



Edit Page Effects

19

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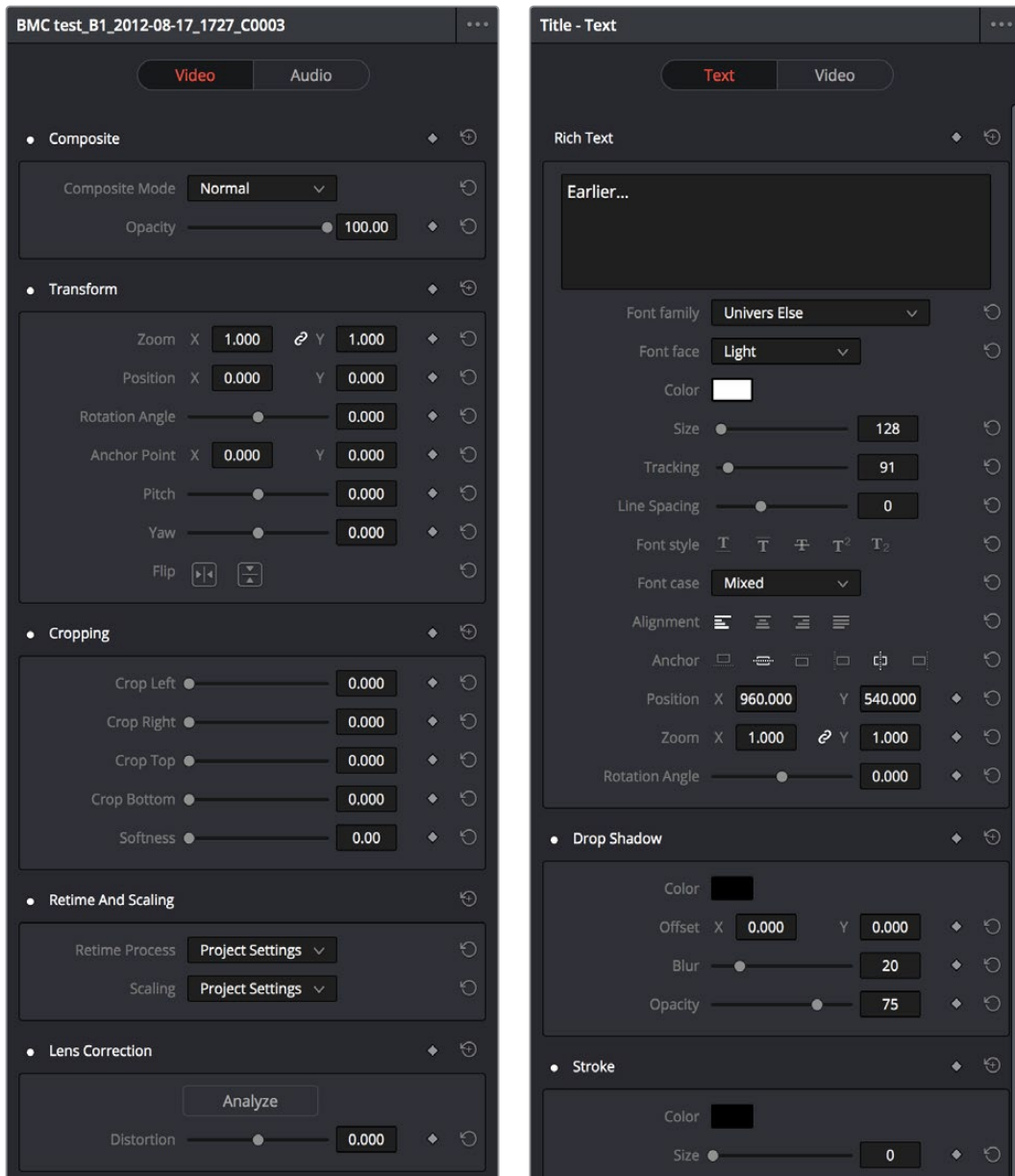
The Edit page is also home to many of the compositing and effects features found in DaVinci Resolve. Many effects can be imported into DaVinci Resolve, including composite modes, opacity settings, linear and nonlinear speed changes, and clips using alpha channels. Once in Resolve, you can make changes to these effects in the Edit page. Alternately, you can also use Resolve's controls to create effects from scratch.

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Using the Inspector

The Edit page Inspector, which is closed by default, is the central area for editing effects parameters relating to compositing, sizing, titling, transitions, generators, and effects of all kinds. Many of the instructions in this chapter require the use of the Inspector, which can be opened or closed by clicking the Inspector button at the far right of the Edit page toolbar, or by double-clicking a transition or generator in the Timeline.



The Inspector displays different parameters depending on what you've selected in the Timeline; (left) parameters of a clip, (right) parameters of a title

The parameters displayed in the Inspector are those of the currently selected item in the Timeline. Changing the selection changes which parameters are displayed, and the parameters you edit in the Inspector only alter the currently selected clip. If multiple clips are selected, the Inspector displays and edits only the leftmost clip within the selection.

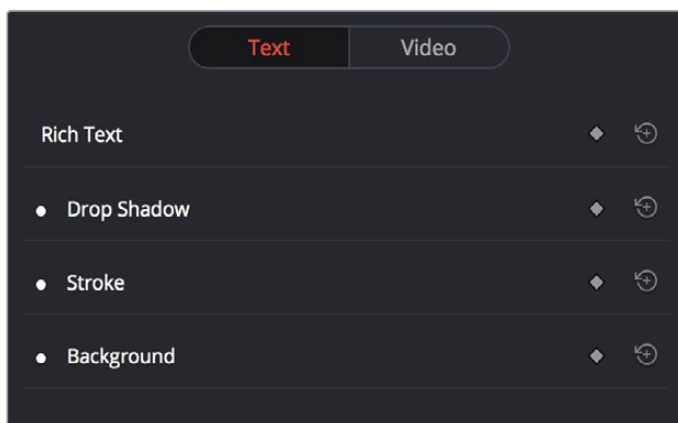
Selection Follows Playhead

Ordinarily, it's possible for the Inspector to show the parameters of a selected clip even when the playhead is over another clip. You can change this behavior by choosing Timeline > Selection Follows Playhead, which sets Resolve to always select whichever clip intersects the playhead in the Timeline. The result is that the Inspector always displays the parameters of the clip at the playhead, without you needing to do anything other than moving the playhead back and forth in the Timeline.

If there are multiple superimposed clips intersecting the playhead all at once, the top-most video clip with an enabled auto-select control will be selected, thus exposing its parameters in the Inspector, and all other clips will be ignored.

Inspector Controls

Different clips in the Timeline expose different controls. For example, ordinary video clips expose Video and Audio panels, while text generators expose Title and Video panels. Whichever panels are exposed, parameters within each panel are organized into groups, with a title bar providing the name of that group, along with other controls that let you control all parameters within that group at the same time.



Closed and open Inspector group controls

These controls include:

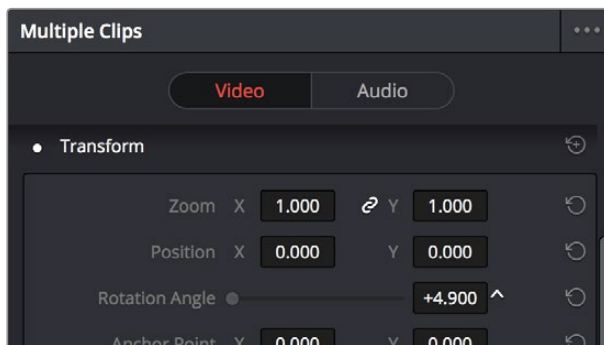
- **Enable button:** A round white button to the left of the parameter group's name lets you disable and re-enable every parameter within that group at once.
- **Parameter group title bar:** Double-clicking the title bar of any group of parameters collapses or opens them. Even more exciting than that, Option-clicking the title bar of one parameter group collapses or opens all parameter groups at once.
- **Keyframe button:** This button lets you add or remove keyframes at the position of the playhead to or from every single parameter within the group. When the button is highlighted orange, a keyframe is at the current position of the playhead. When it's dark gray, there is no keyframe.
- **Reset button:** Lets you reset all parameters within that group to their default settings.

Using the Inspector to Adjust Multiple Clips at the Same Time

There's an easy way to make adjustments to the Inspector parameters of multiple clips at the same time, without needing to use Paste Attributes (described later in this chapter). All you need to do is simultaneously select every clip you want to alter, and then modify the parameter in the Inspector that you want to change. As a result, every selected clip will be adjusted by the same amount.

When you select multiple clips, the Inspector will display "Multiple Clips" as the title. If each of the selected clips have different values in the parameter you're adjusting, that parameter will have two dashes in the value field. There are two ways you can make adjustments to multiple clips:

- If you want to make a relative adjustment to all selected clips while keeping their original offsets from one another, then drag the virtual slider in the parameter field which will display a + or – before however many units your adjustment is.
- However, if you want to set all selected clips to the same value, you can double-click in the number field, type the value, and press Return.

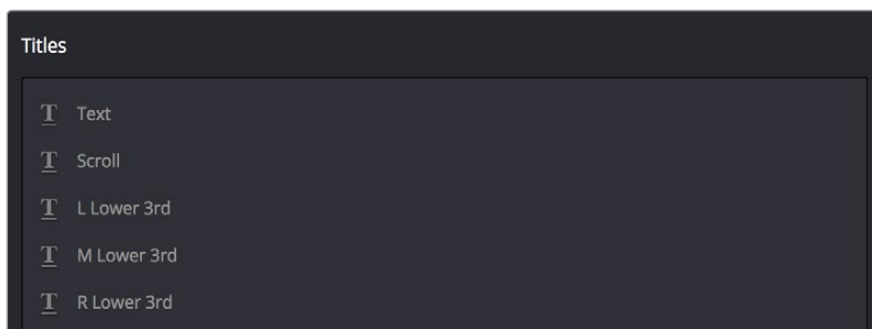


Making a relative adjustment of plus 4.9 in the Rotation Angle of all selected clips

Adding Titles

There's a collection of titles and generators in the Toolbox that you can use to create leader when outputting to tape, add slates, create subtitles, and otherwise fulfill any textual needs your program has.

Titles and generators can be edited much like any other clip. Furthermore, when selected, both titles and generators expose the same Composite, Transform, and Cropping parameter groups as any other clip; these parameters can be used to composite titles and fly them around in order to create different text effects.



The available titles in the toolbox

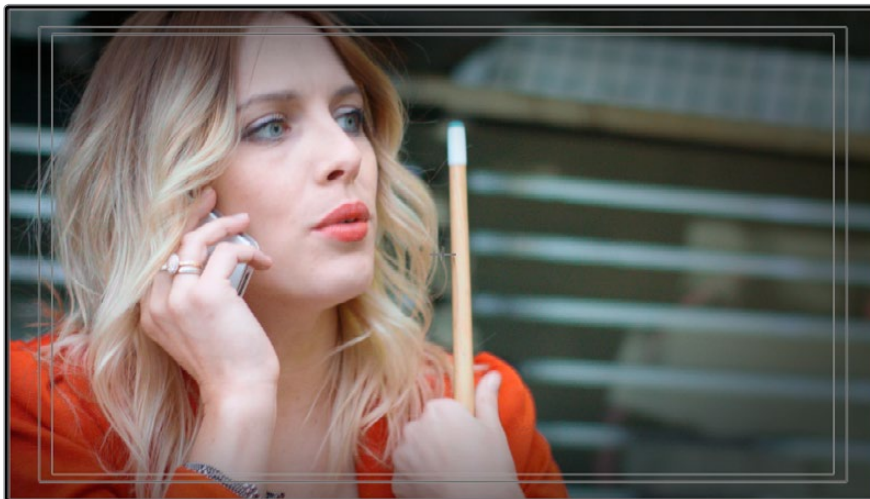
Methods of adding and editing generators and titles:

- **To drag and drop a generator directly into the Timeline:** If you simply drag and drop titles or generators into the Timeline, the default duration of the resulting clip is 5 seconds. This duration can be customized in the Edit panel of the Project Settings.
- **To edit a generator using the edit overlays of the Timeline Viewer:** Click the destination control of the clip you want to edit a generator into, then set Timeline In and Out points to define the duration of the resulting edit, and drag the generator you want to edit onto the edit overlay of the Timeline Viewer that corresponds to the type of edit you want to perform.
- **To reposition the text of a title in the Timeline Viewer:** Select the title generator you want to edit in the Timeline, then click the visible text in the Timeline Viewer so that its bounding box is selected; in this state you can reposition, scale, and rotate the text item.
- **To edit the text of a title in the Timeline Viewer:** Select the title generator you want to edit in the Timeline, then double-click the visible text in the Timeline Viewer to insert a text editing cursor. At this point, you can select, delete, or add any text you want by typing directly in the Timeline Viewer.
- **To edit the parameters of a generator or title:** Open the Inspector, and select the generator or title you want to edit to open it into the Inspector.

Using Safe Area Overlays

If you're working on a broadcast program and you want to adhere to guidelines for title safe and broadcast safe, you can choose to display overlays that indicate where these regions are in the Edit page.

To do so, choose View > Safe Area > Master On/Off.



The available safe area overlays

If necessary, there are a number of ways you can customize this overlay by choosing one of the other options in the View > Safe Area submenu to toggle specific parts of the Safe Area overlay on and off.

These options include:

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

Types of Title Generators

When opened into the Inspector, titles expose a set of text parameters that allow you to style the contents of that clip's Text field within the Inspector. Each of the titles supports rich text, so you can individually style words, lines, or paragraphs of text using the available parameters including Color, Font, and Size. Other attributes such as Alignment, Anchor, Position, and Shadow affect the entire title.

The following titles are available:

- **Simple:** Useful for creating titles consisting of one word, line, or paragraph of text. A single body of text shares one set of rich text controls.
- **Scroll:** Automatically automates a scrolling title sequence from the bottom to the top of the screen. The duration of the generator clip in the Timeline determines the speed of the scroll. Identical parameters as the Simple title.
- **L Lower 3rd:** Automatically positions two lines of text at the bottom left corner of title safe, each with a different set of rich text and Position/Zoom/Rotation controls for independent sizing and animating.
- **M Lower 3rd:** Automatically positions two lines of text at the bottom middle of title safe, each with a different set of rich text and Position/Zoom/Rotation controls for independent sizing and animating.
- **R Lower 3rd:** Automatically positions two lines of text at the bottom right corner of title safe, each with a different set of rich text and Position/Zoom/Rotation controls for independent sizing and animating.

Title Generator Panels

The parameters of text generators are divided into two panels: the Title panel and the Video panel.

