



PART 9

Color Page Effects

Chapter 116

DaVinci Resolve Control Panels

The DaVinci Resolve control panels make it easier to make more adjustments in the same amount of time than using a mouse, pen, or trackpad with the on-screen interface. Additionally, using a DaVinci Resolve control panel to control the Color page provides vastly superior ergonomic comfort to clutching a mouse or pen all day, which is important when you're potentially grading a thousand shots per day.

This chapter covers details about the three DaVinci Resolve control panels that are available, and how they work with DaVinci Resolve.

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About The DaVinci Resolve Control Panels

There are three DaVinci Resolve control panel options available and each are designed to meet modern workflow ergonomics and ease of use so colorists can quickly and accurately construct both simple and complex creative grades with minimal fatigue.

This chapter provides details of the each of the panel functions and should be read in conjunction with the previous grading chapters to get the best from your panel.

The DaVinci Resolve Micro Panel is ideal for edit suites that need a professional grading panel for occasional grades or quick adjustments to shots. You will also find it on set where its small size, portability, and low power needs are ideal for those on the move.



DaVinci Resolve Micro Panel

For many facilities the DaVinci Resolve Mini Panel is an elegant, compact yet powerful full featured grading panel. The direct selection palette keys, soft knobs, and menus offer considerably more flexibility than the Micro panel and a better grading experience as a result.



DaVinci Resolve Mini Panel

For the ultimate grading panel to make an impact on your clients and give you the speed for long and complex grading sessions the DaVinci Resolve Advanced control panels features dozens of keys and menu driven soft knobs so grading operations are just a keystroke or two away. With high resolution liquid crystal displays (LCD) and backlit hard keys to accommodate a darkened grading environment. The color and intensity of the keys and the LCD panel brightness are user programmable, so each colorist can set up his/her personal panel configuration.



DaVinci Resolve Advanced control panels

DaVinci Resolve Micro Panel

The Micro control panel features a row of direct control knobs at the top of the panel, three trackballs with rings for color grading, and to the right, transport and commonly used keys to speed up your grading session. Above the trackballs are reset buttons and also mode selection buttons for Log, Offset, and the Viewer selector. When selecting the Viewer mode, the full display will switch to the Cinema Viewer which is ideal for playback and review of clips. The Log and Offset selections are described below.

Trackballs

The three trackballs, from left to right, are in the traditional DaVinci format of Lift, Gamma, and Gain when DaVinci Resolve is set for Primary grading. This is the default mode for the panels but you can quickly toggle to Log mode using the LOG key just above the center trackball. When in Log grading, the trackballs control the Lowlights, Midtones, and Highlights.

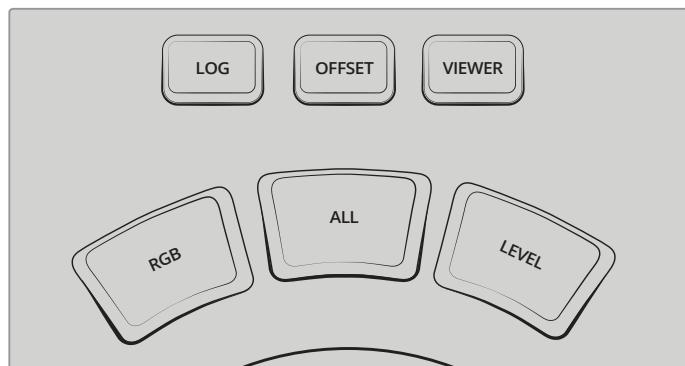
You can also select the OFFSET button whether in PRIMARY or LOG modes. This is a toggle operation and when selected the left hand side ring surrounding the trackball controls the color temperature of the image, the center trackball ring the color tint, and the right hand side trackball controls the image offset balance and master exposure with the ring.

By rotating the trackball the colorist can alter the balance between the red, green, and blue levels of the image. Using the vectorscope as a rough guide, moving the trackball towards the three-thirty clock position adds more blue while reducing the red and green.

The control ring surrounding these trackballs provides a master amplitude control of the associated trackball.

Above the three trackballs are three buttons for resetting the grade:

- **RGB:** This key only resets the RGB balance to default detent.
- **All:** Select All to reset both RGB and level.
- **Level:** Select the Level key to reset the level while maintaining RGB differential.



Log, Offset, Viewer, and Trackball reset buttons

Control Knobs

The top of the panel features 12 high resolution endless turn optical encoder control knobs with detent resets. These are spaced in groups of three for fast operation in dark suites. From left to right the knobs control:

- **Y Lift:** This knob is for adjusting the contrast of the image in the darker areas. The midtone and to a lesser amount the brighter areas of an image will also change.
- **Y Gamma:** Use the gamma knob for primarily mid tone contrast changes with some influence on the darker and brighter sections.
- **Y Gain:** The Y Gain control influences the brighter parts of the image at a greater extent to the mid and darker portions.
- **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.
- **Contrast Pivot:** Changes the center of tonality about which dark and bright parts of the image are stretched or narrowed during a contrast adjustment.
- **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 lowered to a negative value, regions of the image with low amounts of detail are softened while areas of high detail are left alone.
- **Color Boost:** Lets you naturalistically raise the saturation of regions of low saturation, sometimes referred to as a vibrance operation. Can be used also to lower the saturation of regions of low saturation.
- **Shadow:** 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.

- **Highlight:** 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.
- **Saturation:** Increases or decreases overall image saturation. At higher values, colors appear more intense, while at lower values, color intensity diminishes until, at 0, all color is gone, leaving you with a grayscale image.
- **Hue Rotation:** 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.
- **Luminance 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.

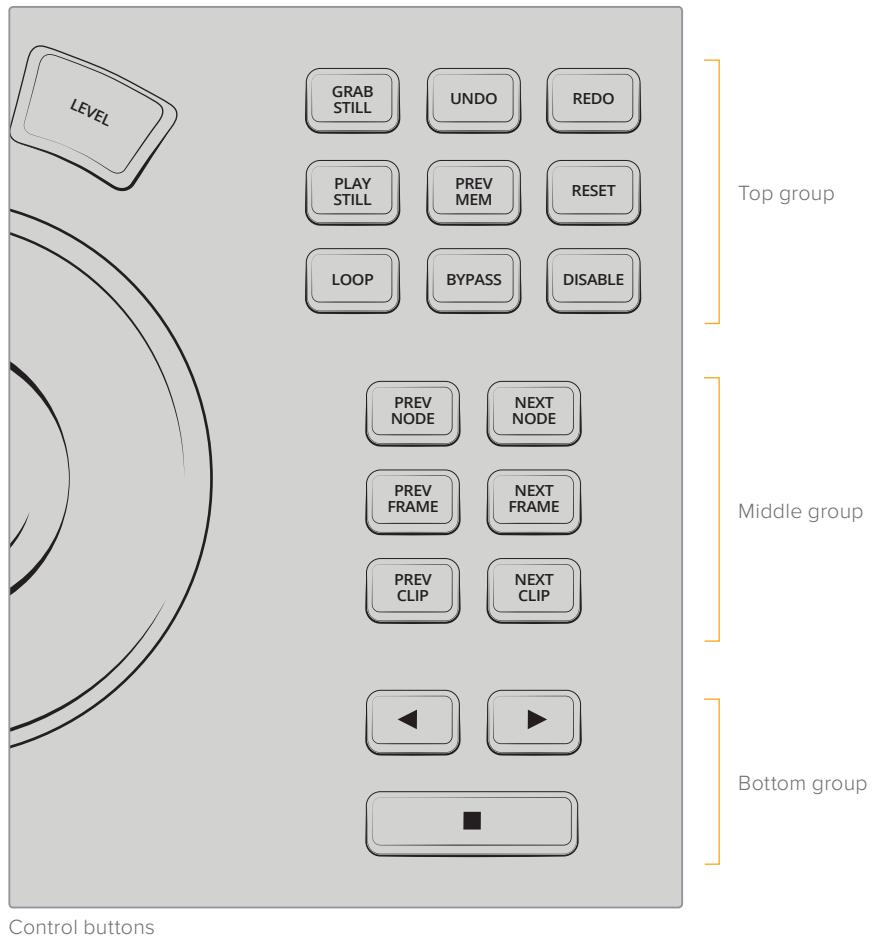
Additional detail can be found in the Color page basics chapter and each of these operations can be seen on the Primary palette of the user interface.

Control Buttons

On the right hand side of the trackballs there are three groups of control buttons.

The top group includes:

- **Grab Still:** At any time when you are grading, selecting the Grab Still key automatically grabs a full resolution frame from the Timeline and attach the node graph metadata for later display and use.
- **Undo:** Undo is one of the favorite keys of colorists. Try any grade, and if you don't like it, simply undo. There are multiple steps of undo available within the page.
- **Redo:** Sometimes you hit undo once too many times. Redo will put back into effect the last item you undid. As with undo, there are multiple levels of redo.
- **Play Still:** Using Play Still, DaVinci Resolve will automatically display a wipe on the Viewer between the current scene and the current still. You can use your mouse on the viewer to move the wipe position. Selecting Play Still a second time will toggle this mode off.
- **Prev Mem:** Each clip, by default, has a memory of its grade, sizing, and so on, which is saved in reference to the source timecode. If you are grading a clip and move from it to another clip, the grade is saved automatically in a memory for that clip. If you come back to the clip and make a change to the grade, then decide you don't like the change, select Prev Mem to return to the previous grade status you found when selecting the clip.
- **Reset:** This key deletes all nodes in the clip except for the first node and resets the grades to default and clears the keyframes.
- **Loop:** You may wish to repeat a review of a grade of a clip, or a selection of clips on the Timeline; this Loop toggle key selects or deselects the Loop operation.
- **Bypass:** This toggle selects the node graph bypass mode.
- **Disable:** This toggle enables or disables the current node.



Control buttons

The middle group of buttons include:

- **Prev Node:** Within the Node Editor on the Color page you are likely to have a number of nodes. These are numbered based on the order that you added them. DaVinci Resolve node graphs are completely user configurable, so you can add nodes anywhere and in any order you like. Thus, the Previous Node key selects the node one lower in numerical order.
- **Next Node:** Similar to the Previous Node key, this selects the node adjacent to the current node, in this case the next higher numerical position.
- **Prev Frame:** To step the viewer one frame in reverse along the Timeline. Press and hold the Prev Frame button to go to the first frame of the clip.
- **Next Frame:** A single frame step forward for each key press. Press and hold the Next Frame button to go to the last frame of the clip.
- **Prev Clip:** Selects the first frame of the previous clip.
- **Next Clip:** Selects the first frame of the next clip.

The bottom group includes the Timeline Transport buttons for reverse play, stop, and play.

- **Left Arrow:** Select this key to play the clip/Timeline in reverse. Press the left arrow key multiple times to play in reverse at a faster speed.
- **Stop:** You guessed it. This stops the playback.
- **Right Arrow:** The forward key plays the clip/timeline forward. Press the right arrow key multiple times to play forward at a faster speed.

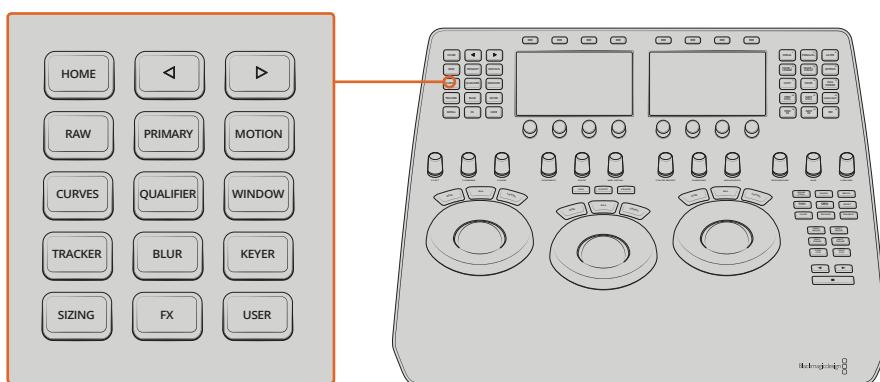
DaVinci Resolve Mini Panel

The Mini control panel has an identical feature set and controls as the Micro panel for the lower trackball deck. In addition the panel has an upper sloped desk with dual high resolution LCD displays with four soft knobs and keys that are menu driven. There are also two banks of control buttons, on the left hand side for palette selection and on the right hand side for commonly used operations.

Please refer to the Micro panel details above for the lower deck features.

Palette Selection Buttons

On the left hand side of the top deck you will find 15 palette selection buttons. To quickly select the main palette toolsets in DaVinci Resolve simply select the appropriate button and the menus on the LCD screens will update to the correct display.



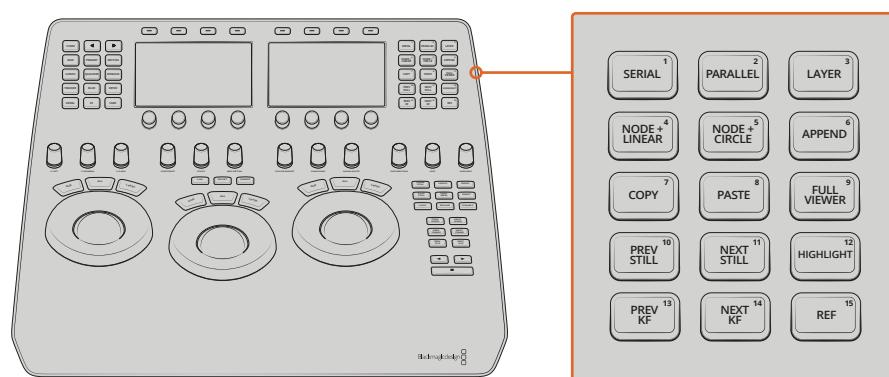
Palette selection buttons

- **Home:** This key is used for the initial setup of the panel and also selects the top-most menu. Additional palettes in DaVinci Resolve without their own direct access button will be available here in future releases.
- **Left Arrow:** A number of menus have multiple pages as indicated by the small dots in the center of the LCD displays. The left arrow moves the menu display left.
- **Right Arrow:** The right arrow moves the menu display right.
- **Raw:** This palette contains groups of parameters that correspond to every camera raw media format that's supported by DaVinci Resolve.
- **Primary:** The first grade for every clip will be likely be a primary. This is where you balance the clip and correct for offsets in the black and white balance. Selecting Primary switches DaVinci Resolve from other grading modes and automatically selects the Primary menus for the LCD displays.
- **Motion:** The Motion Effects palette (only available in the Studio version) contains two sets of controls for applying optical-flow-calculated effects to clips in your program. These include enhanced Spatial and Temporal noise reduction, and motion-estimated artificial motion blur.
- **Curves:** The Curves palette 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).

- **Qualifier:** When you select and isolate a particular color, and change that color, you are making a secondary correction. The qualifier key updates the menus to provide all the Secondary controls, including the 3D, HSL, RGB, or Luma key, with which to isolate the correction you need.
- **Window:** 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.
- **Tracker:** 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, while in FX mode a point tracker can be used to animate ResolveFX or OFX plug-ins with positioning controls
- **Blur:** With the Blur palette controls you can apply an exceptionally high-quality Gaussian blur, or another equally high-quality sharpening operation to your image.
- **Keyer:** Each color correction 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. These key levels are controlled in the Keyer palette.
- **Sizing:** DaVinci Resolve has a powerful toolset for making geometric transforms, using advanced algorithms for optical-quality sizing operations and they are found in this palette.
- **Fx:** Control of the Resolve FX plug-ins from this palette will be available here in future releases.
- **User:** User configured menus will be available here in future releases.

Quick Selection Buttons

On the right hand side of the top deck you will find 15 quick selection buttons. These are for very commonly used selections that a colorist might use many times for each clip.



Quick selection buttons

- **Serial:** The most common node to use on the node graph is a Serial node. A Serial node is a full-featured color correction processor offering primaries, secondaries, windows, tracking, image stabilization, sharpening and blur, matte blur, and so on. Serial nodes are added one after the other in a cascade mode, similar to adding one layer of correction on top of the last. All grades in a preceding node(s) will impact the source image and therefore the grades in following nodes.

- **Parallel:** Unlike adding a Serial node, adding a Parallel node first actually adds two nodes. One behaves like a Serial node with full color correction capabilities. The second is a Parallel Mixer node. This mixer accepts the image from the original Serial node and from the new Serial node and the output is a mix of these two. If the current node is one of the Serial nodes immediately preceding the Parallel Mixer node and you select Add Parallel again, another input to the mixer will be created as will another preceding Serial node. In each case, the input to these Serial nodes will be common, effectively making them in parallel to each other. The key advantage is that the source image is available to many nodes, whereas in a straight Serial node graph, each time you restrict a color in a node the following nodes have little ability or limited range to use that color.
- **Layer:** The Layer node is similar to the Parallel node in that it accepts the image inputs from more than one node. The key difference to a Parallel node is that the mixing of the inputs in a Layer node is prioritized towards the latest additions to the input list. For example, select Add Layer and DaVinci Resolve will add a node in parallel to the current node and link the output of the current and the newly made Parallel node to the two inputs of the Layer Mixer node. The previous current node will have the lowest priority in the mix, and the newly made Parallel node the highest priority. Add one more Layer node, a third input node will be created with a higher mix priority than the first two nodes.
- **Node + Linear:** Adds a Serial node after the current node on the node graph and simultaneously adds a Linear Power Window, thus reducing the number of keystrokes.
- **Node + Circle:** Adds a node after the current node on the node graph and simultaneously adds a Circular Power Window.
- **Append:** Often when navigating around the Node Editor and making correction trims, the colorist decides he/she needs an additional node for more correction. Using the Append Node key will always add a Serial node to the very end of the node graph, regardless of which node in the graph is the current node.
- **Copy:** Used to copy a selected nodes grade to another node.
- **Paste:** Use this key to complete the copy/paste of node grade.
- **Full Viewer:** The Full Viewer display shows an enlarged Viewer and this includes transport controls at the bottom, timecodes and the selections for Reference Still modes, spilt screens, and Highlight modes.
- **Prev Still:** If you have a still selected, the Previous Still key selects the one preceding.
- **Next Still:** The next still is selected if this key is used.
- **Highlight:** When in the Qualifier menus making secondary qualifiers, it's common to select the Highlight key to show a high contrast separation of the qualified color and all other parts of the image. Toggle this key to turn off.
- **Prev KF:** This key steps backward one keyframe on the Clip/Track Timeline display.
- **Next KF:** For keyframe steps forward on the Clip/Track Timeline display.
- **Ref:** This toggle key changes the reference wipe mode between Gallery, Timeline, and Offline sources.

DaVinci Resolve Advanced Control Panel

There are three panels in the Advanced control panel set. The center Trackball panel is where the majority of controls and feedback for the colorist are found and it includes a slide-out keyboard.

On either side of the Trackball panel are two interchangeable panels, the position of which is determined by operator preference. The T-bar panel, shown above on the left, has a T-bar Mix/Wipe control and a number of menu and function keys. The Transport panel, shown above on the right, has the Timeline Transport controls and a Jog/Shuttle control as well as a numerical keypad and associated function keys.

All panels have soft keys and variable control knobs within the LCD panel, which provide an accurate visual reference to the control without the risk of parallax errors.

A key feature of the panel design is real-time feedback, provided to the colorist via the full color LCD panels where you can see, at a glance, the relative settings of the controls and a highlight of the last control touched. For example, if a control is out of its default reset, the panels show this with a selectable color highlight.

Menus, Soft Keys, and Soft Knob Controls

The soft menu structure is designed to offer simultaneous control over multiple functions and a fast, logical, and efficient way to move between the menus. These soft menus, the soft keys, and the operation of these in conjunction with the variable knobs are covered in the preceding chapters of this manual as their state changes depending on the operation being performed.

You will find the LCD on each of the panels has a two-line title description of the menu's main function and there are two lines of text above each pot or switch describing the control. The T-bar and Transport panels also have a "More" key to the bottom right of the LCD which will select a second layer of menus.

The T-bar and Transport panels have quite independent controls compared to the Trackball panel. For example, the T-bar panel's default menu is for Windows adjustment while the default menu for the Transport panel is Sizing. This allows users to control windows or sizing at any time, regardless of the Trackball panel mode and eliminates the need to change the work surface to adjust window position or input sizing.

While the menus change with the UI, the hard keys, trackballs, T-bar, and shuttle control remain relatively constant, so the majority of this chapter describes groups and individual key functions. At the end of this chapter are details on copying forward, scrolling, and rippling changes using the Advanced control panel.

Shift Key Convention

Before describing the hard key operation, it is important to understand two keys on the left and right panels. These keys, Shift Up and Shift Down, provide access to potentially two more functions on each of the next key selected.

For example, on the T-bar panel, next to the Shift Up key is the Base Mem key. The term "Base Mem" is a legacy DaVinci colorist description to revert to the default memory, so there is no grade or sizing on that node. (There is an exception discussed later in this chapter.)

If you select Shift Up and then Base Mem, the All operation is to Base Mem All or reset the current color correction of every node in the node graph for the current clip, leaving the nodes in place. To “Reset” the selected node graph or “Reset Grades and Nodes,” first select Shift Down, then Base Mem.

To permit a fast and single-handed operation, this function does not require you to hold the Shift Up or Shift Down key while selecting the second key; just select them sequentially, first the Shift key, then the function.

Trackball Panel

The center panel has the traditional four trackballs, each with a surrounding control ring and no end stop in either direction. Three variable knob controls are on each side of the panel, three keys above the trackballs, three below the leftmost and rightmost trackballs. On the LCD panel, there are three LCD displays, each with eight knob controls and four keys. The LCD screens are menu driven and thus the knobs, soft keys, and the display itself depends on the application’s current operation. The center panel also offers a slide-out keyboard for naming files, stills, and nodes, as well as for a number of other operations.



The Trackball panel includes a slide-out keyboard

The three trackballs, from left to right, are in the traditional DaVinci format of Lift, Gamma, and Gain when DaVinci Resolve is set for Primary grading; when in Log grading they are Lowlights, Midtones, and Highlights.

By rotating the trackball the colorist can alter the balance between the red, green, and blue levels of the image. Using the vectorscope as a rough guide, moving the trackball towards the three-thirty clock position adds more blue while reducing the red and green.

The control ring surrounding these trackballs provides a master amplitude control of the associated trackball.

Above the three leftmost trackballs you will see three buttons for resetting the grade:

- **RGB:** This key only resets the RGB balance to default detent.
- **All:** Select All to reset both RGB and level.
- **Level:** Select the Level key to reset the level while maintaining RGB differential.

The rightmost (fourth) trackball has a number of modes. It operates similar to a mouse for moving the onscreen cursors, Color curve control point position, and Power Windows position, and can also act as a primary grade Offset control.

Under the leftmost and rightmost trackballs there are three unmarked buttons.

On the left hand side of the panel, the right-most of the three unlabelled buttons below the trackball toggles the right hand side (fourth) trackball in and out of offset adjust mode.

The keys under the right-hand side trackball provide left, center, and right mouse buttons.

Above the rightmost trackball, the three keys have two modes.

When used in conjunction with the Shift Down button, the three buttons above the trackball function as resets, as per the buttons above the other trackballs.

- **Shift Down Adjust Window:** Only resets the RGB balance to default detent.
- **Shift Down Modes:** To reset both RGB and level.
- **Shift Down Cursor:** To reset the level while maintaining RGB differential.

In their normal operation they select:

- **Adjust Window:** Selection turns on the Viewer Shape cursors for the current node and allows the trackball to position the current window.
- **Modes:** This key allows access to a number of menus and acts as an on/off toggle.
- **Display (Shift Up Cursor):** This shift function changes the cursor views on the main monitor. The user can select the cursor display, including: Windows, Off, On the UI but not the main SDI monitor, or displayed on both.
- **Cursor:** The Cursor is used for the color picker when in Curves and Vector/Secondary modes. This key also controls the Window display.

On the left side of the panel are three luminance knobs. From top to bottom they are Luminance Gain, Gamma, and Lift.

On the right side there are three more controls, from top to bottom: Saturation, Hue (has the effect of hue rotation), and Luminance Mix.

T-bar Panel

The T-bar panel, typically located on the left for a right-handed colorist, has an LCD display with four variable controls and nine soft keys. The lower section of the panel houses the T-bar and six groups of hard keys. Each group and their keys are described below.

Mode Control Group

The Mode Control group provides navigation to a number of the GUI pages and a few commonly used functions.

- **Config:** This key opens the Project Setting window where you will set up DaVinci Resolve for each project. Select again to close the window without saving.
- **Browse:** Select Browse to call the Media page where you can review files on attached storage and review the Media Pool.
- **VSR (Shift Down Browse):** This selection is reserved for future use.
- **Conform:** Selects the Lightbox display on the Color page.
- **Shift Up Conform:** Toggles the display of the Lightbox on the SDI output.
- **Deck (Shift Up Revival):** The Deck key selects the Capture mode for importing a batch list from an EDL.
- **Revival:** This key opens the Revival Dirt and Dust-busting window.

- **Scene (Shift Down Revival):** To select the Scene Cut Detection window, select the Shift Down key followed by the Revival key.
- **Current ~ Viewer:** This key toggles between the Color page and the Enhanced Viewer page.
- **Object Track Mode:** This key selects the Tracking menus.
- **Clip/Track/Unmix:** This is a toggle key between the Clip/Timeline modes of the node graph and the Unmix mode.
- **User (Shift Up Cache Mode):** This marks a clip for render cache of the clip output.
- **Cache:** This key is a toggle function to turn the render cache on or off.
- **Editor:** Selects the Edit page where you can edit the Timeline, import AAF, EDL or XMLs and apply speed changes, Composite and Dissolve/Wipe effects, and so on.
- **Proxy On/Off:** This key toggles the proxy mode on and off.
- **Auto Color:** This is a popular key. Using this key, DaVinci Resolve will automatically make a basic primary color correction to balance the blacks and whites of your image.
- **Page Up (Shift Up Gallery):** In larger projects you may have a number of gallery albums holding stills. This key changes the Gallery page to the next higher album on the list.
- **Gallery:** Used to select the Gallery UI page where you can manage, import, and export your stills.
- **Page Down (Shift Down Gallery):** The inverse of the Shift Up Gallery function, this selects the Gallery album one lower than the current.
- **A/C Mode:** This toggle key displays the clips in the Timeline in the order of the EDL (the record order, often referred to as C Mode), or the ascending order of the source clip timecode, called A Mode.
- **Handles Mode:** This selection exposes the handles of the selected clip to allow tracking and grading outside the I/O selections of the current edit.

Timeline Management Group

When grading clips, colorists often try different looks. This group of keys offers a quick way to navigate through these versions and to split and join clips on the Timeline.

- **Split (Shift Up Undo):** This key splits the clip at the position of the cursor on the Timeline.
- **Undo:** Undo is one of the favorite keys of colorists. Try any grade, and if you don't like it, simply undo. There are multiple steps of undo available within the page.
- **Join (Shift Up Redo):** The reverse of split. Place the Timeline cursor at the junction of two clips that have sequential timecode and select Join to make just one clip.
- **Redo:** Sometimes you hit undo once too many times. Redo will put back into effect the last item you undid. As with undo, there are multiple levels of redo.
- **Restore Point:** This selection is reserved for future use.
- **Save:** Remember this key; it's your friend. Save often, and also consider the auto save options found in the User Preferences.
- **Add Version:** When you make a grade on any clip, DaVinci Resolve stores the parameters for that clip. If you want to try different grades, don't lose your good grades, just use the Add Version feature. This key makes a second, third, or higher version of the grade for that clip.

- **Default Version:** If you have multiple versions of grades for a clip, this key is used to select the Default version, regardless of which version is currently displayed.
- **Previous Version:** This selects the grade one version lower in order. For example, if you are on version three, select Previous Version to get to version two. Once the Default version is reached, selecting Previous Version again will select the highest version.
- **Next Version:** Use this key to select the next higher version of the grade. Once the top version is reached, selecting Next Version again will select the lower version.

Keyframing Group

On the bottom right of the Color page is the Keyframe timeline for the current clip.

The Keyframing group of keys is used in association with the Keyframe timeline and controls the selection of marks for the start and end of dynamic transitions of the grade.

- **Start Dynamic:** Use Start Dynamic to select the first keyframe in a transition. The transition may be a grade change, resizing, the addition of a matte, or any number of 100 variables, all of which are associated with the node graph and the Clip or Track timeline.
- **Ripple Value:** If you have a grade or effect, or just an adjustment, and you would like to ripple this effect over another effect or over a large number of other clips, use Ripple Value.
- **Delete:** This key deletes the selected keyframe.
- **Lift Mark:** If you place a keyframe in the wrong spot, put your cursor on the keyframe and use Lift Mark to remove it.
- **Trim:** This key is used with the numerical keypad to trim a keyframe's position.
- **Mark:** Like the Start Dynamic key, Mark is a major key. It places a Static keyframe on the Keyframe timeline.
- **Scene (Shift Down Mark):** This selection opens the Scene Cut Detector.

Memory Access Group

DaVinci Resolve has a number of hot keys, called Mems, where you can store a grade for quick reference. In fact, every time you make a grade for a clip, a memory of the grade is kept. While you could save a still for each clip, having thousands of stills to scroll through would take time, so there are 26 quick and easy memory locations to store a grade, called A–Z Mems.

Every clip has its own metadata for the grade that is stored by DaVinci Resolve as a memory. There are a number of keys available to select or revert to these stored metadata memories, or to clear the metadata to revert to a base grade or no grade state.

- **All (Shift Up Base Mem):** This is used to reset the current color correction of every node in the node graph for the current clip, leaving the nodes in place.
- **Base Mem:** Used to reset the grade of the current node.
- **Reset (Shift Down Base Mem):** Used to reset the grades of the current clip.

Please note that there is an exception to the rule to clear the Base Mem. It is possible, in fact very helpful sometimes, to have a clip preset that is not cleared when you select Base Mem. For example, when a film is over scanned and the frame edges are shown as well as the image. Instead of making an input resize adjustment for every clip to remove the framing, a preset resize can be made and stored, with a label, and this preset is not deleted when using Base Mem.

- **Preview Mem:** To preview one of the Memory grades on any clip, select the clip on the Timeline, select Preview Mem and then the Memory letter. This key is a toggle so if you do not like the grade on the memory for that clip, select Preview Mem again and the grade will revert to the original.
- **Original Mem:** Each clip by default has a memory of its grade and sizing, etc. If you are grading a clip and move from it to another clip, the grade for the first clip is saved automatically in a memory for that clip. If you come back to that clip and make a change to the grade, then decide you don't like the change, select Original Mem to return to the grade status you found originally.
- **Scroll:** When you select Scroll you can navigate up and down the Timeline to find and select a clip and its grade to recall to the current clip.
- **View (Shift Up Current):** The Color page has two display modes. The normal mode includes the viewer, stills, and node graph on the top of the page. Selecting View toggles to the alternate page with a wide Node Graph view and stills but no viewer. Select View again to toggle back to the normal mode.
- **Crnt:** Select Current before selecting a Mem key (A, B, C to Z) and the current grade on the active Timeline clip will be stored in the memory selected.
- **Shift Up:** The Shift Up key permits the operator to select the upper secondary function of keys on the control panel. This operation does not require you to hold the Shift Up key, just select it prior to the second key.
- **Shift Down:** The Shift Down key permits the operator to select the lower secondary function of keys on the control panel. This operation does not require you to hold the Shift Down key, just select it prior to the second key.
- **Macro:** This key displays the Split Screen controls on the T-bar panel LCD display.
- **Memory Keys:** The A, B, C to Z keys, selected directly or with the appropriate Shift Up or Shift Down preselection will recall the grade stored in this memory and will apply it automatically to the clip that is active on the Timeline.

Menu Navigation and Node Control Group

DaVinci Resolve is a nodal-based color enhancement system. Grades are not stored in layers, but in nodes. In operation they can appear to be in layers if you select the Serial nodes, but greater grading flexibility is available by using the Parallel and Layer nodes.

This group also gives you quick access to the main menus to control primaries, secondaries (known here as Vectors), image sizing, and windows. It also offers a quick way to add and manage nodes.



All three panels have LCD panels which display the menus

- **Primary:** The first grade for every clip will be likely be a primary. This is where you balance the clip and correct for offsets in the black and white balance. Selecting Primary switches DaVinci Resolve from other grading modes and automatically selects the Primary and Custom Curve menus for the LCD displays.
- **Vectors:** When you select and isolate a particular color, and change that color, you are making a secondary correction. The Vectors key updates the menus to provide all the Secondary controls, including the hue selection and control.
- **Sizing:** The input and output image resizing engines are controlled using the menus selected by Sizing.
- **Windows:** The Windows key opens the menus for Circular, Linear, Polygon, PowerCurve, and Gradient windows that can be used as a matte or mask for primary and secondary grades.
- **Outside Node:** Selecting the Outside Node key adds another node after the current node and automatically link both image and key paths. If the original node has a grade within the matte shape the new Outside node would control the grade in the inverse (i.e., outside the matte).
- **Add Matte:** Selecting this key displays the Matte node on the node graph for the selected node and the default matte selected.
- **Disable Current:** This key is a toggle key and it disables or enables the grade on the current node.
- **Delete Current:** To delete the current node. Remember to use undo if you had the wrong node selected.
- **Bypass (Shift Up Disable Current):** This toggle selects the bypass mode.
- **Enable/Disable All (Shift Down Disable Current):** This toggle enables or disables all nodes.
- **Node + CPW:** Adding a Serial node is a one button selection, Add Serial, but to also add a window requires a number of extra key selections. The Node + CPW key adds a node after the current node on the node graph and simultaneously adds a Circular Power Window, thus reducing the number of keystrokes.
- **Node + LPW:** As above, adds a Serial node after the current node with a Linear Power Window.
- **Node + PPW:** A Polygon Power Window is also selected when adding a Serial node.
- **Node + PCW:** This key, like the others above, adds a Serial node after the current node, but also sets up the PowerCurve Window to permit the marking of freeform shape points and Bezier spline curves on the viewer to construct a freeform window.
- **Add Serial:** The most common node to use on the node graph is a Serial node. A Serial node is a full-featured color correction processor offering primaries, secondaries, windows, tracking, image stabilization, sharpening and blur, matte blur, and so on. Serial nodes are added one after the other in a cascade mode, similar to adding one layer of correction on top of the last. All grades in a preceding node(s) will impact the source image and therefore the grades in following nodes.
- **Shift Down Add Serial (Add Serial Before):** This adds a serial node before the current node.
- **Add Parallel:** Unlike adding a Serial node, adding a Parallel node first actually adds two nodes. One behaves like a Serial node with full color correction capabilities. The second is a Parallel Mixer node. This mixer accepts the image from the original Serial node and from the new Serial node and the output is a mix of these two. If the current node is one of the Serial nodes immediately preceding the Parallel Mixer node and

you select Add Parallel again, another input to the mixer will be created as will another preceding Serial node. In each case, the input to these Serial nodes will be common, effectively making them in parallel to each other. The key advantage is that the source image is available to many nodes, whereas in a straight Serial node graph, each time you restrict a color in a node the following nodes have little ability or limited range to use that color.

- **Add Layer:** The Layer node is similar to the Parallel node in that it accepts the image inputs from more than one node. The key difference to a Parallel node is that the mixing of the inputs in a Layer node is prioritized towards the latest additions to the input list. For example, select Add Layer and DaVinci Resolve will add a node in parallel to the current node and link the output of the current and the newly made Parallel node to the two inputs of the Layer Mixer node. The previous current node will have the lowest priority in the mix, and the newly made Parallel node the highest priority. Add one more Layer node, and a third input node will be created with a higher mix priority than the first two nodes.
- **Append Node:** Often when navigating around the Node Editor and making correction trims, the colorist decides he/she needs an additional node for more correction. Using the Append Node key will always add a Serial node to the very end of the node graph, regardless of which node in the graph is the current node.

