the Printer Point buttons are defined by the Printer Light Step Calibration parameters, found in the Color panel of the User Preferences. The default settings are designed to emulate traditional film printer adjustments, but these settings can be customized to align DaVinci Resolve's printer points adjustments with those of a particular film lab's equipment. However, if you're not working with a lab, you can change the Step and Density settings to alter how much of an adjustment each printer point makes. For more information, see Chapter 3, "System and User Preferences."
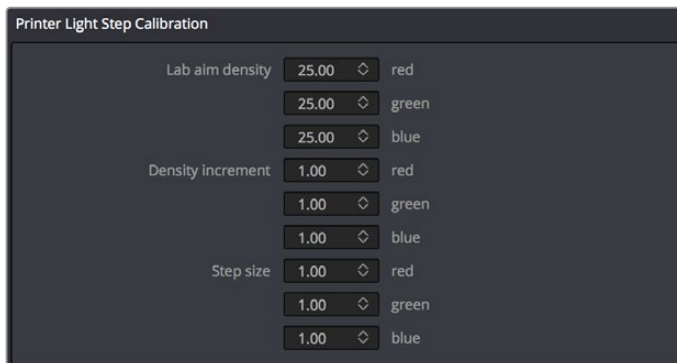
Controls in the Color panel of the User Preferences to adjust Printer Point functionality

There are also a pair of keyboard modifiers that gives you finer control over printer points adjustments made with these special keyboard shortcuts, while retaining the coarser default adjustments that let you make bigger changes more quickly:

- Hold down Command while using these key shortcuts to adjust printer points in quarter-increments.
- You can use half-increments as well, but you will need to assign the keyboard shortcuts for these manually.

> **TIP:** If you're feeling left out because all the cool kids are using printer points and you're unfamiliar with them, making the Parade scope visible is a great way to learn how these adjustments work while seeing their specific effects on the red, green, and blue channels of the video signal.

RGB Mixer Palette

The RGB Mixer palette lets you remix different amounts of image data from one channel to another, and has a wide variety of creative and utilitarian uses. Furthermore, the RGB Mixer can be used either to remix the color channels, or to add different proportions of each color channel into a monochrome image.

By default, the RGB Mixer palette is set to mix any amount of the Red, Green, and Blue color channels into any of the other channels. Each color channel has a dedicated control group of Red, Green, and Blue sliders that you use to do the mixing, and the default values of these can be seen in the screenshot above.

RGB Mixer palette

Each slider has an overall range of –2.00 to +2.00. This means that you also have the option of subtracting any combination of color channel values from a particular channel. For example, you can lower the Red control group's Green slider to –.24 to subtract 24 percent of the Green channel from the Red channel.

Preserve Luminance

With the "Preserve Luminance" checkbox turned on, any channel adjustment you make is prevented from altering the luma of the image by automatically raising or lowering the other two channels to compensate. In the following example, you can see that when "Preserve Luminance" is turned on, lowering the Green control group's Green slider results in the Red and Blue channels being raised by the same amount (as seen in the Parade scope). Conversely, raising a color channel's slider ends up lowering the other two channels by the same amount to keep overall image luminosity the same.
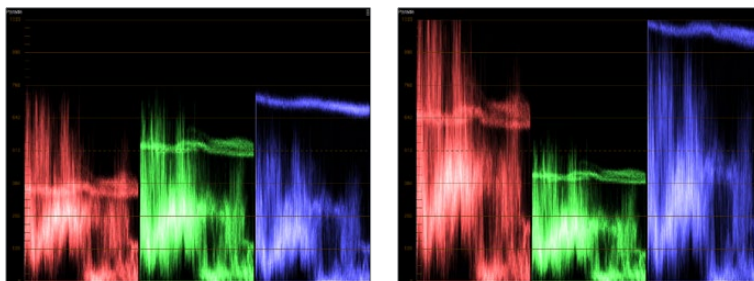
The result of an RGB Mixer adjustment with "With luminance level preserved" turned on.
You can see that lowering the green channel slider also raises red and blue.

Resetting the RGB Mixer

Clicking the Reset button at the top right-hand corner of the RGB Mixer resets each slider to its default position, where Red = 1.00 for Red output, Green = 1.00 for Green output, Blue = 1.00 for Blue output, and all other sliders = 0.

Swap Channels Buttons

A set of three buttons at the bottom of the RGB Mixer lets you easily swap two channels with one another. This can be useful as part of a creative look, or corrective in instances where two channels are accidentally reversed.

- **Swap Red and Green:** Swaps these two color channels.
- **Swap Green and Blue:** Swaps these two color channels.
- **Swap Red and Blue:** Swaps these two color channels.

Using the RGB Mixer in Monochrome Mode

When you turn on the Monochrome checkbox, two of the sliders within each Output group are disabled. This leaves the Red > Red slider, the Green > Green slider, and the Blue > Blue slider as the only available controls.

Sliders at their default values when Monochrome mode is enabled

Keeping in mind that each of the color channels that makes up an image is itself a grayscale channel, the RGB sliders in Monochrome mode let you add different proportions of the Red, Green, and Blue color channels together to create custom grayscale versions of a shot.

To understand why this is useful, let's consider the default values of the Red, Green, and Blue sliders. To emulate the human eye's sensitivity to the wavelengths of light, the Rec. 709 video standard defines an isolated Luma (Y') component as consisting of 0.2126 of the Red channel, 0.7152 of the Green channel, and 0.0722 of the Blue channels added together. This can be seen in the default values (rounded to the nearest integer percentage) of 21, 71, and 7.

This is the standard method of deriving a black and white version of a color image, and in fact produces identical results to those obtained by setting the Saturation parameter to 0.

However, there have traditionally been other ways of mixing the colors of life into different grayscale interpretations. For example, photographers often use colored filters in conjunction with black & white film stocks, such as a yellow/green filter to emphasize pleasing skin tone for lightly complexioned people. A much older example is the use of black & white film stocks with different sensitivities (old orthochromatic stocks were not sensitive to red wavelengths, recording only blue and green to create an image).

Using the RGB Mixer with Monochrome mode turned on gives you the ability to mix your own custom blends of all three color channels to emphasize the creative characteristics you require. For instance, increasing the mix of blue and decreasing red and green can give skin tones a darker, metallic sheen. The following screenshots show multiple versions of the same image with different monochrome mixes.

Three monochrome mixes of the same image. The top image is the result of setting saturation to 0.

Like the parameters in Color mode, you can use the RGB Mixer's Monochrome mode to subtract one color channel from the others, for even more creative effects.

RGB Mixer Controls on the DaVinci Control Surface

All of the RGB Mixer palette controls are available from the DaVinci Resolve control surface.

To open the RGB Mixer curve controls on the DaVinci Resolve control surface:
> Press the CURVES soft key on the main page of the Center panel.

To exit the RGB Mixer curve controls:
> Press the MAIN soft key on the Center panel.

To adjust the principle color regions using knobs:

- Adjust one of the four groups of knobs on the Center panel. All are labeled to identify which RED/GREEN/BLUE source channels are paired with RED/GREEN/BLUE destination channels. For example GREEN->BLUE adds or subtracts an amount of the Green color channel from the Blue color channel.

- Press the PRESERVE LUM soft key to turn on the "With luminance level preserved" checkbox.

- Press MONO to turn on the Monochrome checkbox.

- Press COLOR to turn off the Monochrome checkbox.

Chapter 118

Curves

The Color page has a powerful curves interface that provides controls for adjusting color and contrast with the Custom Curves, as well as a variety of "Hue" or "HSL" curves that let you make more targeted adjustments to hue, saturation, and luminance in a variety of ways.

Contents

Introduction to Curves

The Curves palette, selectable via one of the toolbar buttons above the Center Palette panel of the Color page, has six modes that provide different curve-based methods of manipulating the color and contrast of an image. Each curve lets you adjust a customizable region of the image based either on image tonality (zones of lightness or darkness), hue (specific colors), or saturation (intensity of color). All curves can be adjusted using either the pointer, or knobs on the DaVinci control panel.

> **TIP:** All curves in DaVinci Resolve can be used to affect the overall image, or limited to affect only a specific portion of the image as a part of a secondary operation using qualifiers, windows, imported mattes, or any combination of the three.

Adjusting Curves Using the Mouse

All Color curves in DaVinci Resolve use the following controls for basic on-screen adjustment using the pointer, controlled either with your mouse, pen, or other input device of choice.

**Methods of adjusting curves using the on-screen interface:**

- **To add a control point:** Click anywhere on a curve. A control point is added at the position of the mouse where you clicked, and the curve is altered, if necessary, to match the new control point's position.

- **To add a control point without altering the curve:** Hold the Shift key down, and click anywhere on or around a curve. A control point is added to the curve at the position of the pointer where you clicked, but the curve is not altered.

- **To snap a control point to the neutral diagonal of the curve:** (Custom curve only) Hold the Option key down while dragging any control point on the curve. A diagonal line appears indicating the neutral state of the image, and the control point will snap to it. When you release the Option key and then press the Option key again after releasing, the diagonal guide line disappears.

Snapping a curve's control point back to its neutral position by holding down the Option key

- **To remove a control point:** Right-click any control point to make it disappear.

- **To reset a single color channel curve to a completely neutral setting:** Click the reset button to the right of that color channel's intensity slider.

- **To reset all color channel curves:** Click the Reset Custom Curve button at the upper right-hand corner of the Curves palette.

By default, a control point influences the portion of each curve that falls between its neighboring two control points.
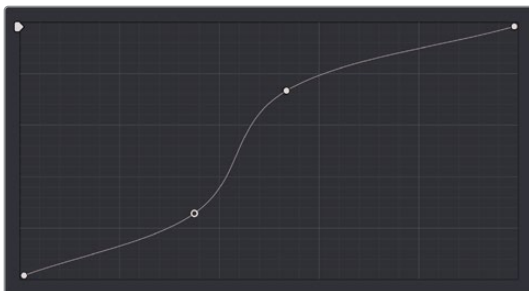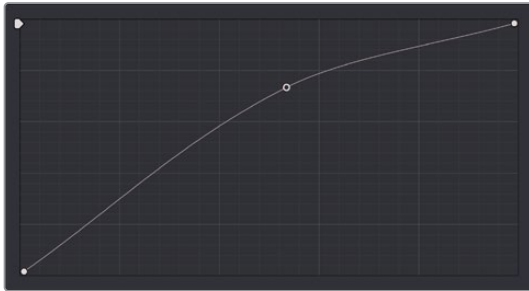
Control point adjustments affect the entire portion of a curve between adjacent control points.

In the top screenshot, you can see that the control point at the position of the pointer is affecting the larger part of the curve that falls between the lower left-hand control point (which is there by default), and a user-created control point placed up within the highlights of the curve.

In the bottom screenshot, an additional control point to the left of the one being adjusted limits the area of the curve that is adjusted. By careful placement of additional control points, you can make extremely targeted adjustments to images using the Custom curves.

This example highlights the importance of using control points to "lock off" portions of a curve at a neutral or nearly neutral position to prevent changes to specific portions of an image, even while using other control points to make changes.

> **NOTE:** The HSL curves also have an optional adjustment mode using Bezier curves that will be covered in those sections.

Sampling Images to Place Control Points on Curves

Another way you can add control points to curves is to move the pointer to the Viewer, and click to sample a color value and place a control point at the position on the currently open curve that corresponds to that value. This works with Custom, Hue, and HSL curves.
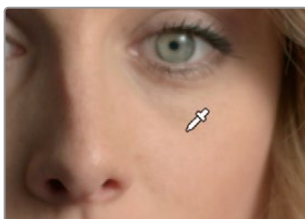

Clicking on a feature of the image
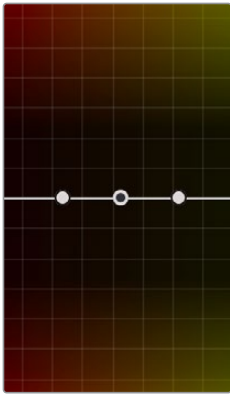
Creates a control point on the currently open curve

Showing Picker RGB Values

While you're dragging the pointer over the Viewer and looking for a feature to sample, you can enable a tooltip that shows you the RGB Value of the pixel under the pointer by right-clicking the Viewer and choosing Show Picker RGB Value to toggle this feature on and off. When you turn this feature on, the View > Show RGB Picker Values In submenu has options for displaying either 8- or 10-bit tristimulus values.
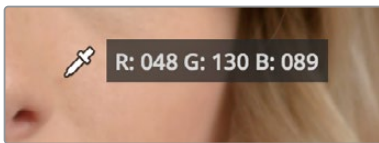
The color picker tooltip that appears when you turn on Show RGB Picker Values
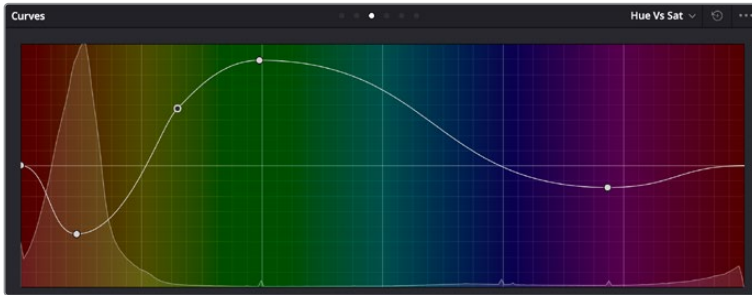
Curves Histograms

The Custom curves and HSL curves all show a histogram that represents the input of the currently selected Correction node, which you can use to guide your adjustments. The Histograms submenu of the Curves palette's Option menu lets you choose to disable these histograms, or to switch the histograms between showing the input or the output of the node. If you switch to Output, the histograms will update to show you the result of your adjustments, at the expense of seeing the image data that the curve is actually working upon.

The Custom curves show a YRGB histogram:

The histogram appearing underneath the Custom Curves shows a YRGB histogram analysis

Each Hue or HSL curve shows a histogram analysis of the two color channels that Curve acts upon: hue against saturation level, luminance against saturation level, or saturation level against saturation level, to give three different examples. In the case of Hue or HSL curves, these histograms make it easy to see which parts of the Curve controls will actually affect image data.

The histogram appearing underneath the Hue vs Sat curve plots all saturation levels at each value of hue

Custom Curves

DaVinci's Custom curves provide smooth adjustment of each clip's Y, R, G, and B channels. The Custom curve mode of the Curves palette is divided into two areas, the Curve Editor to the left, and the Curve controls to the right. The editor contains the actual Curve controls you use to adjust the image. The controls at the right let you choose which curves you're adjusting, and adjust their intensity.
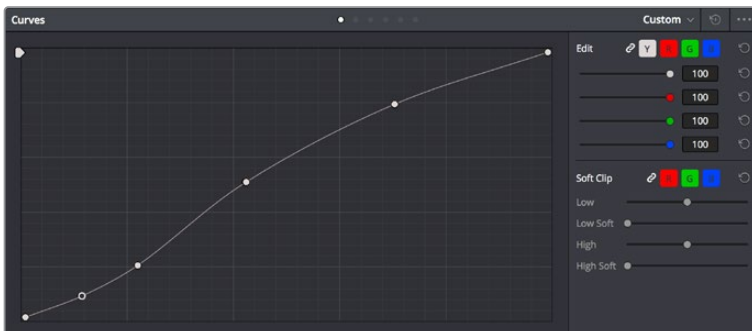
The Custom curves seen used to create a gentle "S" curve adjustment with four additional control points added; the left point is selected

The Custom curves are useful for making more tonally specific, channel-by-channel adjustments to an image than can be accomplished using the Color Balance controls. They're also useful for making strange and wonderful stylistic adjustments through unusual alterations to different combinations of color channels.

Although the ganged Custom curves appear to be a single curve control, the Custom curve editor is actually presented as a series of overlaid curves, and the YRGB curves all appear within a single editor. The default, neutral position of the Custom curves is a diagonal line that runs from the lower-left black point of the image through the upper-right white point.
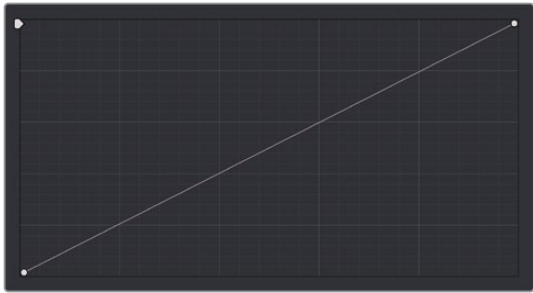
The neutral diagonal position of the curve
at which no adjustment is made

The horizontal axis represents the range of image tonality in the original image, from black (at the left) to white (at the right), while the vertical axis represents the range of alteration you can make. By adding control points to the surface of the curve and raising or lowering it at different regions, you are actually remapping the original horizontal "input" value of a color channel to an "output" value of your choosing.

Additional controls appear to the right of the curve editor itself. A top row of buttons let you select the curve corresponding to an individual color channel for isolated adjustment, while a vertical stack of four sliders let you adjust the intensity of each color channel's curve.


The channel-editing
buttons and curve
intensity sliders
appear to the right
of the curve editor

Editing the Top and Bottom Control Points of Curves

You can also edit curves using the default two control points that the curve control starts out with in the Curve Editor. The Black Point control (at the lower-left) and the White Point control (at the upper-right) let you expand and compress the video signal similarly to using the Lift and Gain Master Wheel controls in the Color Wheels palette.
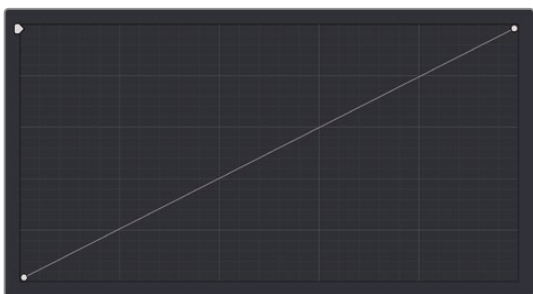

The Curve control at its original state
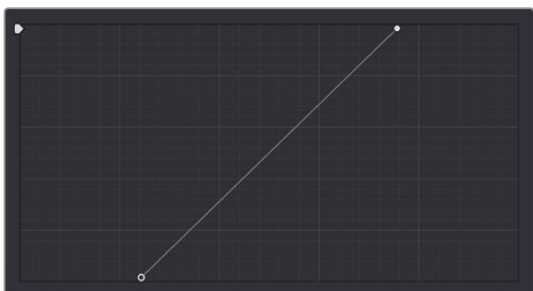
The Black and White Point controls dragged
to the right and left to expand the signal

You can use the Black and White Point controls in the following ways:

- **Using the Black Point control:** Dragging this control up makes a lift adjustment to raise the black point of the signal. Dragging this control to the right makes a lift adjustment to lower the black point of the signal.
- **Using the White Point control:** Dragging this control down makes a gain adjustment to lower the white point of the signal. Dragging this control to the left makes a gain adjustment to raise the white point of the signal.

HDR Grading Using Curves

When using various grading controls in the Color page to grade wide-latitude images for HDR output, you may find it useful to enable the HDR mode of the node you're working on by right-clicking that node in the Node Editor and choosing HDR mode from the contextual menu (only available in Resolve Studio).
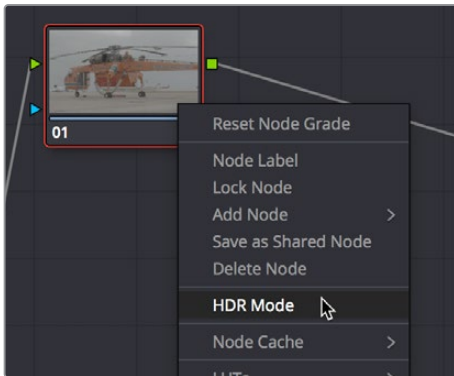
Using a node's contextual menu to put that node into HDR mode

This setting adapts that node's controls to work within an expanded HDR range. Practically speaking, this makes it easier to work with wide-latitude signals using controls that operate by letting you make adjustments at different tonal ranges such as Lift/Gamma/Gain, Custom Curves, Soft Clip, and so on.

Enabling Editable Splines in the Custom Curves

When the Curve palette is in Custom mode, you can choose Editable Splines from the option menu to expose Bezier spline handles on any selected control point, which let you make more precise curve adjustments whenever necessary.


Custom curve with editable splines enabled

> **NOTE:** Beware of making curve adjustments that are too sharp, or with control points that are too close together, as they can introduce unwanted contouring within the image, causing flattening or solarization in parts of the image that you may not want.

Adding Default Anchors to the Custom Curves

You can also choose Default Anchors from the option menu of the Curve palette in Custom mode to place three additional control points on the curve, dividing the curve into five segments that affect the shadows, low midtones, medium midtones, high midtones, and highlights of the image.
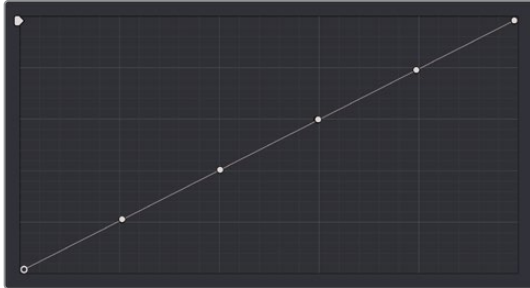
Custom curve with Default Anchors exposed

Ganging and Unganging Custom Curves

By default, the Custom curves are ganged, so that curve adjustments affect a clip's YRGB channels all together, resulting in an adjustment to image contrast that's similar to using the Master Wheels in the Color Wheels palette, or the ring controls of the DaVinci control panel. When making this type of adjustment, increasing contrast also increases image saturation, while reducing contrast also reduces image saturation. Since curves can be manipulated with greater specificity than the three Master Wheels, you can make much finer contrast adjustments using the YRGB curves than when using the Master Wheels only.

Turning ganging off lets you use the full power of Custom curves to alter the image. Unlike the Color Balance controls, each of which adjust all three color channels simultaneously, the Curve controls let you adjust each channel individually when Gang Custom Curves is turned off.

To disable Custom curve ganging:

> Click the Curve Edit button that corresponds to the curve channel you want to edit. Clicking any Curve Edit button highlights that curve to make it easy for editing when curves overlap one another. Once one or more curves is offset from the others, you can freely edit any curve by dragging its control points.

Custom Curve Edit buttons are to the left, the Gang button is to the right

To re-enable Custom curve ganging:

> Click the Gang button to the left of the Curve Edit buttons.

Editing color channels via individual curve adjustments lets you make smooth color-channel specific corrections, or you can make radically individual adjustments to create a wide number of creative effects.
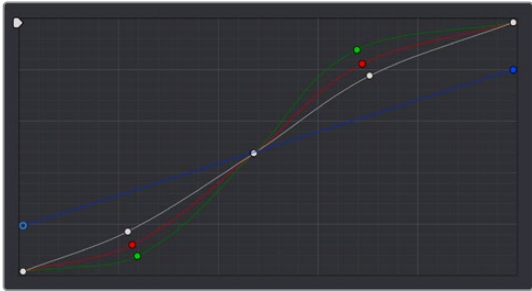
Turning off curve ganging lets you independently adjust each curve

> **TIP:** When curve ganging is disabled, the Luma curve allows you to adjust the Y channel by itself, which is similar to using the Y-only Lift/Gamma/Gain knobs of the DaVinci control panel. When making this type of adjustment, increasing luma contrast results in a perceptual decrease of image saturation.

Copying Custom Curves From One Color Channel to Another

Even if you've unganged the Custom curves, you can still mirror one curve's adjustments to another by copying it using the "Copy to Red/Green/Blue" commands in the Curve palette's option menu.

Curve Intensity Sliders

Four Curve Intensity sliders to the right of the Curve Editor, one for each channel, let you mix between the current curve's effect on the clip, and the original state of the image before you altered the curve. The default Intensity of 100 results in that curve exerting its full effect on the image, while an intensity of 0 results in that curve having no effect on the image. The Intensity sliders provide an easy way to "split the difference" between a curve adjustment and the previous state of the image.

Lowering the Curve Mix slider reduces the effect of that curve's adjustment on the image.

YSFX Sliders

Each of the Custom curves (Y', R, G, and B) has a vertical YSFX slider at the upper left-hand corner of the Curve Editor that lets you invert any or all color channels by any amount you want, to create different types of stylized effects.
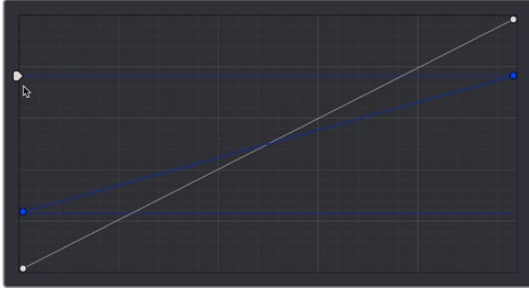

Image with the Luma channel modified
using the vertical YSFX slider

As with all other adjustments in the Color page, YSFX may be combined with Power Windows or HSL qualification to limit channel inversions to specific portions of the image for creative purposes.

Adjusting Custom Curves with the DaVinci Control Panel

The controls that correspond to the Custom curves on the DaVinci control panel are available by default when you first open DaVinci Resolve (the rotary knobs on the Center panel will be labeled PRIMARIES). If these buttons are not visible, you need to switch to the Primaries controls using the soft keys.

To open the Primary Curve controls of the DaVinci Resolve control panel:
- Press the PRIMARIES soft key on the Center panel.
- If the Center panel is currently in CURVES mode, then press the MAIN soft key on the Center panel.

The rotary knobs on the Center panel update to show the CHANNEL OFFSET/CUSTOM CURVES and YSFX controls.

To make curve adjustments:

>Adjust the 0% LUM, 20% LUM, 40% LUM, 60% LUM, 80% LUM, or 100% LUM
>rotary knobs.

By default, all adjustments you make using these controls are ganged across all four YRGB
curve controls. However, if you turn Custom curve ganging off, then these controls only affect
the Luminance curve.

These controls correspond to the following default control point positions on the
Curve controls.
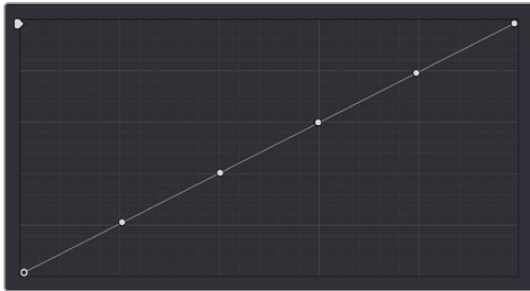
Each rotary curve control on the DaVinci control
surface corresponds to one of these six default
control point positions

You also have the option of using the fourth trackball from the left to adjust individual control
points on curves to any position you like. This works for all curves in DaVinci Resolve that have
control surface mappings.

**Methods of selecting and adjusting individual control points
using the master trackball of the Center panel:**

- **To select a control point to adjust:** Spin the fourth ring control to the left or right to
  select the next control point in that direction (it takes about half of a turn to select
  another control point).

  Selected control points are highlighted in cyan.

- **To move a selected control point:** Adjust the fourth trackball to move the control point
  up, down, left, or right. Selected control points are constrained between whichever
  control points are to the left and right.

Another set of rotary knobs let you adjust Curve Mix and YSFX parameters.

To adjust the Curve Intensity sliders:

>Adjust the LUM CURVE, RED CURVE, GREEN CURVE, or BLUE CURVE rotary knobs.

To make YSFX adjustments:

>Adjust the LUM YSFX, RED YSFX, GREEN YSFX, or BLUE YSFX rotary knobs.

Soft Clip

The Soft Clip controls consist of four sliders underneath the Curve controls of the Custom curves, and give you an interface for adjusting highlight and shadow soft clipping either overall, with Ganging enabled, or on a per-channel basis. The Soft Clip controls are intended to provide clip-by-clip adjustment, as opposed to the Generate Soft Clip LUT settings, which let you set one soft-clipping setting for the entire program. For more information on the Soft Clip LUT setting, see Chapter 3, "System and User Preferences."

High and Low Soft Clip controls within the Curves palette

Soft clipping lets you apply a "knee" to any clipping that occurs at the upper or lower extremes of the image, and can be used to quickly ease off any unpleasantly harsh loss of detail that occurs as a result of blowing out the highlights or crushing the shadows too aggressively.

In the following example, the screenshot at top has had the highlights deliberately blown out by excessively boosting the highlight contrast. As you can see, the edges of the clipped area lack detail. The screenshot at bottom shows the same image with soft clipping increased for all three color channels. The result retrieves detail, compressing the highlights to bring the tops of each color channel back within the allowable range.
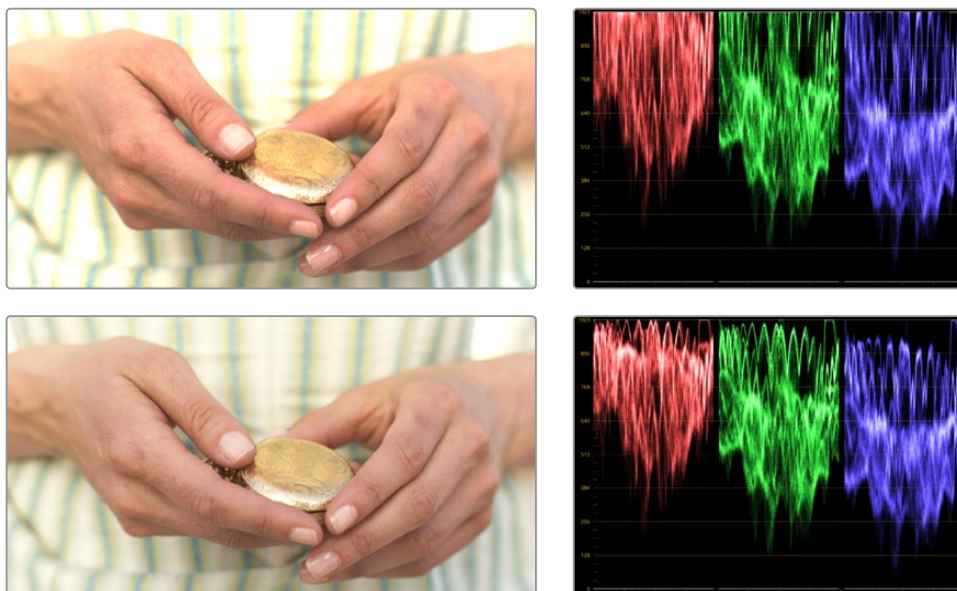
Using High Soft Clip to pull highlight details into the viewable range

Ganging and Unganging Soft Clip Controls

Soft clipping can be simultaneously applied to all three color channels by enabling the Ganging control (on by default), or you can disable Soft Clip ganging to individually adjust each channel. For example, using soft clipping on individual channels can be useful for legalizing RGB out-of-gamut errors for channels that over- or undershoot your QC standards.

To disable Soft Clip ganging and edit soft clipping for individual color channels:

Click the channel control button corresponding to the color channel you want to edit, and then drag the sliders to create the desired adjustment.

To re-enable Soft Clip ganging:

Click the Ganging control to the left of the Soft Clip channel controls.

> **TIP:** Applying too much soft clipping to individual color channels may add an unwanted color tint to the corresponding highlights or shadows of an image. To avoid this, use the soft clipping parameters with ganging enabled to clip all three color channels equally.

Soft Clip Controls

Whether all channels are ganged or not, soft clipping is controlled via two sliders and two additional parameters for each color channel.

High

The High Clipping Point slider lets you adjust the maximum signal level above which the signal is clipped. Any pixels above the clipping level are made equal to the clipping level.

The High Clipping Point defaults to a digital level of 1023 relative to the DaVinci Resolve internal video scopes. Dragging this slider to the left causes the highlights of the image to clip at a lower level, resulting in lower, dimmer maximum levels.


Selecting and adjusting the high clip
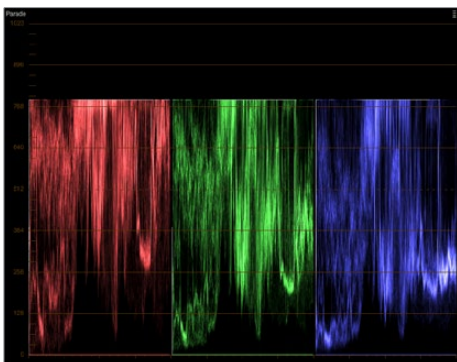
RGB Parade displays the clipped image

At the default position, no clipping occurs and image data that you push above 1023 on the internal scopes is preserved and passed through the image processing pipeline to subsequent nodes. For example, in the following two screenshots, the highlights in the screenshot at top are blown out raising the gain dramatically in Node 1. In the screenshot at bottom, a subsequent adjustment in Node 2 lowers the gain and retrieves all the previously clipped values.
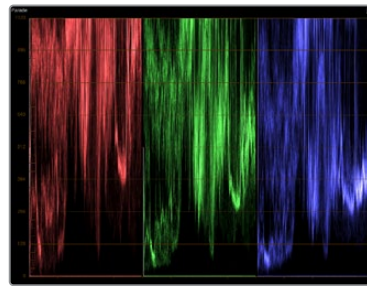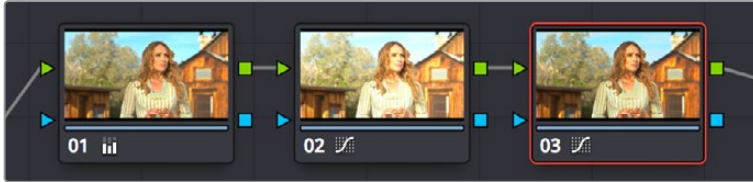

The image is clipped using the Gain control in Node 2
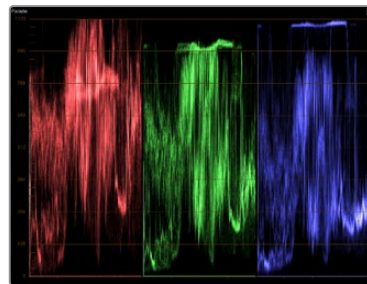
The image data that was clipped in Node 1 is retrieved in Node 3 by lowering
the Gain control. This illustrates the preservation of deliberately clipped data.

However, if at any point in a node tree you drag the High Clip slider to the left, even by a single digit, all image data above the new clipping threshold is discarded from that node forward. In the following example, the High Clip slider in Node 1 is lowered. The result is that all clipped image data is discarded. As a result, when Node 2 lowers the gain, there is no image detail left to retrieve, and all three channels exhibit flattening.
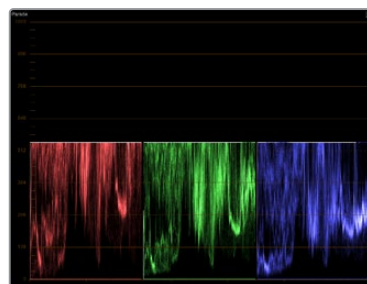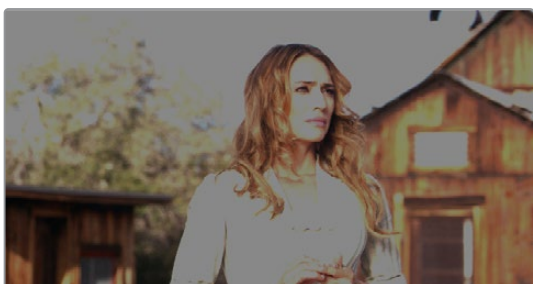
Lowering the High Clip slider in Node 1 forces all image data above the new High Clip threshold
to be irretrievably discarded. Clipped data cannot be brought back by subsequent nodes.

High Soft

The High Soft slider sets the threshold, below the clipping point, at which highlights begin to compress before hard clipping. At unity, no soft clipping occurs. As you raise this value, more and more of the clipped highlight values are compressed, rather than clipped, resulting in softer, more pleasant "glowing" highlights.

> **IMPORTANT** Image data that was clipped "in camera" is not necessarily retrievable using the Soft Clip controls, although there may be some preserved overhead in the super-white highlights of Y'CbCr-encoded video data.

Low

The Low Soft Clipping Point slider lets you adjust the minimum signal level at which the signal clips. This defaults to a digital level of 0 relative to the DaVinci Resolve internal video scopes. Dragging this slider to the right causes the shadows of the image to clip at a higher level, resulting in lighter minimum levels, and a lower-contrast image with lighter (possibly milky) shadows.

Low Soft

The Low Soft slider sets the threshold, above the minimum clipping point, at which shadows begin to compress before hard clipping. At unity, no soft clipping occurs. As you drag this slider to the right, more and more of the clipped shadow values are compressed, rather than clipped, resulting in a softer, more pleasant rolloff in the shadows.

Using Soft Clipping Controls with the DaVinci Control Panel

The soft clipping controls can also be manipulated using the DaVinci control panel, which provides separate controls for ganged and individual color channels.

To open the soft clipping control on the DaVinci Resolve control panel:
> Press the CLIPS soft key on the Center panel.

To exit the soft clipping controls:
> Press the MAIN soft key on the Center panel.

To make a ganged soft clipping adjustment:
- Adjust the MASTER CLIP or MASTER SOFT rotary knobs of the SCENE WHITE CLIPS or SCENE BLACK CLIPS control groups (there are four individual knobs).
- These controls adjust all four corresponding YRGB High Soft, High Clip, Low Soft, or Low Clip parameters simultaneously.

To adjust soft clipping for individual color channels:
- Adjust the RED/GREEN/BLUE CLIP or RED/GREEN/BLUE SOFT rotary knobs of the SCENE WHITE CLIPS or SCENE BLACK CLIPS control groups (there are 12 individual knobs).
- Each control adjusts an individual YRGB color channel.

The HSL Curves

Three sets of Hue curves, and additional Lum vs. Sat and Sat vs. Sat curves, let you make different types of curve-based alterations to the image. Whereas the Custom curves let you make adjustments to the color channels of an image based on tonality (for example, boosting the Red channel in the highlights while lowering it in the shadows), the Hue curves let you make adjustments to the hue, saturation, or luma of elements in an image based on their hue.
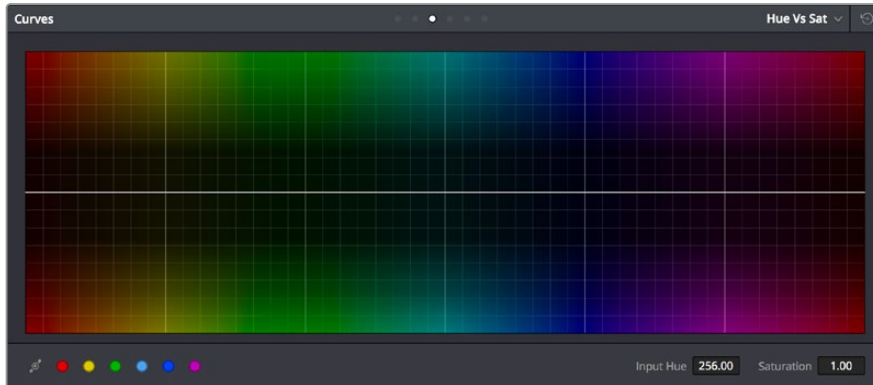

Curves controls including six-vector selection and bezier handle button

For example, you could use the Hue vs. Sat curve to selectively lower the saturation of everything that's blue, while raising the saturation of everything that's red.

You can use these curves to make adjustments similar to those made using HSL qualification, but with one critical difference. Curve adjustments are mathematically smoother than the matte-limited adjustments of HSL qualifiers, so it can sometimes be easier to make specific alterations that blend smoothly with the rest of the image, without the potential for artifacts at the edges of qualified keys that can sometimes defeat a seamless result.

On the other hand, it is often easier to define more distinct boundaries between separate elements using HSL qualification. Only time and experience will help you determine which tools are best for which situations.
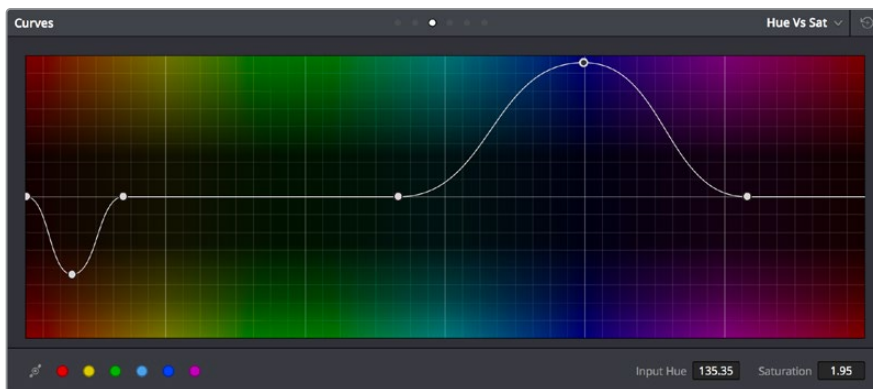
Right—Original image, Left—the image as altered by the Hue vs. Sat curve shown above

Unlike the Custom curves, which default to a diagonal position where lower left represents the black point and upper right represents the white point, Hue and Sat curves are flat. In the case of the Hue vs. Hue/Sat/Lum curves, the horizontal range of the curve from left to right represents the overall range of possible hues, from red through green through blue and then cycling back to red.

Because the range of hues cycle smoothly from the left to the right edge, changes that affect the curve near the left boundary of these curves loop smoothly around to the right boundary, and vice versa, such that the left and right sides of the curve always move together (as you can see in the above screenshot).

> **IMPORTANT** When using Hue curves, the range of hue that you isolate with control points is always relative to the RGB input connected to that node. That means if you change the hue of a shirt from blue to red using Hue vs. Hue and you then want to raise the same shirt's saturation with the Hue vs. Sat curve within the same node, you need to add control points to the same range of blue for both curves.

Image Sampling for Hue and Sat Curves

There's an additional way to use Hue curves in DaVinci Resolve. Whenever one of the Hue vs. Hue, Hue vs. Sat, Hue vs. Lum, Lum vs. Sat, or Sat vs. Sat curve tabs are open, clicking or clicking and dragging over any range of pixels within the Viewer area samples the hues and/or image tonality of that region of the picture, and automatically places three control points on the currently open curve that correspond to the range of color and contrast you sampled. This also works if you use the cursor from the DaVinci control panel with the fourth trackball to sample a range of color.

Additional Controls in the Hue and Sat Curves

While the Hue vs. Hue, Hue vs. Sat, Hue vs. Lum, Lum vs. Sat, and Sat vs. Sat curves can be adjusted similarly to the Custom curves, they have additional controls running underneath the curve graph.

- **Enable Bezier button:** Turning this button on forces a curve to use Bezier control handles, rather than the default DaVinci Resolve Curve Control points, to manipulate each control point on the curve. With Bezier handles enabled, click any control point to reveal its two Bezier handles. Drag either handle to alter the shape of the curve at that control point.

- **Six-Vector Color Patches:** The Hue curves each have six buttons for automatically adding control points to manipulate the red/yellow/green/cyan/blue/magenta ranges of hue. Clicking any of these buttons adds three control points; two to define the outer range of hue to be adjusted, and a middle control point that you use to make the adjustment.

- **Input and Output (Hue Rotate/Saturation/Lum) fields:** These two number fields correspond to the horizontal and vertical adjustment values for the currently selected control point. Click any control point on a curve to view or alter these values. The label of the second field depends on the curve that's selected.

The following sections describe each available curve in more detail.

Hue vs. Hue

The Hue vs. Hue curve lets you change any hue to any other hue. In the following example, the image on the left is the unadjusted original. The image on the right has had the orange jacket shifted to an olive green via a set of three control points.

Changing the hue of the woman's jacket using the Hue vs. Hue curve;
Left—original image, Right—altered image

One excellent use of the Hue vs. Hue curve is to quickly and subtly alter elements that require only minor adjustments. For example, a sky that appears a bit too cyan can be made into a richer shade of blue with a small adjustment.

Hue vs. Hue is also useful for making more radical changes to elements that might be too noisy to key successfully using the HSL qualifier controls. For example, red autumnal foliage blowing in the wind might result in a chattery matte, but you can use the Hue vs. Hue curve to change reds to greens, without having to worry about aliased matte edges giving your correction away.

Hue vs. Sat

The Hue vs. Sat curve lets you selectively alter the saturation of any hue within the image. This is a terrific tool for creative effect, allowing you to quickly and easily boost the saturation of elements you want to catch the viewer's eye, while reducing the saturation of elements you'd prefer the audience not dwell upon.

This can be extremely useful for legalizing over-saturated overshoots or undershoots during a QC pass. For example, desaturating reds that are off the charts while leaving everything else alone.

Lowering the saturation of the woman's jacket using the Hue vs. Sat curve;
Left—original image, Right—altered image

The Hue vs. Sat curve can also be a powerful tool for increasing the color contrast of images that seem lackluster and flat. By boosting the saturation of colorful elements that are distinct from the dominant palette of a scene, you can add variety to an otherwise monochromatic image.

Hue vs. Lum

The Hue vs. Lum curve lets you increase or decrease the lightness of elements of specific colors.

Darkening the woman's jacket using the Hue vs. Lum curve; Left—original image, Right—altered image

This is a tricky curve to use with highly compressed footage, as it can quickly reveal artifacts in the image if you aren't careful. However, if you're working with very high-quality footage, this can be a great tool to darken specific hues to add richness and depth, or to lighten colorful elements to which you want to draw attention.

Lum vs. Sat

The Lum vs. Sat curve is similar to the Custom curves in that alterations to the saturation of an image are based on user-definable ranges of image tonality, rather than hue. In the following example, the Lum vs. Sat curve is being used to decrease selectively the saturation of everything falling into the highlights and shadows of the image, while increasing the saturation of everything within the midtones.

In the following example, a vividly saturated treatment results in shadows that seem artificially colorful. Using the Lum vs. Sat curve, it's easy to gradually desaturate everything below a certain range, with a nice smooth falloff.

This is an outstanding curve to use for creative effect, for example, slightly boosting saturation within the midtones while reducing saturation in the shadows to increase the depth of the darkest portions of the image. It's also a great curve to use to solve QC violations. For example, if you have illegal saturation in the highlights of an image, you can use the Lum vs. Sat curve cleanly and smoothly to lower the specific values that are causing problems.
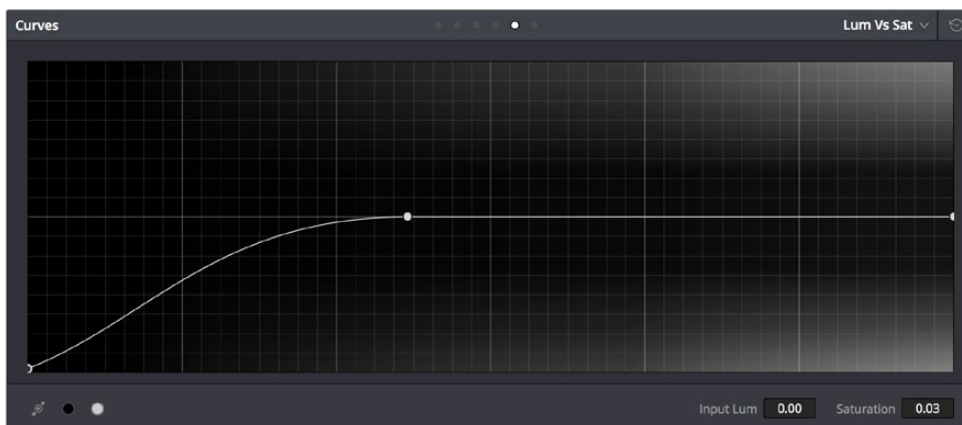
Selective desaturation in the shadows and highlights using the Lum vs. Sat curve;
Right—original image, Left—altered image

Sat vs. Sat

The Saturation vs. Saturation curve lets you selectively manipulate image saturation within specific regions defined by the image's original image saturation. Control points added to the left of this curve affect areas of progressively lower saturation, effectively letting you increase or decrease the saturation of lower-saturated features. Control points added to the right affect areas of progressively higher saturation, letting you increase or decrease the most saturated features of an image.

Like all curves, this operation is extremely useful for stylizing the image. You can create custom vibrance operations, where you selectively increase the saturation of low-saturated regions of the image in different ways to give the picture more "pop." It's also an excellent tool for taking care of over-saturated areas of the picture when adhering to conservative QC requirements. You can specifically desaturate only the most over-saturated parts of the picture, without affecting similar hues at lower levels of saturation.

In the following example, you can see that the portion of the image with the highest saturation has been desaturated, while the rest of the image has been left alone.
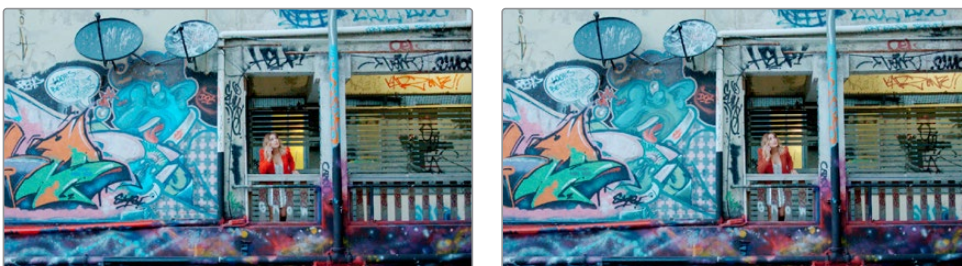
Desaturating only the highest saturated elements in the picture
by lower control points at the right of the Sat vs. Sat curve

Using HSL Curves with the DaVinci Control Panel

Using these curves with the DaVinci control panel unlocks their speed, letting you make fast, controlled adjustments to specific elements within each scene.

To open the Hue and Sat curve controls on the DaVinci Resolve control panel:
> Press the CURVES soft key on the Center panel.

To exit the Hue and Sat curve controls:
> Press the MAIN soft key on the Center panel.

To adjust the principle color regions using knobs:
> Adjust one of the 18 knobs in the PRIMARIES CURVE GRADE control groups corresponding to the RED/YELLOW/GREEN/CYAN/BLUE/MAGENTA colors paired with HUE/SAT/LUM.

To sample a region of a shot to place curve control points:
1. Press the soft key corresponding to the curve you want to adjust (HUE - HUE, HUE - SAT, HUE - LUM, LUM - SAT).
2. Press the CURSOR button (located above the fourth trackball).
3. Use the fourth trackball to move the onscreen cursor to the pixel you want to sample.
4. Press the first of the three buttons underneath the fourth trackball to sample the color at the position of the cursor.

   Three control points appear on the currently selected curve. The outer two control points define the region of the curve you're adjusting, and the center control point (selected by default) lets you make the actual adjustment.
5. To hide the cursor when you're finished sampling, press the CURSOR button again.

To select and adjust control points using the fourth trackball of the Center panel:
- **To select a control point to adjust:** Spin the fourth ring control to the right or left to select the next control point in that direction (it takes about half of a turn to select another control point). Selected control points are highlighted in cyan.
- **To move a selected control point:** Adjust the fourth trackball to move the control point up, down, left, or right. Selected control points are constrained between whichever control points are to the left and right.

Chapter 119

Secondary Qualifiers

Secondary correction describes isolating a specific part of the image, or a specific subject, using a key. Keys in DaVinci Resolve are grayscale images that define which areas of the picture you want to alter (in white) and which parts of the picture you want to leave alone (in black). Keys can be generated either using the controls in the Qualifier palette, by using a Power Window, or by importing an external matte (for more information on how to use external mattes, see Chapter 126, "Combining Keys and Using Mattes"). This chapter focuses on how you can use qualifiers to key a range of color values (similarly to doing a green screen key) in order to create a matte with which to do this kind of isolated adjustment.

Contents

Secondary Qualifiers

This section covers the use of the Qualifier palette, which lets you pull a 3D, HSL, RGB, or Luma key, with which to isolate the correction you need. The Qualifier controls are fast and flexible when you need to isolate an irregularly shaped subject with a distinct range of color or lightness. Since you're generating a key by sampling the image, there's no need for tracking or keyframing, so in the right situation qualifiers can be your fastest solution. In the following example, the client likes the slightly cool treatment overall, but wishes that the skin tones were a little more vibrant. This is exactly the sort of situation where qualifiers can help out. Adding a second node, and using the 3D or HSL Qualifier to isolate the face makes it relatively simple to add color exactly where you want it.
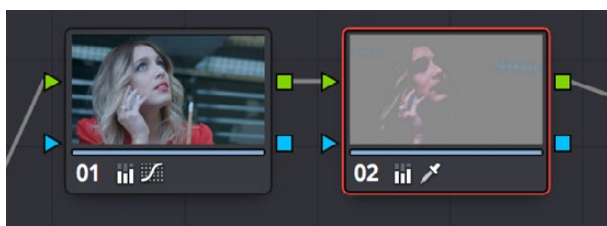
Adding a second node and using HSL Qualification to isolate the skin tones
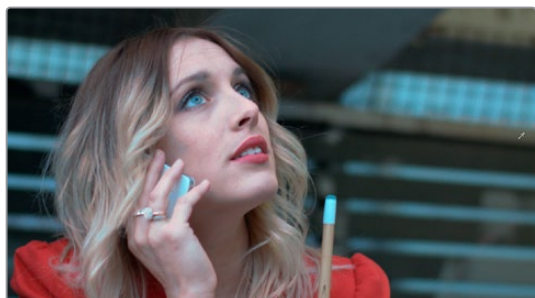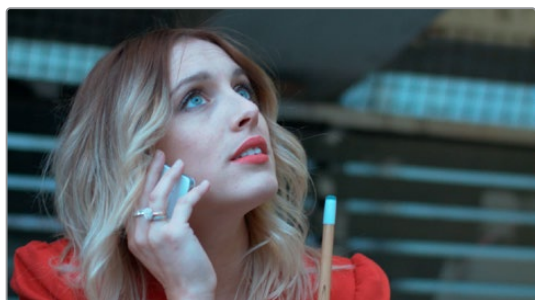
Top—The image with a simple primary correction
Bottom—The final adjusted image

Just about every control in the Color page can be limited using of the Qualifier modes available in DaVinci Resolve. This makes the Qualifier palette a jack-of-all-trades tool with 101 uses. A few practical examples include keying a red element that's too intense for broadcast, in order to darken it or desaturate it; keying a range of green foliage, so you can shift its hue to a more attractive color; keying an actor's skin tone in a commercial, to apply some selective softening to it; or keying a range of sky, in which to add blue.

Adding a Secondary Operation to the Node Editor

Any node can be switched between functioning as a primary correction, where the adjustments you make affect the entire image, and a secondary correction, where you're adjusting a specific element in the scene. The only difference is that nodes being used for secondary corrections are limited using a qualifier, Power Windows, or an external matte.

If you're planning to add a secondary operation to the current grade, you'll need to first add another node in the Node Editor. When pulling a key to qualify part of the image, it's important to understand that you'll be sampling the YRGB values being fed to that node from any previous nodes in the tree. That means that the state of the image being fed to a node you're qualifying affects the key you're pulling.

For example, if the image coming out of Node 1 is well saturated and has a neutral color balance with a wide range of colors, but the image coming out of Node 2 applies a low saturation, monochromatically orange color wash, you may find it more difficult to pull a detailed key from Node 2 than you would from Node 1.
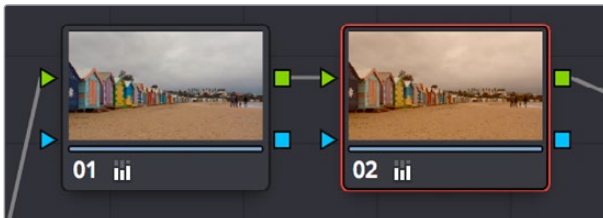

Choosing your battles—the image coming out of Node 1 will be
easier to key than the highly stylized image coming out of Node 2

This is important because you have the flexibility of determining from what image you want to try pulling a qualified key. By connecting the node that's outputting the best YRGB image for the key you're trying to create to the node you're qualifying, you can control what you're keying. For more information about choosing which node to use for setting up a qualifier, see Chapter 126, "Combining Keys and Using Mattes."

The Qualifier Interfaces

The DaVinci Resolve Qualifier palette interface is straightforward. To the left, graphical controls above numeric parameters let you manually adjust what ranges of each color component contributes to the key you're creating. To the right, Selection Range tools below let you define a key by sampling pixels of the image, either using the pointer, or by using the fourth trackball of a DaVinci control panel, while below a set of Matte Finesse parameters let you alter the shape of the key that's been pulled.
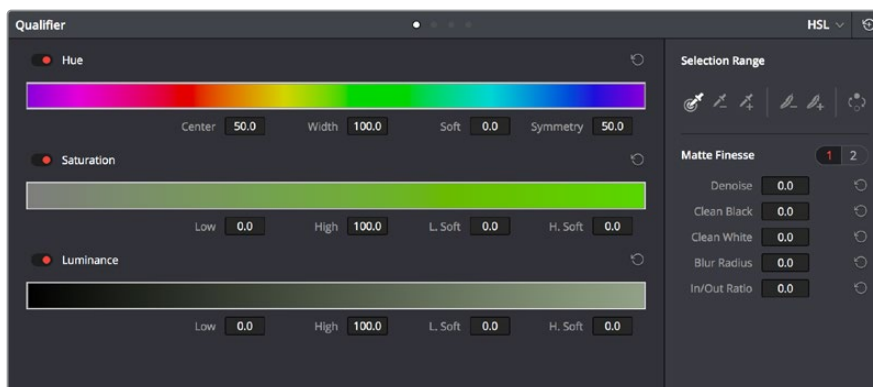
Qualifier palette with HSL controls selected

The default qualification mode is the HSL Qualifier, which uses three color components, hue, saturation, and luma, to define a key. However, you can also use the RGB or LUM (Luma) qualification modes to pull keys using other combinations of color components. The LUM qualifier mode, in particular, lets you make targeted adjustments to specific ranges of image lightness. This is a technique employed by many colorists to alter color temperature within a specific range of image highlights or shadows.

Alternately, you can use the 3D qualifier to quickly and easily pull well-refined keys by drawing lines to sample colors from the image that correspond to volumes of color within a three-dimensional gamut. While the underlying technology is sophisticated, all you have to do is to draw blue lines to sample colors you want to isolate, or red lines to sample colors you want to subtract from the isolation you're creating, all of which automatically generate a high-quality key. Each line you draw adds a sample to the selection list; you can turn each sample off and on to evaluate its contribution to the resulting key, or delete samples that don't make a positive contribution.
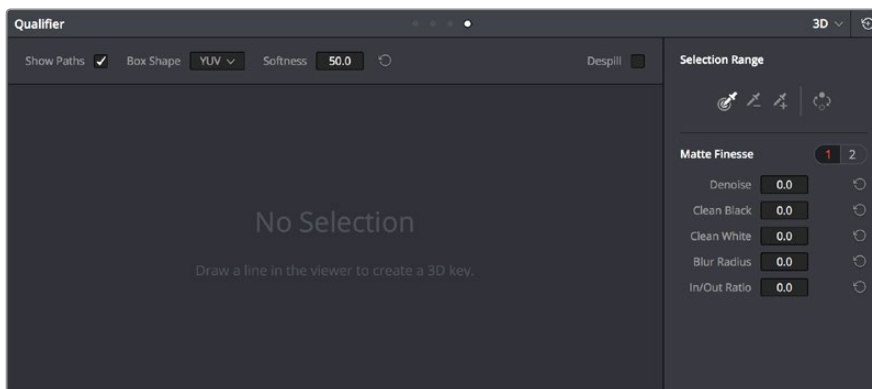
The 3D qualifier

No matter which qualifier mode you use, the Matte Finesse controls make it easy to refine the resulting key to be even cleaner and more usable. In some instances, you can even take a marginal key that would otherwise be unusable, and squeeze it into something useful using the Clean Black, Clean White, and Blur Radius controls.

Which Qualifier Do I Use?

The Qualifier palette's four modes offer you the flexibility to use the best keyer for the job when it comes to isolating a range of color or brightness values. In some cases, keys that are difficult to pull using some modes are easier to pull using others. Here's a brief summary:

- **3D:** The 3D keyer is a good one to start with if you're trying to isolate a range of color such as a blue shirt, a cyan sky, a performer's skin tone, or the orange leaves of a tree in autumn. Its interface of drawing lines over the part of the image you want to isolate, coupled with its high quality and extreme specificity, make it a fast and accurate tool to use in a variety of circumstances. However, the 3D keyer always samples every color component of the image; it's not useful when you want to isolate specific color components, such as luma only, or hue and saturation without luma. The 3D keyer's greatest strength, the speed with which you can sample areas of the picture to include (or exclude) from the final key, is also occasionally a weakness with images where your initial samples aren't giving you satisfactory results, because there aren't many ways to fine tune the key as it's being generated (although you can manipulate the result). On the other hand, for most images you would want to qualify, two or three samples is all you need, in conjunction with using the Matte Finesse controls to adjust the resulting key. If you need to do some compositing in the Color page, the 3D keyer also does an excellent job doing blue and green screen keying to create transparency, and has a built-in Despill control as well.

- **HSL:** In many instances, the HSL keyer is not as immediately accurate as the 3D keyer, and will include a broader portion of the image for any given sample. On the other hand, if the 3D keyer is not giving you satisfactory results for a particular shot, the HSL keyer can sometimes do a better job. Because of its interface, the HSL keyer makes it easier to "fine-tune" the range and softness of each individual color component that's sampled, in order to improve the result. The HSL keyer also gives you the option of disabling color components that you don't want to contribute to the final key, so that you can pull a saturation-only key, or a hue-only key, for instances where that may solve the issue at hand.

- **RGB:** The RGB keyer shares many of the limitations and advantages of the HSL keyer, but since you're sampling and adjusting red, green, and blue color components, the specificity with which you can fine-tune the resulting key works much differently.

- **LUM:** The LUM keyer works specifically to isolate parts of the image based on image tonality, lightness, or darkness. This is the perfect tool when you're trying to isolate highlights or shadows in the image, which let you solve a multitude of different creative and technical issues. The LUM keyer is identical to using the HSL keyer with the Hue and Saturation qualifier controls turned off.

The following two sections provide an overview of how to use the 3D and HSL keyer modes in DaVinci Resolve.

Basic Qualification Using the 3D Keyer

The 3D Qualifier mode offers a fast, simple way of pulling a key to isolate a range of color in the image, by drawing lines over the parts of the image you want to key. Each line you draw over the image adds to or subtracts from the cloud of values you're carving out of a three-dimensional representation of all available colors; you don't see this representation, but this "under the hood" functionality is what gives the 3D keyer its name.

The 3D keyer is a general-purpose keyer, letting you isolate any color you like. However, the 3D keyer is not good at pulling luma-only keys. If you're looking to isolate a range of luma values in the image, you should use the LUM mode.

To use the 3D mode to isolate a subject in the Viewer:

1 Open the Qualifier palette, choose 3D from the mode drop-down, and click the eyedropper.

2 Click and drag across the part of the image you want to isolate to draw a line. Lines that add to the key are colored blue.
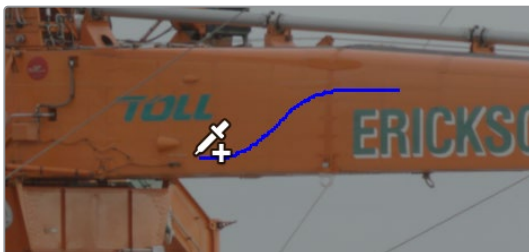
Drawing a line to create a key using the 3D qualifier

3 To see the key you're creating as you work, click the Highlight button in the Viewer Options toolbar at the top of the Viewer.
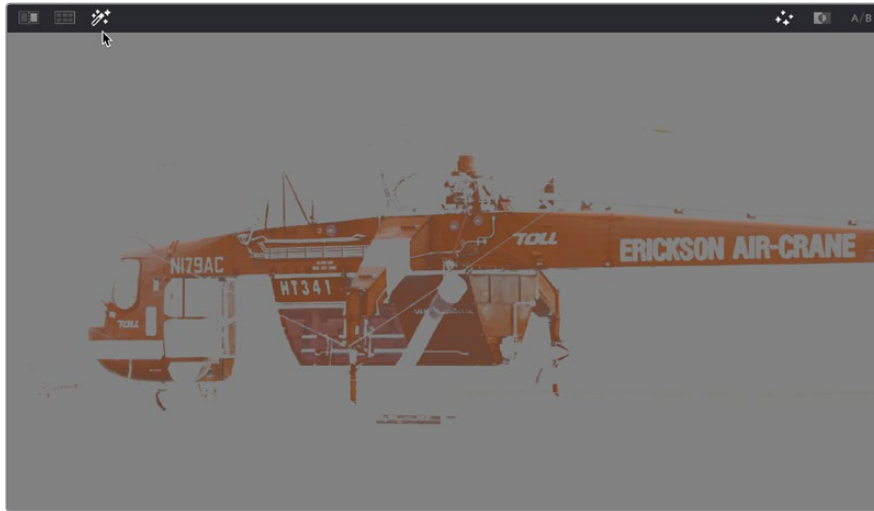
Viewing the key using the Highlight button

With the Highlight turned on, the lines you draw become invisible. They'll reappear whenever you turn the Highlight off.

4 If necessary, draw additional lines to add more of the image to the key you're creating. Ordinarily, it's a good idea to not to draw more then two or three lines to sample the part of the image you're trying to isolate. Ideally, you want the key you're pulling to have a somewhat soft edge, which makes it easier to use the Matte Finesse controls to fine-tune your result later on. If you draw too many lines to sample the image, the result can be a key with hard, jagged edges that can sometimes be more difficult to adjust later on.

A hard-edged key created with three samples

5 Alternately, if there are parts of the image that are included in the key that you want to omit, hold the Option key down and draw a line over these areas. When you turn the Highlight button off, you can see that Option-drawn lines are red, and these subtract areas from the key you're creating. Again, try not to overdo drawing subtractive red lines, as you can end up with an overly hard-edged key that's difficult to adjust using other controls in the next few steps.
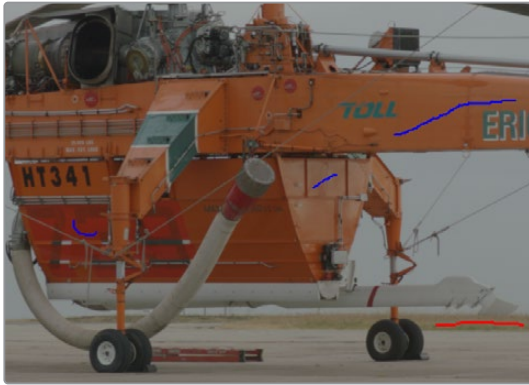
Blue lines add to the key and a red line subtracts the grass
from the key, as seen with the highlight turned off

6 If you find yourself wondering whether a particular sample in the list at left is doing any good, you can click the color patch at the left of any entry in the list to toggle that sample off and on. If you decide you don't need a particular sample, click the trash can button at the right to delete it.
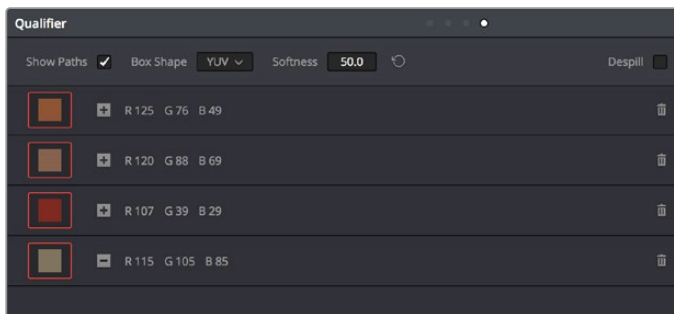
Controls for toggling samples off and on, and deleting them from the list

7 When you're satisfied that the key is good enough to start fine-tuning, stop drawing lines. It's all right if there's a bit of noise, speckling, or if there are small holes in the key you're creating, because you can take care of these using the Matte Finesse controls.