- The Title panel contains all of the text editing, styling, and sizing controls used to edit the contents and look of a title in your project, including the Rich Text, Drop Shadow, Stroke, and Background parameters.
- The Video panel contains the same Composite, Transform, and Cropping parameters that all other clips in DaVinci Resolve have. These parameters are intended for compositing and animating a title.

Shared Title Generator Parameters

The title generators in Resolve are all capable of rich text styling, meaning that you can select any portion of a generator's text and style it differently. For example, you could have three lines of text within a single generator, and style each line individually to create a particular design.



A single generator with three lines of differently styled text

Each title generator shares the same parameters in the Title panel of the Inspector for editing and styling text:

- **Rich Text:** A control group consisting of a text entry field and parameters that can be used to style different parts of the text independently.
 - **Text:** A text entry field for editing the title being generated. If no characters are selected, the styling controls affect the entire block of text. If you select a specific set of characters, the styling controls only affect the selection. Text in this field can also be edited directly in the Timeline Viewer.
 - **Font family:** A pop-up for choosing one of the font families installed on your workstation.
 - **Font face:** A pop-up for choosing which face of the font family currently selected to use.
 - **Color:** Opens the standard color picker for choosing a font color.
 - **Size:** Slider for choosing the text size.
 - **Tracking:** Slider that sets the spacing between characters.
 - **Line spacing:** Slider for setting the spacing between the selected line of text and the next one below.
 - **Font style:** Buttons to apply underline, overhead line, strikethrough, superscript, and subscript styling.
 - **Font case:** A pop-up for forcing the text selection to be Mixed Case (the default), All Caps, All Lowercase, Small Caps, or Title Caps.
 - **Alignment:** Buttons to select the method of alignment: left, centered, right, or justified.
 - **Anchor:** Buttons for selecting how text is anchored to the current position, both horizontally (top, centered, bottom) and vertically (right, centered, left).
 - **Position:** X and Y parameters determining the bottom left-hand corner (the default Anchor settings) of the rich text block being generated. Corresponds to the act of dragging a selected text box in the Timeline Viewer.
 - **Zoom:** X and Y parameters determining the scale of the text. A link button lets you keep the X and Y parameters locked together. Corresponds to the act of resizing a selected text box in the Timeline Viewer from either the corners (to resize proportionally), or the top/bottom/sides (to stretch or squeeze the text).
 - **Rotation:** A slider for rotating the orientation of the text. Corresponds to the act of rotating a selected text box in the Timeline Viewer using the rotation handle.
- **Drop shadow:** A group of controls that lets you apply a customizable drop shadow to every character of text being generated.
 - **Color:** Opens the standard color picker for choosing a drop shadow color.

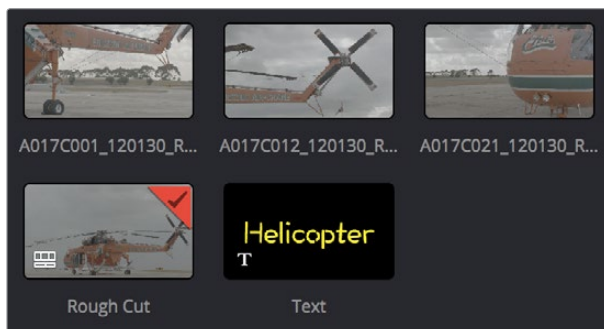
- **Offset:** X and Y parameters determining how offset the drop shadow is from the original text.
- **Blur:** A slider for blurring the drop shadow.
- **Opacity:** A slider determining how transparent the drop shadow is.
- **Stroke:** Lets you add an outline to every character of text being generated.
 - **Color:** Opens the standard color picker for choosing the stroke color.
 - **Size:** A slider lets you choose the thickness of the stroke, in pixels.
- **Background:** This group of controls provides an extremely flexible rectangle or rounded rectangle shape that you can use to add a background, bar, outline, or other intersecting shape to use when designing a title.
 - **Color:** Opens the standard color picker for choosing the interior color of the background shape.
 - **Outline color:** Opens the standard color picker for choosing outline color of the background shape.
 - **Outline width:** A slider lets you choose the thickness of the background shape outline, in pixels.
 - **Width:** A slider lets you choose how wide to make the background shape.
 - **Height:** A slider lets you choose how tall to make the background shape.
 - **Corner radius:** A slider lets you choose the roundness of the rectangle edges.
 - **Center:** X and Y parameters you can use to offset the background shape from the text being generated.
 - **Opacity:** A slider lets you set the transparency of the background shape.

Title Generator Video Parameters

Additionally, each generator has Composite, Transform, and Cropping parameters in the Video panel of the Inspector that let you composite, resize, and animate titles against other clips in the Timeline for motion graphics effects. These parameters are the same as those available for every clip, as described later in this chapter.

Saving Titles in the Media Pool for Future Use

If you've created a title in a style that you want to later re-use, for example, a particularly-formatted lower third that will be the basis for every lower-third in your program, you can drag any title from the Timeline to the Media Pool, and it will be saved as a separate clip. Title clips in the Media Pool are shown with a thumbnail showing a preview of the text they contain. If you've keyframed any animated text or video adjustments, those keyframes are also saved with this clip.



A text generator saved as a clip in the Media Pool

Once saved in the Media Pool, text generators can be opened in the Source Viewer and edited just like any other clip.

Using Generators

Generators, with the exception of Solid Color, lack editable parameters with the exception of the Composite, Transform, and Cropping parameters that are standard for every clip. Additionally, Generators have a Display Name field in the Inspector that lets you give a particular clip a custom name that appears in the Timeline.

The following generators are available:

- **Gray Scale:** A simple grayscale ramp from black to white.
- **EBU Color Bar:** A 1.77:1 aspect ratio set of color bars for PAL-using countries.
- **SMPTE Color Bar:** An updated 1.77:1 aspect ratio set of color bars for NTSC-using countries.
- **10 Step:** A grayscale ramp segmented into 10 steps from black to white.
- **100mV Steps:** A grayscale ramp segmented into segments of exactly 100mV each.
- **Window:** A simple white on black shape generator, defaulting to a white rectangle against a black background.
- **YCbCr Ramp:** A gradient designed to test the Y'CbCr signal.
- **Solid Color:** A simple fullscreen color generator. A Color parameter lets you choose what color this generator outputs.

Using Stills

You can import still images into the Media Pool, and edit them into the Timeline as clips with custom durations. By default, imported stills are 10 seconds long, but you can extend a still image's Out point to a maximum of 17 hours and 40 minutes in length, which ought to cover just about any project you're planning on working on, so long as you're not Andy Warhol. DaVinci Resolve is correspondingly capable of importing still image clips referenced by XML or AAF project files, so long as they're in a supported format.

DaVinci Resolve supports the use of stills in the following formats:

File Format	Alpha Channel Support
.tif	Yes
.png	Yes
.jpg	No
.dpx	No
.exr	Yes
.dng	No
.psd	No

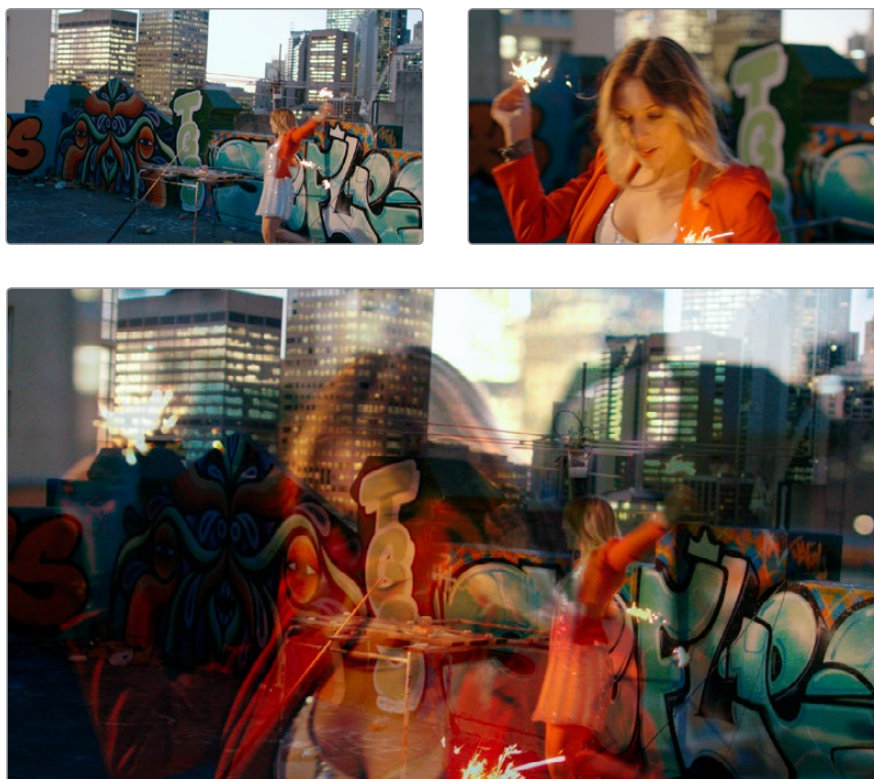
Once edited into the Timeline, still image clips have the same Composite, Transform, Cropping, Retime and Scaling attributes as any other clip.

Photoshop File Support

Only the bitmapped layers of Photoshop (.psd) files appear within DaVinci Resolve as a single clip in the Timeline. Photoshop text layers and layer effects are not supported.

Composite Modes and Transparency Effects

Composite modes are effects that use various mathematical operations to combine one superimposed clip with another, relying on standard image processing math for each color channel whereby black pixels have a value of 0, white pixels have a value of 1, and descending levels of gray are represented by decimal point values (for instance, 0.5 represents 50% gray). When using composite modes to blend two clips together on the Timeline, the three color channels of each pair of pixels are combined using that particular composite mode's math. The results can create transparency effects, increase image exposure, and combine multiple images in many creative and useful ways.



Two source clips combined with the Hardlight composite mode

When using composite modes, it's easy to push parts of the resulting image above the maximum or below the minimum values for brightness. However, this image data is not clipped, even through such areas of the picture may appear flat white or black. Out-of-range data as a result of a composite mode effect is preserved, and may be retrieved by later image processing operations in the Color page.

When you import XML project files, Resolve imports whatever composite modes were used by clips in the original sequence. If necessary, you can then change a clip's composite mode to one that will work better with whatever grade you're creating. Of course, you can also add composite modes to clips that didn't originally have them, adding new effects of your own.

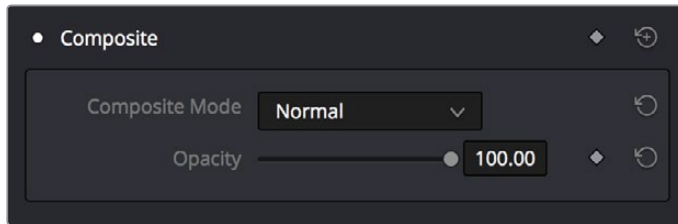
All composite modes interact with the Opacity slider (found below the Composite Mode pop-up menu in the Inspector) to make a clip more or less transparent in addition to compositing already being done.

Composite modes can be used on clips that are superimposed over other clips in the Timeline. However, these composite modes are also available for use within a grade on the Color page using the Layer Mixer node, within which you can combine differently graded versions of an image in creative ways. For example, the Add and Overlay composite modes can be useful for creating glow effects, while Subtract and Difference can create more surreal effects.

Working with composite modes in the Edit page is simple.

To set or change a composite mode for any clip:

Select a clip in the Timeline, then open the Inspector and choose one of the options from the Composite Mode pop-up menu.



Composite mode and Opacity controls in the Timeline

To turn a clip's composite mode off:

- Select a clip in the Timeline, then open the Inspector and choose Normal from the Composite Mode pop-up menu.

More About Composite Modes

There are ten composite modes to choose from. For clarity, simple image math is used to help explain the available Composite Mode effects.

Normal

No image compositing is done. The topmost image on the Timeline or the bottom input of the Layer Mixer node occupies the entire frame.

Add

Each pair of pixels in both superimposed layers is added together. Layer order does not matter. This can result in a dramatic brightening of light areas of both images with areas of the picture that are blown out to maximum white, and this effect is often used by adding the brighter part of an image to itself to create hot glow effects. Image data going above 1.0 is preserved and may be retrieved by later color correction operations. On the other hand, black areas of either image do not alter the combined image at all ($0 + n = n$).

Color

Recombines two layers using HSL image components by combining the Luma of the bottom layer with the Hue and Saturation of the top layer.

Color Burn

Inverts the bottom layer, which is divided by the top layer, and the end result is itself inverted.

Color Dodge

The bottom layer pixels are divided by the top layer, which has been inverted.

Darken

Each pair of pixels in each color channel is compared, and the darker of the two is the output. Layer order does not matter. Darken is useful when you want the darker features of both layers to take precedence, but the output for any given pixel may be a color that doesn't actually exist for that pixel in either of the source layers.

Darker Color

For each pair of pixels, all three color channels from the bottom layer are added together, and all three color channels from the top layer are added together. These results are compared, and the darker pixel of the two layers is the output. Layer order does not matter. Darker Color is useful when you want the darker features of both layers to take precedence. Unlike the Darken composite mode, the result will always be a specific color from either the bottom or top layers.

Difference

The absolute value is taken of the top layer minus the bottom layer, and returned as the result, which is always a positive number. Layer order does not matter. This Blend mode is often used to compare two differently-processed versions of the same image to see if there are any alterations, and how large they are.

Divide

Divides the bottom layer by the top layer. Any color divided by itself = 1.0, or white, while any color divided by white (1.0) = itself.

Exclusion

Similar to the Difference composite mode, but results in lower contrast.

Hard Mix

The R, G, and B channel values of the bottom layer are added to the R, G, and B channel values of the top layer. Layer order does not matter. Can result in extreme effects.

Hardlight

Hardlight is the opposite of Overlay. All bottom layer pixels above 50% are Multiplied, while all bottom layer pixels 50% and below are Screened.

Hue

Recombines two layers using HSL image components, by combining the Luma and Saturation of the bottom layer, with the Hue of the top layer.

Lighten

Each pair of pixels in each color channel is compared, and the lighter of the two is the output. Layer order does not matter. Lighten is useful when you want the lightest features of both layers to take precedence, but the output for any given pixel may be a color that doesn't actually exist for that pixel in either of the source layers.

Lighter Color

For each pair of pixels, all three color channels from the bottom layer are added together, and all three color channels from the top layer are added together. These results are compared, and the lighter pixel of the two layers is the output. Layer order does not matter. Lighten Color is useful when you want the lighter features of both layers to take precedence. Unlike the Lighten composite mode, the result will always be a specific color from either the bottom or top layers.