Reference Configuration Group

This area of the T-bar panel includes six keys and the fader T-bar. It is primarily used for control of stills display with and without reference wipes. The fader bar controls the mix or wipe position when the appropriate mode is active.

- **Key:** This key adds and Alpha output on the node graph.
- **Circle:** This key is not yet implemented.
- **Wipe:** The Wipe key selects a wipe for reference comparison with the current image.
- **H/V:** This key toggles the wipe between horizontal and vertical.
- **Box:** This key is not yet implemented.
- **Mix:** Select this key to mix in preference to wipe.
- **Still:** The Still key permits comparison of the current clip with the selected still.
- **Memory:** Use this key to compare the current clip with a memory.
- **Highlight:** When in the Qualifier (Vector) menus making secondary qualifiers, it's common to select the Highlight key to show a high contrast separation of the qualified color and all other parts of the image. Toggle this key to turn off. Highlight is used so often it's also on the T-bar panel and, when in Vectors mode, on the Trackball panel.
- **Mode (ShiftDownHighlight):** Used to toggle the Highlight mode from gray to high contrast.
- **Timeline:** Select the Timeline key when you want to compare the current to the Timeline image.
- **Offline:** Select the Offline key when you want to compare the current to the Offline image.
- **Reference On/Off:** This toggle key will turn the reference view on or off. When on, you can see the current clip in comparison to a reference.

Transport Panel

The Transport panel, typically located on the right for a right-handed colorist, has an LCD display with four variable controls and nine soft keys. The lower section of the panel houses the Jog/Shuttle knob and six groups of hard keys. Each group and their keys are described below.

Reference Configuration Group

Located at the top left-hand side of the Transport panel are the Deck and Still selection keys. These are all related to controlling the tape deck and to grabbing and selecting stills. There is also an Undo and Redo key, a Shift Up and a Save key.

- **Split (Shift Up In):** DaVinci Resolve associates grading information based on source timecode so it's important to have each source clip identified as a different clip from the others. The Split key will split one clip into two on the frame selected. Each can therefore have its own grade. This is a quick, accurate, and easy way to split a long image sequence into multiple clips.
- **In:** When marking an In point you can use the UI, a keyboard shortcut, or this key.
- **Join (Shift Up Out):** Join is the reverse of the Split key. If you have clips with contiguous timecode, place the playhead on the first frame of a clip and select Join to merge the preceding clip.
- **Out:** The Out key is used to select an Out point on the Timeline or deck.
- **Duration:** To define a duration, first select the time using the numerical keypad (the colon separates the hours, minutes, seconds, and frames), and then select Duration.
- **Gang:** This key is not implemented.
- **Undo:** The colorist's friend. DaVinci Resolve has virtually unlimited undo steps available within the page you are working in.
- **Redo:** If you want to redo a step, use redo. Ideal when used with undo to compare two grades quickly.
- **Source (L):** This key is not implemented.
- **Place (Shift Up A (R)):** This key is not implemented.
- **A (R):** This key is not implemented.
- **F:** This key is not implemented.
- **Place (Shift Up B):** This key is not implemented.
- **B:** This key is not implemented.
- **G:** This key is not implemented.
- **Place (Shift Up C):** This key is not implemented.
- **C:** This key is not implemented.
- **H:** This key is not implemented.
- **D:** This key is not implemented.
- **I:** This key is not implemented.
- **E:** This key is not implemented.
- **J:** This key is not implemented.
- **Shift Up:** Use the Shift Up key as a pre-selector for the keys with an upper option. Select the keys sequentially and do not hold the Shift Up key while selecting the second key.

- **Preroll:** The Preroll key is used in conjunction with the numerical keypad to select a preroll time for tape operations.
- **Cue:** Selecting Cue will force the transport to the preroll position.
- **Previous Still:** If you have a still selected, the Previous Still key selects the one preceding.
- **Next Still:** The next still is selected if this key is used.
- **Play Still:** Using Play Still, DaVinci Resolve will automatically display a wipe on the Viewer between the current scene and the current still. You can use the fader T-bar to move the wipe position and in the Reference Wipe menus change the reference image as required by moving or resizing. Selecting Play Still a second time will toggle this mode off.
- **Save:** The most important key on the panel. Besides using the auto-save feature, you can and should consistently save your project with this key. It only takes a few seconds and can save you hours.
- **Grab Still:** At any time when you are grading, selecting the Grab Still key will automatically grab a full resolution frame from the Timeline and attach the node graph metadata for later display and use.

Transport Control Keys Group

Most colorists will use the Transport Control keys every minute of every grade, so they are located for quick and easy access. While not technically within this key group, the Jog/Shuttle knob is directly above these keys.

- **Jog:** Rotate the Jog control to step forward or backward a few frames at a time.
- **Shuttle:** On the outside of the Jog rotary control is the Shuttle knob. This knob has a detent at the null position and is turned clockwise or counter clockwise to shuttle the Transport/Timeline forward or reverse at the rate selected by the rotation of the Shuttle knob.
- **Loop:** You may wish to repeat a review of a grade of a clip, or a selection of clips on the Timeline; this Loop toggle key selects or deselects the Loop operation.
- **Render:** Once you have finished your grade, the Render key selects the Deliver page used for configuring the render parameters for your project and starting the render.
- **Rec:** (Shift Down Render) This key is not yet implemented.
- **Previous Node:** Within the Node Editor on the Color page you are likely to have a number of nodes. These are numbered based on the order that you added them. DaVinci Resolve node graphs are completely user configurable, so you can add nodes anywhere and in any order you like. Thus, the Previous Node key selects the node one lower in numerical order.
- **Next Node:** Similar to the Previous Node key, this selects the node adjacent to the current node, in this case the next higher numerical position.
- **Highlight:** When in the Qualifier palette making secondary qualifiers, it's common to select the Highlight key to show a high contrast separation of the qualified color and all other parts of the image. Toggle this key to turn on or off. Highlight is used so often it's also on the T-bar panel.
- **Mode:** (Shift Down Highlight) Used to toggle the Highlight mode from gray to high contrast.
- **Shift Down:** This is the preselection key for functions indicated on the lower portion of the second keys legend.
- **First Frame:** Selects the first frame of the current clip.

- **Last Frame:** Selects the last frame of the current clip.
- **Step Reverse:** To step the viewer one frame in reverse along the Timeline.
- **Step Reverse Keyframe:** (Shift Down Step Reverse) This key steps backward one keyframe on the Clip/Track Timeline display.
- **Step Forward:** A single frame step forward for each key press.
- **Step Forward Keyframe:** (Shift Down Step Forward) For keyframe steps forward on the Clip/Track Timeline display.
- **Previous Scene:** Selects the first frame of the previous scene.
- **Next Scene:** Selects the first frame of the next scene.
- **Rewind:** Places the Transport, or Timeline, in rewind.
- **Reverse:** Select this key to play the Clip/Timeline in reverse.
- **Stop:** You guessed it. This stops the current transport operation.
- **Forward:** The Forward key will play the Clip/Timeline forward.
- **Fast Forward:** The inverse of the Rewind key; fast forward shuttles along the Timeline/Transport.

Memory Access Keys Group

For fast and direct access to A to Z Memories, or Mems, use this section of the Transport panel. This is an extremely powerful feature. With any clip selected on the Timeline, with a single key press, for example “A,” the grading parameters stored in memory A, including the node structure, sizing, and so on are automatically applied to the current clip.

- **O (Shift Up A):** Selects memory O.
- **A:** Selects memory A.
- **I (Shift Down A):** Selects Memory I.
- **R (Shift Up B):** Selects memory R.
- **B:** Selects memory B.
- **J (Shift Down B):** Selects Memory J (and so forth).
- **All (Shift Up Base Mem):** This function returns all grades for all nodes on the clip to the default grade/settings and clears dynamic keyframes.
- **Base Mem:** The Base Mem key clears the current node of all its grades and keyframes. Again, with the preset exception noted above.
- **Reset (Shift Down Base Mem Crnt):** This key deletes all nodes in the clip except for the first node and resets the grades to default and clears the keyframes.
- **Preview Mem:** To preview one of the memory grades on any clip, select the clip on the Timeline, select Preview Memory and then the memory. This key is a toggle, so if you do not like the grade on the memory for that clip, select Preview Mem again and the clip’s grade reverts to the original.
- **Original Mem:** Each clip, by default, has a memory of its grade, sizing, and so on. which is saved in reference to the source timecode. If you are grading a clip and move from it to another clip, the grade is saved automatically in a memory for that clip. If you come back to the clip and make a change to the grade, then decide you don’t like the change, select Original Mem to return to the previous grade status you found when selecting the clip.
- **Scroll:** The Scroll key selects a soft menu on the Trackball panel so clips or frames can be scrolled via the rotary control in the soft menu.

Numerical Entry Key Group

On the center right-hand side of the Transport panel is the Numerical Entry key group. Here you will find numbers 0 to 9 and associated keys for entering timecode and clip numbers. You will notice the numbers you type are displayed in a scratchpad area at the bottom of the Keyframe palette.

- **Current:** To store a new grade in any memory, first select the Current key and then the memory of your choice.
- **All Color PTZR:** This key is a toggle that selects the parameters that will be copied when updating a grade. Generally, all aspects of the grade are copied, including the pan, tilt, zoom, and rotation sizing transforms, but on occasion you may wish to copy only the grade and not the sizing parameters. In this case, use the All/Color/PTZR to select the mode you need. You can see the Keyframe Timeline toggle between the master or the node selected and the input PTZR parameters.
- **Select Node:** Use this key in conjunction with the numerical keys to select any node on the current node graph. First, select the node number, and then Select Node. The current node changes to the selected node.
- **Backspace:** The Backspace key moves you one item left in the numerical scratch pad display. This permits correction of your numerical entries.
- **0 to 9:** You guessed it. These are the numbers!
- **>, (Comma):** The comma is used just before the frame count if you wish to indicate a drop frame timecode.
- **: (Colon):** When typing in timecode, the convention is to type the hours followed by a colon, then the minutes, a colon, the seconds, a colon, and finally the frames. DaVinci Resolve does not need to have leading numbers entered where they offer no value and the default value is 0, so to type one hour, three minutes, zero seconds, and sixteen frames, you do not need to type 01:03:00:16. Simply type 1:3::16 and then press Enter. This speeds timecode entry.
- **Clear:** Clears the scratchpad number.
- **- (Minus):** Select the Minus key prior to the number to reduce the number.
- **+ (Plus):** Select the Plus key prior to a number to increase the number.
- **Take/Enter:** Select the Take/Enter key to accept or enter any input.

Keyframing Group

The Keyframe keys are on the bottom right-hand side of the Transport panel. The functions are replicated on the T-bar panel. On the bottom right of the Color page is the Keyframe timeline for the current clip in the Timeline. The Keyframe group of keys is used in association with the Keyframe timeline and controls the selection of keyframes for the start and end of dynamic transitions of the grade.

- **Start Dynamic:** This key is used to select the first point in a transition, a Dynamic keyframe. The transition may be a grade change, a sizing or reposition, or the addition of a matte or any number of 100 variables, all of which are associated with the Node Editor and the Clip or Track Keyframe timeline.
- **Ripple Value:** If you have a grade or effect, or just an adjustment and you would like to ripple this effect over another effect or a large number of other clips, use Ripple Value.
- **Delete:** This key deletes the keyframe.
- **Lift Mark:** If you place a keyframe in the wrong spot, put your cursor on the keyframe and use Lift Mark to remove it.
- **Trim:** This key is used with the numerical keypad to trim a keyframe position.

- **Mark:** Like the Start Dynamic key, Mark is a major key. It places a Static keyframe on the Clip timeline.
- **Scene (Shift Down Mark):** This selection is reserved for future use.

Copying Grades Using the Advanced Control Panel

There are a number of methods of copying grades that are exclusive to the Advanced control panel.

Copy Forward Keys

The simplest way of copying grades using the control panel is to use the comma and colon keys on the keypad of the Transport panel to copy grades 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 a grade from one clip back:** Press Comma (,).
- **To copy a grade from two clips back:** Press Colon (:).

Scroll

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 Advanced 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 Resolve Advanced 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 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.
- **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 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 Color panel of 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.

Chapter 117

Using OpenFX and ResolveFX

This chapter covers the use of ResolveFX and OpenFX plug-ins, that allow you to use the built-in filters that come with DaVinci Resolve, as well as third-party filters from a variety of companies, to create complex effects and adjustments that aren't possible using the ordinary palette tools in the Color page.

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ResolveFX

ResolveFX are the built-in plug-ins that come with DaVinci Resolve. These plug-ins span the gamut from blurs and complex color adjustments to stylized image treatments and lighting effects to sharpen and repair operations that are too complex to accomplish using the palette controls of the Color page.



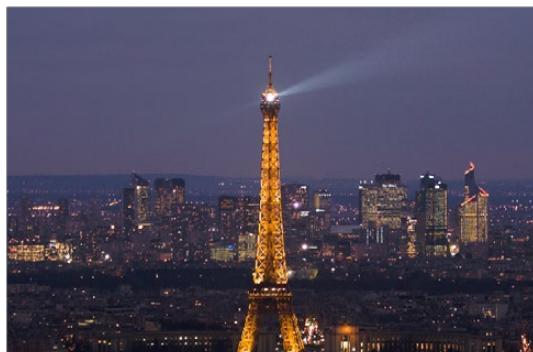
An image before/after using the Abstraction ResolveFX filter

Most ResolveFX plug-ins have been optimized for real-time playback, making it possible to apply complex effects such as Lens Flares, Light Rays, Film Grain, or Warping, and make adjustments while getting immediate, high-quality feedback, and enabling you to play each variation of your effect as you work without the need to wait for rendering or caching to happen first. Of course, if you're working with extremely high-resolution or raw source media, if your workstation is particularly old, or if you're applying many ResolveFX all at once, your performance may slow, necessitating the use of either the Smart Cache or User Cache.

OpenFX

OpenFX (OFX) is an open plug-in standard intended to enable easier development of cross-platform visual effects plug-ins for a variety of applications. Popular plug-in packages include BorisFX Sapphire and Continuum Complete, Red Giant Universe, and NewBlue TotalFX, all of which are ubiquitous tools for feature and broadcast work. The available OpenFX plug-in packages are also growing every year as this format becomes more widely adopted among developers.

With OpenFX support, you can use plug-ins to do many stylized operations that would be difficult or impossible to do using the other tools in DaVinci Resolve. Everything from lens flares, optical blurs and prism effects, lens warp correction, film and video grain and damage effects, dead-pixel corrections, and more can be accomplished with the right plug-in collection.



One of the many Sapphire OFX plug-ins from GenArts

The installation and licensing of OpenFX plug-ins is handled by a vendor's own installer. Once installed, OpenFX plug-ins appear within the Library of the Open FX panel, which can be opened by clicking the FX button at the top right of the Color page or Edit page Interface toolbar.

Where are OFX Installed?

According to the standard governing how OFX work, all OFX plug-ins on a particular workstation are installed into a standardized location to foster plug-in compatibility with multiple applications. These locations are:

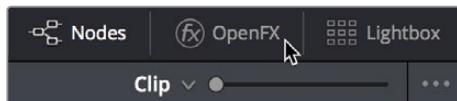
- **On macOS:** /Library/OFX/Plugins
- **On Windows:** C:/Program Files/Common Files/OFX/Plugins
- **On Linux:** /usr/OFX/Plugins

OpenFX Plug-Ins Can Be Processor Intensive

Because they create such a wide variety of effects, some third-party OpenFX plug-ins can be extremely processor intensive, all the more if you add multiple plug-ins to a single grade. If you find your playback performance dropping because of a particularly expensive effects operation, you can use the Smart Cache to automatically cache nodes and clips that have OpenFX plug-ins applied to them. Once fully cached, you can play these clips back in real time, at least until you change that clip's grade again. For more information on caching and on improving performance in DaVinci Resolve overall, see Chapter 6, "Improving Performance, Proxies, and the Render Cache."

Browsing the OpenFX Library

All of these built-in plug-ins appear within categories at the top of the OpenFX Library.

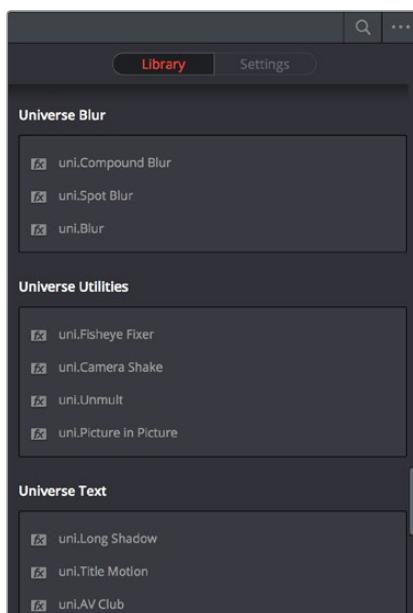


Click the FX button to open the OpenFX Library

When you click the FX button, the Open FX panel opens out of the right side of the Node Editor to show the Library, resizing the Viewer, Gallery, and Node Editor to make room. The OpenFX Library is organized hierarchically. Each vendor's plug-ins appear under a header with the name of that plug-in collection, and possibly organized into categories, separated by headers with Open or Close buttons that appear when you hover the pointer over them, which let you show or hide the contents so that you can make the hierarchy as compact or spread out as you like.

To open and close OpenFX categories, do one of the following:

- Move the pointer over the header you want to open or close, and click the Close or Open button that appears.
- To open or close all headers at once, Option-click the Open or Close button that appears.



The Library in the Open FX panel showing third-party plug-ins from Red Giant

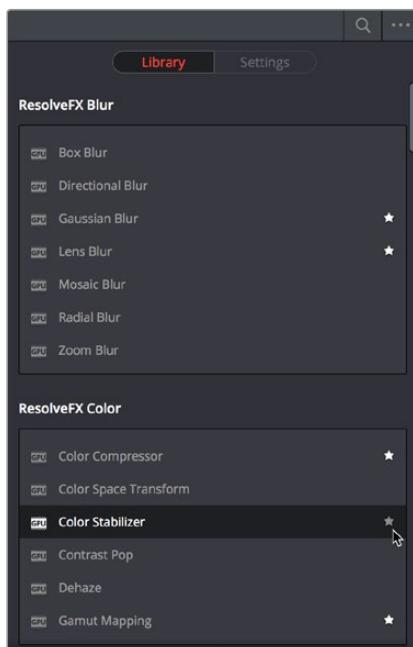
Since many OpenFX plug-in collections are quite large, an optional Search field can be opened at the top of the Library that lets you quickly find plug-ins by name or partial name.

To search for an OpenFX filter by name:

- 1 Click the magnifying glass button at the upper right-hand corner of the OpenFX panel.
- 2 Type your search string into the Search field that appears. A few letters should be enough to isolate only those plug-ins that have that character string within their name.

OpenFX Library Favorites

You can click on the far right of any ResolveFX or OFX filter to flag it with a star as a favorite filter. When you do so, choosing Favorites from the Effects Library option menu filters out all clips that are not favorites, letting you see only effects you most commonly use. To “de-favorite” any effect, click its star to turn it off.



Stars indicate a flagged favorite effect

OFX Random Frame Access

Previous to DaVinci Resolve 12.5, third-party OpenFX plug-ins could only access a limited range of media at a time, which stopped certain types of plug-ins from being able to do the multi-frame temporal analyses of clips they required to function.

DaVinci Resolve Studio 12.5 and later enables third-party OpenFX multi-frame random access, so a wider variety of plug-ins and effects will work in DaVinci Resolve. This feature is not available in the non-studio version of DaVinci Resolve.

Using ResolveFX and OpenFX in the Color Page

This section provides an overview of procedures that describe how you can work with OpenFX plug-ins within the Color page.

Methods of working with OpenFX:

- **To add an OpenFX plug-in to a node:** Drag a plug-in from the OpenFX Library onto a node. If you drag a plug-in onto a node that already has a plug-in, the previous plug-in will be overwritten.
- **To remove an OpenFX plug-in from a node:** Right-click a node showing the FX badge, and choose Remove OFX Plug-in from the contextual menu.

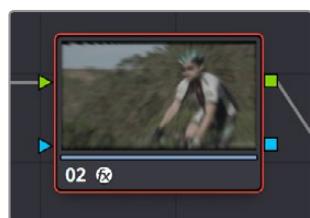
- **To add an OpenFX plug-in as a separate node:** Drag a plug-in from the OpenFX Library onto a connection line in the Node Editor. A new node is created, with a badge at the upper-left-hand corner labeling it as an OFX node.
- **To edit the parameters of an OpenFX plug-in:** Select any node with an FX badge, and open the Open FX Panel to show the Settings list. You can switch to the Library by clicking the Library button.
- **To sample a color parameter within an OpenFX plug-in:** Some OFX plug-ins have a color swatch parameter, which exposes an eyedropper button in the Settings. Clicking the eyedropper turns the pointer into an eyedropper you can use to sample the contents of the Viewer.
- **To use OpenFX onscreen controls in the Viewer:** Select any node with an FX badge, and the onscreen controls, if there are any, should appear in the Viewer. If not, make sure the Viewer mode pop-up is set to FX.

Applying ResolveFX and OpenFX Plug-Ins

Once you've found an OpenFX plug-in you want to use in the Library, there are two ways of applying it within the Node Editor of the Color page. Which method you use depends on how you want to use that plug-in.

Adding a Plug-In to a Corrector Node

If you want to combine an OpenFX plug-in with a grade within a single node, simply drag and drop it onto a new corrector node to apply that plug-in's effect to that node. Nodes with an OpenFX plug-in applied have an FX badge in the bottom left-hand corner.



A node with an OpenFX plug-in applied

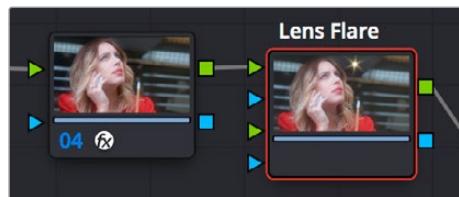
You can only apply one OpenFX plug-in to a node at a time, but by using multiple nodes you can add as many OpenFX plug-ins to your grade as you need.

When added to a corrector node, OpenFX are applied after Motion Blur and Noise Reduction, but before anything else. This means you can use Motion Blur and Noise Reduction to pre-process the image before it's handed off to the OpenFX plug-in. This also means that all other adjustments you make within that node are applied to the OpenFX plug-in's output.

However, the principal advantage of adding plug-ins to corrector nodes is that you can use secondary operations such as a window, a qualifier, or a key to limit that plug-in's effect, much as you would limit any other kind of adjustment you'd make with a corrector node.

Adding a Plug-In as a Stand-Alone OFX Node

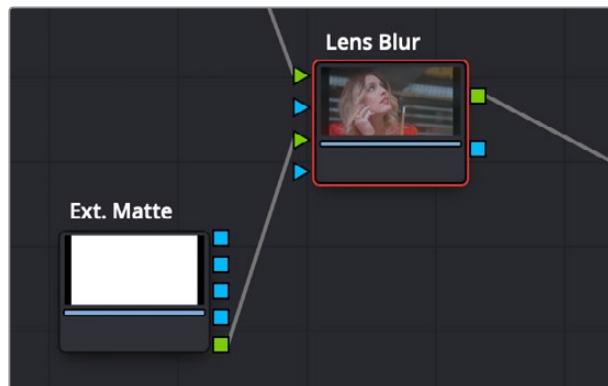
If you want to add an OpenFX plug-in to your grade as a stand-alone effect, you can simply drag any plug-in from the OpenFX Library onto a connection line of your grade, and an OpenFX node will be created.



(Left) A node with an OFX filter applied to it,
(Right) A stand-alone OpenFX node

The advantage of this is that it's fast to apply plug-ins in this way, and this can be an easier way for you to add plug-ins that are more complicated, such as those having multiple inputs for creating compositing effects.

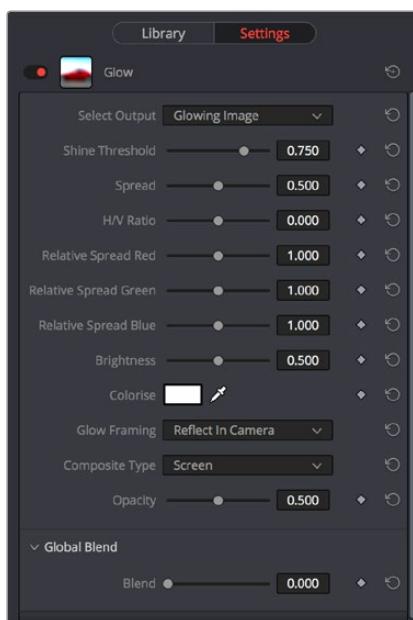
For example, the Lens Blur plug-in lets you connect a black and white image that's been added to the node tree as an external matte to a Lens Blur node's second RGB input to use to create custom bokeh effects when you set the Shape Type pop-up to External Input.



A Lens Blur node set up using a second RGB input
with External Input Shape Type

ResolveFX and OpenFX Settings

When you select a node with a ResolveFX or OpenFX plug-in applied to it, the Open FX panel switches to the Settings, which show you every single parameter associated with that plug-in, ready for customization



The parameters of the VHS plug-in from Red Giant Universe

Adjust any of the standard controls to manipulate that plug-in's effect on the image.

Editing Effects Using the Full Screen Viewer

Because the OpenFX panel can often be too short to present the full controls of more complicated filters, it remains visible when you switch to the Full Screen Viewer mode in the Color page. You can do so by choosing Workspace > Viewer Mode > Full Screen Viewer (Shift-F). This makes it considerably easier to do detailed work within the larger Viewer, while having all of your effects controls available in a taller panel off to the side.



The Full Screen Viewer mode of the Color page lets you keep the Settings panel open as you work

TIP: You can also open and close the Node Editor while in Full Screen Viewer mode, if you need to switch nodes while doing effects work.

ResolveFX and OpenFX Onscreen Controls

In the Edit page, Fusion page, and Color page, ResolveFX and OpenFX display on-screen controls that you can use to visually edit an effect. In the Edit and Color pages, selecting an OpenFX plug-in node or a plug-in in the Inspector that has onscreen controls automatically changes the Viewer's mode to OpenFX Overlay mode, with the available controls ready to use. Different plug-ins expose different custom controls, letting you control the effect or manipulate the image, depending on that plug-in's function.



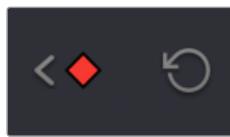
Adjusting the onscreen controls exposed by the GenArts Sapphire Glint Rainbow plug-in

If for whatever reason you switch the Viewer to another onscreen control mode (for example, showing the Window or Image Wipe controls), you can always switch back to the OpenFX controls by choosing the OpenFX Overlay mode from the onscreen control pop-up menu underneath the Viewer.

TIP: 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).

Keyframing ResolveFX and OFX in the Inspector

ResolveFX and OpenFX can be keyframed in the Edit, Fusion, and Color pages. However, they can only be keyframed in the Edit and Color pages using the keyframing controls found in the Inspector (at the time of this writing). Happily, most simple keyframing tasks can be performed using three buttons that appear to the right of any parameter that's capable of being keyframed. It takes two keyframes at minimum to create an animated effect.



The three keyframe controls that appear in the Inspector, from left to right: Previous keyframe, Create/Delete keyframe, Next keyframe

Methods of keyframing parameters in the Inspector:

- **To add a keyframe:** Select a clip, open the Inspector, then move the Timeline playhead to the frame where you want to place a keyframe, and click the Keyframe button next to the parameter of the Inspector you want to animate. Once you've added at least one keyframe to a parameter, all other adjustments you make to parameters in the Inspector, or using the onscreen Transform/Crop controls in the Timeline Viewer, add new keyframes automatically if the playhead is at another frame.
- **To move the playhead to the next or previous keyframe:** Click the small left- or right-hand arrow to either side of a parameter's keyframe control to jump the playhead to the next or previous keyframe.
- **To edit an existing keyframe of a parameter:** Move the playhead to be on top of the keyframe you want to edit, and then change that parameter, either in the Inspector, or using the onscreen controls of the Timeline Viewer.

Methods of changing keyframe interpolation in the Inspector:

- **To change a keyframe to Static:** (Color page only) Static keyframes create abrupt one-frame changes at the keyframe to which they're applied, which is good for creating sudden effects. Move the playhead to a frame with a keyframe using the next/previous keyframe controls, then right-click the orange keyframe button and choose "Change to Static Keyframe." The keyframe control changes to a round button to show that keyframe is now Static.
- **To change a keyframe to Dynamic:** Move the playhead to a frame with a keyframe using the next/previous keyframe controls, then right-click the orange keyframe button and choose "Change to Dynamic Keyframe." The keyframe control changes to a diamond button to show that keyframe is now Dynamic.

Methods of deleting keyframes and disabling keyframed effects:

- **To delete a single keyframe:** Open the Inspector, move the Timeline playhead to a frame with a keyframe, and click the orange Keyframe button in the Inspector to delete it.
- **To delete all keyframes for one parameter:** Click the reset button to the right of a parameter's keyframe control in the Inspector.
- **To delete all keyframes in a group of parameters in the Inspector:** Click the reset button to the right of a parameter group's title bar in the Inspector.
- **To disable or enable a single parameter's keyframed effect:** In the Timeline, click the toggle control at the left of a parameter's keyframe track. Orange means that track's enabled. Gray is disabled.
- **To disable or enable a group of parameters in the Inspector:** Click the toggle control at the left of a parameter group's title bar in the Inspector. Orange means that group is enabled. Gray is disabled.

Motion Tracking ResolveFX and Compatible OFX Plug-Ins

When using ResolveFX in the Color page, ResolveFX that have position parameters, including Dent, Lens Flare, Light Rays (when “From a Location” is selected), Mirrors, Radial Blur, Ripples, Vortex, and Zoom Blur can all be motion tracked to follow the position of a moving subject in the frame using the point-based tracking in the FX mode of the Tracker palette.

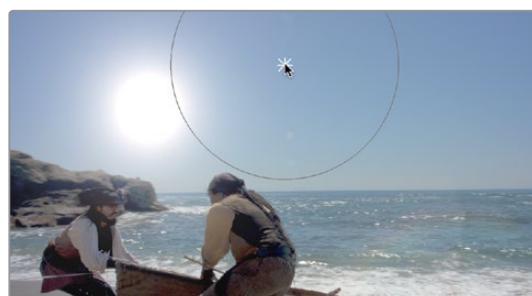
To match move ResolveFX to a feature using the FX tracker:

- 1 Create a new node, and drag the ResolveFX filter you want to apply onto that node to apply the effect. In this example, we’re adding a Lens Flare effect, that has the position parameters necessary to be match moved to follow the motion of the shot, and we’re choosing the MIR-I 2.8/37 preset, which looks like a sun.



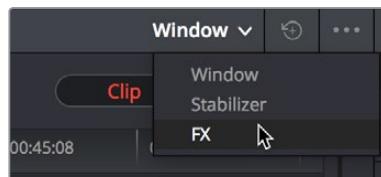
Applying a Lens Flare to the shot

- 2 If necessary, use the onscreen controls in the Viewer or the X Position and Y Position sliders to move the ResolveFX effect to where you want it.



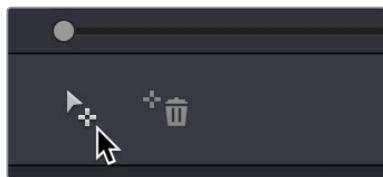
Moving the Lens Flare using the onscreen controls

- 3 Next, open the Tracker Palette and choose FX from the mode pop-up.



Opening the FX tracker mode of the Tracker palette

- 4 Click the Add Tracker Point button, at the bottom left-hand side of the Tracker palette, to add tracker crosshairs to the center of the Viewer.



Adding a point tracker

- 5 Drag the crosshairs to a high-contrast detail (such as a small object or corner), and click the Track Forward button. In this example, there's a rock out at sea that will make a good plane of motion for tracking a far-away sun. There is no inner or outer box to position or resize while you do this; you just need to drag the crosshairs to center on the feature you want to track.



Positioning the point tracker on a feature you want to track

- 6 Now, click the Track Forward button, and DaVinci Resolve will track the feature. The ResolveFX applied to that node will simultaneously move to follow the track, and when the tracking is done, you're finished.



A successful track

- 7 After you've finished tracking, you can freely reposition the ResolveFX to offset it from the track.

For more information about single-point tracking, see the “Point Tracker Workflows” section of Chapter 106, “Motion Tracking Windows.”

Chapter 118

ResolveFX

This chapter provides detailed explanations for each ResolveFX filter that's available on the Edit and Color pages. For more information on how to apply and adjust ResolveFX on the Edit page, see Chapter 31, “Editing, Adding, and Copying Effects and Filters.” For more information on how to apply and adjust ResolveFX on the Color page, see Chapter 117, “Using OpenFX and ResolveFX.”

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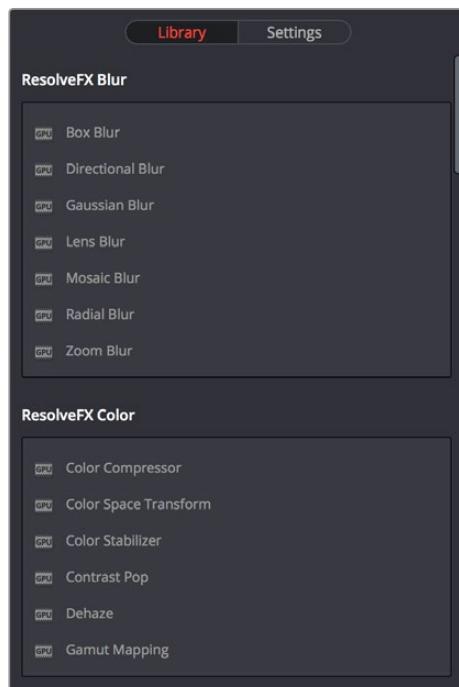
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Catalogue of ResolveFX Filters

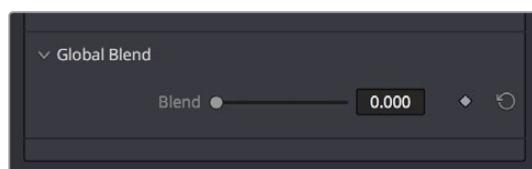
DaVinci Resolve comes with a set of ResolveFX filters, many of which have been optimized for real time playback. These are located within their own category in the Effects Library of the Edit page and in the OpenFX browser of the Color page. These effects (or filters) work just like any other OpenFX plug-in.

ResolveFX come in two types. Some are CPU-based, while most are GPU-accelerated, depending on which type of processing is faster for a particular effect. Each ResolveFX filter's icon shows you which it is.



Icons show which ResolveFX filters
are GPU-accelerated, versus those
that are optimized for CPU processing

In addition to the different parameters built into each filter, every single ResolveFX filter has a Blend parameter that mixes that filter's effect against the original image. Each filter's Blend parameter appears at the bottom of that filter's settings.



The Blend slider found in the parameters
of every ResolveFX filter

ResolveFX Blur

The plug-ins in this category offer a wider variety of different blur methods than those found in the Blur palette.

Box Blur

A variable quality blur that ranges from very low quality to very soft.

- **Horizontal and Vertical Strength:** These sliders let you adjust the width and height of blur.
- **Gang:** This checkbox lets you adjust these parameters together or separately.
- **Number of Iterations:** Controls how smooth the resulting blur is, with 0 being the lowest and most “boxy” level of quality and 1 being the highest and smoothest level of quality. At low iteration values, box blurs can appear somewhat similar to lens blurs.
- **Border Type:** Lets you choose how the edges of the image are affected by this blur, options include Black, Replicate, Reflect, and Wrap Around.

Directional Blur

A blur that’s constrained to a single angle.