A sampled key that's ready for further refinement

Nearly every key you pull will benefit from some further "post-key" refinement. What this means is that, once you've created the best key you can procedurally through sampling the image, you can now adjust the resulting key itself, which is just a gray-scale image, to improve the isolated result. This is what the Matte Finesse controls are for.
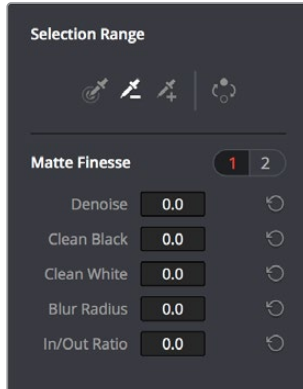
Matte Finesse controls

8 The three most common methods of key refinement using the Matte Finesse controls are to increase Clean Black to fill in "holes" in the parts of the image you're omitting (the background), increase Clean White to close holes in the part of the image you're isolating (the foreground), and then use Blur Radius and In/Out Ratio controls to blur the edge of the key and push it in and out. Using these controls, you can vastly improve nearly any key without the need to endlessly readjust the Qualifier controls.

More information about using the Matte Finesse controls appears later in this chapter.

9 When you're finished, click the Highlight control to turn the highlight off, and make whatever adjustment you need. In this example, the orange of the helicopter will be adjusted using the Hue control to make it blue instead.

Adjusting the orange color of the helicopter to be blue instead

Basic Qualification Using the HSL Keyer

The HSL qualifier is one of the most flexible tools in DaVinci Resolve. Using any combination of sampled hue, saturation, and luma, you can isolate different ranges of color and contrast for specific adjustment. HSL is a general-purpose keyer, meaning you can key any color you like; it's not restricted to blue or green.

The most straightforward way to use any qualifier is to sample the image in the Viewer. A set of four controls let you sample pixels within the image in different ways. When you sample one or more pixels, the Hue, Saturation, and Luma values are analyzed, and set different ranges in each of the Hue, Saturation, and Luma qualifier controls. There are a number of different eyedropper controls available to control how you sample color in the image.

- **Sample Eyedropper:** The first control you use whenever sampling the image. It defines the initial range of the qualification; you must use this tool before any of the others. Clicking once with this tool selects a single pixel value, while clicking and dragging selects a range of image values that add together.

  Color Picker button

- **Add/Subtract Color Range:** These two controls let you add areas of the image to, or subtract them from, the currently selected inner range of values that define the core of the key. As with the eyedropper, you can click on single pixels, or drag over a range of color.
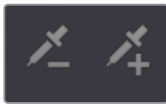
  Add and Subtract color buttons

- **Add/Subtract Softness:** These two controls let you redefine the softness that transitions from the inner range of the key, falling off towards the outer edge of the key. Just like the other controls, you can click on single pixels, or drag over a range of color.
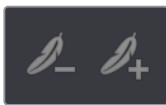
  Add and Subtract qualifier softness

> **NOTE:** When you select one of the sampling controls, it remains selected until you select another sampling control. If you select another clip in the Timeline, then click in the Viewer to sample a key and nothing happens, make sure that you select the Eyedropper control in the Qualifier palette.

If you're working with the DaVinci Resolve onscreen interface, the easiest way to qualify a subject is to use the pointer in conjunction with the sampling controls.

Example image to qualify

To use the HSL Qualifier mode to isolate a subject in the Viewer:

1   Open the Qualifier palette, choose HSL from the mode drop-down, and click the eyedropper.

2   Either click a pixel of the part of the image you want to isolate, or click and drag across a range of pixels within that subject.

Picking to qualify the ocean

3   To see the key you're creating as you work, click the Highlight button in the Viewer Options toolbar at the top of the Viewer.

By default, the area of the image you're isolating appears in color, while the area of the image being excluded appears solid gray.

Viewer image with highlight turned on, isolated region appears in color, omitted region appears gray

Even though the highlight obscures the rest of the image, this doesn't prevent you from using the sampling tools to select pixels you can't see.

4   To subtract from the inner range of the key you're creating, click the minus Color Range control, and click or drag across the portion of the keyed image that you'd like to exclude.

5 To add softness to the outer range of the key you're creating, click the plus Softness control and then click or drag across the portion of the image you'd like to include as a soft edge.

Once you've finished using the range and softness sampling controls to refine the key you're using to isolate the subject, nearly every key you pull will benefit from some further "post-key" refinement. What this means is that, once you've created the best key you can procedurally through sampling the image, you can now adjust the resulting key itself, which is just a grayscale image, to improve the isolated result. This is what the Matte Finesse controls are for.
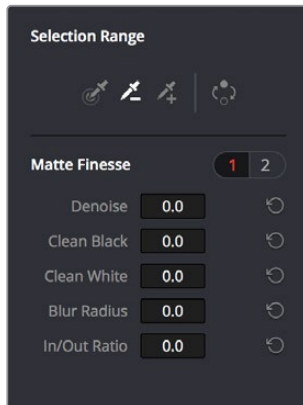
Matte Finesse controls

6 The three most common methods of key refinement using the Matte Finesse controls are to increase Clean Black to fill in "holes" in the parts of the image you're omitting (the background), increase Clean White to close holes in the part of the image you're isolating (the foreground), and then use Blur Radius and In/Out Ratio controls to blur the edge of the key and push it in and out. Using these controls, you can vastly improve nearly any key without the need to endlessly readjust the Qualifier controls.

More information about using the Matte Finesse controls appears later in this chapter.

7 When you're finished, click the Highlight control to turn the highlight off, and make whatever adjustment you need. In this example, the saturation has been raised and the color balance changed to make the adjustment obvious.
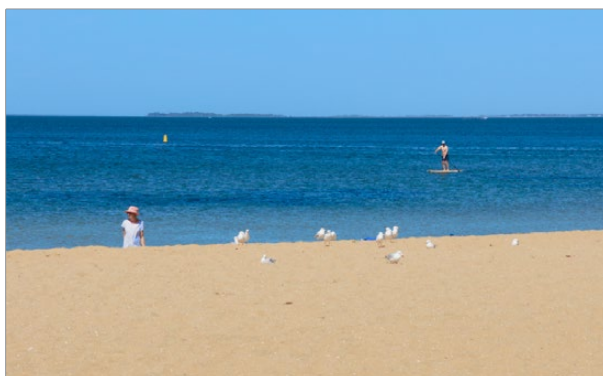
Altered color balance of the ocean and sky

If you have a DaVinci control panel, you can use the fourth trackball to sample the image, referring to either the Viewer or the display connected to the video output of your DaVinci workstation.

To sample a subject using the DaVinci control panel:

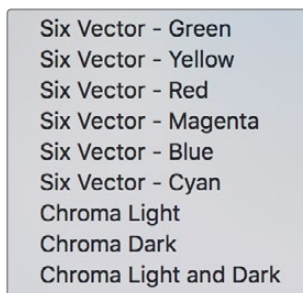1   Press VECTORS on the T-bar panel to open the Qualifier palette, which defaults to the HSL Qualifier controls.

2   Press CURSOR (the third button above the fourth trackball) on the Center panel, to display the small cursor crosshairs in both the Viewer and the video output display.

3   Use the fourth trackball to position the cursor over the subject you want to sample, and press the leftmost of the three buttons appearing underneath the fourth trackball to sample the image.

4   Press HILITE on the Transport panel to turn on the highlight so you can see the key you're creating, and then use the knobs at the top of the Center panel to adjust the range and softness parameters to obtain the most accurate key for your purposes.

HSL Qualifier Presets

There is a set of HSL Qualifier presets, or Six Vector presets, that you can use to isolate automatically a predefined wedge of color (green, blue, red, magenta, yellow, or cyan) or chroma intensity (chroma light, chroma dark, or both). These presets are available either from the Color > Presets menu, or from the DaVinci control panel.

Six Vector – Green
Six Vector – Yellow
Six Vector – Red
Six Vector – Magenta
Six Vector – Blue
Six Vector – Cyan
Chroma Light
Chroma Dark
Chroma Light and Dark

The Color > Presets menu

Selecting one of these presets automatically sets the HSL Qualifier to the corresponding range or color or lightness. Afterwards you can continue modifying the HSL Qualifier to suit your purpose.

**To choose a Six Vector preset from the DaVinci control panel:**

1   Press the PRESETS soft key on the Center panel. The Center panel's soft keys update with all the available lightness and color presets.

2   Press the soft key corresponding to the preset you want to use. The HSL Qualifier updates with the new settings, and the Center panel goes back to the main page of soft key controls.

Using Highlight to See What You're Isolating

The Highlight control at the top of the Viewer (revealed by turning on Viewer Options in the Viewer's Option menu) lets you overlay a representation of the key you're creating over the current image in the Viewer. Overlays are also mirrored to your video output, so they'll show up on an external display as well, in the event that you're hiding the onscreen Viewer.

There are two types of highlights with which you can evaluate a qualification you're creating. Each is useful for different tasks.

- **Flat-Gray:** The default highlight that DaVinci Resolve uses shows the selected portion of the image with the original colors, and the unselected portion of the image with a flat gray. It is useful for seeing the subject you're isolating even while you're adjusting the Qualifier controls, which lets you also see the color or contrast adjustments you're applying at the same time.
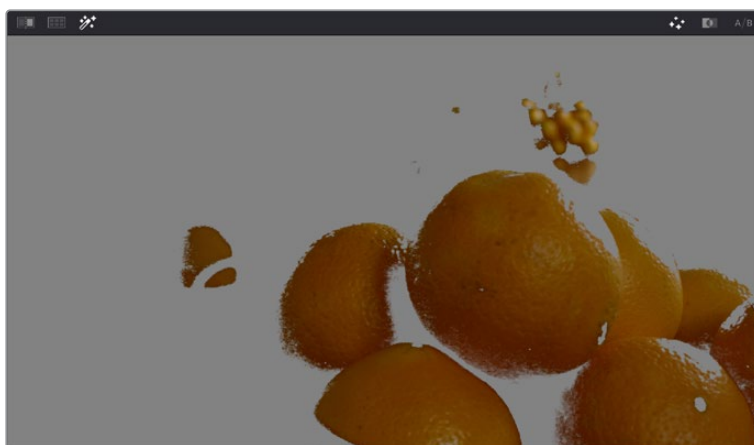
Oranges qualified and highlighted

- **High-Contrast:** Pressing Option-Shift-H, you can show what's called a "high-contrast" highlight, which should be familiar to you if you've used other color correction applications and plug-ins; it's a more typical display wherein the selected portion of the image is white, and the unselected portion of the image is black. The high-contrast highlight is useful in situations where you need to eliminate holes in a key, or evaluate how "chattery" a key is since irregularities are easier to spot when divorced from the original image.
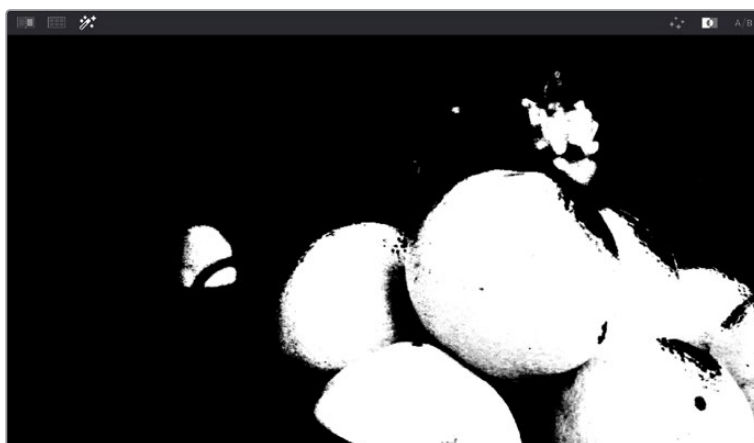
High-Contrast B&W highlighting

To enable or disable a highlight, do one of the following:

- In the Viewer Options toolbar at the top of the Viewer, click the Highlight control, and choose the type of highlight you want from the buttons that appear at the right.

- Choose an option from the View > Highlight submenu; a regular Highlight is Shift-H.

- On the T-bar panel of the DaVinci control panel, press HILITE.

To enable or disable a high-contrast highlight, do one of the following:

- Choose View > Highlight > Highlight BW (Option-Shift-H).

- On the T-bar panel of the DaVinci control panel, press SHIFT DOWN and then press HILITE.

To make high-contrast black and white the default highlight:

1 Open the Preferences > User > Color window.

2 Check "Mattes display high contrast black and white."

3 Click Save.

The next time you click the Highlight control in the Qualifier palette, or press HILITE on the DaVinci control panel, the high-contrast highlight will display.

Using Highlight to Solo Nodes

There's one other use of the Highlight control, and that's to solo individual nodes in the Viewer and video out, rather than outputting the sum of the entire node tree. For example, if you're trying to adjust a stack of nodes attached to a Parallel or Layer Mixer node, it's difficult to see what you're doing while adjusting one of the stack of nodes, because only the final result is being output.

However, if you turn on Highlight while you're selecting a node with no key, then only the currently selected node is output, making it easy to view just one node as you adjust it. Just make sure you turn Highlight off before moving on, or you may confuse yourself.

Showing Picker RGB Values

While you're dragging the pointer over the Viewer and looking for a feature to sample, you can enable a tooltip that shows you the RGB Value of the pixel under the pointer by right-clicking the Viewer and choosing Show Picker RGB Value to toggle this feature on and off. When you turn this feature on, the View > Show RGB Picker Values In submenu has options for displaying either 8- or 10-bit tristimulus values.
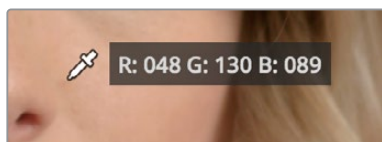

The Color Picker tooltip that appears when you turn on show RGB Picker Values

Qualifier Parameters

Each of the Qualifier modes, except for the 3D qualifier, has parameters that correspond to the relevant color components for that mode, with which you can identify a range and softness, similar to using the sample tools. These parameters can be edited precisely with virtual sliders using the pointer, or using the knobs of a supported grading control panel. However, mouse and tablet users can take advantage of each qualifier's draggable white overlays, for more direct adjustment.

- Drag the left and right edges of any qualifier control overlay to adjust the Low and High values (or the Width value of the Hue control).
- Drag the center of any qualifier control to change the center or to simultaneously change the Low and High parameters together.
- Option-drag the left and right edges of any qualifier overlay to adjust softness.

These draggable controls work for the HSL, RGB, and LUMA qualifier controls (the 3D qualifier works differently).
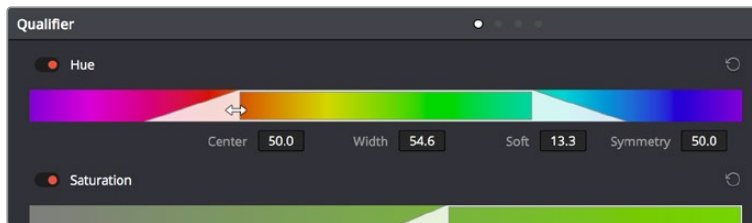
Draggable qualifier controls

HSL Qualification Controls

The HSL Qualifier is by far the most versatile mode of the Qualifier palette. It's also the qualifier that's easiest to understand, and the easiest to adjust by hand if you don't feel the need to sample the image. By selecting range and softness for each of three different color components, hue, saturation, and luma, you can isolate a wide variety of colorful subjects, or ranges of image lightness and saturation.
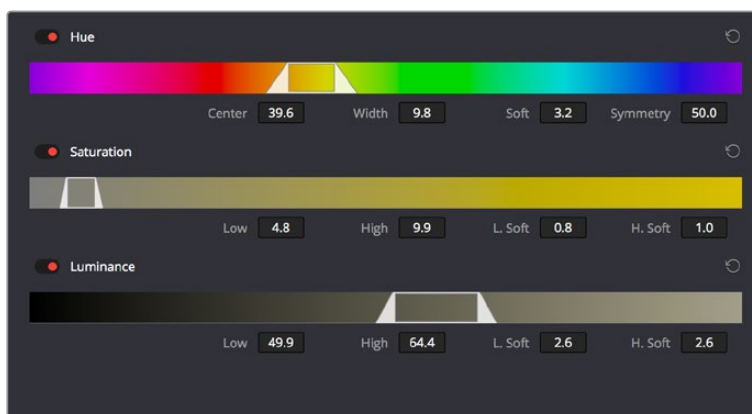
The HSL Qualifier controls in close up

One of the HSL Qualifier's key strengths, and one of its most underutilized features, is that you can enable or disable each of the three HSL components using the Hue, Sat, and Lum buttons, using toggle controls found at the left of each qualifier range control's name. This lets you ignore specific color components, while focusing on others that are more important.

For example, if you're trying to isolate the saturated parts of an image, regardless of the hue or brightness, you can turn off the Hue and Lum qualifiers so that only Sat is used to sample the image.
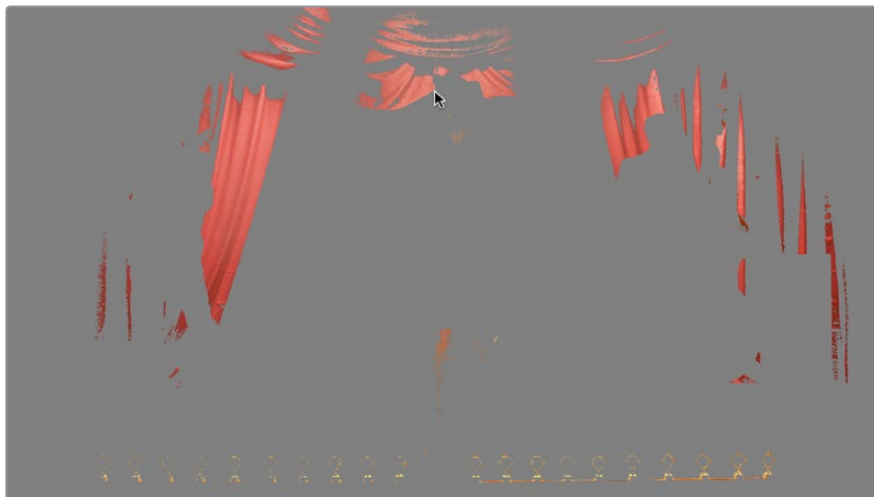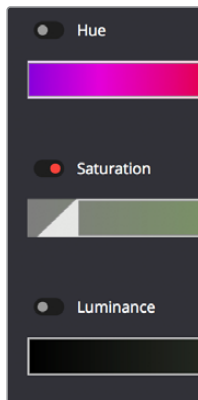
Qualification with saturation only to isolate the most saturated portion of the picture

The HSL parameters include:

- **Hue Center:** Defines the center of the range of Hue being isolated.

- **Hue Width:** Defines the width of the range of hue being isolated. Widening or narrowing this parameter widens and narrows the range of hue about the current Hue Center.

- **Hue Soft:** Widens or narrows the falloff at both sides of the currently selected range of hue.

- **Hue Symmetry:** Lets you selectively alter the angle of Hue Soft falloff at either the right or left side. Lowering this parameter makes the softness to the right of the hue range grow steeper. Raising this parameter makes the softness to the left of the hue range grow steeper.

- **Sat Low/High:** Two parameters let you define the upper and lower range of saturation being isolated.

- **Sat Low Soft/High Soft:** Two parameters let you define the upper and lower softness falling off outside the current range of saturation.
- **Lum Low/High:** Two parameters let you define the upper and lower range of luma being isolated.
- **Lum Low Soft/High Soft:** Two parameters let you define the upper and lower softness falling off outside the current range of luma.

RGB Qualification Controls

The RGB Qualifier mode lets you isolate range and softness in the Red, Green, and Blue channels of an image. While this is not necessarily an intuitive way of manually creating a qualification from scratch, it can provide a different way of isolating potentially trickier ranges of the RGB color space.

If you start by sampling the image, then you can widen and narrow each color channel's isolated range of values. In some cases, you may find it's faster to isolate a specific range of continuous color by adjusting these controls.
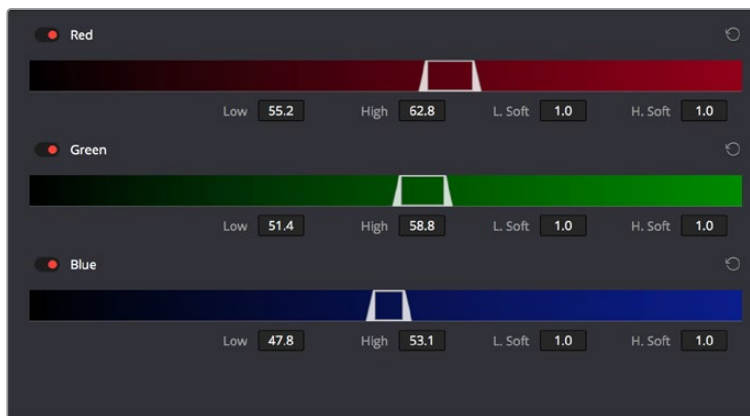
RGB qualification controls

The RGB parameters include:
- **Red Low/High:** Two parameters let you define the upper and lower range of the Red channel being isolated.
- **Red Low Soft/High Soft:** Two parameters let you define the upper and lower softness falling off outside the current range of red.
- **Blue Low/High:** Two parameters let you define the upper and lower range of the Blue channel being isolated.
- **Blue Low Soft/High Soft:** Two parameters let you define the upper and lower softness falling off outside the current range of blue.
- **Green Low/High:** Two parameters let you define the upper and lower range of the Green channel being isolated.
- **Green Low Soft/High Soft:** Two parameters let you define the upper and lower softness falling off outside the current range of green.

Luma Qualification Controls

The Luma Qualifier mode simply pulls a key from the Luma channel all by itself. It's identical to the HSL qualifier with H and S turned off. This single-component keyer is more useful than you might think; it's a common technique to isolate a range of highlights, midtones, or shadows throughout the image to alter the color temperature selectively.

The Luma Keyer mode automatically disables the Hue and Saturation controls

Also, keep in mind that the luma component is the sharpest keyable component when you're working with heavily compressed video. Keys that are noisy or chunky with HSL qualification may be sharper if you just use the Luma Qualifier, although you won't be able to be chromatically specific.

The Luma Qualifier has four parameters:

- **Lum Low/High:** Two parameters let you define the upper and lower range of the luma component being isolated.

- **Lum Low Soft/High Soft:** Two parameters let you define the upper and lower softness falling off outside the current range of luma.

3D Keyer Controls

As discussed earlier in this chapter, the 3D Keyer works much differently than the other qualifiers in DaVinci Resolve. In this mode, drawing lines over parts of the image you want to isolate adds samples to the Sample list, some of which add to the key (when you drag with the pointer) and some of which subtract from the key (when you Option-drag with the pointer). While this functionality is very simple to use, there are other controls that are available.
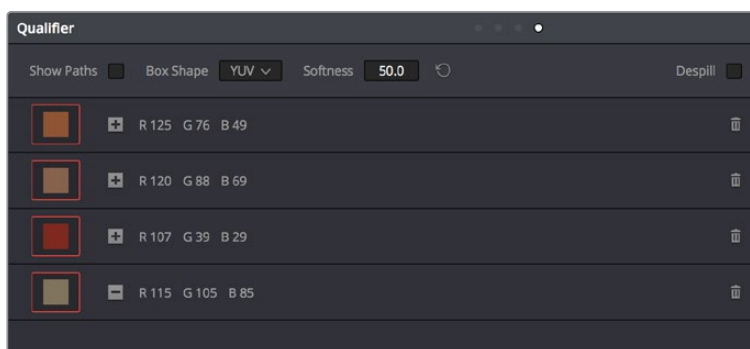
The 3D Qualifier mode

The 3D parameters include:

- **Show Paths:** A checkbox that lets you turn the visibility of the lines you're drawing to sample the image on and off. Turning lines off does not affect the key in any way.

- **Colorspace:** A drop-down menu that lets you choose whether you're sampling colors in YUV colorspace or HSL colorspace. YUV is the default, but if you find you're not getting satisfactory results, you can reset the Qualifier palette and switch to HSL to see if that works any better.

- **Softness:** A single parameter lets you adjust the overall softness of the key you're creating. The default value is 50. Raising this value increases key softness, lowering it decreases key softness.

- **Despill:** If you're using the 3D keyer to pull a blue or green screen key to create transparency in conjunction with the optional Alpha output in the Node Editor, this checkbox lets you turn on an automatic color correction that eliminates blue or green spill from the image, while retaining the image's original color.

- **Sample list:** A list shows each line you drew as a sampled entry. A color patch at the left shows you the average color you sampled, clicking the color patch lets you temporarily turn any color sample off to evaluate its contribution to the overall key. A plus or minus icon shows you whether that patch is adding to or subtracting from the key. The average red, green, and blue color values are shown next, and a trash can icon at the right lets you delete any sample from the list.

Matte Finesse Controls

After you've used the sample controls and qualifier parameters to create the most useful key for your purposes, you may find that it has problems that cannot be overcome easily by the available adjustments. Issues such as chattery edges, holes, or noisy bits can sometimes be easily fixed using the Matte Finesse controls. These controls filter the output of the Qualifier controls and are adjustments that are made to the matte itself, so they may work well in some instances, and poorly in others, depending on what you're trying to do.

Matte Finesse Controls, Page 1

Denoise has been re-added to the Matte Finesse controls, providing a distinct way to post-process extracted keys to selectively reduce the noise in a key, getting rid of stray areas of qualification and softly filling "holes" in a matte.

Denoise in page 1 of the
Matte Finesse controls

Denoise

Denoise provides a distinct way to post-process extracted keys to selectively reduce the noise in a key, getting rid of stray areas of qualification and softly filling holes in a matte.
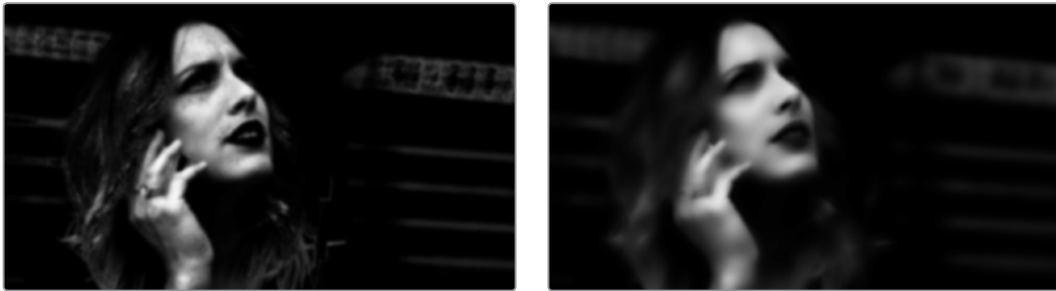
Before/after raising Denoise, viewing the high contrast matte

Clean Black

Clean Black is a specialized operation that eliminates noise (seen as white speckling when viewing a high-contrast highlight) in the black area of a key that omits the regions of the image you don't want to isolate, and shrinks the key by making the dark parts of a key darker the higher you raise this parameter, pushing dark gray areas of the key toward black. The practical result is that raising Clean Black lets you "fill holes" in the background portion of a key and erode translucent edges.
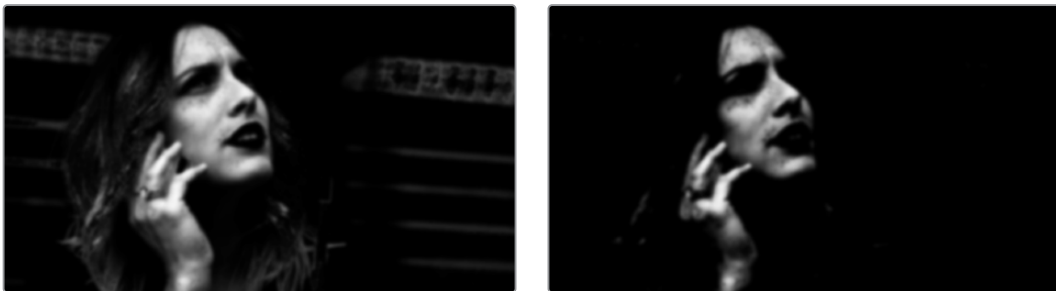
Before/after raising Clean Black, viewing the high contrast matte

Clean White

Clean White is another specialized operation that eliminates noise (seen as black speckling when viewing a high-contrast highlight) in the white portion of a key that include areas of the image you're isolating, and expands the key by making light parts of a key lighter the higher you raise this parameter, pushing light gray areas of the key toward white. The practical result is that raising Clean White lets you "fill holes" in the foreground portion of a key and grow translucent edges.
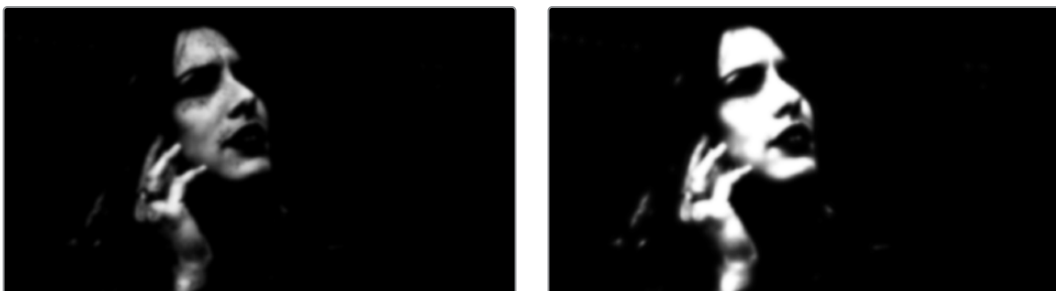
Before/after raising Clean White, viewing the high contrast matte

Blur Radius

In small amounts, blurring a key does well to take the edge off problem edges. However, blurring a key can also feather the edges of a key past the border of the subject you're keying, with the result being a visible "halo" around your subject depending on the adjustment you're making. The range is 0 to 2000, with 0 being the default. With such a large maximum blur radius, combined with the capabilities that the In/Out Ratio provides in customizing the direction of spread, you can turn some pretty precarious mattes into surprisingly smooth and useful results.
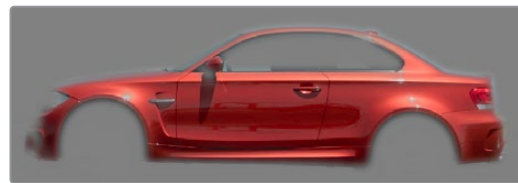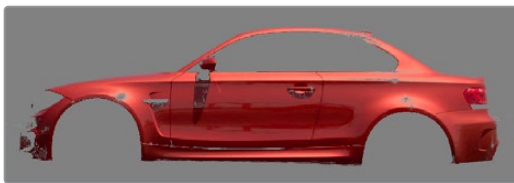
> **TIP:** If haloing is a problem, you can try adjusting the In/Out Ratio parameter, or you may want to consider using the Qualifier Softness parameters to feather the edges of the key, instead.

Using the blur parameters to soften the edges of a key

In/Out Ratio

Controls whether the "Blur Radius" is applied equally to the inside and outside of the edge of the matte (zero), applied only within the matte (negative values), or applied only outside the matte (positive values). Using In/Out Ratio can help eliminate fringing when using the Blur Radius parameter.
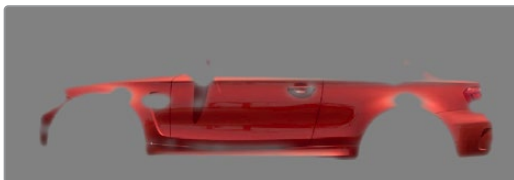
(Left) In/Out Ratio lowered so blurring ends at the edge of the matte and feathers inward, (Right) In/Out Ratio raised so that blurring starts at the edge of the matte and feathers outward

However, you can also use In/Out Ratio even in situations where no Blur Radius is applied at all. Raising In/Out Ratio will fill in small black holes in the matte, while lowering In/Out Ratio below 0 will eliminate speckling by pushing small white bits of the matte toward black.
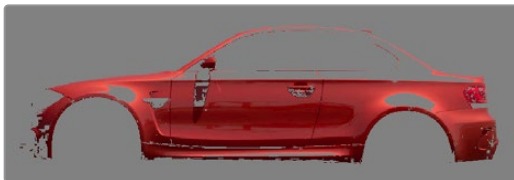
(left) In/Out Ratio controls lowered to expand holes in the matte, (Right) In/Out Ratio controls raised to fill in small black holes in the matte

Matte Finesse Controls, Page 2

The second page of Matte Finesse controls expose controls for shrink, grow, opening, and closing functionality, with control over the shape of the operation, the radius, and iterations. The previously available Black Clip and White Clip controls have also been moved into this second page.

Shrink/Grow controls in page 2 of the Matte Finesse controls

Shrink/Grow/Opening/Closing

The Mode, Shape, Radius, and Iterations controls let you refine the edges of mattes in a variety of ways, shrinking and growing a matte with problem edges, or opening and closing holes that appear within a matte.

- **Mode:** Lets you choose how you want to modify the alpha channel/key. You can choose Shrink or Grow to dilate or erode the edges of the matte with great accuracy. Or, you can choose Opening or Closing to plug or expand holes to clean up a ragged matte.

- **Shape:** Lets you choose how corners and angles in the edges of the key are handled when you grow or shrink it. Circle is the default, and results in even expansion around the surface of the key that eventually averages all angles into a circular shape if you use extreme radius settings. Square averages all angles into a more rectangular shape if you use extreme radius settings. Diamond averages all angles into a diamond shape if you use extreme radius settings.

- **Radius:** Adjusts how much to shrink, grow, open, or close the key.

- **Iterations:** Alters the effect of the Operator Radius setting to create more extreme adjustments.
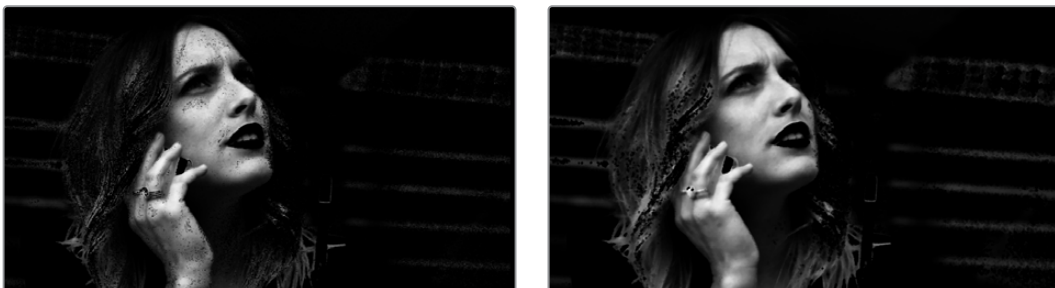
(Left) A matte with small holes in the face, (Right) Mode set to Shrink, Shape set to Circle, Radius set to 3, Iterations set to 3; used to close holes in a matte

Black Clip

Raising Black Clip applies a "lift" adjustment such that translucent areas of the matte (gray areas when viewing a high-contrast highlight) are pushed towards black. The range is 0 to 100, with 0 being the default setting.
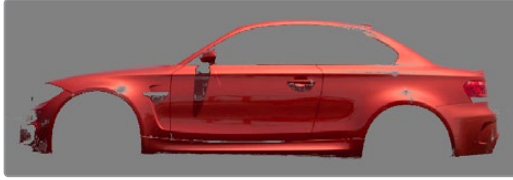
Before/after raising Black Clip

White Clip

Lowering White Clip applies a "gain" adjustment such that translucent areas of the matte (gray areas when viewing a high-contrast highlight) are pushed towards white. The range is 0 to 100, with 100 being the default setting.
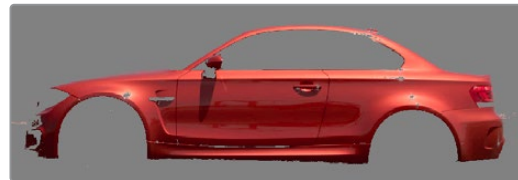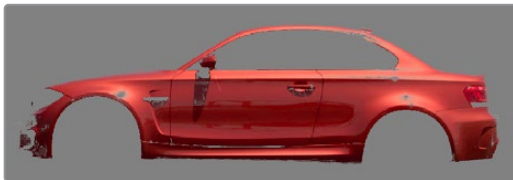
Before/after lowering White Clip

The Many Ways to Invert a Key

Sometimes, you'll need to isolate a subject or range of values in an image, and then make a change to everything else. One way to do this is to add an Outside node after the node in which you've created the key. This lets you make one set of adjustments to what you've keyed, and another set of adjustments to everything outside the key.

If you just need to make a simple adjustment, you can invert the key from within the Qualifier palette. However, there are three other ways to invert a key.

- **The Qualifier Invert button:** Clicking this control simply inverts the key being generated by all of the controls within the Qualifier palette.
- **Key Palette Qualifier Invert:** The Qualifier Invert control within the Key palette provides another control with which you can invert the key that's generated by the Qualifier palette.
- **Key Palette Output Invert:** The Output Invert control within the Key palette is notable because it inverts the sum of all keys applied within that node. For example, if you're using a Qualifier in conjunction with a Window, the two invert controls mentioned previously will only invert the Qualifier key; the Window key remains unaffected. However, using the Output Invert control inverts the overall combination of the Qualifier key and the Window, all together.

Combining Qualifiers and Windows

This is covered in more detail in a subsequent section, but if you create a key using one of the Qualifier modes, and you then add a Window, the final key that's output by that node is limited to the intersection of the Qualifier key and the Window. This makes it easy to use a Window to "garbage matte" out bits of a key that you don't want, that can't be eliminated by further adjustment of the Qualifier controls.
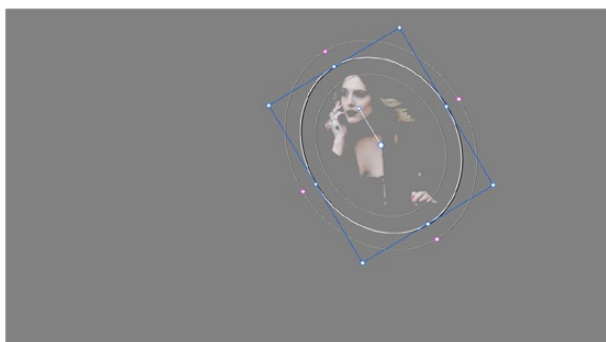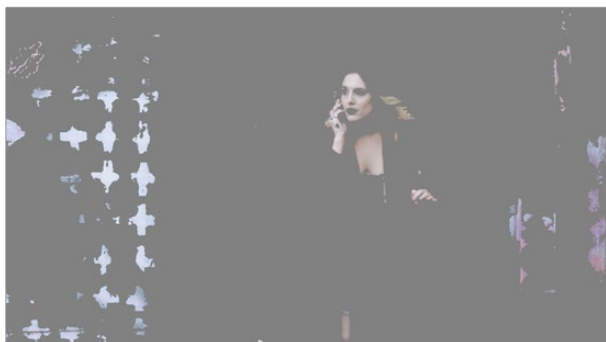
(Top) The woman's skin tone is too close to other elements in the scene.
(Bottom) A Circular Power Window is used to further isolate the woman being isolated.

Manipulating Keys Using Additional Nodes

If you need to make more adjustments to a qualified key than the Matte Finesse controls will allow, you can use the Node Editor to feed the key output of one node to the RGB input of another, at which point you can use all of the second node's color adjustment controls to manipulate the grayscale image that constitutes that key, to improve it.
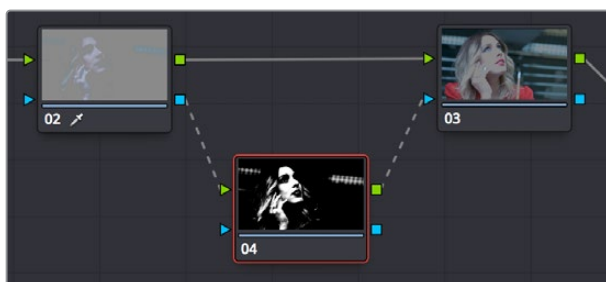
Connecting a key output to an RGB input, and then connecting the RGB output back to the next node's KEY input again

You can also use the Key Mixer node to combine multiple keys in several different ways, adding keys together, or subtracting them from one another, in order to create exactly the key you need.
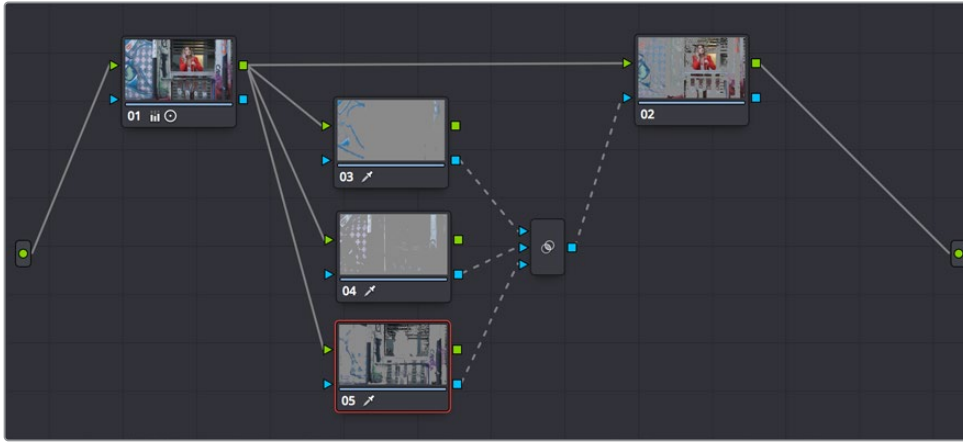
Adding multiple keys together using a Key Mixer

For more information about these techniques, see Chapter 126, "Combining Keys and Using Mattes."

Chapter 120

Secondary Windows and Tracking

Secondary correction describes isolating a specific part of the image, or a specific subject, using a key. Keys in DaVinci Resolve are grayscale images that define which areas of the picture you want to alter (in white) and which parts of the picture you want to leave alone (in black). Keys are generated either using the controls in the Qualifier palette, by using a Power Window, or by importing an external matte (for more information on how to use external mattes, see Chapter 126, "Combining Keys and Using Mattes"). This chapter shows you how to use Power Windows to create shapes with which you can isolate parts of the image in different ways in order to do these kinds of targeted corrections.

Contents

Power Windows

Power Windows are another way of making secondary correction, being essentially shapes you can use to isolate regions of the image. Different controls let you use oval, rectangular, polygonal, or custom curved shapes. Because you can isolate regions of the image by drawing, Power Windows produce exceptionally clean results, with edges that can be precisely positioned and feathered to achieve a variety of effects.

Before/after Curve Power Window isolates
the sky area for a targeted correction

Power Windows (also referred to as simply "windows") are excellent when what you need to adjust can be encompassed within a clearly defined geometrical area. For example, the oval of a person's face, the front of a car, or a wide expanse of sky are all good candidates for windowed adjustments. A drawback of windows can be that they must be animated to follow whatever subject they're isolating. Fortunately, this is where DaVinci Resolve's powerful tracker comes in, making it easy to track Power Windows quickly and accurately to follow along with the subject being isolated.

Circular Power Window to focus attention to the skin

DaVinci Resolve makes it easy to combine multiple Power Windows in different ways, to intersect with one another and create even more sophisticated shapes. For example, multiple windows can be added together, or one window can be used to cut out part of another window, which saves you from the need to make complicated keyframing operations to animate that window's shape.

Multiple windows combined to isolate and mask the image

This section covers the use of Power Windows, how to create and modify them, as well as how to combine multiple windows, and combine windows and qualifiers to create highly specific isolations.

Adding Nodes with Windows

As with qualifiers, you must first add a node to a grade's node tree before you begin windowing a correction. This is because all of the windows within a particular node work together to limit that node's grade. As a reminder, any node can be changed from a primary operation that affects the entire image, to a more targeted secondary operation, simply by turning on a window, using a qualifier, or enabling an external matte.
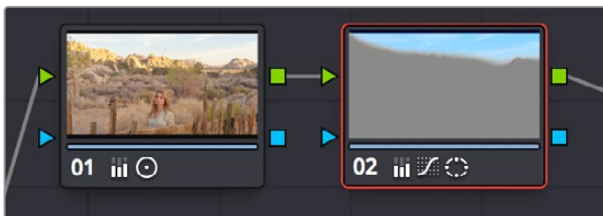
Serial nodes showing the window on Node 2

If you don't create a new node before creating a window, you'll discover you've inappropriately changed a primary correction into a secondary correction. If you create a new serial node, you'll then need to use the controls found within the Window palette to turn on a window to customize for your purposes. However, there are also a set of commands you can use to add serial nodes with a window already turned on, saving you a few clicks or button presses in the process.

To add a new node with a window already turned on:
- Choose Color > Nodes > Add Serial Node + CPW (Option-C), or press the button of the same name on the T-bar panel of the DaVinci control panel to create a new serial node with a circular window.
- Choose Color > Nodes > Add Serial Node + LPW (Option-Q), or press the button of the same name on the T-bar panel of the DaVinci control panel to create a new serial node with a linear window.

- Choose Color > Nodes > Add Serial Node + PPW (Option-G), or press the button of the same name on the T-bar panel of the DaVinci control panel to create a new serial node with a polygonal window.
- Choose Color > Nodes > Add Serial Node + PCW (Option-B), or press the button of the same name on the T-bar panel of the DaVinci control panel to create a new serial node with a Curve window.

When you add a node with a Power Window, the Window palette automatically opens up, ready for editing.
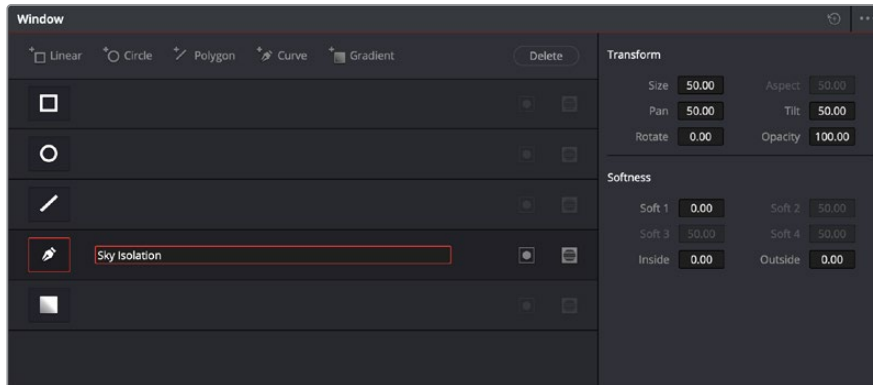
The Window palette

The Window palette is divided into three sets of controls: the Window list, the Presets, and the Transform and Softness controls.

The Window Palette Interface

Once you've created a node with which to apply a Power Window correction, you need to open the Window palette if it hasn't been opened already.

To open the Window palette:
- Click the Window palette button.
- Press the WNDWS button on the T-bar panel of the DaVinci control panel.

The majority of the Window palette is occupied by the Window list, within which you can create as many windows as you need for the task at hand. There are five types of windows you can create, each of which has a different geometry. You can use these windows individually, or you can combine them to create even more complex shapes and interactions. The Window palette has four groups of controls that let you use these windows in different ways.
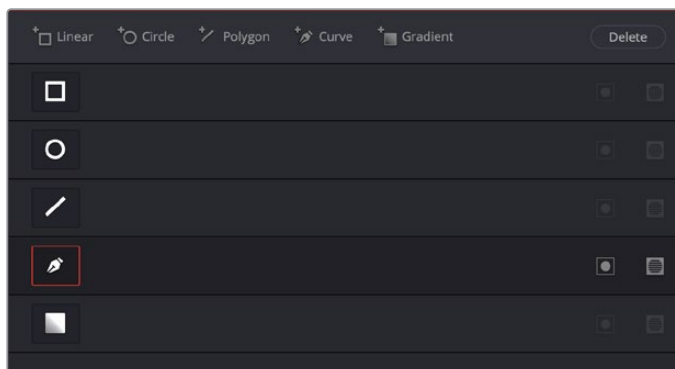
The Window palette with the Window list

- **Window list:** A row of buttons at the top of this list lets you add new windows, which you can then customize as necessary. Each window in the list exposes an On/Off button that shows the shape type, a Layer Name field (blank until you add some text) that you can use to identify what each window is for, an Invert button, and a Mask button that governs how that window interacts with the other windows that are currently enabled (adding to other windows by default, or subtracting from other windows in Mask mode).

- **Transform parameters:** Controls the overall size, aspect ratio, position, and rotation of the currently selected window.

- **Softness parameters:** Controls the edge softness of the currently selected window. Different window shapes have different softness options.

- **Option drop-down menu:** The Option drop-down menu has commands for creating and modifying custom window presets for easy recall later, resetting windows, deleting windows, saving and managing window presets, and copying and pasting track data.

Using buttons along the top of the Window palette, there are five types of windows you can create:

- **Linear:** A four-point shape that can be edited into any kind of rectangle or trapezoid you might need. In addition to the center and corner controls, you can also drag any of the four sides to change the shape.

- **Circular:** An oval that can be shaped, sized, and feathered to solve an amazing number of problems.

- **Polygonal:** A four-point shape that can be expanded with additional control points to create complex sharp-cornered polygonal shapes.

- **Curve:** A Bezier drawing tool that you can use to create any kind of shape, curved, polygonal, or mixed, that you require.

- **Gradient:** A simple two-handled control for dividing the screen into two halves, with options for the center, angle, and feathering of the shape. Good for fast sky adjustments.

Managing Windows

To manipulate a window, first you need to create the type of window you want to use, or if you've got a group of windows created already, you need to select the window you want to work on.

Methods of creating and selecting windows:

- **To create a new window:** Click the Shape icon button or click the Create Window button (at the top of the Window list) that corresponds to the window you want to create.

- **To create a new window using the DaVinci control panel:** Press WNDOWS on the T-bar panel, then use the UP and DOWN buttons on the Trackball panel to select the window type you want to apply, and press ADD.

- **To select a window using the onscreen controls:** Click anywhere within a window to select it in the Viewer.

- **To select a window from the Window list:** Click the Shape icon button corresponding to the window you want to select.

To delete a window you no longer want:

     Select a window, then click the Delete button.

To reset a window:

- **To reset one window to its default shape:** Select a window, then choose Reset Selected Window from the Option drop-down.

Showing and Hiding Onscreen Window Controls

When you open the Window palette, the Viewer goes into Power Window mode. Enabling a window makes that window's onscreen controls appear within the Viewer, and are mirrored to video out so you can see the window controls on your external display. If you like, you can change how and where the onscreen controls appear.

To choose whether onscreen controls are mirrored to video out, or disabled, do one of the following:

Choose an option from the View > Window Outline submenu.

There are three options:

- **Off:** Hides the window outline on both the external display and the Viewer.
- **On:** The default, shows the window outline on both the external display and the Viewer.
- **Only UI:** Hides the window outline on your external display, but leaves it in the Viewer.

Press Option-H to toggle among all three of the above modes.

To show or hide window on-screen controls using the DaVinci control panel:

- Press SHIFT UP and then DISPLAY/CURSOR, above the fourth trackball on the Center panel.

This command is a three-way toggle. The first use of this command hides the window outline on your external display, but leaves it in the Viewer. The second use of this command hides the window outline on both the external display and Viewer. The third use of this command shows the window outline on both the external display and Viewer.

> **TIP:** If you leave the onscreen controls visible in the Viewer, you may find that as you work you want to temporarily hide or show the onscreen controls in the Viewer so you can get an uncluttered look at the image you're adjusting. You can quickly toggle any set of onscreen controls off and on without selecting Off in the menu by pressing Shift-` (tilde).

Using the High-Visibility Power Window Outline Option

Ordinarily, Power Window outlines are white (for the center shape) and gray (for the softness shapes). However, sometimes this color scheme can be difficult to see, so the Color panel of the User Preferences has an option in the General Settings section called "High visibility Power Window outlines." Turning this on sets Power Window outlines to be drawn as green (for the center shape) and yellow (for the softness shapes), to make these windows easier to see in certain circumstances.

(Left) Default window outlines, (Right) High Visibility window outlines
enabled in the Color panel of the User Preferences

Window Transform Controls

Windows have transform parameters that are similar to those found in the Sizing palette. These
parameters let you alter the window, affecting all of its control points together.
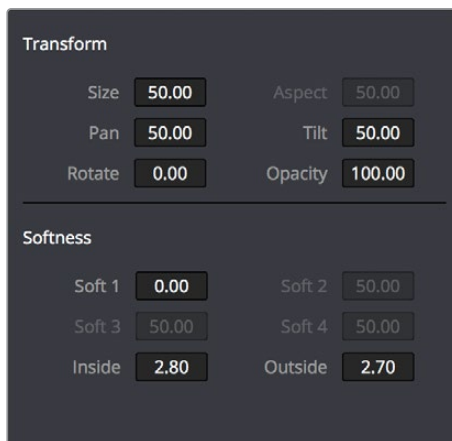
Window transform controls

- **Size:** Scales the entire window up or down. 50.00 is the default size.
- **Aspect:** Alters the aspect ratio of the window. 50.00 is the default value, larger values
  make the window wider, and smaller values make the window taller.
- **Pan:** Repositions the window along the X axis. 50.00 is the default position, larger
  values move the window to the right, smaller values move the window to the left.
- **Tilt:** Repositions the window along the Y axis. 50.00 is the default position, larger
  values move the window up, smaller values move the window down.
- **Rotate:** The default value is 0. Increasing this parameter rotates the shape clockwise,
  decreasing this parameter rotates the shape counterclockwise.
- **Opacity:** Lets you vary the transparency of an individual window's contribution to a
  node's key.
- **Convergence:** When "Apply stereoscopic convergence to windows and effects" is
  enabled in the General Options of the Project Settings, this additional Transform
  parameter appears that lets you create properly aligned convergence for a window
  placed onto a stereoscopic 3D clip. For more information about working with
  Stereoscopic 3D projects, see Chapter 172, "Stereoscopic Workflows."

The transform parameters also correspond to onscreen controls found in the Viewer, which can be manipulated directly using the pointer.
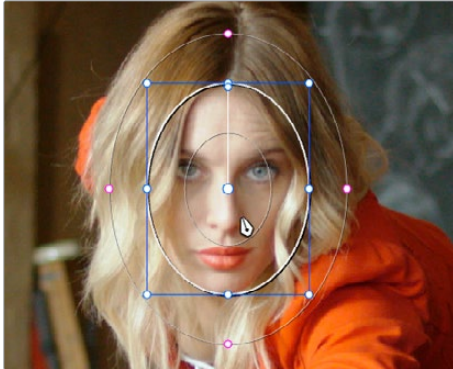
Manipulating the window position on the Viewer

While many of the onscreen controls correspond to parameters within the Window palette, some onscreen controls, such as the control points that govern reshaping linear, polygonal, and Curve windows, are only adjustable via the pointer.

Onscreen controls for window transforms:

- **To select any window:** Click on one of an arrangement of many windows to select it, making that window's controls active.

- **To reposition any window:** Drag anywhere within the window's onscreen control. Window position corresponds to the Window palette's Pan and Tilt parameters. For a Gradient window, drag the center control point.

- **To resize a Circular window while locking its aspect ratio:** Drag one of the four blue corner points out to enlarge, or inwards to shrink. This corresponds to the Window palette's Size parameter.

- **To squish or stretch a Circular window, altering its aspect ratio:** Drag one of the blue top, bottom, left, or right control points. These adjustments correspond to the Window palette's Aspect parameter.

- **To rotate a window:** Drag the top inner white rotate handle, in the middle of the window. For a gradient, drag the bottom arrow handle.

- **To alter window softness:** Drag any one of the magenta softness handles. Different window shapes have different sets of handles, which correspond to the Softness parameters.

- **To reshape a linear window:** Drag any of the white corner handles to corner pin the window, or drag one of the white top, bottom, or side handles to move an entire side segment of the window around.

- **To reshape a polygonal window:** Turning on a polygonal window reveals a simple white rectangle with four corner control points. Click anywhere on the surface of the rectangle to add additional control points with which to reshape the polygon, and drag any control point to alter its shape. Polygonal windows are limited to a maximum of 128 control points.

- **To change the size and aspect of a curve:** Shift-drag a bounding box around the control points you want to transform, and then adjust the corners of the box to resize the points while maintaining the aspect ratio of the shape, or adjust the top, bottom, left, or right points to squish or stretch the shape.

- **To remove control points from polygonal or Curve windows:** Middle-click the control point you want to remove.

Window Softness

Each type of window has different Softness parameters, depending on how adjustable that window is.

- **Circular:** A single parameter, Soft 1, lets you adjust the uniform softness of the oval's edge.

- **Linear:** Four parameters, Soft 1–4, let you adjust the softness of each of the four sides of the linear window independently. Magenta softness control points on the top, bottom, left, and right let you adjust the softness of each side of the linear shape independently.

- **Polygon:** Two parameters, Inside Softness and Outside Softness, let you adjust the overall softness of a polygonal window. There are no onscreen softness control points.

- **Curve:** Two parameters, Inside Softness and Outside Softness, let you adjust the overall softness of a curve. Using the onscreen controls, you can adjust the magenta inside and outside softness control points independently, creating any softness shape you need.

- **Gradient:** A single parameter, Soft 1, lets you adjust the uniform softness of the gradient window's edge.

Drawing Curves

The Curve window is the only window that doesn't display any onscreen controls when it's first turned on. Instead, you must click within the Viewer to add control points, drawing your own custom shape to isolate whatever region you want.

Curve window to isolate a car

To draw a curve:

1 Turn on the Curve window style control.

2 Click anywhere in the Viewer to start adding control points and drawing the shape you need.

3 Click and drag to add and shape Bezier curves, or just click and release to add a hard angle.

4 To finish drawing and close the shape, click the first control point you created to create a corner, or click and drag on the first control point you created to create a Bezier curve.

Once you've drawn a curve, there are many ways of manipulating it.

Simple methods of modifying a curve:

- **To add points:** Click anywhere on a curve to add control points.

- **To reshape a curve:** Drag any control point to a new location.

- **To move a curve:** Drag anywhere within or just outside a curve to move it.

- **To symmetrically alter a Bezier curve:** Drag any Bezier handle. The opposite handle automatically moves in the other direction.

- **To asymmetrically alter a Bezier curve:** Option-drag any Bezier handle. The opposite handle stays in place while you drag the current handle. Once you've created an asymmetric pair of Bezier handles, they move together as one if you simply drag a handle. You need to Option-drag to change the angle.

- **To change a curve into a corner:** Option-double-click any Bezier curve control point to change it to a sharp-angled corner point.

- **To change a corner into a curve:** Option-click any corner point and drag to pull out a Bezier handle, changing it to a curve.

- **To remove points:** Middle-click the control point you want to remove.

> **NOTE:** Removing a control point from a Polygonal window that's already been animated using the Keyframe Editor results in that point abruptly popping on and off at the keyframes creating the animation.

You can also Shift-drag a bounding box to select multiple control points on a curve to move, delete, or transform them all at once.
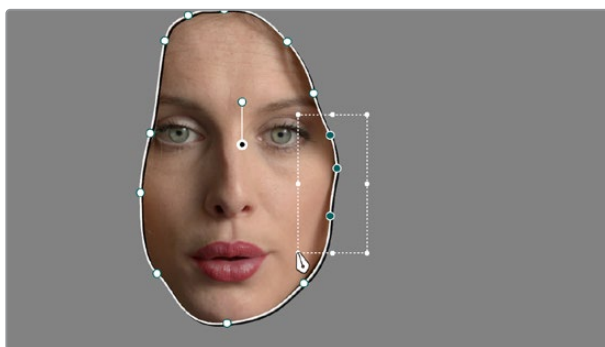
You can Shift-drag a bounding box over multiple control points to manipulate them all at once

To select multiple control points on a curve:

1   Hold the Shift key down and drag a bounding box around the control points you want to manipulate or delete. All included control points will become highlighted.

2   Do one of the following:

- **To move the control points:** Drag anywhere within the bounding box.
- **To transform the control points:** Drag one of the outer corners to resize all control points symmetrically, drag the top, bottom, or side handles to squish or stretch the control points relative to one another, or move the pointer to one of the corners until the rotate cursor appears, and then drag to rotate the control points.
- **To delete the control points:** Press the Backspace key.

3   When you're finished, press the Escape key to deselect the control points.

Converting Linear, Circular, and Polygon Windows into Bezier Curves

If you start out isolating a subject using one of the simple Linear, Circular, or Polygon shape windows and you realize that you need a more complex shape to accomplish the task at hand, you can easily convert them to a more complex Bezier curve by choosing Convert to Bezier from the Window palette Option menu.
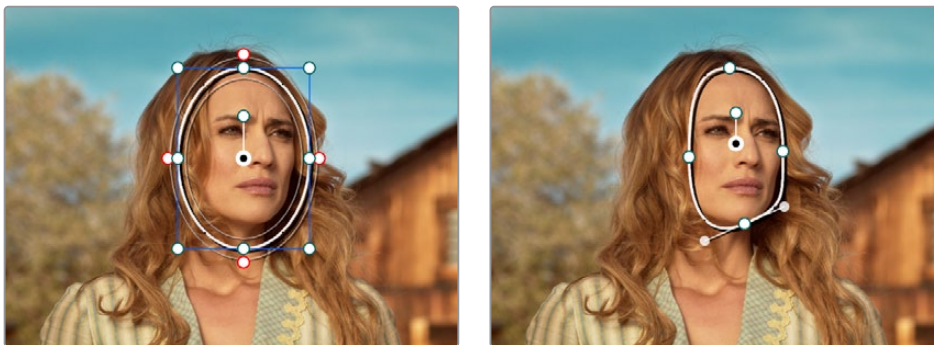
Before and after converting a Circular window to a Bezier curve and adjusting the result, before adding softness to the edge

Once you've converted a simple shape to a Bezier window, you can add control points and manipulate the shape in any way you need to make it better conform to the subject, just as you would with any curve.

Resetting the Window Palette

The entire Window palette can be reset using the Option menu's Reset command.

Combining Power Windows with the Mask Control

Adding multiple windows to a single node is an easy way to create composite keys. When combining windows, the Mask control defines whether one window adds to another window, or subtracts from that window.

In the following example, Circular and Curve windows have both been created, and each window's Mask control is also turned on (by default), resulting in both masks being added together so that the sunset look correction affects both the sky and the woman's face.
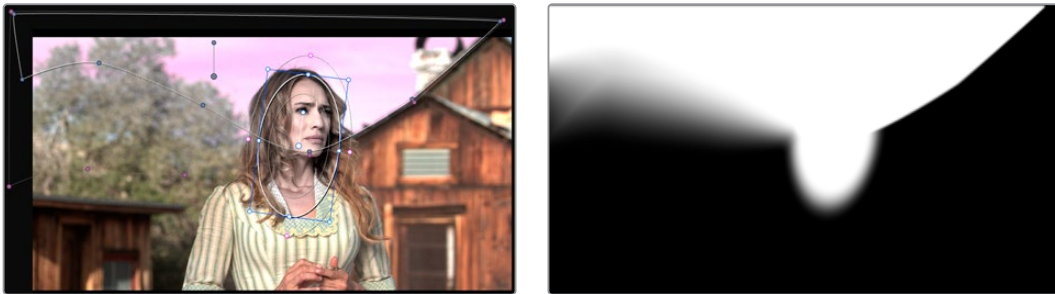
The two images show the combination of the key mattes

By turning the Mask control of the Circular window off, the Circular window is subtracted from the curve.
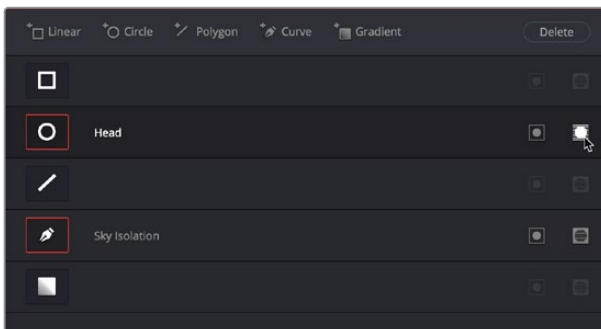
Turning off the Mask control of the Circular window

Now, the woman's face is being protected from the aggressive sky treatment.
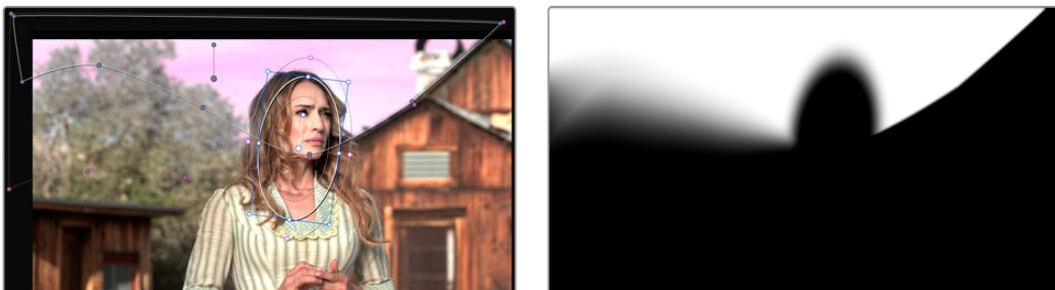
The two images show the result of subtracting the circular window

Since windows can be individually tracked and keyframed, you can quickly set up complex interactions of windows to solve common problems you'll encounter. For example, when you're tracking a window to follow a moving subject that moves behind something in the frame, you can use a second window with Mask turned off to cover the object in front. Now, when the tracked window intersects the subtractive window, the correction will disappear along with the subject.