Linear Burn

Each pair of pixels is summed, and 1 is subtracted from the total. Layer order does not matter. Regions of white in one layer let the other layer show through, while colors and darker tones from both layers interact to tint or darken the resulting image.

Linear Dodge

Each pair of pixels is summed. This composite mode is identical to Add.

Linear Light

All regions where the bottom layer is above 50% are Linear Dodged so as to lighten these parts of the final result, while all regions where the bottom layer is below 50% are Linear Burned so as to darken these parts of the final result. This composite mode intensifies image contrast in the final result.

Luminosity

Recombines two layers using HSL image components by combining the Hue and Saturation of the bottom layer with the Luma of the top layer.

Multiply

Each pair of pixels is multiplied together. Layer order does not matter. This generally has the effect of emphasizing the darkest parts of both images in the resulting output; in particular black areas of either image are preserved ($0 * n = 0$) while white areas of either image have no effect on the output image ($1 * n = n$). Multiply is good for compositing darker elements in a field of white into an image, and can be used to emphasize the darkest parts of a noise, grain, or damage layer you're blending with an image.

Overlay

Overlay combines useful aspects of both the Screen and Multiply composite modes, based on the pixel values of the bottom-most image on the Timeline; all bottom layer pixels above 50% are Screened, while all bottom layer pixels 50% and below are Multiplied. Overlay is an excellent composite mode for combining a layer of noise, grain, or damage imagery with another clip, as it combines both images in visually useful ways throughout the tonal range of shadows through highlights.

Pin Light

In regions where bottom layer pixels are below 50% gray, lighter pixels in the top layer are replaced by darker pixels from the bottom layer, and darker pixels in the top layer replace lighter pixels in the bottom layer, so that the darker half of the final image combines darker pixels from both layers. In regions where bottom layer pixels are above 50% gray, darker pixels in the top layer are replaced by lighter pixels from the bottom layer, and lighter pixels in the top layer replace darker pixels from the bottom layer, so that the brighter half of the final image combines lighter pixels from both layers.

Saturation

Recombines two layers using HSL image components, by combining the Luma and Hue of the bottom layer, with the Saturation of the top layer.

Screen

The pixel values of each layer are inverted, then multiplied, and the result is itself inverted. Layer order does not matter. Screen is the inverse of Multiply, as it preserves the lightest parts of both images, and is useful when compositing lighter elements in a field of black into an image, and can be used to emphasize the lightest parts of a noise, grain, or damage layer you're blending with an image.

Softlight

A less intense method of applying the Hardlight composite mode that results in a more even blend between the two layers.

Subtract

Within each pair of pixels, those of the bottom layer are subtracted from those of the top. This can result in dark areas of the image that hit flat black, but image data going below 0 is preserved and may be retrieved by later color correction operations.

Vivid Light

All regions where the bottom layer is above 50% are Color Dodged so as to lighten these parts of the final result, while all regions where the bottom layer is below 50% are Color Burned so as to darken these parts of the final result. This composite mode vastly intensifies both image contrast and saturation in the final result, for an extreme effect.

Unknown

When importing XML or AAF project files with composite modes that aren't available in Resolve, the Composite Mode pop-up menu is set to Unknown; practically, this is the same as Normal.

Opacity

Each clip has an Opacity parameter, available in the Inspector, that lets you make it more transparent, in a range from 0 (totally transparent) to 100 (totally opaque). When set to a value less than 100, the selected clip is mixed with whatever clip is underneath it on the Timeline, according to the composite mode that's currently used. If no clip appears underneath the Timeline, then the clip is mixed with black.

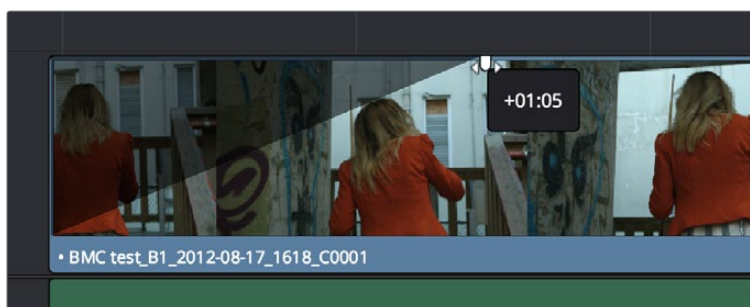
By keyframing this parameter, you can create more complicated fade to black effects or cross-dissolves. Keyframing is covered in more detail later in this chapter.

To change a clip's opacity:

- Open the Inspector, then select the clip you want to adjust, and set the Opacity slider to create the desired amount of transparency.

Video Fader Handles

If you want to dissolve a clip to or from another clip, or to or from black, the traditional way to do so has been to use one of the transitions in the Effects Library. However, you can also use Fader Handles that appear at the beginning and end a clip when you position the pointer right over it. Fader handles are a fast, ubiquitous method of creating a fade to or from black. However, they also make it easy to fade to or from other clips that are underneath one that's superimposed, as seen in the following screenshot.



Dragging a video fader handle on a clip in track V2

To use a fader handle, move the pointer over the clip you want to adjust, and when small green fader handles appear at the upper left and upper right of the video of the clip, drag them to the left or right for the duration you want the fade effect to last.

Alpha Channel Support

If a superimposed video or still image clip in the Timeline has an embedded alpha channel, that alpha channel automatically creates transparency within that clip, compositing it against whatever is in the track underneath. There's no need for you to do anything for this to work.



Superimposing a clip with an alpha channel above automatically composites that clip against the clip beneath it

However, if you want to disable the alpha channel for any clip, for example if a clip is being interpreted as having an alpha channel incorrectly, you can use the Find in Media Pool command to select that clip in the Media Pool, where you can right-click it and choose Change Alpha Mode > None.

NOTE: If you've imported clips with Alpha channels, those alpha channels can be rendered back out for Round Trip workflows if you set Render to Individual Clips in the Deliver page, choose a Format and Codec combination that supports alpha channel output, and turn on the Export Alpha checkbox in the Video panel of the Render Settings list.

Keying, External Mattes, and Window Compositing

It's also possible to use the Qualifier, Power Window controls, and External Matte clips in the Color page to create compositing effects by connecting a key that you create to the optional Alpha Output that can be added to the Node Editor. In this way, you can pull a simple greenscreen key using a qualifier, do rotoscoping or matte work using a Power Window, or use an External Matte to composite two or more clips together, and see these effects on the Edit page.

For more information on the use of the Alpha Output to do node-based compositing, see Chapter 30, "Working in the Node Editor."

Transform, Cropping, and Lens Correction

DaVinci Resolve is a resolution-independent application. This means that, whatever the resolution of your source media, it can be output at whatever other resolution you like. This also means that you can freely mix clips of any resolution, fitting 4K, HD, and SD clips into the same timeline, and scaling each to fit the project resolution as necessary.

Your project's resolution can be changed at any time, allowing you to work at one resolution, and then output at another resolution. This also makes it easy to output multiple versions of a program at different resolutions, for example, outputting both HD and SD sized versions of the same program.

DaVinci Resolve has a powerful tool set for making geometric transforms, using advanced algorithms for optical-quality sizing operations. Within the Edit page, each clip has a set of transform parameters, principally for use in storing sizing data imported from AAF or XML when you turn on the "Use sizing information" checkbox. This has the advantage of keeping these imported Edit Transform settings separate from the Input Sizing parameters found on the Color page, which are typically used by the colorist to make Pan and Scan adjustments of various kinds.

Of course, you can also use these controls to create your own adjustments while working in the Timeline, zooming into clips, repositioning them to improve the composition, etcetera. While there is some overlap between these parameters and those in the sizing palette of the Color page, they're both separate sets of parameters, so you can keep each set of adjustments separate.

When the time comes to output your program, the final resolution of each clip is calculated taking into account the original resolution of the source media, the timeline resolution, image scaling settings, Edit page transforms, and Color page transforms, so that the final resolution correctly uses the cleanest geometric transformation based on the maximum resolution available to each source clip.

The Edit page transform group includes the following parameters, which are also editable in the Edit Sizing mode of the Sizing palette in the Color page:

- **Position X and Y:** Moves the image within the frame, allowing pan and scan adjustments to be made. X moves the image left or right, and Y moves the image up or down.
- **Zoom X and Y:** Allows you to blow the image up or shrink it down. The X and Y parameters can be linked to lock the aspect ratio of the image, or released to stretch or squeeze the image in one direction only.
- **Rotation Angle:** Rotates the image around the anchor point.
- **Anchor Point X and Y:** Defines the coordinate on that clip about which all transforms are centered. When using the on-screen controls, you can Option-drag the center handle to move the anchor point anywhere you want.
- **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.
- **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.

The Edit page has an additional set of cropping parameters:

- **Crop Left, Right, Top, and Bottom:** Lets you cut off, in pixels, the four sides of the image. Cropping a clip creates transparency, so that whatever is underneath shows through.
- **Softness:** Lets you blur the edges of a crop. Setting this to a negative value softens the edges inside of the crop box, while setting this to a positive value softens the edges outside of the crop box.

The Dynamic Zoom controls, which are off by default, make it fast and easy to do pan and scan effects to zoom into or out of a clip. Also, if you import a project from Final Cut Pro X with clips that use the Ken Burns effect, then those clip's effects will populate the Dynamic Zoom parameters in DaVinci Resolve. Turning the Dynamic Zoom group on activates two controls in the Inspector that work hand-in-hand with the Dynamic Zoom on-screen adjustment controls you can expose in the Timeline Viewer (described below):

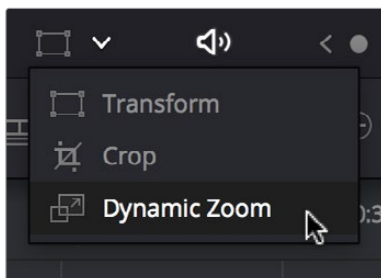
- **Dynamic Zoom Center:** Lets you choose how the motion created by these controls accelerates. You can choose from Linear, Ease In, Ease Out, and Ease In and Out.
- **Swap:** This button reverses the start and end transforms that create the dynamic zoom effect.

The Retime and Scaling group has one parameter that affects clip scale, and another that affects retiming quality:

- **Retime Process:** Lets you choose a default method of processing clips in mixed frame rate timelines and those with speed effects (fast forward or slow motion) applied to them, on a clip by clip basis. The default setting is Project Settings, so that all speed effected clips are treated the same way. There are three options: Nearest, Frame Blend, and Optical Flow, which are explained in more detail in the Frame Interpolation section of Chapter 3, “Project Settings and Preferences.”
- **Scaling:** Lets you choose how clips that don’t match the current project resolution are handled on a clip by clip basis. The default setting is Project Settings, so that all mismatched clips use the same method of being automatically resized. However, you can also choose an individual method of automatic scaling for any clip. The options are Crop, Fit, Fill, and Stretch, which are explained in more detail in the 2D Transforms section of Chapter 29, “Color Page Effects.”
- Finally, the Lens Correction group (only available in Resolve Studio) has two controls that let you correct for lens distortion in the image, or add lens distortion of your own.
- **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 moves the Distortion slider to provide an automatic correction.
- **Distortion:** Dragging this slider to the right lets you manually apply a warp to the image that lets you straighten the bent areas of the picture that can be caused by wide angle lenses. If you clicked the Analyze button and the result was an overcorrection, then dragging this slider to the left lets you back off of the automatic adjustment until the image looks correct.

Transform, Cropping, and Dynamic Zoom Using Graphical Controls

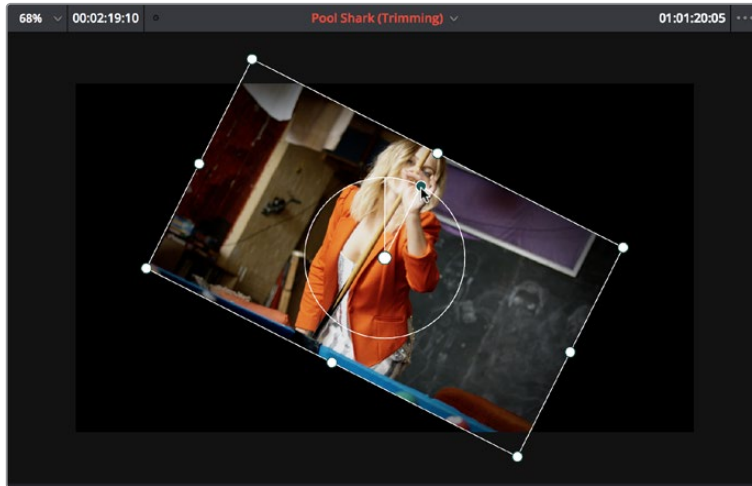
You also have the option of transforming, cropping, or adding dynamic zoom effects to clips using the Transform/Crop/Dynamic Zoom button at the bottom left of the Timeline Viewer.



Transform controls in the Timeline Viewer

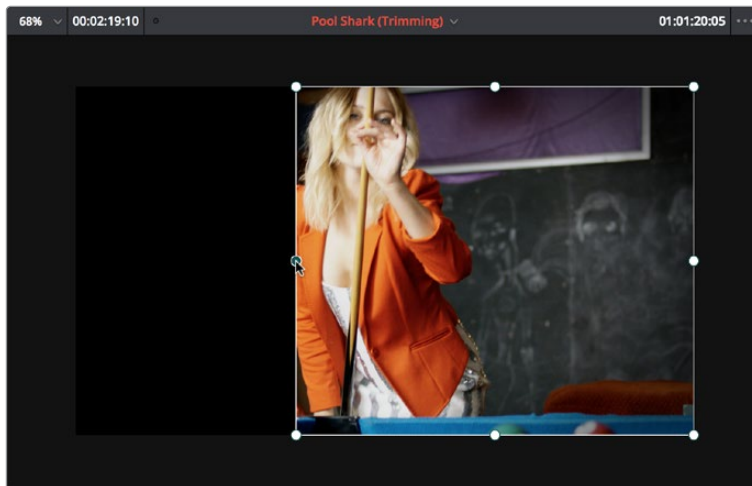
To transform a clip using graphical controls in the Timeline Viewer:

- 1 Click the the Transform/Crop button at the bottom left of the Timeline Viewer to turn it on; white is enabled, gray is disabled.
- 2 Do one of the following:
 - Choose the Transform mode from the pop-up menu, if necessary, to change modes. The appropriate on-screen controls appear to let you manipulate the clip with the mouse. When in Transform mode, you can drag anywhere within the clip’s bounding box to adjust pan and tilt, drag any diagonal corner to proportionally resize, drag any side to squeeze or stretch just width or height, or drag the center handle to rotate.