- **Blur Strength:** How much blur you want.
- **Blur Angle:** The direction of blur.
- **Border Type:** lets you choose how the edges of the image are affected by this blur, options include Black, Replicate, Reflect, and Wrap Around.

Gaussian Blur

What the name says.

- **Horizontal and Vertical Strength:** Two sliders let you adjust the Horizontal and Vertical Strength independently.
- **Gang:** This checkbox lets you keep the Horizontal and Vertical Strength values ganged together.
- **Border Type:** Lets you choose how the edges of the image are affected by this blur; options include Black, Replicate, Reflect, and Wrap Around.

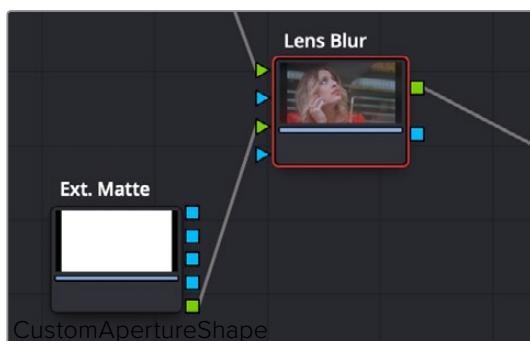
Lens Blur (Studio Version Only)

A high-quality simulation of optical lens blurring. Adjustable parameters let you achieve different kinds of “bokeh” effects, which are similar to those produced by different combinations of aperture design and lens spherical aberration corrections that affect the “circle of confusion” that creates visible shapes in areas of the picture with pinpoint highlights.

Shape

The Shape group lets you choose what shape of aperture to simulate and affects the shape of the bokeh in this effect.

- **Shape Type:** Lets you choose what type of apertures you want to use. There are three options:
 - **Real Apertures:** Lets you choose a realistic option from the Aperture Shape pop-up menu below, with which to influence the shape of the bokeh effect. Aperture Shape options include Triangle, Square, Pentagon, Hexagon, Heptagon, or Octagon shaped aperture.
 - **Creative:** Lets you choose a more fanciful option from the Aperture Shape pop-up menu below, with which to influence the shape of the bokeh effect. These options simulate the kind of bokeh you could realistically achieve by placing a blackout filter with a custom shaped hole in the center in front of a lens. Aperture Shape options include Heart, Star, Starfish, Starburst, Petals, Lip, Eye, Droplet, and Leaf.
 - **External Input:** Uses any arbitrary graphic with a (preferably small) white shape against a black background to influence the shape of the bokeh effect. This shape must be a graphic or matte clip that's added to the Node Editor and can be connected in one of two ways. If the plug-in is dragged onto an ordinary corrector node, then you must use the Add OFX Input command to expose an RGB input with which to connect the image. If you've added the plug-in as a self-contained OFX node (named "Lens Blur"), then you can attach the image to the second RGB input of the Lens Blur node.



A custom shape used in a color node tree to create custom bokeh in the Lens Blur plug-in

- **Aperture Shape:** Provides different options for aperture shapes that influence the shape of this plug-in's simulated bokeh blur effect.
- **Preview Shape:** This checkbox lets you see the actual shape you've selected to use.

Speed

The Speed Options group lets you adjust the quality/speed tradeoff of this plug-in.

- **Quality:** Three options, Full, Half (Faster), and Quarter (Fast), let you choose a suitable tradeoff between image quality and plug-in performance.
- **Horizontal and Vertical Crop:** Crops the shape image being used to influence the bokeh to a smaller size, in the event the large size of the graphic is slowing things down and you can crop out extra black from the edges. You won't notice a change to the result until you start cropping into the white part of the shape.

Controls

The parameters available from the Controls group change depending on the Shape Type you've selected.

- **Blur Size/Scale:** Adjusts the overall amount of blur. At higher values, the shape of bokeh can be more clearly seen.
- **Blade Curvature:** (Only available with Real and Creative Apertures) Lets you round off the edges of the Aperture Shape you selected.
- **Rotation:** Lets you adjust the angle the shape appears at.
- **Anamorphism:** Lets you adjust the aspect ratio of this effect in order to match the lens blur created by anamorphic lenses.
- **Chroma Shift:** Lets you simulate chromatic aberration within the blur effect.
- **Highlights:** Lets you adjust how the highlights of the image affect the blur, dilating or eroding the image more or less depending on how high Smooth Strength is.
- **Apodization:** (Only available with Real and Creative Apertures) A slider that lets you adjust the simulated "Airy disk" pattern in the defocused effect being generated. Dragging the slider to the left toward negative values accentuate concentric rings around the bokeh pattern that simulate the effects of optical diffraction and add a pattern to the result, while dragging this slider to the right introduces positive values that gradually filter the edges of the simulated bokeh pattern, resulting in a progressively smoother result.
- **Catadioptric:** (Only available with Real and Creative Apertures) A slider that lets you simulate the effect of a shaped mirror element in a Catadioptric telescope to "improve" focus within the defocused bokeh effect this plug-in produces. At higher and higher values, the underlying image becomes progressively less blurry, while still being distorted by the bokeh shape being used which results in soft image overlays, creating a very different kind of simulated optical defocusing effect.

Mosaic Blur

A simple, pixelated blur suitable for hiding the face of anonymous witnesses.

- **Pixel Frequency:** Lets you adjust the size of each pixel, thus determining the density and resolution of the resulting grid of pixels.
- **Smooth Strength:** Lets you blur the edges of adjacent pixels.
- **Border Type:** Lets you choose how the edges of the image are affected by this blur; options include Black, Replicate, Reflect, and Wrap Around.

Radial Blur

A blur effect that simulates the motion blur that would occur were the image spinning around its center point.

- **Smooth Strength:** Adjusts how much blurring is applied.
- **X and Y Position:** Lets you move the center of the blur.
- **Border Type:** Lets you choose how the edges of the image are affected by this blur; options include Black, Replicate, Reflect, and Wrap Around.

Zoom Blur

A blur effect that simulates the motion blur that would occur were a camera moving toward the image.

- **Smooth Strength:** Adjusts how much blurring is applied.
- **X and Y Position:** Lets you move the center of the blur.
- **Border Type:** Lets you choose how the edges of the image are affected by this blur; options include Black, Replicate, Reflect, and Wrap Around.

ResolveFX Color

These plug-ins provide color processing methods that aren't available in any of the Color Page palettes.

ACES Transform

Lets you perform the kind of color transforms that the ACES Input Device Transform and ACES Output Device Transform parameters of the Color Management panel do, without the need to have ACEScc or ACEScct enabled.

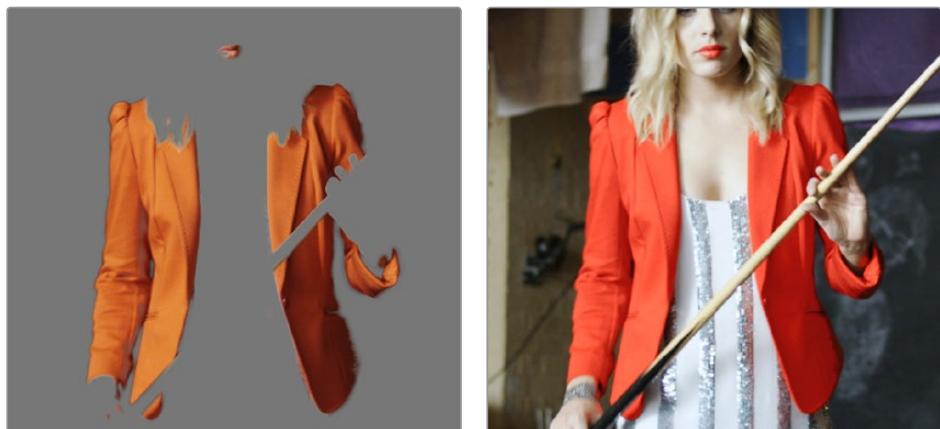
- **ACES Version:** When you've chosen one of the ACES color science options, this pop-up becomes available to let you choose which version of ACES you want to use. As of DaVinci Resolve 15, you can choose from ACES 1.0.3 or ACES 1.1 (the latest version).
- **Input Transform:** This pop-up menu lets you choose which IDT (Input Device Transform) to use to process the image. It presents the same options that are available in the Color Management panel of the Project Settings.
- **Output Transform:** This pop-up menu lets you choose an ODT (Output Device Transform) with which to transform the image data for monitoring on your calibrated display and when exporting a timeline in the Deliver page. It presents the same options that are available in the Color Management panel of the Project Settings.

For more information about the options available in these parameters, see Chapter 7, "Data Levels, Color Management, and ACES."

NOTE: This plug-in does ACES transforms correctly using the transforms specified by the Academy, whereas the Color Transform plug-in does transforms to the ACES color space colormetrically, which is not actually correct for ACES workflows.

Color Compressor (Studio Version Only)

This filter lets you compress a range of colors toward a single target color. It works best when applied to similarly colored regions that have been isolated with a secondary qualifier or window. For example, if you're adjusting an irregularly lit product such as a soda can or a dress that must have a very specific hue, you can isolate that item and use this filter to push the range of Hue, Saturation, and Luminance closer to the ideal color that's identified using the color picker.



(Before/After) Using the Even plug-in to compress original range of hues of the jacket into a narrow “target” range within a secondary operation

- **Target Color:** A color control with an eyedropper button that you choose or sample a single set of Hue/Saturation/Luminance values you want to push all other colors toward.
- **Compress Hue, Compress Saturation, and Compress Luminance:** These sliders let you individually compress the range of colors you’re adjusting in the image to more and more closely match the image. At 0, no compression is applied, at 0.500 the original range of colors in the image have been adjusted to be halfway between their original values and the values of the Target Color, and at 1.000 the original range of colors has been set to be identical to the Target Color.

Color Space Transform

Lets you perform the kind of color transforms that LUTs do, but instead of using lookup tables, this plug-in uses the same math used by Resolve Color Management (RCM) in order to do extremely clean color transforms without clipping.

Color Space Transform

Exposes four pop-up menus that let you set an Input Colorspace, Input Gamma, Output Colorspace, and Output Gamma, in order to do controlled transforms from the Input settings to the Output settings, right within a grade. Resolve Color Management does not have to be enabled for you to use this filter.

Gamut Mapping

The Color Space Transform plug-in provides Gamut Mapping controls to accommodate workflows where you need to transform one color space into another that has a dramatically larger or smaller gamut. These controls are similar to those found in the Color Management panel of the Project Settings.

Tone Mapping Method lets you enable tone mapping to accommodate workflows where you need to transform one color space into another with a dramatically larger or smaller dynamic range by automating an expansion or contraction of image contrast in such a way as to give a pleasing result with no clipping. There are three options, None, Simple, and Luminance Mapping.

- Choosing None results in no tone mapping at all.
- Choosing “Simple” uses a simple curve to perform this transformation, compressing or expanding the highlights and/or shadows of the timeline dynamic range to better fit the output dynamic range. Note that the “Simple” option maps between approximately

5500 nits and 100 nits, so if you're mapping from an HDR source with more than 5500 nits to an SDR destination there may still be some clipping of the highlights above 5500 nits.

- Choosing "Luminance Mapping" lets you use a customized curve operation to remap the gamma of the image and enables the Max. Input Luminance, Max. Output Luminance, and Avg. Input Luminance sliders.
 - The Max. Input (nits) checkbox and slider lets you set the reference maximum Luminance value (in nits) that you want to remap to the value set by the Max. Output (nits) checkbox and slider, which governs the maximum luminance level of the Output color space (in nits). Using these two sliders together, you can set which value from the Input Gamma is mapped to which value of the Output Gamma.
 - The Adaptation slider is designed to compensate for large differences in the viewer's state of visual adaptation when viewing a bright image on an HDR display versus seeing that same image on an SDR display. For most "average" images this setting works best set between 0–10. However, when you're converting very bright images (for example, a snow scene at noon), then using a higher value will yield more image detail within the highlights.
- Choosing "Clip" hard clips all out-of-bounds values.
- Gamut Mapping Method accommodates workflows where you need to transform one color space into another with a dramatically larger or smaller gamut by helping to automate an expansion or contraction of image saturation in such a way as to give a pleasing and naturalistic result with no clipping.
- Choosing None results in no Gamut mapping at all.
- Choosing Saturation Mapping from this menu enables saturation mapping to fit the range of saturation values from the Input Color Space and Gamma into the Output Color Space and Gamma. It enables the Saturation Knee and Saturation Max. controls.
 - The Saturation Knee slider sets the image level at which saturation mapping begins. Below this level, no remapping is applied. All saturation values from this level on up are remapped according to the Saturation Max. slider. A value of 1.0 is maximum saturation in the currently selected output color space.
 - The Saturation Max slider sets the new maximum level to which you want to either raise or lower all saturation values that are above the Saturation Knee setting. A value of 1.0 is maximum saturation in the currently selected output color space.
- Choosing "Clip" hard clips all out-of-gamut values.

NOTE: While this plug-in has ACES settings, it does transforms to the ACES color space colormetrically, which is not actually correct for ACES workflows. For actual ACES workflows, use the ACES Transform plug-in, which uses transforms specified by the Academy.

Color Stabilizer (Studio Version Only)

Designed to deal with clips that have inconsistencies in exposure and color, caused by manual changes to a lens' aperture setting or by a camera's auto exposure settings causing unwanted changes to color and brightness in the middle of a shot. The Color Stabilizer plug-in analyzes a frame of the clip that represents the desired exposure and color, and automatically adjusts every other frame of the current clip to match the analyzed levels.

IMPORTANT The Color Stabilizer gives you the best results with clips that don't have clipped highlights. When used in the Color page, it's recommended to grade the image to bring all the highlights you want somewhere at or under a value of 1023, and then apply the Color Stabilizer to a node after this adjustment.

There are two ways of using the Color Stabilizer:

- The easiest way is to choose Entire Frame from the Region For Analysis pop-up menu. Then, move the playhead in the Viewer to the frame that represents the contrast and color you want the entire clip to have, and click the Analyze This Frame. Now, if you play through the clip, changes in contrast and color should be gone. This method works best for clips where the inconsistency you're trying to eliminate is fairly uniform, affecting the entire picture.
- Another way is to choose Overlay Rectangle from the Region For Analysis pop-up menu. This causes an onscreen rectangle to appear that you can resize and position over a specific region you want to sample for the duration of the clip. If the selected feature you're analyzing is moving, then you can use the FX Tracker to track the subject so the selection box follows it (this is important for a consistent result). Once this is set up, move the playhead in the Viewer to the frame that represents the contrast and color you want the entire clip to have, and click the Analyze This Frame. Now, if you play through the clip, changes in contrast and color should be gone. This method works best for clips where there are parts of the picture that are supposed to have a change in brightness or color, such as when something moves into the frame, or a reflected highlight comes and goes because of the lighting scheme, at the same time as an otherwise undesirable change in contrast or color. You can use the selection box to specifically analyze the part of the frame that has the unwanted exposure change, while ignoring the desirable exposure change.

Depending on what option you choose from the Region for Analysis pop-up menu, different additional options appear.

Analysis Region

If you choose "Entire Frame" from the Region For Analysis pop-up, these controls don't appear. A set of Source X/Y Position and Source Width/Height parameters let you transform the selection box that defines which part of the image is being analyzed.

Channels to Stabilize

Once you've analyzed the frame that represents the best contrast and color for that clip, the Channels to Stabilize controls let you choose how you want to handle making the correction. The What to Stabilize pop-up menu lets you choose between stabilizing White Balance and Brightness, or R, G, B Channels Separately.

- If you choose White Balance and Brightness, two checkboxes let you choose whether or not you want to include Stabilize White Balance and Stabilize Brightness independently from one another.
- If you choose R, G, B channels separately, three checkboxes appear letting for Stabilize Red, Green, and Blue Channel, so you can pick which particular channels you want to correct.

The "Stabilize Levels How" pop-up lets you choose how to make the correction, with options to Match Levels and Contrast, Lift to Consistent Level, Gain to Consistent Level, each of which uses a subtly different method to make the necessary correction, so if one method doesn't work for the particular problem your clip is exhibiting, you can try the other methods to try and get a better result.

Captured Analysis Values

Once you've analyzed the frame, another set of parameters appear showing the captured analysis values upon which the automated correction is based, so that you can make manual adjustments if necessary to improve the result. The parameters that are shown depend on the option you chose from the What to Stabilize pop-up menu.

- If you chose White Balance and Brightness, then you'll have a Normalized White Balance color control, and Low Level and High Level sliders.
- If you chose R, G, B Channels Separately, then you'll have Red, Green, and Blue High and Low Level sliders.

Contrast Pop (Studio Version Only)

A more extreme and selective version of the Midtone Detail control found in the Color Wheels palette, designed to add either sharp high-contrast looks, or soft low-contrast looks to a selective portion of the tonal range of the image.

- **Detail Amount:** Lets you choose how much of this effect to apply. At 0, no effect is applied. At positive values progressively sharper contrast is added, while at negative values progressively softer low-contrast is applied.
- **Detail size:** Lets you choose which structures of the image are affected by this localized contrast adjustment, from smaller to larger.
- **Low and High Threshold:** These values let you define what range of image tonality is affected by this filter, allowing you to omit either shadows or highlights from this operation.
- **Softness:** Lets you soften the transition between the affected and unaffected areas of the image.

DCTL

Lets you apply a DCTL wherever you can apply ResolveFX plug-ins. For more information on DCTLs and where they're installed, see Chapter 145, "Creating DCTL LUTs."

- **DCTL List:** A pop-up that lets you choose from the available DCTLs installed on your workstation.
- **Reload DCTL:** A button that lets you refresh the DCTL list pop-up if you've installed new DCTLs while DaVinci Resolve is running.

Dehaze (Studio Version Only)

Designed to let you make fast, selective adjustments to color and contrast to reduce the visible effects of smog, airlight, and haze in an image. This filter automatically generates a simulated depth matte which is used to apply more of this corrective color adjustment to faraway parts of the image that would be more affected by haze effects and less color adjustment to closeup parts of the image. However, the simulated depth mask is not going to be perfect, so additional controls exist to let you make adjustments to it to achieve a better result.

- **Dehaze Strength:** This slider applies a simultaneous color and contrast adjustment. Raising Dehaze Strength subtly increases contrast (especially in the shadows) while rebalancing color toward the complement of the currently selected Haze Color and selectively intensifying saturation. Lowering Dehaze Strength decreases contrast and rebalances color toward the selected Haze Color itself while selectively lowering saturation.

- **Haze Color:** A color control with an eyedropper button that you choose or sample the color of smog, airlight, or haze in an image that you want to minimize.
- **Display Depth:** Lets you view the simulated depth matte that's being generated. It's useful to turn this on before adjusting the Shadow and Highlight controls below.
- **Shadow:** This slider raises or lowers darkest parts of the simulated depth mask that defines the parts of the image that are supposedly farthest away.
- **Highlight:** This slider lets you raise or lower the lightest parts of the simulated depth mask that defines the parts of the image that are supposedly closest to us.

Gamut Limiter

Lets you limit the gamut to a specified standard. Useful in situations where the delivery color space is a large gamut such as Rec.2020, but the QC specification requires limiting to a smaller gamut such as P3, in order to limit the amount of saturation allowable in the final output. This is a limiting operation, so out of bounds values are hard clipped. This plug-in can be used regardless of whether or not Resolve Color Management is enabled. Because it's a limiter, it should probably be one of the last operations in any node tree to prevent useful image data from being clipped.

- **Current Gamut:** Choose the timeline gamut currently being used by the image.
- **Current Gamma:** Choose the timeline gamma currently being used by the image.
- **Limit Gamma to:** Choose the gamut you want to restrict the image to here.

These menus present the same options as the Resolve Color Management menus in the Color Management panel. For more information about the options available in these parameters, see Chapter 7, “Data Levels, Color Management, and ACES.”

Gamut Mapping (Studio Version Only)

The Color Space Transform plug-in provides Gamut Mapping controls to accommodate workflows where you need to transform one color space into another that has a dramatically larger or smaller gamut. These controls are identical to those found in the Color Space Transform plug-in’s Gamut Mapping group and are similar to those found in the Color Management panel of the Project Settings.

- **Gamma:** A pop-up menu lets you specify what type of gamma the clip is supposed to have, so set this to whatever matches that image (this may match the timeline color space, but it depends on how you’re working).
- **Tone Mapping Method:** Lets you enable tone mapping, to accommodate workflows where you need to transform one color space into another with a dramatically larger or smaller dynamic range by automating an expansion or contraction of image contrast in such a way as to give a pleasing result with no clipping. There are three options, None, Simple, and Luminance Mapping.
 - Choosing “Simple” uses a simple curve to perform this transformation, compressing or expanding the highlights and/or shadows of the timeline dynamic range to better fit the output dynamic range. Note that the “Simple” option maps between approximately 5500 nits and 100 nits, so if you’re mapping from an HDR source with more than 5500 nits to an SDR destination there may still be some clipping of the highlights above 5500 nits.

- Choosing “Luminance Mapping” lets you use a customized curve operation to remap the gamma of the image and enables the Max. Input Luminance, Max. Output Luminance, and Avg. Input Luminance sliders.

The Max. Input Luminance slider lets you set the reference maximum Luminance value (in nits) that you want to remap to the value set by the Max. Output Luminance slider, which governs the maximum luminance level of the Output color space (in nits). Using these two sliders together, you can set which value from the Input Gamma is mapped to which value of the Output Gamma.

The Avg. Input Luminance slider is designed to compensate for large differences in the viewer’s state of visual adaptation when viewing a bright image on an HDR display versus seeing that same image on an SDR display. For most “average” images this setting works best set between 0–10. However, when you’re converting very bright images (for example, a snow scene at noon), then using a higher value will yield more image detail within the highlights.

- **Gamut Mapping Method:** Accommodates workflows where you need to transform one color space into another with a dramatically larger or smaller gamut by helping to automate an expansion or contraction of image saturation in such a way as to give a pleasing and naturalistic result with no clipping. Choosing Saturation Mapping lets you remap the saturation values of the image. It enables the Saturation Knee and Saturation Max. controls.
 - The Saturation Knee slider sets the image level at which saturation mapping begins. Below this level, no remapping is applied. All saturation values from this level on up are remapped according to the Saturation Max. slider. A value of 1.0 is maximum saturation in the currently selected output color space.
 - The Saturation Max slider sets the new maximum level to which you want to either raise or lower all saturation values that are above the Saturation Knee setting. A value of 1.0 is maximum saturation in the currently selected output color space.

ResolveFX Generate

These plug-ins generate imagery that can be used within grades and composites in different ways.

Color Generator

Generates a single color using a color picker control. Useful in conjunction with a layer node’s ability to mix a color with an image using different composite modes.

- **Color picker:** You can click the color picker and use the resulting color controls to choose a color to be generated.
- **Eyedropper:** You can also click the eyedropper to sample a color from the image in the Viewer; the eyedropper always samples the image from the input of the current node, regardless of how the current image looks.

Color Palette (Studio Version Only)

More of an analysis tool than a creative effect, this plug-in offers four Display modes from the pop-up menu at top: Color Palette, Shadow Region, Midtone Region, and Highlight Region.

- **Display Mode:** A pop-up that provides four different options.
 - **Color Palette:** By default this displays the eight most dominant colors in the image as rectangular swatches along the bottom, and the eight most dominant colors in each of the three main zones of image tonality (shadow, midtone, highlight) are displayed as smaller rectangular patches just above. This lets you see, at a glance, the color palette of any given shot, and this can be output for intrepid art directors who find it useful.
 - **Shadow Region, Midtone Region, or Highlight Region:** Displays a visual preview of which parts of the image fall into which regions (as currently defined by the Shadow and Highlight Threshold sliders). These previews are displayed with the current tonal region appearing saturated and all other parts of the image appearing black.
- **Number of Colors:** Defines the number of isolated colors. This can be set to display anywhere from 8 to 24 patches.
- **Shadow and Highlight Threshold:** The definition of where shadows, midtones, and highlights end and begin is controlled by the Shadow and Highlight Threshold sliders.

Grid

As the name implies, this plug-in generates a grid with two sets of properties.

General

These controls let you adjust the overall density and orientation of the grid.

- **Row Cells and Column Cells:** These sliders let you choose how many cells to divide the grid into, both vertically and horizontally.
- **Pan, Tilt, Zoom, Rotate, Width, Height, ShearX, ShearY, Pitch, and Yaw:** These controls let you transform the grid to serve whatever purpose is necessary.

Line Properties

These controls let you control the properties of the grid lines themselves.

- **Line Color:** This color picker control and accompanying eyedropper let you choose a color with which to draw the grid.
- **Individual Hor. Line Width and Ver. Line Width:** These sliders let you adjust the thickness of all horizontal or all vertical lines.
- **Major Line Spacing:** This slider lets you set every nth line to be thicker, while the Major Line Width control lets you choose how thick to make these major lines.

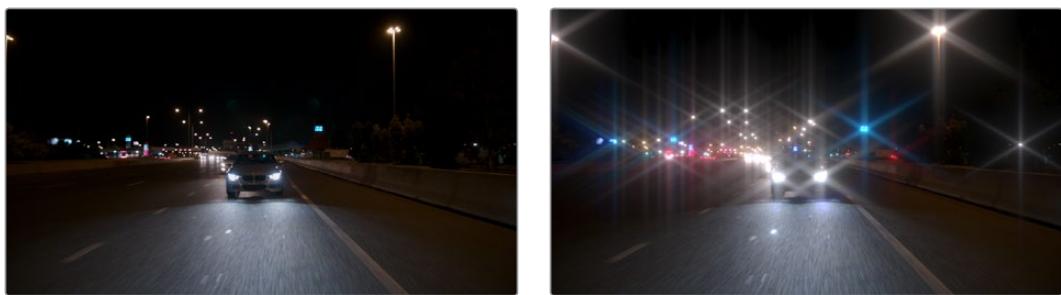
ResolveFX Light

The plug-ins in this category all replicate different optical and lighting effects. While most have been designed to quickly give you realistic results, all can be pushed harder to provide many artistic effects.

Aperture Diffraction

Found in the ResolveFX Light category, Aperture Diffraction models the starburst effect usually seen when shooting bright lights with small apertures, the physical cause of which is light-diffraction on the aperture blades of a lens. This plug-in simulates this, with the result being automatically applied to scene highlights that you can isolate and refine, with customizable virtual apertures.

Small regions of brightness exhibit a star pattern glow, as seen in the following image.



(Left) Original image, (Right) Applying Aperture Diffraction

Large regions of brightness exhibit a more even glow with shaping and texture that look like a natural optical effect. It can be used to create a different type of glow effect with a more realistic look in some situations than the Glow plug-in, though it's more processor intensive. In other situations, this plug-in opens up many different stylistic possibilities for glowing effects.



(Left) Original image, (Right) Applying Aperture Diffraction

Output

These controls let you choose what image is output by this plug-in.

- **Select Output:** Lets you preview the image with different stages of the Aperture Diffraction effect applied, viewing the Isolated Source (to help when adjusting the Isolation controls), Preview Aperture (to help when adjusting the Aperture controls), Preview Diffraction Pattern (showing you the resulting diffraction pattern based on the aperture control settings), Diffraction Patterns Alone (showing you the glow effect that will be applied to the image by itself), and the Final Composite.
- **Quality:** Lets you choose a quality setting to trade off between quality and speed. Choices are Full, Half (Faster), Quarter (Fast).

Isolation Controls

The Isolation controls let you choose which highlights in the scene generate visible glow and patterns. The effect of these controls can be directly monitored by setting Select Output to Isolated Source.

- **Color Mode:** A pop-up menu that lets you either choose to keep the colors of the different highlight regions that generate glow, or treat them all as grayscale brightness only (color controls later can change the effect). Grayscale is faster to process, but Color can result in some brilliant effects.
- **Brightness:** Sets the threshold at which highlights are isolated.
- **Gamma:** Lets you shape the isolated highlights.
- **Smooth:** Lets you blur details in the highlights that you don't want to be pronounced.
- **Color Filter:** Lets you choose a particular color of highlight to isolate (an eyedropper lets you select a value from the Viewer).
- **Operation:** Let you adjust the resulting Isolation matte (options include Shrink, Grow, Opening, Closing) with a slider to define how much.

Aperture Controls

The Aperture controls let you define the shape and texture of the resulting glow this plug-in creates.

- **Iris Shape:** Lets you choose a shape that determines how many arms the star pattern will have. Options are Triangle, Square, Pentagon, Hexagon, Heptagon, and Octagon.
- **Aperture Size:** Lets you alter the resulting diffraction pattern alternating between more of a star shape at higher values and a stippled wave pattern at lower values.
- **Result Gamma:** Lets you adjust how pronounced will be the glow that appears between the arms of the star patterns that appear.
- **Result Scale:** Lets you alternate between pronounced star patterns at high values and more diffuse glows at low values.
- **Blade Curvature and Rotation:** Let you alter the softness and orientation of the arms of each star.
- **Chroma Shift:** Lets you introduce some RGB "bleed" into the glow.

Compositing Controls

These controls let you adjust how to composite the glow effect against the original image.

- **Normalize Brightness:** This checkbox scales the brightness of the glow to a naturalistic range for the image. Also, when Normalize Brightness is enabled, the Aperture Diffraction effect will keep to a consistent overall brightness as the scene changes.
- **Brightness:** Lets you adjust the intensity of the glow effect.
- **Colorize:** Lets you tint the glow effect using a Color control that appears when Colorize is raised above 0.

Glow

A sophisticated, soft glow effect that's highly customizable with only a few key parameters.

- **Select Output:** Lets you preview the image with different stages of the glow effect applied, viewing the Shiny Regions, the isolated Glow Alone, or the Glowing Image.
- **Shine Threshold:** Defines the luminance level at which glow is triggered to appear on the image.
- **Spread:** Defines how far out shine extends from areas of the picture that trigger it.
- **H/V Ratio:** Lets you adjust the proportion of horizontal to vertical spread, allowing you to create "streaky" shine that extends farther in a particular dimension.
- **Relative Spread Red/Green/Blue:** Lets you adjust the spread within each color channel by a different amount, simulating a kind of chromatic aberration in the glow.
- **Brightness:** Adjusts the intensity of the glow effect.
- **Colorize:** A color picker and eyedropper let you choose a color with which to tint the glow.
- **Glow framing:** Lets you choose what happens when shine hits the edge of the frame, whether it's amplified by "Reflect in Camera" or whether it's moderated by a "Vignette" effect.
- **Composite Type:** Lets you choose a composite mode to use to blend the glow effect with the image. Defaults to Screen, which is good for gentle glows. Add lets you create hotter, more intense glows, while other composite modes let you create other varied effects.
- **Opacity:** Lets you adjust the transparency of the glow effect and is a fast way of "easing off" of a glow that you otherwise like, but that's too intense for the shot at hand.

Lens Flare (Studio Version Only)

Simulates different kinds of lens flares resulting from the interplay of light through an aperture of selectable shape bouncing within layered optical elements in a lens. Lens Flares are completely computer-generated, so they're always created at your project resolution, whether it's 1080 or 8K. Four groups of controls give you a lot of ways to customize the presets to create your own effect:

Lens Flare Preset

You can choose a type of flare from the Lens Flare Preset pop-up. If you manipulate the controls to create your own effect, this pop-up switches to Custom.

Select Output

The Select Output pop-up lets you switch among the following viewing options:

- **Final Image:** (Default) Shows the lens flare composited against the current clip.
- **Flare Elements Alone:** Shows the isolated flare, making it easier to adjust.
- **Source Mask and Magnified Source Mask:** Let you see the mask created by the Light Source Masking controls below, which is used to limit the lens flare that's created.

Light Source Masking

Three additional controls at the top let you create a quick and dirty luma key to create a mask that you can use for occluding the lens flare effect behind foreground elements in the scene. For example, if you're using lens flare to simulate the sun in the sky, these controls let you mask trees in the foreground so that the lens flare appears to be behind the trees, as the sun would be.

- **Enable Light Source Masking:** This checkbox enables the Mask Threshold and Virtual Light Source Size sliders. You can then choose either Source Mask or Magnified Source Mask to see the mask that's created by raising the Mask Threshold slider.
- **Mask Threshold:** Raising this slider pulls a fast Luma Key that masks off darker foreground elements (such as trees against the horizon) and limits the flare to areas of the picture where the light source of the flaring can "shine through" (In this example, shining between the trees on the horizon.).
- **Virtual Light Source Size:** This slider determines how quickly the center of a flare will disappear behind the luma-keyed mask you've created; higher values (simulating bigger light sources) cause a flare to disappear more slowly when passing "behind" a feature of the image that's being keyed via the Mask Threshold slider.

Position

Position parameters let you adjust the X and Y Position of the simulated light source that's causing the flare. There are three ways you can adjust the flare position.

- You can Adjust the X and Y Position sliders.
- You can turn on the OpenFX Overlay in the Viewer and drag the on-screen control.
- You can motion track elements within the scene using the FX mode of the Tracker palette.

Global Corrections

The Global Corrections group have parameters that let you quickly adjust the overall quality of the flare effect.

- **Global Scaling:** Lets you make every element of the flare effect larger or smaller at once.
- **Anamorphism:** Lets you stretch all flare elements horizontally to simulate an anamorphic lens' stretching effect.
- **Lens Center X and Y position:** Lets you offset the center of the simulated lens that's causing the flaring, about which the various elements of the flare pivot.
- **Global Defocus:** Lets you blur the overall flaring effect being created to soften the effect.
- **Global Brightness:** Lets you raise and lower the overall level of flaring being produced.
- **Global Saturation:** Lets you adjust the overall color intensity of the flaring.
- **Colorise Result:** Lets you choose how much to tint the flare, if at all. At a value of 0 (the default), no colorization is applied at all.
- **Colorization Color:** Lets you choose a color to use to colorize the flare via the Colorize Result slider above. You can use either a color control or eyedropper to sample color from the source RGB image of the current node.

Aperture

The Aperture parameters let you define the aperture of the simulated camera apparatus through which the flare is being generated. The shape defined by these parameters affects the look of the “starburst element” of each flare, as well as the look of any aperture-shaped “ghost elements” you’re turning on.

- **Aperture Blades:** Defines how many blades make up the aperture. You can choose from 3 to 16 (defaults to 6).
- **Angle:** Sets the angle of the resulting Aperture shape (defaults to 0.183).

Elements

The Elements pop-up is a deceptively simple set of controls that let you expose the customization controls of each of the layers and elements that combine to create the simulated lens flare. Up to ten levels of elements can contribute to a lens flare effect. Each element and ghost shape has a different set of parameters unique to that type of element. Available elements in this pop-up menu include:

- **Full-Screen Glare:** A simulated overall flaring that covers the entire frame at its most intense. This glare increases as the flare nears the center of the screen and decreases as the flare moves toward the edges of the frame. Recommended for extremely big flaring effects. Parameters include:
 - **Glare Brightness:** A slider; set this to 0 to eliminate glare.
 - **Glare Color:** A color picker and eyedropper combination that lets you tint the glare.
- **Flare Spot:** Simulates the central light source that’s triggering the flare. Parameters include Flare Size (set this to 0 to eliminate the flare spot), Flare Irregularity (which lets you create a more organic-looking, off-balance flare), Flare Softness, and Flare Color.
- **Starburst:** Rays of light stretching out from the center of the flare. Parameters include Starburst Size (set this to 0 to eliminate the starburst), Starburst Softness, Starburst Split Angle (which splits each streak of the starburst into a wider feathered pattern), Starburst Split Balance (which lets you adjust the brightness between each half of split streaks), and Starburst Color.
- **Ghost elements:** Seven available layers of Ghost Elements can be enabled and set to different optional shapes for each lens element you want to simulate. Each of the Ghost element layers can use one of five types of shapes, including:
 - **None:** Turns that particular ghost element off.
 - **Aperture Shape:** A polygonal shape defined by the number of blades in the aperture you’ve selected.
 - **Anamorphic Streak:** A wide horizontal artifact typical of anamorphic lenses.
 - **Disc Shape:** A round ring artifact.
 - **Bubble Shape:** An oval with haze within.
 - **Corona Rays:** A ring of streaks stretching outward.