You can also use the Mask control to create more complex shapes than you can with a single window.

Mattes and mask used together to make complex shapes

Furthermore, once you reach the limits of what shapes you can create using the four available windows, you can combine multiple nodes containing multiple shapes and qualifiers using the Key Mixer.

Copying and Pasting Windows

If there's a particular window you've created that you want to either duplicate within the current node, or apply to another node, you can copy and paste an individual window's shape from one item in the Window list to another.

Methods of copying and pasting windows:

- **To copy a window:** Click any enabled window in the Window list, then click the Window palette option menu and choose Copy Window.

- **To duplicate a window:** After copying a window, create another window of the same type that you copied, and then click the Window palette option menu and choose Paste Window.

- **To paste a window to another node:** Double-click or otherwise select another node, open the Window palette, choose the same type of window that you copied in the Window list, and then click the Window palette option menu and choose Paste Window.

- **To paste a window to the same node:** Click any enabled window in the Window list, then click the Window palette option menu and choose Copy Window, then click Paste Append Window in the Window Option menu.

Saving Window Presets

If you find there's a particular window shape or combination of windows that you use frequently, you can save one or more windows as a preset for easy recall whenever needed. For example, if you're working on a documentary within which you find you need to do a lot of face brightening, you can create preset face ovals for close-up, medium, and wide shots, to save you from having to customize a stock circular window for every single new shot. You can also save groups of windows together as a single preset, in order to reuse complicated multi-window shapes.

Window presets are available from a group of Presets controls in the option menu in the upper right-hand corner of the Window palette.
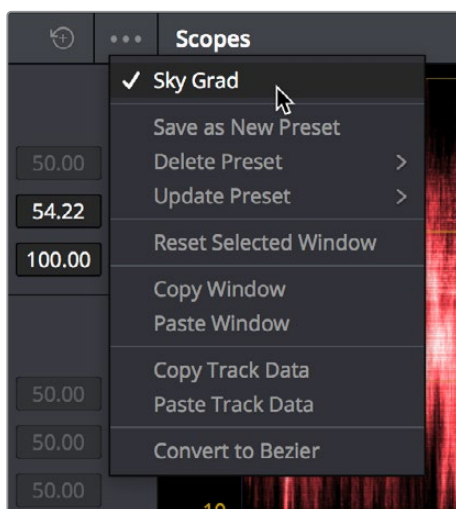
Controls for saving, applying, and deleting window presets

Methods of working with Power Window presets:

- **To save a window preset:** Once you've created one or more windows you want to save, click the Save as New Preset option in the Window palette's option menu. Type a name into the resulting dialog, and click OK. That preset is now available in the Preset section of the option menu.

- **To recall a window preset:** Click to open the Window palette's option menu, and choose a preset from the list. Loaded window presets overwrite whatever other windows were set up in that node.

- **To update an already saved preset:** Recall a preset, change the resulting window(s), then click to open the Window palette's option menu. Select Update Preset, then select the preset name. This will overwrite the selected preset with the altered window arrangement.

- **To delete a window preset:** Click to open the Window palette's option menu, and choose Delete Preset, then choose a preset from the list. Make sure you chose the correct preset name; there is no warning before the deletion, and you cannot undo the deletion once it's done.

Once recalled, windows created by presets can be modified and tracked just like any other window.

Using Windows and Qualifiers Together

Another use of windows is to act as a "garbage matte" when used together with a qualifier. By default, when you use a window and qualifier together, a key is only output where both the window and qualifier intersect. This makes it easy to exclude unwanted parts of a key that are too difficult to eliminate by further refinement of the qualifier controls.

For example, the following qualification is intended to isolate the woman's face, but some of the similarly colored wood and sky in the background is also included.

Instead of driving yourself crazy trying to eliminate the unwanted parts of the key by modifying the current qualification, which is doing a great job of isolating the skin tones, you could instead use a window to isolate her face, excluding everything outside the window, and simplifying your job considerably.
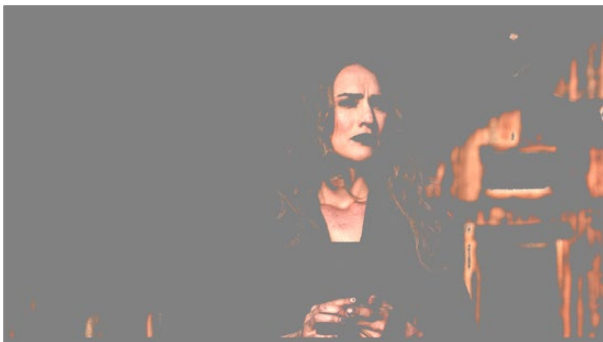
A qualified image with highlight on

If she moves, then you can simply track the window to follow. Simple tracking is covered in Chapter 121, "Motion Tracking Windows."
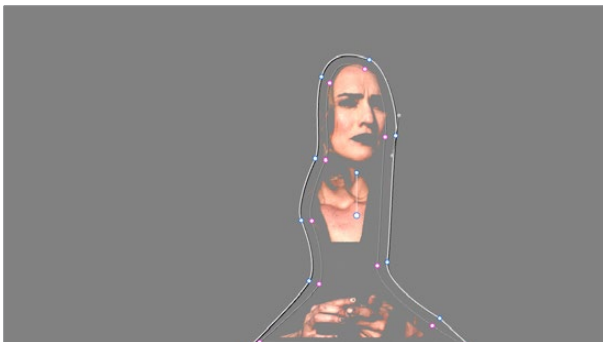
Now with additional Power Window isolation

Furthermore, you can use the window's Invert control to do the reverse, excluding all qualified portions of the key inside the window, and including all qualified portions of the key outside the window.

If you need to build more complex qualifier/window combinations than this, you can add more windows, or you can use multiple qualifiers and windows with the Key Mixer node, which is discussed in Chapter 126, "Combining Keys and Using Mattes."

Manipulating Windows Using a Control Panel

Window shape and position can also be manipulated using the DaVinci control panel. All Windows controls are located on the T-bar panel, except for the ADJ WINDOW button above the fourth trackball of the Center panel.

To enable, mask, or disable a window:

1 Press WNDWS on the T-bar panel. The Window palette should appear.

2 Press the soft key that corresponds to the type of window you want to turn on, CPW (Circular Power window), LPW (Linear Power window), PPW (Polygonal Power window), or PCW (PowerCurve window). The appropriate window controls should appear with an orange highlight.

3 Press the MATTE/MASK soft key to toggle among turning the window on, turning Mask on, and turning the window off.

To reposition a window using the Pan and Tilt knobs:

1 Press the unlabeled soft key at the bottom-right of the T-bar panel to toggle between the current knob mappings on the T-bar panel, and the PAN and TILT mappings.

2 Use the Pan and Tilt knobs to adjust the window's position.

To reposition a window using the fourth trackball:

1 If necessary, press WNDWS on the T-bar panel to open the Window palette.

2 Press ADJ WNDW, above the fourth trackball on the Center panel.

3 Use the fourth trackball to reposition the window.

4 When you're finished, press ADJ WNDW again to exit adjust window mode.

To alter a window's Zoom, Aspect, or Rotation:

Use the ZOOM, ASPECT, and ROTATE knobs on the T-bar panel.

To alter a window's softness, do one of the following:

- For Circular and Linear windows: use the SOFTNESS knob on the T-bar panel.

- For Polygonal and PowerCurve windows: press the unlabeled soft key at the bottom-right of the T-bar panel to toggle between the current knob mappings, and the PAN, TILT, INSIDE SOFT, and OUTSIDE SOFT knob mappings.

To invert a window:

Press the INVERT soft key on the T-bar panel.

Chapter 121

Motion Tracking Windows

While Power Windows can be manually keyframed to follow a moving subject you want to isolate, this chapter shows how you can use the powerful cloud and point-based motion tracking controls in DaVinci Resolve to make Power Windows follow along with the motion of subjects and the camera in the fastest, easiest way possible.
Then, numerous techniques are presented for dealing with complicated tracking scenarios and common problems that arise for subjects that are difficult to track.

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Motion Tracking Windows

The Tracker palette has three modes, available from the Palette menu.

- In Window mode, the tracking controls let you match the motion of a window to that of a moving feature in the frame.
- In Stabilizer mode, the same underlying technology is used to smooth or stabilize the motion within the entire frame.
- In FX mode a Point Tracker can be used to animate ResolveFX or OFX plug-ins with positioning controls. For more information about the FX and Stabilizer modes, see Chapter 133, "Sizing and Image Stabilization."

DaVinci Resolve has an incredibly simple, yet powerful, 3D cloud tracker that allows you to track quickly and accurately any Power Window (Circular, Linear, Polygonal, Curve, or Gradient) to follow any moving feature. This avoids the need to use dynamic keyframes to manually animate a window's position.

In particular, you can use the tracker to match a window's position, size, rotation, and its pitch and yaw in 3D space to either foreground or background elements that move within the frame.
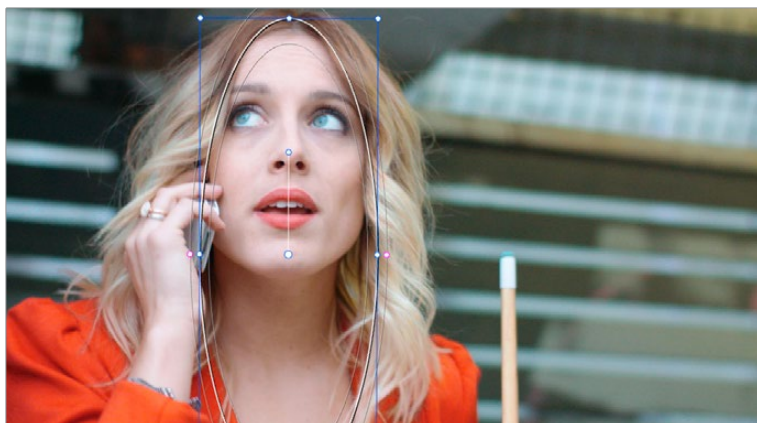
A Power Window tracking a woman's face

Simple Tracking Using the Tracker Menu

The simplest way to track a feature using a Power Window is to use the commands found in the Color > Tracker menu. These commands include:

- **Track Forward (Command-T):** Tracks a window to a feature from the current position of the playhead forward, ending at the last frame of a clip.
- **Track Reverse (Option-T):** Tracks a window to a feature from the current position of the playhead backward, ending at the first frame of a clip.
- **Track Stop (Command-Option-T):** Interrupts any track. This is useful for letting you cancel a long track that goes wrong (the Stop button of a control panel stops tracking as well).

Most window tracks are easy to accomplish using these three commands.

To track any Power Window to match a moving feature within the frame:

1   Move the playhead to the frame of the current shot where you want to begin (you don't have to start tracking at the first frame of a shot).

2   Turn on any window, and adjust it to surround the feature you want to track.

Typically, you'll have done this anyway, for example, framing someone's moving face with a Circular window to lighten their highlights.

3   To initiate tracking, do one of the following:

–   Choose Color > Tracker > Track Forward (press Command-T).

–   Choose Color > Tracker > Track Reverse (Option-T).

–   On the T-bar panel of the DaVinci control panel, press OBJECT TRACK MODE, and then press either the TRACK FWD or TRACK REV soft keys on the Center panel.

DaVinci Resolve automatically opens the Viewer page, places a series of tracking points within the window you've created, and performs the track from the current frame; forward to the last frame or backward to the first frame.

DaVinci Resolve analyzes a cloud of tracking points that follow the vectors of every trackable group of pixels within the window you've created, and the results are fast and accurate. After tracking, the window you've placed automatically moves, resizes, rotates, and skews to match the motion of the feature you're tracking.

Object tracking in progress. Tracking points are automatically placed over trackable features of the image

Once a clip has tracking data applied to one of its windows, a small tracking icon appears within that clip's icon in the Thumbnail timeline.
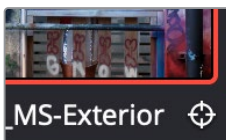
A tracking icon in the top left corner of the Thumbnail timeline shows that clip has been tracked

If the track you've performed is unsuitable, you can reposition the window to cover a different area of the subject you're trying to track, and initiate tracking again. New tracking data overwrites any previous tracking data applied to that window.

Once you're satisfied with your track, you can continue to resize, reposition, or reshape the window being tracked. Tracking data is separate from the window transform parameters (which can be keyframed), so changes you make to a window offset it from the originally tracked path.

Tracking Windows When You'll Be Exporting Media With Handles

When you track windows to match moving features in a clip, the windows are only transformed on frames with tracking data. In Round Trip workflows where you add handles to the graded clips you render for editorial flexibility in the footage you deliver, you need to make sure that you track all windows from the beginning to the end of these handles to make sure that, if an editor actually trims any of the clips you give them to use the handles, all windows are doing what they should.

An easy way to do this is to choose View > Show Current Clips With Handles to display each clip you select in the Timeline with handles defined by the "Default handles length" setting in the Editing panel of the User Preferences. Make sure that the "Default handles length" is equal to the handles you export using the "Add X Frame handles" option in the Render Settings list of the Deliver page. With each clip's handles made visible in this way, you can easily track windows along every frame you'll be rendering.

Simple Ways of Working With Existing Tracking Data

If there's a portion of a shot that you haven't tracked (for example, you started tracking at a later frame, or you ended tracking before the end of the shot), then the window you're tracking remains wherever it was at the first or last frame that was tracked. If you want to fill in these gaps, you can always move the playhead to the first or last frame that was tracked, and then use the Track Backward or Track Forward command to track the rest of the frames in that shot.

Tips for Better Tracking

In situations where a feature changes shape in such a way as to confuse the tracker, you can try tracking a smaller part of the feature by using a smaller window. Once you've achieved a successful track, you can resize the window as necessary, and it will have no effect on the track that's already been made.

Also, if you're tracking a feature that moves behind something onscreen and disappears for the rest of the shot, there's an easy way to avoid having an awkward window sitting in the middle of the scene. You can use dynamic keyframes to animate the Key Output Gain parameter (in the Key tab of the Color page) to fade from the correction's full strength of 1.0 down to 0, the value at which the correction disappears, along with the window itself.

Tracking One Frame at a Time

You can click the "track one frame forward" or "track one frame backward" buttons in the Tracker palette to track a moving feature one frame at a time, making it easier to make adjustments to follow a difficult track when you've set tracking to Frame mode (by clicking the Frame button).

In Frame mode, you can keyframe window transformations to more faithfully conform to troublesome motion as you're moving one frame at a time through the track; manual changes to a window's position will be keyframed to create frame-specific transformations, rather than used to offset the entire tracked motion path as in Clip mode. When you add multiple keyframes in the Tracker graph, animation will be automatically interpolated from keyframe to keyframe.

Copying and Pasting Tracking

There will be plenty of times you'll apply multiple windows to a single moving subject, such as a car, when you can use a single motion track for all the windows. Commands in the Option menu let you copy and paste track data from one window to another within the same node, saving time when you want several windows tracking together as one.

To copy track data from one window to another:

1 Open the Window palette, then select a window that has tracking applied to it (indicated by a tracking badge in the corner of the shape icon), and choose Copy Track Data from the Option pop-up.

2 Select another window, and choose Paste Track Data from the Option pop-up. Once you've copied track data from one window, you can paste it to as many other windows as you like.

You can also copy tracking from the FX mode of the Tracker palette and paste it to a window, in case you want to use the same tracking data for both an effect and a window.

To copy track data from an FX track to a window:

1 Open the Tracker palette, choose the FX mode that contains the tracking data you want to copy, and choose Copy Track Data from the Option pop-up.

Open the Window palette, select a window, and choose Paste Track Data from the Option pop-up. Once you've copied track data from one window, you can paste it to as many other windows as you like.

Tracker Palette Controls in More Detail

You can easily combine object tracking and keyframing to animate windows. For example, you'll typically use object tracking to make a window follow the position and orientation of a moving feature, but you can add dynamic marks to the window track of the correction in the Color page with which to alter its size and shape to better conform to a feature's changing form.

Controls in the Window Tracker Palette

Occasionally, you'll run into a shot that doesn't quite track well enough using the Tracker menu's simple controls. In these cases, the Viewer page provides the complete set of object tracking controls that can be used to modify tracking operations in different situations.
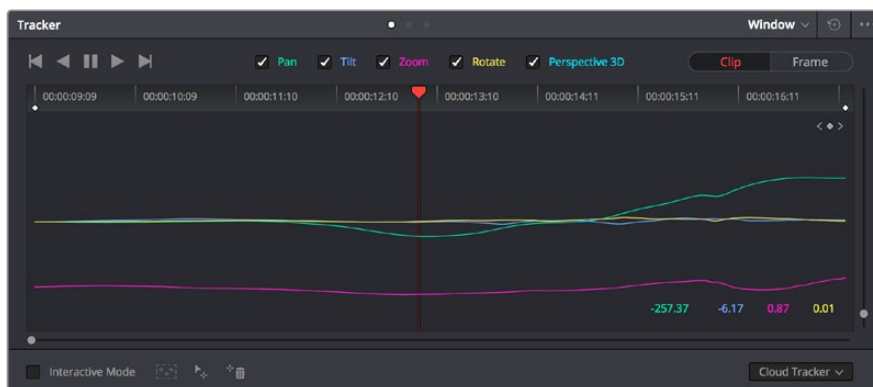
The Tracker palette

The object tracking controls are divided into seven groups.

Tracker Palette Modes

The Tracker palette's Option drop-down menu lets you choose between Window mode (for matching a window to the motion of a feature in the frame), Stabilizer mode (for subduing unwanted camera motion.; for more information on Stabilizer mode, see Chapter 133, "Sizing and Image Stabilization"), and FX mode (for tracking position to be used with ResolveFX or OpenFX plug-ins).

Types of Tracking

A pop-up menu below the Tracker graph lets you choose whether to use the Cloud Tracker or the Point Tracker.
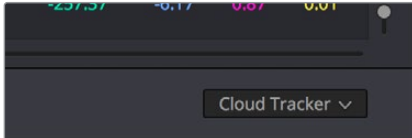
The tracker type pop-up

There are two options:

- **The Cloud Tracker:** Automatically analyzes all parts of the image for trackable points, and uses these to automatically figure out the motion in the shot that you want to use to move a Power Window or stabilize a shot. This tracker type is great for quickly tracking a window to match the movement of almost any feature, with a minimum of work.

- **The Point Tracker:** Lets you create one or more tracker crosshairs that you can manually position in order to track specific features in the shot. The more crosshairs you create and position, the more accurate the track can be. The Point Tracker is incredibly useful in situations where you need to follow the motion of a very specific feature in the frame. It can also be useful in cases where you want to stabilize a shot that has many subjects moving in different directions, and it's difficult to obtain a good result with the Cloud Tracker.

Object Tracking

The object tracking controls provide the most basic tracking functions, some of which are mirrored within the Color > Tracker menu.
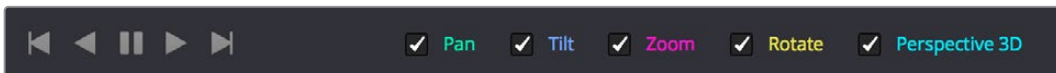
Choose which type of transform you want to track before tracking

A series of five checkboxes let you turn on and off which transforms you'd like motion tracking to apply automatically to the window. These checkboxes must be selected before you perform a track in order to restrict the transforms that are used.

- **Pan and Tilt:** Enables tracking of horizontal and vertical position, when you want to transform a window to follow the location of a tracked subject.

- **Zoom:** Enables tracking of size, when you want to transform a window to resize to follow a tracked subject.

- **Rotate:** Enables tracking of orientation, when you want to transform a window to rotate with a tracked subject.

- **Perspective 3D:** Enables tracking of pitch and yaw in 3D space, when you want a window to skew to follow the orientation of a tracked subject within the scene. Good when you want the window to "stick" to a surface.

NOTE: Once tracking or stabilization has been done, disabling these checkboxes does nothing to alter the result. To make changes, you need to enable or disable the necessary checkboxes first, and then reanalyze the clip.

After you've defined the transforms you want to use for the track, the analyze controls let you proceed with the analysis of the subject being tracked.

- **Track One Frame Reverse button:** Motion tracks a single frame in reverse. Useful for slow tracking of difficult subjects that may require frequent correction.

- **Track Reverse button:** Initiates tracking from the current frame backward, ending at the first frame of the clip. Good for tracking backward when your best starting point is somewhere within the middle of the shot.

- **Pause button:** Stops tracking (if you're fast enough to click this button before tracking is finished).

- **Track Forward button:** Initiates tracking from the current frame forward, ending at the last frame of the clip.

- **Track One Frame Forward button:** Motion tracks a single frame forward. Useful for slow tracking of difficult subjects that may require frequent correction.

Clip/Frame Controls

Two buttons let you set how manual adjustments to the position of tracked windows affect the overall track.

Selecting clip or frame to apply adjustments

- **Clip:** The default mode, in which changes you make to the position of a window are globally applied to the entire track. For example, if you track a feature, and then move the window, the window moves along a motion path that's consistently offset from the original track for the duration of the clip. Use this mode if you're happy with the track, but you want to modify the window's overall shape and position relative to the motion path it's following.

- **Frame:** In this mode, changes you make to the position or shape of a window create a keyframe at the frame at the position of the playhead. Multiple keyframes are interpolated to create animation with which you can manually transform a window to solve a variety of problems. This mode is useful for rotoscoping the shape and position of windows to match a subject that's tough to automatically track. Frame mode is also useful for making corrections to individual frames that were badly tracked, for animating windows to go all the way out of frame along with a subject, or for making manual, frame-by-frame adjustments to window position to cover untrackable sections.

The Tracker Graph

The Tracker graph provides a visual display of the tracking data that's being analyzed. Each of the transform controls that can be tracked has an individual curve, which lets you evaluate each tracked parameter on its own, and each curve is color-coded to match the corresponding label of the tracking transforms listed above.

The Tracker graph showing a curve for each transform control

A vertical slider to the right of the Tracker graph lets you scale the height of the curve data within to make it easier to see it all within the graph. A horizontal slider at the bottom of the graph allows you to zoom in and out of the tracker curves, allowing you to see finer detail of the tracking paths. Above the Tracker graph, a Timeline ruler contains a playhead that's locked to the playheads in the Viewer and Keyframe Editor.

You can draw a bounding box in the Tracker graph with which to select a portion of one or more curves to delete sections of low-quality tracking data using the Clear Selected Keyframes command found in the Tracker Options menu. To eliminate the current bounding box from the Tracker graph, click once anywhere within the graph.

Interactive Mode Controls

The Interactive controls, at the bottom-left of the Tracker palette, let you make manual changes to the automatically generated tracking point cloud that DaVinci Resolve creates when you're tracking with the Cloud Tracker, so you can try different ways of obtaining better tracking results in challenging situations.
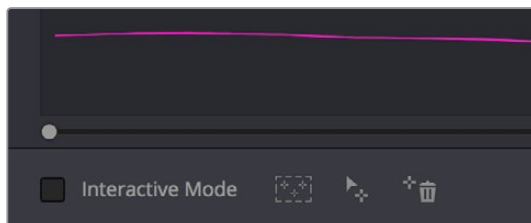
Interactive mode controls

- **Interactive Mode checkbox:** Turns the Interactive tracking mode on and off. When you enter Interactive mode, you can manually alter the point cloud that DaVinci Resolve uses to track the feature within the current window. You'll then make your track while in Interactive mode.

- **Insert:** Lets you add tracking points to whatever trackable features exist within a bounding box that you've drawn in the Viewer. Inserted tracking points are automatically placed based on trackable pixels in the image.

- **Set Point:** Lets you use the cursor (using the DaVinci Resolve control panel), to manually place individual tracking points, one by one, with which to track a feature. If there is no trackable pixel group at the coordinates where you placed the cursor, a tracking point will be placed at the nearest trackable pixel group.

  You must place at least two tracking points at different pixel groups to track rotation, and at least three to track zoom.

- **Delete:** Eliminates all tracking points within a bounding box that you've drawn in the Viewer.

Point Tracker Controls

If you're using the Point Tracker, then the Interactive Mode controls disappear, replaced by the two controls of the Point Tracker.
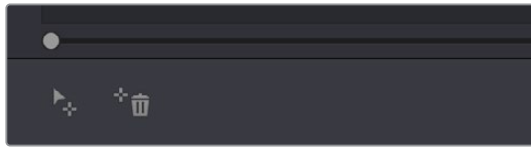
Point Tracker controls

- **Add Tracker:** Click to create a new tracker that's automatically positioned in the center of the frame. Once created, you can drag it using the pointer to line up with the feature you want to track. You can create as many trackers as you like. Multiple trackers are all tracked at once.
- **Delete Tracker:** Select any tracker (selected trackers are red, deselected trackers are blue), and click this button to remove it.

Additional Commands in the Tracker Options Menu

There are some additional commands located in the Palette Options pop-up menu.

- **Reset Track Data on Active Window:** Lets you delete the tracking data corresponding to the currently selected window.
- **Clear Selected Track Data:** When you drag a bounding box over parts of one or more curves in the Tracker graph, this command lets you delete that part of the graph. This is useful when you want to eliminate sections of low-quality track data. Portions of curves that are cleared in this way have linear interpolation automatically applied to them, similar to if you used the Keyframes Interpolation controls.
- **Delete Keyframe:** Deletes tracker graph keyframes at the current position of the playhead.
- **Clear All Tracking Points:** Clears the tracking points in the Power Window at the frame you are on.
- **Show Track:** Turn this checkbox on to show the motion path produced by the tracking you've done.
- **Copy Track Data:** Lets you copy track data from the currently selected window. Windows can be selected directly in the Viewer while the Tracker palette is open.
- **Paste Track Data:** Pastes copied track data to the currently selected window. Windows can be selected directly in the Viewer while the Tracker palette is open.

Cloud Tracker Workflows

The next few examples illustrate how to use the Tracker palette's controls in practical situations. In many circumstances, objects passing in front of a tracked subject, known as "occlusions," can cause problems. While the tracker in DaVinci Resolve is highly occlusion-resistant, the following sections show a variety of techniques you can use when an occlusion prevents you from getting a useful track.

Using Interactive Mode to Manually Choose Tracking Features

Interactive mode lets you manually remove or add tracking points to improve tracking performance in situations where the automatic image analysis in DaVinci Resolve provides unsatisfactory results.

For example, you can delete tracking points within a window that correspond to overlapping features you don't want to track. Suppose a car that you're tracking drives by a sign that partially obscures the car. Without intervention, the PowerCurve that's isolating the car will deform improperly when the car moves along and then away from the sign.

Using Interactive mode, you can delete the tracking points that will overlap the sign you don't want to track, improving the result.

To eliminate specific, unwanted tracking points from a track:

1 Open the Tracker palette.

2 Turn on the Interactive Mode checkbox.
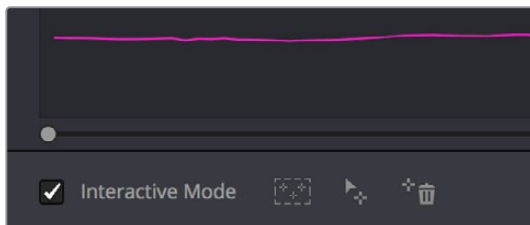
Selecting Interactive Mode

3 In the Viewer, drag a box around the tracking points you want to eliminate within the window.
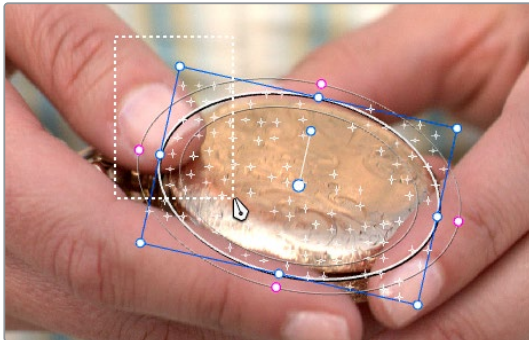
Dragging a box around tracking points that need to be deleted

4 Click the Delete button.
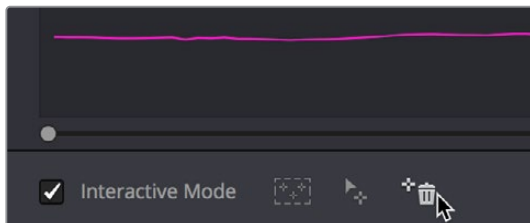
Deleting tracking points

The points within the selection area are deleted.
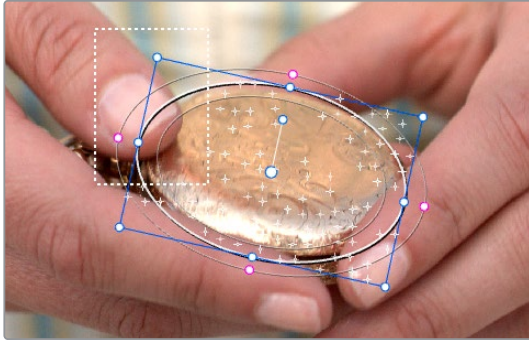
Remaining tracking points ready to be used

5 While Interactive mode is still on, click Track Forward or Track Reverse to track the subject using the remaining tracking points.

6 When you're finished tracking, turn off the Interactive Mode checkbox.

DaVinci Resolve goes back to using automatically placed tracking points.

In another interactive tracking example, you may sometimes run into situations where you want to eliminate all automatically placed tracking points altogether, placing your own in specific regions of the image.

To eliminate automatic tracking points, adding your own instead:

1 Open the Tracker palette.

2 Turn on the Interactive Mode checkbox.
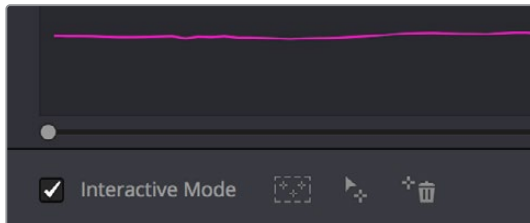
Selecting Interactive mode

3 In the Viewer, drag a box around all the tracking points in the window, and click the Delete button to eliminate all tracking points from the image.
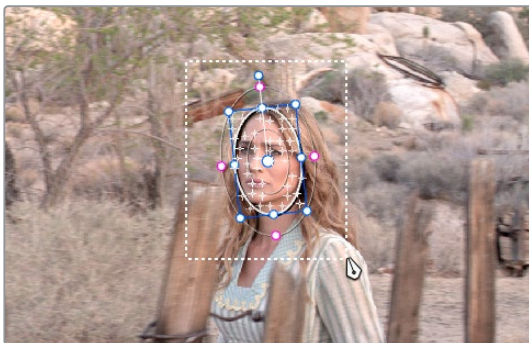
Selection box surrounding all tracking points

4 Click the Delete button to eliminate all tracking points from the image.
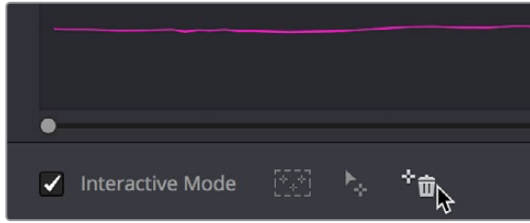
Deleting tracking points

5 Drag a box around the specific area where you'd like to add new tracking points. In this case, you only want to track the top half of the woman's face, since the bottom half is cut off by the fence posts.

Placing the selection box over the top of the window

6 Now, click the Insert Track Points button.
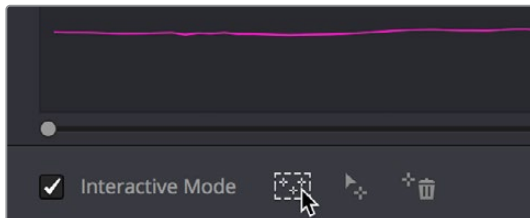
The Insert button of Interactive mode automatically adds tracking points within the current bounding box.

New tracking points are automatically added to whichever features are appropriate for tracking within the box you've drawn.
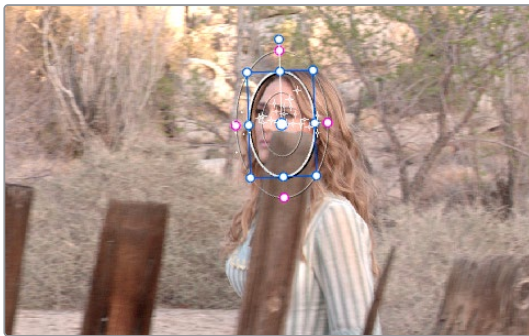
Tracking with the remaining tracking points

NOTE: If no appropriate tracking features can be found, no points will be added.

While in Interactive Object Tracking mode you may also choose to add tracking points one by one.

To add a single tracking point:

1   Open the Tracker palette.

2   Turn on the Interactive Mode checkbox.

3   Using the DaVinci control panel, press the CURSOR button above the fourth trackball of the Center panel, and move the onscreen cursor to the detail of the image that you want to add a tracking point to.

4   Click the Set Point button, within the Interactive mode controls of the Tracker palette.

    This adds a tracking point corresponding to the feature of the image that you clicked, and you're ready to start tracking.

Dealing With Occlusions When Tracking

Sometimes you'll find that you need to deal with a gap in the useful tracking data. For example, objects in the frame that pass in front of the feature you're trying to track cause gaps in the tracking information for a clip.

In situations where a subject being tracked becomes totally occluded by another object in the frame, there's an easy method of interpolating to cover holes in the available tracking data. In the following example, the woman walks behind another fence post, this time one that's taller than she is. The window tracking her face will become completely lost at this point, but interpolation will help to salvage this shot.

Original clip

Interpolating between two sets of tracking data to track past an occlusion:

1   Move the playhead to the first trackable frame of the moving feature you're correcting, and create a Power Window that surrounds it.
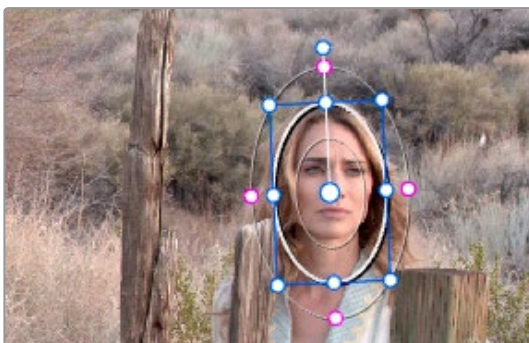
Adding the Power Window

2 Use Track Forward to track the feature as far as you can before it becomes obscured behind something else in the frame.

3 When the Power Window stops tracking the feature reliably, stop the track.

The Power Window is obscured by the post

4 Open the Tracker palette.

5 Click the Frame button to put the Tracker controls into frame-by-frame adjustment mode. This is an important step.
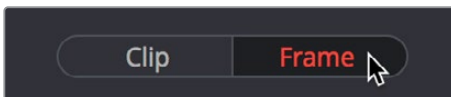
Selecting Frame mode

6 Move the playhead to the frame where the feature you're tracking reappears from behind the occlusion, then drag the window so that it again overlaps the feature.
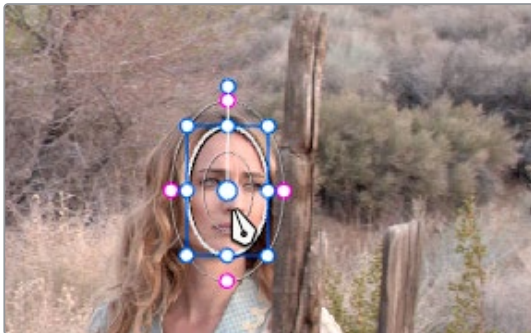
Moving the playhead and position the window

7 Use Track Forward to continue tracking the feature until the end of the clip. Alternately, you could have started from the end of the clip and used Track Reverse to track the feature as far as possible, if that's easier.

Now that you've identified the gap in reliable tracking data for this clip, it's time to set up the interpolation.
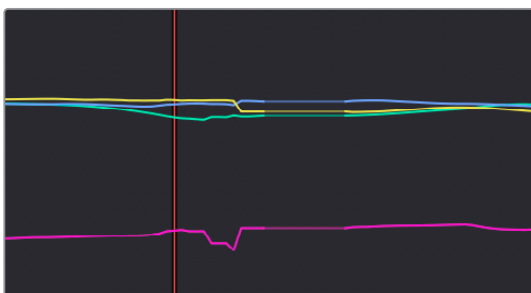
Notice the gap in the tracking data where the window was behind the post

8   Drag a bounding box over the portion of the curves in the Tracker graph that fall between the good tracking data at the beginning and end of the shot.
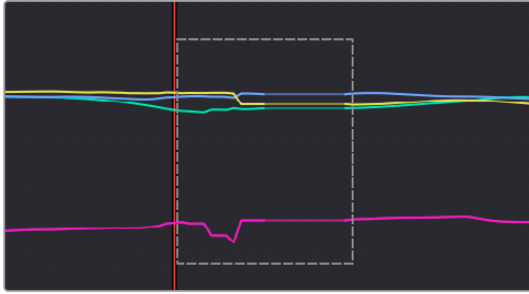
9   Click the Tracker palette option pop-up menu, and choose Clear Selected Track Data.
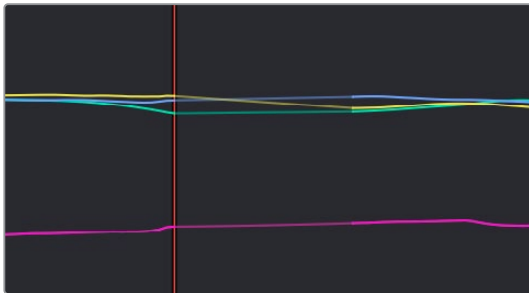
The portions of curves that you selected are deleted, and have linear interpolation automatically applied to them so that there's no hole in the track data or the motion of the window, which now moves smoothly from the last outgoing frame of reliable tracking data to the first incoming frame of new reliable tracking data.

Point Tracker Workflows

As advanced as the Cloud Tracking that is the default in DaVinci Resolve is, there are times when it may be simpler to track using good old-fashioned crosshairs. The Point Tracker makes it easy to track very specific features of a subject with motion you need to follow. Unlike the Cloud Tracker, which automatically looks for all trackable points within a region of the image that you identify using a window, the Point Tracker lets you create one or more crosshairs that you must manually position to overlap with whatever high-contrast features you want to track. This section covers the three main workflows you need to know to use the Point Tracker.

Tracking a Window Using the Point Tracker

The following procedure describes, in a general way, how to use the Point Tracker to track a moving subject and apply that motion to a Power Window.

1   Move the playhead to the frame of the current shot where you want to begin (you don't have to start tracking at the first frame of a shot, since you can always track backward).

2   Turn on any window, and adjust it to surround the feature you want to track. Typically, you'll have done this anyway, for example, framing someone's moving face with a Circular window to lighten their highlights. You want to make sure that the window you want to apply the tracked motion to is selected before you begin tracking. In this example, we'll be tracking a Circular window to follow the woman's face.

Setting up to track a window over a woman's face

3 Open the Tracker palette, and choose Point Tracker from the bottom right pop-up.
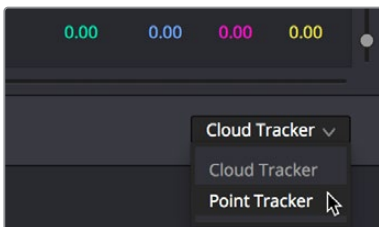
Choosing the Point Tracker

4 Before you start tracking, choose what types of motion you want to track and apply to the window you're working on. You can choose from among Pan, Tilt, Zoom, Rotate or Perspective 3D. Which methods of transformation can be applied depend on how many points you add to track.
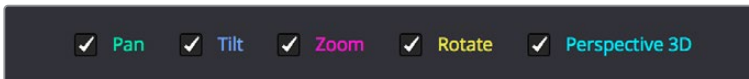
Choosing what type of motion to analyze

5 Click the Add Tracker button. A new tracker crosshairs appears in the Viewer in the center of the frame.
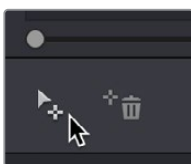
Clicking the Add Tracker Point icon

6 Move the pointer directly over the tracker crosshairs, and when it turns into the move cursor, click and drag to move the crosshairs to line up on top of the feature you want to track. For the best results, this should be a high-contrast detail such as a corner, the end of a line, a small shape like a pebble, or a jagged detail. Unlike other point trackers, there is no inside or outside region to separately adjust, there's only the one crosshairs that you need to align. In this example, this first crosshairs is placed at the inside of her stage left eyebrow (the corner of her eye would introduce too much jitter as the tracker will pick up her blinks).
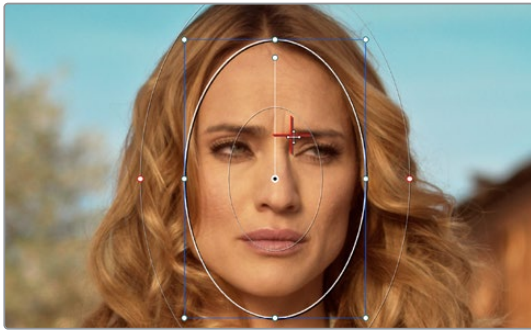
Lining up the tracker crosshairs with the feature you need to track

7 If you want to improve the accuracy of your track, you can create more tracker crosshairs and position them on top of other details within the subject you're tracking. For the best results, make sure that all crosshairs are placed onto details that are in the same plane of motion. In other words, don't put some crosshairs on a person's face in the foreground, and other crosshairs on a tree that's far in the background, since both these features will have very different vectors of motion. In this example, trackers are placed at her inside eyebrows and at the corner of her lips.
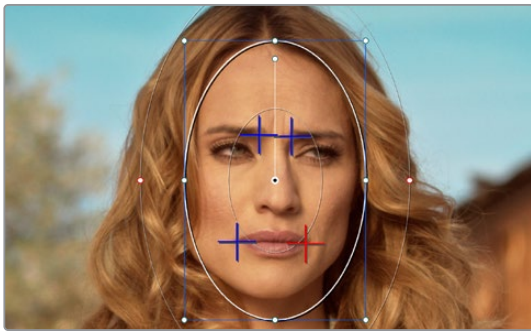
Setting up four trackers to follow the corners of her eyebrows and mouth

8 When you're done placing crosshairs, click the Track Forward or Track Backward buttons to initiate tracking. The clip will be analyzed, and the Tracker graph will update with the tracking data, and the window you had selected automatically moves to match the motion of the feature you're tracking.

The final track, accomplished with four point trackers, with the track path turned on

Removing Trackers

If you find that a particular tracker is causing problems, you can remove it by selecting it in the Viewer, and clicking the Delete Tracker icon, before retracking the subject.

Clicking the Delete
Tracker icon

Using Frame Mode to Offset Track

A common issue when point tracking is how to deal with occlusions and times when the tracked feature moves off screen. In DaVinci Resolve, the solution is to use the Tracker palette's Frame mode to move the tracker crosshairs onto another feature to track, while offsetting the resulting motion so that it continues to follow the original motion path.

1   In this example, a point tracker crosshairs has been positioned at a corner of a window of a building that's being separately adjusted using a Power Window. The window is being used because, as the woman turns to leave, she covers up most of the other trackable outer edges of the building, which would ruin the track.
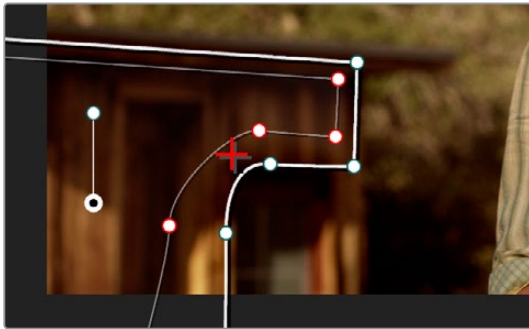
Setting up to track a building moving off screen

2   As the camera pans, the feature being tracked is about to go off frame, which is about to ruin the track. As this happens, click the Stop Track button.
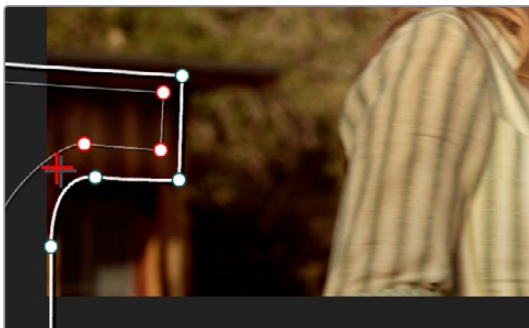
Stopping the track on the last good frame of
the track, before the tracker goes off screen

3   Move the playhead back to the last good frame of tracking, and then click the Frame button in the Tracker palette to go into Frame mode.
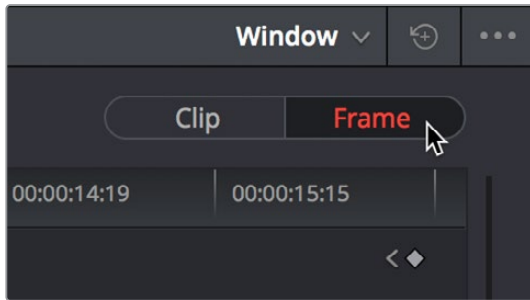
Turning on Frame mode, to prepare to offset the track

4   In Frame mode, you can now drag the tracker to another feature of the building, this time the outer edge of the roof, that will be better to follow as the building goes out of frame to the left, since the Power Window will go out of frame before the rightmost corner of the building's roof does.
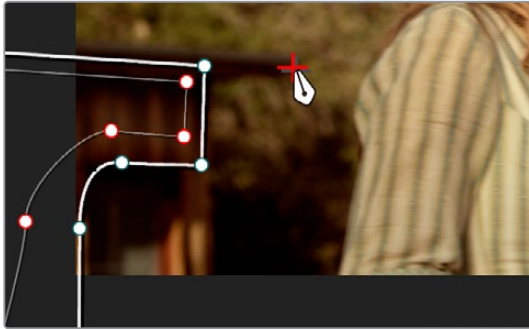
Dragging the tracker to another feature that's better to track

5   Now, click the Track Forward button again, and the crosshairs will begin tracking the new feature, but the motion will be offset, so the movement of the Power Window continues to follow the original motion path.
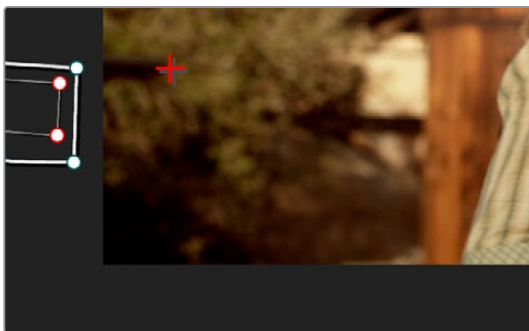
Tracking an offset feature lets the window
go all the way off screen

6   If you turn on the track path (in the Tracker Option menu), and move the playhead to the frame where you moved the tracker, you can see that the motion before you moved the tracker and the motion after continues smoothly along the same path, with no sudden breaks. When you're finished, click the Clip button to get out of Frame mode.
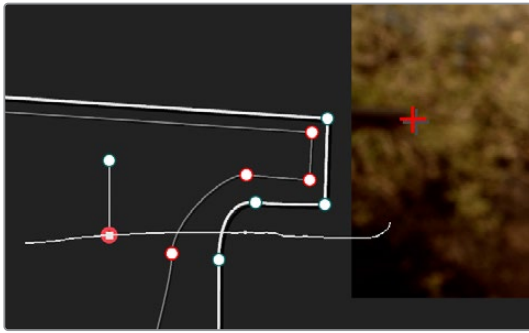
The tracker path before and after moving the tracker crosshairs in Frame mode is smooth and continuous

Rotoscoping Window Shapes After Tracking

While the DaVinci Resolve trackers are pretty miraculous when it comes to making a window follow moving subjects, or elements within a moving scene, there will be plenty of times when the final track isn't quite perfect. For example, if you're trying to isolate someone's face with a very specific window, and the person turns their head, then the resulting change of shape is almost certainly going to require you to make animated adjustments to the window in order to continue making such a specific isolation.
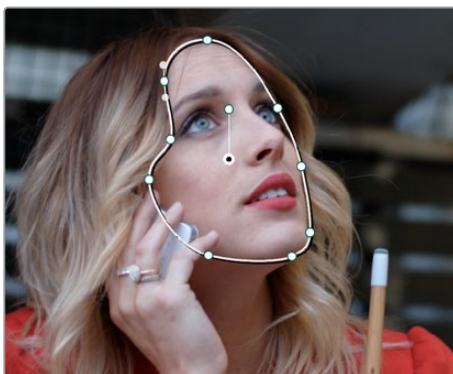
Before and after a window tracking a turning head, the window doesn't quite follow the edge of the woman's face as her head turns

Fortunately, the Tracker palette's Frame mode makes it easy to animate shape changes you make to windows in order to better follow a moving subject, a task often referred to as rotoscoping. By following the motion of a moving subject, and making a series of automatically keyframed adjustments to the window at every point the subject changes speed or direction, you can make a window isolate a moving target with surprising precision.

Using Frame mode to rotoscope the window to better follow the edges of her face and the contours of the jaw

Furthermore, you can also use Frame mode to repair imprecise tracks where the window is veering off course because of quickly or irregularly moving features. In these cases, you have the option of manually tracking the window in Frame mode to fit the trajectory of the feature, frame by frame.

Lastly, you don't even have to have performed a track to use the Tracker graph in Frame mode to keyframe animated changes to a window. In fact, using the Tracker graph in Frame mode can sometimes be more convenient than using the Keyframe Editor in Auto Keyframe mode, depending on what you're doing.

Rotoscoping Controls

The Clip/Frame buttons determine whether or not you're rotoscoping a shape.

- **In Clip mode:** Any changes you make to a window transform it over the entire duration of that clip. In other words, you can track a window to a moving feature, and in Clip mode any changes you make to the size, rotation, position, or shape of the window occur equally from the beginning to the end of that clip.

- **In Frame mode:** Changes you make to a window automatically create a keyframe at the bottom of the ruler in the Tracker graph. Making two or more changes to a window in Frame mode results in automatically interpolated animation from one keyframed window transformation to the next.

You can freely move back and forth between Clip to Frame modes to make changes to a window. Even if you've keyframed a window to change shape, you can turn on Clip mode and make an overall change to the window, enlarging it for example, that results in the window being equally enlarged at every keyframe.

Keyframing in Frame Mode

Once you've added keyframes to the Tracker palette, there are a number of ways you can edit them.

Methods of working with keyframes in the Tracker graph:

- **To add a keyframe:** Click the Add Keyframe icon at the upper right-hand corner of the Tracker graph. It looks similar to the Keyframe icons found in the Edit page Inspector. This is useful for adding a keyframe to a frame where the window fits the subject well, prior to moving forward a few frames and making an alteration to the window to follow the subject that will generate another keyframe.

- **To move the playhead from one keyframe to another:** Click the Previous Keyframe and Next Keyframe icons at the upper right-hand corner of the Tracker graph. These controls look similar to those found in the Edit page Inspector.

- **To delete a keyframe:** With the playhead on the same frame as the keyframe you want to delete, open the Tracker option menu, and choose Delete Keyframe.
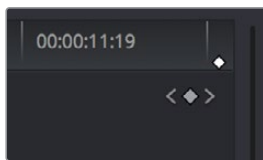
The Previous Keyframe, New Keyframe, and Next Keyframe buttons in the Tracker graph

A Rotoscoping Workflow

The following procedure demonstrates how to use a window to rotoscope an onscreen feature that you want to isolate. In the process, it shows how to set up a window for rotoscoping using the Tracker palette, and discusses some best practices for rotoscoping efficiently.

To rotoscope or manually track a window using automatic keyframing:

1. Create a window to isolate the feature you're wanting to adjust, and use the tracker to make it follow the motion of the subject. If the window doesn't follow the contours of the subject as precisely as you require, then you can begin manually keyframing its shape on top of the tracking you've done to rotoscope the subject.

2. With the Tracker palette open, click Frame to change the tracking mode.
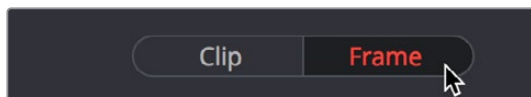
Clicking the Frame button to begin keyframing your shape

3. With the playhead at either the first or last frame where the window fits the subject you're isolating, you can either click the Add Keyframe icon at the upper right-hand corner of the Tracker graph, or wiggle any control point by a pixel or two, to add a keyframe at that frame.

   With the playhead at either the first or last frame where the window fits the subject you're isolating, you can either click the Add Keyframe button at the upper right-hand corner of the Tracker graph, or wiggle any control point by a pixel or two, to add a keyframe at that frame.
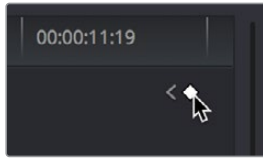
Clicking the Add Keyframe icon in the Tracker graph

Adding a keyframe at the last frame where the window follows the subject's motion well means that any future animated changes you make interpolate from this frame forward, rather than from previous frames where there's no need for alterations.
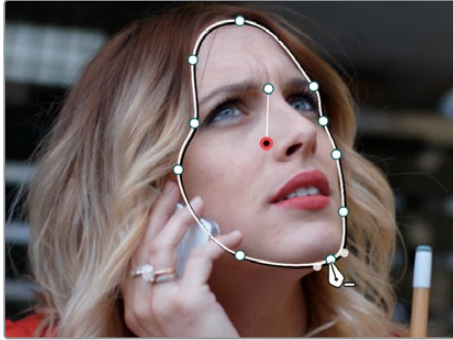
Adjusting the window in Frame mode adds a keyframe

While you're in Frame mode, the changes you make to the window automatically generate a keyframe in the Tracker palette, which appears at the bottom of the Tracker graph's timeline.
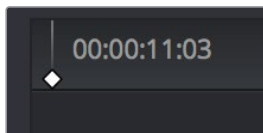
Keyframes appear in the Tracker graph ruler

It's frequently essential to add a keyframe at the last frame where a window conforms well to the subject you're trying to isolate, in order to limit window animation from that frame to the next keyframed transformation, rather than accidentally animating from the beginning of the clip, or from the next or previous keyframe in the Tracker graph.

4   Next, move the playhead to the next frame where the window requires adjustment to better fit the moving subject, and adjust the position of the window, the control points of the window, or both to isolate the subject as necessary.
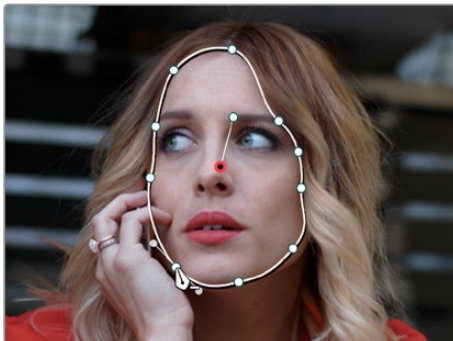
Readjusting the window in Frame mode to follow the subject's motion

This results in a second keyframe being placed in the ruler of the Tracker graph.
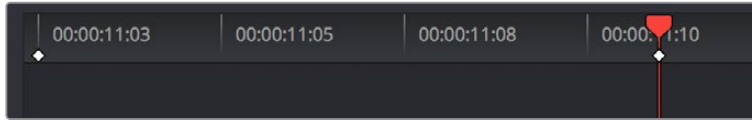
Two keyframes creating rotoscoped animation in addition
to any motion tracking that's applied

5   With your first two keyframes placed, scrub the playhead back and forth between them
    to evaluate how well the window's animation is automatically interpolating to fit the
    motion of the subject you're isolating. If the window doesn't follow the motion of your
    subject well enough, move the playhead to the frame where the window divergence is
    the most pronounced and make another adjustment to correct the shape.
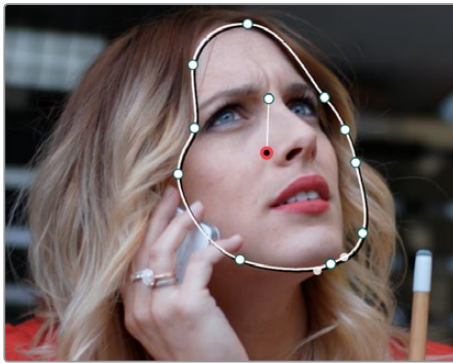
A frame between the two keyframes you've
rotoscoped that needs further adjustment

This creates another keyframe.
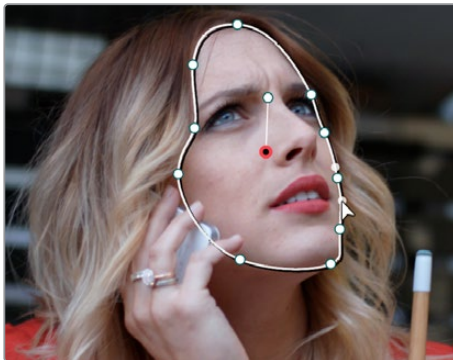
After adjusting the in-between frame

6   When you're finished making adjustments between your first two keyframes, move the
    playhead farther along and add keyframes as necessary to make the window follow the
    motion of your subject.

    In general, look for the frames where your subject's motion starts, stops, speeds up,
    slows down, or changes direction. As you work, it's good to try and add the fewest
    number of keyframes you can to ensure smooth motion from one to another. Too many
    keyframed adjustments made too close together for a smoothly moving subject risks
    adding jerky motion if you're not careful. On the other hand, if you have an erratically
    moving subject, you may have to add more keyframes, possibly frame by frame, to
    achieve the desired result.

> **TIP:** If you're isolating a subject with a complex shape that moves quite a lot, you might consider using multiple simple overlapping shapes to track and rotoscope it, rather than a single complicated one, to make the task easier.

7 When you're finished rotoscoping the window, be sure to click the Clip button to switch back to Clip mode, so you can trim the window's shape across every keyframe you've just created, if necessary. This will also prevent you from accidentally adding more keyframes if you select other shapes.

This technique requires a bit more work then simply using the Tracker, but it'll let you quickly adjust the animation of a window to more tightly conform to a moving subject when you need an adjustment to be specific to that subject alone. You can also use this technique to reposition specific motion path points in the middle of an otherwise successful track to make them fit better, or to add keyframes to the beginning or end of a track when the subject moves offscreen but the window does not.

Viewing a Window's Motion Path

You can turn on the motion path of the window you're tracking by choosing Show Track from the Tracker Option menu, or by pressing the SHOW TRACK soft key on the Center panel of the DaVinci control panel when you're in OBJECT TRACK MODE.

Chapter 122

Using the Gallery

The Gallery provides a way to save, browse, and use saved still frames from different clips in a program. Each project is saved with its own individual set of stills, and each still you save consists of a DPX image of the saved frame, and the grade metadata. You can use saved stills for reference when matching one clip to another, or you can use them to copy grades to other clips, or other timelines.

There are two ways to work with the contents of the Gallery. The Color page has a small Gallery, to the left of the Viewer, that provides quick access to saved stills and grades as you work. The Gallery window, which can be opened via a button at the top right of the Gallery, provides a dedicated interface for organizing your grades, copying grades and memories between projects, and for accessing a dedicated collection of DaVinci Resolve looks.

Contents

Using the Gallery

The Gallery in the Color page and the expanded Gallery window environment share many of the same commands for organizing stills. However, the commands for saving stills and customizing split-screen views are restricted to the Color page.
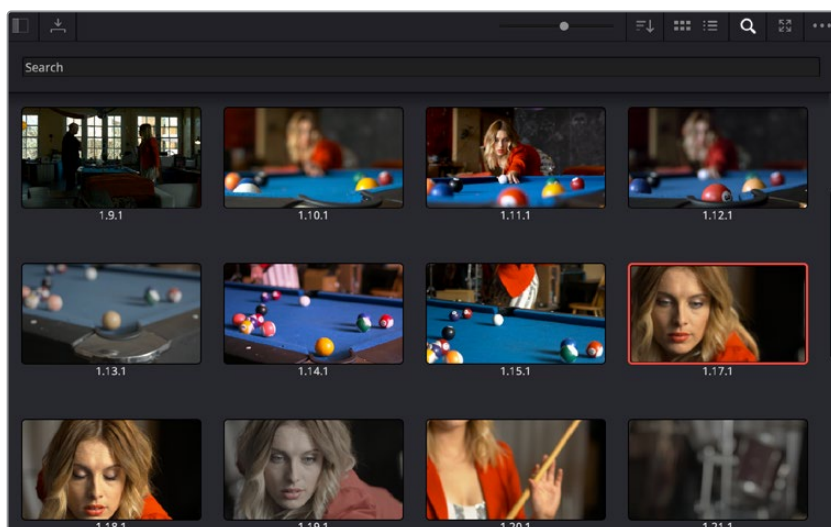
Color page Gallery

Saving Stills

One of the most common operations is to save a clip as a still (with that clip's embedded grade) for future reference and use.

To save an individual still in the Color page, do one of the following:

- Choose View > Stills > Grab Still (Option-Command-G).
- Right-click on the Viewer and choose Grab Still.
- Press GRAB STILL on the Transport panel of the DaVinci control panel.

It's also possible to save stills automatically for every clip in the entire Timeline. This can be useful if you're planning to export a set of grades to hand off to another colorist, or if you need to apply a series of grades manually from one project to another when ColorTrace™ won't work.

To save a still for every clip in the current timeline, right-click the Viewer, and choose one of the following:

- **Grab All Stills > From First Frame:** The first frame of each clip is saved to the Gallery.
- **Grab All Stills > From Middle Frame:** The middle frame of each clip is saved to the Gallery.
- **Grab Missing Stills > From First Frame:** Only the first frame of clips with no stills in the Gallery are saved to the Gallery.
- **Grab Missing Stills > From Middle Frame:** Only the middle frame of clips with no stills in the Gallery are saved to the Gallery.

By default, when you save one or more stills, they're named "TrackNumber.ShotNumber.VersionNumber" with dots separating each number. If you like, you can choose an option from the General Options panel of the Project Settings to "Automatically label Gallery stills" in different ways. This is covered in more detail later in this chapter.

Selecting Stills

To select a range of stills, do one of the following:
- Click one still, then Shift-click another to select a contiguous range of stills.
- Command-click any stills you like to make a noncontiguous selection.
- Right-click any still, and choose one of the following commands:
  - **Select All:** Selects every clip in the Gallery.
  - **Select Current to Last:** Selects every still from the one you've clicked through the last still in the Gallery.
  - **Select First to Current:** Selects every still from the one you've clicked through the first still in the Gallery.

Deleting Stills

If you need to remove one or more stills, this can only be done using the Gallery's contextual menu.

To delete one or more stills, do one of the following:
1. Select one or more stills in the Gallery.
2. Right-click one of the selected stills and choose Delete Selected.

Each still is also saved with a variety of metadata that is used by DaVinci Resolve to manage the contents of the Gallery in different ways. This metadata can also be used for searching and sorting, and is viewable by opening the Still Properties window.

To display a still's properties:

Right-click a still in the Gallery and choose Properties.

A floating translucent window appears displaying the date the still was created, what clip it was grabbed from, when it was grabbed, and the source and record timecode values of the frame it came from.

Still Properties	
Created	Thu May 24 2018 08:14:31
Grabbed from	Pool Shark Color Graded track 1 scene 10
Grab date	Wed May 16 2018 11:14:11
Record Timecode	01:00:45:06
Source Timecode	17:27:52:09
Image file path	/Volumes/MEDIA RAID/.gallery/82fcfa09-ea41-4f30-a82f-88832e2167ec/8c9fa749-70fb-4fbf-91c2-5f2b089d208d.dpx
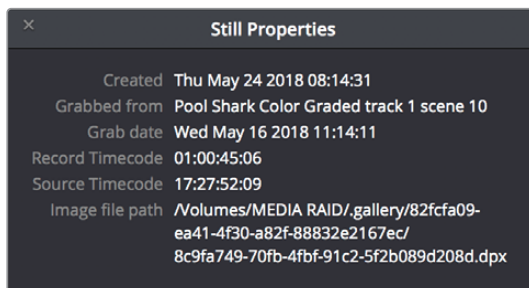
Right-click on a still to choose Still Properties

Where are Stills Saved?

By default, all grades/stills you save are saved in the DPX format, and are placed in the directory path defined in the "Gallery stills location" field in the Working Folders section of the Master Settings panel of the Project Settings. This path defaults to a hidden ".gallery" directory that's created at the location of the first Media Storage Volume you specify in the Media Storage panel of the System Preferences window.

Changing the PowerGrade Still Directory

Optionally, you can change the location where PowerGrade stills are saved by Opening the Gallery Option menu and choosing Change PowerGrades Path. You'll be prompted via a "Select PowerGrades Folder" dialog to choose a directory where all PowerGrades will be saved.

Live Previews of Gallery Stills

The Live Preview option, found in the Gallery option menu, lets you preview how the current clip would look with a particular Gallery Still grade applied to the currently selected clip simply by moving the pointer over the still you want to preview.

Enabling and Disabling the Gallery Live Preview:

1   Open the Gallery option menu and choose Live Preview.
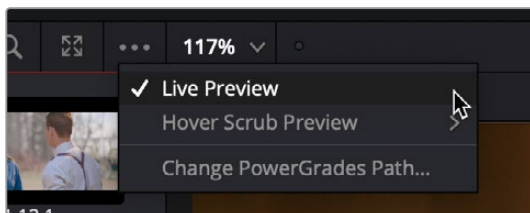
The Live Preview option for the Gallery browser lets you hover over a saved grade to preview it on the current clip in the Viewer

2   Click a node in the Node Editor you want to preview applying the grade from a still to. The live preview will display how the current clip will appear with the grade of the still you select applied to the currently selected node of current grade, which will affect the result.

3   Move the pointer over the still you want to preview.

The Viewer image updates to show how that clip would look with that still's grade applied to the currently selected node.

Hover Scrub in the Gallery

When Live Preview is enabled in the Gallery option menu, the Hover Scrub Preview submenu lets you choose how you want Live Preview to be shown by a thumbnail in the Gallery and in the Viewer when you hover the pointer over a still or LUT in the LUT Browser:

- You can choose to scrub both the thumbnail you're hovering over and the Viewer, letting you preview the current still's grade or a LUT over the duration of the current clip in both the thumbnail and Viewer.

- You can choose to scrub just the thumbnail, leaving the Viewer to show just the grade or LUT over the frame at the position of the playhead.

- You can disable scrubbing altogether, in which case both the thumbnail and the Viewer will only show the grade or LUT over the frame at the position of the playhead.

The Hover Scrub Preview options when Live Preview is enabled

Playing Stills and Setting Up Image Wipes

There are many ways to play a still in the Color page, making it visible as an image wipe in the Viewer and on the external display connected to your video interface.

To play a still, displaying it as an image wipe or full screen, do one of the following:

- Double-click a still in the Gallery.