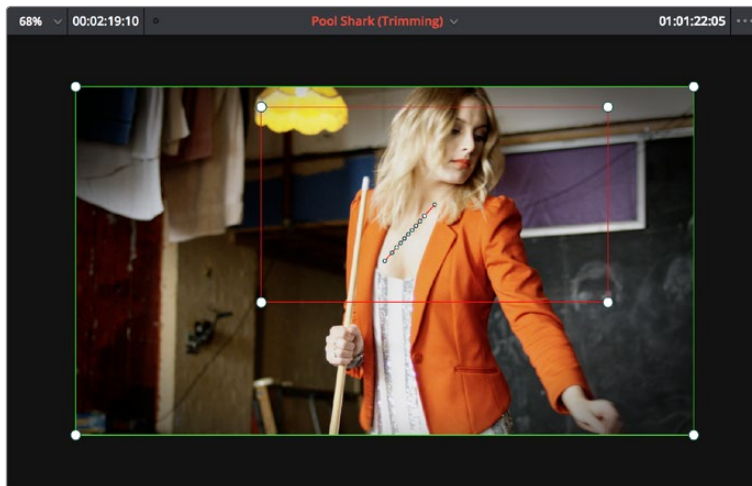
Onscreen controls for transforming in the Timeline Viewer

- Choose the Cropping mode from the pop-up menu. In this mode, each side has a handle for cropping.



Onscreen controls for cropping in the Timeline Viewer

- Choose the Dynamic Zoom mode from the pop-up menu. In this mode, the green box shows the starting size and position of the animated transform, while the red box shows the ending size and position of the animated transform. Drag anywhere within either bounding box to adjust pan and tilt for either the start or the end of the animated effect, and drag any of the corners to adjust the size. A motion path appears to show the motion that's being created.



Onscreen controls for transforming and cropping in the Timeline Viewer

- 3 If necessary, choose a smaller viewing percentage from the Timeline Viewer scale pop-up to better see the on-screen controls if you're rescaling the image, or use the scroll control of your mouse, trackpad, or tablet to zoom out of the image.
- 4 When you're finished, turn the Transform/Crop/Dynamic Zoom button off.

Speed Effects and Retiming

Speed effects describe any effect that speeds up, slows down, or otherwise changes the playback speed of clips in the Timeline. There are four basic ways you can create speed effects in DaVinci Resolve.

- **Importing speed effects:** DaVinci Resolve is capable of reading linear speed effects from imported EDL, AAF, and XML projects, and nonlinear speed effects from XML and AAF project files. When speed effects are present, Resolve plays clips at the specified speed. You can also create speed effects of your own using controls in the Edit page. There are three methods of adjusting clip speed: using the Inspector, using the Change Speed dialog, and using the Retiming effect in the Timeline.
- **Creating speed effects using Fit to Fill edits:** You can also change a clip's speed in the Timeline by editing it using the Fit to Fill command, which retimes the clip to fit into an arbitrary duration in the Timeline of your choosing. For more information on using Fit to Fill, see the section on "Different Types of Edits" in Chapter 14, "Editing Fundamentals."
- **Creating simple linear speed effects:** You can create simple fast or slow-motion speed effects by using the Change Clip Speed command, or by using the left and right handles of the Retime controls in the Timeline. Both of these methods are described in this section.
- **Creating variable speed effects:** You can create much more complex variable speed effects, where the same clip speeds up or slows down multiple times by different amounts, using either the Retime controls, or one of the two different speed curves that are available. These methods are also covered later in this section.

Speed Effects and Audio

Any of the methods of creating linear speed effects that are available in Resolve, including the Change Clip Speed command, the Retime controls, and the Fit to Fill edit, will retime a clip's audio, without pitch correction on Linux and Windows, and with pitch correction on Mac OS X (Yosemite and above), along with its video. However, audio that accompanies variable speed effects will be muted.

Creating Simple Speed Effects

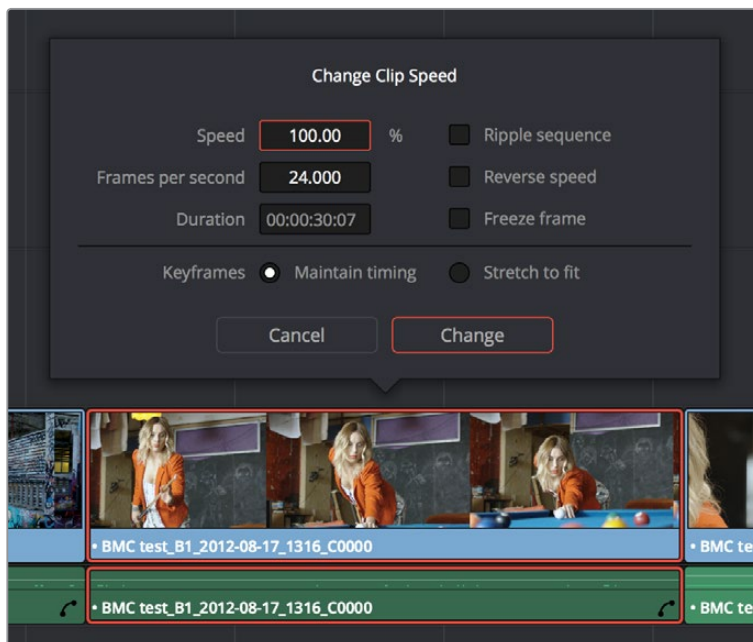
If all you need to do is to make a clip play in slow motion, speed it up, reverse the clip, or create a freeze frame, you can apply a simple speed effect using either the browser or the Change Speed dialog.

To change a clip's speed, do one of the following:

- Select a clip, choose Clip > Change Clip Speed, and use the controls of the Edit Speed Change dialog.
- Right-click a clip in the Timeline, choose Change Clip Speed, and use the controls of the Edit Speed Change dialog.

Speed Clip Change operations have the following options:

- **Change Speed To parameters:** Changes the speed of the selected clip by whatever percentage, frame rate, or duration you like.
- **Ripple Sequence checkbox:** If you want the speed change you're about to make to ripple the Timeline, pushing or pulling all clips following the current one to accommodate the clip's new size, then turn on the checkbox.



Speed effect parameters shown in the Speed dialog

- **Reverse Speed button:** Clicking this button sets the current speed to a negative value, reversing the motion of the clip.

- **Freeze Current Frame checkbox:** Changes the entire clip to a freeze frame of whichever frame is at the current position of the playhead.
- **Maintain Timing/Stretch to fit radio buttons:** Choosing Maintain Timing leaves any keyframes within the clip locked at their original position, while choosing Stretch Keyframes results in all Composite, Transform, and Cropping keyframes being compressed or stretched by the same percentage as the clip during a speed change.

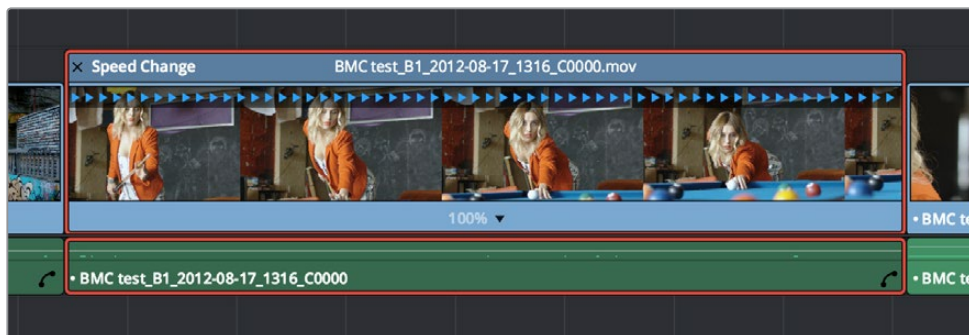
Clip Retiming Controls

Another method of altering clip speed in the Timeline is to apply the Retime effect. This method of clip retiming provides a convenient control overlay that you can use to adjust clip speed directly in the Timeline, and it also provides the controls that are needed for creating variable-speed effects.

To expose the Retime controls on a clip:

- Select a clip, and choose Clip > Retime Clip (Command-R).
- Right-click a clip and choose Retime Clip from the contextual menu.

The Retime controls appear over that clip in the Timeline. They consist of a Retime control track running along the top of the clip with arrows that indicate the speed and direction of playback (the default blue right-facing arrows indicate normal 100% playback) and a Clip Speed pop-up menu at the bottom center of the clip, which also shows the current speed of the clip.



The Speed Effect controls in the Timeline

Retiming An Entire Clip

The simplest way of using the Retiming effect is to change the playback speed of the entire clip, in the process rippling the rest of the Timeline to the right of the retimed clip as you increase its duration by stretching or compressing its duration.

To retime a clip by dragging:

- Move the pointer to the left or right edge of the Speed Change name bar on top of the clip, and when it turns into a Retime cursor, drag either side to stretch or squeeze the clip to retime it.

To retime a clip by specific amounts:

- 1 Select a clip and press Command-R.
- 2 Click the pop-up next to the speed percentage text at the bottom of the clip.
- 3 Do one of the following:
 - Choose a new playback speed from the Change Speed submenu.
 - Choose reverse segment to make the clip play in reverse. Reverse speed is shown in the Retime control track as arrows facing left, instead of right.

To return a clip to its original speed:

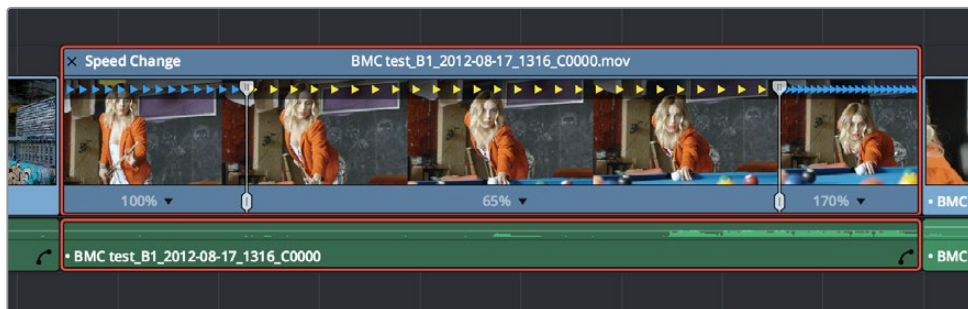
- Click the pop-up next to the speed percentage text at the bottom of the clip, and choose Reset to 100%.

Rippling or Overwriting the Timeline When Using Retime

Whether or not clips to the right in the the Timeline will ripple to accommodate the change in duration resulting in speed changes you make with the Retime controls depends on whether you're using the Selection tool/mode (in which case the Timeline won't ripple), or the Trim tool/mode (in which case the Timeline will).

Reading Clip Speed Arrows

When you retime a clip, the Clip Speed pop-up menu displays the current speed of the entire clip. Additionally, the arrows in the Retime control track show you the speed and direction of playback. When clip speed is slowed down below 100%, the Retime control track shows blue playback triangles that are spaced farther apart. When clip speed is sped up above 100%, the Retime control track shows blue triangles that are bunched closer together. At 100% normal speed, the Retime control track shows blue, evenly spaced triangles, while left-facing blue arrows indicates reverse playback.



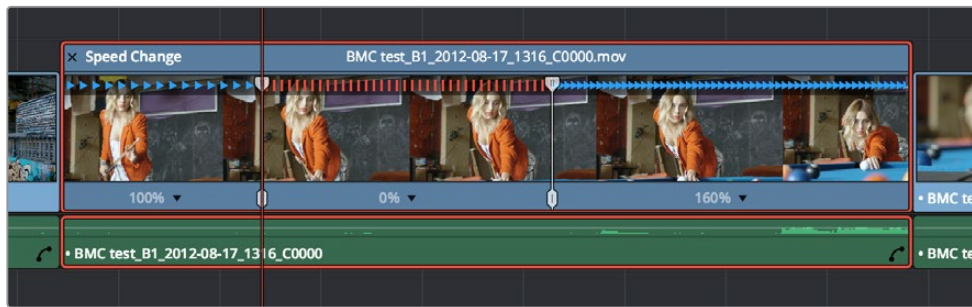
Three clips set to different speeds. From left to right, 100% speed, slow motion, and fast forward are indicated by the yellow arrows.

Creating Variable Speed Effects Using the Retime Controls

You can also use the Retime controls to insert freeze frames within the middle of a clip, and create other custom variable speed effects using speed points. Additional variable speed options include rewind and speed ramp effects, which automatically place speed points to create preset effects.

To create a freeze frame at a particular moment in time:

- 1 With the Retime controls exposed, move the playhead to the frame you want to freeze, within that clip. Ideally, this will be for an effect where you want a character in motion to suddenly stop at a particular frame.
- 2 Open the Clip Speed pop-up menu, and choose Freeze Frame. Two new speed points are added to the clip, defining a range within which the clip is frozen at that frame. This can be seen by the vertical red bars in the retime control track. Past the second speed point, the clip resumes playback from the next frame forward.



Speed effect controls set to insert a momentary freeze frame within the clip

- 3 Drag the second speed point forward or back to define the duration of the freeze frame. The result is that the clip plays normally up until the first speed point, then freezes on that frame until the second speed point, at which playback resumes.

To create variable-speed effects:

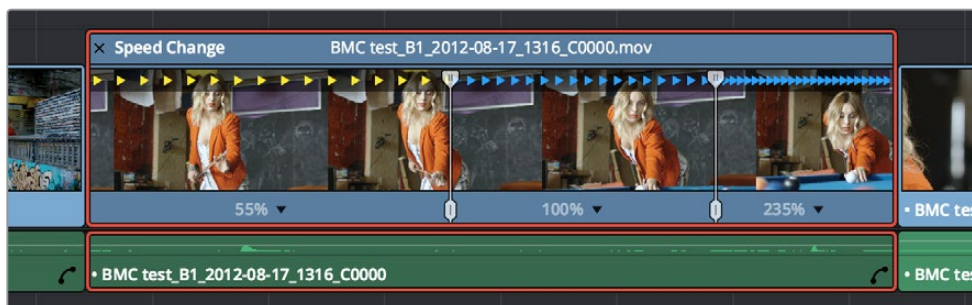
- 1 With the Retime controls exposed, move the playhead to the frame at which you want to change the speed of the clip, and choose Add Speed Point from the Clip Speed pop-up menu.
- 2 Move the playhead forward to the next frame at which you want the clip speed to change again, and add another speed point. It takes a minimum of two speed points to create a speed effect.
- 3 To alter the speed of the clip segment appearing between these two speed points, do one of the following:

Using the pointer, drag the top handle of the second speed point to the right to slow down clip playback, or to the left to speed up clip playback within just that segment. Doing this either shortens or lengthens the clip, and either overwrites or ripples neighboring clips depending on whether you're using the Selection or Trim modes.