Ghost elements share many parameters in common, although specific elements have unique parameters. These parameters are as follows:

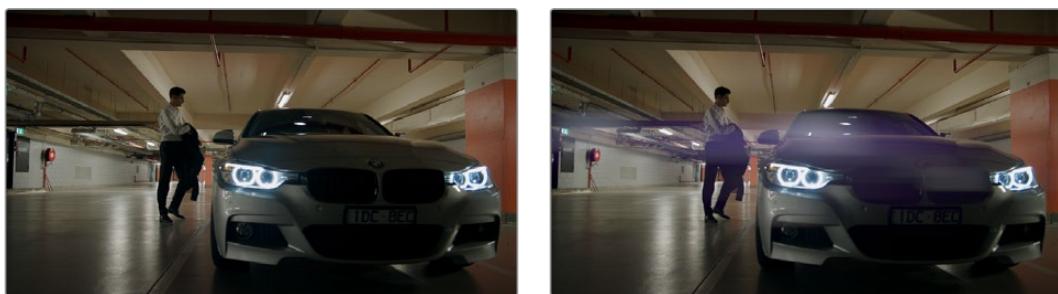
- **Color:** A color picker and eyedropper combination that lets you colorize that specific element.
- **Position:** A slider lets you set that element’s position along the optical path that’s defined by the angle from the (Flare) Position X and Y to the Lens Center X and Y parameters. A value of 0 centers that element on the Lens Position, while larger values push that element farther and farther away from the Lens Position.

- **Size:** Sets the size of that flaring element, or in the case of the Anamorphic Streak, the width.
- **Height:** (Anamorphic Streak only) Sets the vertical thickness of the streak.
- **Center Brightness:** (Aperture, Disk, and Anamorphic Streak only) Defines the brightness in the middle of that element, filling it to appear as a solid element. Set this closer to 0 if you want the element to appear hollow.
- **Edge Brightness:** (All but Anamorphic Streak) Defines the brightness of the edge of that element. Raising this value while lowering the Center Brightness lets you create outlined element effects.
- **Softness:** Lets you blur that element.
- **Bristle Density:** (Corona Only) Lets you alter the number and arrangement of the optical bristles that appear. At lower values, fewer bristles appear, at higher values, more bristles appear. As you change the value of this parameter, the placement of bristles shifts, allowing you to change distribution as well as density with a single control.
- **Bristle Scale:** (Corona only) Lets you alter the thickness of the bristles that appear. Smaller values result in thicker bristles, higher values result in smaller bristles more tightly packed together.
- **Ringing:** (All types but Bubble) Simulates a pattern of diffraction artifacts. Higher values increase the number of rings or streaks comprising the element.
- **Chromatic shift:** Simulates chromatic aberration effects.
- **Eclipse Position:** Simulates where the outer (away from the center) or inner (toward the center) side of a Ghost Element doesn't exist because the light is occluded by the edge of a lens element or some part of the tube housing. Practically, this defines which side of the Ghost Element is affected by the other Eclipse parameters of size, softness, and chromatic shift. Adjusting this results in semi-circular ghost shapes of different kinds. At 0, there is no eclipse. At positive values, the eclipse starts from within the frame and pushes out; at negative values, the eclipse starts from the outside of the frame and pushes in.
- **Eclipse Size:** Defines the size of the eclipse region for that flare element. At higher values, more and more of the flare element is eclipsed.
- **Eclipse Softness:** Defines the softness at the transition from the eclipsed and non-eclipsed regions.
- **Eclipse Chromatic shift:** Lets you create a chromatic aberration effect at the boundary of the eclipsed region. At 0, there is no chromatic shift. At increasingly positive values, there's a shift toward blue. Toward negative values, there's a shift toward red.
- **Repeat:** Lets you use this element to spawn many duplicates defined by the following two parameters.
- **Repeat Position Seed and Repeat Size Seed:** At different values, these parameters let you pseudo-randomly redistribute the placement of repeated elements.

Lens Reflections

Found in the ResolveFX Light category, Lens Reflections simulates intense highlights reflecting off the various optical elements within a lens to create flaring and scattering effects based on the shape and motion of highlights you isolate in the scene. It's an effective simulation that works best when there are light sources or specular reflections in the scene such as the sun, car headlights, light fixtures, fire and flame, or other lighting elements that are plausibly bright enough to cause such flaring.

Also, this plug-in really shines when these light sources move, as each layer of simulated reflections moves according to that element's position within the virtual lens being simulated, creating organic motion that you don't have to keyframe. Without intense highlights, the results of this filter will be somewhat abstract.



(Left) Original image, (Right) Applying Lens Reflections

Output

The Output controls let you preview the image with different stages of the Lens Reflections effect applied.

- **Select Output:** Lets you choose to view the Isolated Source (to help when adjusting the Isolation controls), Reflections Alone (showing you the flaring effect that will be applied to the image by itself), or the Final Composite (the complete effect).
- **Quality:** This pop-up lets you choose how to render the effect. Options are Full, Half (Faster), and Quarter (Fast). The tradeoff is between quality and speed.

Isolation Controls

The Isolation controls let you choose which highlights in the scene will generate lens reflections. The effect of these controls can be directly monitored by setting Select Output to Isolated Source. It's highly recommended to customize the Isolation controls for the image at hand when using this plug-in, as even more so than other plug-ins, the particular highlights used will have a huge impact on the resulting effect.

- **Color Mode:** A pop-up menu that lets you either choose to keep the colors of the different highlight regions that generate lens reflections, or treat them all as grayscale brightness only (color controls later can change the effect). Grayscale is faster to process, but Color can result in some brilliant effects.
- **Brightness:** Sets the threshold at which highlights are isolated.
- **Gamma:** Lets you shape the isolated highlights.
- **Smooth:** Lets you blur details in the highlights that you don't want to be pronounced.
- **Color Filter:** Lets you choose a particular color of highlight to isolate (an eyedropper lets you select a value from the Viewer).
- **Operation:** A pop-up lets you adjust the resulting Isolation matte (options include Shrink, Grow, Opening, Closing), and a slider lets you define how much.

Global Controls

The Global controls let you quickly and easily adjust the overall quality of the Lens Reflections effect using a centralized group of parameters.

- **Global Brightness:** Lets you raise and lower the level of all reflections. Lowering brightness is a good way to make a large lens reflection effect more subtle, although images with small lens reflection effects may benefit from being a little brighter.
- **Global Blur:** Lets you defocus all reflections. This is another good way of making lens reflection effects of all kinds more subtle.
- **Anamorphism:** Lets you deform the reflection elements to simulate an anamorphic lens' stretching effect.
- **Global Colorize:** Lets you adjust the color intensity of the reflections, either intensifying the color of all reflections or desaturating it.

Presets

A Presets pop-up provides a number of different settings to get you started. Selecting a preset populates the Reflecting Elements parameters below, at which point you can customize the effect to work best with the image at hand. It's highly recommended to customize these effects to suit the type of highlights in your image, in order to get the best results.

Reflecting Elements

There are four groups of Reflecting elements, each with identical controls. This lets you create interactions combining up to four sets of reflections. The controls found within each group are as follows.

- **Brightness:** Lets you adjust the intensity of that reflection.
- **Position in Optical Path:** Lets you shift the reflection according to an element's position in the lens. Practically, this means that positive values will enlarge an inverted reflection based on the highlights, while reducing values toward 0 will shrink the reflection, and pushing this into negative values will invert the reflection and pull it into the opposite direction as it begins to enlarge again. A value of -1 positions the reflection right over the highlight that creates it.
- **Defocus type:** Lets you choose what kind of blur to use, choices include Box blur, Triangular blur, Lens blur (the most processor intensive), and Gaussian blur (the default).
- **Defocus:** Lets you choose how much to blur that element.
- **Stretch:** Lets you give the flare an anamorphic widescreen look.
- **Stretch Falloff:** Lets you taper the edges for a less uniform stretching effect.
- **Lens Coating:** A pop-up lets you choose common colors such as purple, green, and yellow that correspond to different anti-reflective lens coatings, as well as a selection of other vibrant colors. Defaults to none. When you choose any other option, a color control and eyedropper let you manually choose a color or pick one from the image. A Colorize slider lets you vary how much to tint the reflection by the selected color, although setting Colorize to 0 lets the flare take its color from the source highlights of the image, which can sometimes give you the most interesting look..

Light Rays

A “rays of light” effect that simulates volumetric lighting emerging from light sources defined by a threshold you define. The effect mimics what are sometimes called “god rays” in the sky, or other highly directional glow effects.

Main Controls

The Main controls include:

- **Select Output:** Lets you preview the image with different stages of the Lightray effect applied, viewing the Final Image, Lightrays Alone, and Source Regions.
- **Source of Rays:** Lets you choose the emitter of the rays, using Bright Regions or Edges.
- **Source Threshold:** A slider that lets you choose the limit at which light areas of the image emit rays.

Position

Position parameters let you define the direction rays take.

- **Ray Directions:** A pop-up menu that lets you choose either “From A Location,” which exposes controls to let you choose an X or Y position to define a point of origin that defines the angle of the light beams, or “At an Angle,” which exposes controls to let you choose an overall orientation for the rays.

Appearance

Appearance parameters let you customize the ray effect.

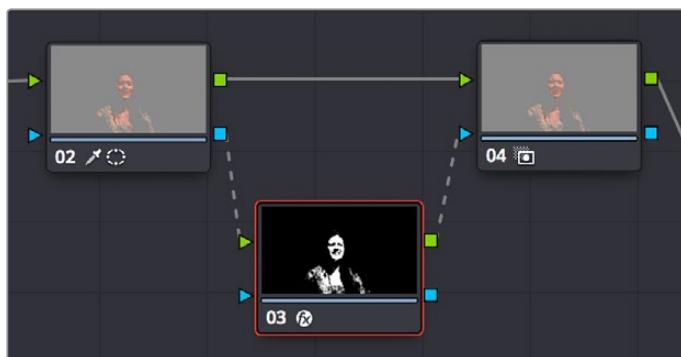
- **Ray Dropoff:** A pop-up with four options.
 - **Default (soft):** Produces soft, indistinct rays of light that appear to fade away as they stream out.
 - **Keep Shape of Source:** The edge of the light rays are defined by the shape that emitted them.
 - **CCD Bloom Harsh:** Severely raises the brightness of the part of the image that’s emitting rays as Length is raised, resulting in harsh glow or bloom in the image.
 - **CCD Bloom Soft:** Gently raises the brightness of the part of the image that’s emitting rays as Length is raised, resulting in a very gentle lightning of the image.
- **Length:** Lets you make the rays longer or shorter.
- **Soften:** Lets you blur the rays being emitted.
- **Brightness:** Lets you adjust how bright the rays are.
- **Color:** A color picker and eyedropper let you define a color with which to tint the rays.

ResolveFX Refine

These plug-ins let you make different kinds of targeted improvements.

Alpha Matte Shrink and Grow (Studio Version Only)

This filter lets you refine the edges of alpha and key mattes in a variety of ways, shrinking and growing the edges, and opening and closing holes that appear within a matte. In the Color page, this filter can be applied to Qualifier or Window keys that have been routed to the RGB input of a corrector node, for adjustment and refinement, before connecting the result to the key input of a subsequent node for use isolating an adjustment.



Applying the Alpha Matte Shrink and Grow filter to a key matte that's fed to the RGB input of a separate node

- **Operation:** A pop-up menu 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 within the key to clean up a ragged matte.
- **Operator Shape:** A pop-up menu 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.
- **Operator Radius:** A slider adjusts how much to Shrink, Grow, Open, or Close the key.
- **Repeat Operation:** A slider alters the effect of the Operator Radius setting to create more extreme adjustments.

Beauty (Studio Version Only)

Beauty is a plug-in that lets you control texture by selectively smoothing image detail that falls above a particular threshold (using the Smoothing Threshold slider), while preserving detail falling below a particular threshold (using the Texture Threshold slider). In this way, you can smooth larger textures you don't want, while either preserving or exaggerating smaller textures that you do want.

In the case of faces and skin, this plug-in provides another method of smoothing larger, unwanted blemishes, while preserving desirable edge detail and underlying structures such as pores, so you can improve the complexion of subjects on shoots where hair and makeup was not available, without over-softening realistic skin details and creating an overly fake plastic look.



(Left) The original image, (Right) A face with Beauty applied to soften the complexion while retaining fine facial detail

Please note that this plug-in is not only for skin detail, and it's not only for softening. Once you isolate the fine detail you want to preserve in a subject, you also have the option of exaggerating it to create highly textured results. This plug-in is effective for any subject with textures that need refinement.

TIP: This plug-in is best used within a qualification that isolates the particular feature you're trying to smooth. The default settings apply a moderate amount of smoothing and fine detail recovery that's appropriate for faces in closeup but will not be universally appropriate for all situations, so some fine-tuning will always be necessary. For naturalistic results, this plug-in produces the best results when used in moderation.

Inspect

The Output pop-up menu lets you choose what part of the Beauty effect you want to view while refining your adjustments. Whatever option you choose here will determine the output of this node. There are three options:

- **Smoothed Result:** Lets you view the image with only smoothing applied by the Smoothing Threshold and Diffuse Lighting sliders, with no texture recovery.
- **Recovered Texture:** Lets you view the isolated texture that's being recovered by the Texture Gain and Texture Threshold sliders, so you can fine tune what you want to preserve.
- **Final:** Lets you see the final effect.

Smoothing

These parameters let you adjust how much smoothing to apply to the image.

- **Smoothing Threshold:** Raising this value increasingly smooths textures above the Texture Threshold (below). Using this control and leaving Diffuse Lighting at 0 preserves the contrast of the lighting on the feature you're smoothing.
- **Diffuse Lighting:** Another method of softening texture, but in such a way that the lighting of the subject also appears to become more and more diffuse (Similar to setting Midtone Detail to negative values).

Texture Recovery

These parameters let you adjust how much texture to put back into the smoothed result.

- **Texture Gain:** Lets you exaggerate recovered texture (at values higher than 1), or minimize recovered texture (at values less than one).
- **Texture Threshold:** Lets you set the threshold at which detail is reintroduced to the image. Texture Threshold must always be equal to or lower than Smoothing Threshold, so lowering Smoothing Threshold may also result in lowering Texture Threshold.

Face Refinement (Studio Version Only)

Face Refinement is an incredibly sophisticated yet easy-to-use filter that lets you quickly make very targeted adjustments to people's complexions. When you apply this filter, imaging techniques are used to automatically detect a face, which is automatically tracked so long as it's somewhat turned toward the camera.

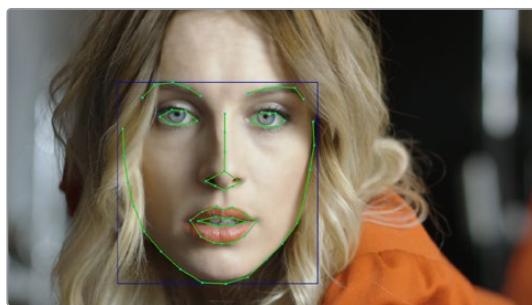
If multiple faces are present in the frame at the position of the playhead, then clicking the Analyze button once results in boxes being drawn over each detectable face. Click any of these boxes to choose which face you want to refine, and that box will be highlighted to indicate which face you'll be refining.



When multiple faces are detected, you can click a box to choose which one to work on

If only one face is present, clicking the Analyze button automatically analyzes that face; no boxes appear and this step is not necessary.

After you've selected which face to track (if necessary), you need only click the Analyze button at the top of the Face Refinement controls to "auto-magically" track the face through the trackable range of motion that this plug-in is capable of, and an outline of the face's major features appears to let you follow its progress.



The Face Refinement filter automatically detecting a performer's face

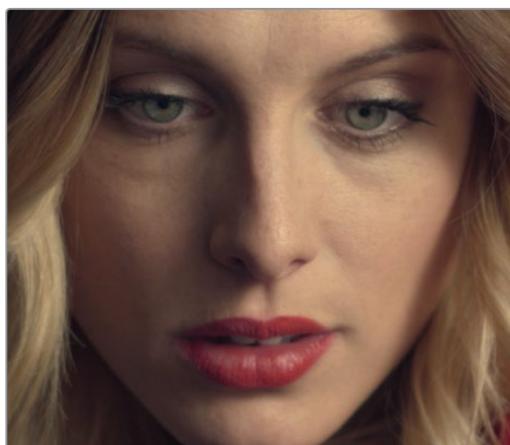
Once the face has been tracked, you're ready to work. This plug-in divides the tracked face into different zones for common operations colorists often perform to quickly eliminate blemishes, adjust the hue and saturation of complexions in regionally appropriate ways, modify lighting, sharpen desirable detail, and refine makeup. Because all adjustments are fit to the proportions

of the face that's been detected and tracked, all you need to do is make the adjustments you need and DaVinci Resolve takes care of the rest.

Main Controls

The Analyze button initiates the process of using the facial detection of the Face Refinement plug-in to detect the face you want to make adjustments for, and track its motion throughout the range of the clip. You only need to do this once, and the data will be stored

- **Smoothing:** This slider removes detail from the areas isolated by the Skin Mask controls, smoothing the complexion. Its operation depends on the settings of the Detail Size and Detail sliders below. You may find you can increase Smoothing more dramatically as you increase Detail using the Detail Size and Detail sliders described below.
- **Detail Size and Detail:** Once you've used the Smoothing slider, you can then use these sliders to selectively put subtle skin details back into the image; Detail size determines the maximum size of details you want to put back into the face, and Detail is a sharpening operation that lets you adjust how visible these small details are. By combining smoothing and subtle preservation of small details, you can get a much more naturalistic result than were you to simply leave the entire face unnaturally smooth.



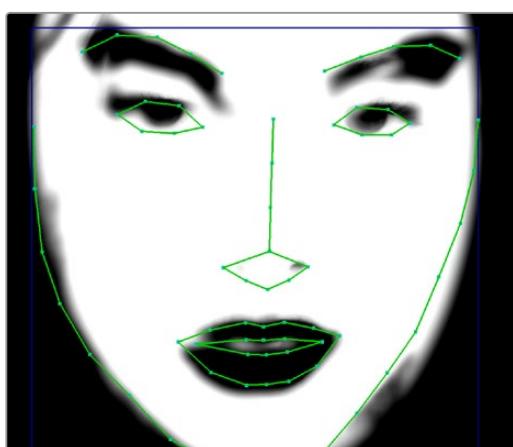
(Top) The original image, (Bottom Left) Only smoothing complexion, (Bottom Right) Using Detail Size and Detail to put natural texture back into the smoothed result (results exaggerated for print)

- **Contrast:** This slider lets you lighten the face in a natural way by keeping the shadows dark even while you brighten the face, making it easy to bring actors out of the background.

Skin Mask

These controls let you adjust the skin mask this plug-in automatically generates in order to limit the effect to only the face of the person you're targeting.

- **Use mask:** This checkbox enables DaVinci Resolve to sample the dominant skin tone values within the face to create a complexion-focused key to isolate the skin tones of the image. However, since it's still possible to have blonde hair, wood panelling, or other skin-colored features in the frame that inadvertently get included in this key.
- **Use face mask:** Turning on this checkbox places a circular garbage mask that follows the face to eliminate these accidental inclusions.
- **Face mask size and Face mask softness:** These sliders let you adjust the face mask to better fit the face you're working on, if necessary.
- **Refine mask:** This slider lets you adjust the face mask to smooth or eliminate gaps in the key.
- **Show mask:** This checkbox makes the face mask being generated visible, which can be helpful to see while you're tuning it.
- **Show overlay:** To impress your clients and see how well Face Detection is tracking the face you're working on, you can turn on this checkbox, which turns on the wireframe tracking that shows you which facial details are being detected.



Limiting the key with the face mask

Color Grading

These controls let you make color adjustments to the overall face.

- **Midtone:** Lets you add a more luminous quality to the skin tone.
- **Color boost:** Specifically boosts saturation in the lowest saturated parts of the face.
- **Tint:** Provides a limited range of naturalistic hues emphasizing orange through red (but extending to green and magenta) with which to tweak complexion.
- **Desaturate shadow:** This slider lets you selectively desaturate the darkest shadows on the face to keep things looking natural, or to desaturate more aggressively in order to stylize the face in a different way. Also useful when using the other adjustments of this plug-in makes the shadows too colorful. Moving this slider into negative values will add saturation.
- **Shine Removal:** This slider is an inverse contrast adjustment designed to ameliorate sweat and shine on a person's face, although moving this slider into negative values will also accentuate shine.

Eye Retouching

These controls target just the eyes and surrounding area of the face.

- **Sharpening:** This slider lets you selectively add sharpening just to the eyes and eyelashes, which lets you instantly add focus to any performer.
- **Brightening:** This slider lets you whiten the eyeballs.
- **Eye Light:** This slider lets you brighten the region of the face around the eyes that's often thrown into shadow by the subject's forehead in situations with imprudent lighting.
- **Eyebag Removal:** This slider uses a variety of techniques to smooth, color-adjust, and brighten the area under the eyes most susceptible to eye bags with tired talent.



Eyes with no special adjustment



Eyes with adjustment

Lip Retouching

These controls target just the lips and surrounding area of the mouth.

- **Hue:** This slider lets you adjust the color of a subject's lips or lipstick.
- **Saturation:** This slider lets you adjust the intensity of lip color.
- **Upper Lip Smooth:** Lets you smooth out fine age lines that can appear above lips.

Blush Retouching

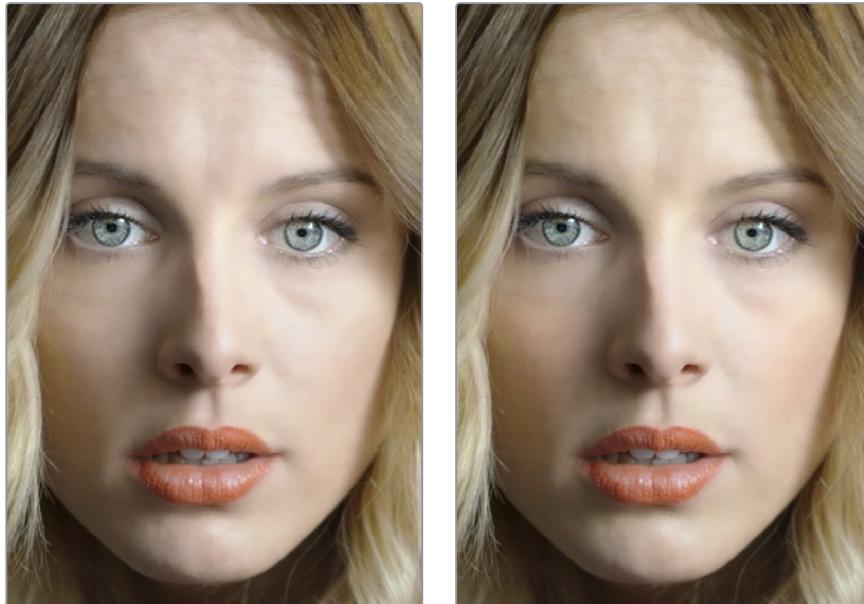
The parameters in this group let you modify the hue of the blush region of a subject's cheek, letting you correct an unwise makeup choice, or push a subject's blush color around to add makeup that wasn't there.

- **Hue:** This slider lets you adjust the hue of the cheeks.
- **Saturation:** This slider then lets you intensify or remove blush color.
- **Size:** This slider lets you adjust the size of the blush area of the cheeks.

About Forehead, Cheek, and Chin Retouching

The next three groups of controls borrow a technique from portrait painters, who've long taken advantage of the "traffic light" approach to rendering skin hues, that observes that foreheads are often a bit yellow, the middle of the face is usually a bit red, and chins can be a bit green.

A combination of unequal sun exposure, capillary distribution, and follicle growth account for this, but the bottom line is that faces are seldom a single unified hue. This means that there may be a region of the face that would benefit from individual adjustment (cheeks that have gotten too much sun, for example). But it also means that when you allow a bit of hue variation into your face grade, you can achieve a more naturalistic result.



(Left) A face graded with a single hue, (Right) A face graded with slight variation in the forehead, blush area, and chin

TIP: For a variety of reasons, people are extremely sensitive to the hues of skin tone, so tiny variations that can be difficult to identify nevertheless have a significant impact on the resulting visuals. Unless you're aiming to create a special effect, these controls are meant to be used sparingly.

Forehead Retouching

As the name implies, adjusts color and texture on the forehead.

- **Hue and Saturation:** These sliders let you adjust forehead color.
- **Smooth:** This slider lets you apply a specific smoothing operation to the forehead to ameliorate wrinkles and worry-lines.

Cheek Retouching

Simple color adjustment controls affecting the entire cheek area, and not just the blush area.

- **Hue and Saturation:** These sliders let you adjust the color of the cheek, eye, and nose area.

Chin Retouching

Simple color adjustment controls over the chin of the face.

- **Hue and Saturation:** These sliders let you adjust the color of the chin, running up alongside the sides of the face (the beard area).

ResolveFX Revival

This category consists of plug-ins that let you fix common technical, damage, and quality problems that bedevil programs being finished, remastered, or restored.

Automatic Dirt Removal (Studio Version Only)

The Automatic Dirt Removal plug-in uses optical flow technology to target and repair temporally unstable bits of dust, dirt, hair, tape hits, and other unwanted artifacts that last for one or two frames and then disappear. All repairs are made while maintaining structurally consistent detail in the underlying frame, resulting in a high quality restoration of the image. Fortunately, despite its sophistication, this is a relatively easy plug-in to use; just drop the plug-in on a shot, adjust the parameters for the best results, and watch it go.



(Left) Original image, (Right) Using Automatic Dirt Removal

NOTE: This plug-in is less successful with vertical scratches that remain in the same position for multiple frames and is completely ineffective for dirt on the lens that remains for the entire shot.

Main Controls

The primary controls used to adjust how much dirt is removed from the image.

- **Motion Estimation Type:** Lets you choose from among None, Faster, Normal, and Better. This tunes the tradeoff between performance and quality.
- **Neighbor Frames:** Lets you choose how many frames to compare when detecting dirt. Choosing more frames of comparison takes longer to process, but usually results in finding more dirt and artifacts.
- **Repair Strength:** This slider lets you choose how aggressively to repair dirt and artifacts that are found. Lower settings may let small bits through that may or may not be actual dirt, while higher settings eliminate everything that's found.
- **Dirt Size Threshold:** This slider lets you tune how large a detected bit of dirt must be to be removed. Raising this parameter lets you omit things like film grain from the operation but may allow smaller bits of dirt through.
- **Show Repair Mask:** This checkbox lets you see the dirt and artifacts that are detected by themselves, so you can see the effectiveness of the results as you fine tune this filter.

Fine Controls

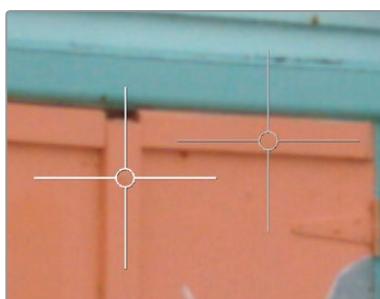
These controls let you fine tune the effect in an effort to perfect the tradeoff between removing dirt successfully and preserving true image detail.

- **Motion Threshold:** This slider lets you choose the threshold at which pixels in motion are considered to be dirt and artifacts. At lower values more dirt may escape correction, but you'll experience fewer motion artifacts. At higher values, more dirt will be eliminated, but you may experience more motion artifacts in footage with camera or subject motion.
- **Edge Ignore:** This slider lets you exclude hard edges in the picture from being affected by dirt or artifacts that are removed. Higher values omit more edges from being affected.

Dead Pixel Fixer (Studio Version Only)

If you have clips that were shot on a camera with one or more “dead” or “stuck” pixels in the sensor, you may have black or white spots that are fixed in place in the image. This filter is designed to let you place crosshairs on each dead or stuck pixel, identifying them so you can use different methods of fixing the problem.

To fix dead or stuck pixels, apply the Dead Pixel Fixer filter, make sure the OFX onscreen controls are enabled in the viewer, and then click on each pixel you need to fix with the mouse to place crosshairs on it. You can click anywhere on the image to place as many crosshairs as you like, there's no limit. You can also Option-click to delete crosshairs you no longer need. To move any crosshairs, simply drag it to another location.



Multiple dead pixel removal targets

When you place multiple crosshairs, you can click to select whichever crosshairs you want to adjust the controls for. Each crosshairs can have different control settings, or you can select multiple crosshairs by Command-clicking all the ones you want to adjust.

Remover-Patch Properties

These controls let you adjust the operation of selected crosshairs you've placed in the Viewer.

- **Fill-in Method:** This pop-up menu provides two methods of fixing problem pixels: “Blend from surround” and “Clone from Elsewhere.” Blend from surround is the default, which automatically blends surrounding pixels to eliminate the problem. Clone from Elsewhere exposes a second sample control that you can drag onto an adjacent part of the picture to clone pixels to fix the problem.
- **Remover size:** This slider lets you change the size of the region you're fixing.
- **Softens:** Lets you switch between a hard (value of 0) or soft (value of 3) edge.

Control Visibility

The Control Visibility pop-up menu lets you choose whether the source and target onscreen controls are visible as you work. Show (the default) leaves all onscreen controls visible all the time. Auto Hide hides all onscreen controls whenever you're dragging one, letting you see the image as you adjust it without having these controls in the way. Hide makes all onscreen controls invisible, so you can see a clean version of the image with the effect, however you can still edit the effect if you remember where the controls are.

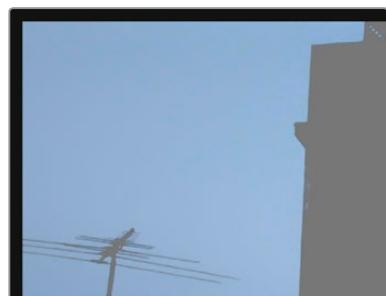
Deband (Studio Version Only)

Low bit-depth media that has areas with shallow gradients of color, such as a sky or a wall, often exhibit color banding, seen as visible stripes, because there aren't enough color values to smoothly represent the gradation from light blue to darker blue in the sky.



An example of banding in the sky of an image

This filter is designed to isolate the edges of color banding and minimize them by dithering pixels from either side to soften the transition. This filter works best when applied to regions of the image that have been isolated with a secondary qualifier or window, otherwise you risk all edges within your image being dithered and thus softened (although this can be an interesting stylistic effect).



Minimizing banding using the Deband filter

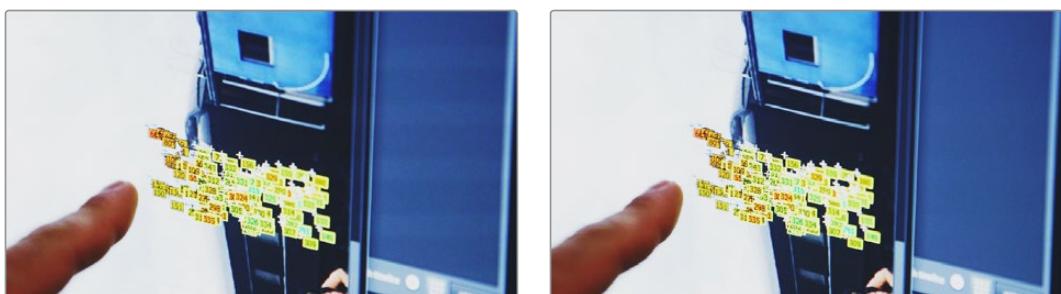
Deband Parameters

Deband controls include:

- **Edge Threshold:** Adjusts how well-defined an edge needs to be in order to be affected by this filter; lowering this excludes fainter edges, while raising this includes them.
- **Radius:** Lowers or raises the intensity of dithering in areas that will be affected.
- **Post Refine:** Narrows (by lowering) or widens (by raising) the areas affected by dithering.
- **Display Edge:** A checkbox that shows you a black and white high-contrast preview of which edges are being detected for dithering, which can help you fine-tune your results.

Deflicker (Studio Version Only)

Introduced in DaVinci Resolve 15, this plug-in replaces the previous Timelapse Deflicker filter, and solves a far broader variety of problems in a much more automatic way. The new Deflicker plug-in handles such diverse issues as flickering exposure in timelapse clips, flickering fluorescent lighting, flickering in archival film sources, and in certain subtle cases even the “rolling bars” found on video screens shot with cameras having mismatched shutter speeds. Two key aspects to this filter are that it only targets rapid, temporally unstable variations in lightness, and that it’s able to target only the areas of an image where flickering appears, leaving all other parts of the image untouched. As a result, this plug-in can often repair problems once considered “unfixable.”



(Left) Original image with flicker, (Right) Result setting Deflicker to Fluoro Light, (clip courtesy Redline Films)

Main Parameters

By default, the top section of this plug-in exposes a single control, which in many cases may be all you need.

- **Deflicker Setting pop-up menu:** The top two options, Timelapse and Fluoro Light, are presets that effectively eliminate two different categories of flickering artifacts. If neither of these presets is quite as effective as you’d hoped, a third option, Advanced Controls, opens up the Isolate Flicker controls at the heart of this plug-in to let you tailor it further to your needs.

Isolate Flicker

Hidden by default, these controls only appear when you set Deflicker Setting to Advanced Controls, and let you choose how to detect motion in the scene so that flickering may be correctly addressed relative to the motion of subjects and items within the frame where it appears.

- **Mo.Est. Type:** Picks the method DaVinci Resolve uses to analyze the image to detect motion. Despite the names of the available options, which options will work best is highly scene dependent. The default, Faster, is less processor intensive, but less accurate, however this can be an advantage and actually do a better job with high detail images that would confuse the Better option. Choosing Better is more accurate, but more processor intensive, and Better will try harder to match fine details which can sometimes cause problems. None lets you disable motion analysis altogether, which can work well (and will be considerably faster) in situations where there’s no motion in the scene at all. The default is Better.
- **Frames Either Side:** Specifies the number of frames to analyze to determine what’s in motion. Higher values are not always better; the best setting is, again, scene dependent. The default is 3.
- **Motion Range:** Three settings, Small, Medium, and Large, let you choose the speed of the motion in the frame that should be detected.

- **Gang Luma Chroma:** Lets you choose whether to gang the Luma and Chroma Threshold sliders or not.
- **Luma Threshold:** Determines the threshold above which changes in luma will not be considered flicker. The range is 0–100, 0 deflickers nothing, 100 applies deflickering to everything. The default is 100.
- **Chroma Threshold:** Determines the threshold above which changes in chroma will not be considered flicker. The range is 0–100, 0 deflickers nothing, 100 applies deflickering to everything. The default is 100.
- **Motion Threshold:** Defines the threshold above which motion will not be considered flicker.

Speed Optimization Options

Closed by default, opening this control group reveals two controls:

- **Reduced-Detail Motion checkbox:** On by default, reduces the amount of detail that's analyzed to detect flicker. In many cases, this setting makes no visible difference but increases processing speed. Disable this setting if your clip has fine detail that is being smoothed too aggressively.
- **Limit Analysis Area checkbox:** Turning this on reveals controls over a sample box that you can use to limit deflickering to a specific region of the image. This option is useful when (a) only one part of the image is flickering, so focusing on just that area speeds the operation considerably, or (b) part of the image is being smoothed too much by deflickering that's fixing another part of the image very well.

Restore Original Detail After Deflicker

Closed by default, opening this control group reveals two controls:

- **Detail to Restore slider:** Lets you quickly isolate grain, fine detail, and sharp edges that should not be affected by the deflicker operation, preserving those fine details exactly.
- **Show Detail Restored checkbox:** Turning this checkbox on lets you see the edges that are detected and used by the Detail to Restore slider, to help you tune this operation.