- Select a still in the Gallery, and click the Image Wipe button on the top Viewer toolbar.

- Click a still in the Gallery, then right-click in the Viewer and choose Show Reference Wipe.

- From the View > Stills menu, choose Next Still (Option-Command-N) or Previous Still (Option-Command-B) to select a still in the Gallery, and then choose Wipe On/Off (Command-W) to play it.

- Press PREV STILL or NEXT STILL on the Transport panel of the DaVinci control panel to select a still, then press PLAY STILL. Press PLAY STILL again to dismiss the still.

Whenever you play a still, the Viewer mode's drop-down menu changes to Split mode.

Once displayed, the wipe between the current clip and the still being referenced can be moved and reoriented in different ways. If you want a full-screen view so you can flip back and forth between the still and the current clip, simply adjust the split until the still fills the entire Viewer.

To adjust a wipe in the Viewer, do one of the following:
- Drag the pointer within the Color page's Viewer to move the wipe.
- Push the T-bar lever up and down on the T-bar panel of the DaVinci control panel.

To customize the type of image wipe that's displayed in the Viewer, do one of the following:
- Click any of the controls at the top right of the Viewer toolbar to choose Horizontal, Vertical, Mix, Alpha, Box, and Difference types of wipe.
- Choose Gallery, Timeline, or Offline from the View > Reference Wipe Mode submenu, or the Viewer contextual menu.
- Choose Horizontal, Vertical, Mix, Alpha, Difference, and Box from either the View > Wipe Style submenu, or the Viewer contextual menu.
- Choose View > Invert Wipe (Option-W), or right-click the Source Viewer and choose Invert Wipe from the contextual menu to reverse each half of the wipe.

Timeline Wipes

A timeline wipe is when you use the Wipe Timeline Clip command in the Thumbnail timeline (it's found in the contextual menu when you right-click a clip other than the current clip) to wipe the current clip against another clip in the Timeline, without needing to save a still first. When you turn a timeline wipe on, the clip in the timeline that's being wiped is outlined in blue.

Gang Timeline Wipe With Current Clip

A "Gang timeline wipe with current clip" option, available from the Viewer option menu, lets you maintain the offset between the current clip and a timeline clip you're wiping against when you move the current clip selection to other clips. With this option enabled, the offset between the timeline wiped clip and the current clip is maintained when you move the clip selection. When this option is disabled, the timeline wiped clip stays where it is regardless of what clip you select.

Change a Timeline Wipe Using the Timelines Album of the Gallery

While you're using the Wipe Timeline Clip to show a wipe of the current clip against any other clip in the Timeline, you can open the Timelines album of the Gallery and click different clips to change which Timeline clip you're wiping against (outlined in blue) without changing the current clip (outlined in orange). Make sure you have selected the same timeline in both the Timeline album, and the Color page.

Labeling and Searching for Stills and Sources

By default, all stills are identified by a three-number code. The first number is the video track the clip is on, the second number is the clip's position number in the current Timeline, and the third number is the version number of the grade.
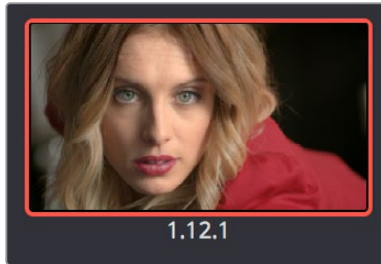
All stills are numbered Track.Shot.Version

If you've saved many stills, it can help to label the important ones with whatever text you find helpful. Once labeled, you can search for stills by label using the Search field, at the upper right-hand corner of the Gallery.

Automatic Labeling

If you like, you can choose an option from the Color group in the General Options panel of the Project Settings to "Automatically label Gallery stills" in different ways. There are many options:

- **Clip Name:** Saves the Clip Name, which defaults to the File Name unless you've customized it.
- **Clip Version Name:** Automatically saves the name of the current version.
- **Source timecode (HH.MM.SS.FF):** Saves the source timecode of the current frame.
- **Timeline timecode (HH.MM.SS.FF):** Saves the timecode for the playhead's position in the Timeline.
- **Timeline Name:** Saves the name of the currently open Timeline.
- **Display LUT Name:** Saves the name of the currently used Display LUT, if one is applied.
- **Custom label using tags:** Choosing this option reveals a field you can use to either type custom text into, or in which you can use metadata variables to save automatically updated information relating to the currently selected clip and timeline. For more information about using metadata variables, see Chapter 173, "Using Variables and Keywords."

For all options, there's also a checkbox you can toggle:

- **Append still number on export:** Turning this checkbox on lets you choose how to include the default still number when exporting stills with the "Use labels on export" option enabled, either as a prefix or suffix.

Manual Labeling

Sometimes the easiest thing to do is to just give a particular still a custom name that's representative of what that still represents, such as "SeemedLikeAGoodIdea." When naming stills manually, it's best to avoid using the forward slash character in case you find yourself exporting these stills with file names. In fact, it's a good idea to avoid using the forward slash character for just about any text that you add in DaVinci Resolve.

To manually label a still:

1   Right-click a still in the Gallery and choose Change Label or double-click directly under the Still ID.

2   Type a name into the Change Still Label dialog, and click OK.

The new label appears underneath the still number.
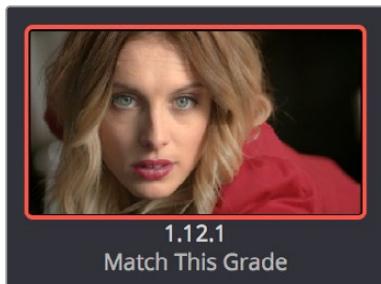
You can also label stills for easier identification

Searching For Stills

Once labeled, you can search for stills you need in the Gallery.

To search for a still by label:

Click the Magnifying Glass button to open the Search field, click to place the cursor within, and then type the name or description you are searching for.

As soon as you start typing, DaVinci Resolve automatically begins to filter the results of the currently selected album in the Gallery to match what's been typed.

Match Reference Wipe Frame

You can right-click any Gallery still and choose Match Reference Wipe Frame to automatically move the playhead to the exact frame that corresponds to that still, and select that clip in the Color page Timeline.

Gallery Options

In the upper right corner of the Gallery palette there are several options that let you adjust the view and organization of your stills.

- **Still Size Slider:** Dragging this slider to the left makes the still thumbnails smaller, dragging it to the right makes them larger.

- **Sort Stills:** Choosing an option from this submenu changes the sort order of all clips in the Gallery. The options are:

  - **Still ID:** Sorts all stills by their assigned ID number (track, clip number, grade version).

  - **Label:** Sorts all stills by their text label.

  - **Record Timecode:** Sorts all stills by their position in the program.

  - **Source Timecode:** Sorts all stills by the timecode of the source clip they came from.

  - **Grab Date:** Sorts all stills by the date they were originally grabbed.

  - **Create Time:** Sorts stills based on when you saved each still.

- **Thumbnail View:** Pressing this icon puts the gallery in Thumbnail view; each still is represented by an image.

- **List View:** Pressing this icon puts the gallery in List view; each still is represented by columns of text attributes.

- **Search:** Opens up a search dialog box, to find stills based on their text label.

- **Gallery View:** Opens up the full Gallery Management window.
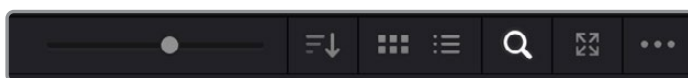
The Gallery options (L-R): Still Size Slider, Sort Stills, Thumbnail, List, Search, Expand, Options

When you right-click the gray area of the Gallery, behind the Still icons, you can open a contextual menu that provides a variety of additional options for controlling how many stills are saved, how they're displayed, and how they're arranged in the Gallery. There are the following options:

- **Switch Wipe Mode:** Switches the Reference mode between showing a "Gallery" still, a "Timeline" clip, or an "Offline" reference movie.

- **Trace Timeline:** When enabled, selecting a clip in the Timeline also automatically selects the first still that was saved from that clip to the Gallery.

- **One Still Per Scene:** When enabled, restricts the Gallery to save only a single still for each clip in the Timeline. If multiple stills have already been saved before turning this option on, those stills will remain in the Gallery until you save another still from the same clip, at which time all other stills from that clip will disappear.

- **Apply Display LUT:** If you have a Display LUT selected in the Lookup Tables panel of the Color Management panel of the Project Settings, it's applied to the video output via a connected video interface, and also to the Viewer. Ordinarily, you don't also want the Display LUT applied to stills you're saving since it's meant to be temporary. Accordingly, stills are saved with a LUT-free image. However, in instances where you may also want to save a reference to the currently used Display LUT, turning on "Apply Display LUT" saves the Display LUT along with the still, and applies that LUT when that still is used for split-screen reference. Keep in mind that the internally saved Display LUT is only used when playing that still in the Viewer; the DPX image that's saved remains unaffected.

- **Sort Stills By:** Choosing an option from this submenu changes the sort order of all clips in the Gallery. The options are:
  - **Record Timecode:** Sorts all stills by their position in the program.
  - **Source Timecode:** Sorts all stills by the timecode of the source clip they came from.
  - **Create Time:** Sorts stills based on when you saved each still.
  - **Clip and Create Time:** A two-level sort; stills are sorted primarily based on the ID number of the clips they came from, and secondarily based on the time they were created.

- **Apply Grades Using:** This submenu contains three options for how to apply the keyframes that are automatically saved within each saved grade.
  - **No Keyframes:** No keyframes are copied. The state of the grade at the frame used to save the still is what is applied to the target clip or clips.
  - **Keyframes Aligning Source Timecode:** Keyframes are copied aligning the source timecode of the saved grade with the source timecode of the target clip. This is the ideal setting when you're copying a grade back to the clip it came from originally, or to a duplicate of that clip elsewhere in the Timeline, and you want the keyframes to align with the same frames as before. If there is no source timecode overlap, keyframes will be pasted aligning with the start frame of the edit, the same as the third option (below).
  - **Keyframes Aligning Start Frames:** Keyframes are copied aligning the start frame of the clip that still was saved from with the start frame of the target clip. This is the ideal setting when you're copying a grade with keyframes from one clip to a completely different clip, with different timecode.

- **Use labels on still export:** Lets you use labels that you've added to stills in the file name of exported stills.

- **Show All Stills:** This command shows all available stills in the current album if any have been hidden, for example by searching or by using the Show Current Timeline Only command.

- **Show Current Timeline Only:** Choosing this option restricts the Gallery to only showing the stills that were saved from the currently selected Timeline. All other stills from other Timelines are hidden until you switch to that Timeline.

> **NOTE:** There are a variety of other commands available in this contextual menu that are covered elsewhere in this chapter.

Organizing Stills Using Albums

All stills you save are always placed into the currently open album of the Gallery, which defaults for new projects to "Stills 1." However, you can create additional albums with which to organize your stills into whatever categories you require. Albums can be shown, created, and removed using the Gallery in either the Color page or Gallery windows.
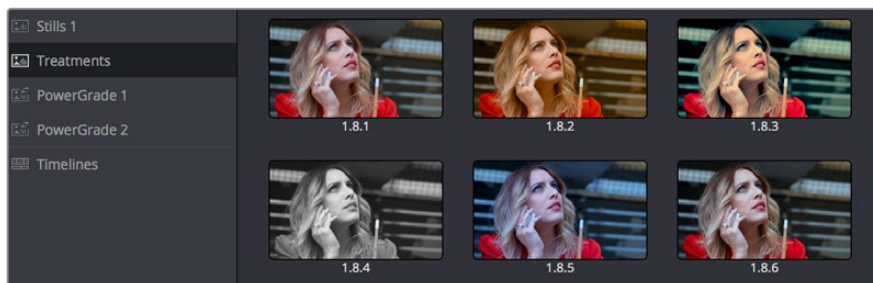
Use albums to organize your stills

To show or hide the Albums list:

Click the Album button, at the top left of the Gallery.

If the Albums list was hidden, clicking the Album button will make the Albums list appear, to the left of the Gallery, containing all albums that are currently available in the project that's open, as well as the PowerGrade album at the bottom. If the Albums list is already visible, then it becomes hidden, making more room for still thumbnails in the Gallery.

Once you've displayed the Albums list, there are a variety of ways you can quickly and easily work with albums.

Methods of working with albums:

- **To add a new album:** Right-click the Albums list, and choose Add Still Album from the contextual menu. A new album is created, numbered incrementally.

- **To add a new PowerGrade album:** Right-click the Albums list, and choose Add PowerGrade Album from the contextual menu. A new album is created, numbered incrementally.

- **To rename an album:** Double-click any album in the list, and when it is selected, type a new name and press Return.

- **To navigate albums:** Click any album to make it the current album. Using the DaVinci control panel, you can use the PG UP/GALLERY/PG DOWN button; press SHIFT UP and GALLERY to move to the next album up the list, or press SHIFT DOWN and GALLERY to move to the next album down the list.

- **To move clips from one album to another:** Drag and drop a still from the Gallery to an album.

- **To remove an album:** Right-click any album, choose Remove Current Album, and click Delete at the prompt. All clips inside that album will be deleted along with the album, so use this carefully.

PowerGrade Albums

PowerGrade albums are meant to be repositories for grades you want to reuse frequently, or for stills that you need to reference from multiple projects, such as when grading a series that shares common looks from episode to episode.
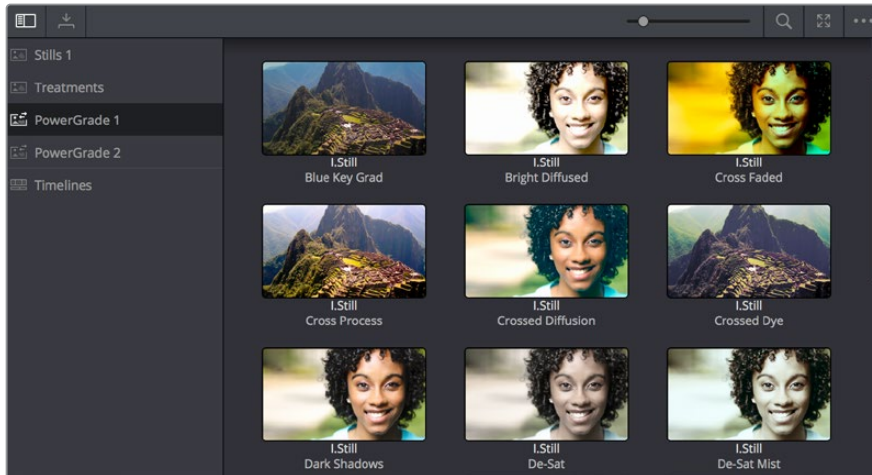
PowerGrades are associated with your user login

Unlike stills saved to the other albums in the list, which are ordinarily available only to the project in which they were saved, stills saved to a PowerGrade album are shared among all projects that have been stored within a particular database. Each database has its own unique PowerGrade album.

Creating a new database creates a new PowerGrade album, which starts out as a clean slate. However, you can always use the Gallery window to copy PowerGrade stills from other projects and databases to the current one, and you can create as many PowerGrade albums as you need to organize your grades. For more information about project management and databases, see Chapter 2, "Managing Projects and Databases."

Functionally, PowerGrade albums are identical to any other album, and you can save, organize, and use stills in PowerGrade albums as you would with other albums. Since PowerGrade albums are special in that they're maintained by DaVinci Resolve, the last PowerGrade album cannot be deleted.

Browse all Grades from the Current Timeline

The Gallery has a Timelines album, available at the bottom of the Album list, that lets you browse all the grades in the current timeline, or in other timelines of the current project (using a drop-down menu that appears at the top of the Gallery browser area), making it easy to copy grades from earlier or later in your timeline, or from other timelines that share the same media.

This is particularly useful for reality shows or documentaries where the same clips can appear multiple times in different parts of a program. Being able to simply show all existing grades in the Gallery frees you from having to save a still for every grade you think you might eventually reuse.
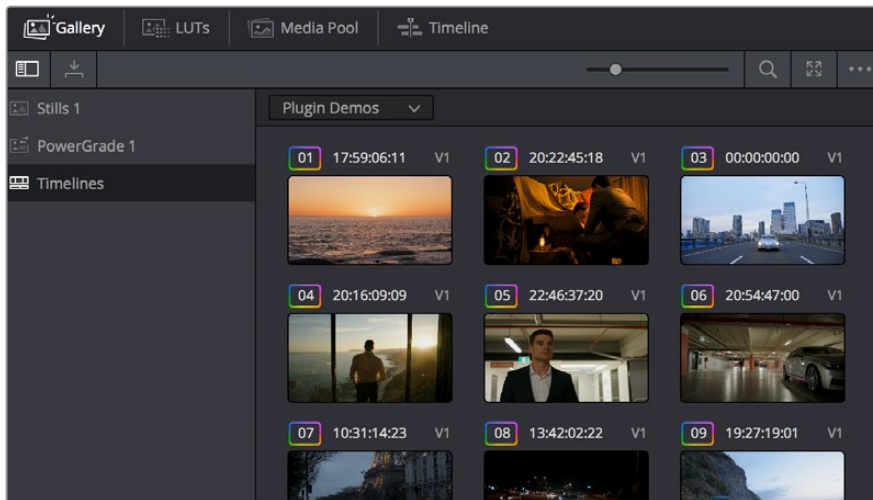
The Timelines grade browser in the Gallery automatically shows all grades in the current timeline

The Gallery Management Window

While you can do quite a lot of stills management using the Gallery as it appears in the Color page, the Gallery window provides additional functionality for copying stills among different projects and databases, for organizing your stills and memories, and for accessing the DaVinci Resolve looks that accompany the application.

To open the Gallery window:
Click the Gallery View button at the upper right-hand corner of the Gallery or select Workspace > Gallery.
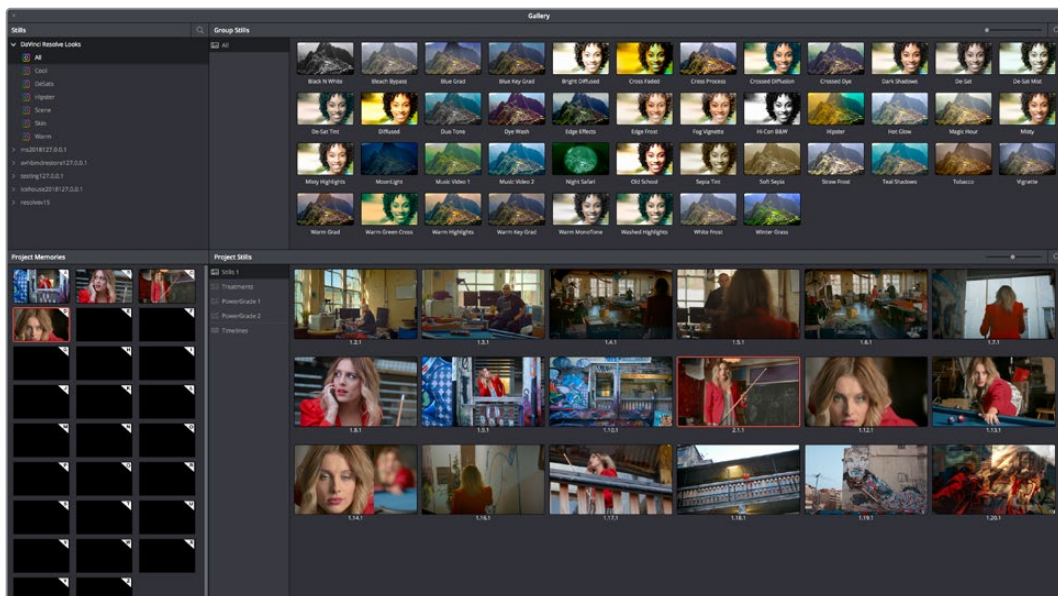
Gallery window

The Gallery opens into a floating window, divided into four areas:

- **Stills navigator:** Lets you navigate the contents of other projects and databases that are available. Independent projects, as well as database > user > project relationships, appear in this hierarchical list. Click the disclosure triangle next to any item on this list to reveal its contents. Click any project in the list to reveal its albums and stills in the Group Stills browser.
- **Group Stills browser:** Displays the contents of the currently selected item in the Stills navigator. One or more selected stills can be copied to the current project by selecting an album in the Project Stills browser, and dragging and dropping the selected stills to the Project Stills browsing area.
- **Project Stills browser:** Contains the same Album list and Project Stills browser that's visible in the Color page Gallery.
- **Project Memories:** Provides a larger view of the project memories that are visible in the Color page Gallery.

To resize different areas of the Gallery window:

Move the pointer to the border between any areas of the Gallery. When the pointer changes to the resize cursor, drag the border to resize the adjacent interface areas to whatever size you need. Dragging all the way to the edge of the screen hides that interface area completely.

What's Available in the Stills Navigator

The Stills Navigator accesses a variety of content via a hierarchical list. Disclosure triangles to the left of each item in the Stills browser let you access the contents of each item, and many items have several nested levels of content within, each accessed by its own disclosure triangle.
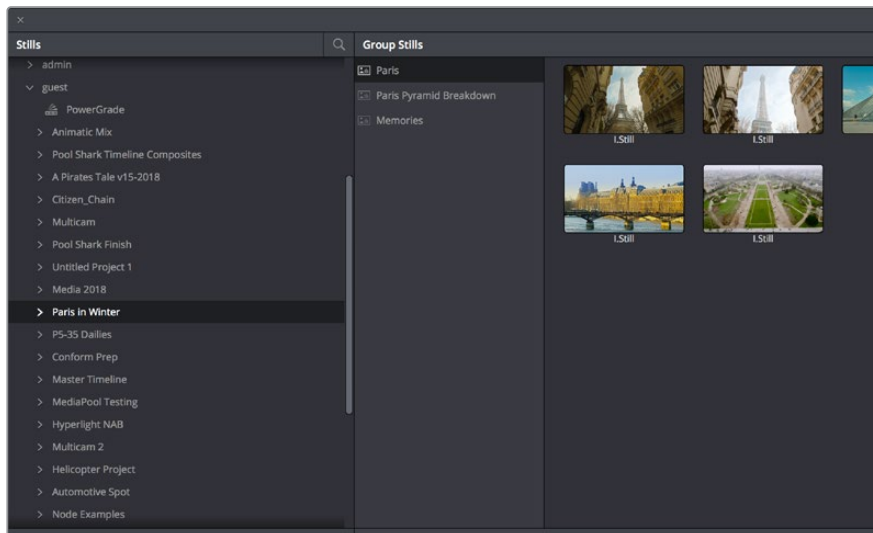
The Gallery Stills database show all projects connected so you can import those stills

- **DaVinci Resolve looks:** A collection of predefined grades, categorized by type, that provides excellent examples of different looks available in DaVinci Resolve. These grades are installed with DaVinci Resolve and cannot be altered.

- **Databases:** Each database that's available appears within this list. Each database has a nested series of users, projects, and timelines within, as well as one nested PowerGrade item for each user, which provides access to the saved stills within.

- **Orphans:** Stills are saved to a separate directory which is defined in the Master Settings panel of the Project Settings. Whenever you delete a database, the stills that corresponded to that database become orphaned. All orphaned stills that lack a connection to any current database appear within the Orphan item in the Stills Navigator.

Browse and Import Timeline Grades From Other Projects

The Gallery window lets you see and import grades in the timelines of other projects, even if they weren't saved as stills first. When you open the Gallery Window and use the hierarchical disclosure controls of the Stills panel to open up and select a specific Database > User > Project > Timeline, you'll see at least three browsable albums to the right: the Stills galleries that were created, the Memories, and at the bottom an album called Timeline Media. The Timeline Media album lets you browse the currently used grades for every clip in that timeline, making it easy to copy the ones you need to the current project's Stills album or Memories.

This is particularly useful if you're working on a series where and you find that you want to re-use different grades, looks, adjustments, or fixes from previous episodes in the current one. Previously, you'd have to remember to save every clip as a still to be able to browse the grades in this way. Now you can simply browse the clips in the Timeline directly.
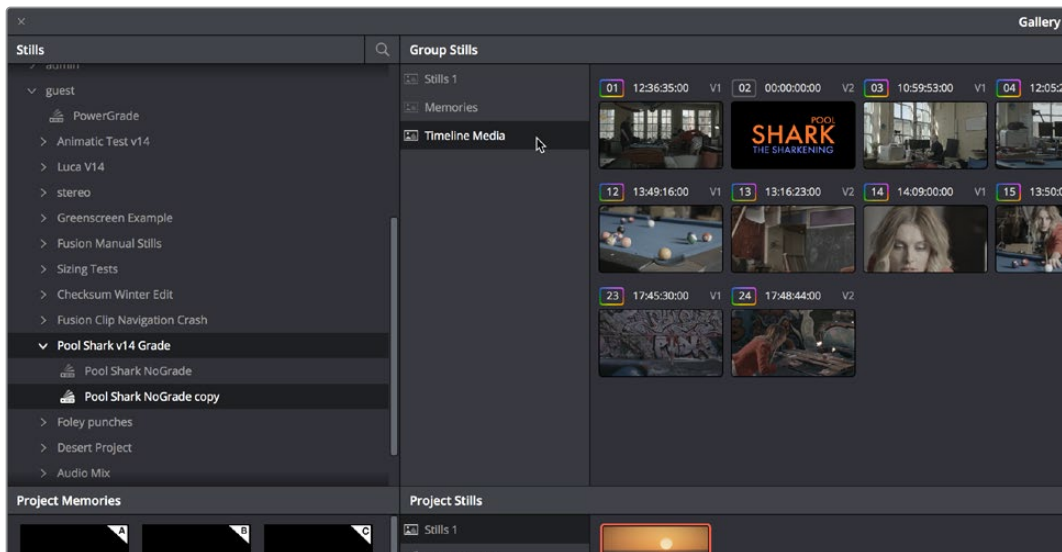
Browsing the timeline grades for another project in the database

Importing and Exporting Stills

It's possible to import still images in different graphics formats into the Gallery, which can be particularly useful when a client provides reference images to which they'd like you to refer. It's also possible to export stills from the Gallery, which is good for sending a series of reference stills for approval to a remote client. In both cases, you can choose whether to import or export images with an accompanying LUT.

For both import and export, DaVinci Resolve supports the following file formats: DPX, CIN, TIFF, JPEG, PNG, PPM, BMP, and XPM.

To import one or more still images:

1   Right-click anywhere on the gray background of the Gallery.

2   Choose one of the following commands:

   – **Import:** Imports image files, along with a matching DRX file, if one is present in the selected directory.

   – **Import With Output LUT:** Imports an image and DRX file, along with a matching LUT file, if one is present in the selected directory.

3   When the Import Stills dialog appears, choose the type of files you want to import from the "Files of type" drop-down menu, then navigate to the files you want to import, select them, and click Import.

To export one or more still images:

1   If you want to export Gallery stills with labels that have been added to them, right-click anywhere in the background of the Gallery and choose "Use labels on still export" in the contextual menu so it becomes checked.

2   Select one or more stills in the Gallery.

3   Right-click one of the selected stills, and choose one of the following commands:

   – **Export:** Two files are saved for each still you selected. An image file in the format of your choice, and a DRX (DaVinci Resolve eXchange) file that contains the grading metadata that was saved with that Gallery still.

   – **Export With Display LUT:** If you have a Video Monitor Lookup Table specified for the current project in the Color Management panel of the Project Settings, this command will output the image as it is processed by the specified LUT. A DRX file is also output containing the grading metadata that was saved with that Gallery still.

4   When the Export Stills dialog appears, choose a file format to export to from the "Files of type" drop-down menu, then choose a location, type a name into the Save As field, and click Save.

   Each of the selected stills is exported with all accompanying files. Each file uses as its prefix the name you typed into the Export Stills dialog, followed by an underscore, the still ID number of the selected still, and the three-letter file extension.

Using and Organizing Memories

Stills and memories contain identical information, and can be split screened, copied, appended, exported, and can display their node graph just like any other still. However, stills that are assigned as a memory make them easier to access via keyboard shortcuts, and from dedicated buttons on the DaVinci control panel.

Memories are hidden by default, but you can reveal them by clicking the Memories button, to the right of the Gallery list button at the top-left of the Gallery.
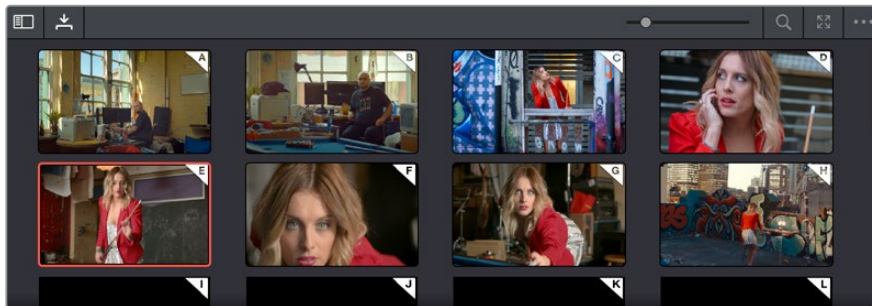
Place grades you will use often in Memories for faster recall

The Memories thumbnail display makes it easy to keep track of which stills have been assigned to which memories in situations where you're using multiple memories to copy grades throughout a program.

To copy stills and memories back and forth, do one of the following:
- Drag a still onto a memory bank.
- Drag a memory into the Gallery.

> **TIP:** In this way, memories can be used to copy stills from one album to another.

To save the current clip's grade to a memory for future use, do one of the following:
- Choose Color > Memories > Save Memory A–H (Option-1 through 8).
- Using the DaVinci control panel, press CRNT on the Transport or T-bar panel, then press the letter of the memory bank you want to save to. Use the SHIFT UP button to save to another memory sharing the same button.
- If you save a grade to a memory that already contains something, the previous memory is overwritten.

To apply a memory to the current clip in a timeline, do one of the following:
- Right-click a memory and choose Apply Grade.
- Choose Color > Memories > Load Memory A–H (Command-1–8).
- Using the DaVinci control panel, press the letter of the memory bank you want to apply. Use the SHIFT UP button to apply a memory that shares the same button.

To clear a memory:
Right-click a memory, then choose Clear.

Chapter 123

Grade Management

The Color page offers numerous ways of saving grades, copying grades, creating and altering groups of clips to share grades, rippling grades and adjustments, and managing multiple versions of grades. All of these procedures enable you to work faster by leveraging work you've already done to apply to other clips that can benefit from the same adjustments, or by applying changes across multiple clips all at once.

Contents

Using Versions to Manage Grades

Working quickly requires a mastery of the numerous grade management features built into DaVinci Resolve. These features are designed to help you copy and ripple grades to individual clips, among manually defined groups of clips via the Node Editor's Clip mode, or among automatically linked clips that share the same source clip in the Media Pool (when using Remote versions). Multiple versions of grades are supported for every clip, as are various options for previewing, overwriting, and appending these versions.

Choosing to Copy Grades Manually or Automatically Using Versions

Each grade you apply to a clip is a version. Each clip can have multiple versions, although only one version can be applied at a time. By default, the first grade applied to every clip in a timeline is a local version named "Version 1." A clip's version name and/or number appears underneath the clip thumbnail, to the right. You can also see the version name, along with a list of all the other versions that are currently available to that clip, by right-clicking a clip in the Timeline and looking for the version names that appear underneath the Local Versions submenu.
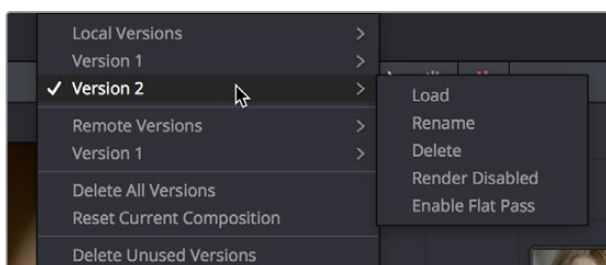
Selecting versions of grades from the Timeline thumbnails

> **NOTE:** Double-clicking the version name underneath a clip's thumbnail in the Timeline cycles the version names, the clip names, and the codec used by each clip.

There are two different types of versions in DaVinci Resolve, each of which provides a different method of grade management and linking among the clips and timelines of a project.

- **Local versions:** The default mode of grade management. Clips using local versions are unlinked, so each clip has its own grade which is not shared with any other clips in any other timelines. Changing the grade of a clip using a local version has no effect on any other clip in that project.

- **Remote versions:** An alternate mode of grade management that you can enable. All clips using remote versions that share the same source clip in the Media Pool are automatically linked, in all timelines, and share the same set of grades.

If you use local versions to grade all your clips, you don't have to worry about one clip's grade being accidentally copied to other clips that happen to come from the same file in the Media Pool, which can make it easier to work. On the other hand, you need to manually copy every grade that you want to duplicate, even among clips that clearly come from the same take or angle. You can always create a group to share a grade among clips using local versions, but that's an extra step.

Switching to use remote versions, instead, puts you into a mode where clips using remote versions that share the same media file are automatically linked together. This gives you a convenient shortcut for grading your program, since a grade that's applied to one linked clip is automatically copied to every other clip it's linked to, which can be convenient when grading a series of headshots appearing throughout a program that come from the same interview take. Another use of remote versions is when you're importing a new edit of an already graded timeline. Using remote versions, you can set your project up so that new incoming timelines are automatically relinked to the previous timeline's grades.

The only disadvantage to using remote versions is that when you find you need to make individual adjustments to clips that are linked, it's an extra step to either create another version, or switch that clip to use a local version, in order to keep its adjustment separate. This will be discussed in more detail later in this chapter.

Mixing Versions

Each clip is capable of having multiple local and remote versions at the same time; you get to choose which to apply. Which type of versioning is best depends on the type of project you're working on, the way in which the media was shot, and how you like to work. The following sections explain the differences in workflow.

Using Local Versions by Default

Since local versions are the default method of grading when you first create a new project (unless you've edited your settings presets), you don't need to do anything to enable this mode at first. As the name implies, local versions are local to the Timeline in which they appear, so local versions are not rippled to linked clips, and they're not shared among different timelines. This makes it easy to avoid accidentally having grades copied when you don't want them to be, but you lose the conveniences that automatic linking can provide.

However, you can always switch the clips in a timeline to use remote versions if you change your mind, either individually, or all together.

Using Remote Versions to Enable Automatic Linking

Remote versions let all clips from the same source media file in the Media Pool share their grades automatically, either within a single timeline, or across multiple timelines in the same project. However, to enable the convenience of remote grades, you need to put DaVinci Resolve into this mode of working using the Settings window.

To enable remote grades to be used:

>   Open the Project Settings, open the General Options panel, and turn off "Use local
>   version for new clips in timeline" in the Color section.

Turning this option off only affects clips that are added to Timelines from that point onward. You can keep track of which clips use remote versions by the (R) that appears when you double-click the area underneath the thumbnail to hide the codec name in the Thumbnail timeline.
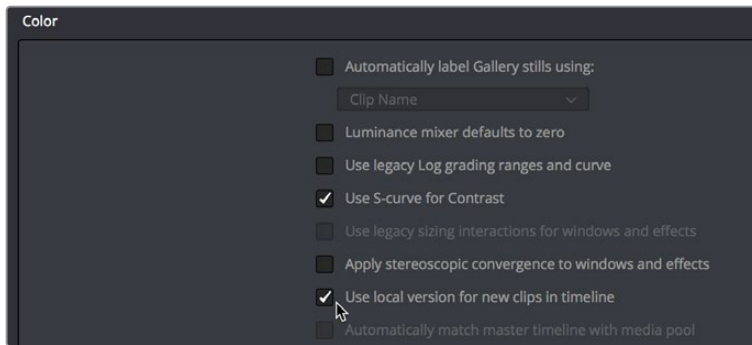
Turning off "Use local version for new clips in timeline" to
enable remote grades to be used by default

How Automatic Linking Works

When clips using remote versions have been added to a timeline, any other clips in any timeline
that (a) use remote versions also, and (b) refer to the same file in the Media Pool are linked.
Selecting a clip using a remote grade in the Color page that is automatically linked to one or
more clips displays a small "linked" badge at the right of that clip's timecode in the
Thumbnail timeline.
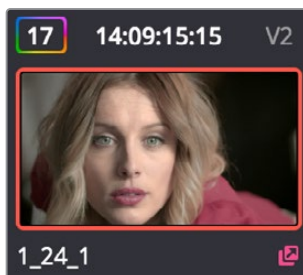
The linking arrow shows this clip
has the same source as the one
selected on the Timeline

> **TIP:** The Timeline Filtering drop-down in the Color Page toolbar has an option named
> "Common Media Pool Clips" that only shows clips in the Timeline that are linked to the
> currently selected clip.

Adjustments that you apply to a remote version of one linked clip are automatically rippled to
every other clip it's linked to, which can save you an enormous amount of time when you're
getting started with a new program. For example, if every reverse angle from the same take
in a particular angle of coverage is automatically linked using remote versions, then the grade
you apply to one reverse angle clip will ripple to every other reverse angle clip throughout
the Timeline.
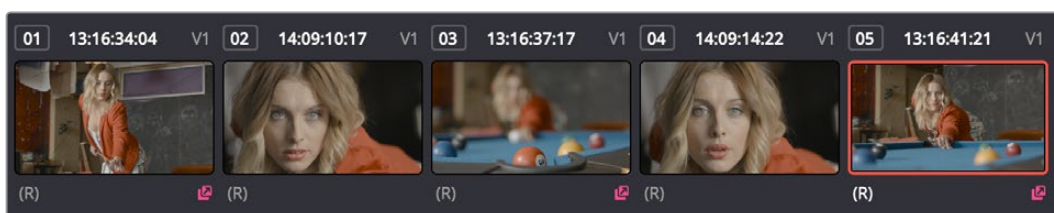
Timeline with three automatically linked clips shown, and codec names hidden
to reveal the (R) that shows these clips are using remote grades

So long as remote versions are enabled, there are other ways that linked clip relationships are formed. If, after conforming an AAF, XML, or EDL, you used the Split Clips button in the Color page to split one conformed clip into many, each of the clips you split would be linked, since they too would share the same source media in the Media Pool.

Finally, automated linking also occurs for clips that appear in multiple timelines that also use remote versions. As a result, the grade you apply to one linked clip is automatically rippled to every other clip it's linked to.

> **NOTE:** Media management or media consolidation operations that split large source media files into many individual media files will defeat automatic linking within the same timeline, since each clip will be conformed to its own individual media file.

Starting with Remote Versions, Then Switching to Local Versions

It's possible to combine the best aspects of remote and local versions into a single workflow, taking advantage of your ability to freely switch from one to the other. Since remote versions make it easy to copy grades among clips that are similar, you can switch to using remote versions first, and then grade your way through the Timeline until you get to the point where you need to start making much more specific changes to individual clips. Then, it's easy to either switch each linked clip that needs individual adjustment to use a local version, or to use the Copy Remote Grades To Local command (described later) to copy the current remote version of each and every clip to a local version, at which point you can make all the specific tweaks you need to without worrying about changes being accidentally copied.

Creating a Master Timeline

DaVinci Resolve version 9 and earlier would automatically create a Master Timeline whenever you added clips to the Media Pool. This changed in versions 10 and later, which by default have no Master Timeline. However, if you want to create a Master Timeline in order to use it as you would have before, this is easy to do.

If you want a Master Timeline to have a single timeline that always contains all clips currently in the Media Pool, there's a way you can create one. However, you need to do it immediately upon creating a new project, before adding any media to the Media Pool. Once you've added one or more clips to the Media Pool, the option you need to do so will be disabled.

To create a new Master Timeline:

1 Create a new project, open the General Options panel of the Project Settings, and turn on the "Automatically match master timeline with media pool" checkbox in the Color section. If you also want all clips to use Remote versions as you grade by default as in previous versions of DaVinci Resolve, you can turn off the "Store grade with local version by default" checkbox.

2 Click Save.

3 Open the Edit page, and choose File > New Timeline (Command-N).

4 When the New Timeline Properties window appears, turn the Empty Timeline checkbox off, and click Create New Timeline.

Now, in addition to the new Timeline, a Master Timeline appears in the Timeline list.

Once created, the Master Timeline contains every clip in the Media Pool of the current project. If you color correct the clips in the Master Timeline, you'll find there's only one set of versions available, found underneath the Local submenu of the Color Page timeline's contextual menu. It's important to understand that local versions within the Master Timeline are in fact the remote versions found in every other timeline of that project.

In fact, it would be fair to say that the remote versions found in other timelines are actually the Master Timeline's versions. When you grade a clip in the Master Timeline, those grades ripple out to every other instance of that clip, in every other timeline within that project, via remote versions.

Sharing of remote versions among the Master Timeline and newly conformed timelines is why you can grade a collection of clips that you import into DaVinci Resolve without any editorial structure, grade and output offline media, and then reimport a project file that relinks to the original clips along with their grades. It's also why you can grade clips in one timeline, and then import additional re-edited timelines via AAF, XML, or EDL, which automatically inherit all remote versions of grades that were created in previous timelines.

Differentiating Clips with Individual Versions

If you've enabled DaVinci Resolve to add clips with remote versions, there are times when you may want to suspend automatic linking. As convenient as automatic grade rippling among linked remote versions is, there are many instances where you may need to stop it. For example, if the Media Pool contains a source media file with the entire content of an interview, then every clip that has been conformed to that source media will be linked, which is ordinarily good since you'd expect they'd all share the same grade. However, if the DP fiddled with the exposure of the camera in the middle of the interview, such that some clips are lighter and others are darker, you may find yourself needing to make different adjustments to clips from different parts of the interview.

One way of doing this, which can be useful in timelines where you only need to make a few of these kinds of changes, is to create a new remote version for every clip to which you need to make an individual adjustment. Since each version is its own grade, and differently named versions don't link to one another, this is a simple solution.

To suspend linking by creating a new remote version:

1   Move the playhead to the clip you need to alter individually.

2   Do one of the following:

   – Choose Color > Grade Version > Add (Command-Y).

   – Right-click the thumbnail in the Timeline, and choose Remote Versions > Create New Version.

   – Using the DaVinci control panel, press ADD VERSION on the T-bar panel.

3   Grade the new version that's appeared.

While this method works well, keep in mind that multiple linked clips using the same version number will always be linked with one another. In other words, suppose Clip 1, Clip 3, and Clip 5 are linked using the default Version 1, which has a strong blue grade applied.
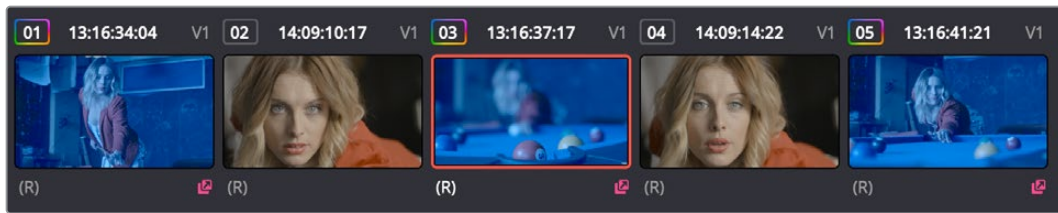
Three clips automatically linked, sharing a blue grade

Then, you set Clip 3 to use Version 2 with a different grade, tinted red. Clip 3 is now unlinked from Clips 1 and 5.
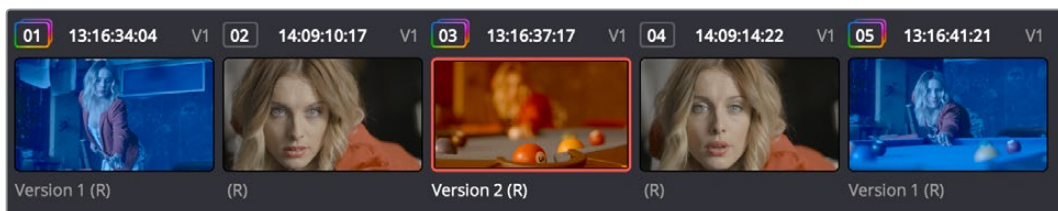
Setting the second of the three clips to use another version with a different remote grade sets it apart

However, switching Clip 5 to also use the red-tinted Version 2 means that Clip 3 and Clip 5 are now linked together, but Clip 1 is no longer linked.
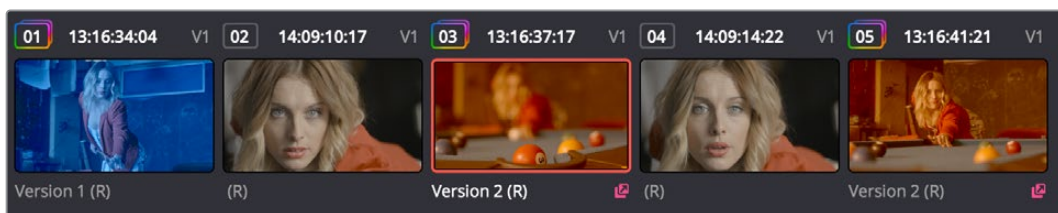
Setting the third of these clips to share the same remote version as the second clip now links those two together, omitting the first clip

Every new remote version you create, and every change you make, becomes available to all other clips in all other timelines that comes from the same source Media Pool clip as the shot you're working on. However, any clip can use any version, and which version is used by a linked clip is not rippled.

For example, Timeline 1 contains a clip named Max CU, which has three remote versions. Timeline 5 also contains Max CU, which is currently set to use Version 2. If you open Timeline 1 and add one more remote version to Max CU, that new version will also be available to Max CU in Timeline 5, but it will still be set to use Version 2.

Switching Clips Between Local and Remote Versions

You can also suspend remote version grade linking by switching individual clips to use local versions. This makes it easy to create a situation where some clips are linked, and other clips are not. Keep in mind that each clip has both local and remote versions, so you can switch from one to the other without losing anything.

To suspend linking by setting individual clips to use a local version:

　　　Right-click a clip thumbnail, choose the submenu of the corresponding remote version you want to copy, and choose Copy to Local. The remote version is copied to a local version, which now appears as the current version that's used.

You can also set every clip in the entire timeline to use local versions. If you switch an entire timeline to local versions, then no clip in that timeline will be linked to any other unless you create a group (covered later in this chapter). This is the default state, but it's useful even when you've switched to using remote versions when you want to grade one timeline differently from the others in a project, for example when doing a trim pass for another video or stereo 3D format, or when grading another cut, such as a trailer, that uses the same media but requires a different look.

To suspend linking by switching from remote versions to local versions:
Right-click any clip thumbnail, and choose one of the following commands:

- **Use Local Grades:** Switches all clips to their local versions. If there are already local versions defined for each clip, those will appear. If there are no local versions yet defined, each clip will be ungraded.

- **Copy Remote Grades to Local:** Copies the currently assigned remote version of each clip to a local version.

Because Undo is used only for individual clip operations, the Use Local Grades and Copy Remote Grades To Local commands cannot be undone. However, switching a timeline from remote to local versions is not a one-way trip. You can select Use Remote Grades to switch every clip in a timeline back to the remote versions at any time.

To switch a timeline back to using remote versions:
- Right-click any clip thumbnail, and choose Use Remote Grades.

Furthermore, you can also copy the local grades you made to be remote grades, for instances where you started grading with local grades, and you want to switch to remote grading using your local grades as a starting point. Be aware that when you do this in a timeline with many clips that share the same source media, the grade of the very last shared clip in the Timeline will be the only remote grade that's used for those auto-linked clips.

To copy each clip's local grade to a remote grade for every clip in the current timeline:
- Right-click any clip thumbnail, and choose Copy Local Grades to Remote.

If you're switching back and forth between local and remote versions, keep the following rules in mind:

- If you select Use Remote Grades, change your remote grades, and then Copy Remote Grades To Local on that timeline again, you'll overwrite all of your previously graded local versions. This is a good workflow if you don't like what you've done with your local versions, and you want to start over by recopying the remote versions.

- If you select Use Remote Grades, change your remote grades, and then select Use Local Grades, you'll return to your previously graded local versions, as they were before you selected Use Remote Grades. This is a good workflow if you just want to switch back to your remote versions in order to copy the remote versions of specific clips to local versions.

Working with Versions

Each clip can have as many local and remote versions as you like. There are commands for creating, renaming, and deleting the versions that are available to each clip when using the pointer, keyboard shortcuts, or the DaVinci control panel. When using the DaVinci control panel, the buttons affect whichever type of version (remote or local) is currently applied to the current clip.

Additionally, DaVinci Resolve 15 introduced the ability to batch create, rename, load, and delete versions for multiple clips that are selected at the same time.

To create a new local or remote version quickly for one or more selected clips, do one of the following:

- Choose Color > Grade Version > Add (Command-Y).
- Using the DaVinci control panel, press ADD VERSION on the T-bar panel.

A new version is created, identical to the type of version that was previously selected (remote or local), named "Version x" where x is the number of the versions that have been created. All keyframes and motion tracking are copied from the previously selected version to the new one.

To create a new version for one or more selected clips, with the option to set a name and whether to copy keyframes:

1   Right-click one of the selected clip thumbnails, and choose one of the following:

- Local Versions > Create New Version
- Remote Versions > Create New Version

2   Type a name for the version in the dialog that appears, and choose either "Copy all marks" or "Copy the first mark only," depending on whether or not you want to copy all the keyframes into the new version.

> **NOTE:** Motion tracking will be copied regardless of whether "Copy all marks" is selected or not.

3   Optionally, you can choose one of the preset version names from the drop-down list. These names are defined in the Versions section of the General Options panel of the Project Settings.

4   Click OK.

To delete a specific version for one or more selected clips:

Right-click one of the selected clip thumbnails, choose the submenu of the remote version you want to delete (it can't be the currently selected version), and choose Delete.

To delete all versions for one or more selected clips:

Right-click one of the selected clip thumbnails, and choose one of the following commands from the contextual menu corresponding to the scope of the versions you want to delete:

- Local Versions > Delete All Versions
- Remote Versions > Delete All Versions
- Delete All Versions

All versions are deleted as specified, except for the currently selected version, which is now the only one remaining.

**To load a particular remote or local version for one or
more selected clips, do one of the following:**

>   Right-click one of the selected clip thumbnails, choose the submenu of the
>   corresponding remote version you want to copy, and choose Load.

To rename the version of one or more selected clips:

1   Right-click one of the selected clip thumbnails, choose the submenu of the
         corresponding remote version you want to rename, and choose Rename.

2   In the Version Name dialog, type a name into the text field. Optionally, you can choose
         one of the preset version names from the drop-down list. These names are defined in
         the Versions section of the General Options panel of the Project Settings.
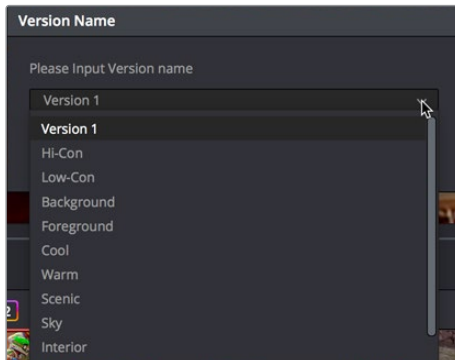
Selecting a Version name from the dropdown list, the names on
the list come from assignments made using the Versions section
of the General Options panel of the Project Settings

3   Click OK.

>   That name now appears underneath the clip thumbnail in the Timeline.

If you're going to use predefined names for versions, you need to define these in the Versions
group of the General Options panel of the Project Settings. Ten drop-down menus let you
choose from preset version names, or enter your own. These names will appear in the drop-
down menu of the Version Name dialog.
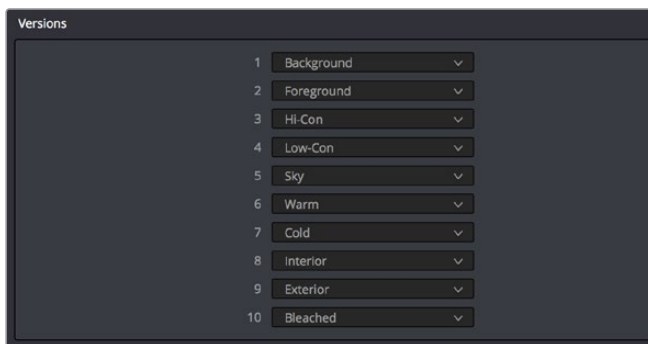
The Versions section of the Project Settings

The Importance of "Version 1"

There are specific operations in DaVinci Resolve where "Version 1," otherwise known as "the default version," is the only version that's used, regardless of how many other versions are available, or which version was previously selected. The default version can be named anything you want, but whatever its name, the default version is the first version in the list, and it's important.

Here are some examples:

- **Importing additional timelines that use the same clips:** In this case, if you're importing timelines and "Use local version for new clips in timeline" is disabled in the Color section of the General Options panel of the Project Settings, then only the default version of each clip is relinked.

- **Whenever you switch a timeline between local and remote versions:** In this case, every clip in the Timeline will be switched to the default version, regardless of what you had selected previously.

Consequently, if you plan to reconform your clips to a newer version of the edit that you're importing, or pursue other workflows that are off the beaten path, it's a good idea to make sure, no matter how many versions you end up creating, that the most important grade is always copied back to the default version.

To copy any version quickly to the default version:

1   Choose Color > Memories > Save Memory A (Option-1). You can use any memory you want, but Memory A is convenient for this example.

2   Choose Color > Grade Version > Default (Command-U).

3   Choose Color > Memories > Load Memory A (Command-1) to apply the saved memory to the default

To copy any version quickly to the default version using the DaVinci control panel:

1   Press CRNT and then press A (or any memory button you like). These controls are available on either the Transport or T-bar panel.

2   Press DEFAULT VERSION on the T-bar panel.

3   Press A (or whichever Memory button you used) to apply the saved memory.

To jump immediately to the default version, do one of the following:

- Choose Color > Grade Version > Default Command-U).

- Press DEFAULT VERSION on the T-bar panel.

Deleting Unused Versions

In cases where you want to make absolutely sure there's no alternative to the grade you want a clip to have, there's an easy way to delete all versions except for the version that's currently in use, thereby making it the default version.

To eliminate either local or remote versions except for the current version:

1   Choose the local or remote version you want a clip to use.

2   Right-click the thumbnail of the clip you want to eliminate extra versions from, and choose Delete Unused Versions from the contextual menu.

If you selected a local version, all unused local versions will be deleted, but remote versions will be left alone. Similarly, if you selected a remote version, all unused remote versions will be deleted, but local versions will be left alone.

To eliminate all other local and remote versions except for the current version:

1   Choose the version you want a clip to use.

2   Right-click the thumbnail of the clip you want to eliminate extra versions from, and choose Delete All Versions from the contextual menu.

Regardless of whether you selected a local or remote version, all other local and remote versions not in use will be deleted.

Rendering Versions

When the time comes to render your clips in the Deliver page, each clip's currently selected version will be rendered. If you need to render a different version for a given clip, you can either make sure it's selected in the Color Page timeline before you open the Deliver page, or use the Versions submenu in the Color mode of the Deliver page Thumbnail timeline. This contextual menu also provides access to the Stereo 3D commands, the Edit PAR (Pixel Aspect Ratio) command, and a command for updating the Render Window Timeline thumbnails to reflect any changes you've made in case they haven't updated automatically.

Additionally, the Commercial Workflow output option, located in the Deliver page, provides a method of rendering multiple versions for each clip when outputting your project in Source Order (as individual media files). There are two additional options in the Version submenus of each clip in the Thumbnail timeline contextual menu that let you control which versions are rendered when you use Commercial Workflow.

- **Render Disabled:** Turning this option on excludes that version from being rendered when Commercial Workflow is enabled.

- **Enable Flat Pass:** Turning this option on forces the selected version to render with the grade turned off, essentially outputting the original media.

For more information on rendering versions using the Commercial Workflow option, see Chapter 166, "Rendering Media."

Copying Grades

There are various methods you can use to copy grades from one clip to another. Which is appropriate to your need depends on your style of working with DaVinci Resolve.

Protecting Adjustments with the Copy Grade Options

Before going into the myriad of ways that grades can be copied from one clip to another, you should know of a series of options, available from the contextual menu of the Gallery (right-click anywhere in the gray area of the Gallery), that let you carefully specify grading, sizing, and stereo data to be preserved when overwriting grades in clips you're copying to. There are three options:

- **Copy Grade: Preserve number of nodes:** Lets you choose 0–10 nodes to be protected when applying a grade. When set to 1, the first node of the copied grade is ignored, but all other nodes are copied. When set to 5, the first five nodes of a copied grade are ignored, as long as there are at least five nodes in the grade of the clip you're copying to. This option is useful for colorists who routinely use the first few nodes

for shot matching and scene balancing, with additional nodes applying individual or stylistic adjustments.

- **Copy Grade: Preserve Camera Raw Settings:** When enabled, the camera raw Source settings of the current clip are preserved, letting you apply stylistic grades from unrelated clips without overwriting clip-specific source settings.

- **Copy Grade: Preserve Input Sizing:** When enabled, Input Sizing adjustments are not overwritten by those of the copied grade.

- **Copy Grade: Preserve Convergence:** When enabled, Convergence adjustments in the Stereo 3D palette are not overwritten by those of the copied grade.

- **Copy Grade: Preserve Floating Windows:** When enabled, Floating Windows adjustments in the Stereo 3D palette are not overwritten by those of the copied grade.

- **Copy Grade: Preserve Auto Align:** When enabled, Auto Alignment adjustments in the Stereo 3D palette are not overwritten by those of the copied grade.

- **Copy Grade: Preserve Dolby Vision™ Analysis Metadata:** When enabled, Dolby Vision Analysis Metadata is not overwritten by that of the copied grade. Only available if you're set up to do Dolby Vision grading. For more information, see Chapter 7, "Data Levels, Color Management, and ACES."

- **Copy Grade:** Preserve Dolby Vision™ Trim Metadata: When enabled, Dolby Vision Trim Metadata in the Dolby Vision palette is not overwritten by that of the copied grade. Only available if you're set up to do Dolby Vision grading. For more information, see Chapter 7, "Data Levels, Color Management, and ACES."

Clip Grades and Timeline Grades in Saved Stills

Every time you save a still into the Gallery or a memory, it contains both the Clip grade, and the Timeline grade, if one is applied. Which grade is applied when you copy from a still depends on which mode you're in, which is selectable from the drop-down menu in the upper right-hand corner of the Node Editor.
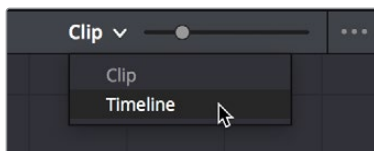
Node Editor Clip and Track selector

If you're in Clip mode, you'll only copy the saved clip grade. If you're in Timeline mode, you'll only copy the saved timeline grade.

Choosing Which Aspect of a Grade to Copy with All/Color/Sizing

When copying grades using the techniques described in this section, you can use the All/Color/Sizing setting that are available via the Keyframe Timeline Mode submenu of the Mark menu, the drop-down menu that's visible at the upper-right of the Keyframes Editor, or your control panel. When copying a grade in conjunction with the settings in this menu, the following rules apply:

- **All:** When All is selected, both the grade and the sizing are copied.

- **Color:** Only the grade is copied, the target clip retains its original Input Sizing settings.

- **Sizing:** Only the Input Sizing is copied, the target clip retains its original grade.

Choosing How to Copy Keyframes

When working with saved grades that have keyframes, you can choose how these keyframes are copied via a setting in the Gallery contextual menu. There are three options:

- **No Keyframes:** No keyframes are copied. The state of the grade at the frame used to save the still is what is applied to the target clip or clips.

- **Keyframes Aligning Source Timecode:** Keyframes are copied aligning the source timecode of the saved grade with the source timecode of the target clip. This is the ideal setting when you're copying a grade back to the clip it came from originally, or to a duplicate of that clip elsewhere in the Timeline, and you want the keyframes to align with the same frames as before. If there is no source timecode overlap, keyframes will be pasted aligning with the start frame of the edit, the same as the third option (below).

- **Keyframes Aligning Start Frame:** Keyframes are copied aligning the start frame of the clip that still was saved from with the start frame of the target clip. This is the ideal setting when you're copying a grade with keyframes from one clip to a completely different clip, with different timecode.

To control how keyframes are copied when you're copying grades:

> Right-click anywhere in the gray background area of the Gallery, and choose one of these options from the Apply Grades Using submenu.

From that point on, keyframes, should they exist, will be copied using the selected method whenever you copy a grade using any of the previously described methods.

Copying Grades Using the Mouse

An incredibly easy way of copying a grade from one clip to another, or from a still or memory in the Gallery to a clip, is by using the third button of your mouse, usually mapped as the "middle-click" of the mouse scroll wheel.

To copy a grade from a clip or still to one or more clips using the pointer:

1 Select the clip thumbnail you want to copy the grade to in the Timeline; a single selected clip appears highlighted orange. If you want to copy a grade to several clips, you can either Command-click multiple non-adjacent clips, or Shift-click a continuous range of clips; multiple selected clips appear highlighted red.

2 Middle-click the clip thumbnail, Gallery still, or memory you want to copy the grade from.

> The grade of the clip you middle-clicked is copied to the previously selected clip or clips.

> **TIP:** If you're using a trackpad, third-party software may allow you to define a "three-finger-click" that works the same as mouse button 3. If you're a pen and tablet or trackball user, you may be able to define a stylus or other button to perform the same button-3 action.

If you don't have access to a middle-click on the pointing device you're using, there's another way of doing this using a contextual menu command.

To copy a grade from a clip or still to one or more clips using the Apply Grade command:

1. Select the clip thumbnail you want to copy the grade to in the Timeline; a single selected clip appears highlighted orange. If you want to copy a grade to several clips, you can either Command-click multiple non-adjacent clips, or Shift-click a continuous range of clips; multiple selected clips appear highlighted red.

2. Right-click the clip thumbnail, Gallery still, or memory you want to copy the grade from, and choose Apply Grade from the contextual menu.

The grade of the clip you middle-clicked is copied to the previously selected clip or clips.

Copy Forward Commands

Another simple way of copying grades is to use the equals (=) and minus (–) keys on the keyboard to copy grades forward from one or two clips behind the currently selected clip. This is a great way to copy grades in scenes with a shot-reverse-shot structure, where you're cutting between two angles of coverage, each of which uses the same grade.

To copy grades forward:
- **To copy a grade from one clip back:** Choose Color > Apply Grade From One Clip Prior, or press Equals (=).
- **To copy a grade from two clips back:** Choose Color > Apply Grade From Two Clips Prior, or press Minus (–).

To copy grades forward using the DaVinci control panel:
- **To copy a grade from one clip back:** Press Comma (,).
- **To copy a grade from two clips back:** Press Colon (:).

Copying Using Memories

Memories are virtually identical to stills, except that they're labeled with a letter (A–Z) for easy access via keyboard shortcuts or DaVinci control panel buttons. A memory bank above the Gallery browser provides a visual reference of which saved grade is assigned to which letter. This makes it easy to keep track of multiple saved memories in instances where you're copying them to several different clips throughout a scene or program.

For example, you might save a memory for each angle of coverage in a complicated scene, making it easy to copy grades forward. In another example, you might save a memory for the grade applied to each interview subject's headshot in a documentary, so you can copy that grade forward as you work through the documentary.

To save the current clip's grade to a memory for future use, do one of the following:
- Choose Color > Memories > Save Memory A–H (Option-1–8).
- Using the DaVinci control panel, press CRNT on the Transport or T-bar panel, then press the letter of the memory bank you want to save to. Use the SHIFT UP button to save to another memory sharing the same button.

If you save a grade to a memory that already contains something, the previous memory is overwritten.

To apply a memory to one or more clips in a timeline, do one of the following:

1 Choose one or more clips in the Thumbnail timeline to copy to. This can be the current clip, or it can be a range of clips that you select by Command-Clicking or Shift-Clicking.

2 Do one of the following to copy a grade to the selected clips:

  – Right-click a memory and choose Apply Grade.

  – Choose Color > Memories > Load Memory A–H (Command-1–8).

  – Using the DaVinci control panel, press the letter of the memory bank you want to apply. Use the SHIFT UP button to apply a memory that shares the same button.

To clear a memory:

Right-click a memory, then choose Clear.

Copying Using Preview Memory

You can also preview the effect of a memory or saved grade on the current clip, with the option to either keep it if it works, or go back to the previous grade if it doesn't.

To Preview Memory:

1 Move the playhead to a clip for which you want to preview a memory.

2 Choose Color > Preview Memory (Option-Shift-P).

3 Do one of the following:

  – Right-click any saved still in the Gallery and choose Apply Grade.

  – Choose Memories > Load > Memory A–H (Command-1–8).

The selected grade or memory is now being previewed.

4 Now, do one of the following to either accept or reject the memory:

  – If you like the effect, then you can leave it be and move on to another clip.

  – If you don't like the effect, then choosing Color > Preview Memory (Option-Shift-P) again reverts the clip to the original grade.

To Preview Memory using the DaVinci control panel:

1 Move the playhead to a clip on which you want to preview a memory. You can use the PREV SCENE and NEXT SCENE buttons to move quickly.

2 Press PVW MEM on the T-bar panel, and then press the letter of the memory bank you want to preview. Use the SHIFT UP button to apply a memory that shares the same button.

3 Do one of the following:

  – If you like the grade you're previewing, there's no need to do anything else. Simply move to another clip and continue working.

  – If you don't like the grade you're previewing, press PVW MEM again and the clip's grade will revert to its original state. Pressing PVW MEM repeatedly toggles the current clip between its original and the previewed grade.

Copying from Stills in the Gallery

As mentioned previously, each still you store in the Gallery contains the grading information as well as the image of the frame it was saved from. This saved grade can be applied to any clip in the Timeline.

> **IMPORTANT** Copied grades overwrite any previously existing grades on the clip or clips you copy to.

To apply a grade from a still to one or more selected clips in a timeline:

1   Choose one or more clips in the Thumbnail timeline to copy to. This can be the current clip, or it can be a range of clips that you select by Command-clicking or Shift-clicking.

2   Do one of the following to copy a grade to the selected clips:

  – Right-click a still in the Gallery and choose Apply Grade.

  – Middle-click a still in the Gallery.

  – Double-click a still to wipe it in the Viewer against the current clip in the Timeline, then right-click the Viewer and choose one of the options from the Apply Grade submenu.

To apply a grade from a still to the current clip using the DaVinci control panel:

1   Select the clip you want to copy a grade to using the PREV SCENE or NEXT SCENE buttons of the Jog/Shuttle panel.

2   Press NEXT STILL or PREV STILL to select the still with a grade that you want copy from.

3   Press PLAY STILL to wipe the selected still against the current clip.

4   Press SHIFT UP and then press PLAY STILL to copy the grade from the selected still to the current clip.

Append Node Graph

You can also append a saved grade to any clip in a timeline. This adds the entire node graph of the saved still to the end of the node tree of the current clip. In other words, the current clip's grade isn't overwritten, the applied grade is added to the end of it.