Also using the pointer, you can drag the bottom handle of any speed point to widen the range of the clip that plays at that particular speed. Doing this reallocates frames from before and after the speed segment being adjusted to keep all speed segments playing at the same speed, and this also shortens or lengthens the clip, but by a different amount.

- 4 To clear a speed point and eliminate that particular clip's speed segment from the effect, choose Clear Speed Point from any Clip Speed pop-up menu to eliminate whichever speed point appears to its left.

When you create variable-speed effects, the arrows in the Retime control track can help you keep track of what you're doing, and each segment's speed pop-up shows you the actual numeric speed. The change in speed from each speed segment to the next is automatically eased, for a smooth transition from one speed to another.

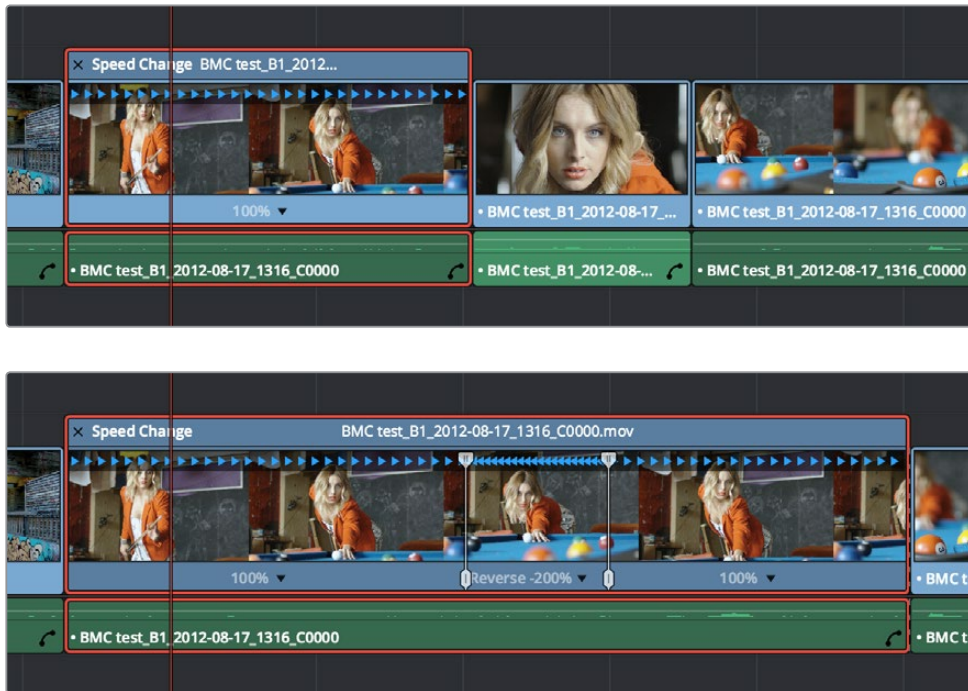


Speed controls set to ramp among three different playback speeds; arrow spacing shows the timing

There are two additional sets of commands for creating preset speed effects that use multiple speed points.

To add a rewind effect:

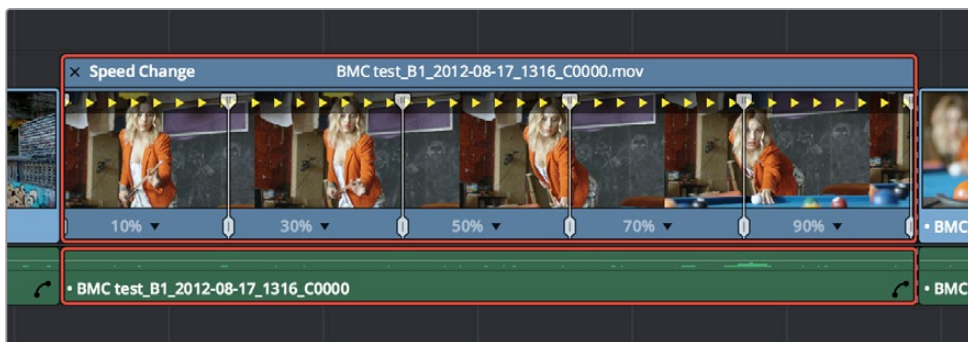
- With a clip's retime controls exposed, open any Clip Speed pop-up menu and choose a preset percentage from the Rewind submenu. This results in two additional speed points being added after the rightmost speed point in the current segment, which creates the effect of the current segment playing in fast reverse for the chosen percentage, and then playing a second time from the beginning.



Speed effect controls before and after creating a “rewind” effect

To add a speed ramp:

- With a clip's retime controls exposed, open any Clip Speed pop-up menu and choose one of the two options from the Speed Ramp submenu to replace the current speed effect with a series of five speed segments that start at 10% and increase progressively to 30%, 50%, 70%, and then 90%. Once created, you can drag the speed points to customize this effect to create whatever durations you require.



Speed effect controls set to create a gradual ramp from 0 to 100 percent playback speed

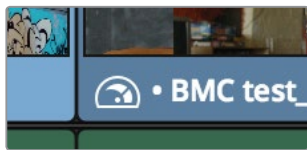
Closing Retime Controls

When you're finished creating your Retime effect, you can close the Retime controls so that clip assumes a normal appearance again. Closing the Retime controls has no effect on the timing of the clip, it just ensures you cannot accidentally modify the speed of the clip with the mouse.

To close the Retiming controls in the Timeline:

- Click the X button at the upper left-hand corner of the Retime control box.
- Select the retimed clip, and either choose Clip > Retime Controls, or press Command-R.

When a retimed clip has its Retiming controls hidden, a Retime badge appears to the left of that clip's name in the Timeline. You can reopen the Retiming controls whenever you need to make further changes.



The Speed Effect badge that shows a clip is being retimed

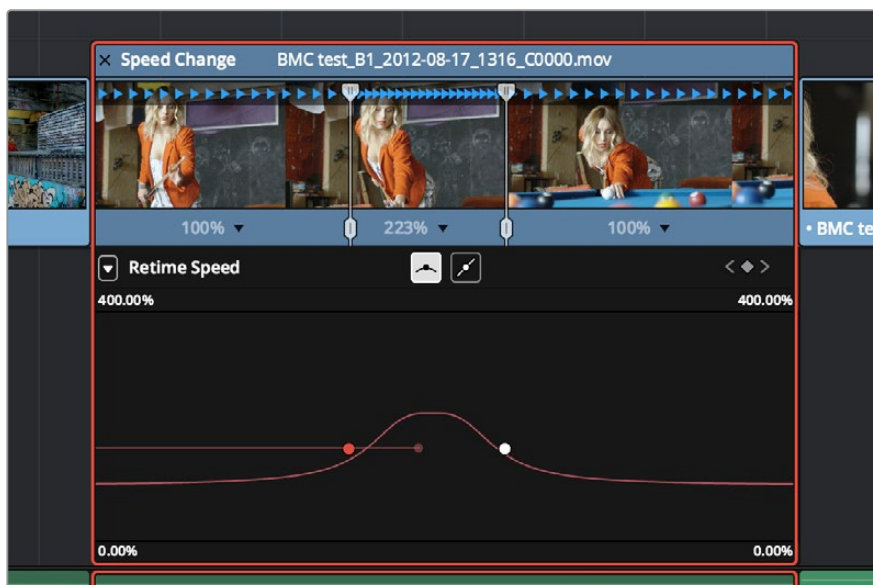
To reopen the Retiming controls in the Timeline:

- Select the retimed clip, and either choose Clip > Retime Controls, or press Command-R.

Once you've retimed a clip using the Retime effect, you can use that clip's Retime Process parameter in the Inspector to define how that clip's retiming is processed, using the low quality Nearest option, using Frame Blending, or using Optical Flow.

Using Retime Curves

You can also optionally use curves to retime clips, either in conjunction with the Retime controls, or by themselves. For example, you can use the simpler retiming controls first to create the overall speed effect you need, and then use the Retime Curves to create further refinements by adjusting bezier curve handles to adjust speed transition points, or you can expose a Retime Curve first and use it to create your speed effect from scratch by adding and adjusting control points and curve segments.

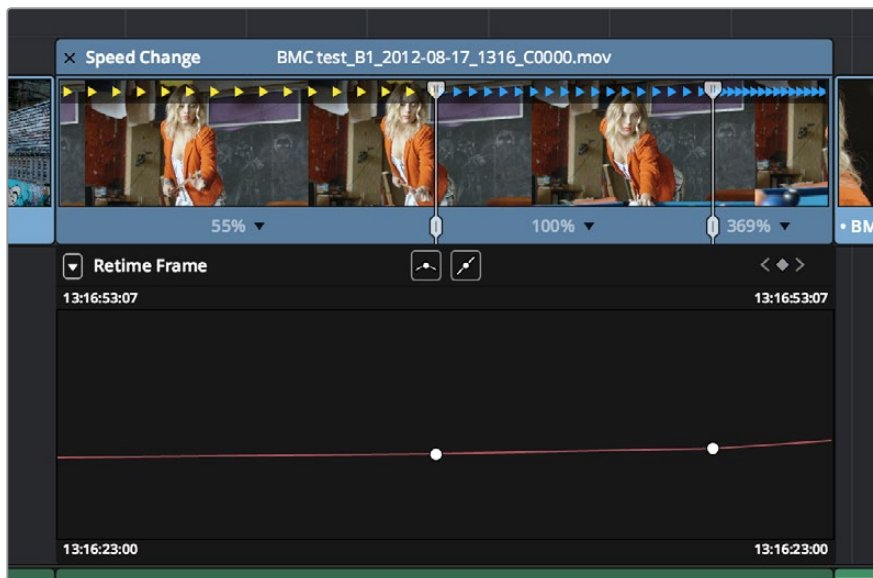


The Retime Curves let you adjust the transition from one speed to another using handles

No matter how you like to work, the control points of speed curves have a 1:1 correspondence to the speed points that are exposed in the Retime Controls, and curve segment modifications are mirrored by speed point adjustments in the Retime Controls if you have both exposed at the same time. This means that, when creating complex variable retiming effects, it's easy to drag whichever control most easily adjusts the quality of speed you require.

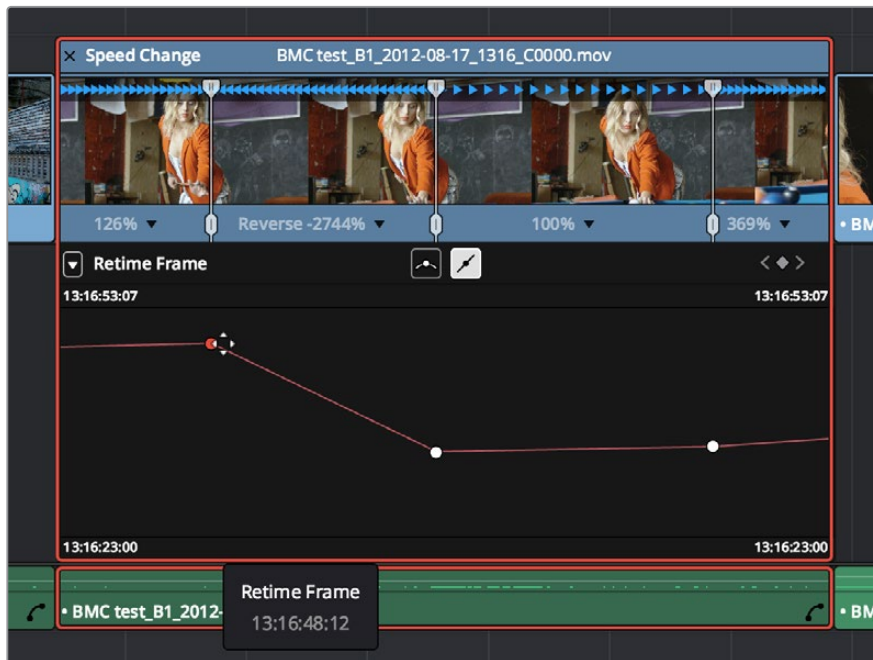
In addition, there are two kinds of Retime Curves you can use for maximum flexibility. Which is best depends on what you're more comfortable with, and on which will handle the type of motion you want to create more easily:

- The Retime Frame curve exposes a diagonal line that represents a time graph. This is a type of curve found in many other postproduction applications, in which the vertical axis represents each frame of that clip's source media, and the horizontal axis represents each frame of playback in the Timeline. With the default diagonal graph, there is a one to one correspondence between each frame of source media and each frame of timeline playback; this represents 100% speed. However, adding control points lets you alter how source frames are mapped to the Timeline. For any two control points on the Retime Frame curve, so long as the control point at the left is lower than the control point at right of a curve segment, there will be forward motion, with longer shallow curve segments creating slower motion, and steeper shorter curve segments creating faster motion in the clip.



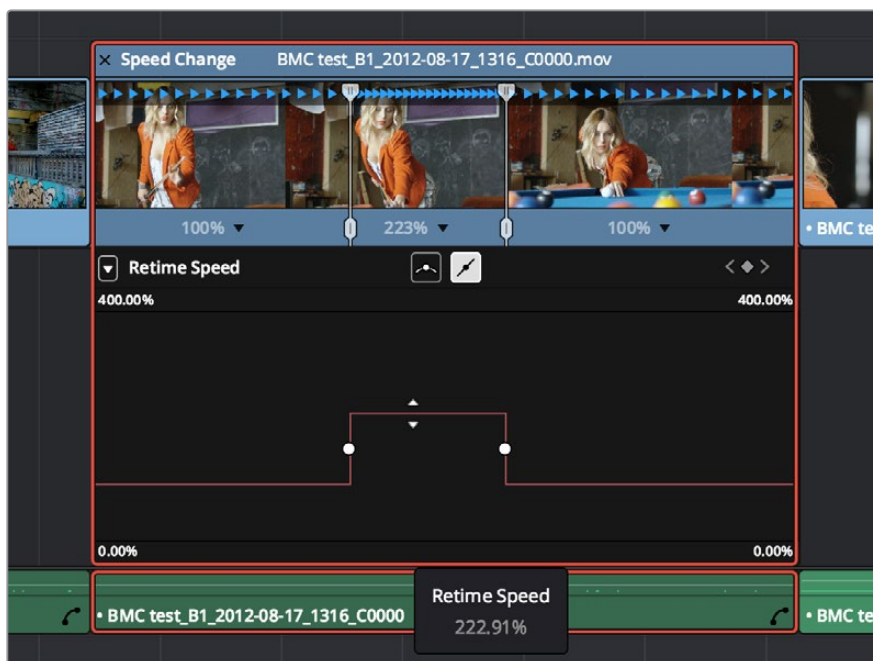
A diagonal Retime Frame curve with two segments: a long shallow segment to the left that creates slow motion, and a short steep segment to the right that creates fast motion

- If a curve segment has a left control point that's higher than the right control point, then the motion will be reversed and that segment will play backwards.