Output

The Output pop-up menu lets you choose what Deflicker outputs, with options to help you troubleshoot problem clips. Here are the available options:

- **Deflickered Result:** The final, repaired result. This is the default setting.
- **Detected Flicker:** This option shows you a mask that highlights the parts of the image that are being detected as having flickering, to help you evaluate whether the correct parts of the image are being targeted. This mask can be very subtle, however.
- **Magnified Flicker:** This option shows you an exaggerated version of the Detected Flicker mask, to make it easier to see what the Deflicker plug-in is doing.

Dust Buster (Studio Version Only)

This plug-in is also designed to eliminate dust, dirt, and other imperfections and artifacts from clips, but it does so only with user guidance, for clips where the Automatic Dirt Removal plug-in yields unsatisfactory results. This guidance consists of moving through the clip frame-by-frame and drawing boxes around imperfections you want to eliminate. Once you've drawn a box, the offending imperfection is auto-magically eliminated in the most seamless way possible. This works well for dirt and dust, but it also works for really big stains and blotches, as seen below.



(Left) Drawing a box around dirt in the original image, (Right) Result in the Dust Buster plug-in

This plug-in works similarly to, but supersedes the legacy Dust Removal feature, which only worked on select image sequence formats and wrote new media files on disk. The Dust Buster plug-in works on any format of movie clip and works non-destructively, storing all image repairs within the plug-in without creating new media. Best of all, this plug-in is able to do its magic with only three controls.

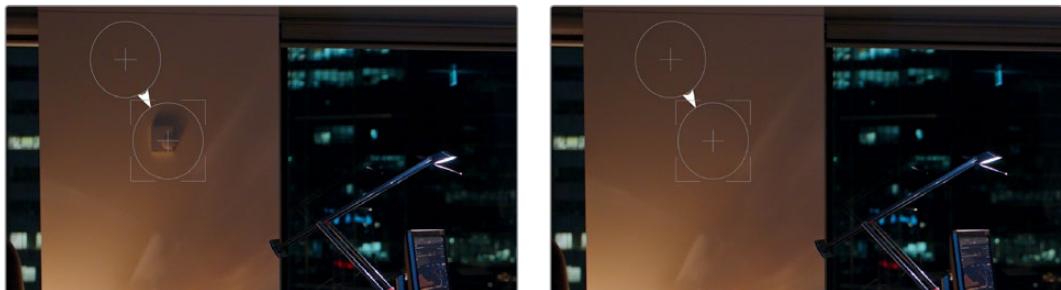
- **Mode:** Selects how imperfections within the bounding box you draw are fixed. By default, Auto just takes care of things without you needing to think about this. However, if you're not satisfied with the result, you can undo and choose a different method from this pop-up menu. Here are all the options that are available to you.
 - **Auto:** The default method. Once you've drawn a bounding box, the two frames prior to and the two frames after the current clip will be analyzed and compared to the current image. The best of these 5 frames will be drawn upon to remove the imperfection in the current frame. Images two frames away are prioritized since that will avoid the appearance of frozen grain, but only if they're suitable.
 - **Prev/Next Frame:** If you draw a bounding box from left to right, the next frame will be drawn upon to remove the imperfection. If you draw a bounding box from right to left, the previous frame will be used.
 - **Prev-1/Next+1 Frame:** If you draw a bounding box from left to right, the image two frames forward will be drawn upon to remove the imperfection. If you draw a bounding box from right to left, the image two frames back will be used.
 - **Spatial Fill:** In cases where the other two modes yield unsatisfactory results, such as when the underlying image has fast or blurred motion, this mode uses surrounding information in the current frame to remove the imperfection.
- **Show Patches:** Off by default. Turning this checkbox on lets you see every bounding box you've drawn to eliminate imperfections. While the patches are shown, you can Shift-click to select individual patches, group select patches by Command-dragging a bounding box, and delete unwanted patches individually by Option-clicking them.
- **Reset Frame:** Resets all of the bounding boxes drawn on the current frame, so you can start over.

Patch Replacer (Studio Version Only)

The Patch Replacer is a quick fix when you need to “paint out” an unwanted feature from the image. For those of you who've been using windows and Node Sizing to do small digital paint jobs, this plug-in offers more options and a streamlined workflow.

On adding the plug-in, an onscreen control consisting of two oval patches appears, with an arrow connecting them indicating which patch is being copied into the other. The oval to the left is the “source” patch, used to sample part of the image, and the oval to the right is the “target” patch, used to cover up the unwanted feature using pixels from the source patch.

To use the Patch Replacer, simply drag the target patch over the feature you want to obscure, resize it to fit using the corner controls (the source patch is automatically resized to match), and then drag the source patch to an area of the image that can convincingly be used to fill the target patch.



(Left) Original image, (Right) Removing the thermostat with the Patch Replacer

The source and target patches can be motion tracked using the FX tracker, so this tool is effective even if the subject or camera is moving.

Main Controls

The Fill-in Method pop-up menu is arguably the most important, as it defines what method to use to fill the destination patch with whatever is in the source patch. The rest of the primary controls work differently depending on which Fill-in method you choose.

- **Clone:** Simply copies the source patch into the target patch. When Clone is selected, the Replacement Detail slider (which defaults to 1) lets you fade out the source patch, while Region Shape lets you choose a different kind of shape to use, and Blur Shape Edges lets you feather the edge of this operation, to more convincingly blend the source with the target area.
- **Adaptive Blend:** A much more sophisticated method of obscuring the target area using pixels from the source patch, and in many cases will yield better results more quickly than cloning. The source patch is copied into the target patch in such a way as to combine the source detail with the lighting found inside of the target area, creating in most instances a fast, seamless match. The Keep Original Detail checkbox, when turned on, merges detail from the source and target patches to create a composite, rather than a fill. The Blur Shape Edges slider works a bit differently with Adaptive Blend selected, but the idea is the same, feathering the effect from the outside in to obscure instances where there's a noticeable border around the target area.
- **Fast Mask:** Eliminates the source patch, doing instead a quick neighboring pixel blend that works well with small patches but can betray a grid pattern on larger patches. Region Shape and Blur Shape Edges are both adjustable.

Patch Positions

Source X and Y, Target X and Y, and Target Width and Height are provided as explicit controls both for numeric adjustment, should that be necessary, and also to allow for keyframing in case you need to change the position and/or size of the source and fill patches over time.

Keep in mind that the source and target patches can be motion tracked using the FX tracker, although two checkboxes, Source Follows Track and Target Follows Track, let you disable FX tracker match moving when necessary.

Onscreen Controls

The Control Visibility pop-up menu lets you choose whether the source and target onscreen controls are visible as you work. Show (the default) leaves all onscreen controls visible all the time. Auto Hide hides all onscreen controls whenever you're dragging one, letting you see the image as you adjust it without having these controls in the way. Hide makes all onscreen controls invisible, so you can see a clean version of the image with the effect, however you can still edit the effect if you remember where the controls are.

ResolveFX Sharpen

These plug-ins offer a newer and more detailed method of sharpening specific details in images than the sharpen operation found in the Blur palette. Three different plug-ins offer different ways of using the same fundamental algorithm to perform different tasks.

Sharpen (Studio Version Only)

The Sharpen filter functions by separating the image into four levels of detail, the underlying structure, the fine scale details, the medium scale details, and the large scale details, each of which encompasses differently sized structures that comprise the overall image. In this way, the Sharpen filter lets you apply different amounts of sharpening to each of the fine, medium, and large structures of the image, giving you enormous control over how these different structures of image detail are affected.

Main Controls

Controls the overall sharpening effect.

- **Sharpen Amount:** The primary global control that lets you add sharpening to the image. To refine the result, use the controls in Detail Levels to choose how much sharpness to apply to each size of structure this plug-in can operate upon. 1.800 is the default value. 0 is no sharpening, 5.000 is maximum sharpening.

Detail Levels

Lets you customize the sharpen effect in a variety of highly specific ways.

- **Fine Detail Size:** This slider adjusts the threshold of what is considered to be a fine detail, although this also alters which image structures are affected by the Medium and Large Details sliders as well. Lowering this slider omits larger structures of the image from sharpening. The default is 0.050.
- **Fine Detail:** At its default setting, the Fine Details slider governs the sharpness of extremely fine detail such as skin pores and strands of hair, or small speckles on textured surfaces. Lower settings apply less sharpening to these structures, while higher settings apply more sharpening.
- **Medium Details:** This slider governs the sharpness of coarser detail such as freckles, wrinkles, clusters of hair, and surface details with greater edge definition. Lower settings apply less sharpening to these structures, while higher settings apply more sharpening.
- **Large Details:** This slider governs the sharpness of the largest details in the image, such as eyelids, the shadows at the edges of lips and noses, and the edges where hair meets the face, and the most contrasty edge details throughout the image. Lower settings apply less sharpening to these structures, while higher settings apply more sharpening.

Chroma

A special purpose control that you want to handle with care.

- **Sharpen Chroma:** Selectively sharpens the chroma of the image while leaving the luma (Y) alone.

Sharpen Edges (Studio Version Only)

A variation of the Sharpen filter that's streamlined for detecting edges to create a key used to limit sharpening to the selected edge details of an image. This is a good filter to use when attempting to make mildly soft-focus clips less objectionable.

Main Controls

Controls the overall sharpening effect accomplished with this plug-in.

- **Sharpen Amount:** The primary global control for adding sharpening to the edges detected by this filter.
- **Sharpen Radius:** Controls the granularity of the detail that's added using Sharpen Amount.

Edge Detection Controls

These controls let you customize the sharpen effect in very specific ways.

- **Display Edges:** This checkbox lets you see a grayscale preview of the edges that are being detected for sharpening while you use the other controls in this group. If you turn this checkbox on, you can see precisely the effect that the four other controls in this section have on the key that determines which parts of the image are sharpened.
- **Pre Denoise:** Smooths the matte to remove individual pixels of noise. Reducing Pre Denoise lets you minimize edges from the key that you don't want to sharpen and soften edges that are jagged because of excessive noise. Raising Pre Denoise adds more edges to the sharpening operation and strengthens the edges that are already there.
- **Edge Detect Threshold:** Lets you adjust how strong edge detail needs to be in order to be included in the key. Reducing this parameter includes more edges in the operation, while raising it excludes edges from the operation.
- **Edge Mask Strength:** Lets you increase the intensity of the edges in the key. Reducing Edge Mask Strength diminishes the edges and reduces the intensity of sharpening in those areas. Raising Edge Mask Strength intensifies the edges and adds more of the image within the region of each detected edge to the sharpening operation.
- **Edge Blur:** Lets you control the softness of the edges in the key. Reducing Edge Blur sharpens the key and narrows the edges that are affected by sharpening. Increasing Edge Blur softens the key and potentially includes a wider area of image detail in the sharpening operation.

Soften and Sharpen (Studio Version Only)

A variation of the Sharpen filter that's streamlined for letting you both smooth some details and add sharpness to other details of the image based on the size of the structures. It can be used with any image for which you want to smooth some features while sharpening others, but this is an operation that's often used for minimizing unwanted blemishes, wrinkles, or scarring when used within a window or qualifier that's isolating the skin.

The advantage of using Soften and Sharpen is that you can use the Small Texture slider to leave a bit of natural skin detail intact, such as pores and other small naturalistic details, while you use the Medium and Large Texture controls to smooth out unwanted details in whatever proportion gives you a naturalistic result.

TIP: The best way to achieve a more natural result is to leave Small Texture at 0 or just above, while reducing Medium Texture just enough to minimize whatever details merit minimizing and reducing Large Texture by somewhat less to minimize larger blemishes, while leaving overall face detail intact. This is the logic behind the default values of Small 0.000, Medium –0.800, and Large –0.300.

Main Controls

Each of the Small, Medium, and Large Texture sliders can be moved into both negative and positive values. A value of 0 means no change is made to the corresponding details of the image. Negative values remove the corresponding details from the image, eventually leaving only the underlying smooth structure of the image at –1.000. Positive values add sharpness to the corresponding details of the image, to a maximum value of 1.000.

- **Small Texture:** Affects extremely fine detail such as skin pores and strands of hair.
- **Medium Texture:** Impacts coarser detail such as freckles, wrinkles, and clusters of hair.
- **Large Texture:** Affects the largest details in the image such as eyelids, eyebrows, the edges of lips and noses, and the edges where hair meets the face.

TIP: What's identifiable as a small, medium, or large structure depends in large part on how the subject of the shot is framed. These structures differ depending on whether you're grading a subject in a long shot (where they appear small) versus a subject in closeup (where they appear large).

Adjust Small Skin Texture Granularity

This control lets you adjust the distinction between the Small and Medium/Large texture controls in the previous group of controls.

- **Small Texture Size:** Defines the threshold that differentiates Small Textures from Medium and Large Textures, to help you fine-tune the Small Texture that you want to preserve. Raising this value includes more of the image as small details, while lowering this value excludes more of the image from small details.

ResolveFX Stylize

The plug-ins found in this category all enable different ways of creating artistic modifications to the image.

Abstraction (Studio Version Only)

A deceptively powerful filter that lets you create a wide range of cartoon-like renders by simplifying an image into adjustable pools of similar color with optional outlines.

Main Controls

These controls create the foundation of this effect.

- **Pre Blur:** Simplifies the image by blurring unwanted details prior to this filter taking effect.
- **Abstraction Strength and Iterate Abstraction:** These parameters work together to then smooth the image, creating pools of simplified color within the details of the image.
 - **Abstraction Strength:** Must be higher than 0 for the Iteration No. parameter to have an effect. Higher Abstraction Strength simplifies image detail even more by averaging adjacent regions of color together.
 - **Iterate Abstraction:** Reduces the amount of small detail in the image even further by “widening” adjacent areas of similar color to blend together as one.

Quantization Controls

These controls simplify the pools of color even more aggressively by quantizing the bit depth used to stylize the image. The result is an even sharper flattening of each region of color.

- **Quantization:** A checkbox turns this function on.
- **Steps:** Raising this parameter lets you subdivide each region of color into a greater number of separate regions.
- **Softness:** Lets you blur the border between each level of color.

Draw Edge Controls

Adds an edge to the regions of color created by this effect.

- **Draw Edge:** Enables edge drawing.
- **Edge Strength:** Raising this value results in thicker and better-defined edges.
- **Edge Detection Threshold:** Raising this value restricts edges to only the boldest edge details in the picture.

Blanking Fill

This plug-in is specifically designed to quickly fill black frame blanking with a stylized image derived from the clip itself, to make blanking less intrusive for viewers in documentaries and news segments. In the following example, the Blanking Fill plug-in is used to add image to the left and right of “pillarboxed” standard definition 4:3 video that appears within a High Definition or Ultra High Definition 16:9 aspect ratio.



(Left) Original standard definition image, (Right) Image with default Blanking Fill applied

A variety of controls let you easily customize this effect to suit your own purposes.

Source

These controls let you transform the clip in different ways, which also affects how that clip is used to fill the blanking area.

- **Zoom:** Zooms the clip while keeping it within the native domain of definition. Good for quickly cropping unwanted pixels around the edges so they're hidden and aren't used for blanking fill.
- **Crop Sides:** Crops both the left and right edges of the image and increases the area at the sides with blanking fill.
- **Crop Top & Bottom:** Crops both the top and bottom edges of the image and increases the vertical area with blanking fill.

Fill Extent

These controls let you choose how the current duplicate of the image is stretched to fill the blanking area.

- **Zoom Mode:** There are three options:
 - **Stretch to Timeline:** Automatically warps the image to stretch it to fit the full frame. Keeps features in the blanking fill area level with where they appear in the original image.
 - **Zoom to Timeline:** Automatically zooms into the image to fit the full frame. Results in the clip looking "inset" from the blanking fill image.
 - **Manual:** Reveals Expand and Aspect sliders that let you manually choose how much to zoom and stretch the image to fit the blanking fill area.
- **Expand:** (Only appears when Zoom Mode is set to Manual) Zooms the image.
- **Aspect:** (Only appears when Zoom Mode is set to Manual) Stretches the image.

Fill Appearance

These controls let you change the look of the image being used to fill the blanking area.

- **Blend Edges:** Lets you feather the edges where the original image meets the blanking fill area.
- **Blur Background:** Lets you choose how much or how little to blur the image that fills the blanking fill area.
- **Fade Amount:** Lets you fade or tint the blanking fill area. At 0, there's no fade applied. At 1.000, the blanking area is filled with a solid color defined by the Fade Color control.
- **Fade Color:** A color picker/eyedropper combination that lets you choose a color with which to fade, tint, or fill the blanking fill area.

Drop Shadow

These controls let you add a drop shadow to “lift” the foreground image against the blanking fill image.

- **Shadow Strength:** Lets you choose how solid the drop shadow appears.
- **Drop Angle:** Lets you choose the angle the drop shadow appears at. At 0 the drop shadow is centered.
- **Drop Distance:** Offsets the drop shadow farther in the direction of the Drop Angle
- **Blur:** Softens the drop shadow.
- **Color:** Tints the drop shadow.

Edge Detect

An edge detection effect with options for customizing which edges create outlines.

- **Mode:** Lets you choose between RGB and Grayscale edges. RGB is the default.
- **Edge color:** (only enabled if Mode is set to Grayscale) Lets you colorize the edge outlines that are generated.
- **Threshold:** Determines the lightness level that's used for edge creation.
- **Smooth:** Lets you soften these edges.
- **Brightness:** Lets you adjust edge intensity.
- **Denoise Type:** Can be switched between Soften and Sharpen, to preprocess the image.
- **Denoise Strength:** Raise this slider to emphasize dominant outlines and de-emphasize weak ones.
- **Edge Mask Overlay:** This checkbox lets you superimpose the edges created with this filter over the RGB image via a multiply operation.

Emboss

An emboss effect with several options to create different kinds of outline and emboss effects.

- **Emboss Style:** This pop-up lets you choose from among Relief, Emboss Over, Sobel, and Laplacian types of embossing.
- **Power:** Lets you adjust how pronounced the emboss effect is.
- **Angle:** Lets you choose the apparent angle at which the emboss effect is rendered.

Channels

Three checkboxes let you choose to use the Red, Green, and Blue channels to create this effect.

JPEG Damage

Simulates the kinds of minor or major artifacts you get when doing JPEG compression; useful for simulating compression damage.

- **Quality:** Lets you lower the bit depth of the image.
- **Resolution:** Lets you increase the size of macroblocking artifacts that appear.
- **Block Aspect Ratio:** Lets you adjust the macroblocks to be more square or rectangular.
- **Frequency Scale:** Sharpens the effect.
- **Scale Component:** Lets you base this effect on All Frequencies, the X-Frequency, or the Y-Frequency.

Mirrors

An effect that lets you reflect part of the image in any direction you like. At its simplest, this can create a split mirror effect like that found at the end of Prince's "When Doves Cry." At its most complicated, multiple reflections can be set up, to create whirling Kaleidoscope patterns in the image.

Main Controls

These controls let you choose what kind of effect this plug-in has.

- **Mirror Placement:** Lets you choose different types of mirror effects including Individual (a simple reflection), Rosette, and Kaleidoscope.
- **Reflect at Borders:** Lets you add another reflection of the image whenever the angle and position of your reflection would result in offscreen black coming into the frame.

Individual Controls

When Mirror Placement is set to Individual, a series of six sets of Mirror parameters lets you add multiple mirrored edges in different combinations; by default only one is on, but you can turn more edges on to create more complicated mirror effects. Each group of Mirror parameters has the following parameters:

- **Enable Mirror:** Turns that mirror reflection on.
- **X and Y Position:** Positions the center of the mirror split reflection.
- **Angle:** Lets you adjust the angle of the seam along which a reflection will run.
- **Flip:** Flips which side of the image is reflected.

Rosette Controls

When Mirror Placement is set to Rosette, a single set of parameters creates a variety of circular patterns.

- **X and Y Position:** Positions the center of the circular rosette reflection.
- **Angle:** Lets you adjust the orientation of the rosette pattern about its center.
- **Wedge Width:** Lets you adjust the thickness of the wedges around the outside of the rosette pattern, and by extension how many wedges there will be. Thicker wedges results in fewer reflections around the rosette pattern and thinner wedges result in more reflections around the rosette pattern.

Kaleidoscope Controls

When Mirror Placement is set to Kaleidoscope, a single set of parameters lets you create a variety of kaleidoscopic images:

- **X and Y Position:** Positions the center of the mirror split reflection.
- **Center Size:** Lets you shrink or expand the cells comprising the kaleidoscopic image.
- **Angle:** Lets you adjust the angle of the seam along which a reflection will run.
- **Number of Sides:** Three sides produce a triangular pattern, while four sides produce a rectilinear pattern aligned with the currently selected angle.

Prism Blur

Simulates flat chromatic aberration and a vignetted lens.

- **Blur Strength:** Lets you blur the primary image.
- **X and Y Position:** Let you change the center of the effect within the frame about which chromatic aberration is created.
- **Aberration Distance:** Adjusts how far the aberration effect appears from the source image.
- **Aberration Strength:** Intensifies the zoom blur used to create the chromatic aberration effect to intensify it.
- **Vignette Size:** Lets you add edge vignetting to the image; setting this to 0 removes the vignette, while 1 is the maximum size of a vignette using this filter.
- **Vignette Sharpness:** Lets you adjust the feathering of the vignette effect; lowering this value softens the edge, while raising this value sharpens, but never fully eliminates the softness from this edge. The Vignette effect is designed to fall off in a way that simulates how a lens would exhibit vignetting.

Scanlines

Simulates television scanlines, or any effect where you want alternating lines to darken the image. A variety of parameters makes this an extremely flexible effect that can be applied in numerous ways.

Appearance

Let you customize the type of scanline effect you want.

- **Line Frequency:** Lets you choose how many or few lines are superimposed on the image; fewer lines automatically space themselves to be thicker as they're uniformly distributed across the image.
- **Line Sharpness:** Lets you blur the border between each line, softening the effect.
- **Line Angle:** Lets you rotate the lines to appear at any angle; the default is 0 which results in horizontal lines.
- **Line Width:** Lets you increase or decrease the width of the blanking lines that obscure the image (which default to black but are tinted by the Color 2 parameter), thus increasing or decreasing the amount of image showing through.
- **Line Shift:** Lets you offset the lines being overlaid on the image. Animating Line Shift lets you create a rolling scanlines effect.

Color

Lets you tint and shift channels of the alternating scanlines created by this filter. Exaggerated, this can create numerous other stylistic effects.

- **Color 1 and Color 2:** Color picker and eyedropper controls that let you tint each alternating set of lines (eyedroppers let you sample a color from the RGB image being input into the current node).
- **Shift Red, Green, and Blue:** Lets you offset individual channels.
- **Scanlines Only:** Lets you see just the scanlines in isolation while you adjust them.

Composite

Lets you choose how to composite the scanlines effect against the original image.

- **Scanlines Only:** Lets you output an image consisting only of the scanlines pattern you've created. Good for creating different kinds of patterned textures and mattes.
- **Composite Type:** Lets you choose which composite mode is used to blend the scanline effect into the

Tilt-Shift Blur

Main Controls

These controls select and control the overall effect.

- **Blur Type:** You can choose between Fast Blur and Lens Blur (Lens Blur is the default).
- **Blur Strength:** A slider lets you adjust the amount of blur you add.

Lens Iris

The Lens Iris controls are only available when Blur Type is set to Lens Blur. This is a simplified set of controls from those of the Lens Blur filter.

- **Iris Shape:** Lets you choose what type of apertures you want to use, with which to influence the shape of the bokeh effect. Aperture Shape options include Triangle, Square, Pentagon, Hexagon, Heptagon, or Octagon shaped aperture.
- **Blade Curvature:** (Only available with Real and Creative Apertures) Lets you round off the edges of the Aperture Shape you selected.
- **Rotation:** Lets you adjust the angle the shape appears at.
- **Anamorphism:** Lets you adjust the aspect ratio of this effect in order to match the lens blur created by anamorphic lenses.
- **Highlights:** Lets you adjust how the highlights of the image affect the blur, dilating or eroding the image more or less depending on how high Smooth Strength is.

Depth of Field

Additional Depth of Field settings let you adjust the depth map being used to create the depth-of-field effect.

- **Depth Map Preview:** This checkbox lets you see the grayscale depth map directly while making these adjustments. The white area will be blurred, while the black area will be unaffected.
- **Center X, Center Y, and Angle:** These parameters let you transform the depth map.

- **In Focus Range:** Lets you expand or contract the black center of the depth map that defines the blurred region.
- **Near Blur Range and Far Blur Range:** Two parameters let you individually adjust the falloff of the white bottom and top of the depth map.

Watercolor (Studio Version Only)

A variation on the Abstraction filter, this filter reduces images into simplified washes of softly blended colors, in a very painterly fashion.

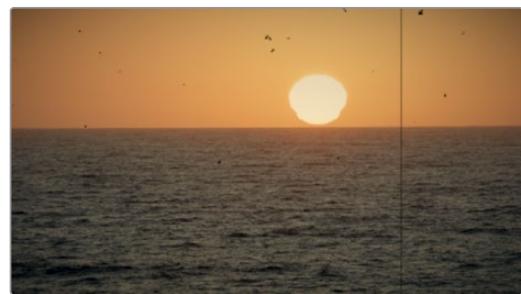
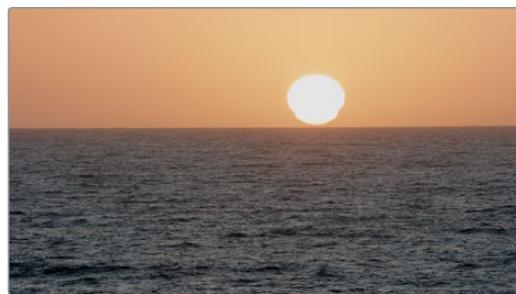
- **Channels:** This pop-up menu lets you choose whether to use Luminance or RGB to derive the smoothed color from.
- **Show Gradient:** This checkbox lets you see the boundaries that define each area of smooth color, based on the value you choose from the Smoothness slider below.
- **Smoothness:** Adjusts the amount of detail in the final result. Low smoothness values result in more detail in the smoothed result, while higher values result in larger pools of lower detail yet smoother color.

ResolveFX Texture

These plug-ins are designed to add texture to images, to replicate both naturalistic and other effects.

Film Damage

Found in the ResolveFX Texture category. After you've used the new ResolveFX Revival plug-ins to fix damage in archival footage, you can turn around and use the Film Damage plug-in to make brand new digital clips look worn, dirty, and scratched instead. When used in conjunction with the Film Grain and Flicker Addition plug-ins, you can convincingly recreate the feel of poorly kept vintage archival footage.



(Left) Original image, (Right) Result with Film Damage

Blur and Shift Controls

The three parameters at the top let you alter the foundation of the image to begin creating the look of an older film.

- **Film Blur:** Adds just a bit of targeted defocusing to knock the digital sharpness out of the image.
- **Temp Shift:** Defaults to warming the image just a bit to simulate the warmer bulb of a film projector, although you can use it to cool or warm the image in varying amounts.

- **Tint Shift:** Defaults to yellowing the image to simulate damage to the film dyes, but you could move the slider in the other direction to add a bit of magenta, simulating a different kind of dye failure.

Add Vignetting

These parameters simulate lens vignetting darkening the edges of the image.

- **Focal Factor:** Adjusts how far the vignetting extends into the image.
- **Geometry Factor:** Affects how dark the vignetting is and how pronounced the edges are.
- **Tilt Amount:** Affects how balanced the vignetting at the top of the image is versus the bottom of the image.
- **Tilt Angle:** Affects how balanced the vignetting left of the image is versus the right, but only when Tilt Amount is set to something other than 0.

Add Dirt

These parameters let you simulate dirt particles (not dust) that have adhered to the film. These are larger specks, although there's several ways you can customize these.

- **Dirt Color:** This control lets you choose what color you want the dirt particles to be (black simulates dirt on a print, while white simulates dirt on a negative).
- **Changing Dirt:** This checkbox lets you alternate between simulating temporarily unstable dirt on the film (checkbox on) and dirt on the lens that doesn't move (checkbox off).
- **Dirt Density:** Lets you choose more or less dirt particles appearing over time. Dirt Size lets you choose the average size of dirt particles to appear.
- **Dirt Blur:** Lets you defocus the dirt, so it's not so sharp.
- **Dirt Seed:** Changes the random distribution of dirt when you change this value, but for any given value, the results for any given set of control adjustments remain consistent.

Add Scratch

Five sets of Add Scratch parameters let you add up to five scratches to the image, simulating something scratching the emulsion while the film played.

- **Scratch Color:** Lets you choose the color you want the scratch to be (scratches can be a variety of colors depending on the depth of the scratch, type of film, and method of printing).
- **Scratch Position:** Lets you adjust the scratch's horizontal position on the image.
- **Scratch Width and Scratch Strength:** Let you adjust the scratch's severity.
- **Scratch Blur:** Lets you defocus the scratch.
- **Moving Scratch:** This checkbox lets you choose whether the scratch is jittering around or not.
- **Moving amplitude:** Determines how far it moves. Moving Speed determines how fast it moves.
- **Moving Randomness:** Determines how it meanders about.
- **Flickering Speed:** Determines how much the scratch flickers lighter and darker in severity.

Film Grain (Studio Version Only)

Composites a procedurally generated layer of simulated “film grain” over the image. Individual simulated grains with falloff are generated to match the resolution of the project.

Main Controls

These controls let you quickly choose and apply a film grain effect.

- **Film Grain Presets:** This pop-up lets you quickly choose from among different 8mm, 16mm, and 35mm film grain effects.
- **Composite Type:** Lets you choose a composite mode with which to combine the image with the grain simulated by this plug-in.
- **Opacity:** Lets you fade the Film Grain effect against the original image.
- **Grain Only:** This checkbox lets you see just the grain layer that you’re creating, so you can evaluate its look prior to it being composited into the image.

Grain Params

The Grain Params group lets you adjust the quality of the grain.

- **Texture:** Larger values create more separation between the grains generated by this plug-in, while smaller values bunch them up closer together to create denser grain patterns.
- **Grain Size:** Larger values zoom into the individual simulated grains generated by this plug-in, while smaller values zoom out.
- **Grain Strength:** Adjusts the contrast of the simulated grain layer. Higher values produce more contrast, lower values less.
- **Offset:** Lightens or darkens the entire simulated grain layer. The practical effect is that lower values emphasize lighter grains, while higher values emphasize darker grains.
- **Symmetry:** An asymmetrical contrast adjustment. Lower values darken the lighter grains, while higher values brighten the darker grains.
- **Softness:** Lets you blur the grain layer to create even softer transitions from one grain to another.
- **Saturation:** Lets you make the grain more or less colorful. At a value of 0, grain is monochrome.

Advanced Controls

In the Advanced Controls, the Shadow, Midtone, and Highlight Gain controls let you adjust the amount of grain that’s composited into each of these tonal regions of the image.

ResolveFX Transform

The plug-ins in this category allow different types of animated and non-animated transforms than are possible in the Sizing palette or Clip Transform controls of the Inspector.

Camera Shake (Studio Version Only)

This effect replicates random camera motion for Horizontal and Vertical position, Rotation, and Zoom. A variety of parameters are provided to let you customize the quality of motion, from slow meandering drift to abrupt, jagged jerks and pops.

Main Controls

The primary controls governing how much camera shake is added.

- **Motion Scale and Speed Scale:** These sliders let you adjust the overall amplitude and speed of camera shake that's introduced to the image.
- **Motion Blur:** Lets you add simulated motion blur to the image being shaken, which can add a more realistic look to the motion. Motion blur is more visible on fast-moving motion, as DaVinci Resolve is simulating the effect of a motion picture camera's shutter speed on exposed subjects in motion.

Shake Levels

These controls let you adjust the intensity of camera shake.

- **Pan Amplitude:** Lets you set how much horizontal motion you want.
- **Tilt Amplitude:** This slider lets you choose how much vertical motion you want. These sliders are completely independent of one another.
- **Rotation Amplitude:** Lets you introduce rotational motion to the camera shake, as well.
- **PTR Speed:** This slider lets you choose how fast the Pan, Tilt, and Rotation camera shake is.
- **Zoom Amplitude:** This slider lets you add zooming to the camera motion being created.
- **Zoom Speed:** This slider lets you choose how fast this random zooming should occur.
- **Zoom Type:** This pop-up menu lets you choose how to add zooming; you can choose Outward Only, Inward Only, or Outward and Inward. If you choose Inward Only, you don't have to worry about blanking appearing around the edges of the frame.

Shake Quality

These controls let you customize the type of shaking you want.

- **Motion Method:** This pop-up menu lets you choose from different ways of generating the motion this plug-in introduces. You can choose from SINE, Rectified SINE, Rectified SINE (Invert), and Square Wave (good for popping or flickering motion).
- **Phase:** This slider lets you set the starting point of the camera shake you're creating, based on the Motion Method and Amplitude settings you've chosen.
- **Randomness Scale:** This slider lets you introduce irregularity to the Horizontal, Vertical, and Rotational motion of the camera shake. The greater this value, the more irregularity will be introduced.
- **Randomness Speed:** This slider lets you choose between smoothly erratic motion (at lower values) or more jagged motion (at higher values).
- **Pause Length:** This slider lets you adjust the frequency of intermittent pauses that break up the random motion added by this filter.
- **Pause Interval:** This slider lets you adjust the duration of intermittent pauses that break up the random motion added by this filter.
- **Pause Randomness:** This lets you add a degree of randomness to the intervals that happen.
- **Random Seed:** This slider lets you alter the value that sets what random values are being produced. Identical values result in identical randomness.

Blanking Handling

These controls let you determine what to do when camera shake causes blanking past the edge of the image.

- **Border Type:** This pop-up menu lets you choose how you want to fill the empty spaces at the edge that appear if the camera shake you create pushes the image out of the current frame size of your project. Four options let you choose to Replicate, Reflect, or Wrap-Around the image to fill the gap.
- **Zoom to Crop:** This slider lets you zoom in on the image to crop out unwanted blanking being introduced by the Camera Shake effect.

Flicker Addition

Why remove flicker with the ResolveFX Flicker Removal plug-in when you can add it instead? Found in the ResolveFX Transform category, the Flicker Addition plug-in adds rapidly animated exposure changes to make the image appear to flicker, creating animated effects that would be difficult to keyframe manually. When applied to an image in different ways, this plug-in can be used to simulate torchlight, firelight, light fixtures with old ballasts or frayed wiring, or any temporally unstable light source. For example, you could key only the highlights of a night-time image, and use Flicker Addition to affect those isolated highlights.

Two groups of controls let you control the quality of this flickering.

Main Controls

These controls let you choose how to apply the flicker, and its overall speed and intensity.

- **Flicker Type:** This pop-up menu lets you apply the flicker as a Lift, Gamma, Gain, or Vignette adjustment.
- **Range slider:** This lets you set how widely the flickering will vary.
- **Speed:** This lets you adjust how quickly the flickering is animated.
- **Smoothness:** This slider lets you adjust the temporal quality of the flickering, whether it changes abruptly from one value to another (at lower settings) or whether it makes more continuous transitions from one value to another (at higher settings).
- **Flicker R, G, B Channels:** Three checkboxes let you choose which color channels are affected by this flickering.

Flicker Quality

These controls let you adjust the details of how the flickering animates.

- **Randomness Scale:** This slider lets you introduce irregularity to the Horizontal, Vertical, and Rotational motion of the camera shake. The greater this value, the more irregularity will be introduced.
- **Pause Length:** This slider lets you adjust the frequency of intermittent pauses that break up the random motion added by this filter.
- **Pause Interval:** This slider lets you adjust the duration of intermittent pauses that break up the random motion added by this filter.
- **Pause Randomness:** This lets you add a degree of randomness to the intervals that happen.
- **Random Seed:** This slider lets you alter the value that sets what random values are being produced. Identical values result in identical randomness.