By planning ahead, you can save fragmentary grades that create specific effects or adjustments using only a few nodes. You can then use these fragmentary grades as a toolkit that you can add to other grades in order to mix and match different adjustments and effects.

For example, you could create a three-node glow effect, save it, and then apply that effect at the end of a completely different clip's grade.
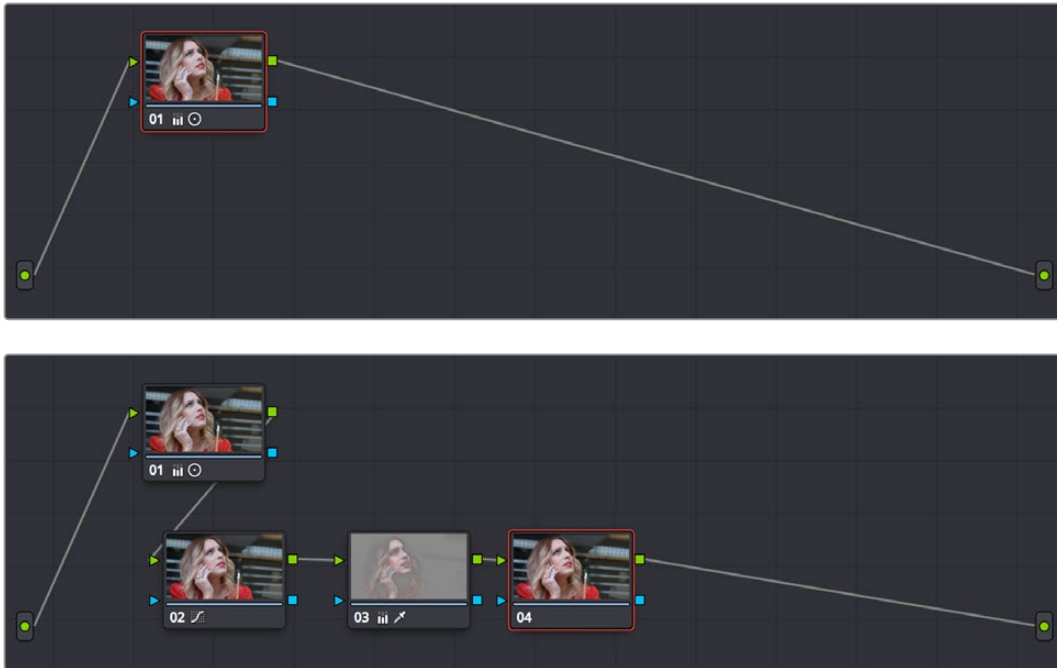
Appending grades places them after the original nodes

To append a saved grade or memory as individual nodes, do one of the following:

- Drag a still or memory from the Gallery onto a connection line in the Node Editor; when the plus icon appears, drop it and its nodes will be appended within the node tree starting at that connection.
- Right-click a still or memory in the Gallery, and choose Append Node Graph.

Ordinarily, when you append the node graph from a memory or still to another node graph, you end up adding a whole shedload of new nodes. This may be exactly what you need, but in situations where you want to keep things a bit tidier, you also have the option of appending node graphs as compound nodes.

To append a saved grade or memory as a compound node:

Command-drag a still or memory from the Gallery onto a connection line in the Node Editor; when the plus icon appears, drop it and its nodes will be appended to the node tree as a single compound node.

> **NOTE:** When you append the nodes from a gallery still to a grade, how keyframes are applied depends on the "Apply Grades Using" setting of the Gallery. For more information, see Chapter 122, "Using the Gallery."

To append a saved grade or memory using the DaVinci control panel:

1 Select the clip you want to append a grade to using the PREV SCENE or NEXT SCENE buttons of the Jog/Shuttle panel.

2 Press NEXT STILL or PREV STILL to select the still with a grade that you want to append.

3 Press PLAY STILL to wipe the selected still against the current clip.

4 Press SHIFT UP and then press NEXT STILL to append the nodes of the grade from the selected still to the current clip.

Once you've appended a compound node, you can open it up to access and modify its contents as you would any other compound node. For more information on compound nodes, see Chapter 124, "Node Editing Basics."

Aligning Keyframes to a Specific Frame While Copying Grades

If you need to copy a grade with keyframes so that the start keyframe of the copied grade aligns with a specific frame of the Timeline, you can do so using the following procedure:

To copy a grade and align its keyframes to a specific frame of the Timeline:

1 Save a grade with keyframes as a Gallery still by right-clicking the Viewer and choosing Grab Still.

2 Choose the clip you want to copy the saved grade to in the Thumbnail timeline.

3 Double-click the Gallery still to wipe it against the current clip in the Viewer.

4 Move the playhead to the frame of this clip you want the first keyframe of the saved grade to be aligned with.

5 Right-click the Viewer and choose Apply Grade > Align Keyframes to Current Frame.

Copying Individual Nodes and Settings

Copying grades from clip to clip copies everything except for keyframes and motion tracking. However, there is one way you can copy the motion tracking from one clip to another, and that's by copying and pasting individual node settings. This can save time when you're assembling complicated node trees by recycling specific nodes or node settings from previous grades.

Copying and Pasting All Settings From One Node to Another

The simplest thing you can do is to copy all of a node's settings, and paste them into another node. This makes it easy to duplicate things like windows, qualifier settings, keyframing, or motion tracking that you want to reuse in another node as the basis for another operation. This is also a quick way to manually ripple a change you make in a node to that same node in another clip's grade.

To copy a node's settings from one clip to another, do one of the following:

- Option-drag one node onto another. When you drop it, the settings of the node you dragged overwrite those of the node you dropped onto.

- Select a node with settings you want to copy and choose Edit > Copy (Command-C). Then, select a node you want to paste these settings to either in the current grade or in the grade of another clip, or create a new node, and choose Edit > Paste (Command-V) to paste the settings you copied. These pasted node settings overwrite any other settings that node previously used.

Paste Attributes on the Color Page

You can copy the settings of one node and paste a subset of those settings to another selected node by choosing Edit > Paste Attributes (Option-V). A Paste Attributes window appears that shows you which node you're copying from, and which node you're pasting to, and provides controls for choosing whether you want to paste keyframes and how to align them (Start Frames or Source Timecode), as well as a series of checkboxes for choosing which palettes, windows, and OFX/ResolveFX you want to apply. You can only paste all parameters from a specified palette; there's no current provision for pasting specific parameters from within a given palette, with the exception of pasting specific windows and their accompanying trackers.
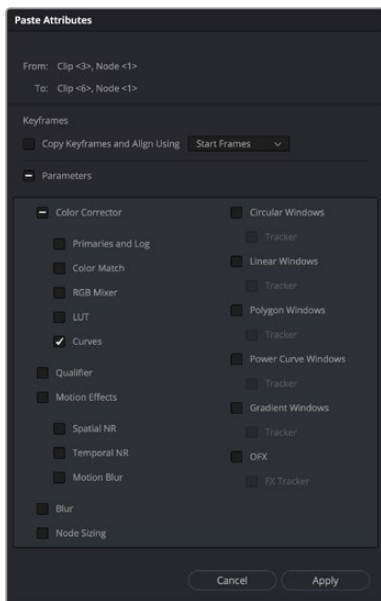
The Paste Attributes window on the Color page

Copying from the Node Graph of Other Clips or Gallery Stills

When constructing new grades, you may sometimes find it convenient to copy existing nodes or node settings from the grade of another clip or gallery still. This can be easily accomplished by exposing the node tree of any still that's saved in the Gallery, or any clip in the Thumbnail timeline, and using the controls found in the floating node graph to copy individual nodes or node adjustments to the current clip's grade shown in the Node Editor.

Copying Clip Settings Using Display Node Graph

In Clip mode, the floating Node Graph window has four sets of controls you can use to choose how to copy nodes and adjustments:

- **Clip Node Graph:** By default, the Clip node graph is displayed at the left. You can drag any node from the floating node graph to the current grade shown in the Node Editor, and drop it onto an existing node to overwrite that node's settings or onto a connection line to insert it as a new node.
- **Timeline Node Graph:** (Only available if there is a Timeline grade) You can switch to the Timeline grade, if there is one, by either clicking the second button in the Node Graph title bar, or by choosing Timeline from the drop-down menu at the upper right-hand corner of the floating Node Graph window.
- **Apply Color/PTZR/Source/All buttons:** With the Clip panel selected, four buttons let you selectively copy the entire grade, the sizing, the source settings, or all settings at once to the current clip.
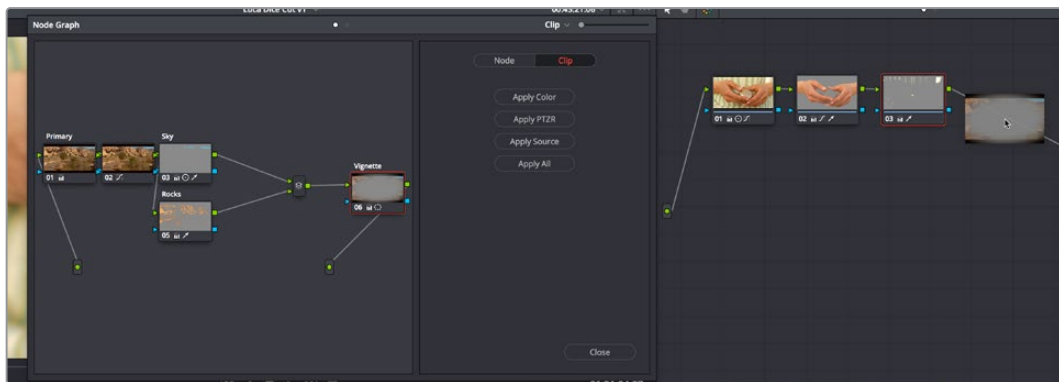
Dragging a node from another clip's node graph to the currently selected clip's grade in the Node Editor

Copying Node Settings Using Display Node Graph

In Node mode, the floating Node Graph window displays all of the available Color Attributes found within each node, instead of the Apply Color/PTZR/Source/All buttons:

- **Node Settings:** Use the checkboxes to choose which node adjustments get copied and which do not. After you've checked the settings you want to selectively copy, dragging a node from the floating node graph onto nodes in the Node Editor copies or appends the selected attributes into the target node, leaving all other attributes alone. For Windows and OpenFX, you have the option of also copying any motion tracking that's available.
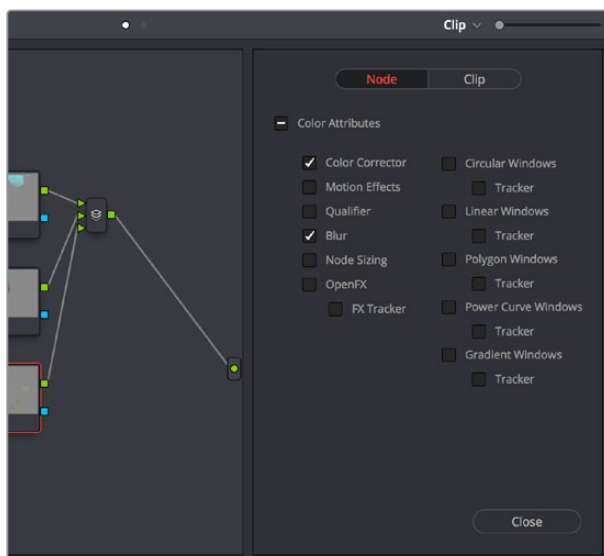
The Node panel open with the Color Corrector and Blur attributes selected for copying

Ability to Open Compound Nodes in "Display Node Graph"

When you right-click a Gallery still or a thumbnail and choose Display Node Graph for a grade that uses compound nodes, you can right-click any compound node and choose "Show compound node," or Command-double-click a compound node to open it and see its individual nodes.
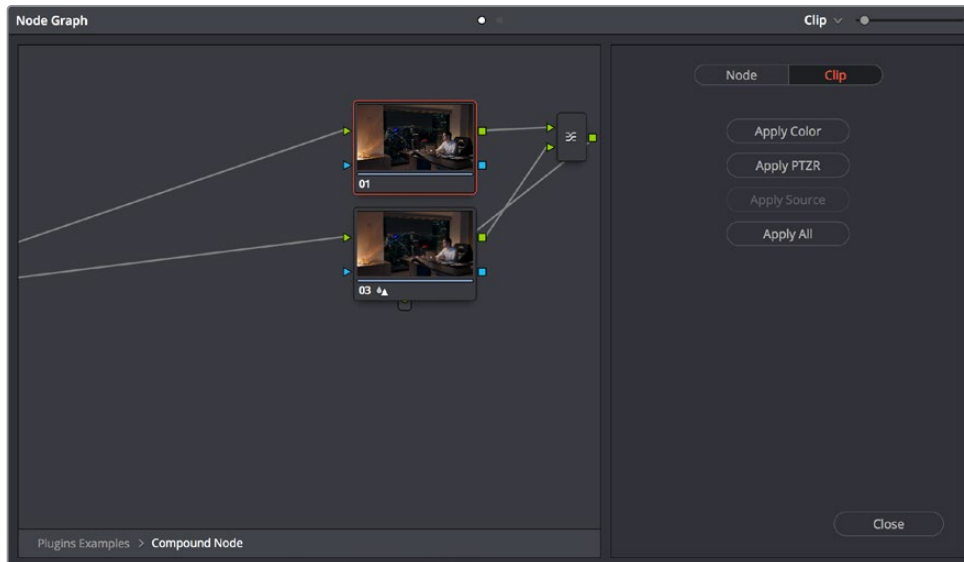
Opening a compound node in a floating Node Graph window

How to Copy Nodes Using Display Node Graph

The following procedures describe how to open the floating node graph in different situations.

To copy individual nodes or settings from any still in the Gallery:

1. Click the thumbnail in the Timeline of the clip you want to copy nodes to. Its node graph will appear in the Node Editor.

2. Right-click a still in the Gallery you want to copy nodes from, and choose Display Node Graph. A floating Node Graph window appears displaying that still's node tree.

3. (Optional) While the Gallery Node Graph window is open, you can select any other still, and this window will update to show the currently selected still's node graph, ready for you to copy from.

4. In the floating Node Graph window, choose Clip if you want to copy overall clip attributes, or choose Node to copy individual node attributes.

5. Do one of the following to copy nodes or settings to the Node Editor.

   – In Clip mode, drag any node from the floating node graph to the current grade shown in the Node Editor, and drop it onto an existing node to overwrite that node's settings. If you open the Node panel and choose specific attributes, only those attributes will be copied to the node you drag onto.

   – In Clip mode, drag any node from the floating node graph to the current grade shown in the Node Editor, and drop it onto a connection line to insert it as a new node. If you open the Node panel and choose specific attributes, only those attributes will be copied to the new node that's created.

   – In Clip mode, click Apply Color to copy the entire grade from the floating node graph to overwrite the current grade in the Node Editor.

– In Clip mode, click Apply PTZR to copy the sizing from the floating node graph to overwrite that of the current clip.

– In Clip mode, click Apply Source to copy the source settings from the floating node graph to overwrite those of the current clip.

– In Clip mode, click Apply All to copy every setting from the floating node graph to the current clip.

– In Node mode, select which attributes you want to copy, and then drag any node from the floating node graph to the current grade shown in the Node Editor, and drop it onto an existing node to overwrite the settings of that node that you selected.

– In Node mode, select which attributes you want to copy, and then drag any node from the floating node graph to the current grade shown in the Node Editor, and drop it onto a connection line to insert it as a new node with only the settings that you selected.

6 While the floating Node Graph window is open, you can also select any clip in the Thumbnail timeline to change the grade that's displayed in the Node Editor, ready for you to copy to.

7 Click Close when you're finished.

To copy individual nodes or settings from any clip in the Timeline:

1 Click the thumbnail in the Timeline of the clip you want to copy nodes to. Its node graph will appear in the Node Editor.

2 Right-click the thumbnail of another clip you want to copy nodes from, and choose Display Node Graph.

> **NOTE:** The Display Node Graph command only appears in the contextual menu of a clip in the Thumbnail timeline that is not currently selected.

3 (Optional) In the floating Node Graph window, choose Clip if you want to copy overall clip attributes, or choose Node to copy individual node attributes.

4 Do one of the following to copy nodes or settings to the Node Editor.

– In Clip mode, drag any node from the floating node graph to the current grade shown in the Node Editor, and drop it onto an existing node to overwrite that node's settings. If you open the Node panel and choose specific attributes, only those attributes will be copied to the node you drag onto.

– In Clip mode, drag any node from the floating node graph to the current grade shown in the Node Editor, and drop it onto a connection line to insert it as a new node. If you open the Node panel and choose specific attributes, only those attributes will be copied to the new node that's created.

– In Clip mode, click Apply Color to copy the entire grade from the floating node graph to overwrite the current grade in the Node Editor.

– In Clip mode, click Apply PTZR to copy the sizing from the floating node graph to overwrite that of the current clip.

– In Clip mode, click Apply Source to copy the source settings from the floating node graph to overwrite those of the current clip.

– In Clip mode, click Apply All to copy every setting from the floating node graph to the current clip.

– In Node mode, select which attributes you want to copy, and then drag any node from the floating node graph to the current grade shown in the Node Editor, and drop it onto an existing node to overwrite the settings of that node that you selected.

– In Node mode, select which attributes you want to copy, and then drag any node from the floating node graph to the current grade shown in the Node Editor, and drop it onto a connection line to insert it as a new node with only the settings that you selected.

5 (Optional) While the floating Node Graph window is open, you can also select any clip in the Thumbnail timeline to change the grade that's displayed in the Node Editor, ready for you to copy to.

6 Click Close when you're finished.

Rippling Adjustments Among Multiple Clips

If you've graded a sequence of clips and find yourself needing to make a quick change to several clips all at once, you can use the Color > Ripple Node Changes to Selected Clips/ Current Group commands to quickly copy changes made to one clip to several others. However, these commands require that you follow certain rules in order to get the results you want.

Node rippling uses the number of each node to determine what changes should ripple to which nodes. In other words, changes made to Node 3 will ripple to Node 3 of every other selected clip, or to Node 3 of every other clip in the current group (depending on which command you use).

Rippling changes from one clip to several others requires that all clips share the same number of nodes, at least for the nodes you're rippling. If you try to ripple a change to one or more clips that don't have a node with the same number as the one you're rippling, then no change will be rippled to those clips.

To ripple a change in one node to several selected clips:

1 Select the clip you want to use to make the change so that it's the current clip, outlined in orange.

2 Now, Command-click or Shift-click to select the range of clips you want to ripple your change to, so that they're all selected red.
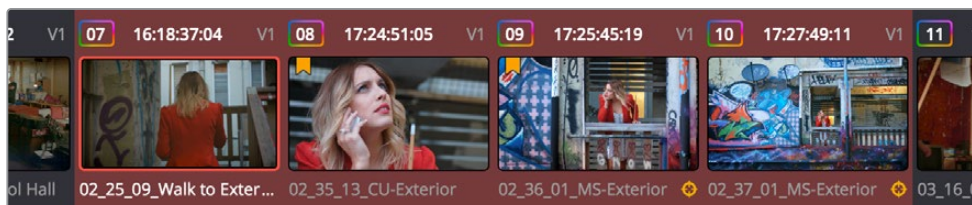
The orange outlined clip is the current clip you're modifying, and the clips highlighted in red are the ones you're rippling this change to

You don't have to select the clips you're going to ripple your change to prior to making the change, but it may be easier to keep track of what you're doing if you set everything up in advance. The clip you're changing should be outlined in orange, and the clips you're rippling the change to should be highlighted in red.

3   Select a node to modify. Ideally, every selected clip should have a node sharing the same number as the one you're modifying. If some clips don't, then those clips won't inherit the change you're going to be rippling.

4   Make whatever changes you need to, adjusting any of the palette controls in the Color page you need to, except for Camera Raw, Sizing, and Data Burn, which aren't node-specific.

5   When you're happy with the change you've made, choose Color > Ripple Node Changes to Selected Clips.

The change you've made should ripple to every other selected clip with a node of the same number, and in a few moments the thumbnails of those clips should update to show the change.

If you've created a group, it's even easier to ripple node adjustments to the other clips in the group.

To ripple a change in one node to the current group:

1   Select the clip you want to use to make the change so that it's the current clip, outlined in orange. It must be part of a group for this to work.

2   Select a node to modify. Ideally, every selected clip should have a node sharing the same number as the one you're modifying. If some clips don't, then those clips won't inherit the change you're going to be rippling.

3   Make whatever changes you need to, adjusting any of the palette controls in the Color page you need to, except for Camera Raw, Sizing, and Data Burn, which aren't node-specific.

4   When you're happy with the change you've made, choose Color > Ripple Node Changes to Current Group.

The change you've made should ripple to every other clip in the current group that has a node of the same number, and in a few moments the thumbnails of those clips should update to show the change.

Appending a Node to Multiple Clips

If you've made an adjustment to a node in one clip that you'd like to apply to several other clips, you can quickly do that using the Color > Append Node to Selected Clips command. You can do this as a prelude to using one of the Ripple Node Change commands, as it's a quick way to make sure several previously ungraded clips have the same nodes, but you can also do this as a quick way to apply the same node change to several clips, regardless of whether they have matching node trees.

To append a node to other selected clips:

1   Select the clip you want to use to make the change so that it's the current clip, outlined in orange.

2   Select the node you want to append to other clips.

3   Now, Command-click or Shift-click to select the range of clips you want to ripple your change to, so that they're all selected red.

The clip you're copying from should be outlined in orange, and the clips you're rippling the change to should be highlighted in red.

4   Choose Color > Append Node to Selected Clips.

The selected node should be appended to the end of the node tree of each selected clip, and in a few moments the thumbnails of those clips should update to show the change.

Scroll Copy Grades Using the DaVinci Control Panel

Scroll mode lets you quickly preview the effects of many different grades applied to clips in the Timeline on the currently selected clip, with the option to either accept or reject the previewed grade to which you've "scrolled." This can be useful for checking to see if any of the previous grades you've created in a scene will work for the currently selected clip.

To use Scroll mode:

1   Move the playhead to the clip to which you potentially want to copy a new grade. You can use the PREV SCENE and NEXT SCENE buttons to move quickly.

2   Do one of the following to enter Scroll mode:

   – Press SCROLL on the Transport panel.

   – Press MODES, above the fourth trackball on the Center panel, then press the SCROLL MODE soft key.

3   Now, do one of the following to preview different grades from other clips:

   – Press the PREVIOUS SCENE and NEXT SCENE soft keys to move from clip to clip in the Timeline, previewing each grade to the current clip.

   – Turn the SCROLL SCENES knob to scroll smoothly along multiple clips in the Timeline.

   – Turn the SCROLL FRAMES knob to scroll along different frames of any clip, previewing the effects of keyframed grades at different points in time.

   – Press the TOGGLE DECK KEYS soft key to use the transport controls on the Transport panel to play through the Timeline, previewing grades as you go.

   – Press a number on the keypad of the Transport panel, and then the SCENE NUMBER soft key, to jump to a clip and preview its grade.

   As you scroll from clip to clip, a red outline indicates the clip with the grade being previewed, and an orange outline indicates the current clip to which you're previewing each scrolled grade.

4   When you're finished, do one of the following to either accept or reject a scrolled grade:

   – Press EXIT AS WAS if none of the grades you scrolled through was suitable. This exits Scroll mode and leaves the clip as it was previously.

   – Press EXIT AS IS if you've found a grade that works for the current clip. This exits Scroll mode and copies the scrolled grade.

When you press the TOGGLE DECK KEYS soft key in Scroll mode, each of the Transport Control buttons on the Transport panel functions as a means of previewing the grades of other clips in the Timeline.

- **STEP FWD:** Move to the next clip and preview its grade.
- **STEP REV:** Move to the previous clip and preview its grade.
- **FWD:** Plays (scrolls) forward at 1 scene per second, previewing each new grade as it appears.
- **REV:** Play (scrolls) the clips in reverse at 1 scene per second, previewing each new grade as it appears.
- **FFWD:** Shuttles (scrolls) forward through the Timeline at 4 scenes per second, previewing each new grade as it appears.
- **RWD:** Shuttles (scrolls) reverse through the Timeline at 4 scenes per second, previewing each new grade as it appears.

Rippling Changes Using the DaVinci Control Panel

DaVinci Resolve has a mechanism for rippling specific changes made to one clip to a range of other clips in the Timeline. This is only possible using the controls of the DaVinci control panel.

The general idea of the ripple function is that you select a clip, make a change, and then ripple that change to a range of other clips. This rippled change can be applied to the same node in each clip, or the change can be added as an appended node within each rippled clip.

The Ripple mode that's used when you press the RIPPLE VALUE button can be changed in the Color panel of the User Preferences. There are four options.

- **Exact values changed:** Changes made to the current clip are rippled to the specified clips using the exact parameters that were changed. For example, if Lift in the current clip is changed to 0.75 of its range, each clip you ripple will have a Master Gain setting of 0.75. Only parameters you adjust are rippled.
- **Percent value changed:** Changes made to the current clip are rippled to the specified clips by the percentage of change you made to the altered parameters. For example, if the current clip has a Lift level of 1.00 and is changed to 0.90 units, then the Lift setting of each clip you ripple will have a relative reduction of 10% relative to its previous value.
- **Unit value changed:** Changes made to the current clip are rippled to the specified clips by the same delta of change, using whichever units make sense for the effected parameter. For example, if the current clip had a Lift of 0.80 and you increased it to 0.90, each rippled scene's master gain level increases by 0.10.
- **All values are copied:** The current clip's grade is rippled to the specified clips in its entirety. No comparison is made with the original clip's parameters, and all memory parameters are rippled.

The following procedure describes in detail how you can use the DaVinci control panel to ripple a change to a range of other clips. While this procedure may appear complicated, it's just that there are several options. Once you learn the sequence of commands, this process is actually quite fast.

To ripple a change using the Ripple Mode soft key commands:

1 (Optional) Press MODES, then press RIPPLE MODES. Four commands appear mapped to the middle soft keys of the Center panel, which can be used later to execute different types of ripple operations.

2 Move the playhead to the clip you want to adjust.

3 Adjust the current clip that you want to ripple to other clips in the Timeline.

4 Define the range of clips you want to ripple to using the number pad on the Transport panel. The following combinations will work:

   • An absolute range of clips is defined by entering two clip numbers separated by a comma. For example, if you want to ripple the current change to clips 10 through 15, you'd press "10 , 15"

   • To specify every clip from the beginning of the Timeline, use the Minus (–) key. For example, to specify a range of clips from the beginning to clip 20, you'd press "– , 20"

   • To specify every clip to the end of the Timeline, use the Plus (+) key. For example, to specify a range of clips from the clip 50 to the end, you'd press "50 , +"

   • To specify every clip in the whole Timeline, press "– , +"

5 (Optional) You can control whether the rippled change is applied in an appended node, or an existing node, in every rippled clip:

   • If you want to apply the rippled change as a new node that's appended to the end of every rippled clip's grade, press SHIFT DOWN.

   • Otherwise, the rippled change will be applied to the same node in every rippled clip that you made your adjustment to in the current clip. In other words, if you made a change to Node 2, it would be rippled to Node 2 of all the clips you specified. If one of the rippled clips doesn't have the same number of nodes, you may get an error.

6 To execute the ripple, do one of the following:

   • Press RIPPLE VALUE on the Transport panel to ripple a change using the currently selected Ripple Mode in the User Preferences.

   • Press one of the Center panel soft keys corresponding to the ripple function you want to perform. There are four soft keys;

     – **STATIC RIPPLE:** Changes made to the current clip are rippled to the specified clips using the exact parameters that were changed. For example, if Lift in the current clip is changed to 0.75 of its range, each clip you ripple will have a Master Gain setting of 0.75. Only parameters you adjust are rippled. Identical to the "Exact values changed" ripple setting.

     – **RELATIVE RIPPLE:** Changes made to the current clip are rippled to the specified clips by the percentage of change you made to the altered parameters. For example, if the current clip has a Lift level of 1.00 and is changed to 0.90 units, then the Lift setting of each clip you ripple will have a relative reduction of 10% relative to its previous value. Identical to the "Percent value changed" ripple setting.

     – **ABSOLUTE RIPPLE:** Changes made to the current clip are rippled to the specified clips by the same delta of change, using whichever units make sense for the affected parameter. For example, if the current clip had a Lift of 0.80 and you increased it to 0.90, each rippled scene's master gain level increases by 0.10. Identical to the "Unit value changed" ripple setting.

     – **FORCED RIPPLE:** The current clip's grade is rippled to the specified clips in its entirety, overwriting all previous nodes and parameters in the rippled clips.

The adjustment you made in step 4 is applied to the designated range of clips.

Admittedly, that was a long and detailed procedure, but the actual button sequences are straightforward once you put them together. Here are some examples of button sequences that ripple an adjustment you've just made in different ways:

- **"10 , 15" then SHIFT DOWN then RIPPLE VALUE:** Copies the change you've made to the current clip, and applies it as a new node that's appended to the end of clips ten through fifteen.

- **MODES then RIPPLE MODES then "34 , 45" then FORCED RIPPLE:** Copies the entire grade of the current clip, using it to overwrite the grade of clips 34 through 45.

- **MODES then RIPPLE MODES then "– , +" then SHIFT DOWN then RELATIVE RIPPLE:** Copies the change you've made to the current clip as a relative percentage, and applies it as a new node appended to the end of every single clip in the entire Timeline.

> **WARNING** Once you ripple a change in this manner, there is no going back. Since undo is a per-clip operation, there is no global undo for changes made to the entire Timeline. Proceed with caution.

Using Shared Nodes

Shared nodes are meant to be a way to extend the benefits of automatically rippled changes among different clips to colorists that prefer a flatter node structure than Group Grading allows. By turning individual Corrector nodes into Shared nodes, and copying these to multiple clips, you enable linked adjustments right from within the clip grade. This means that the clip grade can freely mix both clip-specific nodes and Shared nodes, all within the same node tree. This makes Shared nodes fast to use as there's no need to create groups or switch to a group node tree (covered in the next section) to reap the benefits of linked adjustments among multiple clips.

A grade with an Unshared (at left) and Shared node (at center), a badge indicates the Shared node, which is also locked

What Are Shared Nodes Good For?

Shared nodes are similar to group grades, except that they don't require grouping and can be added to any normal grade. Changes made to a Shared node are automatically rippled to all other instances of that node in the grades of other clips. Furthermore, you can add as many Shared nodes to a grade as you like, and you can arrange them in any order to control the order of the operations they apply. And, of course, you can intersperse them with ordinary Corrector nodes

Shared nodes are extremely flexible. For example, you can use Shared nodes to:

- Add a Color Space Transform Resolve FX or a LUT to the beginning of every clip from a particular source
- Add a base correction to every talking head shot of a particular interviewee
- Add a shot matching adjustment to each clip from a particular angle of coverage within a scene
- Add a stylistic adjustment to every clip in a specific scene
- Make your base adjustments when grading with remote versions, so those adjustments remain linked when you copy your remote versions to local versions for fine tuning

In fact, you can mix and match Shared nodes among differently overlapping sets of clips to accomplish any or all of the above at once. For example, you can add one Shared node to make an adjustment to every clip from a particular camera, add a second Shared node to each of those clips that are in a particular scene, and then add a third Shared node to whichever of those clips happen to be a closeup of the lead actress, before adding one or two regular Corrector nodes that aren't shared to make clip-specific tweaks.

> **IMPORTANT:** At the time of this writing, there is a limitation when using Shared nodes. Grades using shared nodes cannot be used in collaborative workflows. It is hoped that this limitation is temporary.

Creating Shared Nodes

Creating a Shared node is easy, assuming you've created a node that has an adjustment you'd like to share among multiple clips.

To create a Shared node:

- Right-click any Corrector node and choose Save as Shared node.

Locking Shared Nodes

Once you turn a node into a Shared node, that node is automatically locked, preventing you from accidentally making adjustments to it that would affect all other grades using that same Shared node.

To toggle the locked status of a Shared node, do one of the following:

- Right-click any Shared node and choose Lock Node from the contextual menu.
- Open the Keyframe Editor, and click the Lock icon in the track header of that node's keyframe track.

Copying Shared Nodes

Because Shared nodes are essentially Corrector nodes within clip grades, they're easy to work with. Once you've created one or more Shared nodes, there are a variety of ways you can copy them to the grades of other clips in your program to take advantage of the linked adjustments they let you make.

Ways of copying Shared nodes among multiple clips:

- **Add a Shared node to another clip's grade using the Node Editor contextual menu:** Once you save a node as a Shared node, it becomes available from the bottom of the Add Node submenu of the Node Editor contextual menu, making it easy to add any Shared node to any clip. If you customize the label of the Shared node, that custom label appears in the contextual menu, making it easier to find what you're looking for.

- **Add Shared nodes to a basic grade you'll be copying to other clips:** If you create one or more Shared nodes when you initially build a grade, copying that grade to other clips naturally copies the Shared nodes as well.

- **Save a Shared node as a Gallery still and apply it to other clips:** If you save a grade with a Shared node in it to the Gallery, then every time you copy that Gallery still to another clip, you copy its Shared node.

- **Create a Shared node and append it to a selection of additional clips:** If you've already graded several clips in a scene, you can add a Shared node to the end of one of the clips grades and make sure it's selected, then select all of the other clips in the scene and choose Append Node to Selected Clips.

- **Use Shared nodes to preserve linked adjustments when copying remote grades to local grades:** If you use Shared nodes to make your base adjustments when you grade using Remote Versions to automatically copy those grades to other clips that come from the same source media, those adjustments will remain linked when you copy your remote versions to local versions for fine tuning.

You can also choose options in the Gallery that dictate what happens when you copy a grade that has shared nodes within it.

Converting Shared Nodes Back to Corrector Nodes

Sometimes you need to stop a node from being shared. For example, if you want to copy a grade from another scene to use as the starting point for a new grade, chances are you don't want any shared nodes to continue being shared as you customize that grade for the new scene. In this instance, you can convert the Shared node back to a regular Corrector node, make any adjustments you need to customize it for the new scene, and then turn that node into a brand new Shared node that's specific to the new scene.

To convert a Shared node back to a Corrector node:

- Right-click any Shared node, and choose Convert to Corrector from the contextual menu.

Deleting Shared Nodes

If you've created a Shared node that's being used in multiple clips, and you decide you want to eliminate the linked relationship among these nodes so they all work independently, you can "delete" a specific Shared node. This leaves the now unlinked nodes intact within each node tree in which they appear, but clears their effect. Additionally, that Shared node is removed from the Add Node submenu.

To Delete a Shared node:

- Right-click any Shared node, and choose a node to delete from the Delete Shared Node submenu.

Using Adjustment Clips

You can also apply a single grade to multiple clips in the Timeline using Adjustment clips that have been superimposed over numerous other clips in the Timeline. They can be used to apply a single grade to all clips in a scene, or to add further color adjustments or trims to a section of clips via a second grade that's applied on top of the individual clip grades that are already applied.

Adjustment clips are a great way to add adjustments to multiple clips that you may be making frequent changes to. If you make changes to a grade in an Adjustment clip, that change is automatically applied to all clips underneath it in the Timeline. Additionally, grades applied via adjustment layers can be turned off by disabling the adjustment layers, either one at a time, or by disabling an entire track with adjustment layers in it.
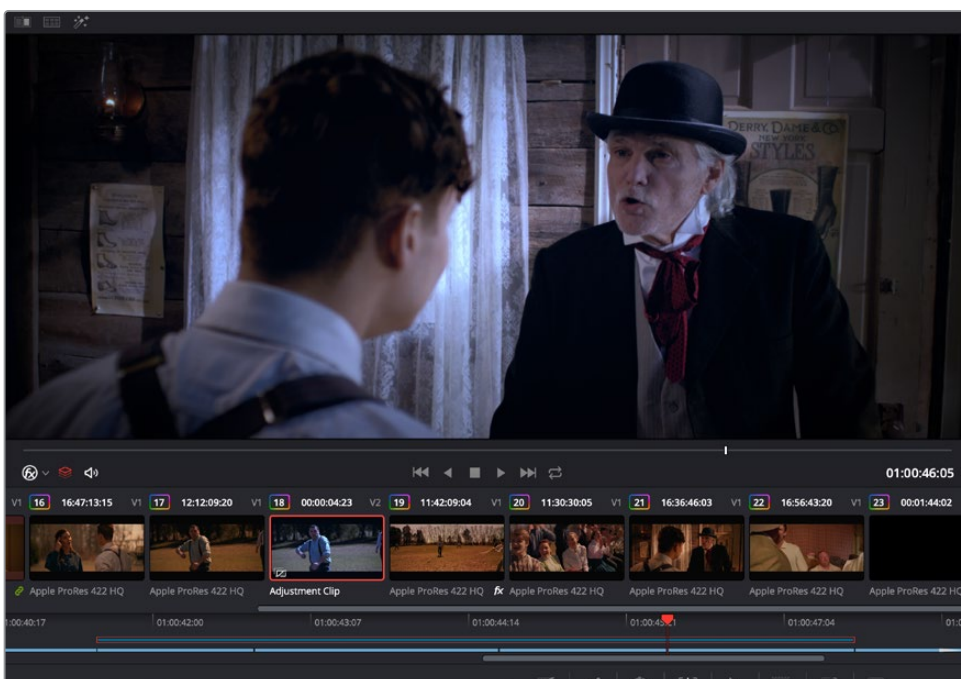
An Adjustment clip (shown selected in the Mini Timeline)
used to apply a cooler grade to four other clips in a scene

Adjustment clips can be edited into the Timeline on the Edit page, and are available from the Effects bin of the toolbox in the Effects Library. When an Adjustment clip is superimposed above one or more clips in the Timeline, all effects that are applied to the Adjustment clip are also applied to all clips underneath it.

Adjustment clips can be used to apply the following types of effects:

- ResolveFX and OpenFX plug-ins
- Inspector parameters, including Composite, Transform, Cropping, and Dynamic Zoom
- Fusion page effects
- Color page grading and sizing

Effects clips are a fast and easily revised way to apply one or more grades and effects to a range of clips.

> **TIP:** Multiple adjustment layers can be grouped together so that you can apply Group and Clip grades to adjustment layers, linking multiple adjustment layers together in situations where you want to apply the exact same trim or stylistic adjustment to multiple scenes in non-contiguous areas of the Timeline.

Using Groups

Grouping is one of DaVinci Resolve's most powerful features for organizing grades amongst multiple clips. Groups are manually created collections of clips with automatic linking relationships that make it easy for you to control the rippling of grades among sets of clips that you define. When clips have been grouped together, selecting one member of the group reveals a group "linked" badge at the top-right of each clip's thumbnail belonging to the group.
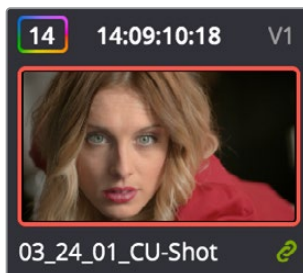
The green link icon indicates
this clip is in a group

You can create as many groups within a single project as you need. You can add or remove shots from the current group, and the current group is defined by the last shot you've selected (if it belongs to a group, that's the new current group).

As introduced in DaVinci Resolve 11, the grading of grouped clips is easier than it has ever been. Once grouped, you can choose from one of four Node Editor modes to grade the current clip. Which mode you choose determines whether that grade will automatically ripple to every other member of that group, or whether the grade will only affect that one clip. In this way, you can combine multiple node trees, some which will ripple, and one which won't, to create the final look of each clip in that group.

For example, you might group together every clip from the same angle of coverage in a scene. You might also group together every clip from a particular section of B-roll that will be graded with the same treatment. This way, whenever you make a change or otherwise update one member of the group using one of the rippled Node Editor modes, every clip in the group will be changed together.

This section discusses how to create and manage groups, how best to use them, and what issues you need to be aware of to use groups to best advantage.

Creating and Managing Groups

The following procedures describe how to create, load, modify, and delete groups.

To create a new group:

1 Select one or more clip thumbnails in the Timeline. You can select a contiguous range of clips by clicking one and then Shift-clicking another, or you can make a noncontiguous selection by Command-clicking individual clip thumbnails anywhere in the Timeline.

2 Right-click one of the selected clip thumbnails, and choose Add Into New Group.

3 Type a name into the field of the Group Name dialog, and click OK.

The new group is created, and the clips you had selected now appear with the "linked" group badge above the thumbnails.

To load a different group, do one of the following:

– Move the playhead to another clip that's a member of that group.

– Right-click any clip belonging to any group, and choose
Group > "Name of group" > Load.

The selected group now becomes the current group. Using the Add Into Current Group command will add a clip to the newly loaded group.

To add one or more clips to an existing group:

1 Load the group you want to add clips to.

2 Select one or more clip thumbnails in the Timeline. You can select a contiguous range of clips by clicking one and then Shift-clicking another, or you can make a noncontiguous selection by Command-clicking individual clip thumbnails anywhere in the Timeline.

3 Right-click one of the selected clip thumbnails, and choose
Group > "Name of group" > Assign to Group.

The selected clips now appear with the "linked" group badge above the thumbnails.

To remove one or more clips from an existing group:

1 Select one or more clip thumbnails in the Timeline that you want to remove from a group. You can select a contiguous range of clips by clicking one and then Shift-clicking another, or you can make a discontiguous selection by Command-clicking individual clip thumbnails anywhere in the Timeline.

2 Right-click one of the selected clip thumbnails, and choose Remove From Group.

To rename a group:

1 Right-click any clip belonging to any group, and choose
Group > "Name of group" > Rename.

2 Type a new name into the field of the Group Name dialog, and click OK.

The group is renamed. The new name appears as a new submenu of the Timeline contextual menu.

To delete a group:

– Right-click a clip belonging the group you want to delete, and choose Group > "Name of group" > Delete.

– This clears the group, while preserving the last applied grade within each clip.

Using Group Modes to Control Which Grades Ripple and Which Don't

When you create a group and then select any clip that is a member of that group, additional Node Editor modes become available that let you apply multiple levels of grades to the clips in that group.
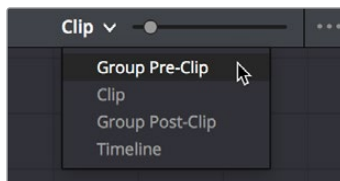
Available options in the Node Editor modes drop-down

For clips that aren't grouped, two dots at the top of the Node Editor let you switch between Clip and Timeline modes via a single click. If you're working on a clip that's part of a group, four dots will be displayed to allow fast access to the Pre-Clip and Post-Clip Group modes as well.

Four dots at the top of the Node Editor let you choose which mode you're working on

Node trees you create using the Group Pre-Clip and Group Post-Clip modes automatically ripple changes to every member of a group. Node trees created with the Clip mode are specific to each clip. Node trees created with the Timeline grade affect the entire Timeline, all at once. Combining node trees made using these different modes makes it easy combine clip-specific changes with group-wide changes that make grading faster.

- **Group Pre-Clip:** Node trees assembled in this mode affect every clip in the group simultaneously. Pre-Clip adjustments are useful for creating an overall grade that you want to use as a starting point for the scene, such as when you need to normalize a group of log-encoded clips in a specific way, or when you want to create a base grade that generally improves every clip in a scene.

- **Clip:** The Clip grade corresponds to the local or remote version associated with that clip. Node trees assembled in the Clip mode only affect the specific clip that's selected. All Local and Remote versions you create are in Clip mode. Clip adjustments are useful for matching clips to one another in a scene, doing clip-specific secondary adjustments, or making any other sort of adjustment that you only want applied to the current clip, rather than to the group as a whole. Clip adjustments are applied after Pre-Clip adjustments.

- **Group Post-Clip:** Node trees assembled in this mode also affect every clip in the group simultaneously, but these adjustments are applied after the Clip adjustments. Post-Clip adjustments can be useful for applying a creative look to an overall scene, so that later revisions to a scene's look can be accomplished with a single set of adjustments that automatically affect the entire group.
- **Timeline:** Node trees assembled in this mode affect every single clip in the entire Timeline. Timeline adjustments are useful when you have a single change that you want to apply to every single clip at once.

The image processing of each Node Editor mode is sequential, making it easy to keep track of the order of operations affecting a particular clip.

An Example of Grading a Group of Clips

This section shows an example of how you might approach grading a group of clips using the different Node Editor modes that are available. Keep in mind that this is only one of many possible approaches you could take to the use of groups, and was chosen because it exercises everything you can do to a single grade.

To get started, select a series of clips that you want to group, and right-click one of them and choose Create New Group to group them together, entering a name and clicking OK when prompted. One convenient advantage of simply creating groups from a selection is that you're not limited to selecting a continuous range of clips in the Timeline. Another advantage is that you can use the View > Timeline Thumbnail Mode > Source (C-mode) command, or Timeline filtering, to isolate the range of clips you want to use for creating a group.

There are different ways you might choose to group clips together:

- All clips within a particular scene
- All clips recorded from a specific camera
- All headshots of a particular person
- All clips from a particular angle of coverage
- All exteriors of a particular location

The list could go on and on, but you get the idea. You can group any selection of clips together that have reason to share a common grade. In this example, a series of shots from an exterior scene are selected and made into a group.
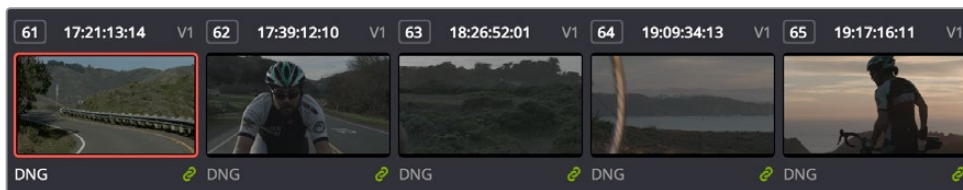
Clips made into a group

Once you've created a group, choose Group Pre-Clip from the Node Editor mode drop-down. This is the first grade that's applied, as the underlying grade that affects the entire group. Using this node tree, adding a LUT to normalize the clips, a Color Wheel adjustment, and some Curve adjustments to tune the color provide a primary grade that now affects every single clip in the group.
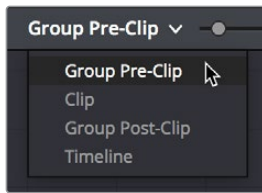
A primary adjustment applied to the Group Pre-Clip mode

With this accomplished, you can see there's some variation among the clips in the scene that needs to be corrected in order for every clip to match. Choose Clip from the Node Editor mode drop-down. Grades that you make in Clip mode only affect the clip to which they're applied, so now you can work clip by clip using the Image Wipe and Split-Screen controls to compare clips and make whatever adjustments are necessary to make each one match the main look for the scene.
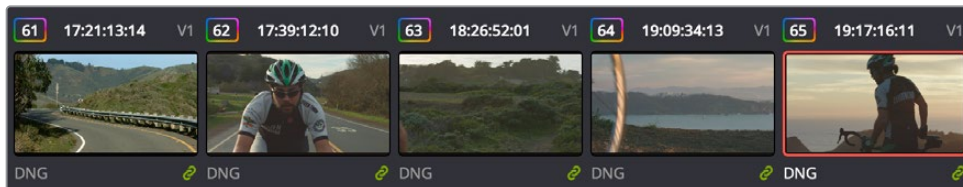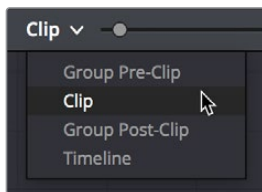
Scene balancing adjustments made using the Clip mode

Once all the clips are balanced with one another, you can choose Post-Clip Group from the Node Editor mode drop-down. This lets you add one more grade on top of the Pre-Clip and Clip grades that you've already applied, that you can use for any number of things. In this example, a single stylistic adjustment is applied that now affects all of the clips at once. If a client wants to see something different, you can easily make the necessary changes to one clip, and all other clips in that group will immediately be altered as well.
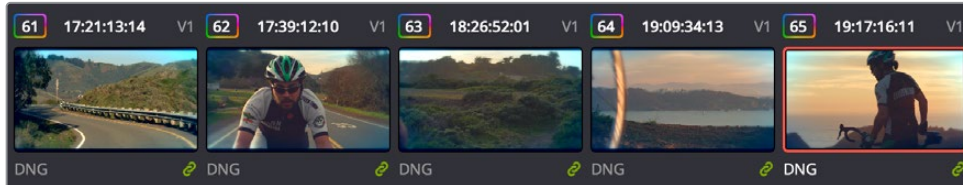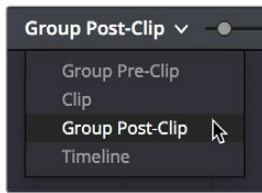
A stylistic adjustment applied to the Group Post-Clip mode

At this point, the scene is graded via a well organized set of corrections. If the client later wants a change affecting the underlying primary grade that everything is built on, you can adjust the Pre-Clip grade. If you spot an inconsistency with your shot matching at any point, you can make a fast tweak to the relevant Clip grade. And if the client wants a stylistic change, you can make any necessary adjustments to the Post-Clip grade to change the overall look of the whole scene. In each case, groups give you total control over which adjustments will ripple across the whole group, and which adjustments will be clip-specific.

Using Undo in Groups

Each Node Editor mode has a separate undo stack, meaning that separate multiple-level undo is saved for Group Pre-Clip, Clip, and Group Post-Clip.

Saving Stills and Grades in Groups

When you save a still for a clip that's part of a group, the result is that the still reflects the look of the combined Pre-Clip, Clip, and Post-Clip node trees, but the grade that's saved within depends on the Node Editor mode you had selected when saving the still. For example, if the Node Editor is set to Group Pre-Clip, then you'll only save the Pre-Clip grade; the Clip, Group Post-Clip, and Track grades will be ignored. Copying a saved grade to a clip in a group results in that grade being copied to the node tree of whichever Node Editor mode is currently open.

Collapse Group Grades

If you want to take a clip out of a group, but you want its grade to continue incorporating all adjustments made in the Pre-Group and Post-Group Node Editor modes, you can use the Collapse Group Grades command to copy all nodes in the Pre-Group and Post-Group grades to the Clip grade. When you do this, Pre-Group nodes are added before any pre-existing nodes in the Clip grade, and all Post-Group nodes are added after, in order to maintain the correct order of operations.
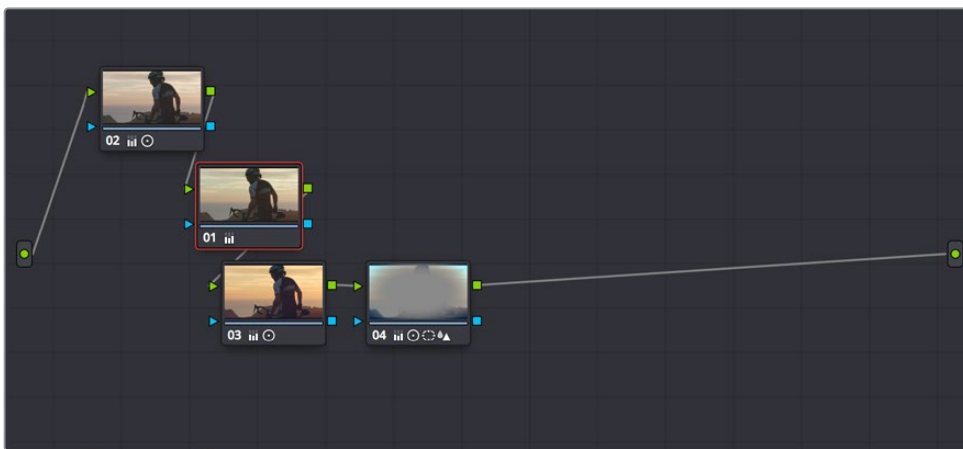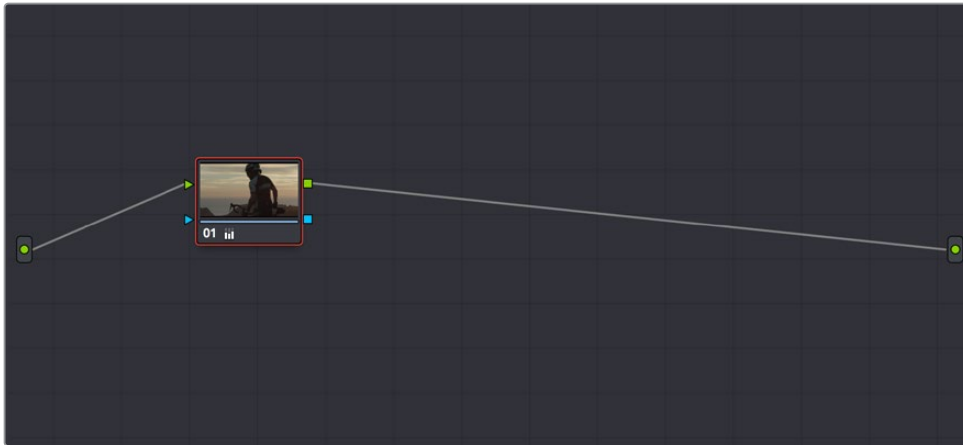
(Top) The Clip node tree, (Bottom) After using the Collapse Group Grades command
to flatten the Pre-Group and Post-Group nodes into the Clip node tree

To flatten all group grades into a single Clip mode node tree:

- Right-click a clip's thumbnail in the Thumbnail timeline, and choose Collapse Group
  Grades from the contextual menu.

Using Collapse Group Grades on a clip always removes that clip from whatever group it was
previously a member of. This can also be an easy way of creating a single flat node tree in
preparation for saving a grade to the Gallery for applying to other clips that aren't themselves
in groups.

Groups and Versions

Local or Remote versions you create relate only to the Clip grade. Group Pre-Clip and Group
Post-Clip grades cannot be versioned.

Exporting Grades and LUTs

If you find it necessary to exchange grades with other workstations, there are two ways you can do so directly: by exporting grades, or LUTs. This section discusses the export of Grades; for more information about exporting LUTs, see Chapter 130, "Using LUTs."

To export a grade:

1   Save the grade you want to export as a still in the Gallery.

2   Right-click the saved still in the Gallery, and choose Export.

3   Select the image format you want to save the still as. Choices include: DPX, Cineon, TIFF, JPEG, PNG, PPM, BMP, and XPM.

4   Choose a location for the resulting still image and saved grade files, type a name into the Save As field, and click Save.

    Two files are saved. The image file contains the still image of the frame that was stored. A DRX (DaVinci Resolve eXchange) file contains all the grading information.

To Import a grade:

1   Right-click anywhere in the gray area of the Gallery, and choose Import.

2   Click the Options button to select the specific file type you want to import, or select "All Files" for multiple formats.

3   Choose the image file that was exported from your DaVinci Resolve workstation, or someone else's. The accompanying DRX file must be in the same location. If you lose the original image file, you can still import the DRX file by itself. It will preserve the node structure of the still, but you will not be able to wipe against it.

    The still you imported appears in the Gallery, containing the grading information you wanted to import.

Node Editing Basics

This chapter covers the basics of using the Node Editor in DaVinci Resolve to manage all of the adjustments you decide to apply to a clip, as well as the fundamental procedures for editing and organizing nodes within a tree that are the basis for creating more sophisticated effects.

Contents

Node Editor Basics

By default, every clip has one node in the Node Editor that contains the first corrections you make. However, you also have the option of creating multiple nodes, where each node contains one or more corrections that affect the image.
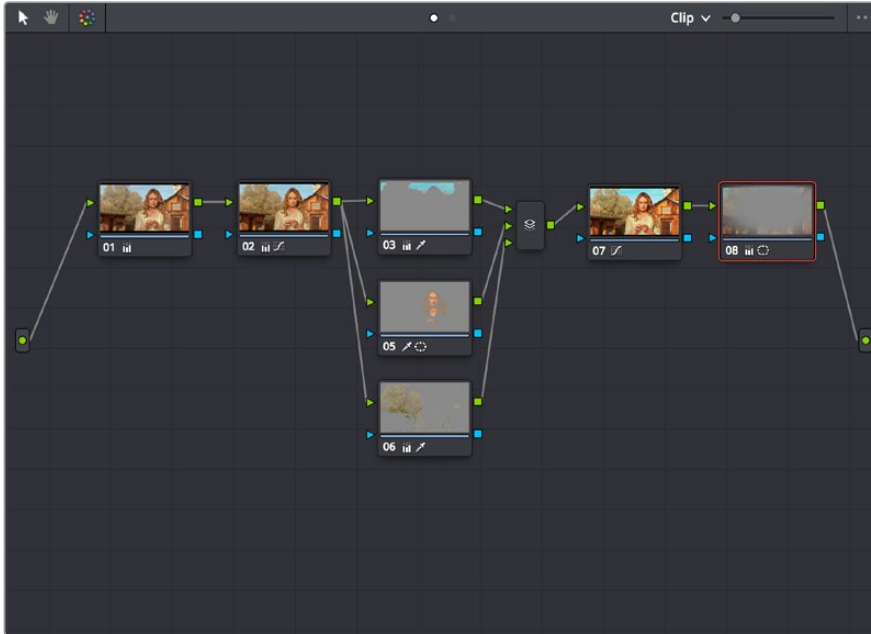
The Node Editor showing a reasonably full-featured grade

The specific arrangement of nodes you create lets you exert precise control over the order of operations performed by your grade, which provides many advantages. This section covers different ways of creating, editing, and arranging node trees to harness the full power of DaVinci Resolve.

Thumbnail-Optional Nodes

The Node Editor option menu provides a Show Thumbnails option that lets you disable or enable the thumbnails attached to each Corrector node.
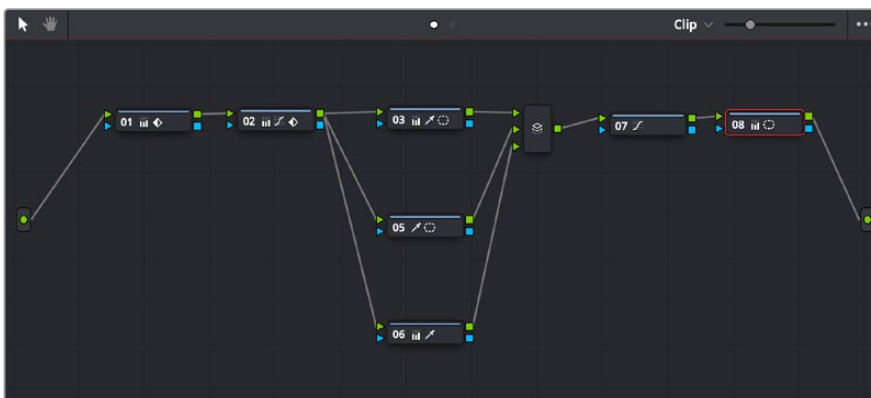
Disabling thumbnails in the Node Editor option menu makes nodes shorter

How Many Nodes Do I Need to Use?

In this chapter and the ones that follow, you'll learn many different techniques for combining adjustments and nodes in different ways to achieve highly specific effects. Consequently, new DaVinci Resolve users often wonder, how far do I go? There is no right answer, but suffice it to say that some of the world's leading colorists achieve stunning results in as few as three or four nodes, while others routinely build carefully organized hierarchies of ten to twenty nodes, or more. The number of nodes you use is often dependent on the quality of media you've been given to work with, as well-lit footage usually requires less work than material shot run-and-gun with available light, that typically needs many more adjustments to achieve an acceptable result. Furthermore, the number of nodes you may use can also depend on what kind of program you're working on, with commercial spots affording the colorist enough time in the schedule to build truly massive grades that adjust every little detail, and narrative features and television shows requiring you to work faster and do more within fewer adjustments in order to stay on track. The real answer? Each grade requires as many nodes as are necessary. No more, no less.

The Node Editor Interface

As you work within the Node Editor, you may find the need to zoom into or out of it to get a better look at the node tree, and to pan around the working area to deal with large collections of nodes.

To expand the size of the Node Editor's working area:
- Drag the border between the Node Editor and the Viewer to the left or right to make it wider or narrower.
- Right-click anywhere within the Node Editor (except on a node) and choose Toggle Display Mode, which hides the Viewer and moves the Node Editor to the right of the Gallery, enlarging it considerably. Right-click and choose Toggle Display Node again to return to the default layout.
- You can toggle Display mode using the DaVinci control panel by pressing SHIFT UP and the DISPLAY/CURSOR button above the fourth trackball on the Center panel.

To arrange the node tree to fit your current working area:
- Right-click anywhere in the Node Editor (except on a node) and chose Cleanup Node Graph from the contextual menu. This will rearrange your node tree to fit in whatever size working area you have at the time.

To zoom and pan within the Node Editor, do one of the following:
- Use the Node Editor's zoom slider to shrink or enlarge the nodes in the Node Editor.
- Click the Pan tool (the hand icon) at the upper left-hand corner of the Node Editor, and drag anywhere within the gray area of the Node Editor to pan around.
- Press the H key to toggle between selection and pan modes in the Node Editor.
- Middle-click and drag anywhere within the Node Editor to pan around.
- Right-click and choose Zoom In or Zoom Out.
- Right-click and choose Zoom to Window to fit the node tree to the current size of the node graph.
- Right-click and choose Original Size to return the node graph to the default size.
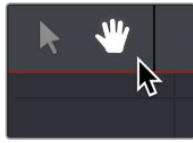
The Node Editor's Pan (Hand) tool

The Components of a Node Tree

Ambitious grades may require trees of multiple nodes to create the necessary effect. This section covers the mechanics of putting nodes together into the structures that are described in more detail later in this chapter.

Every node you add is a "Corrector" node, which is capable of either primary or secondary correction, depending on whether or not you enable the Qualifier/Window/Matte controls. Even "Serial" and "Parallel" nodes are simply Corrector nodes that are added in series or in parallel to the previous node in the node tree; the names are a consequence of how they're added.

Each Corrector node has two inputs and two outputs, which lets you separately manage the RGB image-processing channel, and the Key channel that defines areas of isolation for image processing operations, or transparency for compositing. RGB connections are light green, located at the top left and right of each node. Key connections are blue, located at the bottom left and right of each node. Inputs into the node are triangles, and outputs are squares. These inputs and outputs let you control the flow of image and isolation channels coming into and going out of each node in the tree.
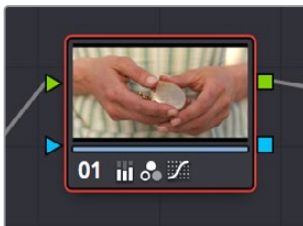
A single node, the RGB (green) and key (blue) triangular inputs and square outputs are clearly visible

Nodes are attached to one another via "connections," seen as lines that connect one node to another. Image data flows from left to right, starting with the Source input all the way at the left of the Node Editor, through each node in the tree, and ending at the Node Tree output at the right of the Node Editor.
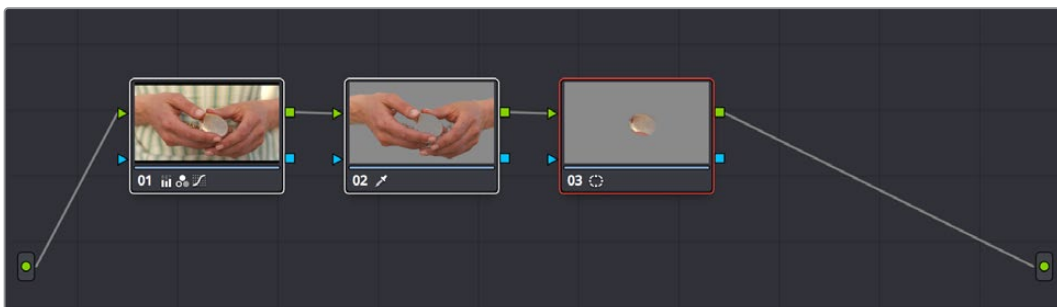
A simple serial arrangement of corrections

Here's an explanation of the different components of a basic node tree where all nodes are connected in serial, one after the other, and how they work together:

- **Source Input:** The green source node to the far left is the clip's image data as processed by the Sizing and Source decode settings, ungraded. The Source input feeds RGB data to the grade, and is connected to the RGB input of the first node in your tree. If necessary, you can connect the Source input to more than one Corrector node, creating multiple simultaneous streams of image processing emerging from the original source state of the image that you can eventually recombine in different ways using the Parallel or Layer Mixer nodes.

- **Nodes:** Each node in the node graph represents a collection of image processing operations that can be enabled or disabled separately from any other node in the graph. By separating operations into multiple nodes, you're able to precisely control the order of all image processing operations in DaVinci Resolve to create many different corrections and effects. The green RGB inputs and outputs are used to connect these nodes together. Each node's thumbnail image shows how the clip looks at that particular stage of the grade, giving you a visual indication of what each node is doing, and small badges below each node show you which specific operations are being applied by that node.

- **RGB Inputs and Outputs:** The green inputs and outputs at the upper right and left of each node are used to connect the RGB image that's output from one node to the RGB input of the next node. For a Corrector node to have an effect, you must connect both its RGB input and its RGB output to neighboring nodes in the tree. Furthermore, every single node in the Node Editor must be connected for a grade to be enabled; having any disconnected node in the node tree disables that grade until it's fully connected.

- **Key Inputs and Outputs:** The blue inputs and outputs at the bottom right and left of each node are used to route the key channel generated by a node's Qualifier or Window controls, or imported via a Matte clip that you previously associated with a clip in the Media page. When you connect the key output of one node to the key input of another, you basically copy the first node's key to the second node. You can also combine the key outputs of multiple nodes in various ways using the Key Mixer node.

- **Node Tree Output:** The RGB output of the last node in a tree must be connected to the green Node Tree output node, which "completes the circuit" of image processing, and passes that correction on to the next stage in the DaVinci Resolve image processing pipeline. If the output is not connected, the node tree is disabled and has no effect on the clip. You can only connect one RGB output at a time to the Node Tree output.

- **Second Source Input (for RED HDRx):** You can access the alternate highlight exposure of RED HDRx media by exposing this optional second Source input. For more information, see"Mulit-Channel RED HDRx Support" in Chapter 127, "Channel Splitting and Image Compositing."

- **Second Source Input (from Fusion page):** You can also create additional sources to route in masks or mattes created in the Fusion page for use as keys in the Color page.

- **Alpha Output:** It's possible to create regions of transparency for compositing directly in DaVinci Resolve by connecting a key output to an optional Alpha output. For more information, see Chapter 126, "Combining Keys and Using Mattes."

Node Badges and Labels

Nodes appear with various labels and badges to help you identify what each node is contributing to the overall grade. How long a label and how many badges appear depends on the size of each node, as set by the Node Editor's Zoom slider.