A Retime Frame curve with an inverted curve that creates reverse motion

- The Retime Speed curve (seen below) exposes a flat line that represents 100% speed. Adding pairs of control points and dragging each segment to raise or lower it alters speed; you must drag the segments, not the control points themselves. Raising a curve segment shortens that segment and speeds up that portion of the clip, while lowering a curve segment lengthens that segment and slows down that portion of the clip. As you adjust each curve segment, a tooltip shows you the exact speed percentage that segment represents. You should note that it's impossible to create reverse motion using the Retime Position curve; you need to use either the Retime controls or the Retime Speed curve described above.



A Retime Speed curve with two segments: a shorter one that creates fast motion, and a longer segment that creates slow motion

Methods of working with speed curves:

- **To expose speed curves for a clip in the Timeline:** Right-click a clip in the Timeline, and choose Retime Curve. The Curve Editor is exposed for that clip, and you can edit it as you would any other curve, adding moving, and deleting control points.
- **To switch between editing Retime Speed and Retime Frame curves:** Use the Curve pop-up at the upper left-hand corner of the Curve Editor to check or uncheck the curves you want to be visible. Clicking on a curve within the editor makes that curve the currently edited one.
- **To close a speed curve:** Clicking the Curve button at the right-hand side of the clip's title bar in the Timeline toggles the curve open and closed.

As far as adding, removing, and smoothing control points on speed curves and adjusting curve segments, they work identically to any other curve in the Timeline. For more information, see “Keyframing in the Timeline and Curve Editor” later in this chapter.

Speed Effect Processing

Once you've retimed a clip, you have the additional ability to change how the retimed clip is processed in order to improve its visual playback quality, especially in the case of clips that are slowed down. There are two ways you can set this. First, there's a project-wide setting available in the Master Project Settings. Secondly, you can change how clips are retimed via a per-clip setting available in the Inspector.

To change the Retime Process setting of an entire project:

- 1 Open the Project Settings to the Editing panel.
- 2 Choose an option from the Retime Process pop-up menu.

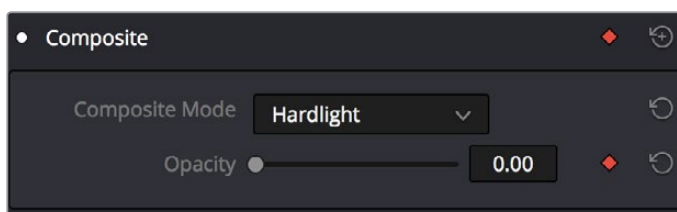
To change an individual clip's Retime Process setting:

- Select a clip, then open the Inspector and choose an option from the Retime Process pop-up in the Retime and Scaling group.

Keyframing Effects in the Edit Page

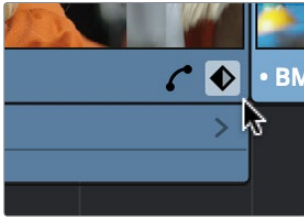
Most parameters in the Inspector of the Edit page can be keyframed, in order to create animated effects such as zooming in via the Zoom parameter, fading out via the Opacity parameter, or cropping from one side to reveal a clip underneath via the Cropping parameters. Additionally, if you import a project from an NLE that has keyframed sizing settings, those keyframes will be imported and exposed within the Edit page of Resolve.

The primary controls for keyframing are within the Inspector. Any parameter that can be keyframed has a gray keyframe button to the right of its slider. If the playhead is on a keyframe, this button turns orange and small navigation arrows appear to its right and left, otherwise it stays gray.



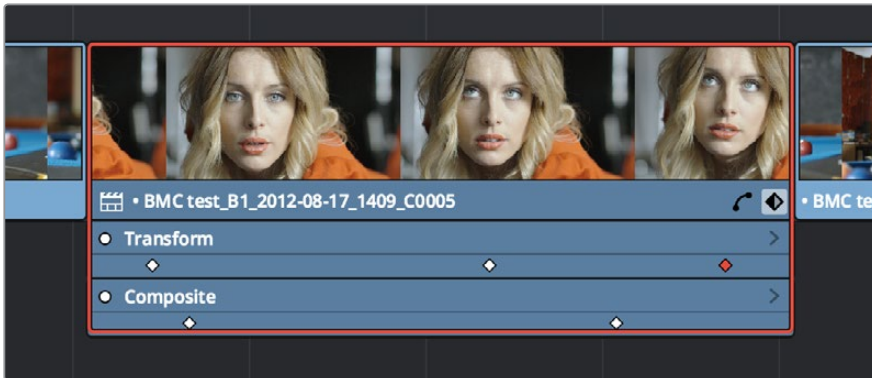
Orange Keyframe buttons in the Inspector show there's a keyframe at that frame

Once you've keyframed one or more parameters within a particular group in the Inspector, that clip displays a pair of small buttons at the far right of its name bar in the Timeline, a Curve button and a Keyframe button. Only keyframed clips have these buttons.



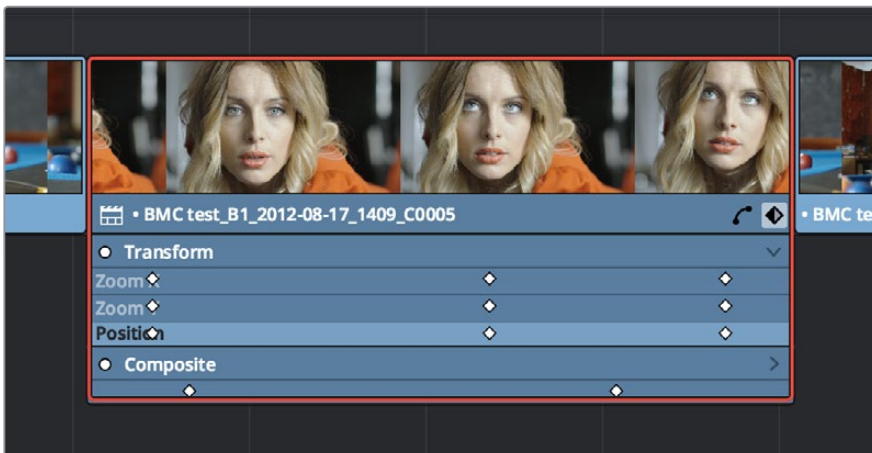
The Keyframe track button in the Timeline appearing on a keyframed clip

Clicking the Keyframe button exposes the keyframe tracks for that clip. Each group of parameters in the Inspector reveals a single, aggregated keyframe track, that holds all the keyframes of all the parameters within that group, and makes it easy to move, delete, cut, copy, and paste keyframes for each clip. For example, the Pan, Tilt, Zoom, Rotation Angle, and Anchor Point keyframes all appear within the Transform track.



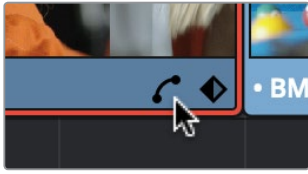
A keyframe track for all of the Transform group parameters

If you want to edit each parameter independently, a small disclosure control at the right of each keyframe track lets you open up an aggregated keyframe track into individual keyframe tracks, one for each parameter that's been keyframed within that group of Inspector controls.



Clicking a keyframe track's disclosure control reveals individual keyframe tracks for each keyframed parameter in the Inspector

Additionally, each keyframed clip has a Curve button that, when clicked, exposes that parameter within a Curve Editor that's attached to the clip in the Timeline.

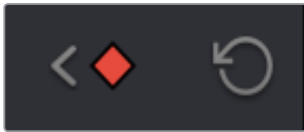


A clip's Curve Editor button, used to open the Curve Editor for that particular clip

Multiple parameters can be opened within the Curve Editor at the same time, and you can choose which curve to work on by clicking it in the Curve Editor, or clicking one of that parameter's keyframes in the keyframe track above. Selected control points can be moved, and their bezier interpolation changed using one of the four buttons located at the top of the Curve Editor.

Keyframing in the Inspector

Keyframing in the Edit page works slightly differently than when using the Keyframe Editor in the Color page. Most simple keyframing tasks can be performed in the Inspector using three buttons that appear to the right of any parameter that's capable of being keyframed.



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

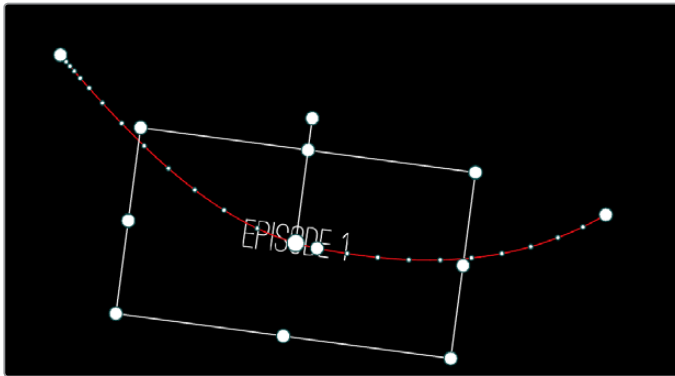
Methods of keyframing parameters in the Inspector:

- **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 on-screen 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:** Right-Bracket (]) and Left-Bracket ([). You can also 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 on-screen controls of the Timeline Viewer.
- **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:** Click the white dot at the left of a parameter's keyframe track in the Timeline. White means that track's enabled. Gray is disabled.
- **To disable or enable a group of parameters in the Inspector:** Click the white dot at the left of a parameter group's title bar in the Inspector. White means that group is enabled. Gray is disabled.

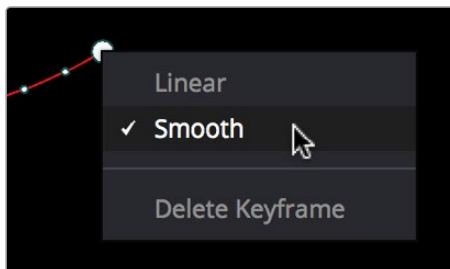
Keyframing Motion Paths in the Timeline Viewer

If you're keyframing a clip's transform controls to create motion, a motion path appears when you turn on the onscreen transform controls using the button to the left of the transport controls.



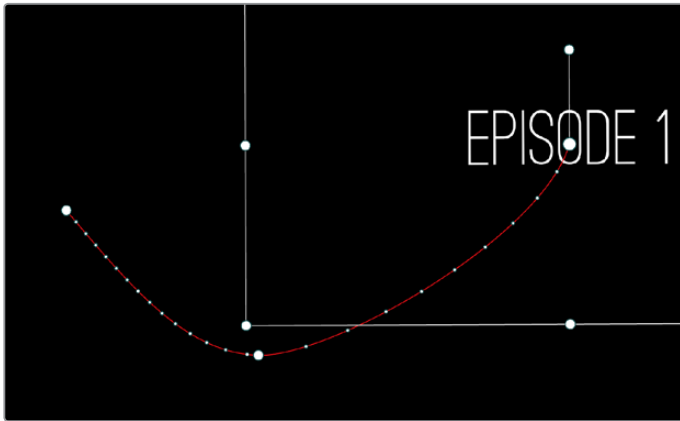
A visible motion path resulting from animated Position X and Y parameters

Each keyframed change to the Position X and Y parameters creates a control point on the surface of the motion path, which is linear by default, creating a sharp edge. However, you can right-click any control point and choose Smooth from the contextual menu to add bezier handles to that control point, which let you change the sharp angle to an adjustable curve.



Changing the linear control point into a bezier curve

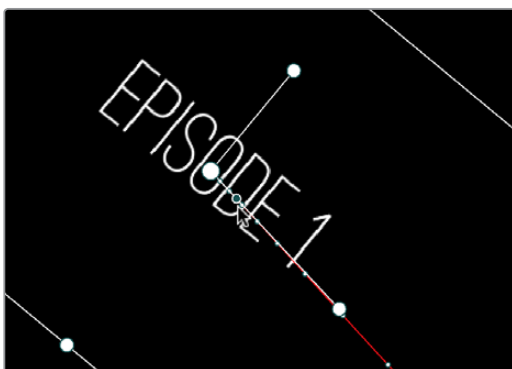
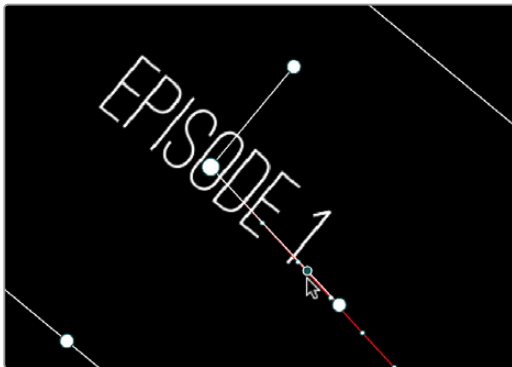
The control points making up any motion path can be dragged around at will to change the path the selected clip will travel. Dots on the surface of the motion path indicate the velocity of motion; dots that are closer together indicate slower motion, while dots that are farther apart indicate faster motion. Dragging a motion path control point farther away from another one will speed up the animation between both points, while dragging it closer will slow the animation down, as you're setting up the selected clip to travel a longer or shorter distance within the same keyframed time.



Dots on the motion path show that the left half has slow motion, while the right half has faster motion

You can also adjust the shape of any control point's curve by clicking to select that control point, which exposes its bezier handles, and then dragging the handles to adjust its curve. Once handles have been exposed, there are a variety of methods you can use to adjust them and manipulate the motion path.

Finally, you can adjust the acceleration of motion by adjusting the Acceleration handle on the stem of any Bezier curve. Dragging an acceleration handle towards a control point creates an eased keyframe, where motion slows to a stop, or begins from a stop. Dragging an acceleration handle away from a control point creates more linear motion, where the object moves continuously through that control point.



An acceleration handle on the Bezier handle of a curve lets you create eased motion by dragging it in towards the control point being adjusted

Methods of adjusting the bezier handles of motion paths:

- Drag any control point to reshape the motion path.
- Drag any bezier handle to change the shape of the curve.
- Command-drag any bezier handle to break the tangent between it and the opposite bezier handle. When you release the Command key, the two bezier handles become locked together again at whatever angle you created.