Match Move (Studio Version Only)

TIP: Match move workflows are now much more effectively accomplished in the Fusion page using the tools and methods found there.

The Match Move filter is a patch-based tracker that follows a pattern region defined by a tracker control. You can place as many trackers as you like by applying this filter to a node and clicking on a feature you want to track in the Viewer. Ideal features for tracking are high contrast details that have sharp angles that are clearly defined.

Each tracker control consists of (a) a center point that indicates where the tracked motion path will be centered, (b) an inner box that identifies the patch of image you're tracking (that can be resized), (c) an outer box that defines the search region for the track (that can also be resized), and (d) a patch window that shows you a zoomed in closeup of the patch you're tracking. Patch windows can be resized, and the other tracking controls hidden or shown, using controls in the Display Options section of the Match Move controls.



A tracker control in the Match Move filter

If you've accidentally placed a tracker control somewhere you don't want one, you can either drag anywhere within the inner box to move it to another location, or you can Option-click it to delete that tracker.

Once placed, you can choose how much image detail is considered for analysis by resizing that tracker control. To resize a tracker, move the pointer over the edge of the inner box, and drag to shrink or enlarge it.

This plug-in will automatically derive as much motion data as the number of trackers you've placed allows:

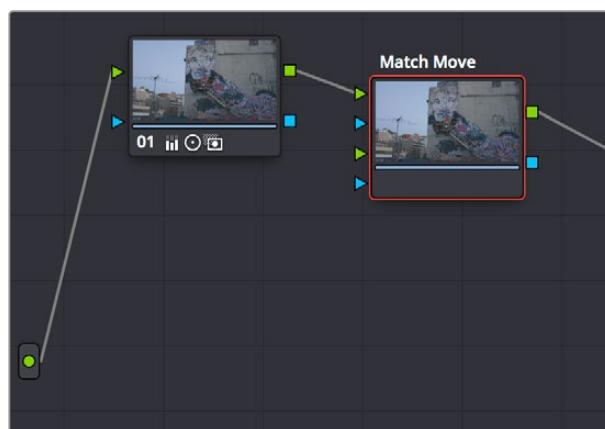
- One tracker tracks horizontal and vertical position (pan and tilt).
- Two or more trackers also track rotation.
- Four or more trackers also track perspective.
- If you place six or more trackers, then the Match Move filter is capable of automatically choosing the best tracker data from the overall collection to give you the most accurate track that's possible.

A Match Move Workflow

The following example shows the simplest complete workflow for importing a foreground clip to composite with a match move to follow a background clip that's already in the timeline. This workflow is suitable for such operations as placing a graphic as a sign on a side of a building, or into the display of a phone.

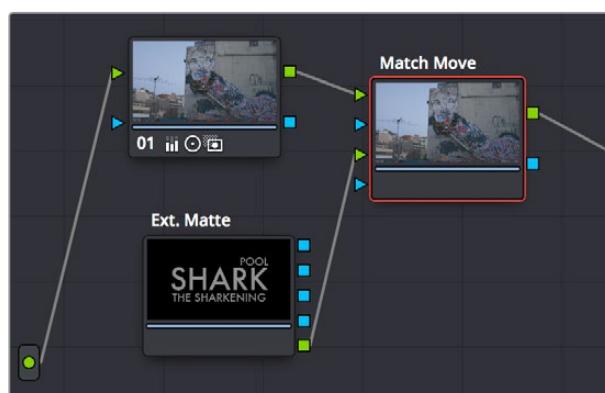
To match move:

- 1 Open the Media Pool in the Edit page, right-click a clip you want to match move to a clip in the Timeline, and choose “Add as Matte For Color Page Clip” to add it to the Color page Node Editor of the currently selected clip as a Timeline Matte. This is currently the only way you can match move and composite a foreground clip against a background clip in the Color page.
- 2 Open the Color page, make sure the background clip you want to match move to is selected, then open the OpenFX library and drag the Match Move plug-in directly onto the connection from the last node in the tree to the Output, to add it as a stand-alone FX node.



Adding the Match Move filter as a stand-alone FX node

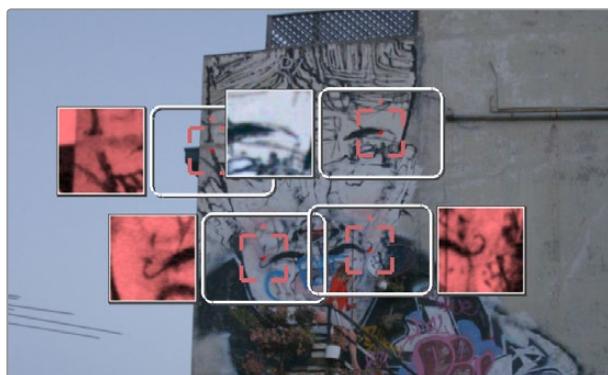
- 3 Right-click any corrector node in the node tree (Node 01 in this example) and choose the clip you added in step 1 in the Add Matte > Timeline Mattes submenu of the contextual menu to expose that clip as an Ext. Matte node. Delete the connection between the new Ext. Matte node and the node it's connected to, and then reconnect its RGB output to the second input of the FX node.



Connecting the foreground image to the second input of the FX node

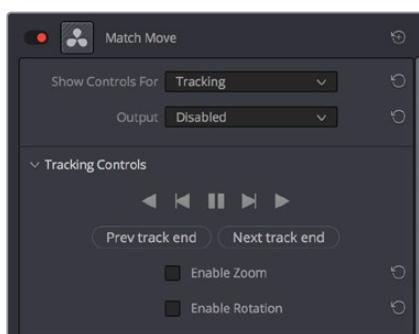
- 4 Select the FX node, make sure the OpenFX onscreen controls are enabled, choose whether you want to start at the first or last frames of the clip to begin the tracking process, and then click within the Viewer to place tracker controls on the surface of the image you're going to attach the foreground image to. If you want to do a perspective track, place at least four tracker patches in areas you know won't be occluded by other things in the frame. Choose features that are high contrast and angular for the best results, and try to make sure the features you track won't go offscreen or be occluded by other features within the frame. As you place tracking controls, their patch window

will be tinted the color of the channel that DaVinci Resolve automatically determines will provide the best tracking result.



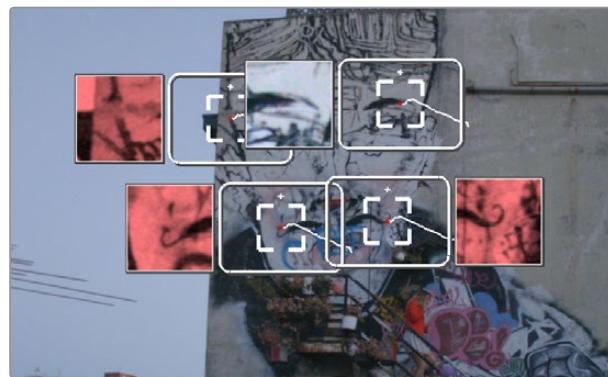
Adding tracker controls to the feature you need to Match Move to

- 5 (Optional) If necessary, you can delete trackers you don't want by Option-clicking them.
- 6 Now that your tracker controls are all set up, you're ready to begin the tracking analysis. If the playhead is at the beginning of the clip, click Track Forward, otherwise click Track Backward. DaVinci Resolve will automatically analyze all tracker controls within the clip until the last frame of the clip is reached.



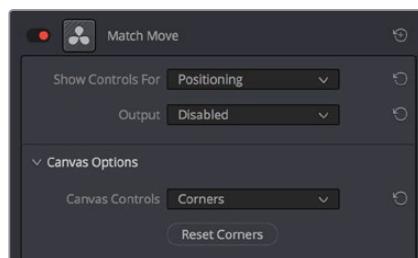
Using the Tracking controls

- 7 (Optional) If anything occludes a patch that's being tracked, or if the tracked feature starts going off the edge of the frame, that tracker control may veer off course and will eventually turn off. If this happens, there's a way to continue the track that's surprisingly easy:
 - a Click the Track Forward or Track Backward button again to stop the analysis.
 - b Move the playhead back to the last good frame of tracking data, then click the inner box of each tracker control that went wrong to make sure they're turned on (you know it's on if the patch window is displayed), and then click "Clear tracking forward" or "Clear tracking backward" as necessary to delete the incorrect tracking data. When you're done, click the inner box of each tracker that went wrong to turn it back off again, so it doesn't continue trying to track incorrectly (you know it's off if the patch window is hidden).
 - c Now, place additional trackers on different features of the same surface to replace the trackers that you had to turn off.



Placing more tracking controls to cover for tracking controls that turn themselves off when going offscreen or being occluded by other moving features in the image

- d Click “Track forward” again to continue the track, and DaVinci Resolve will automatically use those additional features to continue the analysis.
- e When the analysis is complete, turn the trackers you disabled back on again. All trackers that are turned on contribute data to the match move, for whichever ranges of frames they contain valid tracking data.
- 8 When DaVinci Resolve finishes its analysis, move the playhead back to the first frame of the track, and choose Positioning from the “Show controls for” pop-up menu. This takes you to the next stage in the Match Moving process.



Choosing the Positioning controls

- 9 A grid appears, covering the Viewer. This is the positioning canvas, and it lets you corner-pin the area in which the foreground image you connected in step 3 will be composited and tracked. You can corner-pin and resize it by dragging it by the corners, and you can move it by dragging the center.



Resizing the canvas to fit the foreground image into the background

- 10 Once you’ve positioned the grid, scrub back and forth to verify that it tracks correctly and looks right once it’s in motion.

- 11** Choose Compositing from the “Show controls for” pop-up menu to expose the compositing controls.
- 12** Set the Output pop-up menu to “Composite” to output the final match-moved composite. If necessary, you can use the Composite Type and Plate Cropping controls to choose how the foreground image is blended with the background and whether you need to crop unwanted parts of the image from the edges.



The final match moved composite

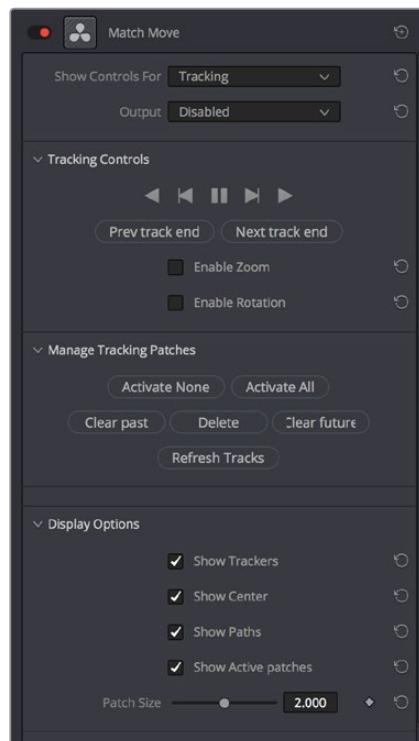
At this point, you've finished the match move.

Main Controls

The “Show controls for” pop-up menu lets you choose one of four pages of controls that take you through the match moving workflow. The Output pop-up menu lets you choose what you want to output, with choices for Disabled, Positioning Reference, and Composite.

Tracking Controls

The Tracking Controls govern the first stage of the match moving process, and this page of controls provides everything you need for setting up, executing, and refining multi-patch motion tracks.



The controls that are exposed when Main Controls is set to Tracking Controls

The Tracking Controls group

The primary controls used to initiate tracking. These consist of the tracking buttons that let you execute tracks either automatically using the outer Track Forward or Track Backward buttons, or manually using the inner Track Next or Track Previous buttons. The middle button lets you pause tracking.

The Next Track End and Previous Track End let you jump to previous and subsequent tracked sections of frames; in cases where there may be gaps in your tracking data, these controls let you jump to different segments of contiguous tracking data.

Two checkboxes let you choose whether you want to track and analyze Zoom and/or Rotation. These must be set before you begin tracking.

The Manage Tracking Patches group

The two buttons at the top let you choose which tracking patches are enabled to contribute to the overall match moving result, or disabled. Activate None and Deactivate All let you turn all patches on or off at once.

Clear Past and Clear Future let you clear bad tracking data forward or back in time from the playhead's current position, for enabled tracker controls. Delete Tracking lets you delete the tracking data at the current frame only for enabled tracker controls.

Refresh Tracks updates a tracker control's patch when the feature it's tracking changes shape, color, or lighting enough to interrupt the track. Select one or more trackers and click Place New Patch in Track to update the tracked feature at that frame.

The Display Options group

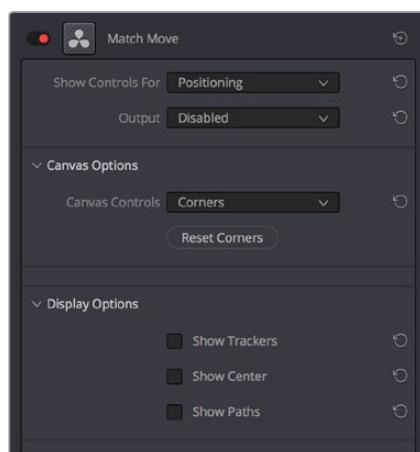
This group lets you turn the visibility of different onscreen controls off and on.

Checkboxes let you Show Trackers, Show Center (the red tracking center point), Show Paths (the tracked motion paths), and Show Active Patches. A slider lets you adjust the size of each patch window.

Show Comp Result lets you see the composited foreground layer against the background layer.

Positioning

The Positioning controls govern the second stage of the match moving process. They provide everything you need to transform the foreground image to fit against the background by moving, corner-pinning, and resizing.



The controls that are exposed when Main Controls is set to Positioning

Canvas Options

The Canvas Controls pop-up menu lets you switch between corner-pin controls, where dragging the four corners lets you corner-pin, dragging the center lets you reposition, and dragging the top, bottom, and sides lets you resize vertically or horizontally.

A Reset Corners button lets you reset the grid to full screen, if you need to scrap what you're doing and try again.

The Display Options group

This group lets you turn the visibility of different onscreen controls off and on.

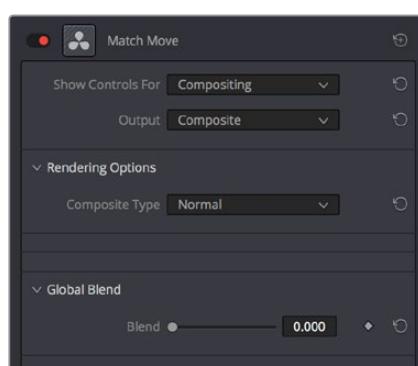
Checkboxes let you Show Trackers, Show Center (the red tracking center point), and Show Paths (the tracked motion paths).

Show Comp Result lets you see the composited foreground layer against the background layer.

Compositing

The Compositing controls govern the third stage of the match moving process, to use when fitting the foreground image against the background image to make a seamless composite.

Note, if you need to color correct the foreground image to match the background, you'll need to add a corrector node between the Ext. Matte that's routing in the foreground image into the Color page and the FX node that's doing the compositing.



The controls that are exposed when Main Controls is set to Compositing

Rendering Options

The Composite Type pop-up menu lets you choose whether the composite that's being output is an overlay of the Ext. Matte over the background, or the background Plate only.

Plate Cropping

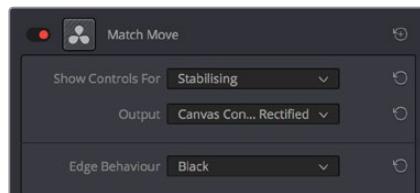
Four sliders let you crop the Left, Right, Top, and Bottom of the image, if necessary.

Global Blend

The Blend slider, present in every ResolveFX plug-in in DaVinci Resolve, lets you adjust the opacity of the effect, effectively controlling the opacity of the foreground layer.

Stabilizing

The Stabilizing controls actually have nothing to do with match moving, but instead allow you to use the motion tracking accomplished with the Tracking Controls to stabilize the image. An Edge Behavior pop-up menu lets you choose how to handle blanking around the edges as a result of the background image being transformed to keep the subject of the frame in place.



The controls that are exposed when Main Controls is set to Stabilizing

ResolveFX Warp

The filters in this category let you warp the image in different ways, creating procedural or custom distortion effects, some of which can be automatically animated. The Warper plug-in is a point-based free-form warp tool.

Dent

A warp effect that creates different types of circular bowing and folding effects.

- **DentType:** This lets you choose from six different types of “dent” warping effects. The options are Type 1, Type 2, Type 3, Sine, Cosine, and Black Hole.
- **X and Y:** Position sliders let you offset the center of the warp.
- **Size:** This lets you adjust the diameter of the warp.
- **Strength:** This lets you adjust the extent and direction of the warp, lowering this below zero “pulls” the image into the center of the effect, while raising this above zero “pushes” the image outward to buckle according to the DentType you’ve chosen.
- **Edge Behavior:** This eliminates any blanking caused by negative distortion by filling black areas in one of several user-defined ways; options include Black (do nothing and leave the blanking), Reflect, Wrap-Around, and Replicate.

Lens Distortion

Lets you add convex or concave lens distortion to an image, to make it warp by bulging outward or bulging inward, similar to a poorly made lens. This filter could also be used in a corrective manner, to compensate for images exhibiting barrel distortion. Additionally, the amount of distortion applied to each color channel can be varied, in order to create the effect of chromatic aberration using the curvature of the distortion you’re adding for a more accurate effect.

- **Red, Green, and Blue Distortion:** These sliders are ordinarily locked together by the Gang checkbox. When adjusted as ganged, moving these sliders to the left (negative values) increases “fisheye” distortion, while moving these sliders to the right (positive values) creates an inverted “fisheye” effect that bows the image inward rather than outward. Turning Gang off lets you set the Red, Green, and Blue Distortion sliders to different values, introducing more accurately simulated chromatic aberration to the image.
- **Fine Adjustment:** This checkbox results in the distortion sliders operating within a much smaller range, enabling more precise adjustments.
- **Edge Behavior:** The options available in this pop-up eliminate blanking caused by negative distortion by filling black areas in one of several user-defined ways; options include Black (do nothing and leave the blanking), Reflect, Wrap-Around, and Replicate.
- **X and Y Position:** These sliders let you change the center of the distortion effect.

TIP: To resize a clip with an extreme distortion effect that introduces blanking around the edges of the frame, you'll need to use the Zoom control found in the Node Sizing mode of the Sizing palette. Edit and Input sizing will only zoom the image within the border created by blanking.

Ripples

A warp effect that creates different types of ripples.

Main Controls

These controls govern the type of ripple and the quality of optional ripple shine that you want.

- **Ripple Shape:** Lets you choose from Circular, Square, Horizontal, Vertical, Exponential, Star, and Radial ripples.
- **Wave Shape:** Lets you choose from Sinusoidal, Triangular, Fresnel In, Fresnel Out, and Natural waves.

A set of Shine parameters lets you overlay a simulated shine on top of these ripples.

- **Shine:** A checkbox lets you turn this shine on and off.
- **Shine Direction:** Lets you add a light shine to the peaks of the ripples. Works best at low shine strength.
- **Vertical Shine Height:** Lets you adjust the thickness of the highlights running along the ripples.
- **Shine Size:** Lets you adjust the length of the highlights running along the ripples.
- **Shine Strength:** Lets you adjust the overall appearance of the shine.
- **Animate:** This checkbox, if checked, reveals a Speed slider that lets you set how quickly the ripple effect auto-animates the phase of the currently configured ripple effect, without the need to use keyframes.

Ripple Controls

A separate set of Ripple parameters lets you enable up to five overlapping ripples.

- **X and Y Position:** Lets you change the center position of each set of ripples.
- **Amplitude:** Lets you adjust the "height" of each ripple caused by this effect.
- **Frequency:** Lets you choose how many ripples are being created.
- **Decay:** Lets you adjust the falloff of the ripple effect, where ripples gradually diminish as they reach the point of decay.
- **Phase:** Lets you adjust the phase of the ripple effect relative to the center origination point. If you want to animate a ripple simply, you can also choose to keyframe the Phase parameter to create the same effect created by the Animate checkbox above.

Vortex

Vortex begins as an S shaped warp effect, but you can adjust the parameters to create many types of warping effects.

- **X and Y position:** Two sliders let you offset the center of the warp.
- **Size:** Adjusts the diameter of the warp.
- **Angle:** Adjusts the direction and intensity of the warp effect; setting Angle below 0 twists the image to the left, while raising Angle over 0 twists the image to the right.
- **Power:** Rotates the area that's affected to create a harder border between what is warped and what isn't.
- **Swirl:** Intensifies the effect, twisting the image into an even tighter swirling effect.

Warper (Studio Version Only)

The Warper is a free-form image warper that uses points, rather than a mesh or splines, to push and stretch features in an image as if they were on a sheet of rubber. While the Warper has a lot of options and settings, getting started is really easy.

To warp a feature of the image, just click on it to add a warp point, and drag to push that part of the image in the direction you want it to go. By default, warp points influence the entire image, which is pinned down at the corners. This system makes it simple to warp large regions of the image, such as when you want to warp an edge of the image to get rid of a boom dip. Warp points are gray unless they're selected, in which case they're white.



The original image

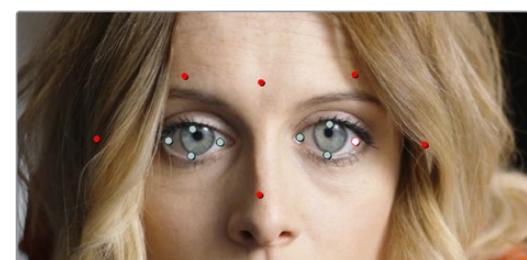


The image warped with a single control point

To “pin down” parts of the image you don’t want to warp, Shift-click to place limiter points (which are red, pink if they’re selected). By combining warp points with limiter points, you can quickly create extremely specific warp effects to squish and stretch features in an image in any way you want.



The original image



The image warped with control (gray) and limiter (red) points

As you work, you can Option-click any unwanted warp or limiter point to delete it. To start from scratch, you can click the Warper plug-in’s master reset control in the OpenFX Inspector.

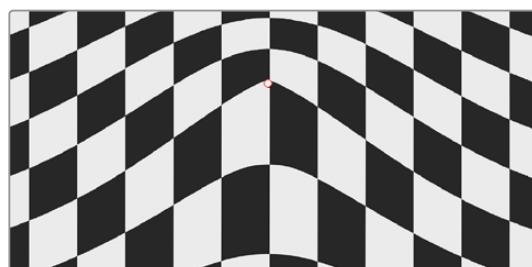
Additionally, you can use the FX mode of the Tracker palette to motion track the feature you’re

warping. Then, by setting the Tracking pop-up menu to FXTracker, every warp and limiter point you've placed will move along with the feature you're tracking, meaning you can create warp effects that move along with someone's face, with a car driving on the road, or with something in a shot with camera motion.

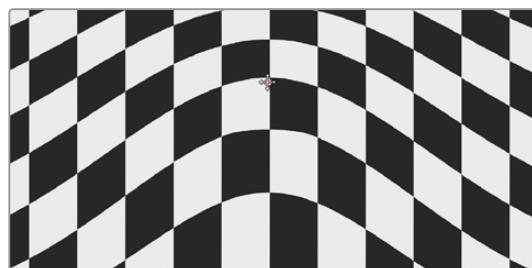
Effect Options

These controls affect how warp points that you add will affect the image.

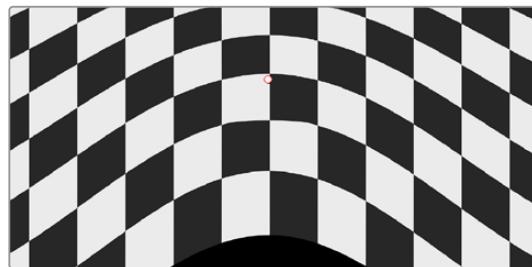
- **Warp Limits:** A pop-up menu lets you choose how to treat the edges of the image when you're warping it. There are three modes:
 - Corners (the default) lock the four corners of the image in place, but allow the sides to bulge in or out as you warp and allowing blanking to creep in.
 - Edges locks the full width and height of all four edges in place as you warp, preventing blanking. Distance locks parts of the image that are n pixels away, but the default setting is very permissive.
 - Manual allows the entire image to be warped without locking any part of it, allowing for extreme warps all along an entire edge of the image, but requiring you to place at least one limiter point prior to adding a warp point.
- **Warp Sharpness:** A pop-up menu lets you choose one of three methods of interpolating how the image bends around a Warp point: Sharp, Rubber-Sheet (the default), and Rounded. Sharp produces the “most pointy” warps, while Rounded produces the most gently curved warps. Rubber-Sheet strikes a balance between the two extremes.



Sharp



Rubber-Sheet



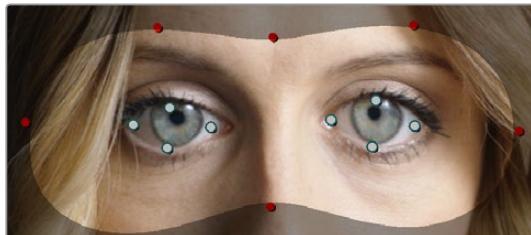
Rounded

- **Edge Behavior:** A pop-up menu eliminates any blanking caused by warping that affects the edge of the image by filling black areas in one of several user-defined ways; options include Black (do nothing and leave the blanking), Reflect, Wrap-Around, and Replicate.
- **Quality:** A pop-up menu lets you choose from among three methods of calculating the warping effect you're creating: Faster, Default, and Better. Each choice is an obvious trade-off between image smoothness and performance.
- **Warp Scale:** This slider lets you scale the overall warp effect you're creating. Setting this to 0.000 reduces the warp effect to nothing, while raising it to the maximum value of 2.000 doubles the warp effect.

Onscreen Controls

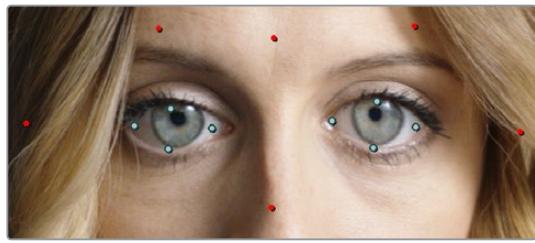
The second set of controls lets you customize which of the Warper's onscreen controls appear, with different options that make it easier to see certain things in various situations.

- **Render a reference grid:** This checkbox superimposes a reference grid over the image to make it easier to see what kind of warping you're applying.
- **Show Warp Boundaries:** This pop-up menu has three choices for letting you see which areas of the image will be locked off by limiter points you place in the image.
 - None hides this information and is the default setting.
 - As Border shows a red line at the boundary where warping becomes locked off.
 - As Mask dims the area that's protected from warping by limiter points.

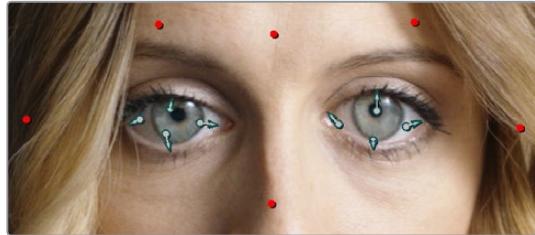


Show Warp Boundaries set to As Mask

- **Control Visibility:** This pop-up menu lets you choose whether the warp and limiter points you create are visible as you work. Show (the default) leaves all control points visible all the time. Auto Hide hides all control points whenever you're dragging one, letting you see the image as you adjust it without having control points in the way. Hide makes all control points invisible. You can add new control points, but you can't see existing control points to edit them.
- **Show:** This pop-up menu lets you choose how to represent warp points, and there are two options.
 - Warp Points (the default) simply shows warp points as gray dots.
 - Warp Vectors display pairs of controls connected by a line; a round dot shows the anchor, or the part of the image the warped portion of the image came from, and an arrow shows the destination, where you've warped that part of the image to. Seeing the anchor and destination of each warp operation can sometimes be useful when you're doing something complex.



Warp points



Warp vectors

- **Scale Controls:** This slider lets you shrink or grow the control points or warp vector handles to the most convenient size for the task at hand.

Waviness

- **Waviness Type:** Lets you choose Vertical or Horizontal waviness.
- **Scale:** Lets you choose the size of the waves.
- **Strength:** Lets you adjust the amplitude.
- **Phase:** Lets you “move” the wave and is a good parameter to keyframe if you’re animating this effect manually.
- **Animate:** A checkbox that reveals a Speed slider that lets you set how quickly the Waviness effect auto-animates without the need to use keyframes.

Chapter 119

Sizing and Image Stabilization

DaVinci Resolve has a powerful toolset for making geometric transforms, using advanced algorithms for optical-quality sizing operations.

This section covers the nuts and bolts of resolution independence in DaVinci Resolve, and how to use the Sizing palette. This chapter also covers how to use the Stabilizer mode of the Tracker palette to subdue unwanted camera wiggle.

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The Five Color Page Sizing Modes

The Sizing Palette on the Color page can be put into one of five modes, each of which accomplishes a different task.

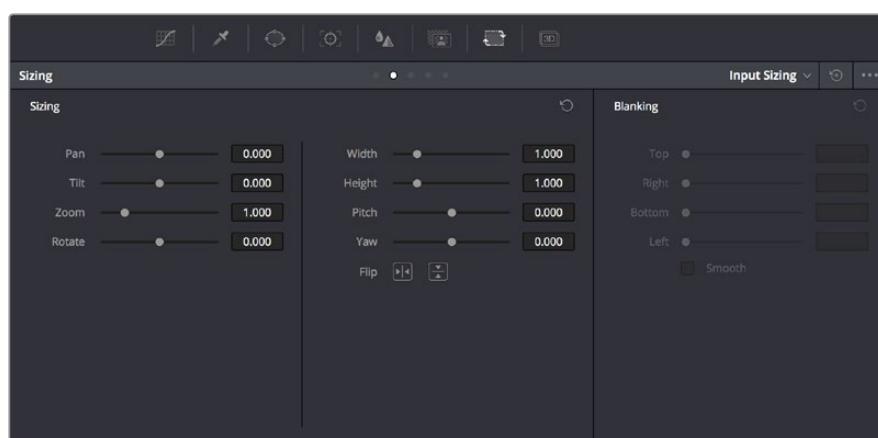
- **Edit Sizing:** These controls mirror those found in the Inspector of the Edit page.
- **Input Sizing:** These controls let you make sizing adjustments to individual clips that affect their overall geometry (pan, tilt, zoom, and rotation). These controls are useful for doing clip-by-clip pan and scan adjustments.
- **Output Sizing:** These controls are nearly identical, except that they affect every clip in the entire timeline, all at once. Output sizing is useful for making a formatting adjustment to an entire timeline, such as changing an HD timeline to an SD timeline with simple adjustments to crop and pan the resulting framing.
- **Node Sizing:** Lets you add targeted sizing adjustments at any point within the node tree. Like Input Sizing, Node Sizing is specific to a particular clip. Unlike Input Sizing, Node Sizing is affected by operations that split color channels (such as the splitter/combiner nodes) and limit the image (such as qualifiers and windows). You can also add as many node sizing adjustments to a clip's grade as you need.
- **Reference Sizing:** A set of sizing controls that lets you reposition the still when a wipe comparison is being made. Using these controls, you can move the still image to better compare it to the clip you're wiping it against. The Reference Sizing controls only work when you have a wipe enabled.

Sizing Order of Processing on the Color Page

Input Sizing adjustments are applied before all image processing that takes place in the node graph, including Node Sizing, while Output Sizing adjustments are applied after image processing in the node graph.

Sizing Controls

Input, Node, and Output Sizing share many of the same controls. When the Sizing palette is set to Input Sizing mode, the controls transform each clip individually. If you're simply pushing in on one or two clips, or making individual pan and scan adjustments to account for a change in format, these are the controls you want to use.



The Sizing palette

- **Pan:** Moves the clip along the horizontal, X axis. Positive values move the clip right, negative values move the clip left.
- **Tilt:** Moves the clip along the vertical, Y axis. Positive values move the clip up, negative values move the clip down.
- **Zoom:** Positive values enlarge the clip, negative values shrink the clip.
- **Rotate:** Positive values rotate the clip clockwise. Negative values rotate the clip counter-clockwise.
- **Width:** Positive values stretch the image wider, negative values squish the image narrower.
- **Height:** Positive values stretch the image taller, negative values squish the image shorter.
- **Pitch:** Rotates the image toward or away from the camera along an axis running through the center of the image, from left to right. Positive values push the top of the image away and bring the bottom of the image forward. Negative values bring the top of the image forward and push the bottom of the image away. Higher values stretch the image more extremely.
- **Yaw:** Rotates the image toward or away from the camera along an axis running through the center of the image from top to bottom. Positive values bring the left of the image forward and push the right of the image away. Negative values push the left of the image away and push the right of the image forward. Higher values stretch the image more extremely.
- **Key Lock:** (Node Sizing only) Lets you choose how regions of the image that are isolated by one or more windows will be transformed.

There are two options:

- **Off:** While off, the transform controls will move the windowed region to another area of the frame, effectively duplicating the windowed area.
- **On:** While on, the transform controls will move other areas of the frame into the windowed regions, effectively covering up the windowed area with another portion of the picture.
- **Flip Image:** Two buttons let you flip the image in different dimensions.
 - **Flip Horizontal control:** Reverses the image along the X axis, left to right.
 - **Flip Vertical control:** Reverses the clip along the Y axis, turning it upside down.
- **Lens Correction:** (Edit Sizing only) Two controls let you correct for lens distortion in the image, or add lens distortion of your own (only available in the Studio version).
 - **Analyze:** Automatically analyzes the frame in the Timeline at the position of the playhead for edges that are being distorted by wide angle lens. Clicking the Analyze button modifies the effect of the Distortion slider so that it gives a more accurate result, but it doesn't perform a correction.
 - **Distortion:** Dragging this slider to the right applies a warp to the image that lets you straighten the bent areas of the picture that can be caused by wide angle lenses. It's not necessary to click the Analyze button prior to using this slider, but using the Analyze button can improve the accuracy of the result.

Blanking Controls

Output Sizing mode also has a set of Blanking controls that you can use to add custom blanking to a clip or project. For example, you can use these controls to add nonstandard letterboxing or pillarboxing to an image. Along with all other Output Sizing adjustments, blanking is added last in the image processing pipeline, so it's not affected by any of the color or contrast adjustments you make.

- **Top:** Adjusts the top letterbox.
- **Right:** Adjusts the right pillarbox.
- **Bottom:** Adjusts the bottom letterbox.
- **Left:** Adjusts the left pillarbox.
- **Smooth:** A checkbox that lets you turn on edge anti-aliasing for source blanking. Overrides the Anti-alias Edges pop-up menu found in the Image Scaling panel of the Project Settings.

NOTE: It might be necessary to turn anti-aliasing off if you notice black blurring at the edges of blanking being applied to an image.

Blanking presets are also available by choosing from the Timeline > Output Blanking submenu. Choosing one of these options automatically sets the Blanking parameters of the Sizing palette's Output Sizing mode. The following presets are available:

- **1.33:** SD or 4:3
- **1.66:** European theatrical
- **1.77:** HD or 16:9
- **1.85:** Theatrical flat aspect ratio
- **2.35:** Original anamorphic (scope) theatrical wide-screen
- **2.39:** Current 35mm anamorphic (scope) theatrical wide-screen
- **2.40:** Current 35mm anamorphic (scope) theatrical wide-screen (rounded up for Blu-Ray)
- **Reset:** Restores the clip to its original aspect ratio.

Anti-aliasing at the edges of blanking is handled by an Anti-Alias Edges setting in the Image Scaling panel of the Project Settings. For more information, see Chapter 3, "System and User Preferences."