Nodes showing the kinds of labeling and badges that are available
for identifying what operations each node is performing

- **Node number:** Nodes are numbered in the order in which they appear in the node graph, making it possible for you to select specific nodes by number via the DaVinci control panel.

- **Adjustment badges:** As you apply various operations within a node, small badges appear underneath the thumbnail that indicate which palettes have been used to adjust that node. How many badges are visible depends on how far in or out you're zoomed into the Node Editor, and whether or not there are Color Space or HDR labels already taking some of this room. At larger node sizes, more badges can appear within the width of the node. Each palette in the Color page has a unique badge. If you apply more operations than a node has area to display, a single "downward arrow" badge appears.

- **Animation badge:** Nodes with animated parameters display a keyframe badge.

Labeling Nodes

Nodes can be labeled to identify a particular node's function in your grade. This can make it easier to revise a grade months later. Node labels are also saved when you save a still, so labels can also make it easier to decipher a saved grade down the road. At each node's default size in the Node Editor, nodes can appear with up to 12 characters of text, although larger nodes can accommodate more text.

To label a node:

1   Right-click a node and choose Change Label.

2   Type the label text you want and press Return.

    The label you entered appears above the node in the Node Editor.

To edit a node's label:

    Once a node has a label, you can change the label at any time by double-clicking it.

Selecting Nodes

The node that's currently selected in the Node Editor is highlighted in orange, and is referred to as the current node. When you adjust any of the parameters or settings in the Color page, you're adjusting parameters within the current node. You can only select one node at a time.

To select a node, making it the current node, do one of the following:

- Click any node in the node graph.

- Choose Color > Nodes > Previous Node (Option-Shift-Semicolon) or Color > Nodes > Next Node (Option-Shift-Apostrophe). When you do this, the last node loops around to the first one, and vice versa.

- Using the Transport panel of the DaVinci control panel, press the PREV NODE or NEXT NODE buttons. When you do this, the last node loops around to the first one, and vice versa.

- Using the Transport panel of the DaVinci control panel, enter the number of the node you want to select using the keypad, and then press the SELECT NODE button.

The selected node appears highlighted in orange. You also have the ability to select multiple nodes, in preparation for doing things like moving them or creating compound nodes (covered later in this chapter).

To select multiple nodes:

- Command-click each of the nodes you want to simultaneously select.

- With the Node Editor Selection tool chosen (at the upper left-hand corner of the Node Editor) simply drag to select multiple nodes using a bounding box.
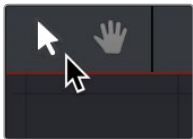
The Node Editor's Selection tool

When you select multiple nodes, each one appears highlighted in white, with the exception of the current node, which remains orange.
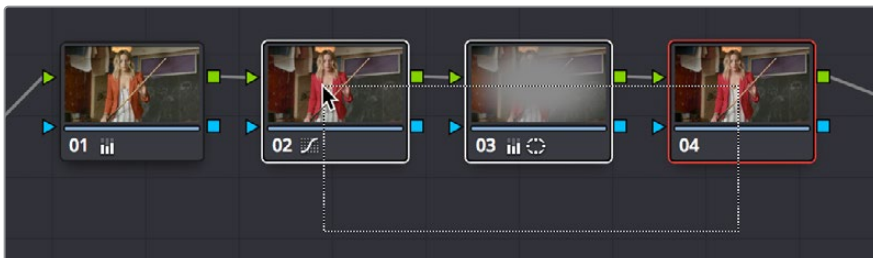
Selecting three nodes by dragging a bounding box

When you select another clip in the Timeline, the default behavior is that the last node that was selected when you worked on that clip is the one that's selected when you move to that clip again. However, a setting in the option menu of the Node Editor and the Color panel of the User Preferences, called "Switching clips," lets you change this behavior. For more information on this option, see Chapter 3, "System and User Preferences."

Disabling Nodes

In the process of creating a node tree, it's often useful to turn one or more selected nodes off to disable their effect on your grade. It's also useful to turn the entire node tree off and on in order to see "before and after" views of the current clip. Disabled nodes are not processed during rendering, and they remain disabled when you save that grade along with a still in the Gallery and then apply that grade to another shot.

Disabling Individual Nodes

Disabling a single node is useful for temporarily disabling adjustments that you don't think you want to use but don't want to discard (however you should remember that it's alarmingly easy to inadvertently turn these nodes back on again). It's also good for giving your client a before and after preview of the last adjustment.

To toggle individual nodes off and on, do one of the following:
- Click the number of any node in the node graph to disable that node by itself.
- Select a single node, and choose Color > Nodes > Enable/Disable Selected Nodes (Command-D).
- On the DaVinci control panel, press the DISABLE CURRENT button (on the T-bar panel).

Disabling Multiple Nodes All At Once

If you select more than one node in the node tree, using any of the methods of turning nodes off and on described above (including Command-D) will toggle Enable/Disable Selected Nodes. Please note that the current node outlined in orange is always considered to be part of the selection.

This makes it easy to do before/after comparisons of any combination of nodes doing complicated adjustments by selecting them, while leaving un-selected nodes doing base adjustments that you want to leave enabled alone.

Disabling All Nodes

In addition to the Bypass All Grades command, disabling all nodes of a grade at once is another easy way of disabling a grade to provide a before and after of the original state of the clip (or the color managed state of the clip if Resolve Color Management (RCM) is enabled). More importantly, it's a good way to disable all nodes of a grade in preparation for walking your client through each operation in that grade node by node, as you turn each node on in turn while narrating how it's improving the image.

To turn every node off and on at once, do one of the following:
- Choose Color > Nodes > Enable/Disable All Nodes (Option-D) to toggle all nodes off and on.
- On the DaVinci control panel, press SHIFT-DOWN and then the DISABLE CURRENT button (on the T-bar panel).

> **IMPORTANT** When you turn every node off and then on again, every node is re-enabled, even nodes that had previously been individually disabled.

Turning Grades and/or Fusion Effects Off

The Bypass Color Grades and Fusion Effects button/drop-down commands in the Viewer's title bar are also available via View > Bypass Color and Fusion menu commands. Turning off Fusion effects in the Color page is an easy way to improve playback performance on low power systems when you just need to make a quick set of grading adjustments. Toggling grades off and on is also a convenient way to quickly get a before and after look at a shot where the before goes all the way back to the source.

If you choose Toggle Bypass or click the Viewer control, you'll turn off whatever is checked in the optional menu, which lets you choose whether or not you want to bypass both Color and Fusion, or just one or the other.

(Left) Menu commands for bypassing Color and Fusion, (Right) Edit page Timeline Viewer controls

Resetting Nodes

If you're dissatisfied with your current operations and want to start over, there are three ways you can reset nodes in the Node Editor. These are available as items in the Color menu, and buttons on the DaVinci control panel's T-bar panel.

- **Reset Selected Node Grade:** Resets the currently selected node, eliminating all keyframes, to the default parameter settings.
- **Reset Grades and Keep Nodes:** Resets every node in the current node tree, without affecting the node tree's structure; all nodes remain where they were. However, each node has been reset to the default parameter settings.
- **Reset All grades and Nodes:** Deletes every node and keyframe, and restores a single node set to the default parameter settings.

You can also reset nodes using the mouse, which can be a quick thing to do if you're already working in the Node Editor to accomplish other things.

Methods of resetting nodes with the mouse:

- **To reset a selected node:** Right-click that node and choose Reset Node Grade from the contextual menu.
- **To reset all grades and nodes:** Right-click anywhere in the background of the Node Editor, and choose Reset All Grades and Nodes from the contextual menu.

Methods of resetting nodes with the keyboard:
- **To reset a selected node:** Press (Shift-home).
- **To reset all grades and nodes:** Press (Command-home).
- **To reset all grades and keep nodes:** Press (Shift-Command-home).

Previewing and Restoring Node Trees

There are two other methods of quickly dealing with unwanted changes you've made to node trees, without needing to use undo.

- **Preview Memory:** Lets you preview the effect of any saved grade on the current clip. To preview, choose Color > Preview Memory (Option-Shift-P), and then right-click any saved still in the Gallery (or Memory) and choose Add Correction. In fact, you can use Add Correction to try out as many stills as you like. If you like any still's effect, then you can leave it be. If you don't like any of the stills you previewed, then choosing Color > Preview Memory again reverts the clip to the original grade.
- **Original Memory:** This command lets you quickly revert a clip's grade to its original state when you first selected that clip. It is accessed by choosing Color > Original Memory (Option-Shift-O). This is useful for getting immediately back to a clip's original grade if you've made a series of changes that you then regret. Selecting another clip in the Timeline and then reselecting the clip you made changes to resets what is considered to be the current grade.

Caching Specific Nodes to Improve Performance

You can flag specific nodes to be cached, along with all nodes appearing upstream in that node tree. By caching nodes using processor-intensive effects, you free up real time capability for the remaining downstream nodes in a grade. Choosing Playback > Render Cache > User only caches nodes that you've flagged for caching.

When you choose Playback > Render Cache > Smart mode, DaVinci Resolve automatically caches any nodes that use Motion Blur, Noise Reduction, or OFX plug-ins, without you needing to do anything.

To flag a node and all corrections made in upstream nodes for caching:
Right-click any node and choose Node Cache > On from the contextual menu.

Editing Node Trees

There is no limit to the number of nodes you can create and connect to one another, and you can make as many or as few parameter adjustments as you like within each node. The following procedures describe the ways you can add nodes to the node graph as you build each grade's node tree.

Adding Nodes

The simplest thing you can do to add to the complexity of a node tree is to add additional nodes, in order to add more adjustments to the current grade. You can add nodes so that they're automatically attached to nodes that are already in the node tree, for immediate adjustment, or you can add unattached nodes to empty areas of the node tree in preparation for assembling a particularly complicated and specific node tree to accomplish a difficult task.

Methods of adding nodes to the tree using a mouse, tablet, or trackpad:

- **To add any kind of node to the node graph using the mouse:** Right-click any node in the node tree, and choose the type of node you want to add from the Add Node submenu of the contextual menu.

- **To add a disconnected node to the node graph:** Right-click anywhere within the node graph's background, then choose Add Node > Corrector from the contextual menu. Disconnected nodes have no effect on a node tree until they're connected.

Methods of adding nodes to a currently selected node in the tree using the keyboard or control panel:

- **To add a serial node after the currently selected node:** Press Option-S key, choose Color > Nodes > Add Serial from the menu, or press the ADD SERIAL button on the T-bar panel of the DaVinci Resolve control panel.

- **To append a serial node to the very end of the node tree:** Press Option-K, choose Color > Nodes > Append Node from the menu, or press the APPEND NODE button on the T-bar panel of the DaVinci Resolve control panel.

- **To add a serial node before the currently selected node:** Press Shift-S, or choose Color > Nodes > Add Before Current, or press SHIFT DOWN and then ADD SERIAL on the T-bar panel of the DaVinci Resolve control panel.

- **To add nodes in parallel to the currently selected node:** Press Option-P, choose Color > Nodes > Add Parallel from the menu, or press the ADD PARALLEL button on the T-bar panel of the DaVinci Resolve control panel.

- **To layer nodes with the currently selected node:** Press Option-L, choose Color > Nodes > Add Layer from the menu, or press the ADD LAYER button on the T-bar panel of the DaVinci control panel.

- **To add an outside node to the currently selected node:** Press Option-O, choose Color > Nodes > Add Outside Node from the menu, or press the ADD OUTSIDE button on the T-bar panel of the DaVinci control panel.

Adding Nodes with Windows Turned On

There are also dedicated commands for adding serial nodes with Circular/Linear/Polygon/Curve windows automatically turned on, for convenience.

To add a node to the tree with a Window automatically enabled:

Choose an item from the Nodes menu, or press the button on the T-bar panel of the DaVinci Resolve control panel that corresponds to the following:

- **Node + CPW:** Circular Power window (Option-C)
- **Node + LPW:** Linear Power window (Option-Q)
- **Node + PPW:** Polygonal Power window (Option-G)
- **Node + PCW:** PowerCurve window (Option-B)

Whenever you add a node to a tree, it's numbered consecutively to come after the next most recent node you'd added, regardless of the order in which it appears in the node tree. For example, if you've already added three nodes, and then you decide to add another node in between Nodes 1 and 2, the new node will be Node 4, and the order of the nodes will be 1, 4, 2, and 3.

Deleting Nodes

If there's a node that you no longer need, you can choose to remove it completely from the node tree to remove its effect permanently.

To delete a node, do one of the following:
- Select a node, then press the Forward-Delete key.
- Right-click a node, and choose Delete Node.
- Using the DaVinci Resolve control panel, select any node, and press the DEL-CURRENT button (on the T-bar panel).

After you've deleted a node, the node to the left and right of the node you deleted are automatically connected so that the node tree is unbroken. Also, all the nodes in a tree are renumbered after the deletion of any node, so there's no discontinuity in node order. For example, if you have three consecutively numbered nodes in a tree and you delete the second one, the node that was formerly number 3 is renumbered to be 2.

Connecting and Disconnecting Nodes

For a node tree to work, every node in the Node Editor must be connected into a working node tree, from the Source input, through each node in the tree, to the Node Tree output. Any disconnected node will result in that clip's grade being disabled. However, you may find the need to disconnect some parts of a node tree in order to reconnect them in different ways.

To connect two disconnected nodes:

Click and drag a connection from the RGB or key output of one node to the corresponding RGB or key input of another, and when the line highlights, release the mouse button.

To change the connection from one node to another:

> Move the pointer over the second half of any connection line between two nodes until it highlights blue, then click and drag it to reconnect it to another input, on that node or another.

To disconnect two nodes, do one of the following:

- Position the pointer over the right-hand side of a node connection so it highlights, and click it to delete it.
- Click a link to select it (selected links turn orange), and then press the Delete or Forward-Delete key.
- Right-click a link and choose Delete Link.

To overwrite a node's previous connection:

- You can drag a connection to a node input or output that's already connected, which will overwrite the previous connection with the new one you're dragging. When you do this, the connection that's about to be overwritten appears highlighted in orange.
- You can connect any node's RGB or Key output to as many inputs as you want, but you can only have one connection going to a node's input. The exception to this is a node with multiple inputs, designed to combine the output of multiple nodes. These include the Parallel, Mixer, and Key Mixer nodes.

Extracting a Node

Sometimes you need to remove a node from its current position in the node tree, such that the nodes to the left and right of it automatically reconnect to one another, saving you from having to reconnect them manually. This is called extracting a node.

To extract a node, do one of the following:

- Select a node, and choose Color > Nodes > Extract Current Node.
- Select a node, and press E.

Keep in mind that disconnected nodes in the node tree suspend grading altogether, so you'll want to either reconnect that node to another part of the node tree, or delete it; you cannot leave it disconnected in the Node Editor.

Inserting a Node

If there's a disconnected node in the Node Editor, there's a simple way you can insert it into the node tree between any two other nodes. This also works for nodes that you're dragging into a node tree from another source, for example, from the exposed node tree of a still in the Gallery.

To insert a disconnected node between two other nodes:

> Drag a disconnected node, or a node from another node tree, onto the connection between any two other nodes in a node tree; when a plus icon appears over the node you're dragging, drop it to insert the node.

Rearranging Node Order

The order in which nodes are connected in your tree affects the result of a grade. For example, if you boost the highlights in the first node, and then you try to isolate a portion of the picture in a second node that you now realize has been clipped, you may to need to change your order of operations to optimize your corrections.

To swap the contents of two nodes:

> Command-drag any node and drop it onto another node to swap the operations within each node. The nodes won't appear to have moved, but you should be able to tell from the node badges underneath that the operations have been reversed.

To move a node to any other position in the node tree:

1 Double-click any node in the node tree and press E to extract it, removing it from the tree so that it becomes unattached.

2 Drag the now-unattached node to the connection line between any two other nodes in the tree, and when a small plus icon appears, drop it to automatically connect that node at that position in the node tree.

Copying and Pasting All Settings From One Node to Another

The simplest thing you can do is to copy all of a node's settings and paste them into another node. This makes it easy to duplicate things like windows, qualifier settings, keyframing, or motion tracking that you want to reuse in another node as the basis for another operation. This is also a quick way to manually ripple a change you make in a node to that same node in another clip's grade.

To copy a node's settings from one clip to another, do one of the following:

- Option-drag one node onto another. When you drop it, the settings of the node you dragged overwrite those of the node you dropped onto.

- Select a node with settings you want to copy and choose Edit > Copy (Command-C). Then, select a node you want to paste these settings to either in the current grade or in the grade of another clip, or create a new node, and choose Edit > Paste (Command-V) to paste the settings you copied. These pasted node settings overwrite any other settings that node previously used.

> **NOTE:** There are additional methods of copying nodes and individual node settings. For more information, see Chapter 123, "Grade Management."

Keeping Node Trees Organized

It's a good idea to keep the arrangement of your nodes in the node graph clean and neat. It'll make it easier to read your tree if you need to revisit a grade later on, and it will also make it easier for other colorists working on the same project to figure out what you're doing. The following procedures describe how to rearrange the nodes in your tree, and the node tree working area, to help you keep on top of your grades.

To move nodes within the Node Editor:

- Drag any node to a new position.
- Command-click or drag a bounding box around multiple nodes that you want to move, and drag them all to a new position.

Of course, it's easy to get carried away. If you've been working furiously on a complex grade and you find yourself staring at a riot of disorganized nodes, it's easy to quickly reorganize your node graph using a pair of commands in the Node Editor contextual menu.

To clean up the node graph, right-click the Node Editor and choose:

- **Cleanup Node Graph:** Moves all nodes in the node graph so they appear in an evenly spaced grid. Connection lines are routed around nodes to minimize clutter.
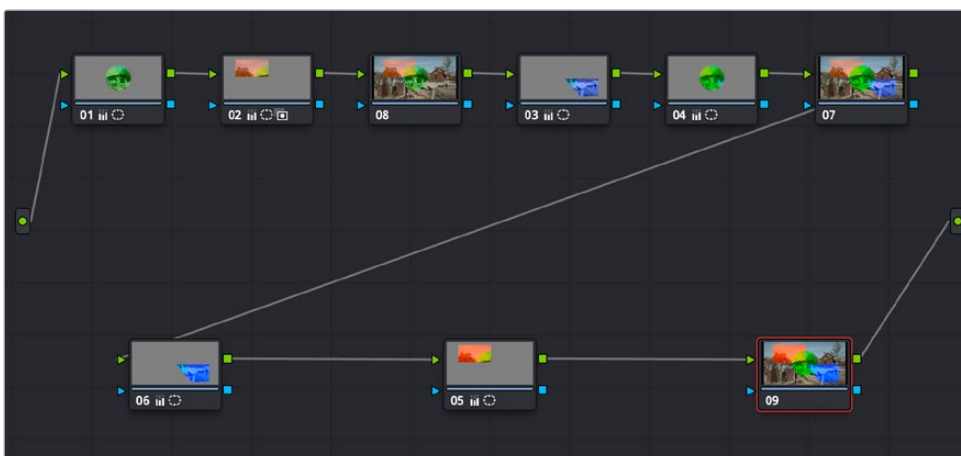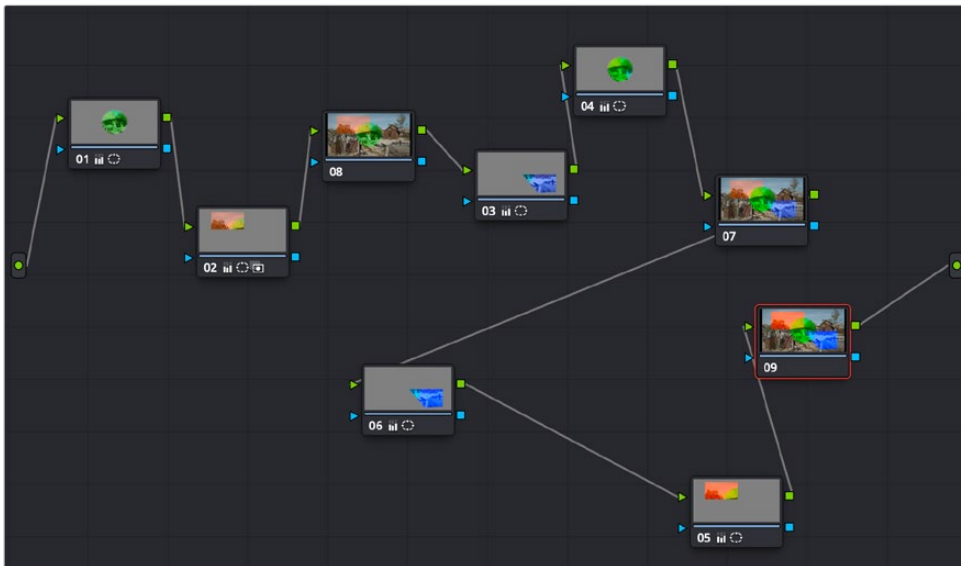
Before/after using "Cleanup Node Graph"

Using Compound Nodes

Another node structure you can use to keep complex node trees organized is the compound node. You can Command-click to select any number of nodes in the node tree (selected nodes are highlighted white), and then use the "Create Compound Node" command to nest all selected nodes inside of a single node.
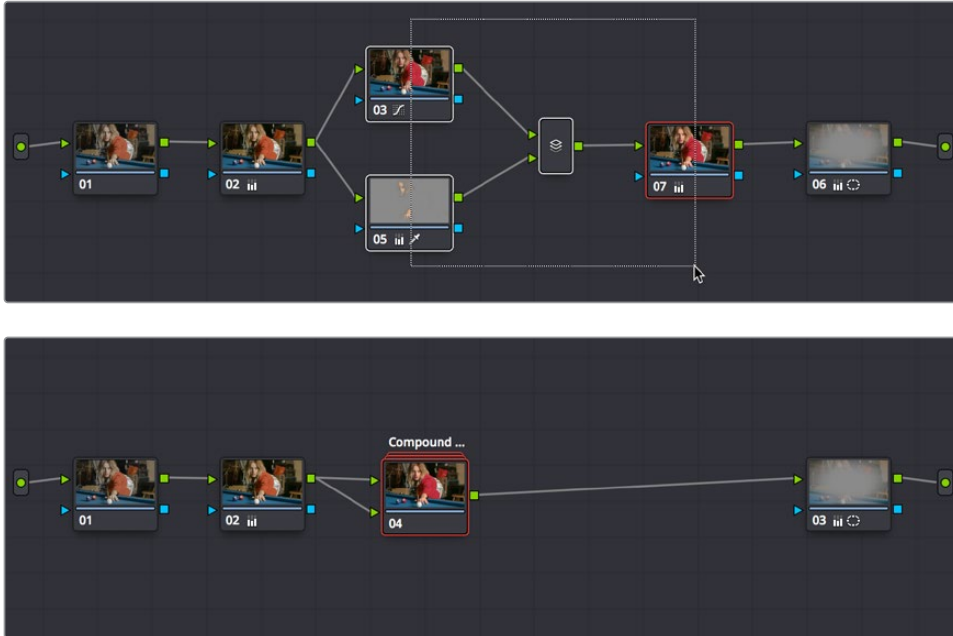
Before/after creating a compound node

The resulting compound node that's created has as many inputs and outputs as are necessary to accommodate the connection lines that attached the nodes you selected to the rest of the node tree.

You can use compound nodes to organize complicated node trees by nesting sets of nodes that work together to do a specific thing within a single node. You can also turn a set of nodes that you're using to create a specific effect into a compound node in preparation for saving to the Gallery. Creating a library of effects in this way makes it easy to reuse them via the Append Grade command, without the undue burden of adding lots more nodes to your grade later on.

Methods for creating and working with compound nodes:

- **To create a compound node:** Command-click each node you want to nest inside of a compound node to select them with a white highlight, or drag a bounding box around a group of nodes. Then, right-click one of the selected nodes, and choose Create Compound Node from the contextual menu.

- **To edit a compound node:** Either hold the Command key down while double-clicking the compound node you want to open, or right-click any compound node and choose Show Compound Node from the contextual menu. The contents of that node appear in the Node Editor, taking the place of the overall node tree.

- **To exit a compound node you're editing:** To return to the top level node tree, double-click the leftmost item in the path control at the bottom of the Node Editor, or click the name of the compound node. You can also right-click in the compound Node Editor and choose "Exit Compound Node" from the contextual menu.

- **To label a compound node:** Right-click a compound node, choose Change Label from the contextual menu, and type a new label for that node. Press the Return key when you're finished.

- **To decompose a compound node:** Right-click the compound node you want to decompose, and choose "Decompose Compound Node" from the contextual menu. The compound node disappears, replaced by the original nodes within. Please note, if you had applied an adjustment to the compound node itself, that adjustment is lost when you decompose it back into its constituent nodes. If you want to preserve the compound node adjustment itself, you can copy it, then decompose the node, and then create a new node and paste the adjustment you'd copied.

Adding Inputs and Outputs to Compound Nodes

When you open the contents of a compound node using the Show Compound Node command, you can make whatever adjustments you like to the node tree within, but you also have the option of right-clicking within the Node Editor and choosing Add Source to add an input to the compound node, or Add Output to add an output. Adding more inputs and outputs lets you set up the node to connect to the rest of your node tree in more complicated ways. Disconnected inputs and outputs have no effect on your grade.

Furthermore, you can also use the Add Alpha Source and Add Alpha Output contextual menu commands to add KEY inputs and outputs to a compound node, making it easy to route key or alpha channel data to other connections in the enclosing node tree.

Nesting Compound Nodes

Compound nodes can also be nested within other compound nodes, if necessary.

Grading Compound Nodes

After you've created a compound node, you can select it to make one or more adjustments using the compound node itself, which effectively adds those adjustments after all other adjustments that take place via the nodes that are inside of the compound node. This gives you the opportunity to "trim" the effect that compound node is having on your grade, or to limit it using a qualifier or window.

To adjust the individual nodes nested within a compound node, you need to first open the compound node. Then, you can select and adjust any node as you ordinarily would.

Identifying Nodes

As you make various adjustments to nodes, small badges appear underneath that indicate what each node is actually doing. Since nodes are capable of holding multiple adjustments, any given node may have multiple badges; how many badges a node can show depends on the zoom level of the Node Editor. Larger nodes will show more badges, whereas smaller nodes will show fewer badges, hiding whichever badges don't fit.
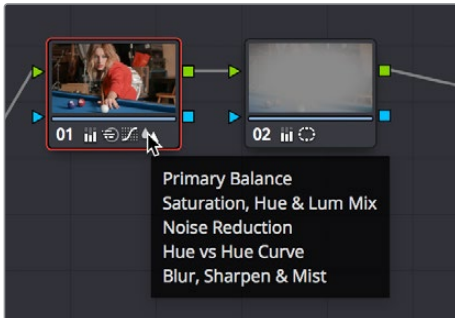
Badges underneath each node indicate
which adjustments it contains

Another nice organizational feature of the Node Editor is an automatic tooltip that appears whenever you hover the pointer over a particular node, that shows you a concise list of all the operations applied to that particular node.

Putting Nodes into HDR Mode

When using various grading controls in the Color page to grade wide-latitude images for HDR output, you may find it useful to enable the HDR mode of the node you're working on by right-clicking that node in the Node Editor and choosing HDR Mode from the contextual menu.
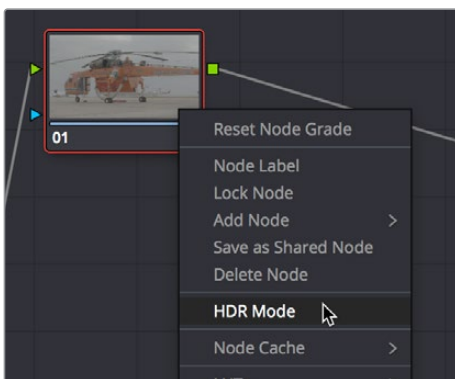
Using a node's contextual menu to put that node into HDR mode

This setting adapts that node's controls to work within an expanded HDR range. Practically speaking, this makes it easier to work with wide-latitude signals using controls that operate by letting you make adjustments at different tonal ranges such as Lift/Gamma/Gain, Custom Curves, Soft Clip, and so on.

Clip vs. Timeline Grading

Ordinarily, the Node Editor has two modes. The default Clip mode lets you create individual grades for each clip or group in the Timeline. However, the Timeline grade mode lets you apply a single grade simultaneously to every clip in the Timeline, as seen in the Thumbnail timeline in the following screenshot.

A paragon of sophisticated grading, the author applies a red edge vignette to every clip in the project simultaneously using the Timeline grade

There are a variety of reasons you might want to do this. For example, if you're working on a commercial spot, you might elect to use Clip grades to do general correcting and scene-to-scene balancing, and then use the Timeline grade to apply a single stylistic grade to the entire spot simultaneously. That way, any changes the client wants made to the style of the grade can be instantly applied to the whole spot.

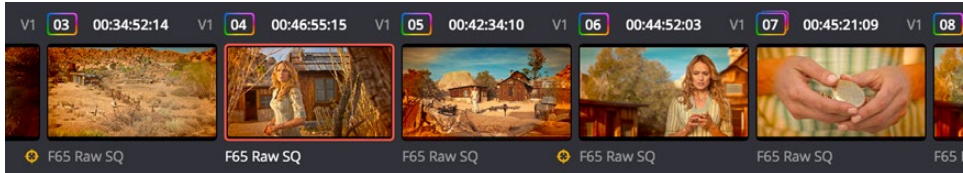Another example would be using the Timeline grade to apply corrections meant to address QC issues running throughout a program, desaturating highlights or selectively darkening a specific shade of red wherever it appears.

To switch between Clip and Timeline grading modes:

Choose the mode from the drop-down menu at the top right of the Node Editor.
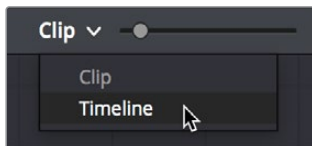
Selecting Track mode in the Node Editor

Click the dot in the Node Editor toolbar that corresponds to the Clip or Timeline mode

Two dots show whether you're in Clip or Timeline mode; these can be clicked to switch

> **NOTE:** When you reset the Timeline grade using the Color > Reset All Grades and Nodes command, the Output Sizing parameters are reset as well.

Two dots at the top of the Node Editor let you switch between Clip and Timeline modes via a single click. If you're working on a clip that's part of a group, four dots will be displayed to allow fast access to the Pre-Clip and Post-Clip Group modes as well. For more information about group grading, see Chapter 123, "Grade Management."

Timeline Grades and Saved Stills

When you save a Gallery still, the Clip and Timeline grades are both saved. However, when you apply a grade from that still, you only apply either the Clip grade, or the Timeline grade, depending on which mode the Node Editor is in. For more information on saving and applying grades, see Chapter 123, "Grade Management."

Grading Order of Operations

As you construct grades more carefully in the Color page, it may help you to know what the precise order of operations are in the image processing pipeline of DaVinci Resolve. While you can control the order of operations for node-specific adjustments by being careful about what you do in which nodes, the order of pre-grade, non-node specific, and post-grade operations are all fixed.

The following illustration shows DaVinci Resolve's order of operations:

Operations that take place before nodes

Camera Raw ⟶ Resolve Color Management Input to Timeline Color Space Conversion or ACES IDT ⟶ Input LUT ⟶ Edit Sizing ⟶ Input Sizing

Operations that take place within nodes

Shot Match ← Stereo Color Match ← Color Match ← OpenFX/ResolveFX ← Noise Reduction ← Motion Blur

Color Boost ⟶ Lift/Gamma/Gain ⟶ Contrast/Pivot ⟶ Custom Curves ⟶ Shadow/Midtone/Highlight ⟶ Hue/Saturation

Node Sizing ← Defocus ← Soft Clip ← Channel Mix ← HSL Curves ← 1D or 3D LUT

Operations that take place after nodes

Output Sizing ⟶ Output LUT ⟶ Resolve Color Management to Output Color Space Conversion or ACES RRT to ODT ⟶ Deliver Page Output

Color Page Display LUT

The order of image processing operations in DaVinci Resolve

Chapter 125

Serial, Parallel, and Layer Nodes

This chapter covers the four fundamental node structures you can use to combine Color page adjustments in even more detailed ways. These methods let you control your order of operations and re-combine multiple versions of the graded image in much more specific ways.

Contents

Serial, Parallel, and Layer Node Tree Structures

There are several ways you can organize nodes in a tree. Each method lets you control a group of image processing operations in different ways to achieve specific results. This section covers how to use Serial nodes, Parallel nodes, and Layer nodes, as well as how to use LUTs, work with HDR media that lets you combine two different exposures using two different Source inputs, and apply additional project-wide adjustments using the Timeline grade.

Serial Node Structures

The simplest, and most common node structure is a serial cascade of nodes, where a linear series of nodes is connected, one after another.
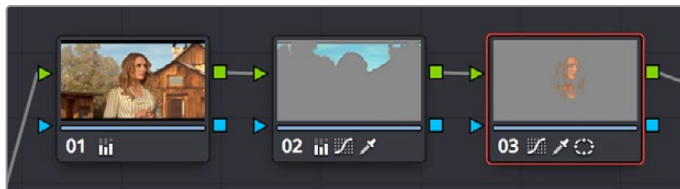
Serial nodes, where the output of one node feeds an altered image to the next

Much of the time, this method of constructing a tree of multiple operations is all you need to do. It's a simple and intuitive way of organizing your adjustments, similar in principle to the stacks of layers used in other grading and compositing applications to apply multiple operations to a clip.

Controlling What Feeds a Node's RGB Input

When you create a grade using serially arranged nodes, each node's output is used as the next node's input, so the order in which the nodes are arranged determines the order of image processing operations.

In the following screenshot, the node tree shows a series of three operations that are applied to a log-exposed, low-contrast clip. The first node expands clip contrast and increases saturation. The second node isolates the sky to intensify its color. The third desaturates and warms the image. At right, you can see the result of this node tree.
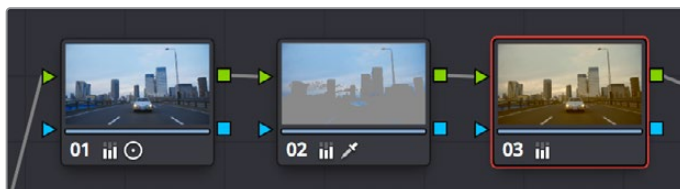
Node 2 pulls a clean key from the image data fed it by Node 1

If, instead, we reversed the order of Nodes 2 and 3, the result will be a less effective key.

By comparison, Node 3 pulls a less then optimal key from the image data fed it by Node 2

Because the secondary operation is sampling the desaturated image, rather than the source, the HSL Qualifier's key has less image data to work with, and thus you may get an inferior result.

Parallel Node Structures

Another way to organize your corrections is to use a Parallel node structure, which lets you apply two or more overlapping adjustments at a single stage of a node tree. You can use the Parallel node structure for organizational reasons when there is a group of secondary corrections that you want to apply all at once. You can also use this structure for the unique way it blends overlapping image adjustments.

The Parallel Mixer node that makes this possible has multiple RGB inputs and a single RGB output. This lets the Parallel Mixer mix together multiple Corrector nodes, outputting a single image as a result.

When you add a Parallel node to an existing node, DaVinci Resolve automatically adds one Corrector node below the current node, and adds a Parallel Mixer node to its output.
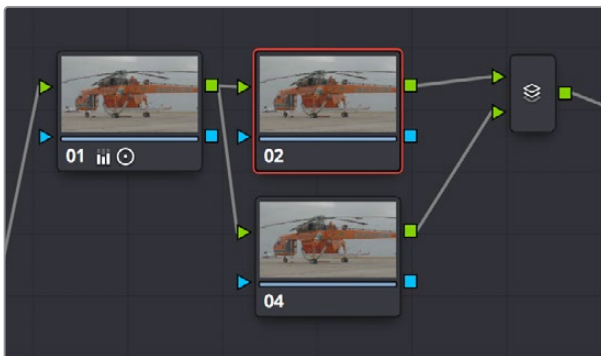
Adding a Parallel node to Node 2 automatically adds the Parallel Mixer

> **TIP:** If you want to create a series of Parallel nodes that connect to the output of the currently selected node, create a Serial node before you create your first Parallel node.

If you're manually connecting another node to a Parallel Mixer node, you must first create an additional input to connect it to.

To create an additional, unconnected input on a Parallel Mixer node:

Right-click a Parallel Mixer node and choose Add One Input.

Ordinarily, the RGB input of every Corrector node that's connected to a Parallel node is connected to the output of the same node. This results in a stack of nodes that take the same state of the image as their input. This makes it easy to apply multiple secondary operations without worrying about whether or not a change to one will affect the keys of the others.

Further Parallel nodes can be added as you wish
with each using a common source

If you add another node in parallel, the Parallel Mixer automatically adds another input. You can have as many nodes in parallel as you need.

The adjustments made by all nodes that are connected to a Parallel Mixer are combined equally, regardless of which nodes are highest. In the following example, a separate overlapping window is applied by each of three nodes in parallel.
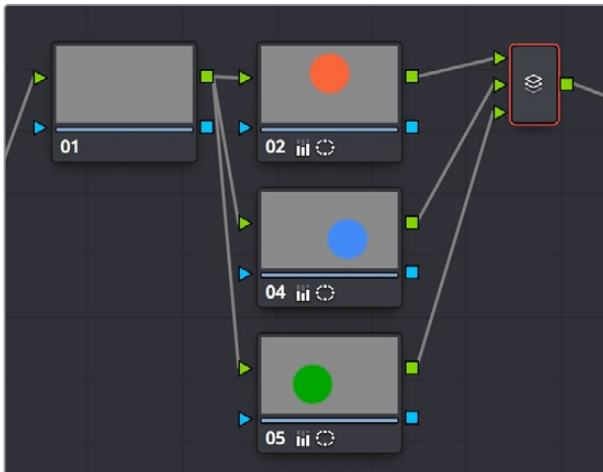
The Parallel Mixer blends all input nodes together

As you can see in the image at right, the three tints created by the overlapping windows are all mixed together equally; the colors blend with one another as if they are optically mixed. Most of the time, this is exactly what you want when you're blending overlapping naturalistic color adjustments.

Converting Parallel Mixers to Layer Mixers

On the other hand, if you need your overlapping color adjustments to have priority over one another, or if you want to combine multiple adjustments using composite modes, then you may want to use the Layer Mixer node instead. If you've created a Parallel Mixer structure and you want to convert it to a Layer Mixer, you can.

To change a Parallel Mixer node into a Layer Mixer node:
> Right-click a Parallel Mixer node and choose Morph Into Layer Mixer Node.

Layer Mixer Node Structures

The Layer Mixer is structurally quite similar to the layout used by the Parallel Mixer. However, there are two key differences. First, the Layer Mixer node combines multiple adjustments with priority given to the image adjustment in the lowest overlapping node input. Second, you have the option of combining all of the Corrector nodes that are connected to a Layer Mixer using one of several different composite modes, to create a wide variety of visual effects.

Because of their similarities, layering nodes with the Layer Mixer works in much the same way as creating a Parallel node structure.

Layer Mixer Prioritization

In the following example, the same node structure from the Parallel Mixer example is shown, this time with the three overlapping color adjustments mixed together using the Layer Mixer.
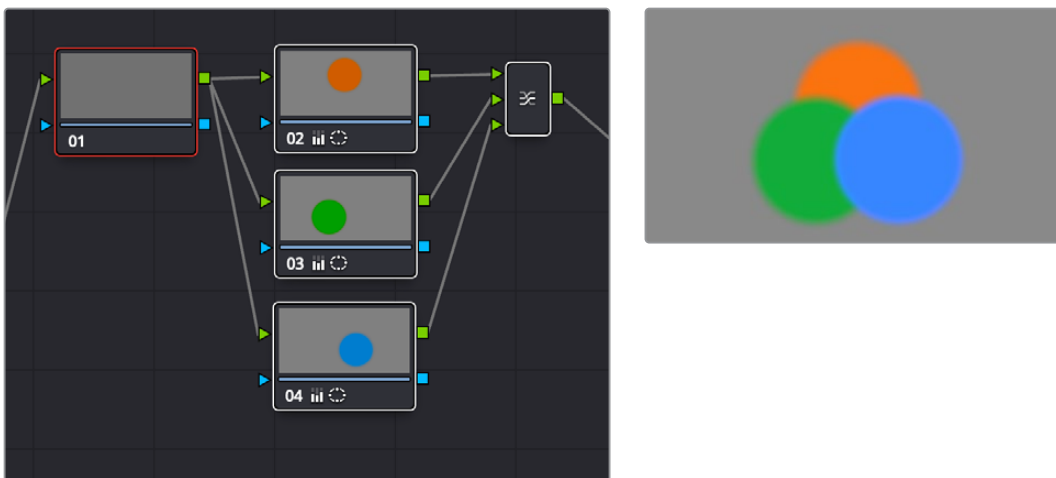
The Layer Mixer prioritizes nodes connected to lower inputs such that each node's output completely obscures whatever is behind it

Now, instead of the three adjusted color tints being blended, you can see that the blue tint, which is connected to the lowest input of the Layer Mixer, is dominant and covers the overlapping regions of the two other adjustments. Meanwhile, the green tint, which is connected to the middle input of the Layer Mixer, covers the overlapping portion of the orange tint, which is connected to the highest input of the Layer Mixer.

Rearranging which connections are attached to which Layer Mixer inputs changes each node's priority, and like the Parallel Mixer, you can add more inputs if you need to connect more nodes manually.

The Layer Mixer's prioritization is most useful when you have an overlapping adjustment that you need to override any other adjustments happening on that stack. In the following example, two nodes are connected to the Layer Mixer node. Node 2 is applying a high-contrast, cool look to the entire clip. Node 3 isolates the skin tone, which is unflattering with the background stylization, and applies a different, more naturalistic adjustment.
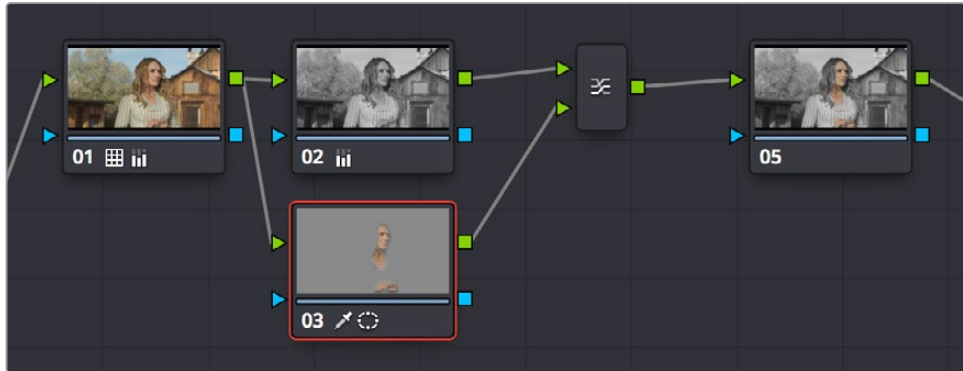
Using the layer mixer, grades on Node 3 will have a greater priority over Node 2, so the final grade combines the high contrast from Node 2 with the adjusted skin tone from Node 4

Because of the Layer Mixer's prioritization, the adjustment made to the woman's skin tone completely covers the adjustment made to the node that comes above it, providing the best of both worlds with one simple adjustment.

> **TIP:** If you want to "solo" overlapping nodes that are connected to the Layer Mixer to see their individual adjustment, turn on Highlight (Shift-H, or the HILITE button on the Transport panel of the DaVinci control panel). This lets you view just that node's effect, regardless of what other node adjustments are overlapping.

Using Composite Modes With the Layer Mixer

You have the option of combining the adjustments made by all nodes connected to a Layer Mixer node using the same Composite modes that are available when compositing clips in the Timeline. This lets you combine different overlapping image adjustments using compositing math to achieve creative effects or utilitarian fixes.

The following simple example shows two overlapping Corrector nodes connected to a Layer Mixer node that's set to the Add composite mode. Node 3 has no adjustment, but Node 5 has an extremely high-contrast curve adjustment applied, along with a blur, that effectively isolates the highlights of the image and feathers them out.

Combining two nodes using the Layer Mixer set to
Add to create a glowing effect

By adding both treatments together, a hot glow has been created, blowing out the highlights of
the image. Many, many other effects are possible using the different composite modes that are
available. For more information on composite modes, see Chapter 41, "Compositing and
Transforms in the Timeline."

Adjusting Layer Node Strength Using Key Output Gain

Whether you're combining overlapping corrections, or mixing different adjustments using
Composite modes, you'll run into situations where you want to reduce the influence of one
overlapping adjustment relative to the other nodes that are connected to the Layer Mixer node.
This can be accomplished using each overlapping node's Key Output Gain parameter, located
in the Key palette.
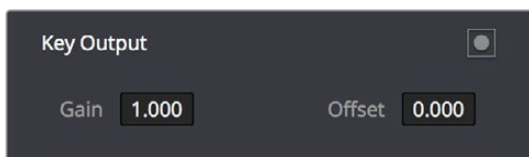
Using the Output Gain parameter in the Key palette

Key Output Gain defaults to 1.00, but lowering this value reduces the strength of that node's
contribution to the Layer Mixer. Using the previous example, selecting Node 4 (the
high-contrast image used to create the glow), opening the Key palette, and reducing the Key
Output Gain parameter to 0.50 reduces the intensity of the Glow effect by half.

You can use Key Output Gain to mix the proportion of any number of overlapping adjustments in order to create the perfect combination for your purposes.

> **TIP:** You can also use the Key Output Gain parameter to mix the proportion of adjustments being combined using the Parallel Mixer node.

Converting Layer Mixers to Parallel Mixers

You can easily convert a Layer Mixer to a Parallel Mixer should you discover that you need to mix your overlapping corrections evenly rather than combine them with priority. Keep in mind that you'll lose the ability to use Composite modes.

To change a Layer Mixer node into a Parallel Mixer node:

Right-click a Parallel Mixer node and choose Morph Into Parallel Node.

Chapter 126

Combining Keys and Using Mattes

A key is the actual image channel that's generated by different secondary operations to isolate specific portions of images to work on. This chapter covers different ways you can manipulate and combine keys from multiple nodes, or propagate keys among nodes. It also shows different ways you can use mattes that are imported from other applications, as well as how to use the Key palette to further manipulate keys in different ways.

Contents

Introduction to Manipulating and Combining Keys

Each node's key input and key output makes it possible to route key channel data from one node to another so you can apply isolated corrections. Furthermore, the Key Mixer lets you combine a variety of keys from different nodes to create more detailed keys with which to tackle complex operations. This section covers all the ways you can recombine key data, as well as how keys can be used in conjunction with the Alpha output to create regions of transparency in a clip for compositing right within DaVinci Resolve.

Outside Nodes

Whenever you use a Power Window or HSL Qualifier to limit a correction within one node, a special node structure lets you automatically create a second node, called an Outside node, to apply additional adjustments to the inverse of the region you isolated in the previous node. Outside nodes are really just Corrector nodes with the Key Palette's Key Input Invert control enabled, which makes it easy to apply separate corrections to an isolated subject and to its surroundings.
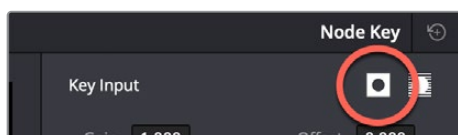
The Key Input Invert button, in the Key palette, that inverts any key fed to that node's Key Input

In the following example, the sky has been isolated using a Power Window, and an Outside node has been added to make an additional correction to everything else within the shot.
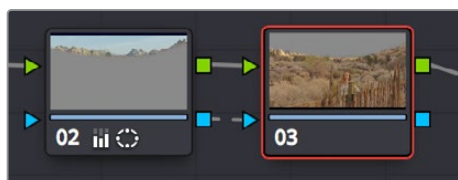
The Outside node automatically has its key input inverted

To add an Outside node to a node, creating a secondary correction:

1   Select a node that has been limited using a Power Window or HSL Qualifier.

2   Do one of the following:

   –   Choose Nodes > Add Outside (Option-O).

   –   Right-click a node choose Add Outside Node.

Press the ADD OUTSIDE button on the T-bar panel of the DaVinci control panel.

A new node is created immediately after the selected node, with the RGB and key outputs of the first node automatically connected to those of the new node.

When selecting the new node and opening the Key palette, you can see that the Key Input's Invert control is on by default, which is what inverts the key from the previous node.

The Key Input Invert control is on by default for each node

If, instead of using the Outside node to invert the incoming key, you want to copy the existing key in order to perform another operation to the same isolated region, you can disable the key input's Invert control.

Feeding Keys From One Node to Another

One of the most powerful aspects of the Node Editor is the ability to create keys based on a specific part of the node tree, and feed the result into a completely different correction somewhere else in the node tree. This is one of the reasons for the separate key input and output on every Corrector node.

The key that's created whenever you use the HSL Qualifier, create one or more windows, or use an external matte can be output from one node's key output and fed to the key input of any other node in a tree. There are many reasons to do this, but the following example shows a common problem you can solve with this technique.

Using a key from one node to make an adjustment with a different node:

1 Use Node 1 to apply a basic primary correction, increasing contrast and balancing the color to achieve a pleasing ambient color temperature.

2 Add a Serial node (Node 2), followed by a Layer Mixer node which also adds Node 4 (as seen in the following screenshots). Then, completely desaturate Node 4 and add contrast to make it super-high contrast black and white, desaturate Node 2 just a bit, and right-click the Layer Mixer node to choose the Overlay blend mode with which to combine these two layers.

A group of nodes to create a stylized image

The result is a highly stylized image, but the skin tone on the actor's face and hands in the resulting image are too monochromatic, and you want to give them some differentiation. Simply adding another node after the Layer Mixer and keying the skin tone may not work well because the low level of saturation will make a key difficult to pull.

The resulting stylized image may be difficult to key accurately

3 Add another node after the Layer Mixer (Node 5 in the screenshot), and then right-click in the gray background area of the Node Editor, and choose Add Node > Corrector to create an unattached node, (Node 6).

4 Connect the RGB output of Node 1 to the RGB input of Node 6, and then connect the key output of Node 6 to the key input of Node 5. Now you're ready to pull a high-quality key from the very first correction in Node 1, skipping all the complication coming afterwards.

5 Use the HSL Qualifier in Node 6 to pull a good strong skin tone key based on the primary image. Given the way the node tree is now set up, that key is fed to Node 5, and will limit whatever adjustments you make there.
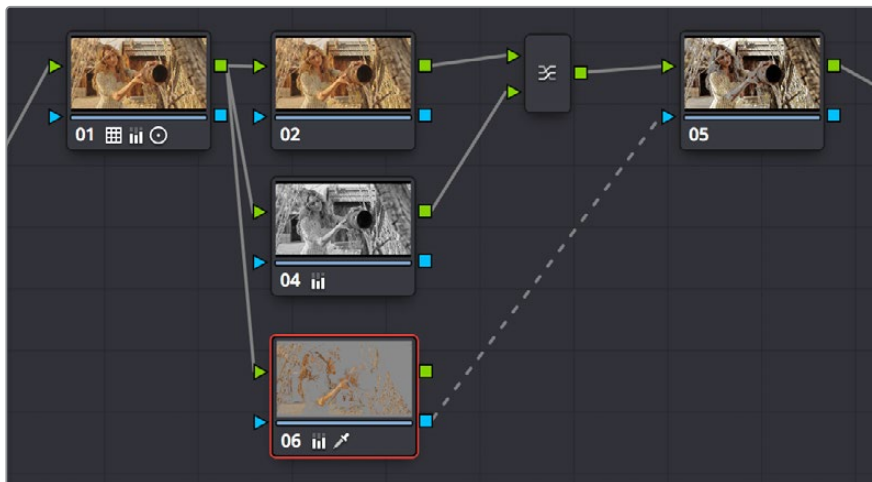
Using Node 6 to pull a key from the image output by Node 1, and feeding that key to Node 5

6 Now, you can make your adjustment to Node 6's grade, to lower the contrast, brighten, and increase the saturation of the actor's skin tone.As a result of this operation, the background remains desaturated and contrasty, while the actor's skin tone has the brighter quality we need for the shot.

(Top) An entire clip with a high-contrast grade, (Bottom) The skin tone graded differently from the high-contrast grade using a key

This example could have been handled in a variety of different ways, but the point is that you can add nodes that connect to the state of the image at any part of a node tree, and use them to generate keys to feed to any other node, regardless of what's happening to the picture in between.

Connecting Key Outputs to RGB Inputs, and Vice Versa

There's another way you can manipulate a key from one node using another in the Node Editor, and that's to connect the key output from one node to the RGB input of another node. When you do this, you can use any of the controls of the second node to manipulate the key, and you can then use the result by connecting the RGB output of the second node to the key input of a third node.

Connecting a key output to an RGB input to adjust a key with a second node's controls

In the node tree shown above, Node 2 pulls a key, Node 4 manipulates the key, and Node 3 uses the key to make a color adjustment.

Keep in mind that a key is just a grayscale image. Setting up this kind of node structure lets you use any of the second node's controls, such as the Custom Curves, Noise Reduction or Motion Blur controls, Sharpen, Midtone Contrast, Lift/Gamma/Gain, Contrast, or Log controls, to manipulate the key in ways you couldn't do using only the Matte Finesse controls.

While this technique may not be necessary for conventional color isolations, it can come in very handy when making tricky isolations with hard to key subjects, or when using one of the Qualifier modes to pull a key to create transparency for compositing using the Node Editor's Alpha output. In this instance, you can connect the RGB output of a node used for key manipulation directly to the Alpha output. In the example, Node 1 pulls a key, and the RGB is connected to Node 3 which is used to color correct the foreground image. The key from Node 1 is connected to the RGB of Node 2, which manipulates the key to clean it up prior to connecting it to the Alpha output block at the bottom right of the Node Editor.
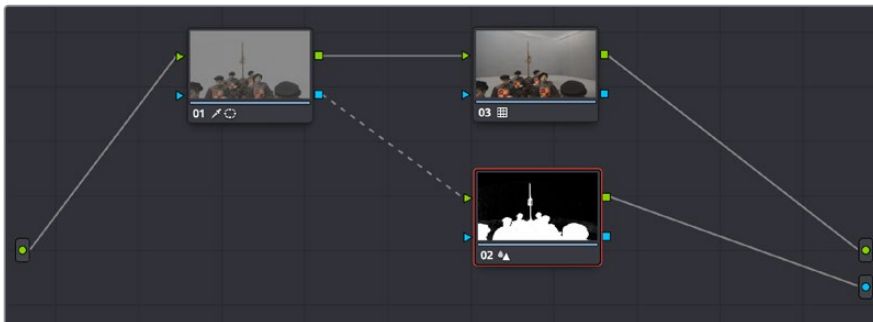
Connecting a key output to an RGB input to adjust a key
used to create transparency via the Alpha output

Furthermore, this capability also lets you create keys in other ways besides using the Qualifier palette controls. In the following example, the Contrast and Custom Curve controls in Node 3 create a high-contrast matte of the windows which is blurred. The RGB output of Node 3 is then connected to the KEY input of Node 2, where the resulting key can be used for a variety of adjustments; in this case, to tint the product within the image green. Alternately, this technique could be also be used to create transparency via the Alpha output.
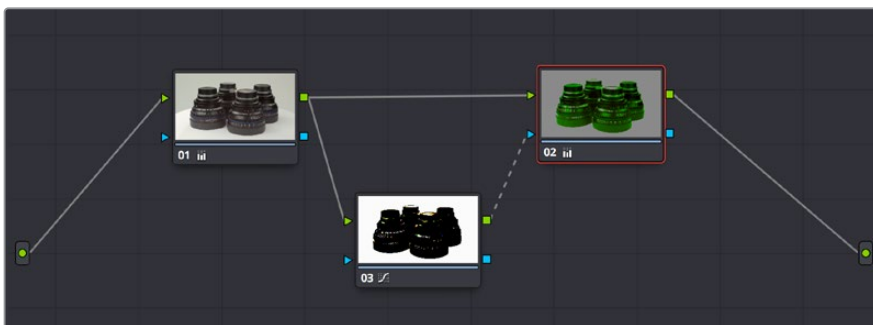
Using a high-contrast color correction as a key

Interconnecting key and RGB inputs and outputs is a powerful capability that lets you create many kinds of workarounds for uncommon situations.

Using External Mattes

The External Matte node has evolved over the years. What was once purely a means for importing matte channels for defining opacity and limiting adjustments has expanded to become a way to import the RGB channels of a media file to be used for overlaying grain, texture, and stylized distress onto an image, and even as a way to use the channels of a clip itself as a matte.

Matte clips can be added to your project in one of two ways:

- You can add mattes using the Media page, either by attaching them to a clip so a particular matte is only available to a particular clip as part of a Clip grade, or you can add timeline mattes that stand alone in the Media Pool, which are then available to any Track grade.

- You can also add a matte to a clip using the Media Pool in the Color page, by dragging a clip from the Media Pool to the Node Editor. When you do so, that clip is turned into an external matte in the current grade, which you can use as a matte for secondary adjustments, or as a compositing layer (in conjunction with the Layer mixer) for mixing textures or images with your grade. That clip is also automatically attached to the Media Pool clip that corresponds to the clip you're grading, as a clip matte, to help you keep track of which clips are using other clips as mattes.

For more information about adding matte clips in the Media page, see "Adding and Removing External Mattes" in Chapter 11, "Adding and Organizing Media with the Media Pool."

Whether attached or unattached, mattes operate within a grade using EXT MATTE (external matte) nodes. EXT MATTE nodes have the following outputs:
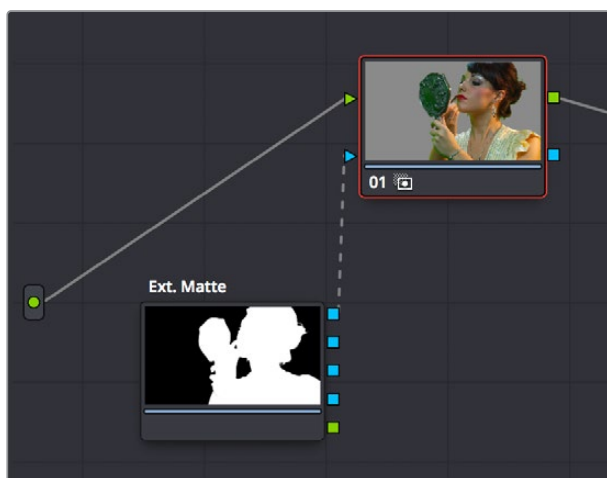
An external matte connected to the first node of a grade

- **EXT MATTE Outputs:** Four blue square key outputs let you output the channels contained within the EXT MATTE node, but which channels are available affects what is output. If the EXT MATTE node's source clip has RGBA channels, then these are available as Alpha, Red, Green, and Blue key outputs that you can attach to any other node's key input. On the other hand, if the EXT MATTE node's source clip only has RGB channels, then the key outputs that are made available are Y (luma), Red, Green, and Blue, and a "Use Lum for Alpha Output" setting in the Node Editor contextual menu lets you use the Y channel as a matte.

  An interesting aspect of these four outputs is that each one is dedicated to individual A, R, G, and B color channels. Ordinarily, External Matte clips are written with matte data

written simultaneously to all three RGB channels. However, you could also render separate pure primary-colored mattes to each color channel (a so-called "disco" matte), so that the Red channel has one matte, the Green channel another, and the Blue channels still another, thereby exporting three separate mattes within a single media file, for convenience. If you add another matte to the Alpha channel, you can even export four mattes within a single file. You can then use each one of these mattes individually by connecting the correct output of the EXT MATTE node. (Note: For backward compatibility, projects from versions of DaVinci Resolve previous to 12.5 continue to output RGBY from the square outputs, not YRGB.)

- **RGB Output:** A square green RGB output lets you connect the RGB image data of a matte clip to any other clip's RGB input. This is especially useful when you're combining a matte clip with the current clip using a Layer Mixer node, to create a textured composite of some kind.

External Mattes to Limit Adjustments

Going back to the External Matte node's original use, mattes are typically grayscale media files that represent image opacity, and are meant to be used either as alpha channels for creating opacity within a corresponding RGB clip, or as a matte for limiting effects.

An example of a matte channel would be the key created by a green screen keyer. If you output just the key, that would be an external matte. If you receive an external matte along with an effects clip, you can attach the matte to its corresponding RGB clip in the Media page. Then, you can access that matte via an External Matte node in the Node Editor, so you can use the key it outputs to limit different kinds of corrections you want to apply.

In the following example, the keyed matte of a green screen composite clip is used to apply different corrections to the inside and outside of a keyed composite, in order to make the subject match the background more convincingly.
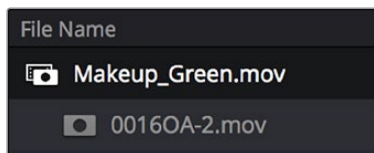
A matte attached to clip Makeup_Green.mov, as seen in the Media Pool

To use a clip matte to limit an adjustment within a Clip grade:

1   Right-click any node, and choose the attached matte you want to use from the Add Matte submenu of the contextual menu.

   By default, the EXT MATTE node that appears has its first output connected to the Connect one of the EXT MATTE node's triangular key outputs to the key input of a node you want it to limit.

2   Select the node to which the EXT MATTE node is attached, and add an Outside node to make it possible to add adjustments on either side of the matte.

Node Editor displaying the influence of the external matte
on multiple nodes when the keys are linked

3 If necessary, select Node 1, and use the Key palette controls to modify the incoming
key, inverting or blurring it as necessary to create the isolation you need.

> **NOTE:** Don't select the EXT MATTE node, because it exposes different
> controls in the Key palette for transforming, flipping, looping, and freezing
> the matte.

At this point, you can add adjustments to the inside and the outside of this composited
shot to improve the composite.

(Before/After) An external matte is used to apply
separate grades to the foreground and background of
a previously composited clip

Ideally, external mattes are exported so that they match the size and duration of the
RGB clip they're supposed to accompany. If they don't match or if you're using some
other grayscale clip as an external matte to create some sort of effect, then there are
parameters in the Key palette that you can use to retime or transform a matte so it
works better in your grade.

To slip the sync of a matte relative to the clip it's attached to:

   1   Select the Ext Matte node you want to slip.

   2   Open the Key palette, and turn off the Lock Matte checkbox.

   3   Raise or lower the Offset parameter until the matte is perfectly aligned with the clip it's supposed to match..

To transform a matte:

   1   Select the Ext Matte you want to transform.

   2   Open the Key palette, and turn off the Lock Matte checkbox.

   3   Use the Pan, Tilt, Zoom, Rotate, Width, Height, HFlip, or VFlip parameters to adjust the matte so it has the correct geometry.

It's worth mentioning that you can attach as many external mattes to a single clip in DaVinci Resolve as you like. For example, if a CGI shot has been delivered with a set of isolation mattes for each of three characters in the scene, you can import all three mattes and use them to isolate adjustments that you want to make in the Node Editor.

Extracting External Mattes from OpenEXR Layers

OpenEXR media is capable of containing multiple layers and multiple alpha channels, which can also be accessed from EXT MATTE nodes. As a result, DaVinci Resolve uses a slightly different but related procedure for accessing these mattes.

To extract OpenEXR layers as external matte nodes:

   1   Right-click any node, and choose the .exr clip name from the Add Matte submenu of the contextual menu.

       By default, the EXT MATTE node that appears has its first output connected to the Connect one of the EXT MATTE node's triangular key outputs to the key input of a node you want it to limit.

   2   Double-click the EXT MATTE node to select it, then right-click it and choose which layer you want to use from the Select Matte submenu.
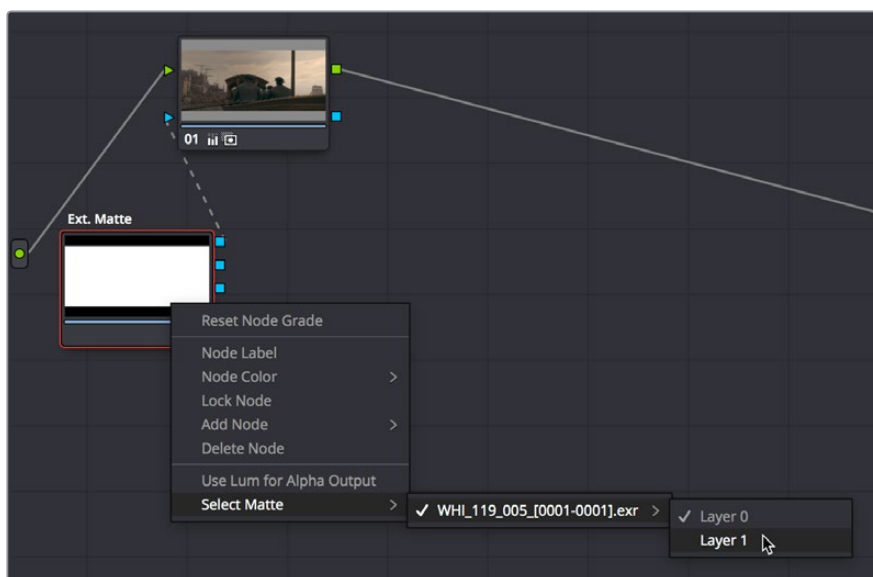
Right-clicking an OpenEXR file's EXT MATTE node to choose which layer to use

OpenEXR files with multiple RGBA layers (or passes) embedded within them (RGBA + RGBA + RGBA and so on) or OpenEXR files with multiple alpha channels (RGBA + A + A) expose multiple entries in this submenu. Whichever one you choose is the layer that will be used as a matte by that EXT MATTE node.

Once you've extracted an OpenEXR layer, you can use it as you would any other EXT MATTE node described in this section, to limit adjustments (as seen above), or to add texture or transparency (as seen in the following sections).

Using External Mattes to Add Texture

You can also use external mattes as creative tools, to add grain and texture. For example, you might use a more abstract animated matte, or a grayscale film scan of dirt and dust, to apply correction for effect.
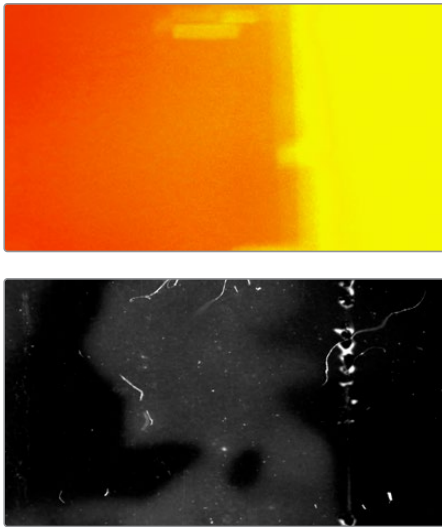
Light leak and dirt and dust images From Warren Eagles' Scratch FX collection (FXPHD), designed to add texture to your grades

Once attached to a clip, external mattes can be exposed in the Node Editor, and their key output can be used just like any other key in a node tree.