To eliminate a control point on a motion path, along with its keyframe:

- Right-click any control point and choose Delete Keyframe.

To switch a control point between sharp and curved angles:

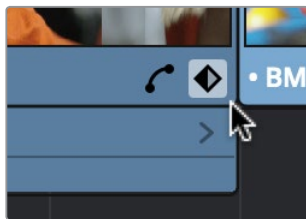
- Right click any control point and choose Linear (for a sharp angle) or Smooth (for a curve).

Keyframing in the Timeline and Curve Editor

If you need to do more complicated keyframing than the relatively simple controls of the Inspector allow, you can use the Keyframe tracks and Curve Editor found in the Timeline.

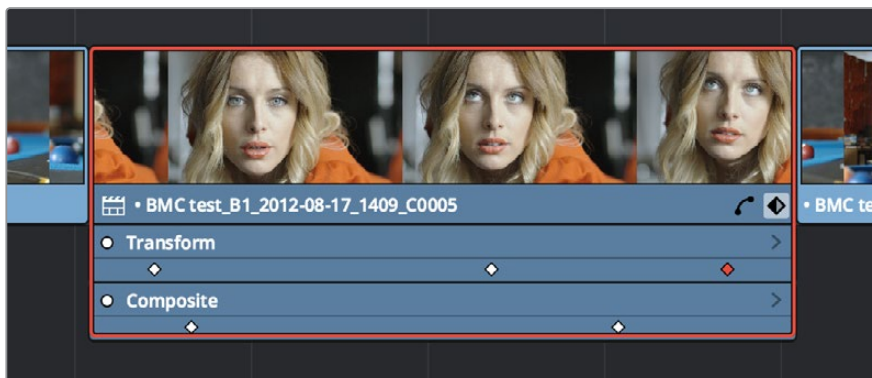
The Keyframe Editor

When one or more clip parameters are keyframed, two small buttons appear at the far right of a clip's name bar in the Timeline, a Curve button and a Keyframe button. Clicking the Keyframe button opens the Keyframe Editor, exposing one keyframe track for each group of parameters that's keyframed. For example, the Composite parameters, Transform parameters, and Cropping parameters are all encapsulated by group tracks.



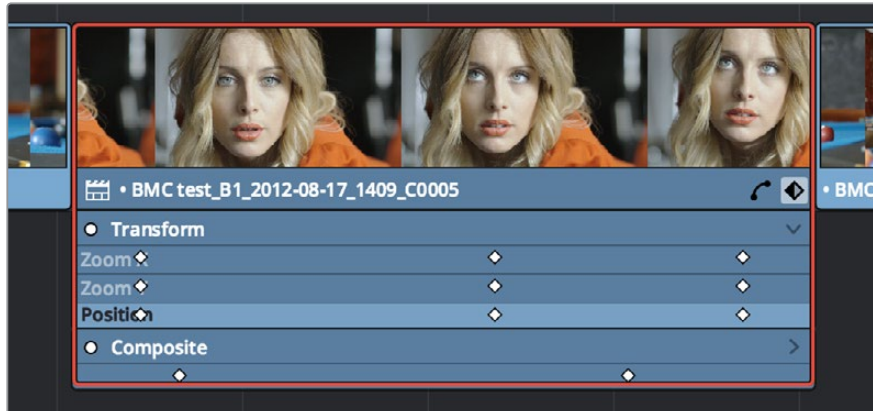
The Keyframe track button in the Timeline appearing on a keyframed clip

For example, if you'd added keyframes to the Zoom and Position parameters, these keyframes all appear within a single keyframe track labeled Transform, while Opacity adjustments appear on a second keyframe track for Composite.



Group keyframe tracks open in the Timeline

However, each group keyframe track has a disclosure button that lets you show or hide each individual parameter that's keyframed within that group. For example, clicking the Transform keyframe track's disclosure button shows the Zoom and Position tracks, so you can adjust those individual keyframes.



Individual parameter keyframe tracks open in the Timeline

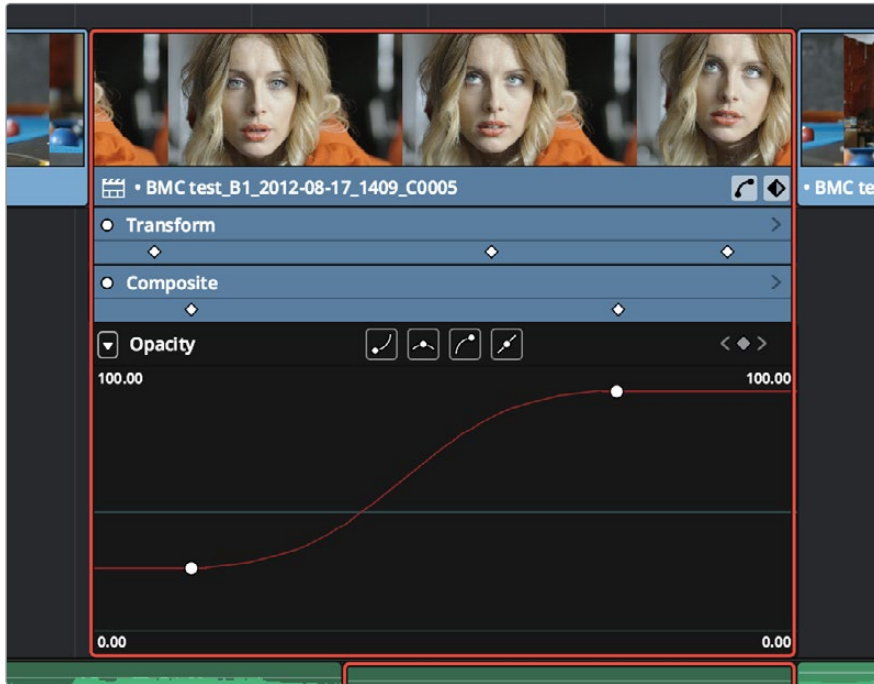
These keyframe tracks let you edit keyframes in context of the actual clip durations in the Timeline. Click the small Keyframe button at the bottom right of the clip's name bar to close the keyframe tracks when you're finished.

Methods of adjusting keyframes in the Keyframe Editor of the Edit Page:

- **To add new keyframes to the Keyframe Editor:** Option-click anywhere on a track of the Keyframe Editor to add a new keyframe, which defaults to whatever the current value is for that parameter at that frame.
- **To select one or more keyframes in the Keyframe Editor:** Click a single keyframe to select it, or drag a bounding-box around multiple keyframes to select them all at once.
- **To move one or more control points:** Select one or more control points and drag left or right. While you drag keyframes, a tooltip appears showing you the offset in frames of your adjustment from the beginning of that clip's source media. If you're only dragging one keyframe, the tooltip also shows you the name of the parameter you're modifying.
- **To nudge selected keyframes one frame at a time:** Select one or more keyframes and use the left and right arrow keys to nudge them back and forth, for precision editing.
- **To delete one or more control points:** Select the keyframe(s) you want to delete and press Backspace.
- **To disable or re-enable an entire track of keyframes:** Click the white button at the far left of each keyframe track; it turns gray to show that track has been disabled.
- **To cut, copy, and paste one or more keyframes:** Make a selection of keyframes, and use the Cut (Command-X) or Copy (Command-C) key shortcuts. Then, move the playhead to where you want the first of the pasted keyframes to start, and press Paste (Command-V).
- **To duplicate one or more keyframes:** Make a selection of keyframes, then hold the Option key down and drag the selected keyframes to duplicate them and move the duplicates to a new position.

The Curve Editor

If you want to work with keyframes in even more detail, you can click the small Curve Editor button at the far right of a clip's name bar. The Curve Editor can be opened in addition to the Keyframe Editor, or it can be opened in isolation.



The Curve Editor open in the Timeline

You can open multiple parameters into the Curve Editor using the curve pop-up menu at the upper left-hand corner of the Curve Editor that lets you choose which parameters are exposed via checkboxes. This menu also lets you choose which curve is selected by clicking the name of the parameter you want to edit.



Choosing which parameters to display in the Curve Editor

While you can only work on one curve at a time, you can choose which curve is selected to edit. Using the control points exposed by each curve, you can edit parameters, alter keyframe timing, and change each control point's interpolation to create custom easing effects affecting the acceleration of change from one keyframe to the next.

Methods of keyframing parameters in the Curve Editor of the Edit page:

- **To switch which curve you're editing:** If the Keyframe Editor is open at the same time as the Curve Editor, you can click the keyframe track you want to edit and the corresponding curve will be highlighted. Otherwise, click the curve pop-up menu at the upper left-hand corner of the Curve Editor, and choose which curves you want to expose to work on. If multiple curves are open in the Curve Editor, click the curve you want to edit to highlight it for editing.
- **To select one or more keyframes:** Click a single keyframe to select it, Command-click multiple keyframes to select them one at a time, or drag a bounding-box around multiple keyframes to select them all at once.
- **To drag one or more control points on a curve:** Select one or more control points and drag left or right to retime them, and up or down to change their value. Hold the Shift key to constrain keyframe adjustment in only one direction.
- **To nudge selected keyframes one value or frame at a time:** Select one or more keyframes and Command-Left Arrow and Command-Right Arrow to nudge them in time, or Command-Up Arrow and Command-Down Arrow to nudge their value, for precision keyframe adjustments.
- **To add a new control point to a curve:** Option-click anywhere on a curve to add a new control point.
- **To delete one or more control points from a curve:** Select the keyframe(s) you want to delete and press Backspace.
- **To cut, copy, and paste one or more keyframes:** Make a selection of keyframes, and use the Cut (Command-X) or Copy (Command-C) key shortcuts. Then, move the playhead to where you want the first of the pasted keyframes to start, and press Paste (Command-V).
- **To change the interpolation of a control point:** Click the control point you want to edit to select it, and then click one of the four bezier interpolation buttons in the Curve Editor title bar.
- **To adjust a bezier handle:** Drag the bezier handle in any direction to alter the curve.



The Curve Editor with bezier interpolated keyframes

When you're finished working with the Curve Editor:

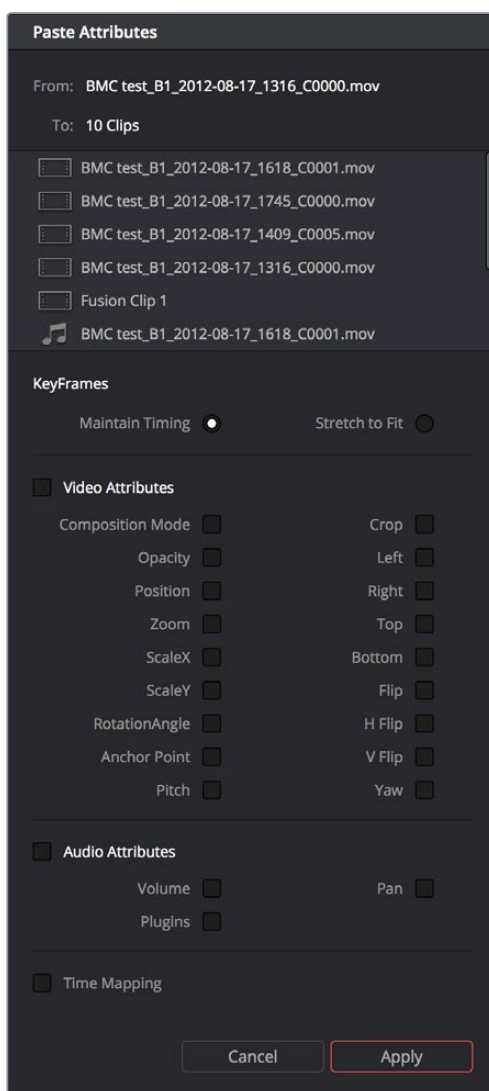
- Click the Curve Editor button at the bottom right of the clip's name bar to close the Curve Editor.

Paste Attributes

You can copy and paste attributes from one clip to multiple clips using the Paste Attributes command. This is a fast way to apply video and audio adjustments and effects from one clip to many others in the Timeline.

To copy attributes:

- 1 Select a clip with attributes you want to apply to other clips, and press Command-C.
- 2 Select one or more other clips to paste to.
- 3 Choose Edit > Paste Attributes (Option-V).
- 4 When the Paste Attributes window appears, click the checkboxes of each of the attributes you want to paste, and click Apply when you're done.



The Paste Attributes window

The Paste Attributes window shows you the clip you're copying from and the clip(s) you're pasting to at the top, and provides checkboxes you can use to select which attributes you'd like to paste. A pop-up menu below lets you choose how you'd like to apply any keyframes that are part of the attributes being pasted; the options are Maintain Timing or Stretch-to-Fit.

Fusion Connect

For instances where the various effects in the Edit and Color page aren't enough to achieve the effect you require, you can use the Fusion Connect features of DaVinci Resolve to send one or more clips from the Edit page timeline to Blackmagic Fusion, in order to do more robust compositing and effects work there. You can use this workflow in the Mac OS, Windows, and Linux versions of Resolve, since Fusion works on all three platforms. This is a simple round-trip operation that lets you send clips from the Resolve timeline to Fusion, add effects, and then render a finished effect out of Fusion that will automatically appear back in your timeline.

Using Fusion Connect

Sending one or more clips to Fusion is simple.

To send clips to Fusion:

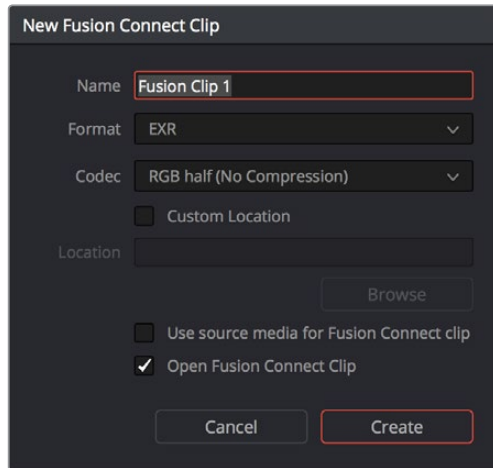
- 1 Select one or more clips in the Timeline that you want to send to Fusion. In this example, two superimposed clips are selected.