Resetting the Sizing Palette

You can reset every control within the Sizing palette at any time by clicking the reset button in the upper right-hand corner of the palette.

Input and Output Sizing Presets

If there are Input or Output Sizing settings that you find yourself using repeatedly, you can save them as presets for easy recall. For example, if there's a group of input settings that you use to resize a clip of a particular format to match the current project, you can save it as a preset that you can use whenever.

- **Preset pop-up menu:** Provides access to all the currently saved presets in the current database.
- **Delete preset:** To delete a preset, select it from the pop-up menu, click the trash can button, then click OK.
- **Add preset:** To add a preset, make whatever settings adjustments you need, then click the plus button. When the Format Preset dialog appears, enter a name, check that the settings are correct, then click Save.
- **Change preset:** To change a preset, load the preset you want to change, make whatever changes you need, then click the check button.

The Input and Output Sizing modes save different presets. Each of these sets of presets is available from the “Override input scaling” and “Override output scaling” pop-up menus in the Palette Options menu.

Sizing Controls with the DaVinci Control Panel

There are two sets of DaVinci control panel mappings for the sizing controls. The most obvious controls can be seen permanently mapped to the knobs and soft keys of the Transport panel. This makes these controls easy to access for projects where you’re panning and scanning nearly every shot of a film-scanned program.

To adjust PTZR settings:

- 1 Press the OUTPUT or INPUT soft key to switch between Output Sizing and Input Sizing modes.
- 2 Use the PAN, TILT, ZOOM, and ROTATE knobs of the Transport panel, and the H FLIP and V FLIP soft keys.

To adjust Input and Output Blanking:

- 1 Press the INPUT BLANKING or OUTPUT BLANKING soft key on the Transport panel.
- 2 Use the knobs labeled LEFT, RIGHT, TOP, and BOTTOM to make a blanking adjustment.
- 3 Press SIZING when you’re finished.

Another set of DaVinci control panel mappings appears when you press the SIZING button of the T-bar panel. In this case, the Center panel knobs and soft keys update to a page showing the following:

- **Ref Wipe Sizing Adjustments:** These controls, on the middle screen of the Center panel, let you reposition a still from the Gallery that’s being displayed in a split screen. This can make it easier to compare features that would otherwise be obscured by the still’s position on screen.
- **Input Sizing Adjustments:** The Input Sizing controls are displayed on the right screen of the Center panel. These are similar to the mappings on the Transport panel, but the Center panel’s second row of knobs also exposes PITCH, YAW, H SIZE, and V SIZE controls, and there’s an additional MODIFY PAR button that lets you change the pixel aspect ratio of a clip.
- **Output Sizing Adjustments:** If you press the OUTPUT soft key on the Center panel, the knobs and soft keys change to show the Output Sizing controls. Press BLANKING to expose all the preset aspect ratios on the Transport panel, along with the USER which allows you to expose user definable presets.

To save and recall user definable blanking aspect ratios:

- 1 Press SIZING on the T-bar panel.
- 2 Press the OUTPUT soft key on the Center panel.
- 3 Press the OUTPUT BLANKING soft key on the Transport panel, and then enter the blanking aspect ratio as a number (e.g., 2.4) using the number pad on the Transport panel to set your customized blanking.
- 4 Press the BLANKING soft key on the Center panel.
- 5 To apply the new ratio, press the BLANKING soft key on the Center panel, then press USER on the Transport panel, and press one of the USER 1–5 soft keys.

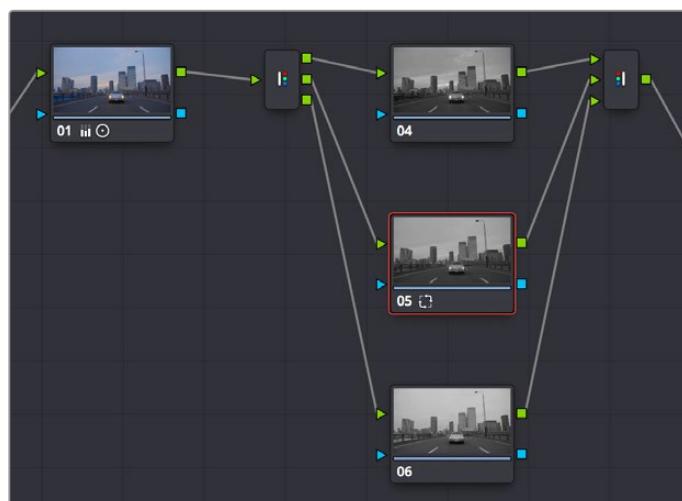
TIP: With the Input Sizing Adjustments controls exposed on the Center panel, you can set the Transport panel to display the Output Sizing controls, for simultaneous presentation of every sizing control that's available.

Using Node Sizing for Channel and Paint Effects

Using Node Sizing, you can apply individual sizing adjustments on a per-node basis. All Node Sizing adjustments within a grade are cumulative, and any keyframing done to Node Sizing parameters is stored in that node's Node Format keyframe track in the Keyframe Editor. Two good examples of Node Sizing include realigning color channels individually in conjunction with the Splitter/Combiner nodes, or duplicating windowed regions of an image by moving them around the frame.

Example 1: Using node sizing on individual color channels:

- 1 Choose Nodes > Add Splitter/Combiner Node to add this node structure to the current grade.
- 2 Select one of the three Corrector nodes connected between the Splitter and Combiner nodes that corresponds to the color channel you want to transform.



Adding the Splitter/Combiner nodes to use Node Sizing on individual color channels

- 3** Open the Sizing palette, choose Node Sizing from the mode pop-up, and use the Sizing parameters to transform that channel as necessary. For example, if you have an old video clip with misaligned color components, you could pan a misaligned channel to the left or right to try and improve its alignment.



Before and after panning the green channel

Example 2: Using Node Sizing to duplicate a windowed area of an image to cover a blemish:

- 1** Create a new node.
- 2** Open the Window palette, create a Circular window, and then shrink and reposition it to surround a feature you want to remove.
- 3** Open the Tracking palette, and track the window to follow the feature to be removed.
- 4** After the track is complete, now move the window to an adjacent area of clean detail that's right next to the feature you want to remove. This is the area of the image you're going to duplicate and cover the unwanted feature with.
- 5** Now, open the Sizing palette, choose Node Sizing from the mode pop-up, and use the Sizing parameters to move a duplicate of the windowed area to cover up the unwanted feature.



Before/after using Node Sizing to clone an area of the image to cover up the actor with a plant to create a clean background

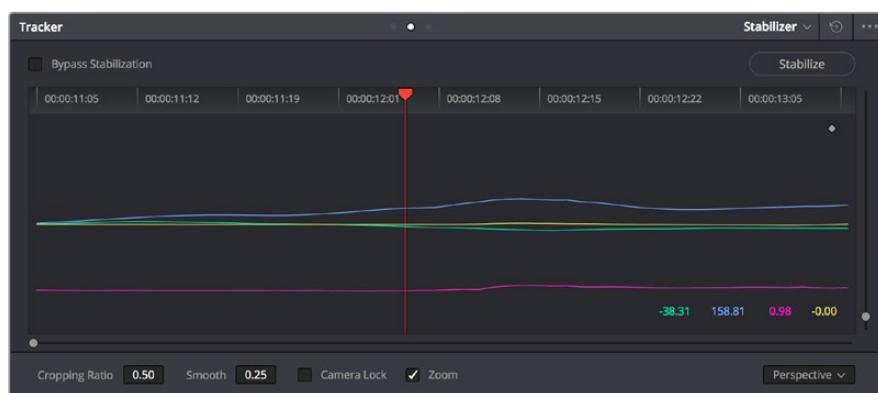
When you're done, playing through the clip should show that the duplicated area of the image is still tracking the feature you want to remove.

Image Stabilization in the Tracker Palette

The Image Stabilization mode of the Tracker palette lets you smooth out or even steady unwanted camera motion within a clip. The analysis is performed in such a way as to preserve the motion of individual subjects within the frame, as well as the overall direction of desirable camera motion, while correcting for unsteadiness.

Using the Stabilizer

Starting in DaVinci Resolve 14, an advanced stabilizer that's capable of both warping and translation to minimize unwanted shaking in a clip replaces the classic stabilization tools that were available previously (these tools are still available should you need specific capabilities of the older toolset, and are covered in a later section). With a single click of the Stabilize button, the currently selected clip is analyzed and automatically stabilized using a combination of warping and image translations.



The default Stabilizer controls

Stabilizer Parameters and Controls

The default settings yield good results for most situations, but there are ways you can customize stabilization in situations where unique issues arise.

A pop-up menu provides three different options that determine how the selected clip is analyzed and transformed during stabilization. You must choose an option first, before clicking the Stabilize button, because the option you choose changes how the image analysis is performed. If you choose another option, you click the Stabilize button again to reanalyze the clip.

- **Perspective:** Enables perspective, pan, tilt, zoom, and rotation analysis and stabilization.
- **Similarity:** Enables pan, tilt, zoom, and rotation analysis and stabilization, for instances where perspective analysis results in unwanted motion artifacts.
- **Translation:** Enables pan and tilt analysis and stabilization only, for instances where only X and Y stabilization gives you acceptable results.

The other controls let you customize how aggressively the selected clip is stabilized.

- **Bypass Stabilization:** This checkbox lets you turn stabilization off and on to be able to compare the stabilized and unstabilized image.
- **Cropping Ratio:** This value limits how hard the stabilizer tries to stabilize, by dictating how much blanking or zooming you're willing to accept in exchange for eliminating

unwanted motion. A value of 1.0 results in no stabilization being applied. Progressively lower values enable more aggressive stabilization. Changing this value requires you to click the Stabilize button again to re-analyze the clip.

- **Smooth:** Lets you apply mathematical smoothing to the analyzed data used to stabilize the clip, allowing camera motion in the shot while eliminating unwanted jittering. Lower values perform less smoothing, allowing more of the character of the original camera motion to show through, while higher values smooth the shot more aggressively. Changing this value requires you to click the Stabilize button again to reanalyze the clip.
- **Camera Lock:** Turning on this checkbox disables Cropping Ratio and Smooth, and enables the stabilizer to focus on eliminating all camera motion from the shot in an effort to create a locked shot.
- **Zoom:** When this checkbox is turned on, the image is resized by a large enough percentage to eliminate the blanking (black edges) that is the result of warping and transforming the image to eliminate unwanted camera motion. The lower a value Cropping Ratio is set to, the more DaVinci Resolve will need to zoom into an image to eliminate these blanked edges. If you turn this off, the image is not zoomed at all, and whatever blanking intrudes into the image is output along with the image, on the assumption that you'll have dedicated compositing artists deal with eliminating this blanking by filling in the missing image data in a more sophisticated manner. You may also leave this checkbox turned off if you're planning on animating the Input Sizing Zoom parameter to dynamically zoom into and out of a shot being stabilized to eliminate blanking only where it occurs, using only as much zooming as is necessary for each region of the shot.

Using the Classic Stabilizer

The “classic” image stabilizer controls available in DaVinci Resolve version 12.5 and earlier are still available, simply select “Classic Stabilizer” from the option menu of the Tracker palette. Classic image stabilization in DaVinci Resolve consists of three steps. First, you analyze the clip. Second, you choose the Stabilization settings you want to use. Third, you click Stabilize to calculate the result.

When analyzing the clip, you can choose to use either the default Cloud Tracker, which automatically finds as many trackable points as possible throughout the image and calculates stabilization based on all of them, or you can use the Point Tracker, which lets you manually place one or more individual crosshairs on image features that you select. For more information on using the Point Tracker for window tracking, see Chapter 106, “Motion Tracking Windows.”



The Stabilizer mode of the Tracker palette

As with object tracking, you can choose which aspects of motion to stabilize, but this must be done before you do the initial image analysis.

Analyze Controls

The Analyze controls automatically scan through the entire clip, identifying trackable features that can be used to stabilize the shot.

A series of four checkboxes let you turn on and off which axes you'd like to stabilize. These checkboxes must be selected before you perform an analysis in order to restrict the data that's generated.

- **Pan:** Enables horizontal stabilization.
- **Tilt:** Enables vertical stabilization.
- **Zoom:** Enables stabilization of size.
- **Rotate:** Enables stabilization of orientation.

NOTE: Once 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.

The next three buttons let you perform the stabilization analysis.

- **Track Reverse:** Initiates tracking from the current frame backward, ending at the first frame of the clip.
- **Pause:** Stops tracking (if you're fast enough to click this button before tracking is finished).
- **Track Forward:** Initiates tracking from the current frame forward, ending at the last frame of the clip.

Interactive Mode Controls

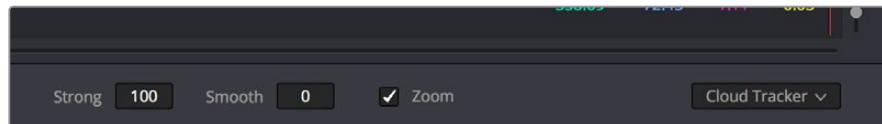
The Interactive controls let you make manual changes to the automatically generated tracking point cloud that DaVinci Resolve creates, so you can try different ways of obtaining better stabilization results in challenging situations.

- **Interactive Mode checkbox:** Turns the Interactive stabilization mode on and off. When you enter Interactive mode, you can manually alter the point cloud that DaVinci Resolve uses to stabilize the image. You'll then make your analysis while in Interactive mode. When you exit Interactive mode, your manual changes to the point cloud are eliminated, and DaVinci Resolve again uses automatically placed point clouds to do all stabilization.
- **Insert:** Lets you add tracking points to whatever analyzable features exist within a bounding box that you've drawn in the Viewer. Inserted stabilization points are automatically placed.
- **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 stabilization points within a bounding box that you've drawn in the Viewer.

The procedures for using Interactive mode for stabilization are the same as for tracking. For more information, see Chapter 106, "Motion Tracking Windows."

Stabilization Parameters and Controls

There are five controls in the Stabilization group:



Stabilization selections

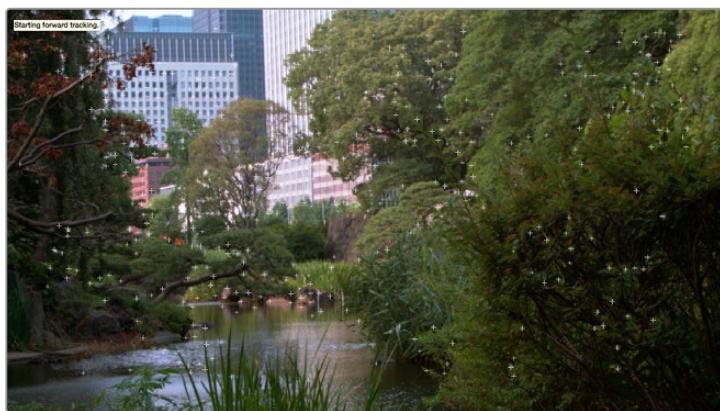
- **Strong:** Lets you choose how tightly you want to use the stabilization track to eliminate motion from a shot. With a value of 100, stabilization is maximized in an effort to “lock” the shot in place and eliminate all camera motion. This value is a multiplier. Since some clips might look more natural with looser stabilization, choosing a number lower than 100 lets a percentage of the original camera motion show through. Zero (0) disables stabilization altogether. Additionally, you can invert the stabilization by choosing -100, as described in the section on performing a match move below, and you can use a negative value either lower or higher than -100 to under or overcompensate when inverting the stabilization, simulating the effects of parallax where foreground and background planes move together but at different speeds.
- **Smooth:** Lets you apply mathematical smoothing to the analyzed data used to stabilize the clip, and is meant to be used when the Strong parameter is less than 100, allowing camera motion in the shot while eliminating unwanted wiggling. Lower values perform less smoothing, allowing more of the character of the original camera motion to show through, while higher values smooth the shot more aggressively.
- **Zoom:** When this checkbox is turned on, the image is resized by a large enough percentage to eliminate the blanking (black edges) that is the result of repositioning the image to eliminate unwanted camera motion. The higher a value Smooth Frames is set to, the more DaVinci Resolve will need to zoom into an image to eliminate these blanked edges. If you turn this off, the image is not zoomed at all, and whatever blanking intrudes into the image is output along with the image, on the assumption that you’ll have dedicated compositing artists deal with eliminating this blanking by filling in the missing image data in a more sophisticated manner. You may also leave this checkbox turned off if you’re planning on animating the Input Sizing Zoom parameter to dynamically zoom into and out of a shot being stabilized to eliminate blanking only where it occurs, using only as much zooming as is necessary for each region of the shot.
- **Tracker Type:** A pop-up menu below the Tracker graph lets you choose whether to use the Cloud Tracker or the Point Tracker. The default Cloud Tracker automatically finds as many trackable points as possible throughout the image and calculates stabilization based on all of them. This is fast, but can result in problems if there are too many prominent subjects in the frame with different vectors of motion. The Point Tracker, by contrast, lets you manually place one or more individual crosshairs on image features that you select. This involves more steps, but has the advantage of letting you choose exactly which features exhibit the motion you’re trying to stabilize. For more information on using the Point Tracker for window tracking, see Chapter 106, “Motion Tracking Windows.”
- **Stabilize:** After you’ve tracked the clip and adjusted the previous two controls, you need to click Stabilize to calculate the resulting effect of the Strong, Smooth, and Zoom controls on your clip. Whenever you make changes to the Strong, Smooth, or Zoom parameters, you need to click Stabilize to recalculate the resulting effect on your clip.

Classic Stabilization With the Cloud Tracker

Image stabilization in DaVinci Resolve is easy, but you need to follow a specific series of steps for it to be successful.

To stabilize an image:

- 1 Open the Tracker palette, and choose Stabilizer from the Palette mode pop-up menu. Make sure the Tracker Type pop-up menu at the bottom right of the Tracker palette is set to Cloud Tracker.
- 2 Turn off any of the Analyze checkboxes (Pan, Tilt, Zoom, Rotate, Perspective 3D) that correspond to transform axes you don't want to smooth.
- 3 Click the Track Forward button to track the clip forward (or Track Reverse if you'd rather start from the end of the clip and work backward).



Multiple tracking points are automatically placed to analyze the motion of the image for stabilization

This analyzes the clip, but no stabilization is yet applied.

- 4 Adjust the Strong parameter to reflect what kind of stabilization you want. If you want to eliminate all possible motion from the shot, leave Strong set to 100. If you want to use stabilization to smooth out the shot but leave some motion in the frame, reduce the strong parameter to be less than 100 but greater than 0. This parameter is a multiplier, so higher numbers reflect a higher percentage of smoothing being applied to the clip's range of motion, and lower numbers reflect a lower percentage of smoothing being applied to the original range of motion.
- 5 If you've set the Strong parameter to a value less than 100 to calm the motion in the shot, rather than lock the shot completely, you can also adjust the Smooth parameter to mathematically smooth what motion remains in the shot. This lets you even out any "wobbling" that you don't want, while retaining the camera motion that you do want. The Strong and Smooth parameters work together, so experiment with different values in each parameter to get the result you need.
- 6 Choose how you want the edges of the stabilized clip to be handled using the Zoom checkbox:
 - If you want DaVinci Resolve to zoom into the image as much as is necessary to prevent blanking (black edges) from intruding into the frame (the result of repositioning the image to steady camera motion), then turn on the Viewer Zoom checkbox.
 - If you want to leave the scale of the image alone, allowing blanking (black edges) to intrude into the frame so that you either (a) have an effects artist deal with filling in these holes later, or (b) manually animate the Input Sizing Zoom parameter to eliminate blanking in a dynamic way, then turn off the Viewer Zoom checkbox.

- 7 With all of these controls adjusted, click Stabilize. The clip is immediately transformed to apply the amount of stabilization you selected via the Smooth Frames slider.
- 8 Play the clip and examine the stabilization effect. If you need to make any changes, choose new Strong and Smooth Frames values, then click Stabilize. Any time you change any of the Stabilization parameters, you need to click Stabilize to recalculate the resulting transform to your clip.

Classic Stabilizing Using the Point Tracker

For clips in which there are too many moving subjects for the Cloud Tracker to get a solid lock, you need to track a very specific feature in order to successfully stabilize the image. In these cases, it's often faster to use the Point Tracker for stabilization.

To stabilize an image using the Point Tracker:

- 1 Open the Tracker palette, and choose Stabilizer from the Palette mode pop-up menu.
- 2 Choose Point Tracker from the Tracker Type pop-up menu at the bottom right of the Tracker palette. This changes the available controls under the tracker graph.
- 3 Click the Add Tracker Point button to add a crosshairs to the Viewer, and drag it to a high-contrast, angular feature you want to track that's indicative of the overall motion of the clip.



Using the Point Tracker to stabilize an image

TIP: You can optionally add more than one Tracker crosshairs to track multiple features, and DaVinci Resolve will attempt to stabilize as many dimensions as are made possible by the additional trackers. One point lets you stabilize Pan and Tilt. Two points lets you try to stabilize Pan, Tilt, and Rotation. Four points lets you try to stabilize Pan, Tilt, Rotation, and Zoom.

- 4 Click the Track Forward button to track the clip forward (or Track Reverse if you'd rather start from the end of the clip and work backward).

This analyzes the feature you chose to track with the crosshairs, but no stabilization is yet applied.

- 5 Adjust the Strong parameter to reflect what kind of stabilization you want. If you want to eliminate all possible motion from the shot, leave Strong set to 100. If you want to use stabilization to smooth out the shot but leave some motion in the frame, reduce the strong parameter to be less than 100 but greater than 0. This parameter is a multiplier, so higher numbers reflect a higher percentage of smoothing being applied to the clip's range of motion, and lower numbers reflect a lower percentage of smoothing being applied to the original range of motion.
- 6 If you've set the Strong parameter to a value less than 100 to calm the motion in the shot, rather than lock the shot completely, you can also adjust the Smooth parameter

to mathematically smooth what motion remains in the shot. This lets you even out any “wobbling” that you don’t want, while retaining the camera motion that you do want. The Strong and Smooth parameters work together, so experiment with different values in each parameter to get the result you need.

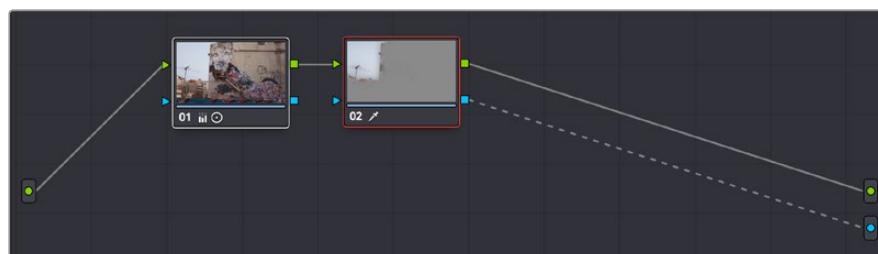
- 7 Choose how you want the edges of the stabilized clip to be handled using the Zoom checkbox:
 - If you want DaVinci Resolve to zoom into the image as much as is necessary to prevent blanking (black edges) from intruding into the frame (the result of repositioning the image to steady camera motion), then turn on the Viewer Zoom checkbox.
 - If you want to leave the scale of the image alone, allowing blanking (black edges) to intrude into the frame so that you either (a) have an effects artist deal with filling in these holes later, or (b) manually animate the Input Sizing Zoom parameter to eliminate blanking in a dynamic way, then turn off the Viewer Zoom checkbox.
- 8 With all of these controls adjusted, click Stabilize. The clip is immediately transformed to apply the amount of stabilization you selected via the Smooth Frames slider.
- 9 Play the clip and examine the stabilization effect. If you need to make any changes, choose new Strong and Smooth Frames values, then click Stabilize. Any time you change any of the Stabilization parameters, you need to click Stabilize to recalculate the resulting transform to your clip.

Using Stabilization to Create a Match Move

In some circumstances, such as when you’re using the HSL Qualifier to create transparency for a composite (using the Alpha Output described later in this chapter), you may find you need to apply the motion from a foreground clip to the background clip so that the two clips appear to be moving as one. This is referred to as doing a “match move,” and is a necessary step when creating a composite for purposes of doing a sky replacement, for example. This can be done in a simple way using the Stabilizer mode of the Tracker palette.

To match the motion of a background clip to a foreground clip:

- 1 First, in the Edit page, edit a foreground clip onto track V2, and a background clip with a more interesting sky onto track V1.
- 2 With that done, open the Color page and follow the instructions in the section titled “Using a Qualifier Key to Create Transparency” in Chapter 112, “Channel Splitting and Image Compositing,” to key the sky, and use that key to create a region of transparency in the foreground clip that lets the background sky clip in track V1 show through.



Creating transparency to replace the sky in a superimposed clip with a sky image edited into a lower video track

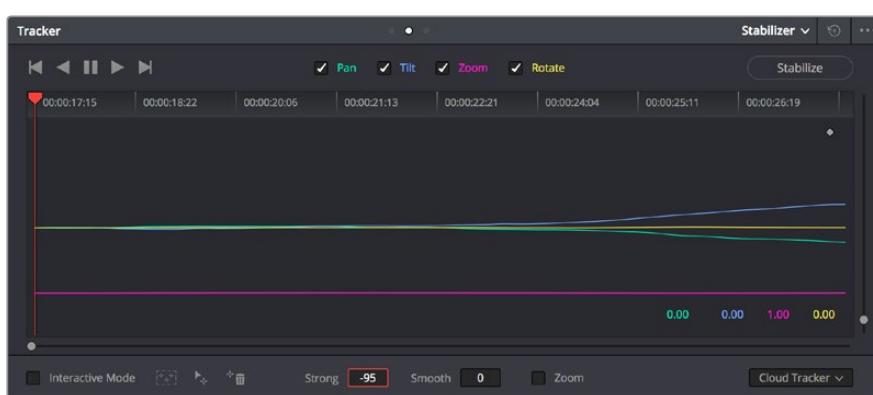
In this example, the plain blue sky is being keyed so that it can be replaced with a more interesting photo of a dramatically cloudy sky.



Before (top) and after setting up a sky replacement by connecting an HSL qualifer of the blue in the sky to the Alpha Output to create transparency

This procedure works equally well with still images or movie clips. Also, depending on the range of motion you're going to be matching, you'll probably need to use a background image that's somewhat larger than the region you're keying, to make sure you have full coverage as the layer moves to match the foreground motion. If necessary, you can zoom into the image using the Zoom parameter in the Transform section of the Edit page Inspector.

- 3 In this example, the foreground clip happens to have a camera pan, which gives the composite away as the sky doesn't move along with it. To move the compound clip of the sky image to match this pan, open the Tracker pallet.
- 4 Choose its Stabilizer mode, and then click the Analyze Forward button to analyze the motion of the entire clip. Then, click the Tracker palette's Option menu, and choose Copy Track Data.
- 5 Select the clip that you want to match (in this case the sky image), then open the Tracker Palette's Option menu and choose Paste Track Data.
- 6 Now, for this to work correctly, you need to set the Strong parameter to -100 , and click the Stabilize button. Setting a negative value inverts the tracking data you copied in step 3, which enables it to become a match move. If you're feeling extra tricky, you can set the Strong parameter to a little less than -100 , say -94 , which introduces a disparity of foreground and background motion that simulates parallax.



Inverting the Strong parameter with a negative number to create matched motion

At this point, playing through the clip should result in a nicely matched correspondence between the movement of the foreground and background layers.



The background sky layer after it's been matched to the motion of the foreground layer, the sky now follows along with the motion of the camera in the superimposed clip

Tracking and Stabilizing with the DaVinci Control Panel

All of the tracking commands are available via the DaVinci Resolve control panel.

To open and close tracking controls:

Press OBJECT TRACK MODE at the top of the T-bar panel.

All of the tracking controls appear on the soft keys of the Center and T-bar panels.

To do simple tracking:

Use the TRACK FWD, TRACK REV, and STOP TRACK soft buttons on the left side of the Center panel.

Press SHOW TRACK if you want to see the resulting motion path.

To turn tracking on and off for Pan, Tilt, Zoom, and Rotate:

- 1 Press the P/T/Z/R ENABLE soft key. The middle four soft keys of the Center panel change to display PAN ON/OFF, TILT ON/OFF, ZOOM ON/OFF, and ROTATE ON/OFF.
- 2 Use these buttons to toggle any of these checkboxes on or off, then press BACK to go back to the other tracking controls.

To interpolate between two separately tracked ranges of frames:

- 1 Use the transport controls to move the playhead to the first frame you want to place a mark, and press MARK. A Viewer Mark appears on the tracking bar, identifying either the beginning or the end of the gap in that clip's motion tracking data.
- 2 If necessary, use the transport controls to move the playhead to the second frame where you want to place a mark, and press MARK. A second Viewer Mark appears in the tracking bar, identifying both the beginning and end of the gap in that clip's motion tracking data.
- 3 To perform the interpolation, do one of the following:
 - If you marked both the first and last tracked frames that surround a gap in tracking data, press the INTRPLT BETWEEN soft key.
 - If you marked the last tracked frame in the first half of the clip, then use the transport controls to move the playhead to the first tracked frame of the second half of the clip and press the INTRPLT REV soft key.
 - If you marked the first tracked frame in the second half of the clip, then use the transport controls to move the playhead to the last tracked frame of the first half of the clip and press the INTRPLT FWD soft key.

To move the playhead to different “cue” frames:

Press the CUE START, CUE LOWER, CUE UPPER, or CUE END soft keys on the T-bar panel.

To use Interactive mode:

- 1** Press the INTERACTIVE soft key at the left of the Center panel.
Additional button controls appear on the soft keys of the Transport panel, including INSERT (POINTS), DELETE (POINTS), CLEAR (POINTS), and SET POINT.
- 2** Do one of the following:
 - To eliminate all tracking points, press the CLEAR soft key.
 - To add a single tracking point, press CURSOR (above the fourth trackball), use the fourth trackball to position the onscreen cursor over the feature you'd like to add a tracking point to, and then press the SET POINT soft key.
 - To eliminate a range of tracking points in order to prevent the tracking of an undesirable feature, use the mouse to draw a bounding box around the tracking points you want to remove, and press the DELETE soft key.
 - To add a range of tracking points to a specific feature, use the mouse to draw a bounding box around the feature you want to track, and press the INSERT soft key.
- 3** Use the TRACK FWD, TRACK REV, and STOP TRACK soft buttons on the left side of the Center panel to perform the necessary tracking.
- 4** Press the INTERACTIVE soft key again to leave Interactive mode.

Chapter 120

The Motion Effects and Blur Palettes

This chapter covers the Noise Reduction and Motion Blur effects found in the Motion Effects palette. It also goes into detail about the Blur, Sharpen, and Mist features of the Blur palette.

Contents

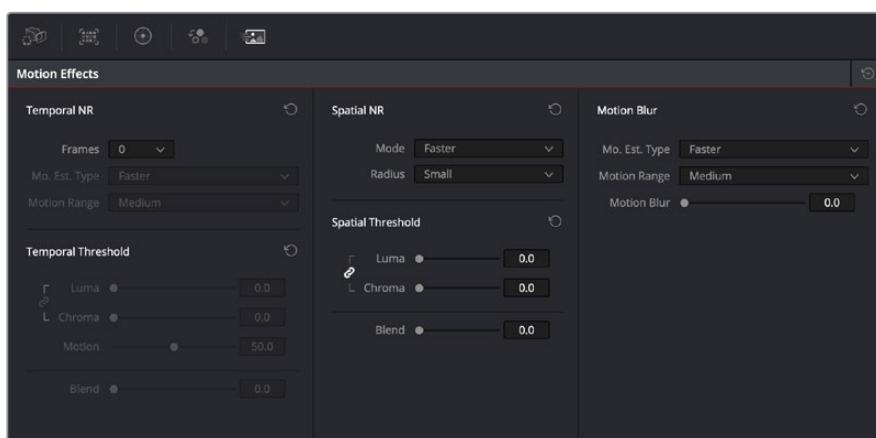
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Motion Effects Palette

The Motion Effects palette (only available in the Studio version) contains two sets of controls for applying optical-flow-calculated effects to clips in your program. These include enhanced Spatial and Temporal noise reduction, and motion-estimated artificial motion blur.

Noise Reduction Controls

Two sets of parameters let you apply GPU-accelerated Temporal and/or Spatial noise reduction that's designed to let you subdue noise in problematic clips, in close to real time on workstations with appropriate processing power. Both methods of noise reduction can be used separately or together, in varying amounts depending on the needs of the particular material you're working on. Furthermore, each set of controls is highly customizable, allowing for varying amounts of noise reduction to the chroma and luma of an image, as well as numerous options for how to apply this noise reduction.



Noise Reduction and Motion Blur controls

Temporal NR Controls

The Temporal NR controls analyze images across multiple frames in order to isolate noise from detail. Motion estimation settings let you exclude moving subjects from this operation in order to prevent unwanted motion artifacts.

- **Number of Frames:** The number of frames you want DaVinci Resolve to average in order to separate detail from the noise. You can choose between 0 and 5 frames. 0 applies no frame averaging, higher values apply more frame averaging, at the expense of being significantly more computationally intensive the higher a value you use. Also, a higher frame setting will yield a better analysis, but may yield unwanted artifacts if there are fast-moving images in the frame. A value of 1 may yield better results for fast-moving images. If you need to use higher frame values but you see artifacts, you can also try adjusting the Motion Threshold to fix the issue.
- **Motion Est. Type:** Picks the method DaVinci Resolve uses to detect motion in the image. The default, Faster, is less processor intensive, but less accurate. Choosing Better can effectively exclude motion more accurately, but is more processor intensive. None lets you disable motion estimation altogether, with the result being the application of Temporal NR to the entire image.
- **Motion Range:** Three settings, Small, Medium, and Large, let you set the speed of motion that Motion Estimation should expect to exclude. A Small setting assumes slow-moving subjects with little or no motion blur, allowing Temporal NR to affect more

of the image at a given Motion Threshold setting. A Large setting assumes fast motion with blur occupying a larger area of the image, which excludes more of the image from Temporal NR at the same Motion Threshold setting. Choose the setting that gives you the best compromise between a reduction in noise and the introduction of motion artifacts when adjusting the Motion Threshold parameter.

- **Luma Threshold:** Lets you determine how much or how little Temporal NR to apply to the luma component of the image. The range is 0–100, where 0 applies no noise reduction at all, and 100 is the maximum amount. Too high a setting may eliminate fine detail from the image.
- **Chroma Threshold:** Lets you determine how much or how little Temporal NR to apply to the chroma component of the image. The range is 0–100, where 0 applies no noise reduction at all, and 100 is the maximum amount. Too high a setting may eliminate fine color detail from the image, although you may find you can raise the Chroma Threshold higher than the Luma Threshold with less noticeable artifacting.
- **Luma/Chroma Threshold ganging:** Ordinarily, the Luma and Chroma Threshold parameters are ganged together so that adjusting one adjusts both. However, you can ungang these parameters in order to adjust different amounts of noise reduction to each component of the image, depending on where the noise happens to be worst.
- **Motion Threshold:** Defines the threshold separating which moving pixels are in motion (above this threshold) versus which moving pixels are static (below this threshold). Using Motion Estimation, Temporal Noise Reduction is not applied to regions of the image that fall above this threshold, in order to prevent motion artifacts by not applying frame-averaging to parts of the image that are in motion. Lower values omit more of the image from Temporal NR by considering more subtle movements. Higher values apply Temporal NR to more of the image by requiring faster motion for exclusion. You can choose between 0 and 100, where 0 applies Temporal NR to no pixels, and 100 applies Temporal NR to all pixels. The default value is 50, which is a suitable compromise for many clips. Be aware that if you set too high a Motion Threshold, you may see artifacts in moving parts of the image.
- **NR Blend:** Lets you dissolve between the image as it's being affected by the Temporal NR parameters (at 0.0) and the image with no noise reduction at all (100.0). This parameter lets you easily split the difference when using aggressive temporal noise reduction.