To use a clip matte to create texture for a Clip or Timeline grade:

1   When applying a matte as part of a Clip or Timeline grade, right-click any node and choose the attached or timeline matte you want to use from the Add Matte submenu of the contextual menu. Unattached mattes appear in the Add Matte > Timeline Mattes submenu.

2   Disconnect the EXT MATTE node's key output connection to the Key input of the node it's connected to by default.

3   Add a Layer Mixer to the end of the node tree.

4   Disconnect the bottom Corrector node's RGB input, and then connect it to the EXT MATTE node's square RGB output.
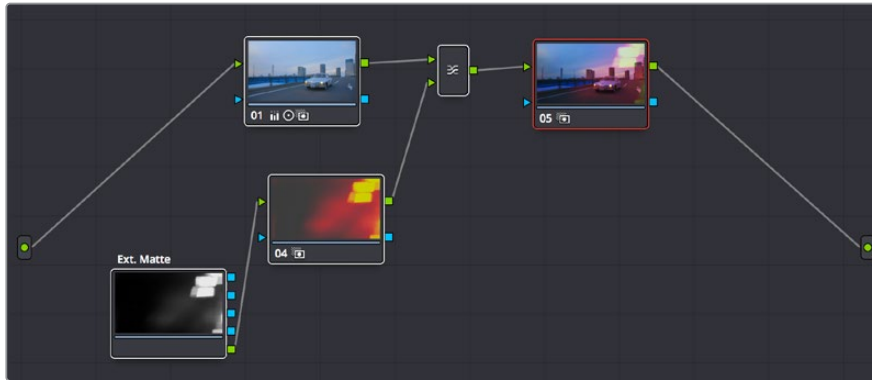
A node tree set up to feed an EXT MATTE node's RGB output to the input of a node connected to a Layer Mixer, in order to blend it with the grade using composite modes

5 Right-click the Layer Mixer node, and choose Overlay from the Composite Mode submenu to blend the Ext Matte node most effectively with the grade.

6 If necessary, you can use the grading controls of the Corrector node to which you've attached the EXT MATTE node to change the characteristics of the texture clip, desaturating it for instance. You can also select the EXT MATTE node itself, open the Key palette, and use the Transform, Offset, Loop, or Freeze controls described later to change how the matte appears.

The resulting texture effect, blended with the grade using the Overlay composite mode

> **TIP:** If you want the texture you create to be unaffected by blur or sharpening operations within the grade, be sure to add it to the very end of the node tree.

Using External Mattes to Create Transparency

You can also use an EXT MATTE node to create transparency in a clip, for compositing with clips underneath it on the Timeline.

To use a clip matte to create transparency in a clip:

1 Right-click any node, and choose the attached matte you want to use from the Add Matte submenu of the contextual menu.

Adding an EXT MATTE node to a Clip grade applies the effect to only that clip, whereas adding an EXT MATTE node to a Track grade applies the effect to the entire Timeline.

2 Right-click any empty area of the Node Editor, and choose Add Alpha Output to reveal the Node Tree output on the right that lets you assign a key to be used to define clip transparency.

3 Connect one of the EXT MATTE node's triangular key outputs to the Alpha output at the right of the Node Editor.

The node setup for using an external matte to composite two layer

The areas of the matte defined by the key are now rendered transparent.

The final composite created using the external matte node

Key Palette Controls for the External Matte Node

When you select an EXT MATTE node, the Key palette displays different parameters only for mattes. Be aware that you must turn off the Lock Matte checkbox before you can make adjustments to transform the matte.
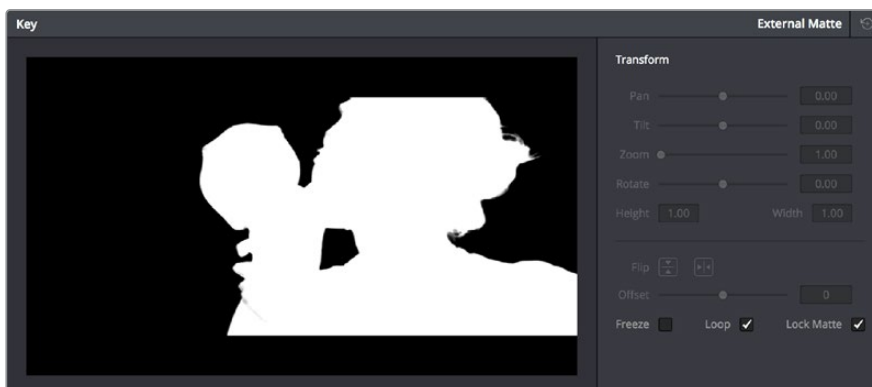
The Key Palette showing a texture layer added as an EXT MATTE node

- **Transform:** Standard Pan, Tilt, Zoom, Rotate, Width, and Height parameters let you transform a matte to fit the image better.
- **Flip Image:** Two buttons let you flip the matte clip horizontally or vertically.
- **Offset:** Adjust this parameter to offset the start point of a matte clip.

- **Freeze:** Turning on this checkbox freezes the matte clip on a single frame. Adjust the Offset parameter to choose which frame to freeze on.
- **Loop:** Turning on this checkbox enables matte clips to loop endlessly, which lets shorter matte clips cover longer durations.
- **Lock Matte:** When turned on, locks the sizing of a matte to whatever changes are made to the Input Sizing of that clip, so the matte transforms to follow the clip.

You can also use external mattes as creative tools. For example, you might use a more abstract animated matte, or a grayscale film scan of dirt and dust, to apply correction for effect.

Using Mattes From the Fusion Page

If you're grading a composite that's been created in the Fusion page, you can feed mattes created in different parts of a Fusion composition to the Color page to use in the grade as well. For example, if you're grading a composite of a foreground actor who's green screen keyed against a background layer, you might want to use the matte generated for the key to protect the foreground subject from an operation in your grade that you only want to affect the background. Happily, this is easy to set up.

In the following Fusion composition, two DeltaKeyer nodes (one to create an overall matte, and one to create a solid matte protecting the core) and one BSpline node (to create a garbage matte) work together to create a finely-tuned matte. This matte is used by the Merge1 node to preserve the subject's hair and composite them in front of a gently blurred (using the LensBlur node) planet, with the final result connected to the MediaOut1 node, which feeds this image to the Edit page and Color page for continued adjustment.
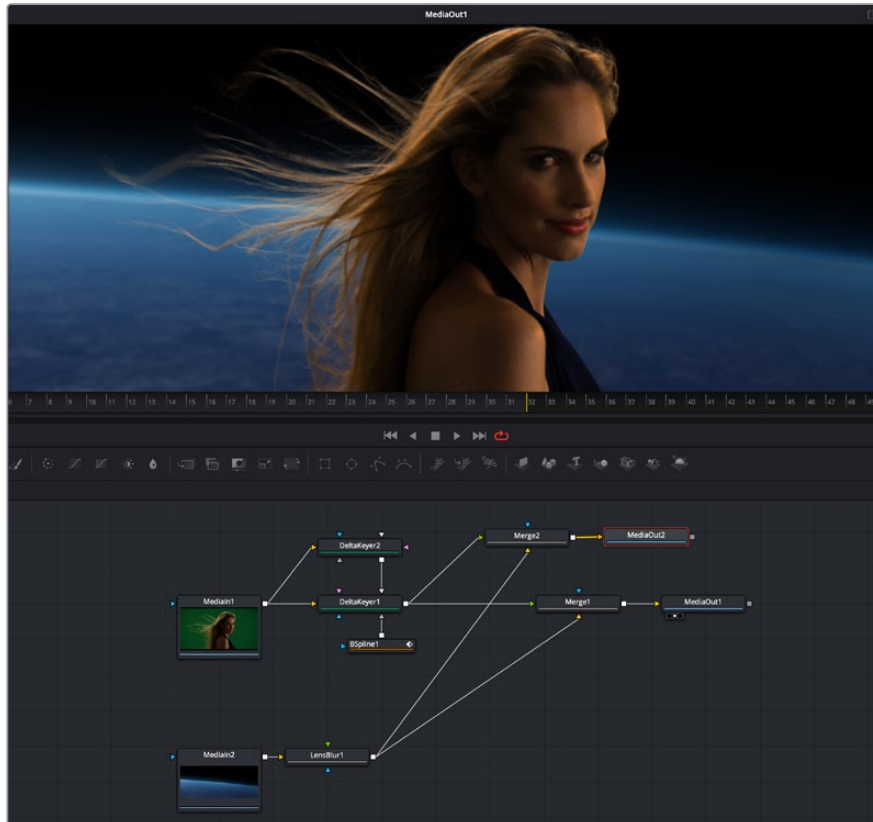
A greenscreen composition in the Fusion page, outputting the
RGB in MediaOut1, and the foreground matte in MediaOut2

Because the Merge1 node outputs the entire composition as a single image, a second MediaOut node (highlighted) is added to output the matte, just in case the colorist might want to use it later.

> **TIP:** In this composition, the foreground and background images are different sizes, so outputting the alpha channel of the DeltaKeyer1 node would result in a matte sized to match the foreground image, but that doesn't fit the composition, which is cropping the top and bottom of the foreground image based on the frame size of the widescreen background image. To get around this, the foreground and background images are composited a second time using the Merge2 node, which has the Operator parameter set to "In" to output just the foreground image and matte, as resized by the Merge operation. The resulting MediaOut2 node thus outputs a foreground matte that's properly sized to fit the composition.

On the Color page, the grade in node 1 is applied to the overall final result, which is a single image. After grading, it's decided that the woman appears a bit warm relative to the cool blue of the planet behind.
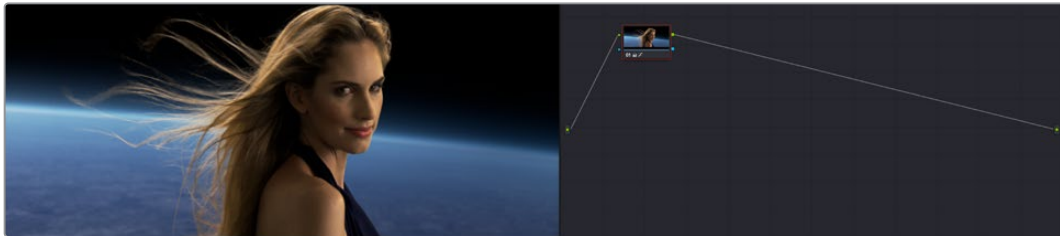
The composition as it appears in the Color page Node Viewer

Right-clicking the background of the Node Editor and choosing Add Source adds a second source at the left of the Node Editor.
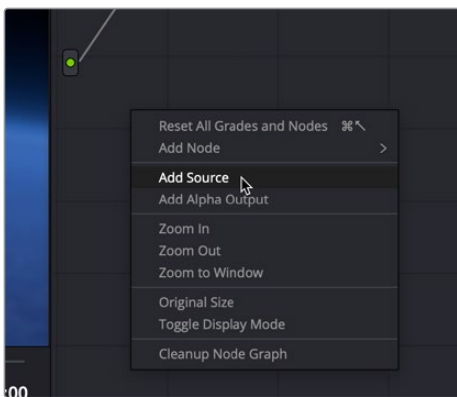
Adding a source to bring in the MediaOut2 node's matte output from the Fusion page composition

This second source corresponds to the second MediaOut node you added to the Fusion page composition, which outputs the Matte as a key in the Color page, usable just like any other key. If you hover your pointer over each source, a tooltip appears letting you know which output corresponds to which node.

Hovering the pointer over a source identifies it in a tooltip

Generally, sources are arranged from top to bottom from the first MediaOut node appearing in a Fusion composition to the last. At this point, you can connect the second Source to the Key input of a second corrector node, using that key to selectively grade just the woman in the foreground (grade exaggerated for effect), without affecting the background. The Viewer is shown with Splitscreen set to Highlight Modes, so you can see the result as well as the key from the Fusion page that's being used by Node 2.
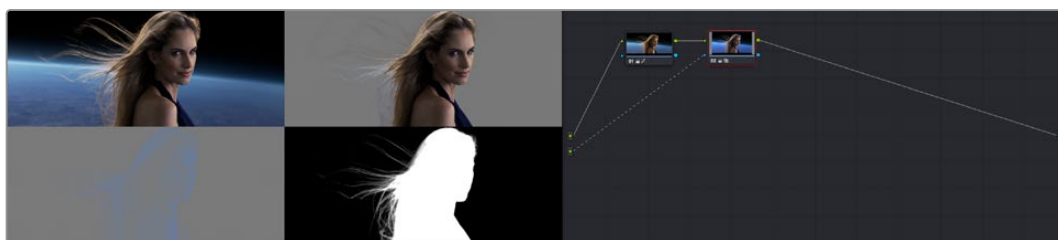
Connecting the second source to a second Corrector node's KEY input to use the matte to limit a correction made to the foreground character

Using the Key Mixer

The Key Mixer node lets you mix keys output from multiple Corrector nodes, combining them in different ways to create a single key output. This makes it possible to build much more intricate keys than you can with a single qualifier or set of four windows. In particular, the Key Mixer node is the only way to combine multiple keys made using qualifiers and windows, adding, subtracting, or intersecting them to create a highly specific result.

Adding Two Keys Together

In the following example, you'll learn how to set up a Key Mixer to combine the keys output by two Corrector nodes in a node tree. Then you'll learn how to change the way the input keys are combined using the Key palette.

To combine two or more keys using the Key Mixer:

1 Right-click anywhere on the gray area of the Node Editor, and choose Add Node > Key Mixer.

2 Create two Corrector nodes, then attach their RGB inputs to the RGB output from an appropriate node in the main part of the tree, and attach their key outputs to the key inputs of the Key Mixer.

3 Next, attach the key output of the Key Mixer node to the key input of the node you want to use to make the correction. Remember, the objective is to use the key that's output by the Key Mixer to limit the adjustment being made using another node, in this case Node 3.
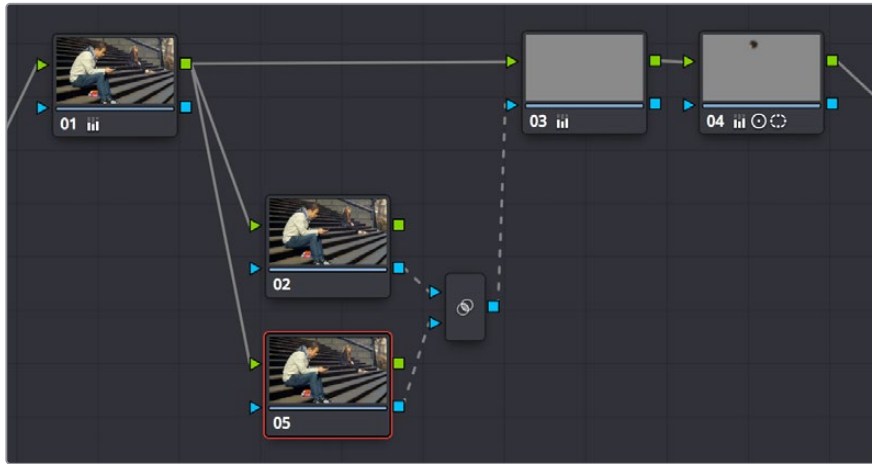
Setting up the node tree you'll need to combine two keys together

Keep in mind, especially since this is a significant reordering of nodes in the Node Editor, that every node needs to be connected properly for the overall grade to work.

4 Now that the node structure is fully connected, use windows, qualifiers, or both to create keys in each of the nodes that you connected to the Key Mixer. In this example, Node 2 is isolating the main skin tone, and Node 5 is isolating the blue of his jeans and hood.

By default, all keys connected to the Key Mixer are added together, as you can see in the Key Mixer's thumbnail.
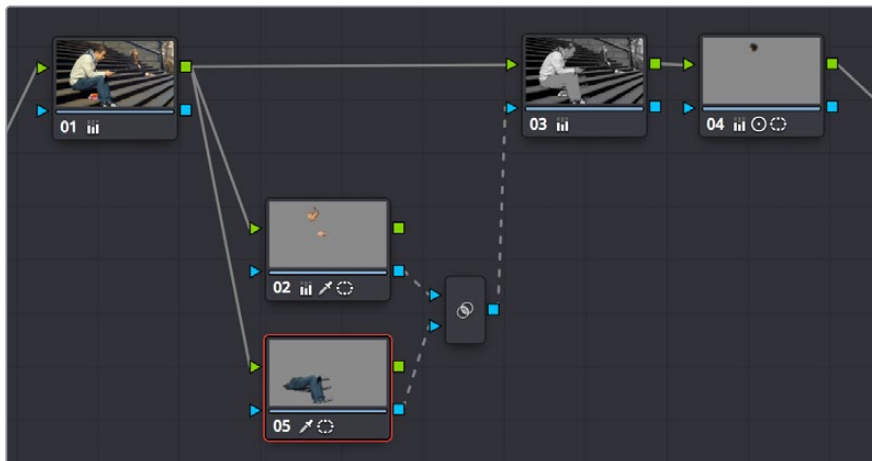
Combining multiple keys with the Key Mixer

If you wanted, you can use the controls in the Key palette to change this, in order to isolate the intersection of two keys, or to subtract one key from another. This is covered in the next section.

5 Continuing with the previous setup where both keys are added together by default, selecting Node 3 and dropping the saturation to be very faint stylizes the entire background, while leaving the various hues of the man we've isolated alone.

Final grade, the talent in color with a B&W background

Subtracting One Key from Another

The way multiple keys are combined within the Key Mixer depends on a pair of Key Input buttons you can toggle using the Key palette. In the following example, a partial green tint is washed throughout the midtones of the image using a qualifier, but you want to exclude the man's skin tone from this operation. Using the Key Mixer, you can subtract one key from another to accomplish this with ease.

A selective blue tint added to the midtones of the image includes the red sign

To change the Key Input settings for a node connected to a Key Mixer:

1   In this example, Node 2 is isolating part of the midtones of the image, and feeding its key through the Key Mixer to Node 4, which is using it to apply a partial blue tint. However, in preparation for subtracting the skin tone from this operation, Node 3 is isolating the man's skin tone.
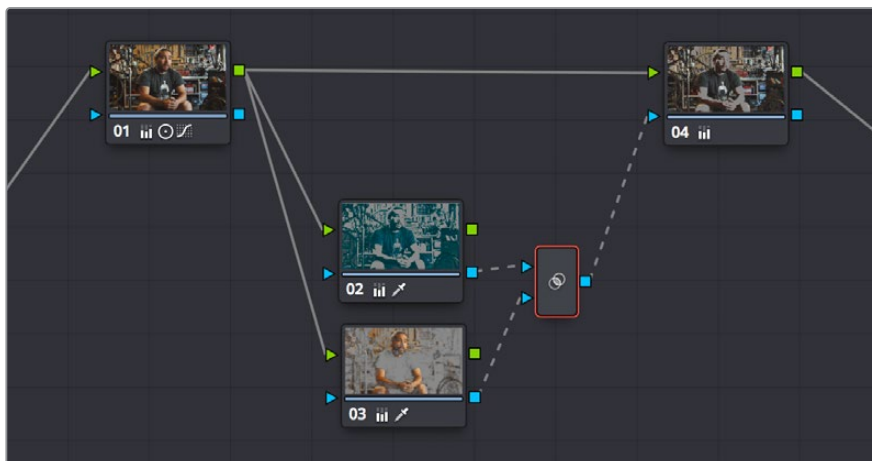
A node setup in preparation of subtracting the Bar sign from the midtone isolation being used to add a partial blue tint

2 To reveal the controls you'll use to change how the key from Node 3 interacts with the key from Node 2, double-click the Key Mixer node to select it.

3 Open the Key palette; a list of all input links that are connected to the Key Mixer appears at the right.
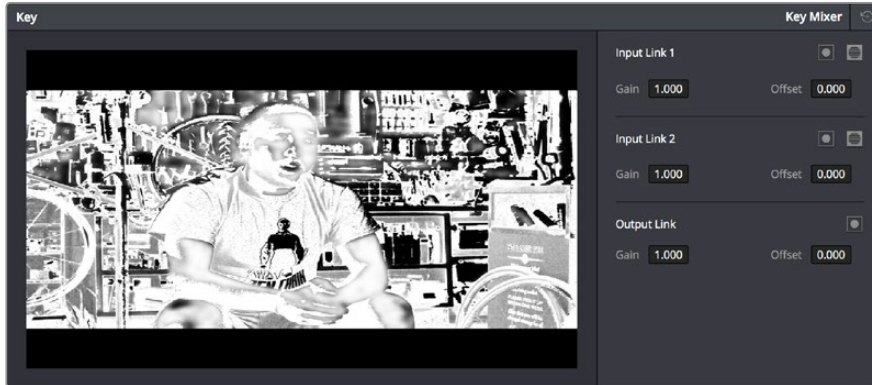
The input list of the Key Mixer node

4 Within each list entry is the input name (Input Link 1, Input Link 2, etc.), a Matte control, a Mask control, a gain parameter, and an offset parameter.

- **To subtract Node 3's key from that of Node 2:** Turn on both the Key Input Matte button and the Key Input Invert button for Input Link 2.
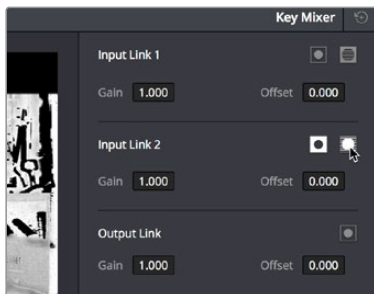
Turning on Matte and Invert for Input Link 2 to Output Node 3 subtracted from Node 2

- **To subtract Node 2's key from that of Node 3:** Turn on both the Key Input Matte button and the Key Input Invert button for Input Link 1.
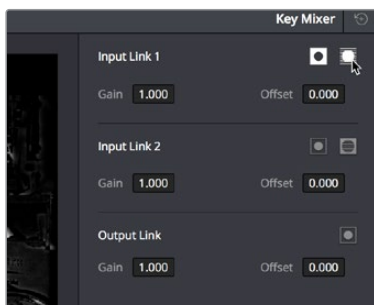
Turning on Matte and Invert for Input Link 1 to Output Node 2 subtracted from Node 3

- **To limit the output to the intersection of both keys:** Turn on the Key Input Matte button for either Input Link 1 or Input Link 2.
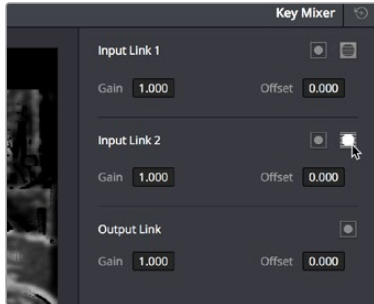
Turning on Matte for Input Link 1 to output the intersection of two mattes

- **To invert the resulting matte you've created:** Turn on the Output Link Invert button.

When you're finished, if you choose to subtract Node 3's key from that of Node 2, the result should resemble the following screenshot.

The result of subtracting a key of the man's face from a key of the overall midtones of the image, and using that to add a selective green tint

Adding Inputs to Key Mixer Nodes

New Key Mixer nodes have two key inputs by default. If necessary, additional inputs can be added in order to combine even more keys with one another.

To add inputs to the Key Mixer:
- Right-click a Key Mixer node, and choose Add One Input.

When combining three or more keys, the interaction of keys using the Key palette controls becomes even more complex, but the rules outlined above still apply.

Using the Key Palette

For example, the Key Input Invert control is always enabled when you add an Outside node, which is why the Outside node applies adjustments to the inverse area of the previous node. If you turn this control off, that node's key will exactly mirror the original key being fed to it from the previous node.

The controls that are available in the Key palette vary depending on what kind of node you have selected:

- **Corrector Nodes:** Have three sets of parameters. Key Input parameters let you make adjustments to keys being fed through a node's Key Input connection. The Key Output parameters let you make adjustments to the key data being output by a node's Key Output connection, and includes the incredibly powerful Offset Gain parameter that governs the strength of that node's contribution to the overall grade. Finally, the Qualifier parameters let you make adjustments to the internal key created with the HSL Qualifier or Window controls. This functionality is covered more extensively in the next section.

- **Ext Mattes:** Have two sets of parameters. Transform parameters let you make geometric transformations to a matte so it fits the clip it's being applied to better. An Offset control lets you slip the sync between an external matte and the clip to which it's applied. This functionality is covered in the section on external mattes.

- **Key Mixer Nodes:** Have two sets of parameters that are dependent on which of the connections attached to a Key Mixer's key inputs is selected. Input parameters let you adjust how much of a contribution a key makes to the total key mix, and whether the contribution is additive or subtractive.

The Output parameters let you adjust the inversion and strength of the key that's output by the Key Mixer. This functionality is described more extensively in the Key Mixer section.

Layer Mixer and Parallel Mixer nodes have no adjustable controls in the Key palette.

Using the Key Palette to Affect Corrector Nodes

When you open the Key palette for a selected Corrector node, you can adjust the following parameters:
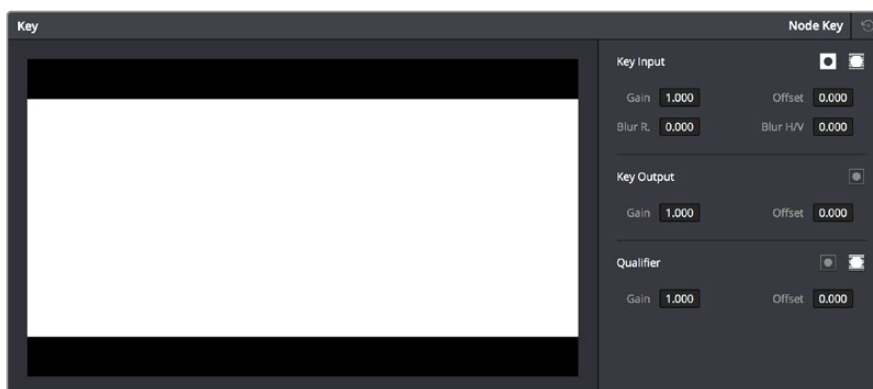
Key palette showing controls when a node is selected

Key Input Controls

- **Input invert:** Inverts the key being fed into the key input. Off by default.
- **Input matte:** Lets you switch the key input between Matte and Mask modes. In Matte mode (on by default) the key input combines via intersection with keys generated internally using the Qualifier or Windows palette. In Mask mode, the key input is added to the internal key instead.
- **Gain:** Controls the strength of the key connected to the key input.
- **Offset:** Controls the contrast of the key connected to the key input.
- **Blur Radius:** Blurs the key connected to the key input
- **Blur H/V Ratio:** Alters the horizontal/vertical ratio of the blur that's being applied to the key input.

Key Output Controls

- **Qualifier invert:** Inverts the overall key.
- **Gain:** Using the key output, this parameter governs the strength of that node's contribution to the overall grade. Setting Gain to 0 results in that node having no effect at all, while the default setting of 1.00 applies the full strength of any adjustments made with that node. The maximum setting of 2.00 increases the intensity of any part of the key output that's less than 100 percent white. You can also use this parameter to keyframe the key output to fade that node's contribution in or out with one set of keyframes.
- **Offset:** Lets you adjust the contrast of the Output key. This has no effect if the entire key is 100 percent white (a solid key).

Qualifier Controls

- **Qualifier invert:** Inverts the key created by that node's Qualifier palette.
- **Qualifier matte:** Lets you switch the interaction of the keys generated by the Qualifier and Window palettes between Matte and Mask modes. In Matte mode (the default), the Qualifier and Windows palettes combine via intersection. In Mask mode, they're added together instead.
- **Gain:** Lets you raise or lower the strength of the key generated by the Qualifier palette.
- **Offset:** Lets you adjust the contrast of the key generated by the Qualifier palette.

Using the Key Palette to Adjust Key Mixer Controls

When you open the Key palette for a selected Key Mixer node, you can adjust the following controls:
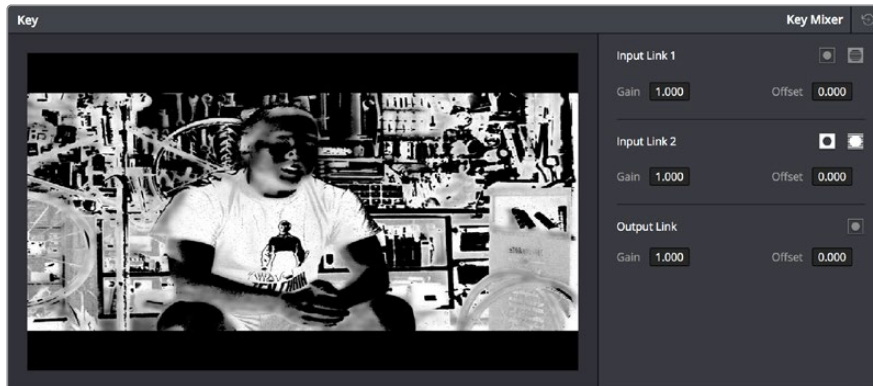
Key palette showing controls when a Key Mixer is selected

- **Input list:** A list of every input that's connected to the Key Mixer. Each entry on the list has the following controls:
  - **Input name:** The name of each node connection attached to that key mixer, such as Input Link 1, Input Link 2, and so on.
  - **Input invert:** Inverts the key being fed into this particular input. Off by default.
  - **Input mask:** Lets you switch the key input between Matte and Mask modes. In Matte mode (on) the key input combines via intersection with other inputs connected to the Key mixer. In Mask mode (off by default), the key input is added to the other key inputs connected to the Key mixer.
  - **Gain parameter:** Decreases or increases the intensity of that input matte's contribution to the resulting output matte.
  - **Offset parameter:** Adjusts the contrast of that input matte's contribution to the resulting output matte.

- **Output invert:** Inverts the overall result of the various Input Link interactions.
- **Gain:** This parameter increases or reduces the strength of the resulting output key. Setting Gain to 0 results in all inputs being set to black, while the default setting of 1.00 outputs the combined mattes at full strength. The maximum setting of 2.00 increases the intensity of any part of the key output that's less than 100 percent white, which can have the practical effect of "growing" soft edges. You can also use this parameter to keyframe the key output to fade that node's contribution in or out with one set of keyframes.
- **Offset:** Lets you adjust the contrast of the Output key.

The Many Uses of Key Output Gain

Several of the techniques discussed in here and in "Secondary Qualifiers," can be further customized using the Key Output Gain parameter, which makes it easy to control the strength of a node's effect on your grade with a single adjustment. In the following example, two simple Serial nodes are applied to a clip, with the first one expanding image contrast, and the second one using a variety of controls to add some extreme warmth to the highlights.

A tint applied only to the highlights of the image

If you decided that you want to reduce the amount of warmth added by the second node without readjusting the controls you used to create the effect, you could open the Key palette and lower the Key Output Gain parameter to fade the effect with a single adjustment.
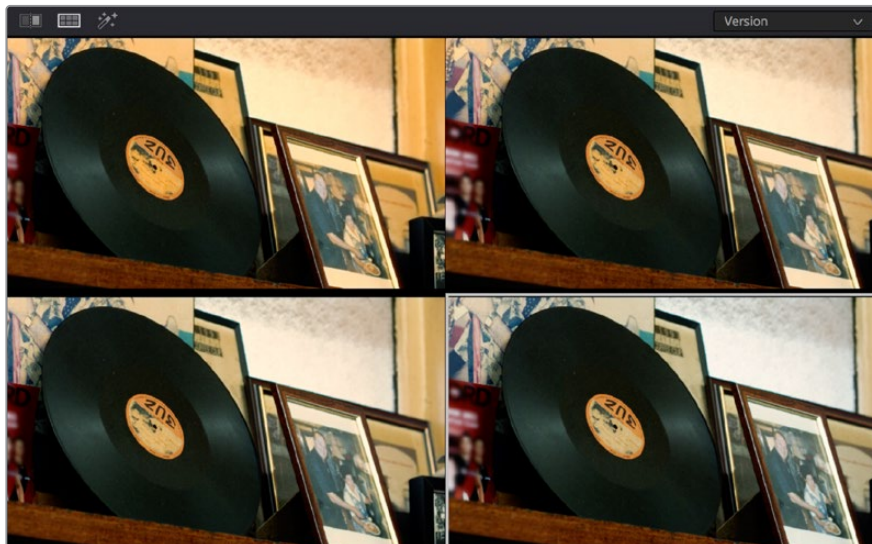
Four versions of this grade shown using the Versions option of the Split Screen controls, with Output Gain set to 1, .75, .5, and.25 for comparison

This principle also works for controlling the strength of individual nodes that are being combined in parallel, that are combined using the Layer node, or for simply fading out the effect of any node in the node tree you want to "turn down" a bit.

Chapter 127

Channel Splitting and Image Compositing

This chapter begins by showing node structures you can use to isolate, split apart, convert, and recombine the image channels of clip in different ways. This includes ways of using the additional image channels that are provided in some types of media.

The second part of the chapter shows ways that you can do image compositing right in the Color page, with techniques for using external mattes for compositing, and using qualifier keys to do green- and blue-screen compositing against other layers in the Timeline.

Contents

Isolating, Splitting, and Converting Color Channels

DaVinci Resolve provides two different methods of making channel-specific adjustments, depending on whether you need to apply an adjustment to just one channel within a single node, or apply separate adjustments to all three channels across several nodes.

Enabling, Disabling, and Converting Node Channels

Within the contextual menu of each node in the Node Editor is a series of four options:
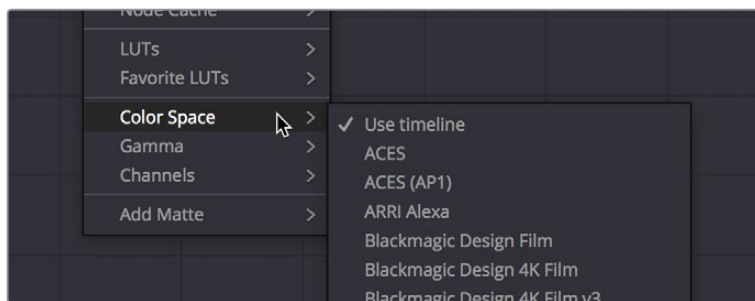
Expanded choices for choosing a color space and gamma for image processing within a node, and for disabling channels

While the ability to change the color space in which a particular node's operations work from the RGB default has been available for many versions, the list of available color spaces was greatly expanded in DaVinci Resolve 15 (all the previous options such as Lab (CIE), HSL, and YUV are still there). Additionally, you have the option of choosing the gamma that node works with as well, with a similarly long list of options.

Choosing a node-specific color space and gamma does not directly alter the image, as with the Color Space Transform ResolveFX plug-in. Instead, changing a node's color space and gamma alters what type of image channels the red, green, and blue controls affect, and how the adjustments you make within that node are applied. For example, this lets you make a temperature adjustment with a node's gamma set to Linear, which in some instances may be mathematically advantageous.

Additionally, three checked Enable Channel 1–3 options let you turn individual channels off or on, limiting which channel that node's adjustments will actually affect.

In the following example, you'll see how to use these features to selectively sharpen just the Y' (luma) of an image without affecting the chroma, which can be a more subtle effect than simply sharpening the entire image.

To use channel disabling and color space conversion to sharpen luma only:

1 Add a node with which to apply the sharpening you want to the current clip.

2 Right-click the new node, and choose YUV from the Color Space submenu of the contextual menu.

3 Apply sharpening by doing one of the following:

- Using that node's contextual menu, uncheck Enable Channel 2 and Enable Channel 3, which correspond to the U (Cb) and V (Cr) channels, leaving only Channel 1 (Y) enabled. Then, open the Blur palette, and drag the ganged Radius sliders down to sharpen the Y channel.

- You can also just open the Blur palette, ungang the Radius sliders, and drag the red slider down to sharpen the Y channel, since any control with three gangable sliders will automatically assign those sliders to whichever channels are used by the currently selected Color Space.

(Before) The original image, (After) Sharpening applied to only the Y' channel of the image

As you can see, while the Blur palette ordinarily provides separate R, G, and B controls that can be unganged from one another, the Color Space submenu lets you apply sharpening to the channel definitions of other colorspaces, providing many other corrective and creative possibilities with the same controls.

Supported Color Spaces for Conversion

The Color space submenu available when you right-click a node in the Node Editor supports four different color spaces that you can set each node to work within. When you choose a color space other than RGB, all channel-specific controls (the Custom curves, Soft curves, RGB Lift/Gamma/Gain sliders, and RGB mixer) operate on the particular channels of that color space, rather than the default YRGB channels. By switching color spaces, you can achieve very different kinds of adjustments by swinging values among mathematically different axes.

YUV converts the image into Y', Cb, and Cr channels. The Y' channel governs luminance, while the Cb and Cr are color difference channels that work within the broadcast model of color.

HSL converts the image into Hue, Saturation, and Lightness channels. Lightness is identical to Luminance, while Hue and Saturation are exactly as described.

LAB operates on the L, A, and B channels. The L channel governs luminance, while the A and B channels are color difference channels; A adjusts color on an axis from magenta to green, B adjusts color on an axis from yellow to blue.

Splitting Channels with the Splitter/ Combiner Nodes

Another method of applying corrections to individual color channels is using the Splitter/ Combiner nodes, which break the Red, Green, and Blue channels apart into separate node tree branches, each capable of accepting multiple serial and parallel nodes of image adjustment. There are two ways you can create a Splitter/Combiner node structure.

Methods of adding Splitter/Combiner nodes:

- **To add a premade Splitter/Combiner node structure:** Choose Color > Nodes > Add Splitter/Combiner Nodes (Option-Y). A Splitter and Combiner node appear already connected to three Corrector nodes, one for each color channel.

- **To manually construct a Splitter/Combiner node structure:** Right-click in any empty area of the Node Editor, and choose from the Add Node submenu to create a Splitter node, a Combiner node, and three Corrector nodes, wiring them together as necessary to create the desired effect.

The Splitter Combiner node structure

The Splitter node takes an incoming image and provides individual outputs for each color channel (top/red, middle/green, bottom/blue). When you connect each of these outputs to a Corrector node, that color channel automatically connects to all three internal channels of that node, so that the default three nodes in a Splitter/Combiner structure are internally processing red/red/red, green/green/green, blue/blue/blue. The Combiner then pulls the Red, Green, and

Blue channels out of each node connected to its three inputs, and reassembles them into a single RGB image again. Of course, what happens in between the Splitter and Combiner is entirely up to you.

One of the simplest ways of showing the possibilities of this node structure is to combine it with Node Sizing in the Sizing palette. Using Node Sizing, you can correct for misaligned channels in older archived video, or create channel misalignments for creative looks. In the following example, a simple Node Sizing adjustment to a split Blue channel will create an interesting "prism vignette" effect.

To use Node Sizing on individually split channels:

1   Choose Nodes > Add Splitter/Combiner Node (or press Option-Y) to add a premade Splitter/Combiner node structure to the Node Editor.

2   Select the middle of the three Corrector nodes appearing in between the Splitter and Combiner nodes (Node 5 in the following screenshot).

3   Open the Sizing palette, choose Node Sizing from the Mode drop-down, and then raise the zoom parameter by a small amount; this example uses 1.014.

Zooming just one color channel
using the Splitter/Combiner nodes

As you can see in the screenshot, just the Green channel has been zoomed in on across the entire image. This is only possible using Node Sizing. This is cool, but not quite what you need.

4   Open the Window palette, add a Circular window, turn on its Invert control, and transform it to be a very soft, horizontally aligned vignette. This limits the individual scaling done to the Green channel to just the outer edge of the image, similar to a lens with excessive chromatic aberration.

The resulting channel split effect

You could easily keep going, applying varying amounts of zoom with different window shapes to each of the other color channels, and perhaps adding some blur to enhance the effect, but this example should show the creative potential available when using this technique.

Multi-Channel RED HDRx Support

The RED EPIC, SCARLET, DRAGON, and WEAPON cameras are all capable of shooting in an HDR mode that effectively "brackets" two different exposures of each frame. The resulting image data stores two channels of image data: the regular exposure, and a "highlight exposure" that's underexposed by a user-selectable margin (+3, +4, +5, or +6 f-stops difference).

By default, the Input bar in the node graph feeds the regular exposure to your grade's node tree. To take advantage of the additional "highlight" exposure, you can add an additional Source input to the node graph that feeds a second stream of image data that you can mix with the regular exposure in different ways.

> **NOTE:** You can also take advantage of the highlight exposure of RED HDRx media by enabling and adjusting the Magic Motion controls in the Camera Raw palette.

To set up a node tree combining the normal and highlight HDR versions:

1   Using the first default node (Node 1), grade the image to see if you even need to use the alternate exposure that's available. We'll assume for this example that you do. In this example, the sky of the default exposure is pretty blown out, but there may be detail that can be retrieved using the highlight exposure.

Using HDRx images with the Layer Mixer

2   Create a Layer Mixer node by choosing Nodes > Add Layer (Option-L), or press the ADD LAYER button of your control panel.

Two nodes are created, a Layer Mixer node that's added after Node 1, and a third node (Node 3) that's connected to a second RGB input of the Layer Mixer node in parallel to Node 1.
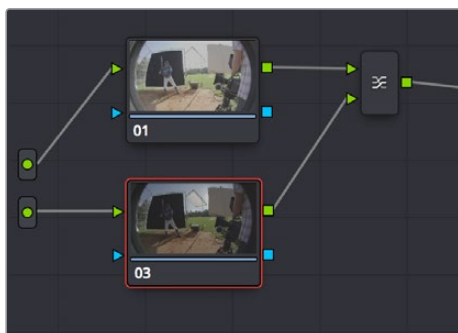
The Source currently supplies two input, but you can add a second source, which is the short exposure in the HDR image

3   Right-click anywhere within the node graph (except on a node) and choose Add Source from the contextual menu.

A second Source input appears underneath the first, which outputs the highlight exposure of the image as a separate image stream.

A node tree that uses a Layer Mixer node to mix two
Corrector nodes, each connected to separate outputs for
the regular and highlight exposures.

4   Delete the connection between the top Source input and Node 3, and then connect the bottom Source input to the RGB input of Node 3.

Immediately, the image in the node thumbnail and Viewer updates to show the darker, underexposed version of the HDR image. This is because, by default, the Layer Mixer is mixing 100% of Node 3 over Node 1.

5   Select Node 3 and use one of the following two procedures to create a useful combination of the two exposures:

To create a mix of the two exposures, open the Key tab, and drag the Key Output Gain slider to lower the contribution of Node 3 to the overall image (you can also do this using the DaVinci control panel by pressing the KEY MODE soft button, and then using the Post Mix Gain rotary control). Using dynamics (keyframing), this is a good way to animate a dissolve from the regular exposure to the highlight exposure if you're going from a dark environment to a bright environment in the same take and you want to create a smooth transition between both exposures.
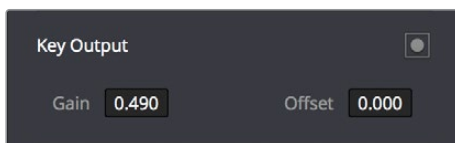
Dissolving between the regular and highlight
exposures of RED HDRx media using the Key
Output Gain slider of a Corrector node connected
to a Layer Mixer node.

> **TIP:** You can also use the Blend Type and Blend Bias parameters in the Camera Raw palette to blend the two exposures without building a dedicated node tree.

To use the highlight exposure to selectively put detail back into the image (for example, to retrieve blown-out windows), use a Power Window, HSL Qualification, or a combination of the two to isolate the region you want to retrieve in Node 3. (Be careful if you're using HSL Qualification to combine both exposures, as keyed edges can be tricky to blend.)

Isolating a region of the image to replace using
the highlight exposure image of a RED HDRx clip
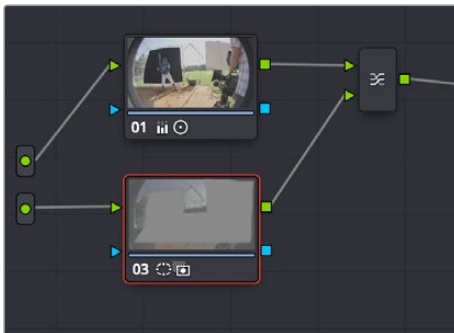
Final node display with isolations

A Note About RED HDRx Media and Performance

Since RED HDRx media records two complete streams of image data, DaVinci Resolve must simultaneously decode two separate tracks whenever you add a second Source input. (If you don't add the second Source input, only the first stream is decoded.)

Because of this, whether you're relying on your computer's CPU or GPU to decode RED media, you'll get half the performance when using the highlight stream of an HDR clip.

To improve performance, you can enable the Smart Cache by choosing Playback > Render Cache > Smart (or by pressing the CACHE MODE button on the T-bar panel of your DaVinci Resolve control panel repeatedly until you toggle to User mode). This automatically caches all raw source clips to the current codec set in the Render Cache Format parameter of the Master Settings panel of the Project Settings. Alternatively, you can enable the User Cache, and cache all HDRx clips manually by right-clicking them and choosing Render Cache Fusion Output > On (or by pressing the CACHE MODE button of your DaVinci Resolve control panel). DaVinci Resolve renders all cached clips while you're paused, so the next time you play a cached clip, it will play at full speed.

If you regularly use RED HDRx media, multiple high-end GPU cards are recommended for optimal decoding performance.

Introduction to Compositing Using the Alpha Output

While DaVinci Resolve can use the alpha channel of imported media for compositing, the Alpha Output in the Node Editor is an optional output that you can turn on to create clip transparency using operations inside DaVinci Resolve to create composites against other clips on lower video tracks. There are many ways of using the Alpha Output, but this section will focus on three examples.

Using a Qualifier Key to Create Transparency

In this first example, the Alpha Output will be used to composite a green screen clip with a background plate.

A green screen clip, ready for compositing

In preparation for this composite, the background plate is on track V1 of the Timeline, and the green screen clip has been superimposed on track V2.
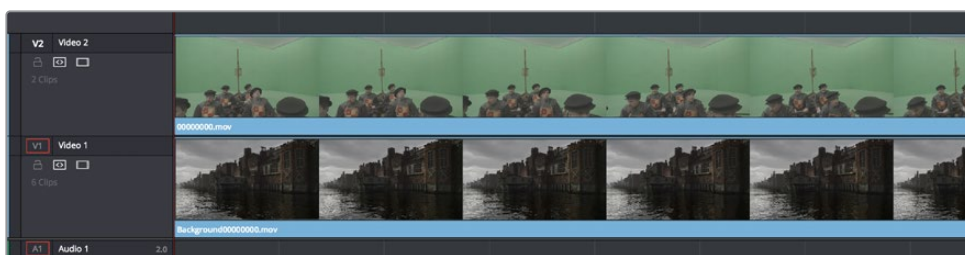
A superimposed green screen clip on track V2 of the Timeline, above a background plate on track V1, ready for compositing.

To create a chroma-key composite in the Color page:

1   Right-click anywhere within the gray area of the Node Editor and choose Add Alpha Output to add the Alpha Output at the right of the node graph.

An Alpha Output appears underneath the Node Tree output at the right of the Node Editor.

The image Node Tree output with Alpha Output below

2   You'll want to use Node 1 to color correct the image to optimize it for keying. In this example, the foreground plate is log-encoded, so a LUT is added to Node 1 to normalize it.

3   Add a Serial node after Node 1 and connect its key output to the Alpha Output. This is a fast way to build this composite if you're confident that the corrections you've made in Node 1 won't adversely affect the key (or if you know they'll improve it by expanding the contrast of a flat-contrast source clip).

Alternately, you could create a second processing branch by adding a disconnected node (Node 2), connecting the Source node to its RGB input, and then connecting its key output to the Alpha Output you just added. Creating a second image processing branch from which to pull your key lets you key directly from the source (assuming the source is fit to key without adjustment), avoiding any problems that grading the first node could introduce to the key.
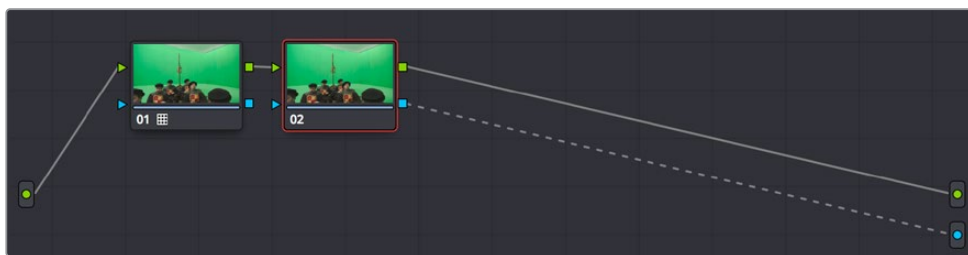
Node 1 grades the clip, expanding contrast to improve both the image, and its ability to be keyed. Node 2 uses Qualifier controls to pull the key.

4   Use the Qualifier controls of Node 2 to key out the green background, and then turn on the Invert checkbox to create the proper composite. In this example, we're using the 3D Qualifier mode to pull a high-quality key.
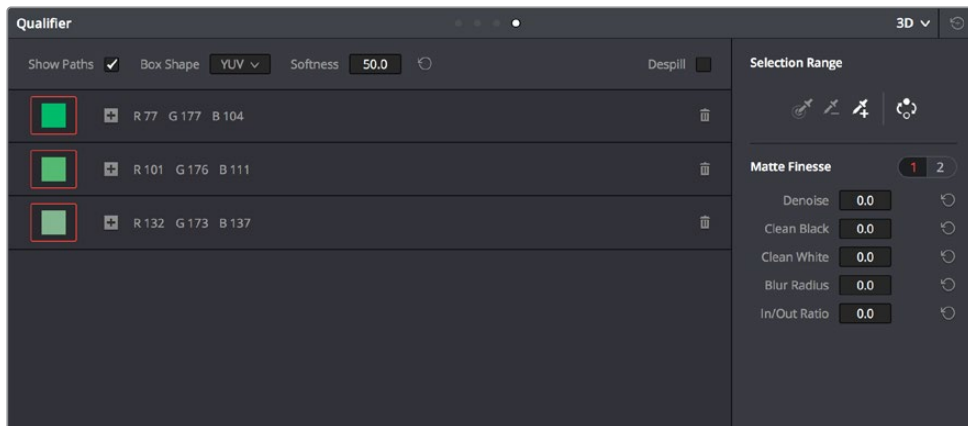
An HSL Qualification to key the green feeding the Alpha Output to create transparency

5 If there's green spill in the composite (or blue in cases where you're keying a bluescreen) you can turn on the Despill checkbox to eliminate it.
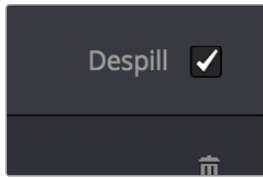
6 You can also use a Power Window to garbage matte out any elements you don't want intruding into the shot, using the Tracker palette if necessary to make the window follow the motion of the foreground subject.
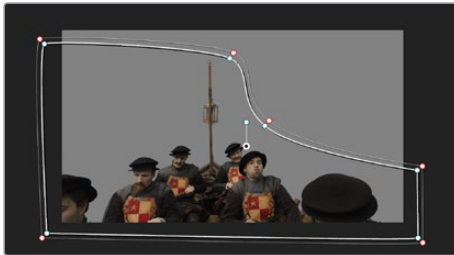
A PowerCurve used to garbage matte
out unkeyable lighting fixtures

7 If necessary, you can add another node to the output of Node 2 to make whatever corrections are necessary to the background plate clip to make the composite blend more seamlessly. For example, with this additional node selected, you could right-click the background clip and choose "Shot Match to This Clip" to use the automatic shot matching in DaVinci Resolve to adjust the foreground to match the background.
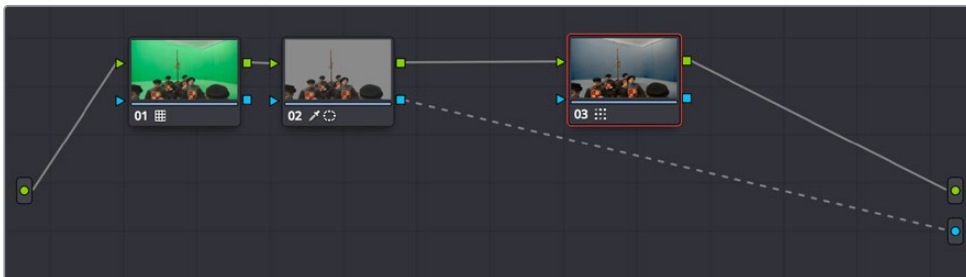
Adding more color adjustments to a node added after the qualifier

With all this set up, you end up with a nice green screen composite that's visible in both the Color and Edit pages.

The result, with a window garbage matte cropping
out the equipment, ready for further refinement

Using a Matte to Create Transparency

If you've been provided with a separate Matte clip for defining clip transparency, you can use that Matte clip within the node tree of a superimposed clip to create a composite using the Alpha Output.

To create a composite using an external matte:

1 To associate an external matte with a clip, open the Media page, select the clip you want to add a matte to in the Media Pool, navigate to the matte file using the Library browser, and then right-click the matte file and choose Add as Matte. For more information on importing mattes, see Chapter 126, "Combining Keys and Using Mattes."

2 Open the Color page and select the foreground clip in the Thumbnail timeline, then right-click Node 1 in the Node Editor and choose the matte you added from the Add Matte submenu.

An EXT MATTE node appears underneath Node 1, with the first of its four key outputs connected to Node 1's key input. (Working with external mattes is covered in more detail in a prior section of this chapter.)

3 Now, right-click anywhere within the node graph (other than on a node) and choose Add Alpha Output from the contextual menu.

An Alpha output appears underneath the Node Tree output.

4 Drag a connection line from the second key output of the EXT MATTE node to the Alpha output.

Using an external matte in the grade and to the Alpha output

You should now see a successful composite, with the external matte creating a region of transparency in the foreground clip through which the background clip shows through.

Before and after the final composite, created by connecting an EXT MATTE node to the Alpha output in the node graph

Use an OFX Plug-in to Create Transparency

If you've installed an OFX plug-in capable of keying, you can right-click the node you've applied it to and choose Use OFX Alpha to route the key created by the plug-in out the key output of that node. When Use OFX Alpha is enabled, the HSL Qualifier and Window palette output is ignored, the only key that's output is from the OFX plug-in.
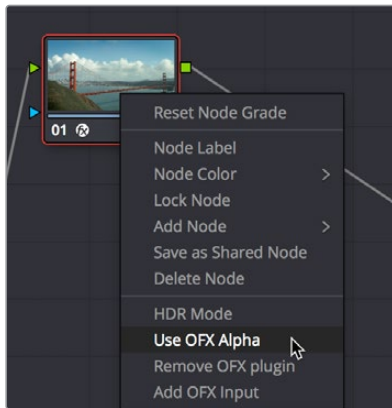
Choosing Use OFX Alpha in the Node Editor

Once Use OFX Alpha is enabled, and you've created a key using your OFX plug-in of choice, you can right-click anywhere within the node graph (other than on a node) and choose Add Alpha Output from the contextual menu to make the Alpha output appear, and you can then connect the key output from the node with the OFX plug-in to the Alpha output to use it to create transparency.
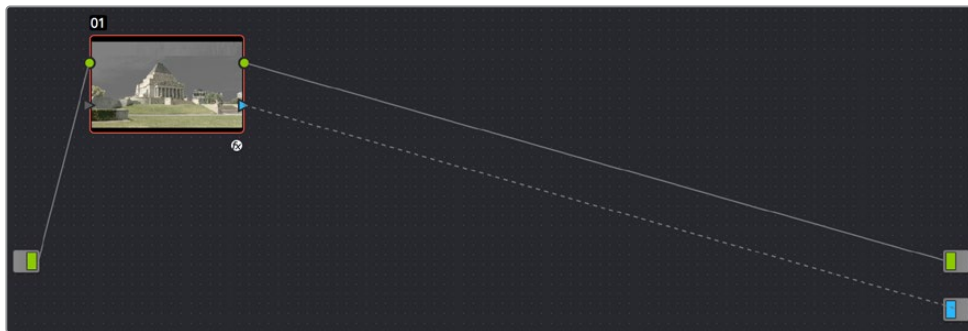
Setting up a composite using an OFX plugin

> **NOTE:** When Use OFX Alpha is enabled for a node, you cannot use a window to create a garbage matte within that node as you would when keying with the HSL Qualifier. To create a garbage matte with which to exclude unwanted and unkeyable elements from the edges of the picture, you'll need to combine the key from a window in another node with the key output by the OFX plug-in using a Key Mixer node.
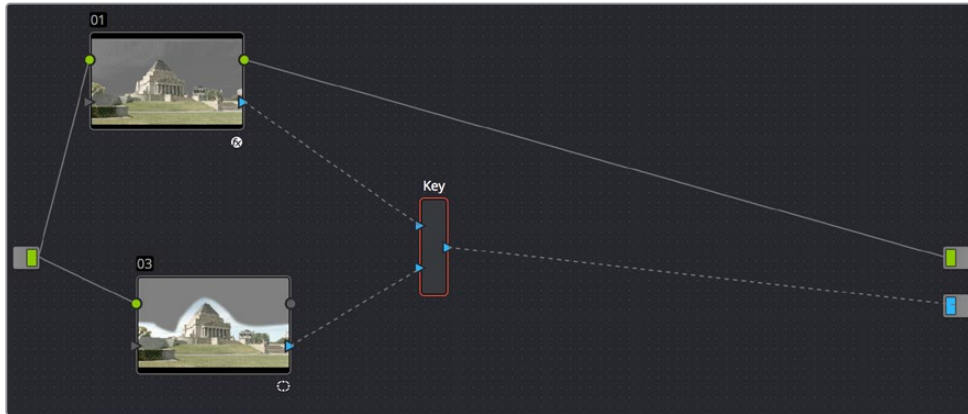
Combining an OFX key with a window using a Key Mixer to add a Garbage matte

Compositing Entirely Within an OFX Plug-In

Certain OFX plug-ins that are capable of combining two image streams to create a composite can be used as of DaVinci Resolve version 11.1 by exposing a "second layer input" on the node to which that plug-in has been applied. This makes it possible to composite the image you're grading with the RGB output from an EXT MATTE node.
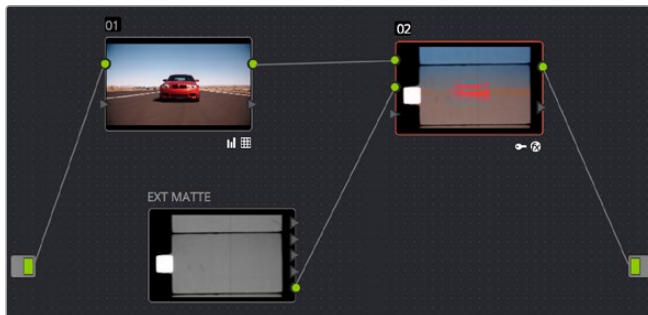
Combining a clip with an EXT MATTE image using the second layer input of a node with an OFX plug-in applied to it

To create a composite using an OFX plug-in:

1   Open the OpenFX Panel, use the Library to find the OFX compositing plug-in that you want to use, and drag it onto the appropriate node to apply it. The above example shows the Boris Effects plug-in "BCC Composite," which mathematically combines two image streams using one of a long list of blending modes.

2   Right-click the node with the OpenFX plug-in applied to it, and choose Second Layer Input from the contextual menu. A second RGB input should appear on the left of the node, underneath the first.
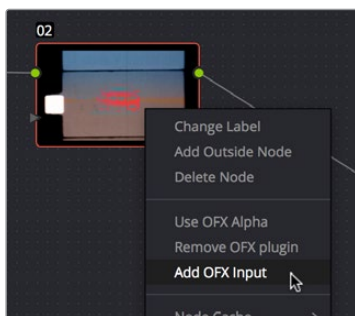
Adding the second layer input of a node
with an OFX plug-in applied to it

3 Open the Media page, locate the clip you want to composite in the Library, and import it as an unassigned matte.

4 Open the Color page again, right-click the node with the OpenFX plug-in applied to it, and choose Add Matte > Track Mattes > "name of matte imported in step 3" from the contextual menu.

5 By default, the EXT MATTE node that appears is connected via one of its key outputs. Delete the key connection, and drag a new connection line from the EXT MATTE node's RGB output to the second RGB input of the node with the OpenFX plug-in.
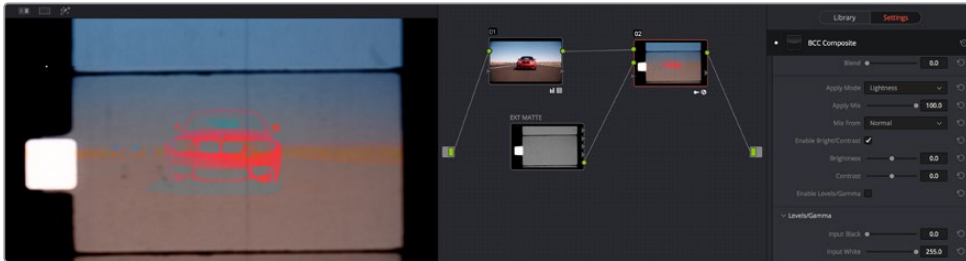
The composited image, node tree, and OFX parameters shown side by side

6 At this point, the node tree is wired up to composite the clip with the EXT MATTE image, and you need only adjust the parameters of the OpenFX plug-in to achieve the result you desire.

Chapter 128

Keyframing in the Color Page

The Color page has a dedicated Keyframe Editor, found at the right of the palette area, that you can use to animate grading changes from one frame to another. Because grading is a fundamentally different task than editing, the Color page Keyframe Editor operates somewhat differently from the Curve Editor in the Edit page.

Contents

Introduction to Keyframing

Whether it's referred to as keyframing, dynamics, or marks, DaVinci Resolve provides an interface for automatically interpolating color adjustment parameters in various ways from one setting to another. For example, if you have a clip with varying exposure settings, you can animate a series of contrast adjustments using Dynamic keyframes to make the changes in exposure less distracting.
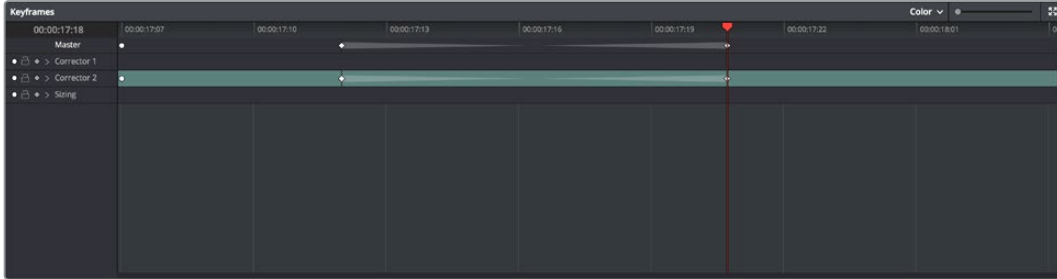
The Keyframe Editor with dynamic keyframes animating the parameters of Node 2

In another example, suppose you're grading a documentary, and an archival clip that's edited in the middle of the Timeline actually consists of six different shots from a program in the eighties. If you're in a hurry, you can insert Static keyframes (marks) at the cut points of each of these shots, creating instant one-frame transitions between different adjustments made to that clip's grade, which allows you to create unique adjustments for each shot within the clip.
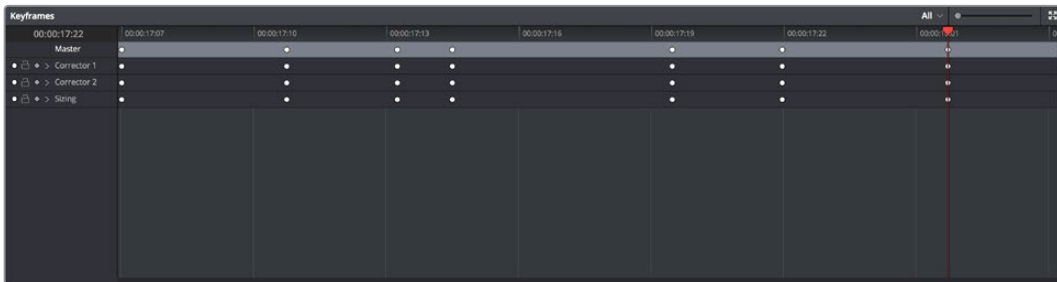
Round static keyframes added to all parameters, enabling individual adjustment of shots merged together within a single clip

In both cases, you use the Keyframe Editor to create a series of keyframes with which to change parameters from one value to another. In this section, you'll learn how to work with the Keyframe Editor to set up these kinds of animated changes.

The Keyframe Editor Interface

The Keyframe Editor has all the controls necessary to create and modify keyframes for the currently selected clip. If necessary, you can even make it wider in a single screen layout by clicking its expand button (at the top right of the Keyframe Editor). If you have two computer displays, you can use the Color page's Dual Screen layout which places the Keyframe Editor on a second screen and uses the entire width of the monitor, for even more room.
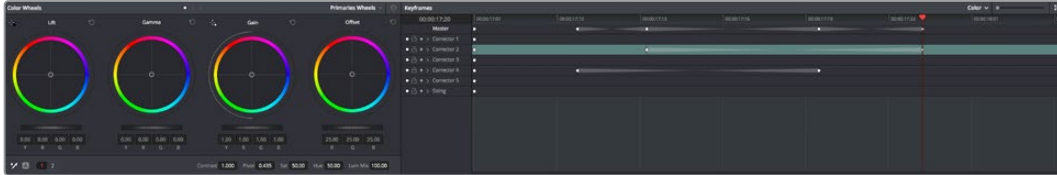
The Node Editor shown in wide mode, pushing all other palettes to the left

The Keyframe Editor consists of the following components:

- **Timeline Ruler:** Mirrors the record timecode of the currently selected clip; dragging within the Timeline Ruler moves the playhead, and a timecode display to the left shows the current frame.
- **Keyframe track header:** Each node in the current grade has a corresponding keyframe track, Sizing has its own keyframe track, and the track header contains controls you can use to manage the keyframing.
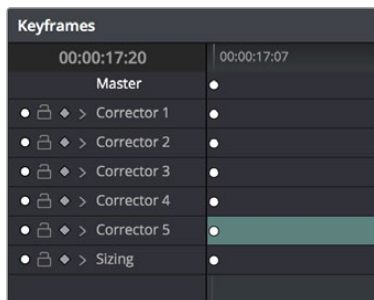
The keyframe track header

- **Enable/Disable button:** A round white button lets you enable or disable that track's corresponding node.
- **Lock button:** Lets you prevent any changes from being made to that track's corresponding node. Nodes that have been locked show a lock icon. You can also lock or unlock nodes by right-clicking a node in the Node Editor and choosing Lock Node from the contextual menu.
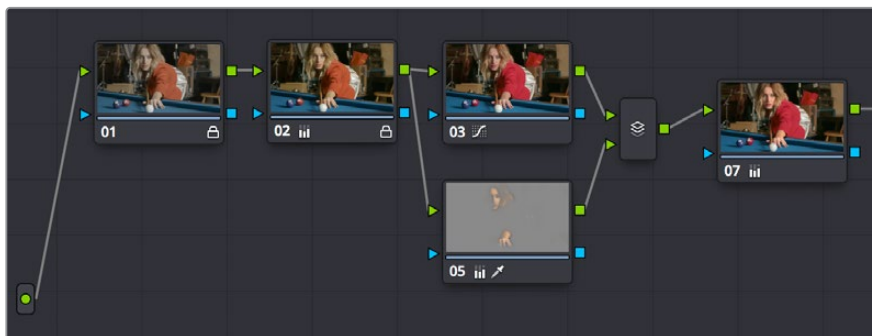
Nodes 1 and 2 have been locked in the Keyframe Editor of the Color page

- **Auto-Keyframe button:** Turn this button on to automatically create a Dynamic keyframe every time you adjust any parameter within that node.