Selecting two clips to send to Fusion

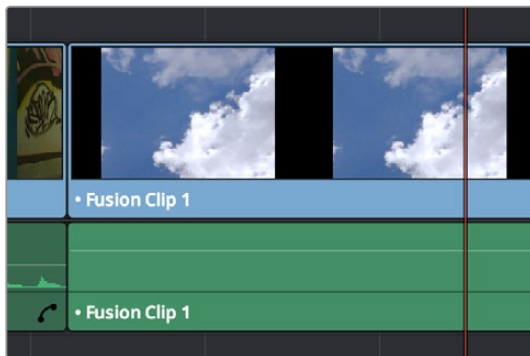
- 2 Right-click one of the selected clips and choose New Fusion Connect Clip from the contextual menu.
- 3 In the New Fusion Connect Clip dialog, choose the following options:
 - a. Enter a name.
 - b. Choose a video format (for rendering media to send to Fusion).
 - c. Choose a codec, based on the format you selected.
 - d. If you want to save the Fusion Connect Clip that you're creating, along with its directory and media, to a specific location, turn on the Custom Location checkbox, then click the Browse button and choose a location. Otherwise, the directory containing the Fusion Connect clip and any source media rendered along with it is placed in the same directory as the scratch disk.
 - e. If you don't want to render self-contained media with baked in effects and grading from Resolve, turn on the "Use source media for Fusion Connect clip" to create a Fusion Connect project that references the original media files on disk.

- f. If you want to immediately open Fusion, turn on the “Open clip in Fusion” checkbox. If you do this, then Resolve by default renders each of the video clips you selected, along with every speed effect, transform, and Color page operation that’s been applied to each clip, using the Timeline Color Space. However, if you click Cancel when the Render Composition Media dialog appears, then the Fusion project that opens references the source media on disk, rather than rendered media that’s generated by Resolve.

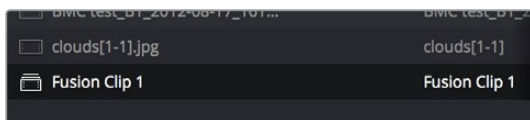


The New Fusion Connect Clip dialog

- 4 When you’re finished, click Create. Resolve creates a Fusion Connect clip, which appears in the Timeline as a single clip, and in the Media Pool.



Fusion Connect clips in the Timeline

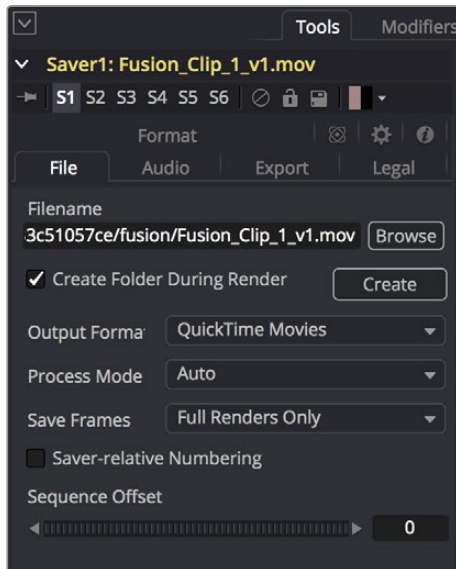


Fusion Connect clips in the Media Pool

- 5 Opening the Fusion Connect clip in Fusion can be done in one of two ways:
 - If you turned on “Open clip in Fusion,” then Fusion automatically opens and the clips you selected appear as Loader nodes within Fusion.
 - If you didn’t, then you can right-click the Fusion Connect clip in the Media Pool, and choose Fusion Connect > Open Fusion from the contextual menu.

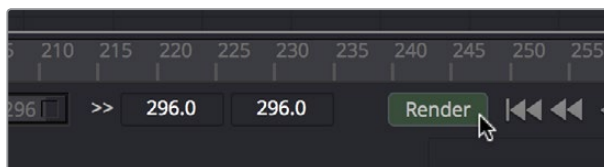
At this point, new media is rendered (by default), Fusion opens, and the clips you sent are converted into a Fusion node tree, explained in greater detail in the following section.

- 6 In Fusion, use the available tools to create the required effect.
- 7 Optionally, before you render, if you want to change the Output Format, click the Output node, and choose a new format from the Output Format popup in the Tools tab. If you don't do this, the Fusion composite will be rendered using the format you selected when you sent the Fusion Connect clip in the first place.



The Tools panel where you can change the file information governing the rendered output

- 8 When you're finished creating your effect in Fusion, click the Render button to open the Render Settings, check to make sure that the settings are correct, and click Start Render. This renders the Fusion composition to the disk location and using the name that you chose in step 3.

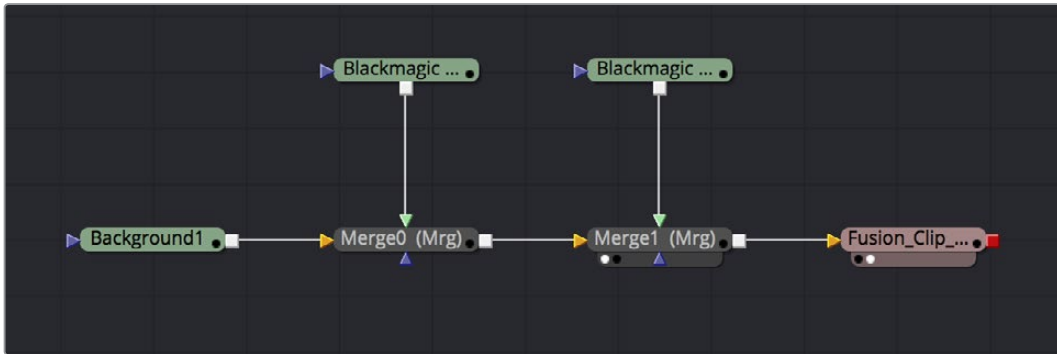


Selecting two clips to send to Fusion

- 9 A Render Settings dialog appear, which lets you choose how you want to render the output, with options including the Quality, Frame Range, and Size of the media being output. If the default settings are good, click Start Render. A progress bar indicates how long the render will take. For more information, consult the Fusion User Manual.
- 10 Once rendering has finished, save your Fusion Project, reopen DaVinci Resolve, and you should see that the Fusion Connect clip in the Timeline has updated to show the new effect you created in Fusion.

How Clips are translated into Node Trees

In Fusion, each clip that you send appears as a Loader node that is linked to that clip's media on disk. If you selected multiple clips, each clip is superimposed over the one just below it using a Merge node, which lets you merge two images at a time with an Over operator by default.



Two superimposed clips sent to Fusion as represented in the Fusion node tree

With this as your starting point, you can add nodes (called Tools in Fusion) to apply operations of your own, in order to create more sophisticated effects and composites. For more information about using Fusion, see the Fusion User Manual, available from the Support page at the Blackmagic Design web site.

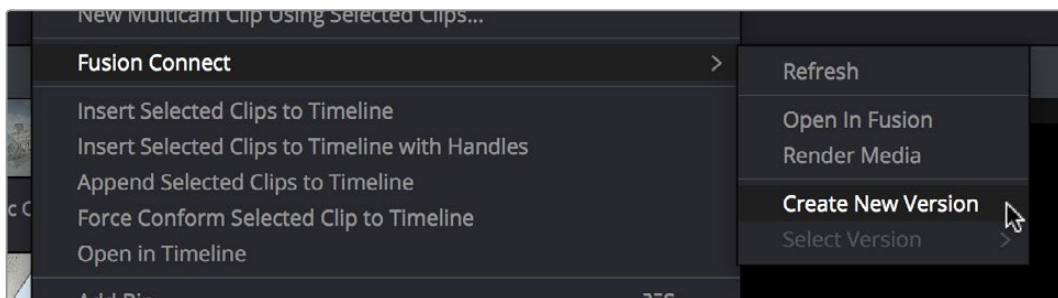
Altering Fusion Connect Clips

If, at any point, you want to modify the Fusion composition, you can reopen the project in Fusion, or right-click the Fusion Connect clip in the Resolve Media Pool and choose Fusion Connect > Open in Fusion. Once in Fusion, make whatever changes you want to, and then re-render the clip to overwrite the previously rendered media. When you create new versions in this way, each version's Fusion project file and rendered output is maintained and preserved, so you can always go back and forth.

When you return to Resolve, you may need to right-click the Fusion Connect clip you just opened, and choose Fusion Connect > Refresh to make sure that Resolve correctly sees the re-rendered media from Fusion.

Creating Multiple Versions of Fusion Clips

If you want to render a new version, but you want to keep the previous version, then you can right-click the Fusion Connect clip in the Resolve Media Pool and choose Fusion Connect > Create New Version.

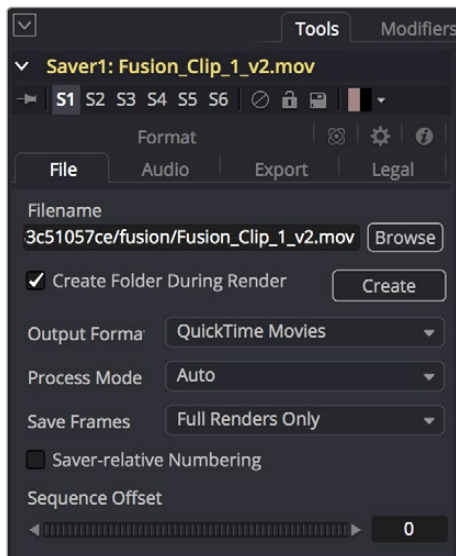


Creating a new version of a Fusion Connect composite

This creates a duplicate of the composite in Fusion, with the “_v1” part of the file name incremented so it doesn’t overwrite the previous version of that composite.

Once in Fusion, make whatever changes you need to the composite, then re-render the clip to generate an additional piece of media for that version. The Filename of the Saver node for the new media you’re rendering is also automatically incremented with the “_v1” segment of the filename changed to the next version number, such as “_v2” if it’s version two of the effect.

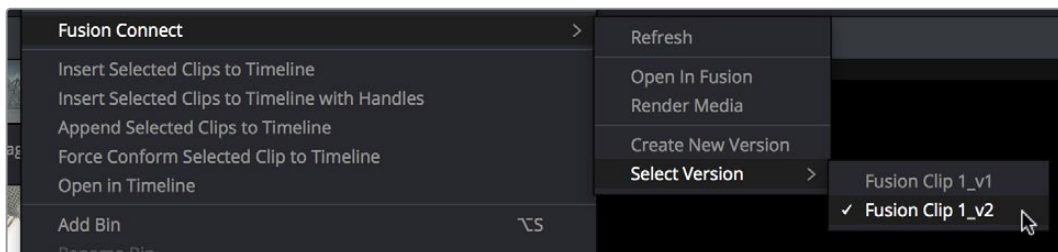
When you’re finished, you’ll end up with a Fusion Project file and a corresponding rendered media file that share the same version number. When you return to Resolve, Resolve will automatically detect that there are multiple versions in the Fusion Connect directory, and will make each version available via a Choose Version submenu for Fusion Connect clips in the Media Pool.



The Tools panel shows the Saver node’s updated Filename for the new version’s rendered output

Switching Versions of Fusion Connect Clips in Resolve

Once you’ve created multiple versions of a Fusion Connect clip, you can switch which version is used for that clip in Resolve by right-clicking the Fusion Connect clip in the Media Pool, and choosing the version from the Fusion Connect > Select Version submenu of the contextual menu.



Choosing which version to use from the Fusion Connect > Select Version submenu

TIP: If you want to switch versions for a Fusion Connect clip in a timeline, you can right-click that clip and choose Find in Media Pool.

Sending a Fusion Connect Directory to Another Machine

If you're going to hand off a Fusion Connect directory to someone else using a different workstation, it's a good idea to render self-contained media for the Fusion composition to make it easy to hand off everything the compositing artist will need. Otherwise, you'll need to manually find and provide the associated media files yourself. There are two ways of rendering self-contained media for Fusion:

- If you check "Open Fusion Connect Clip" in the New Fusion Connect Clip dialog, then Resolve by default renders each of the video clips you selected, along with every speed effect, transform, and Color page operation that's been applied to each clip, using the Timeline Color Space.
- If you haven't opened the Fusion Connect clip in Fusion yet, you can also right-click any Fusion Connect clip in the Media Pool, and choose Fusion Connect > Render Media from the contextual menu.

Once that's done, there are two ways you can locate the actual Fusion Connect directory's location, in order to copy it for whomever is going to be doing the compositing work for you.

- You can turn on the Custom Location checkbox in the New Fusion Connect Clip dialog, then click the Browse button and choose a location where the resulting directory is easily copied.
- You can also right-click on any Fusion Connect clip in the Media Pool, and choose Reveal in Finder to open that Fusion Connect clip's directory.

Since your Resolve project keeps track of the location of the Fusion Connect directory from the moment it's created, you don't want to move it, since Resolve is counting on it being where it thinks it is. Once your colleague has completed the compositing work in Fusion, all they need to do is send you back the Fusion Composition file (just so you can keep everything together), and the media they rendered, both of which you need only copy to the top level of the corresponding Fusion Connect directory. Once you do that, Resolve should automatically see the rendered media and refresh those Fusion Connect clips on your timeline.

Creating Multiple Versions of Fusion Clips on Another Machine

If you've handed off the directory created by the Fusion connect process to someone off site, they can still create multiple versions of the composite that can be managed by DaVinci Resolve.

Use the Save As command in Fusion to save a duplicate of the Fusion project with the "_v1" segment of the filename incremented to the next version number, such as "_v2" if it's version two of the composite. Make sure you save this duplicate Fusion project into the same directory as the original, so Resolve can find it. Once created, you can change this duplicate project file any way you need.

When you're finished, select the Saver node (at the very end of the Fusion node tree), and change the Filename by incrementing the V1 part of the Filename field. What part of the file path you rename depends on whether you're rendering to a file-based format, or a frame-based format. For example, if you're rendering a QuickTime clip being named Output_V1.mov, then change the Filename to Output_V2.mov in the Tools tab, and render. If you're rendering a DPX image sequence, then you'll want to change the name of the folder that encloses the frames, so change the Filename from ".../fusion/OutputDirectory_V1/Output_00000000.dpx" to ".../fusion/OutputDirectory_V2/Output_00000000.dpx" to obtain a correctly named second version.

Updating Fusion Connect Clips Using Render Media and Refresh

If you change a grade or effect that's applied to a clip inside of a Fusion Connect clip, you'll need to right-click that clip and choose Fusion Connect > Render Media to re-render updated media files for the Fusion project.

If you re-render a Fusion composite and overwrite media that's already referenced by a Fusion Connect clip in an open DaVinci Resolve project, you may need to refresh that media reference in Resolve. The easy way to do this is to right-click any Fusion Connect clip in the Media Pool or Timeline, and choose Fusion Connect > Refresh.