Spatial NR Controls

The Spatial NR controls let you smooth out regions of high-frequency noise throughout the image, while attempting to avoid softening by preserving detail. It's effective for reducing noise that Temporal NR can't.

- **Mode:** As of DaVinci Resolve 15, the Mode pop-up lets you switch Spatial NR between three different algorithms. All three modes of operation use exactly the same controls, so you can switch between modes using the same settings to compare your results.
 - **Faster:** Uses a computationally lightweight method of noise reduction that's good at lower settings, but may produce artifacts when applied at higher values.
 - **Better:** Switches the Spatial NR controls to use a higher quality algorithm that produces greatly superior results to Faster, at the expense of being more processor intensive to render, as well as not allowing you to decouple the Luma and Chroma Threshold sliders for individual adjustments to each color component.
 - **Enhanced:** Does a significantly better job of preserving image sharpness and detail when raising the Spatial Threshold sliders to eliminate noise. This improvement is particularly apparent when the Spatial Threshold sliders are raised to high values

(what constitutes “high” varies with the image you’re working on). At lower values, the improvement may be more subtle when compared to the “Better” mode, which is less processor intensive than the computationally expensive “Best” setting.

Additionally, “Best” lets you decouple the Luma and Chroma threshold sliders so you can add different amounts of noise reduction to each color component, as the image requires.

- **Radius:** Options include Large, Medium, and Small. A smaller radius offers greater real time performance, and can provide good quality when using low Luma and Chroma Threshold values. However, you may see more aliasing in regions of detail when using low NR Threshold values.

Setting Radius to be progressively larger results in higher quality within areas of greater visual detail at high Luma and Chroma Threshold values, at the expense of slower performance. An NR Radius of Medium should provide suitable quality for most images when using medium NR Threshold settings. As with many operations, there’s an adjustable tradeoff between quality and speed.

- **Luma Threshold:** Lets you determine how much or how little noise reduction to apply to the luma component of the image. The range is 0–100, where 0 applies no noise reduction at all, and 100 is the maximum amount. Too high a setting may eliminate fine detail from the image.
- **Chroma Threshold:** Lets you determine how much or how little noise reduction to apply to the chroma component of the image by smoothing out regions of high-frequency noise while attempting to preserve the sharpness of significant edge details. The range is 0–100, where 0 applies no noise reduction at all, and 100 is the maximum amount. Too high a setting may eliminate fine color detail from the image, although you may find you can raise the Chroma Threshold higher than the Luma Threshold with less noticeable artifacting.
- **Luma/Chroma Threshold ganging:** Ordinarily, the Luma and Chroma Threshold parameters are ganged together so that adjusting one adjusts both. However, you can ungang these parameters in order to adjust different amounts of noise reduction to each component of the image. For example, if an image softens too much at a certain level of noise reduction, but you find there’s more color speckling than there is luma noise, you can lower the Luma Threshold to preserve detail while raising the Chroma Threshold to eliminate color noise.
- **NR Blend:** Lets you dissolve between the image as it’s being affected by the Spatial NR parameters (at 0.0) and the image with no noise reduction at all (100.0). This parameter lets you easily split the difference when using aggressive temporal noise reduction.

Using Noise Reduction

The following procedure suggests a method of using the Noise Reduction (NR) parameters to achieve a controlled result.

Applying noise reduction to an image:

- 1 Enable Temporal NR by choosing 1 to 5 frames from the Number of Frames pop-up menu. Keep in mind that more frames dramatically increase the render time of this effect, while it may or may not significantly improve the result, depending on your material.
- 2 Choose options from the Motion Est. Type and Motion Range pop-up menus corresponding to how much motion is in the image. If there’s a lot of motion, you may need to choose Better and Large. If there’s not very much motion, lesser settings may suffice.

- 3 With Luma and Chroma Threshold linked, slowly raise either parameter until you just start to see a reduction in noise within the nonmoving areas of the image, then make smaller adjustments to determine the maximum amount of Temporal NR you can add without creating motion artifacts, or overly softening image detail you want to preserve.
- 4 If there's obviously more chroma than luma noise in the image, you can disable Luma/Chroma linking at a satisfactory level of luma noise reduction, and then raise the Chroma Threshold to apply more aggressive Temporal NR to address color speckling in the picture.
- 5 If you're not satisfied with the tradeoff between the maximum possible threshold of noise reduction and the prevention of motion artifacts, you may want to adjust the Motion Threshold setting, lowering it to omit more of the motion from the noise reduction operation, or raising it to include more motion. If you're still not satisfied, you can also try better Motion Est. Type and Motion Range settings.

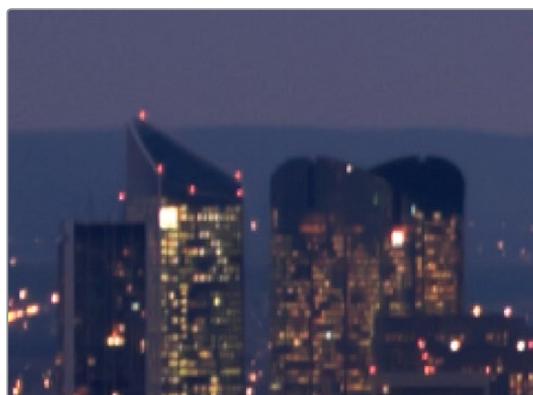
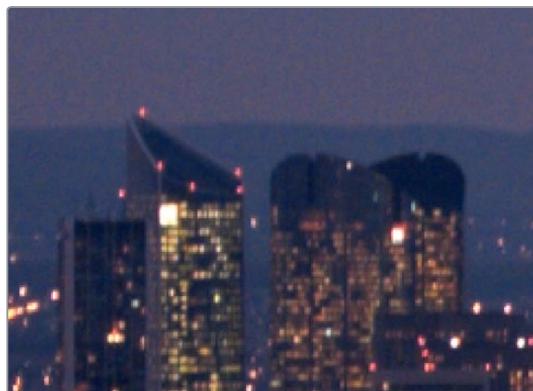


(Top) Before and (Bottom) after Temporal NR to reduce noise in unmoving areas of the image

Keep in mind that the strength of Temporal NR is to reduce noise in unmoving parts of the image. When you've achieve the best tradeoff between noise reduction in the still areas and avoidance of motion artifacts in the moving areas of the image, then it's time to turn to Spatial NR to further eliminate noise throughout the rest of the picture.

- 6 Enable Spatial NR by raising either the Luma or Chroma Threshold parameters, which are linked by default, until you strike a suitable balance between the reduction of noise, and an unwanted increase in image softness.
- 7 It's recommended to choose the Better option from the Spatial NR mode pop-up, as it will yield the best possible results. However, this can be processor-intensive, so if you need better real-time performance, you can switch the mode to Faster and compare results.

- 8** If there's obviously more chroma than luma noise in the image, you can disable Luma/Chroma linking at a satisfactory level of luma noise reduction, and then raise the Chroma Threshold to apply more aggressive Spatial NR to address color speckling in the picture.



(Top) Before and (Bottom) after noise reduction improves the "look"

- 9** If you've had to use a high Spatial NR Luma or Chroma Threshold setting to reduce noise visibly, and areas of detail look a bit chunky or aliased, you can choose a larger setting from the Radius pop-up menu to enable a more detailed analysis of the scene. This will result in higher visual quality, but larger NR Radius settings are more processor intensive, and may reduce real time performance if you don't have adequate GPU resources available to your system.
- 10** If you've found suitable noise reduction settings, but the result is too aggressive and makes the image appear too processed, you can try raising the Spatial NR and/or Temporal NR Blend parameters to fade between the noise reduction added by each set of controls, and the image as it was before you added noise reduction.

Try Applying Temporal NR First, then Applying Spatial NR

Because Temporal NR analyzes multiple frames for its noise isolation, it tends to be better at preserving detail accurately in regions of the image where there's little motion. If you try applying Temporal NR first and get a successful result, even if only in part of the image, you may reduce how much Spatial NR you have to apply, thus improving the overall quality of your final result.

Keep in mind that while Temporal NR does a great job in unmoving parts of an image but is less effective when dealing with subjects in motion, Spatial NR is able to reduce noise everywhere in the frame falling below its threshold, even when there's motion. Ultimately, a combination of the two is almost always going to be a winning combination.

Spatial NR Radius, How Large Should You Go?

Larger NR Radius settings can dramatically improve the quality of high-detail regions in shots where you're using aggressive Spatial noise reduction, but it's not necessary to always jump to the large Radius setting, which provides the highest precision. In many cases, when evaluating an image that you're applying noise reduction to, you may not actually be able to perceive the additional quality, and you'll waste processing time on an unnecessary level of correction.

It's a good idea to make sure that you're evaluating the full-frame image on a large enough display to see the noise you're working on within the viewing context of the intended audience. Zooming really far into a clip while applying noise reduction may encourage you to use higher quality settings than are necessary, because an excessively enlarged detail of an image lets you see subtle changes that you wouldn't notice at actual size.

Limiting Noise Reduction in Useful Ways

As with any other correction in the Color page, noise reduction can be limited using HSL Qualification or Power Windows. This means you can focus your efforts on reducing noise in the most problematic areas of an image (for example, in shadows and background regions), while sparing elements that you don't want to affect (such as faces or better-lit areas of the image).

Furthermore, you can use Spatial NR in lieu of Blur operations to perform a subtler form of complexion smoothing, using the HSL qualifier or a window to isolate an actor's skin tone for targeted noise reduction.

Controlling the Order of Operations for Noise Reduction

You can apply noise reduction at any point in your image processing tree using a dedicated node. If you have an image with noise that you think might be enhanced by whatever corrections you need to make (increasing the contrast of underexposed clips often increases whatever noise is within an image), there are two approaches to noise reduction:

- **Apply noise reduction at the beginning of a node tree:** This lets you pre-emptively eliminate any noise before it becomes a problem as a result of whatever adjustments you're planning to make. The result can be smoother, but you may also notice that the edge detail within the image is a bit softer.
- **Apply noise reduction at the end of a node tree:** The alternative is to make your adjustments first, and then apply noise reduction in a separate node afterwards. In this case, you may find that the noise reduced regions of the image aren't quite as smooth, however the edge detail within the image may be visibly sharper as a result.
- **Apply Noise reduction to only one color channel of an image:** Using the Splitter/Combiner nodes, you can also apply noise reduction to only one color component of an image. If you're grading a video clip with a noisy Blue channel, this can be a way to focus noise reduction where it's needed.

Neither result is universally better or worse than the other. Which is preferable depends on the image you're working on, and the type of result you're looking for (you might prefer some shots to be a bit softer, while you'd like other shots to be a bit sharper). The real point is that the node-based image processing of DaVinci Resolve lets you choose which technique works best for you.

NOTE: If you apply noise reduction and make color adjustments within the same node, noise reduction is processed first, followed by color adjustments.

Using Noise Reduction Controls with the DaVinci Control Panel

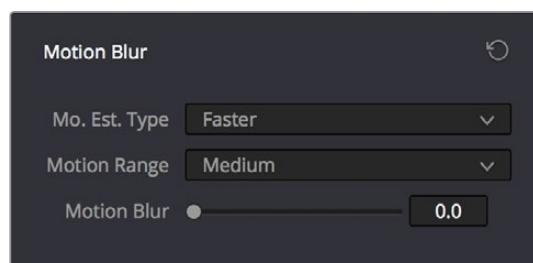
All three Noise Reduction controls are available via knobs on the PRIMARIES, NOISE REDUCTION control group on the Center panel.

To open the Noise Reduction controls on the DaVinci control panel:

Press the PRIMARIES or MAIN soft key on the Center panel, whichever is visible (depending on which control group is currently displayed).

Motion Blur

Motion Blur settings use optical-flow based motion estimation to add artificial motion blur to clips that have none. This can be useful in cases where a program was shot using a fast shutter speed, and you later decide that the resulting video has too much strobing. By analyzing the motion within a clip, the Motion Blur settings can selectively apply blurring to the image based on the speed and direction of each moving element within the scene.



Motion Blur controls

Three parameters let you set how much motion blur to add, and at what quality:

- **Motion Est. Type:** A setting of Better provides more accurate pixel mapping at the expense of being more processor intensive. Faster provides a more approximate result, but is less processor intensive.
- **Motion Range:** Determines what speed of motion to consider when defining regions being blurred.
- **Motion Blur:** Raise this parameter to add more motion blur to the image, lower it to add less. The range is 0–100, where 0 applies no motion blur, and 100 applies maximum motion blur.

The Blur Palette

The Blur palette has three different modes of operation—blur, sharpen, and mist. While the functionality of the Blur and Sharpen modes somewhat overlap, each mode provides dedicated controls that the other ones lack.

As with virtually everything else in the Color page, the operations performed in the Blur palette can be limited as a secondary operation using HSL Qualifiers, Windows, or Imported mattes, which makes it easy to apply these effects to specific portions of the image.

Many of the controls in the Blur palette consist of three ganged sliders, one for red, one for green, and one for blue.

By default, these ganged sliders move together as one, resulting in each color channel of the image being equally affected. A small white button to the left of each control's name lets you ungang these sliders, in order to apply degrees of adjustment to individual color channels.

Blur

The default mode, Blur lets you apply an exceptionally high-quality Gaussian blur, or another equally high-quality sharpening operation to your image. This mode of operation has the simplest controls.

Two sets of linked parameters let you adjust the extent and directionality of blur or sharpening. Which is applied depends on the direction in which you adjust the Radius control.



Blur Radius controls are ganged by default, but can be unganged

- **Radius:** This is the primary control for adding blur or sharpening. The default value of 0.50 results in no effect being applied to the image. Raising the radius slider increases blur, to an incredibly soft maximum value of 5.10 when using mouse control and a maximum value that can exceed 6.00 when using the control panel. Lowering the radius increases sharpness, with a minimum value of 0.00 providing maximum sharpness.

TIP: If you raise the Radius slider all the way to 1.00 and the image isn't blurred enough, add another node and use it to add another blur operation.

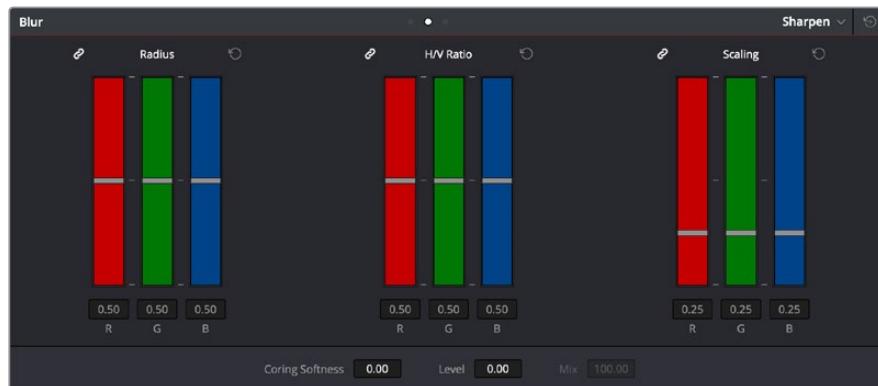
- **H/V Ratio:** Lets you add directionality to the current operation. At the default value of 0.50, the image is affected in both the horizontal and vertical directions equally. Raising H/V Ratio makes the effect increasingly directional along the horizontal axis, while lowering makes the effect increasingly directional along the vertical axis.

To adjust the Blur controls using the DaVinci control panel:

- 1 Press the VECTORS button on the T-bar panel, or the VECTORS soft key on the Trackball's main page.
- 2 Use the BLUR AMOUNT and H/V RATIO knobs to add either blur or sharpening.
- 3 When you're finished, press the PRIMARIES soft key to return to the Center panel's main page.

Sharpen

While the Blur controls also let you apply sharpening simply by lowering rather than raising the Radius sliders, the actual Sharpen mode provides additional controls specifically for tailoring sharpening operations.



Sharpening with Coring Softness and Level

- **Radius:** This is the primary control for adding blur or sharpening. The default value of 0.50 results in no effect being applied to the image. Raising the radius slider increases blur, to a maximum value of 1.00. Lowering the radius increases sharpness, with a minimum value of 0.00 providing maximum sharpness.
- **H/V Ratio:** Lets you add directionality to the current operation. At the default value of 0.50, the image is affected in both the horizontal and vertical directions equally. Raising H/V Ratio makes the effect increasingly directional along the horizontal axis, while lowering makes the effect increasingly directional along the vertical axis.
- **Scaling:** Multiplies the amount of scaling being applied by the Radius control for sharpening operations. The scaling parameter has no effect if Radius is set to 0.50 or above for blur effects.

The Coring Softness and Level parameters work together to let you limit sharpening to only the most detailed areas of the picture that would most benefit from it, based on a threshold of image detail that you define using the Level and Softness parameters.

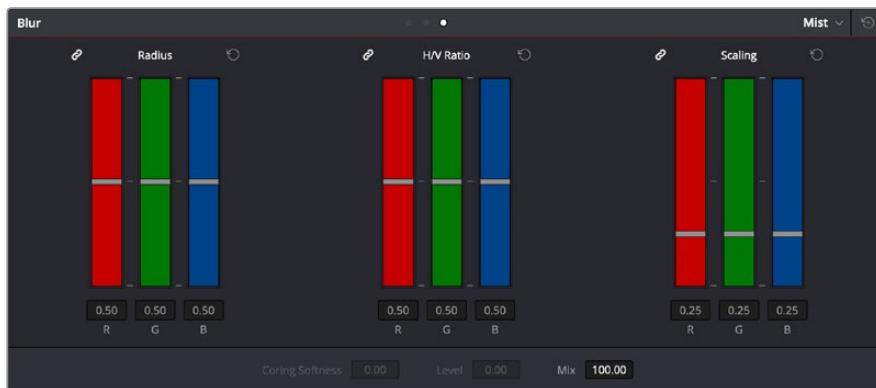
- **Level:** The first slider you should use. Raising this value sets the threshold at which image detail is omitted from the sharpening operation. The default setting of 0 sets the threshold low enough to sharpen the entire image. Raising Level gradually omits low-detail areas of the image, which results in sharpening being restricted to well-defined outlines.
- **Coring Softness:** After you've set the Level slider to an appropriate amount, raising Coring Softness blends the border between parts of the image that are sharpened and parts of the image that are left alone.

To adjust the Sharpening controls using the DaVinci control panel:

- 1 Press the VECTORS button on the T-bar panel, or the VECTORS soft key on the Center panel's main page.
- 2 On the Center panel, press the IMAGE MODE soft key repeatedly to cycle to the RESOLVE IMAGE SHARPENING controls.
- 3 Use the SHARP AMOUNT, SCALING, LEVELS, and SOFTNESS knobs to create the desired sharpening effect.
- 4 When you're finished, press the PRIMARIES soft key to return to the Center panel's main page.

Mist

The Mist mode lets you combine blur and sharpen operations in such a way as to create effects similar to those achieved via “Vaseline on the lens” or Pro-Mist optical filters.



Mist including Mist Mix control

Unlike the Blur or Sharpen modes, where the Radius sliders provide immediate access to the desired effect, the Mist mode requires you to lower the Radius and Mix sliders together to get a desirable result. By varying the amounts of Radius and Mix, you can create many variations on the mist effect.

- **Radius:** When creating a Mist effect, you first need to lower Radius to sharpen the image. This operation then combines with a lowering of the Mix parameter to provide the combination of detail and blurring that results in a mist effect.
- **H/V Ratio:** Lets you add directionality to the current operation. At the default value of 0.50, the image is affected in both the horizontal and vertical directions equally. Raising H/V Ratio makes the effect increasingly directional along the horizontal axis, while lowering makes the effect increasingly directional along the vertical axis.
- **Scaling:** Multiplies the amount of scaling being applied by the Radius control, and lets you intensify a mist effect beyond the Radius slider's ordinary range. The scaling parameter has no effect if Radius is set to 0.50 or above for blur effects.
- **Mix:** After you sharpen the image using the Radius slider, decreasing the Mix parameter adds a superimposed blur that mixes with the high-detail areas of the picture to create the mist effect.

To adjust the Mist controls using the DaVinci control panel:

- 1 Press the VECTORS button on the T-bar panel, or the VECTORS soft key on the Center panel's main page.
- 2 On the Center panel, press the IMAGE MODE soft key repeatedly to cycle to the RESOLVE MIST EFFECT controls.
- 3 Use the RADIUS, H/V RATIO, SCALING, and MIX knobs to create the desired mist effect.
- 4 When you're finished, press the PRIMARIES soft key to return to the Center panel's main page.

Chapter 121

Dust Removal

This chapter shows how you can use the legacy Dust Removal feature that's built into the Color page. There's also a pair of ResolveFX plug-ins: "Automatic Dirt Removal" and "Dust Buster," found in the Revival category of the ResolveFX plug-ins. For more information on those, see Chapter 118, "ResolveFX."

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Introduction to Dust Removal

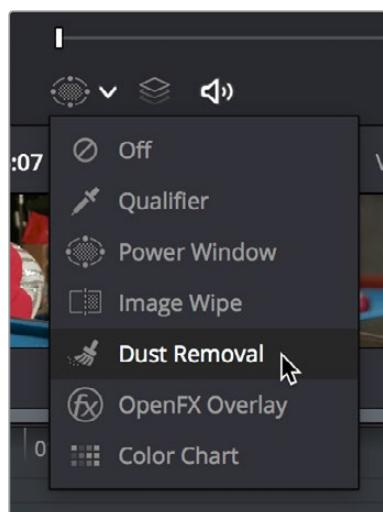
The interactive Dirt and Dust Removal tool provides an interface for dustbusting right from within DaVinci Resolve. This is a raster-based effect, and results in a duplicate set of “dustbusted” media being created within a hidden subdirectory.

If, at any point, you’re unsatisfied with the adjustment you’ve made, you need only use the undo command to return the clip you’re working on to its prior state.

IMPORTANT The Dirt and Dust Removal tool only works with DPX image sequences. Media in a raw, ProRes, or DNxHD format must first be converted to a DPX image sequence before it can be operated on with this tool.

To use the Dirt and Dust Removal tool:

Click the Onscreen Control pop-up menu at the bottom left of the Viewer, and choose Dust Removal.



Selecting the Dirt and Dust tool in the Viewer OSD menu

To open the Dirt and Dust Removal tool setup options:

Right-click the Dirt and Dust Removal icon showing in the Onscreen Control pop-up to open the setup window.

Dirt and ROI Settings Parameters

In the Dirt and ROI Settings window, there are a number of parameters that you can use to optimize this tool for the particular problem you’re trying to solve.

- **Algorithm:** The Algorithm pop-up menu lets you select the method of filtration to use when painting out dirt or dust. Different options provide different methods for replacing the problem pixels with image data copied from other frames in time, or from other regions of the current frame. You’ll want to choose an option that works best for the type of camera and subject motion happening within the clip you need to clean. For more information on the advantages of each algorithm, see the next section.

- **Aggression:** Increase or decrease the Aggression and Blend sliders depending on the degree of correction you want to apply.
- **Blend:** Sets the % of the original image to be feathered at the edges of the repair.
- **Optimize:** Turning this option on provides better-looking results, at the expense of increased processing time.
- **ROI Mode:** Determines whether a correction is applied with a single click, or via a paint stroke. There are three options.
- **Click and Clean:** Applies a correction with one click, and is fast to use on small dust spots.
- **Draw and Clean:** Lets you “paint” over a larger dirty area with the mouse or a pen, with the correction being applied at the conclusion of your paint stroke.
- **Cnc Size:** Defines the width of the “brush” that’s used to paint out dirt and dust.

Algorithms for Dirt and Dust Removal

There are six algorithms you can choose from that determine how the pixels you paint over are automatically replaced.

- **Auto-temporal –/+ 1:** When an ROI is drawn, the previous frame, the next frame and the current frame will all be used for analysis. The best of these 3 will be automatically selected and used for removing the dirt in the current frame.
- **Auto-temporal –/+ 2:** This is the same as the above, but the frames used instead are the current frame, previous-to-previous frame (i.e., 2 frames back), and next-to-next frame (i.e., 2 frames forward). Therefore, if the ROI is drawn on frame 100, frame 98, frame 100, and frame 102 will be used for analysis. The best of these 3 will be used for removing the dirt in the current frame. The advantage of this selection is that it will avoid the appearance of frozen grain, which may be possible in case of dirt against a stationary background.
- **Temporal –/+ 1:** if the ROI is drawn by dragging the mouse from left to right, the next frame will be used for motion-compensated dirt removal. If the ROI is drawn by dragging the mouse from right to left, the previous frame will be used.
- **Temporal –/+ 2:** if the ROI is drawn by dragging the mouse from left to right, the next-to-next frame will be used for motion-compensated dirt removal. If the ROI is drawn by dragging the mouse from right to left, the previous-to-previous frame will be used.
- **Spatial:** In case of fast or blurred motion, using the previous or next frames may give unsatisfactory results. In this case, the same frame itself can be used for removing the dirt. This will use surrounding information in the current frame to remove the dirt.
- **Median:** The Median filter performs a blending of the pixels, smoothing out the region. Use this when other options do not replace the image, or when there is no support information in which to reconstruct the original. Using small boxes will produce better results.

Chapter 122

Data Burn

This chapter covers how to use the Data Burn window that's available to every page in DaVinci Resolve.

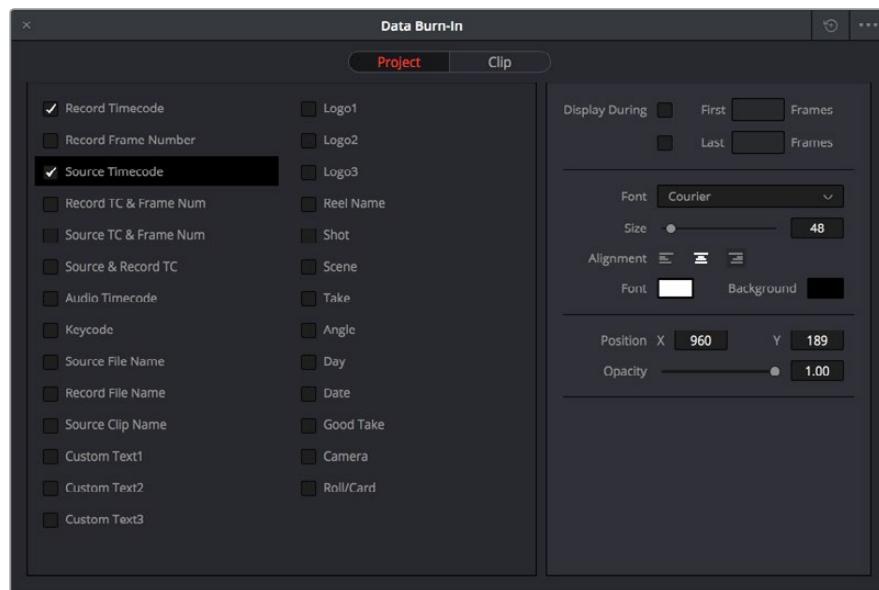
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Data Burn

The Data Burn window lets you display select metadata as a timeline-wide “window burn” that’s superimposed over the image in the Viewer. This window burn is written into files that you render in the Deliver page, and it’s also output to video, for viewing on your external display, or for outputting to tape.

The Data Burn window is available by choosing Workspace > Data Burn-In.



Data Burn window

Traditionally, window burns are useful as a reference when creating offline media that you need to keep track of later. However, the Data Burn window is extremely flexible. For example, it’s also useful for watermarking review files that you don’t want to be distributed accidentally with either custom text or graphics with alpha channels, for adding graphical logos or “bugs” to programs in preparation for broadcast (again, optionally using graphics with alpha channels), for superimposing custom reference guidelines of some sort over the images being monitored, or even just for temporarily displaying timecode or clip names to refer to on your monitor while editing, mixing, or reviewing graded dailies with a client.

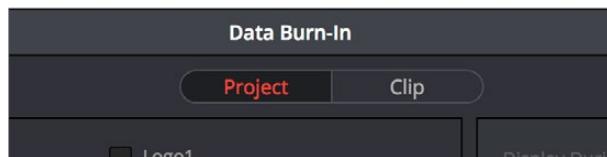


Viewer displaying a logo, custom text, timecode and source clip name

Project vs. Clip Mode

Two buttons at the top of the Data Burn window let you choose whether you want to edit one set of burned-in metadata that will be displayed for the entire duration of the Timeline, or edit burned-in metadata on a clip-by-clip basis. You can combine the two, having timeline-wide window burn settings and separate clip-specific window burn settings for a handful of clips in that timeline at the same time.

When rendering in the Delivery page, window burns are applied both when rendering timelines as individual source clips and when rendering as one single clip.



Two separate panels let you adjust project-wide window burns vs. clip-specific window burns

Setting Up Burned-In Metadata

Setting up different clip and project metadata to output as a window burn is easy.

To set up a window burn:

- 1 Choose Workspace > Data Burn-In.
- 2 Click Project or Clip at the top of the Data Burn-In window.
- 3 Turn on the checkboxes of whatever items of metadata you want to display in the “Add to Video Output” column. More information about the available items appears later in this chapter.

The first item of metadata is centered near the bottom of the frame, above Action Safe. Each additional item of metadata you turn on for display is added above whichever items are already displayed, regardless of their position in the “Add to Video Output” list.

- 4 Click any currently enabled item of metadata from the list to highlight it in black, and edit that item’s Custom Output parameters at the right. More information about the available parameters appears later in this chapter.

To reset the current window burn setup:

Click the Reset button next to the Option pop-up menu to reset the current mode of the Data Burn window.

Saving and Loading Burn-In Presets

If there are common sets of metadata that you regularly use and switch among, you can save each set up as a preset for future use.

To save a burn-in preset:

- 1 Click the Option menu and choose Save As New Preset.
- 2 Type a name into the Burn In Preset dialog that appears, and click OK. That preset is added to the list of saved presets in the Option menu.

To delete a burn-in preset:

- 1 Choose a preset from the Option menu.
- 2 Click the Option menu, and choose Delete.

To modify a burn-in preset:

- 1 Choose a preset from the Option menu.
- 2 Edit it however you like.
- 3 Click the Option menu, and choose Update.

Data Burn Metadata

The leftmost column in the Data Burn window contains a list of all the options that you can add to the video output as a window burn. Each option has a checkbox that lets you turn it on or off. You can also select in the Option pop-up if you would like the item name rendered as a prefix to the burn-in data.

NOTE: If two clips overlap in the Timeline, the metadata that matches the currently visible clip in the Viewer is what will be displayed in the window burn.

- **Record Timecode:** The timecode relative to the Timeline, as set in the Conform Options section of the General Options panel of the Project Settings.
- **Record Frame Number:** The number of frames from the first frame of the Timeline.
- **Source Timecode:** Each clip's individual timecode.
- **Record TC & Frame Num:** Both metadata options combined in one line.
- **Source TC & Frame Num:** Both metadata options combined in one line.
- **Source & Record TC:** Both metadata options combined in one line.
- **Audio Timecode:** The timecode of audio that's been synced to a clip.
- **Keycode:** Also referred to as edge-code, the identification codes running along the edge of film stocks that provide an absolute reference for which digital frames correspond to which film frames.
- **Source File Name:** The full file path, including file name, of the media file that's linked to the current clip.
- **Record File Name:** The file name as defined in the Render Settings list of the Deliver page.
- **Source Clip Name:** The file name of the media file that's linked to the current clip, without the file path.
- **Custom Text1:** A line of text that you type into the Text field of the Custom Output parameters. You can use any characters you like. When editing any of the three custom text fields that are available, you can use "metadata variables" that you can add as graphical tags that let you display clip metadata. For example, you could add the corresponding metadata variable tags %scene_%shot_%take and the custom text would display "12_A_3" if "scene 12," "shot A," "take 3" were its metadata. For more information on the use of variables, as well as a list of all variables that are available in DaVinci Resolve, see Chapter 144, "Using Variables and Keywords."

- **Custom Text2:** A second line of text that you can customize.
- **Custom Text3:** A third line of text that you can customize.
- **Logo1:** Lets you superimpose a graphic over the image in a customizable location. Compatible graphics formats include PNG, TGA, TIF, BMP, and JPG. Alpha channels are supported for transparency in logos.
- **Logo2:** Lets you superimpose a second graphic.
- **Logo3:** Lets you superimpose a third graphic.
- **Reel Name:** The currently defined reel number for the current clip.
- **Shot:** Shot metadata, if it's been written to the file by a camera, or entered into the Metadata Editor on the Media page.
- **Scene:** Scene metadata, if it's been written to the file by a camera, or entered into the Metadata Editor on the Media page.
- **Take:** Take metadata, if it's been written to the file by a camera, or entered into the Metadata Editor on the Media page.
- **Angle:** Angle metadata, if it's been written to the file by a camera, or entered into the Metadata Editor on the Media page.
- **Day:** Day metadata, if it's been written to the file by a camera, or entered into the Metadata Editor on the Media page.
- **Date:** Date metadata, if it's been written to the file by a camera, or entered into the Metadata Editor on the Media page.
- **Circled Take:** Corresponds to Good Take metadata, if it's been written to the file by a camera, or entered into the Metadata Editor on the Media page.
- **Camera:** Corresponds to the Camera metadata, if it's been written to the file by a camera, or entered into the Metadata Editor on the Media page.
- **Roll/Card:** Corresponds to the Roll/Card metadata, if it's been written to the file by a camera, or entered into the Metadata Editor on the Media page.

Custom Output Options

The parameters in the Custom Output panel let you modify the look, position, and in some cases content, of the selected metadata item. Pan and Tilt are individually customizable for each metadata item.

- **First x frames:** Turning on this checkbox lets you specify a number of frames during which the current item of metadata will be displayed before dissolving away over one second. When enabled, the current item of metadata will cut onscreen with the beginning of each new clip, remain onscreen for the duration specified, and then dissolve away.
- **Last x frames:** Turning on this checkbox lets you specify a number of frames before the end of each clip during which the current item of metadata will appear onscreen after fading up over one second, before cutting away with the end of the clip.
- **Font:** Defaults to Courier, but you can choose any font that's installed on your system.
- **Size:** Defaults to 48, but you can choose standard increments from 6 to 72.
- **Alignment:** Defaults to Center. The only other option is Left.
- **Color:** Defaults to white, but you can choose from a range of predefined colors in this pop-up menu.

- **Background:** Defaults to black, although the apparent color is influenced by the Opacity setting. For a more garish look, you can choose from a range of predefined colors in this pop-up menu.
- **X-Y Position:** Lets you change the horizontal and vertical orientation of the current item of metadata. The default horizontal value is the center of the frame, relative to the current project's frame size. The first item of metadata is centered vertically near the bottom of the frame, above Action Safe. Each subsequent item of metadata you turn on is automatically placed above the previous item of metadata, regardless of its order in the "Add to Video Output" list.
- **Opacity:** Defaults to 0.50. Lets you define the transparency of the burned-in metadata's background color.
- **Text:** (only if one of the Custom Text options is checked) A text field that lets you enter custom text to display as one of three possible custom text items.
- **Logo:** (only if one of the Logo options is checked) A field that displays the file path of any currently selected graphic that you're displaying as one of the three possible Logo graphics. Compatible graphics formats include PNG, TGA, TIF, BMP, and JPG. Alpha channels are supported for transparency in logos.
- **Import File button:** (only if one of the Logo options is checked) Lets you choose a graphics file to use as a logo.

Gang Rendered Text Styles

You have the option of independently styling each item of metadata, depending on whether the Gang Render Text Styles option is checked in the Data Burn window's Option menu. When turned on, all text metadata share the same font, size, color, background, justification, and opacity. When turned off, each item of metadata can have individual settings.

Prefix Render Text

Another option in the Data Burn window's Option menu lets you turn the prefixes, or headers, on or off for all metadata that's enabled to be burned in.