- **Track disclosure triangle:** Exposes individually keyframable groups of parameters underneath the main keyframe track.

- **Keyframe tracks:** To the right of the track header, the keyframe tracks are where you create and edit the keyframes that animate parameter changes. A topmost "master keyframe track" shows every keyframe applied on every keyframe track in the Keyframe Editor, even keyframes applied to a keyframing track hidden inside a track with a closed disclosure triangle.

- **Keyframes:** Each keyframe appears as a small diamond for a Dynamic keyframe or as a circle for a Static keyframe. Dynamic keyframes are associated with dissolves while Static keyframes (marks) act instantly. Grades are linked to the preceding keyframe, which may be a default one on the first frame of the master clip. Keyframes can be selected by clicking on them, or moved by dragging them to another position in the keyframe track.

- **FX track:** ResolveFX or OFX plug-ins that have been added to a grade as a standalone node have a separate track for creating animated effects. Every parameter of that track is keyframed via a single consolidated keyframe track. If you apply multiple plug-ins as multiple nodes, each has a separate FX track.

- **Sizing track:** The Pan, Tilt, Zoom, Rotate, and Convergence (in Stereo 3D projects) parameter have an entirely separate track for creating animated pan and scan adjustments.

- **Track selection Dropdown:** A colored bar shows the currently selected scope of keyframing: all tracks at once, just the current correction node, or the Sizing settings, as defined by the Keyframe Timeline mode discussed in the next section.

Ordinarily, the Keyframe Editor takes up the rightmost bottom third of the Color page. However, you can make it wider to have more room to work if you have a scene requiring complex keyframing.

To expand and collapse the Keyframe Editor:

    Click the Expand/Collapse button at the top right corner of the Keyframe Editor.
    The Keyframe Editor widens or narrows accordingly.

To zoom into and out of the keyframe tracks:

- Use the Zoom slider to zoom into or out of the Keyframe Editor.

- Right-click any keyframe track and choose Maximum Zoom to zoom all the way in.

- Right-click any keyframe track and choose Reset Zoom to fit the entire clip into the available width of the Keyframe Editor.

All/Color/Sizing

Perhaps the most important control for keyframing, the Keyframe Timeline mode, lets you switch the scope of what tracks get keyframed when you use the Start Dynamic or Add Static Keyframe commands, either from the keyboard or via the buttons of your control panel. This command alternates among three modes:

- **All:** The default mode. Adds keyframes to every track in the Keyframe Editor, keyframing every parameter in every node all at once, including the Sizing settings. In this mode, an orange bar appears highlighting the topmost "master keyframe track."

- **Color:** Only adds keyframes to the node currently selected in the Node Editor. In this mode, a green bar appears highlighting the keyframe track corresponding to the node currently selected.

- **Sizing:** Only adds keyframes to the Sizing track, which is useful when you're keyframing "pan and scan" style transforms. In this mode, a blue bar appears highlighting the Sizing track.

- **EXT MATTE:** Only appears if there's an external matte node in the node tree. Lets you keyframe external matte-specific parameters in the Key palette.

Even though All is the default setting, it may be to your advantage to switch to the Color or Sizing keyframing modes to avoid creating a lot of unnecessary keyframes. Even though keyframing everything all at once is a fast way to work, the extra keyframes may slow you down when you later need to make adjustments to nodes that didn't need to be keyframed in the first place.

To change the keyframing mode, do one of the following:

- Choose an option from the Keyframe Mode drop-down at the top right of the Keyframe Editor.

- Choose an option from the Mark > Keyframe Timeline Mode submenu.

- Press the ALL/COLOR/Sizing button on the Transport panel of the DaVinci control panel repeatedly until you've chosen the mode you need.

> **TIP:** This control has one other function. Choosing a mode also affects what is copied when you use the various grade management tools in DaVinci Resolve. For example, if you choose Color, then you can copy a clip's color grade without copying its sizing. If you choose Sizing, then you can copy the sizing without copying the color grade. For more information, see "Copying Grades" in Chapter 123, "Grade Management."

Keyframing Methods

There are two different types of keyframes used by DaVinci Resolve to create automated changes. Each type of keyframe interpolates parameters differently.

Dynamic Keyframes (Dynamics)

Dynamic keyframes are the most conventional type of keyframe you'll use, and are the type of keyframe used for creating animated changes from one state to another. For example, if you need a grade to become brighter over time to compensate for a change in lighting conditions, you'll use Dynamic keyframes.

Nearly every parameter and control in the Color page can be keyframed, but it's important to understand that the Interface controls do not animate to match whatever dynamically keyframed changes are taking place. Instead, visible Interface controls that correspond to keyframed changes will jump from their initial position at one keyframe to their final position when the playhead reaches the next keyframe.

This can be most confusing with Curves, which can be interpolated using Dynamic keyframes just like any other control or parameter. Just keep in mind that the actual settings are animating, even though the controls are not.

To animate a node using Dynamic keyframes:

1   Move the playhead in the Keyframe Editor's Timeline ruler to the frame where you want to begin a change.

2   Do one of the following to place a Dynamic keyframe at that frame:
    – Choose Mark > Add Keyframe (Command-[).
    – Press the START DYNAMIC button on either the T-bar or Transport panels of the DaVinci control panel.
    – Turn on the Auto Keyframe button for the track you want to animate in the Keyframe Editor.

    Dynamic keyframes are diamond-shaped.

3   If necessary, adjust your clip at this first position of your animated change. If you're using Auto Keyframe, then you have to make an adjustment for a keyframe to be created.

4   Now, move the playhead to the frame that is at the second position of the animated change you're making, and create another Dynamic keyframe if you're creating keyframes manually, or make another adjustment if Auto Keyframe is on.

5   After you've created this second keyframe, make whatever adjustments are necessary to the clip to create the final look you need.

    At this point, playing from the first keyframe to the second keyframe should show a smoothly animated change from the first adjustment to the second. When you're finished, make sure you turn Auto Keyframe off if it was enabled.

Static Keyframes (Marks)

Static keyframes, or marks, are keyframes that are used to create abrupt, one frame changes from one state to another. They're typically used to mark edit points separating one shot from another when multiple shots appear within a single clip. However, Static keyframes are also useful in any situation where you need a sudden change from one setting to another, such as when creating a lightning effect.
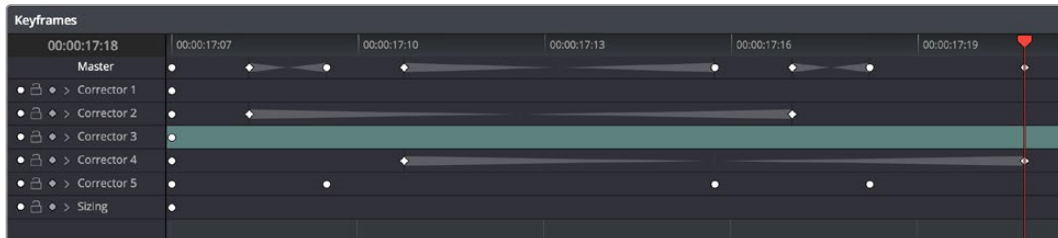
Static keyframes are round

To automate a node using Static keyframes:

1   Find the frame at which you want the abrupt change to take place, and place a keyframe at that frame by doing one of the following:

   –   Choose Mark > Make Static Keyframe (Command-]).

   –   Press the MARK button on either the T-bar or Transport panels of the DaVinci control panel.

   Static keyframes (marks) are round.

2   Move the playhead to any frame before the keyframe to make changes to the entire segment of the clip leading up to the keyframe, or move the playhead to any frame after the keyframe to make changes to the entire segment of the clip appearing after the keyframe. The playhead does not need to be on top of the keyframe, but if it is, you'll be adjusting the second portion of the clip.

> **NOTE:** If you're using Static keyframes to automate grading changes between multiple shots appearing within a single clip, keep in mind that you can't add nodes from one keyframe to the next as you would if you had split the clip in the Edit page.

Mixing and Converting Dynamic and Static Keyframes

Typically, if you're creating multiple animated changes within a clip, you'll want to use all Dynamic keyframes. Similarly, if you're creating a series of abrupt changes, you'll use all Static keyframes. However, you can mix Dynamic and Static keyframes together, so long as you keep in mind the following rules:

> If you add a Dynamic keyframe to the right of a Static keyframe: There will be no interpolation from the Static keyframe to the Dynamic keyframe. However, if you add a Static keyframe to the right of a Dynamic keyframe, there will be interpolation.
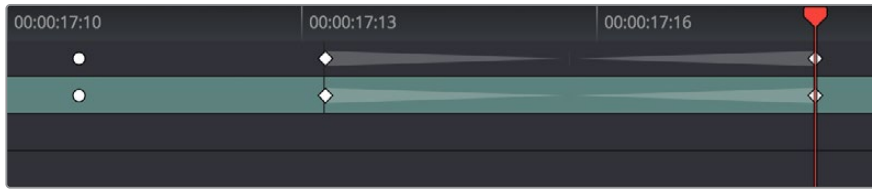
No dynamic interpolation following the static keyframe

If you accidentally create the wrong kind of keyframe, it's easy to convert it into the type of keyframe you need.

To change one kind of keyframe into another:

1   Click the keyframe you want to convert to select it.

2   Right-click the selected keyframe, and choose either Change to Dynamic Keyframe or Change to Static Keyframe.

Try Creating Keyframed Changes in a Separate Node

One tip to keep in mind is that you don't have to create keyframed changes within the same nodes you're using to create other adjustments. If you want to create some automated changes without altering the nodes you've already adjusted, you can simply create a new node in which to make your keyframed changes. That way, if you don't like the result, or you somehow find yourself hopelessly tangled up in a needlessly complicated set of keyframes, it's easy to reset either just the keyframes or the entire node without affecting the rest of your grade.

Keyframed Nodes Have a Badge

Nodes with keyframed parameters display a keyframe badge in the Node Editor, to make them easy to find. Note that keyframe badges won't appear when you simply add a keyframe but only once there's an actual keyframed adjustment being made.

Keyframed nodes display a badge in the Node Editor

Using Specific Keyframing Tracks

If you're simply using the Color mode of the All/Color/Sizing command to do keyframing, then you'll be adding keyframes to every parameter of the currently selected node whenever you apply a single keyframe. However, often that's overkill in situations where you only need to keyframe a single setting or group of settings.

For example, you may find that you need to keyframe a color adjustment in order to change the color temperature and brightness when the camera pans across a window, but you don't want to keyframe the Windows palette controls because you want to adjust them independently. This can be done by opening a Corrector track to expose the keyframing tracks within.
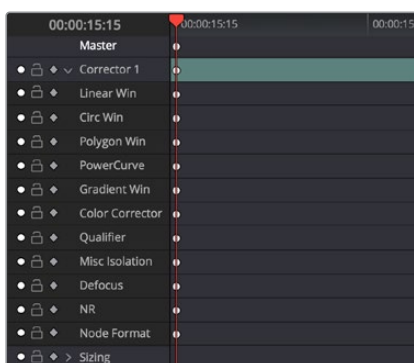
Individual keyframing tracks within a Color Corrector node

Keyframing tracks let you keyframe different sets of similarly functioning parameters separately from one another. For example, there's one keyframing track for all the color adjustment parameters, and another keyframing track governing the parameters found within the Qualifier palette.

To reveal a node's keyframing tracks:

> Click the disclosure triangle next to the number of the node you're keyframing.

To keyframe an individual keyframing track manually:

1   Make whatever adjustments you need to the currently selected node, and click its disclosure triangle to reveal its keyframing tracks.

2   Move the playhead in the Keyframe Editor to where you want to add the first keyframe, then right-click within the keyframing track you want to animate, and choose Add Static Keyframe or Add Dynamic Keyframe (this example shows a Dynamic keyframe).

    A keyframe appears at the position of the playhead in that keyframing track.

3   Move the playhead in the Keyframe Editor to where you want to add the next keyframe, then right-click within the keyframing track and again choose either Add Static Keyframe or Add Dynamic Keyframe (this example shows a Dynamic keyframe).

Keyframing just the Circular Power Window using its individual keyframe track

Now, you can make whatever changes you need to the controls governed by the keyframing track you keyframed, in order to create the necessary animated effect.

> **TIP:** You can also animate individual keyframing tracks using automatic keyframing, explained in more detail later in this chapter.

Corrector Keyframing Tracks

All of the parameters governing the adjustment of color and contrast controls, as well as various effects, Power Windows, and other adjustments are sorted into various sub-tracks within the Corrector track.

- **Linear Win:** Controls parameters corresponding to the Linear window.
- **Circ Win:** Controls parameters corresponding to the Circular window.
- **Polygon Win:** Controls parameters corresponding to the Polygon window.
- **PowerCurve:** Controls parameters corresponding to the PowerCurve window.
- **Gradient Win:** Controls parameters corresponding to the Gradient window.
- **Color Corrector:** Controls all parameters found in the Camera Raw, Color Wheels, Primary Controls, RGB Mixer, and Curves palettes.
- **Qualifier:** Controls all parameters in the Qualifier palette.
- **Defocus:** Controls all parameters in the Blur and Key palettes.
- **NR:** Controls the Spatial and Temporal Noise Reduction and Motion Blur parameters found in the Motion Effects palette.
- **Open FX:** Controls all parameters of whichever OFX plug-in is applied to the current node.
- **Node Format:** Controls all parameters of the node sizing mode of the Sizing palette for the current node.

ResolveFX Keyframe Tracks

The Color Page Keyframe Editor supports viewing and editing keyframes for ResolveFX and OpenFX plug-ins in the Color page in one of two ways:

- Plug-ins that have been added to a Corrector node appear within the hierarchical list of keyframe tracks that appear within that node's top-level keyframe track.
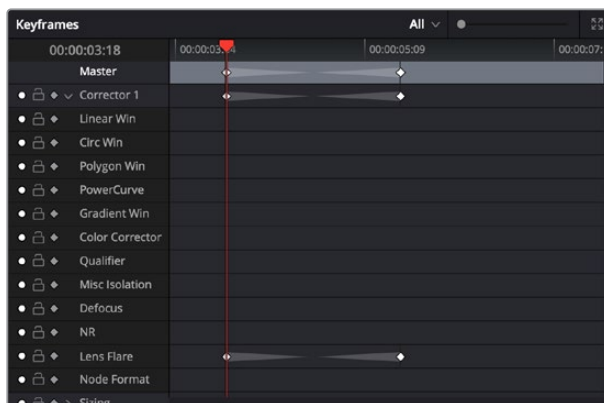
The keyframe track of a ResolveFX plug-in added to a Corrector node

- Plug-ins that have been added as standalone nodes appear within a new FX track of the Keyframe Editor. Each plug-in that's added as a separate node has a separate FX track.
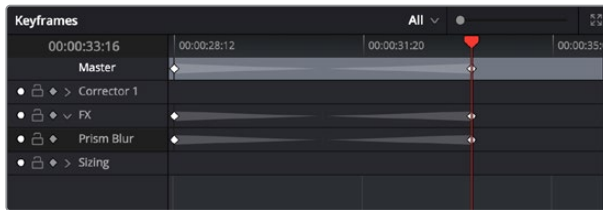
The keyframe track of a ResolveFX plug-in added as a standalone node

The Sizing Keyframing Tracks

The Sizing keyframing tracks govern sizing transforms and stereoscopic adjustments separately from the color controls.

- **Input Sizing:** Controls the Input Sizing parameters found within the Sizing palette.
- **Convergence:** Controls the Convergence parameter in the Stereo 3D palette.
- **Float Window:** Controls the Left, Right, Top, and Bottom Position/Rotate/Softness Floating Windows parameters.
- **Auto Align:** Controls the Pitch and Yaw parameters in the Stereo 3D palette.

> **TIP:** Output Sizing can only be keyframed when you choose Timeline mode in the Node Editor.

The Ext Matte Node's Freeform Isolation Track

If your node tree has an External Matte, the EXT MATTE node exposes a Freeform Isolation track in the Keyframe Editor. This is useful for time offsets or Sizing repositioning of the Ext Matte image.

Automatic Keyframing

Every track in the Keyframe Editor has an Auto-Keyframing button that can be turned on or off. When auto-keyframing is enabled for a particular track, every change made to a parameter or control associated with that keyframe track automatically generates a keyframe. There are two ways you can use this:

- Used with a keyframing track, auto-keyframing makes it simple to set up animated changes to specific adjustments within a node. This is a lot easier than manually placing keyframes one by one.
- On the other hand, turning on auto-keyframing for the Corrector track correspondingly enables auto-keyframing for every keyframing track belonging to that node. In this case, keyframes will automatically be placed on whatever keyframing track corresponds to the parameters or controls you adjust.
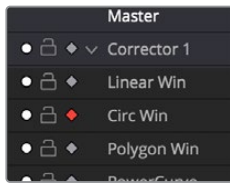
Auto-keyframing selected for Circular
window on Node 1

When auto-keyframing is disabled, changes you make alter existing keyframes. How this
alteration works depends on the location of the playhead, and the type of keyframes in the
Keyframe Editor. For more information, see the next section.

Modifying Keyframes

Once you've started adding keyframes to animate changes to a grade, there are a variety of
methods available to navigate and edit these keyframes to further customize these effects. This
section covers the different ways you can navigate among, alter, and remove keyframes.

Navigating Among Keyframes

For many operations, it's necessary to move the playhead directly on top of the keyframe you
want to modify. While you can always use the transport controls or pointer to move the
playhead, there are also commands for jumping to a specific keyframe.

To move the playhead among a series of keyframes, do one of the following:
- Choose Playback > Next > Keyframe (the right bracket key) or Playback > Previous >
  Keyframe (the left bracket key).
- On the Transport panel of the DaVinci control panel, press SHIFT then STEP REV to
  move the playhead to the previous keyframe, or press SHIFT then STEP FWD to move
  the playhead to the next keyframe.

Moving Keyframes

If you need to change the timing of a series of keyframes, you can move the position of any
keyframe, along with whatever values that keyframe contains.

To move a single keyframe using the onscreen interface:
- Use the pointer to drag any keyframe to another location.
- Drag keyframes in a top-level Corrector or Sizing track to simultaneously move all other
  keyframes on the same frame within that corrector.

To move a single keyframe using the DaVinci control panel LIFT MARK button:
1 Move the playhead to the keyframe you want to move. This procedure works for either
  Dynamic and Static keyframes.
2 Press LIFT MARK on either the T-bar or Transport panels.
3 Move the playhead to the frame you want to move that playhead to.
4 Press MARK on either the T-bar or Transport panels.

To move multiple keyframes at the same time:

1   If necessary, open the keyframe track with the keyframes you want to move.

2   Drag a bounding box around the keyframes you want to move. Selected keyframes appear highlighted in red.

3   Drag any of the selected keyframes to move them to the left or right.

Changing Keyframe Values

Unlike many other applications, DaVinci Resolve lets you alter keyframe values when the playhead isn't directly on an existing keyframe. How this works depends on the location of the playhead relative to the keyframes that are in the Keyframe Editor, and what kind of keyframes you're editing.

- **If the playhead is to the left or on the first Dynamic keyframe:** The Dynamic keyframe at or to the right of the playhead updates with the new adjusted values.

- **If the playhead is to the left or on the last Dynamic keyframe:** The Dynamic keyframe at or to the left of the playhead updates with the new adjusted values.

- **If the playhead is between two Dynamic keyframes:** The Dynamic keyframe to the left of the playhead updates with the new adjusted values, but the Dynamic keyframe to the right is unaffected.

- **If the playhead is between two Static keyframes (marks):** Adjustments made between two Static keyframes always affect the keyframe to the left of the playhead. The entire segment of the clip between that keyframe and the next is affected equally.

Changing Dynamic Attributes

By default, the transition from one Dynamic keyframe to the next is linear. However, if you need to alter the acceleration of value interpolation from one Dynamic keyframe to the next, then you can change that keyframe's dynamic attributes.

To change a keyframe's dynamic attributes:

1   Click to select a keyframe in the Keyframe Editor.

2   Right-click the selected keyframe, and choose Change Dynamic Attributes.

3   When the Dynamic Attributes window appears, do one or both of the following:

   – Choose a new outgoing acceleration curve using the Start slider, affecting the interpolation occurring to the right of that keyframe.

   – Choose a new incoming acceleration curve using the End slider, affecting the interpolation occurring to the left of that keyframe.

   As you choose different acceleration curves, the display to the right shows the resulting curve graph.

Changing the dissolve profile

4 When you're happy with the curve, click OK.

By using different Start and End values, you can make animated adjustments "ease in" or "ease out" of a particular keyframe, to create a more gradual or abrupt transition.

> **TIP:** The default dynamic profile start and end of each new keyframe can be set via the Dynamics Profile values in the General Options panel of the Project Settings.

Deleting Keyframes

You have the option to delete individual keyframes, or to delete all the keyframes within a particular grade at once.

To delete individual keyframes, do one of the following:
- Move the playhead on top of the keyframe you want to delete, then choose Mark > Delete Keyframe (Option-]). Every keyframe at the position of the playhead is deleted.
- Using the DaVinci control panel, press DELETE on either the T-bar or Transport panels. Every keyframe at the position of the playhead is deleted.
- Using the pointer, click a keyframe in the Keyframe Editor to select it, then right-click that keyframe and choose Delete Selected Keyframe. Only the selected keyframe is deleted.

To delete every keyframe for the current clip:
Choose Mark > Delete All Keyframes.

Copying Keyframes

It's possible to copy a set of keyframes from one node to another, either within the current grade, or in another clip entirely. It's also possible to copy an entire grade with keyframes from one clip to another.

To copy a set of keyframes from one node to another:

1   Select a node to copy keyframes from, and choose Edit > Copy (Command-C).

2   Do one of the following:

   −   To copy all keyframes, select another node to paste keyframes and other adjustments to, and choose Edit > Paste (Command-V).

   −   If you want to just copy only the keyframe information from a specific keyframe track, choose Edit > Paste Attributes (Option-V), then click the "Copy Keyframes and Align Using" checkbox, and select the appropriate parameters to copy.

> **TIP:** This procedure also works for tracking data that you want to copy from one node to another, either in the current clip, or another clip altogether.

To copy an entire grade with keyframes from one clip to another:

1   Click the thumbnail of the clip you want to copy to in the Thumbnail timeline.

2   Right-click the thumbnail of the clip you want to copy from, and choose Apply Grade from the contextual menu.

> **NOTE:** When copying a grade with keyframes from one clip to another, the keyframes will automatically be placed at matching frames that correspond to the source timecode of the originating clip. This makes it easy to copy a grade with keyframes to the same clip elsewhere in the Timeline, but it may not provide the desired results if you're applying a grade with keyframes from one clip to a completely different one.

Keyframes and Saved Stills

If you save a still from a clip using keyframes within the grade, by default keyframes are not saved. However, the still and grade that are saved reflect whatever parameter values are contained by the next keyframe to the left of the position of the playhead. For example, if a clip has a dynamically keyframed transition from a saturation of 50 to a saturation of 0, and you place the playhead right in the middle of both keyframes when you save a still, the grade and still that are saved have a saturation of 50.

However, if you right-click the background of the Gallery, choose one of the options within the "Apply Grades Using" submenu, and choose the appropriate "Keyframes Aligning…" options, then grades saved within a still are saved with the keyframes, which reference the source timecode, or start frame of the original clips. This means that if you apply a saved grade with keyframes to a clip, the keyframes will automatically be placed at matching frames that correspond to the source timecode or start frame of the original clip. This makes it easy to copy a grade with keyframes to the same clip elsewhere in the Timeline, but it may not provide the desired results if you're applying a grade with keyframes from one clip to a completely different one.

Adding EDL Marks

Just as clip grades are separate from the timeline grade that can be applied to the entire Timeline, so clip keyframes are separate from timeline keyframes. Keyframes you apply to the timeline grade work exactly the same as clip keyframes. However, there is one extra option you have when keyframing the timeline grade.

If you find yourself wanting to adjust a timeline grade individually to take into account variations from one clip to the next, you can use the Add EDL Marks on Tracks command to add a Static keyframe (mark) to the Keyframe Editor at the position of every edit point in the entire Timeline.

To add EDL marks:

1   Choose Timeline from the Node Editor's mode drop-down menu.

2   If you want to keyframe a grade, then create whatever grade you need to apply to the entire Timeline. If you want to keyframe Sizing settings, you don't need to do anything else.

3   Right-click the Corrector track or the Sizing track in the Keyframe Editor, and choose Add EDL Marks on Tracks.

     Marks appear at the frame of every edit point in the Timeline. You may want to widen the Keyframe Editor to make it easier to work with all these keyframes.

After you've added EDL marks, you can delete them if you decide you don't want them any more.

To delete EDL marks:

•   Right-click the Corrector track in the Keyframe Editor, and choose Delete EDL Marks on Tracks.

If you've added your own keyframes in addition to the EDL marks, then the Delete EDL Marks on Tracks command only eliminates the EDL marks. Your custom marks are left alone.

Chapter 129

Copying and Importing Grades Using ColorTrace

ColorTrace is a key feature of DaVinci Resolve, which lets you copy grades quickly and easily from the clips of one timeline to those within another, based on the source timecode of each clip (or using clip names when in Automatic mode). You can even use ColorTrace to copy grades between timelines within the same project, and ColorTrace one stereo timeline to another.

Contents

Copying Grades Using ColorTrace

ColorTrace copies whichever version of a clip's grade was applied in the Source timeline you're copying from, either local or remote, depending on which grades each clip in the Source timeline is set to use. Furthermore, ColorTrace copies Group Pre-Clip and Group Post-Clip grades, as well as Fusion compositions. These improvements make this an extremely reliable tool for copying grades from one timeline to another in a wide variety of situations.

To use ColorTrace:

1   Open the Edit page and select the Timeline you want to use ColorTrace with from the Media Pool, then open it and choose Timelines > ColorTrace > ColorTrace From Timeline.
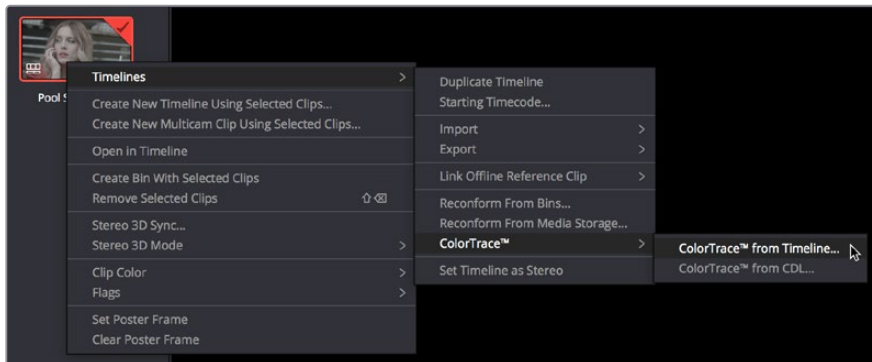
Choosing ColorTrace for a selected Timeline

The ColorTrace Setup window appears, which shows every database, user, project, and timeline within a single hierarchical list.

2   Using the Project List browser, select the specific Timeline you want to copy grades from.

You'll need to click the disclosure triangle to the left of the database, user name, and project that contains that Timeline in order to select it.
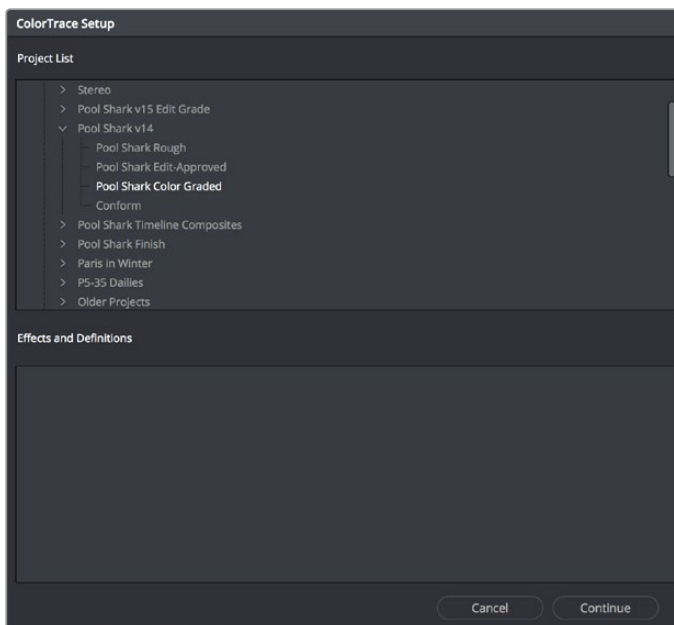
ColorTrace project and Timeline selection window

3 (Optional) If you're using ColorTrace with a project that has numerous VFX clips in a workflow where all VFX clips have specific reel names that identify them, you can enter these names (with asterisks (*) used as wildcards that indicate text in each reel name that can vary) in the "Effects Shot Definitions" field.

This speeds automatic ColorTrace operations by enabling DaVinci Resolve to use fuzzy string matching when a clip's reel number qualifies it as a VFX shot so that the best match is displayed first on the list. You can enter multiple VFX reel names with wildcards, one per line, for simultaneous string matching. You can use whatever reel name text makes sense for your workflow, some examples of VFX reel names are as follows:

```
*_COMP_*
VFX*
EFFECTS*
```

4 Click Continue.

The ColorTrace window appears with two tabs that let you choose how to work.

5 Choose which mode to work in by clicking the Automatic or Manual tab:

- In Automatic mode, ColorTrace automatically searches for matching clips between the selected Timeline and the current Timeline. Each clip is color coded depending on the correspondence that's been identified.

- In Manual mode, you copy grades yourself, using the Copy and Paste procedures, or by dragging and dropping using your mouse.

The ColorTrace window is complex; details about the operation of each mode are covered separately in the following sections.

6 When you're finished using ColorTrace, click Close.

Using ColorTrace in Automatic Mode

In Automatic mode, ColorTrace automatically finds the correspondences between clips in the selected Timeline that you want to copy grades from (the Source timeline), and those in the current Timeline that you want to copy grades to (the Target timeline).
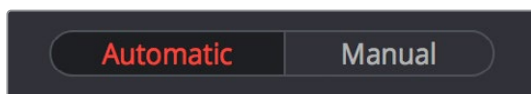
Selecting the Automatic or Manual ColorTrace

Each clip in the Target Timeline Thumbnail timeline is outlined with a color that indicates its status.

- **Red:** No match was found at all. Generally true for clips in the current Timeline that weren't used in the Timeline you're ColorTrace matching to.

- **Blue:** Due to overlapping timecode and reel names, multiple correspondences have been found (similar to a reel conflict), and you must select the correct one for each clip. This often happens with VFX and motion graphics clips that you've imported with timecode starting at 00:00:00:00.

- **Green:** A match has been found.
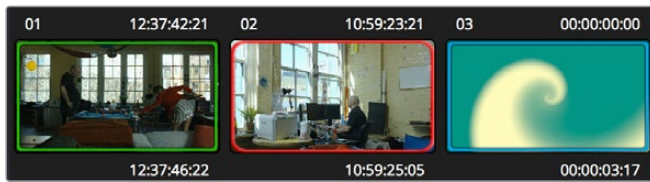
ColorTrace Thumbnail outlines indicate matching, overlapping, and non matching clips

In Automatic mode the correspondence between each clip in the Source timeline and each clip in the Target timeline should be automatically made. However, overlapping timecode and reel names can cause problems. The other controls in the ColorTrace window help you deal with the subset of clips that can't be automatically matched, or are matched in error. These controls are:
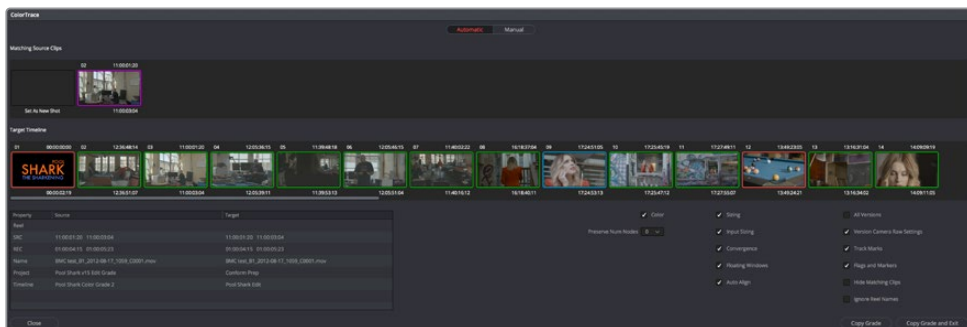
The ColorTrace window shown in Automatic mode

- **Matching Source Clips list:** Shows a scrollable collection of thumbnails that might correspond to the selected clip in the Target timeline.
- **Target Timeline:** Shows each clip in the Timeline you want to copy grades to, color coded according to how good a match it is.
- **Clip Info pane:** Displays two columns of properties for the source clip and the target clips that you've selected. These properties include the reel, source timecode, record timecode, clip name, project names, and timeline names of each clip, for easy comparison.
- **Attributes and options checkboxes:** A series of checkboxes lets you specify which clip attributes are copied as part of the ColorTrace operation.
- **Color:** Enables the copying of grades.

  – **Preserve Num Nodes:** When copying grades, lets you prevent the first X nodes of the target clip grades from being overwritten by the first X nodes of the source clip grades.

  – **Sizing:** Enables the copying of Edit sizing attributes.

  – **Input Sizing:** Enables the copying of Input Sizing attributes.

  – **Convergence:** Enables the copying of Convergence for Stereo 3D projects.

  – **Floating Windows:** Enables the copying of Floating Windows for Stereo 3D projects.

  – **Auto Align:** Enables the copying of Auto Align settings for Stereo 3D projects.

  – **All Versions:** Copies all versions, rather than just the current version, from the source to the target clips. The currently selected version of each source clip is always correctly copied.

– **Version Camera Raw Settings:** Enables the copying of versioned Raw settings, rather than just the current Raw setting.

– **Track Marks:** Enables the copying of keyframes.

– **Flags and Markers:** Enables copying of all flags and markers.

– **Hide Matching Clips:** Hides all clips which have been successfully matched, and only show the clips with multiple or no matches. This lets you focus on the subset of problem clips within a potentially long timeline.

– **Ignore Reel Names:** If you believe the reel names are in error, you can turn this checkbox on to ignore them, matching all source and target clips by timecode alone.

- **Copy Grades:** Copies the matched source grades to each green and purple target clip.

- **Copy Grades & Exit:** Once you've finished making all the grade matches you can, click this button to copy the matched source grades to each green and purple target clip, and close the ColorTrace window.

Here's how to use these controls to sort out which source clips to copy from for each blue and red target clip in the Target timeline.

To manually choose which source grades should be copied to which target clips:

1   Click any blue clip thumbnail in the Target timeline.
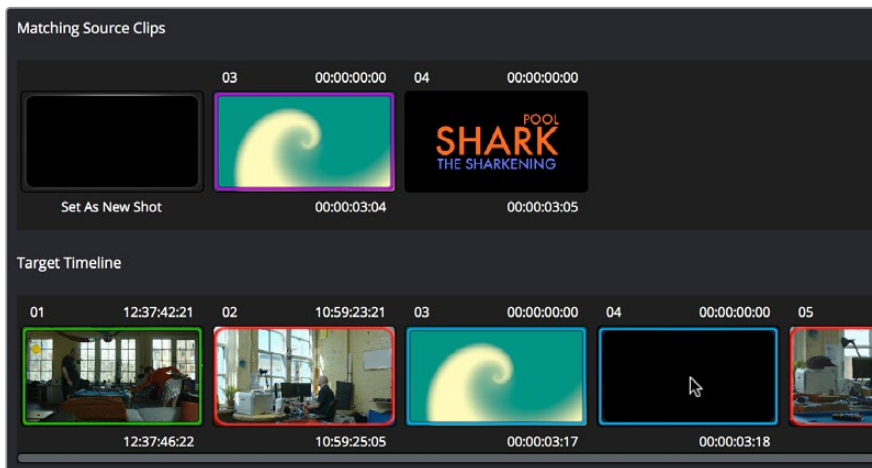
Revealing a number of different possible correspondences in the Matching Source Clips timeline

A collection of clips with overlapping timecode and reel names appears. If you want to ignore the reel names because you believe they might be in error, turn on the Ignore Reel Names checkbox.

2   If a comparison of the Source and Target thumbnails doesn't make the choice obvious, then click any of the clips in the Matching Source Clips timeline to view its metadata for comparison in the source/target columns below.

Source and Target clip metadata for comparison

3 Once you've decided on a clip correspondence, double-click the Matching Source Clip thumbnail you want to copy from. If no clip in the Matching Source Clip pane is a good match, double-click the "Set As New Shot" box.

The Source and Target thumbnails both turn purple, to show that you've created a correspondence.
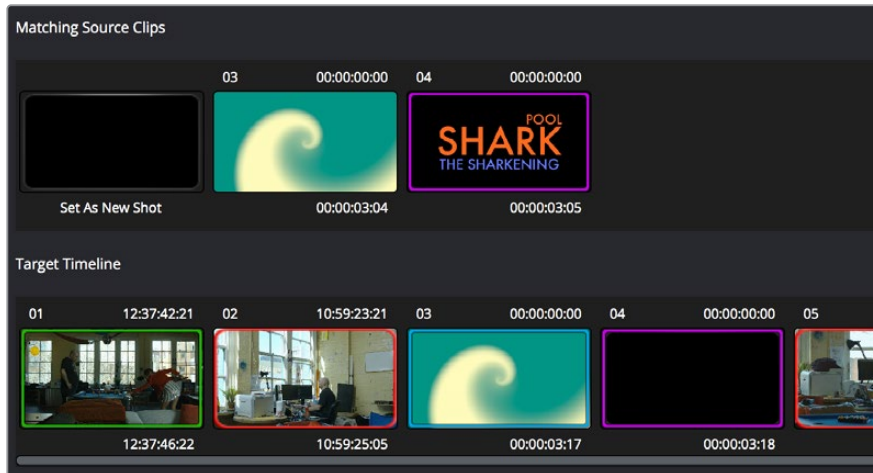
The matching Source and Target clips now both marked with purple outline

Continue working your way through every thumbnail with Blue and Red Xs until you've found matches for every clip in the Timeline for which it's possible.

4 When you're finished, click Copy Grades & Exit.

Using ColorTrace in Manual Mode

Manual mode is ideal for situations where you want to copy grades between programs with clips that have no timecode or reel name correspondence at all. The Manual ColorTrace interface is designed to let you move through two different timelines, either a clip at a time, or in matching multiples of clips, copying grades from the Source timeline to the Target timeline.

For example, if you're trying to copy grades from a timeline that was conformed from individual media files, to another timeline that was conformed from a flattened master media file, you can use the ColorTrace Manual mode to accomplish this.

The manual interface consists of two sets of controls that correspond to the Source timeline (labeled "Timeline to copy from"), and the Target timeline (labeled "Timeline to paste to"). The general idea is that you move through both sets of timelines one clip at a time, or in matching multiples of clips at a time, and copy grades from the "Copy from" timeline to the "Paste to" timeline.

ColorTrace Manual window

Manual mode has the following controls:

- **Source timeline:** Shows all clips in the Source timeline you selected; the clips you're copying grades from. Click any one clip thumbnail to select it, or click a thumbnail, and then Shift-click another thumbnail to select a contiguous range of clips. You cannot select a noncontiguous range of clips.

- **Copy Range controls:** Two fields show the range of clips in the current selection that you'll be copying from, referred to by their numeric position in the Source timeline. You can change the range numerically by either entering new numbers in the fields, or by using the up/down arrow buttons to alter the value by one. The First button automatically adds all clips from the first one in the Timeline into the current selection. The Last button automatically adds every clip going to the last one in the Timeline to the current selection.

- **Target timeline:** Shows all clips in the Target timeline you selected; the clips you're pasting grades to. Selecting clips works identically as with the Source timeline.

- **Paste Range controls:** Two fields show the range of clips in the current selection that you'll be pasting to, referred to by their numeric position in the Source timeline. All controls work identically to the Copy Range controls.

- **Attributes and options checkboxes:** Turn off the checkboxes of any clip characteristics that you don't want to copy as part of the ColorTrace operation. A more complete description of these options appears in the section on the Automatic ColorTrace mode.

- **Paste button:** Once you've selected one or more source clips and a matching number of target clips, clicking Paste copies the grades, PTZR settings, and marks (depending on the corresponding checkboxes).

- **Undo Last:** Lets you undo the most recent paste action.

- **Undo All:** Lets you undo all paste actions in Manual mode.

- **Done:** Finishes the operation and closes the ColorTrace window.

If you're cherry picking individual grades from one timeline to paste into shots in another, you can copy grades one at a time.

**To copy one source grade to one target clip:**

> Click a thumbnail in the Source timeline (on top) to copy from, then click a thumbnail in the Target timeline (on the bottom), and click Paste.

You can also simultaneously copy the grades of entire scenes of clips from one timeline to another. For example, if you're copying grades from an originally graded timeline to a re-edited version of the same program, you can copy every grade from a 10-clip scene in the Source timeline to the same 10 clips in the Target timeline which have been pushed back later in the Timeline.

To copy a group of source grades to a group of target clips:

1 Choose a continuous range of source clips by doing one of the following:

   − Click the first clip in the range, and then Shift-click the last clip in the range.

   − Enter the clip number of the first clip in the left "Copy Range" field, and then enter the clip number of the last clip in the right field.

   − Click a clip, and then click First to select every clip from that one to the first clip in the Timeline.

   − Click a clip, and then click Last to select every clip from that one to the last clip in the Timeline.

2 Choose a continuous range of Target clips by using the same procedures as in the previous step, but using the "Paste Range" controls.

> **IMPORTANT** You must select the same number of target clips as you did source clips for the Paste button to become enabled.
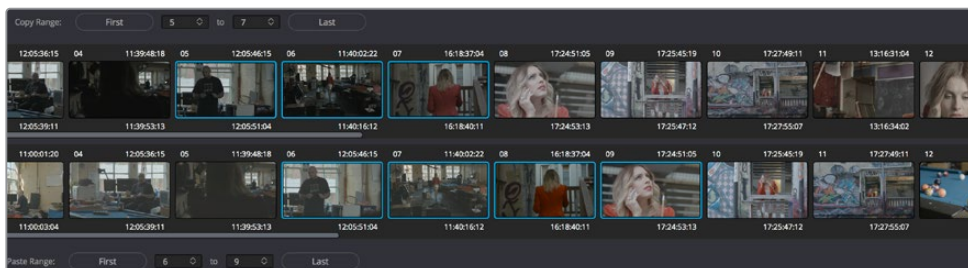
Group copy and paste of grades

3 When you've made your selections, click Paste.

The grade settings from the source clips are pasted to the destination clips, in order. In other words, if you copy from clips 5 through 9 to clips 11 through 15, then grade 5 is copied to shot 11, grade 6 is copied to shot 12, grade 7 is copied to shot 13, and so on.

Importing CDL Data Using ColorTrace

The ColorTrace CDL command lets you import ASC CDL file formats from other applications into DaVinci Resolve. DaVinci Resolve also has the ability to read DRX filenames from CDL files, allowing a CDL to load exported DaVinci Resolve grades.

There are three supported file formats:

- **CMX EDL:** An EDL with comments referring to CCC/CDL XML files, or even Slope, Offset, and Power (SOP) data within the comment area.
- **CCC and CDL XML:** A file format that contains various color correction looks, and even references.

To import CDL data into DaVinci Resolve:

1 If you're importing CCC/CDL XML correction looks:

   – Open the Gallery page, right-click anywhere within the Stills tab, and choose Import from the contextual menu.

   – When the Import Stills dialog appears, open the CDL/CCC files. When these are finished importing into the Gallery, an ASC logo will appear along with them.

2 Open the Edit page and select the Timeline you want to use ColorTrace with in the Timeline list.

3 Right-click anywhere within the Timeline, and choose ColorTrace from CDL.

4 Select an EDL using the Select EDL dialog, and click Open.

5 Select its corresponding CDL and CCC files using the Select CDL Files dialog. If there are no CDL or CCC files (which is the case if there are inline SOP comments within the EDL), you should click Cancel.

6 Using the ColorTrace With CDL window, copy the source grades from the CMX EDL/ CCC & CDL XML files to the Target timeline.

   At this point, the ColorTrace window works identically as previously described.

For formatting reference, here are some examples of CMX, CCC, and CDL files.

Example CMX EDL File

```
TITLE: Final EDL FCM: NON-DROP FRAME 010 001 V C 01:19:28:16 01:19:28:16
01:00:41:18 01:00:42:18 *ASC_CC_XML test_cc.102 011 001 V C 00:00:00:00
01:19:28:16 01:00:42:18 01:00:43:18 *ASC_SOP (0.9 1.2 0.5)(0.4 -0.5 0.6)(1.0
0.8 1.5)
```

Example CCC File

```
<ColorCorrectionCollection xmlns:"urn:ASC:CDL:v0.5" >
<InputDescription> test corrections for ref_input_image.1920
</InputDescription> <ViewingDescription>
for mathematical analysis only </ViewingDescription>
<ColorCorrection id="test_cc.100"> <SOPNode>
<Description> for ref_output_image.0100 </Description> <Slope> 1.0 1.0
1.0 </Slope> <Offset> 0.0 0.0 0.0 </Offset> <Power> 1.0 1.0 1.0 </Power>
</SOPNode> </ColorCorrection>
<ColorCorrection id="test_cc.101"> <SOPNode>
<Description> for ref_output_image.0101 </Description> <Slope> 1.0 1.5
0.6 </Slope> <Offset> 0.0 -0.1 0.01 </Offset> <Power> 1.0 1.5 0.5 </
Power>
</SOPNode> </ColorCorrection>
</ColorCorrectionCollection>
```

Example CDL File

```
<ColorDecisionList xmlns=<94>urn:ASC:CDL:v0.5<94> >
<InputDescription> GeneralProducts M1 std thru GP M1 LUT4 </
InputDescription> <ViewingDescription> GP P1, DCI P3, Pathe color emul
</ViewingDescription> <ColorDecision>
<MediaRef ref=<94>/some/Project/frame%250900-0954%5B.dpx<94>/>
<ColorCorrection id="cc03340">
<SOPNode> <Description>change +1 red, contrast boost</Description>
<Slope>1.2 1.3 1.4</Slope> <Offset>0.3 0.0 0.0</Offset> <Power>1.0 1.0
1.0</Power>
</SOPNode> </ColorCorrection>
</ColorDecision> </ColorDecisionList>
```

Using CDL Adjustments

Once you've imported a CDL (Color Decision List), then the CDL adjustment for each clip is made available to you via a contextual menu command in the Thumbnail timeline of the Color page.

Calculating CDL Functions

To turn the SOP values into a primary correction, the following math is used by DaVinci Resolve:

```
Output = (Input * Slope + Offset)Power
```

Output refers to the final grade. Input is the value of each pixel within each color channel (on a scale from 0–1). The detent value for Slope is 1. The detent value for Offset is 0. The detent value for Power is 1.

Chapter 130

Using LUTs

Lookup Tables, also known as LUTs, are one of the most ubiquitous means of creating, exchanging, and applying image processing operations there is for purposes of color management, display calibration, look management, and general-purpose processing of image color and contrast. DaVinci Resolve has robust support for LUTs throughout its image processing pipeline.

Contents

What is a LUT?

LUTs are simply files, similar to plug-ins but far more focused and with no user interface, that specify image processing operations. These operations are accomplished in a variety of ways. The traditional approach is to use a 1D table or 3D "cube" of pre-calculated values to perform an image color transform. However, newer LUT formats including CLF and DCTL let you use mathematical scripts to process an image.

Whatever type of LUT you use, these files can be loaded into DaVinci Resolve and applied at different points of the image processing pipeline to apply image processing operations for different purposes. There are several well-known uses of LUTs, but the important thing you should take away is that LUTs are simply color transform operations that can be used for many things, and there's no single use of a LUT that's more or less important than any other.

Here are some frequent uses for LUTs:

- While optionally superseded by Resolve Color Management (RCM), lookup tables (LUTs) have been frequently used to create a starting point adjustment for media acquired with some logarithmic encoding. DPX log film scans, digital media using the ARRI ALEXA's Log-C encoding, Sony's S-Log exposure setting, or RED R3D media that is debayered using the REDFilmLog setting are all examples of media using a logarithmic exposure curve, designed to protect as much detail in the highlights and shadows of a digitally encoded image as possible. While log-encoded media retains a lot of image data, the picture is initially flat and unsuitable for use without grading. The exposure and color must be adjusted to "normalize" the media, making it look closer to the way it's supposed to, in order to start grading. While you can do this manually, it's usually faster to use a LUT that's tailored to your type of media and the exposures you're using. Alternately, you can also use Resolve Color Management to accomplish this.

- LUTs are commonly used in onset workflows where dailies for different scenes are managed with corresponding LUTs. These LUTs were used to monitor the media as it was being recorded to define a baseline reference for how each scene is meant to look, at least so far as field monitoring is concerned. In more advanced workflows, LUTs are used as a baseline look, defined prior to the shoot and used during the shoot, that then defines the creative starting point for different scenes once grading begins after the shoot.

- LUTs are frequently used as a stylistic component of a grade, or "look" that gives users a quick start when desiring some manner of creative adjustment. Over the years, companies and individuals have created an ecosystem of such looks that are disseminated and sold in various LUT formats supported by DaVinci Resolve.

In all of these instances, LUTs are simply image processing adjustments that are applied to affect the color and contrast of a clip, in much the same way as you'd make adjustments using any of the contrast or color controls in the Color page.

Supported LUTs

DaVinci Resolve uses both 1D and 3D LUTs, and supports LUTs in a variety of formats.

- **.cube:** DaVinci Resolve uses both 1D and 3D LUTs in the .cube format. 3D LUTs are exported as 33x33x33 cubes with 32-bit floating point processing. 65x65x65 cubes created outside of DaVinci Resolve are also compatible but may cause issues with performance. DaVinci Resolve can also read and use Shaper LUTs in the .cube format, but these must also be created outside of DaVinci Resolve. The .cube format used by DaVinci Resolve is no relation to the Iridas/Adobe SpeedGrade .cube format.

- **Panasonic VLUT format:** A LUT format associated with Panasonic VariCam cameras.

- **CLF (common LUT format):** CLFs use an XML format that is capable of encompassing a limited number of mathematical transforms in addition to traditional lookup-tables to do image processing. Promoted by the academy as the ideal LUT format for use with ACES, LMTs for ACES are recommended to be in the CLF format due to its increased precision and flexibility.

- **DCTL:** DCTL files are actually color transformation scripts that DaVinci Resolve sees and applies just like any other LUT. Unlike other LUTs, which are 1D or 3D lookup tables of values that approximate image transformations using interpolation, DCTL files are actually comprised of computer code that directly transforms images using combinations of math functions that you devise. Additionally, DCTL files run natively on the GPU of your workstation, so they can be fast. For more information on DCTL, see Chapter 174, "Creating DCTL LUTs."

What's the Difference Between a LUT and a Shaper LUT?

DaVinci Resolve is capable of importing and using LUTs within its 32-bit floating point image processing pipeline. The .cube format can be used as either a simple 33x33x33 3D LUT, or as a shaper LUT, which is actually a method of using two LUTs, a 1D LUT and a 3D LUT together, that addresses signal processing issues that 3D LUTs alone can't handle.

For processor efficiency, 3D LUTs are designed with reasonable lower and upper limits for the data they will handle. It's well known that when a 3D LUT is fed values that are outside of the range that LUT is designed to handle, the out-of-range data will be clipped. Since many LUTs are designed with digital cinema workflows in mind, the practical result is that feeding a video signal with super-white in it to a 3D LUT that's designed for full-range data (0–1) will clip the super-white part of the signal.

Shaper LUTs handle this issue by first using a 1D LUT to process video signals with out-of-range data, fitting the signal into a range that the 3D LUT won't clamp. The output of the 3D LUT includes the reverse transformation, to effectively zero out the 1D LUTs transform, while retaining whatever processing the 3D LUT was meant to apply.

Shaper LUTs are also useful for dealing with extremely large data sets, such as OpenEXR files that can theoretically handle an image data range of −infinity to +infinity. Using a Shaper LUT, you can remap the incoming data to fit more precision in the 0–1 range, leaving less important data outside the range.

LUTs and ACES

The academy that promotes the correct use of ACES strongly recommends that LUTs be processed in the ACES color space. For this reason, two project settings let you choose how this will be done:

- **ACEScc AP1 Timeline Space:** This setting works for either the ACEScc or ACEScct Color Science settings depending on what you've selected in the Color Science pop-up at the top of the Color Management panel in the Project Settings. This setting lets you use LUTs that were created for ACES workflows that are similar to (but not the same as) LUTs you would create and use in a traditional log-encoded workflow. LUTs designed for working with this setting should have a range of −0.358 to 1.468 so that grading operations that clip an image from 0 to 1 won't destroy the look being applied.

  The "ACEScc AP1 Timeline Space" setting is also good for workflows where you want to use conventional LUTs that were designed for Rec. 709 workflows using the ResolveFX "ACES Transform" plug-in, which over a series of three nodes lets you transform the image from ACES to 709, apply a Rec. 709-designed LUT, and then convert the image from 709 back to ACES.

- **ACES AP0 Linear:** This setting requires you to apply an LMT LUT that has been specifically created for ACES image data. Only use this setting if you're using CLFs that are designed for ACES using a range of −65504 to 65504, as specified by SMPTE 2065.

Adding Lookup Tables of Your Own

The menus in the Color Management panel of the Project settings include a series of factory preset LUTs that were installed with DaVinci Resolve, along with any LUTs that have been generated by DaVinci Resolve, or that you've imported into the proper directory for your operating system for your own use.

- **On OS X:** Library/Application Support/Blackmagic Design/DaVinci Resolve/LUT/
- **On Windows:** C:\ProgramData\Blackmagic Design\DaVinci Resolve\Support\LUT
- **On Linux:** /home/resolve/LUT

If you downloaded the non-studio version of DaVinci Resolve from the Apple App Store, LUTs are saved in a different location in order for DaVinci Resolve to remain totally self-contained. In this case, you can click the Open LUT Folder button in the Lookup Tables panel of the Project Settings, to open up a Finder window at the location these LUTs are stored. You can use this window to copy LUTs that you want DaVinci Resolve to have access to, or delete LUTs that you no longer need.

If you add a LUT to one of these directories after DaVinci Resolve has been opened, you can click the Update Lists button to refresh the contents of the pop-up menus.

LUT Controls in the Project Settings

While there's an entire group of LUT controls in the Color Management panel of the Project Settings, those are designed to apply LUTs, in different parts of the image processing pipeline, to the entire Timeline. This is useful when you want to apply a single color and contrast transformation to the entire program at once, but less so if you want to apply different LUTs on a per clip basis. (For more information on using the Lookup Table settings, see Chapter 3, "System and User Preferences.")

Applying a LUT to the Source

Another way of applying a LUT to a clip is to apply it directly to the source clip, which you can do to any clip in the Media Pool, or in the Thumbnail Timeline of the Color page. This can be convenient, but keep in mind that source clip LUTs cannot be copied from one timeline to another using ColorTrace, so using source clip LUTs limits your potential workflows. For most workflows, it's better to apply LUTs directly in the Node Editor so they live in each clip's grade.

To apply a LUT to one or more selected clips in the Media Pool:

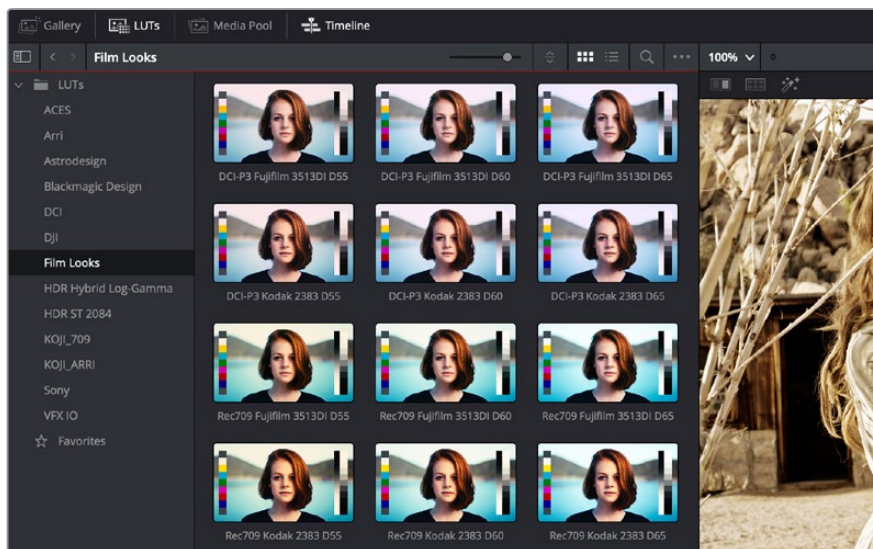> Right-click one of the selected clips, and choose a LUT from the 1D LUT or 3D LUT submenus.

To apply a LUT to one or more selected clips in the Thumbnail Timeline of the Color page:

> Right-click one of the selected thumbnails, and choose a LUT from the 1D LUT or 3D LUT submenus.

> **TIP:** If you're wanting to apply an image transformation to normalize log-encoded source clips, consider using Resolve Color Management (RCM) to do so via clip tagging in the Media Pool instead. It's an easier process and opens up greater flexibility of workflows. For more information, see Chapter 7, "Data Levels, Color Management, and ACES."

Using the Color Page LUT Browser

The LUT Browser on the Color page provides a centralized area for browsing and previewing all of the LUTs installed on your workstation. All LUTs appear in the sidebar, by category.

The LUT Browser

By default, all LUTs appear with a test thumbnail that give a preview of that LUT's effect, but you can also get a live preview of how the current clip looks with that LUT by hover scrubbing with the pointer over a particular LUT's thumbnail (this is described in more detail below).

To open the LUT Browser:

> Click the LUT Browser button in the UI Toolbar at the top of the Color page.

Methods of working with the LUT Browser:

- **To see the LUTs in any category:** Click on a LUT category to select it in the sidebar, and its LUTs will appear in the browser area.

- **To make a LUT a favorite:** Hover the mouse over a LUT and click the star badge that appears at the upper right-hand corner, or right-click any LUT and choose Add to Favorites. That LUT will then appear when you select the Favorites category in the Node Editor contextual menu for nodes.

- **To search or filter for specific LUTs:** Open a bin that has the LUT you're looking for, then click the magnifying glass icon to open the search field, and type text that will identify the LUTs you're looking for.

- **To see LUTs in Column or Thumbnail view:** Click the Column or Thumbnail buttons at the top right of the LUT Browser to choose how to view LUTs in the browser area.

- **To sort LUTs in Thumbnail view:** Click the Thumbnail Sort pop-up menu and choose which criteria you want to sort LUTs by. The options are filename, type, relative path, file path, usage, date modified. There are also options for ascending and descending sort modes.

- **To sort LUTs in Column view:** Click the column header to sort by that column. Click a header repeatedly to toggle between ascending and descending modes.
- **To update the thumbnail of a LUT with an image from a clip:** Choose a clip and frame that you want to use as the new thumbnail for a particular LUT, then right-click that LUT and choose Update Thumbnail With Timeline Frame.
- **To reset the thumbnail of a LUT to use the standard thumbnail:** Right-click a LUT and choose Reset Thumbnail to go back to using the standard test image.
- **To refresh a LUT category with new LUTs that may have been installed:** Select a LUT category, then right-click anywhere within the browser area and choose Refresh to refresh the contents of that category from disk.

Enabling and Disabling the LUT Viewer live preview:

1   Open the LUT Viewer's option menu and choose Live Preview.
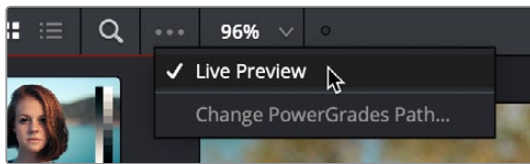
The Live Preview option for the LUT browser lets you hover over a LUT to preview it on the current clip in the Viewer

2   Click a node in the Node Editor you want to preview applying a LUT to. The live preview will display how the current clip will appear with the LUT you select applied to the currently selected node of the current grade, which will affect the result.

3   Move the pointer over the LUT you want to preview.

The Viewer image updates to show how that clip would look with that LUT applied to the currently selected node.

To apply a LUT from the LUT Browser to a specific node, do one of the following:

- Right-click a LUT and choose Apply LUT to current node.
- Drag a LUT from the LUT Browser and drop it onto the node you want to apply a LUT to. If you drag a LUT onto a node that already has a LUT, the previous LUT will be overwritten by the new one.

Applying a LUT Within a Node

DaVinci Resolve lets you apply LUTs within a grade by connecting a LUT to a particular node in the Node Editor. This gives you the greatest amount of control over where the LUT is applied in your image processing pipeline, and it also gives you the opportunity to apply image adjustments prior to the LUT, and after the LUT, as you require.

To apply a LUT within a node, do one of the following:

– Right-click any node, and choose a LUT from the 1D Input LUT, 1D Output LUT, 3D LUT, DCTL, or CLF (common LUT format) submenus of the LUT submenu. The LUT submenus list whichever LUTs have been installed on your workstation. For more information on installing LUTs, see Chapter 3, "System and User Preferences."

– Right-click any node, and choose a LUT from the LUT > Favorites submenu.

– Use the LUT Browser to find a LUT you want to use, and then drag and drop that LUT onto the node you want to apply it to

> **TIP:** If you hold down the Option key while scrolling through the submenu of LUTs in a Corrector node's contextual menu, you'll get a live update in the Viewer of how each LUT affects the image.

To reveal a selected node's LUT:

For any node in the Node Editor with a LUT applied to it, you can right-click that node and choose Reveal Selected LUT to automatically open the LUT viewer and select that LUT.

LUTs Are the Last Operation Within a Node

Each node in the Node Editor is capable of performing multiple operations, and these operations occur in a specific order. LUTs that you add to a node impose their transformation as the last operation within that node, after all other Color page adjustments applied by that node.

Practically, this means that you can use a node's Color and Contrast controls to trim the image data that will be fed into a LUT applied to that same node. For example, if a LUT's contrast adjustment clips the highlights of the image too much, you can use that node's Contrast controls to lower the highlights of the image prior to the LUT, restoring detail to the image.

Favorite LUTs Submenu in Node Editor

When you "star" a LUT as a favorite in the LUT Browser, those favorite LUTs appear in a submenu of the contextual menu that appears when you right-click on a node in the Node Editor. This makes it easy to create a short list of your go-to LUTs for various situations, for rapid application right in the Node Editor.
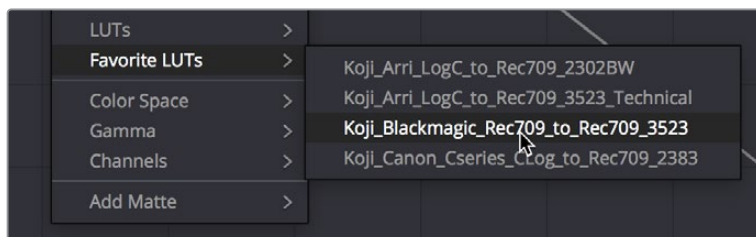
A Favorite LUTs submenu in the Node Editor contextual menu gives you a short list

Exporting LUTs

If you find it necessary to exchange image adjustments with other grading applications, compositing applications, or NLEs, often the easiest inter-application solution is to export a LUT. This can be done whether your grade consists of one node or several nodes, so long as they contain only Primaries palette adjustments, Custom Curves palette adjustments, and compatible ResolveFX plug-ins that include Color Space Transform, ACES Transform, and Gamut Mapping. All nodes with compatible functions will be mathematically combined and translated into a LUT.

Keep in mind that any nodes that use Qualifiers, Windows, incompatible filtering operations (such as sharpening or blurring), or incompatible ResolveFX or OpenFX will be completely ignored, as will all other correction operations made within these nodes.

To export a LUT:

1   Right-click a clip thumbnail in the Timeline of the Color page, and choose one of the following commands corresponding to the type of LUT you want to export:

   – **Generate 3D LUT (33 Point Cube):** A DaVinci-developed LUT format
   – **Generate 3D LUT (65 Point Cube):** A DaVinci-developed LUT format
   – **Generate 3D LUT (Panasonic VLUT):** A LUT format associated with Panasonic VariCam cameras

2   Choose a location for the resulting LUT file in the file dialog. The default file path depends on your operating system; saving it here will make it available to DaVinci Resolve for future use.

   – **On OS X:** Library/Application Support/Blackmagic Design/DaVinci Resolve/LUT/
   – **On Windows:** C:\ProgramData\Blackmagic Design\DaVinci Resolve\Support\LUT
   – **On Linux:** /home/resolve/LUT

   If you like, you can create a new folder in which to save your custom LUTs.

3   Enter a name into the Save As field, and click Save. A LUT file is saved.

Once created, you can use an exported LUT from within DaVinci Resolve, applying it to a clip or node directly, or applying it to the entire project using the settings found in the Color Management panel of the Project Settings. You can also copy the LUT to a memory stick to give to someone for monitoring or previewing in an onset workflow, or to someone using another grading application that can read this LUT format.