



Capturing From the Cintel Film Scanner

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Controlling the Cintel Film Scanner

The Blackmagic Cintel film scanner is a compact, easy to use, real time film scanner capable of converting 35mm and 16mm (with a separately purchased gate) positive and negative film formats into Cintel Raw Image (CRI) digital files that can be organized, edited, and graded using DaVinci Resolve, delivered to any format Resolve can output, and archived for later use.



The Cintel scanner

DaVinci Resolve can control any Blackmagic Cintel film scanner that's connected to your computer via Thunderbolt 1 or 2. Once connected, the Film Scanner controls in the Media page can be enabled, which let you choose the film type to be scanned, align the film frames to the sensor, adjust the scanner's light source for optimal exposure and color, and choose whether to use the scanner's hardware-based Automatic Perf Detection to perform image stabilization.

NOTE: This chapter of the DaVinci Resolve manual describes the use of a Cintel film scanner connected to DaVinci Resolve for the purpose of ingesting scanned film. For other operational inquiries, please see the documentation that accompanies the scanner itself, or visit the Blackmagic Design support page on the web to download it.

Similar to Tape Capture, you can choose to scan sections of film a shot at a time, or as part of a batch capture workflow by logging all of the clips on a particular roll that you want to scan.

The Cintel Raw Format

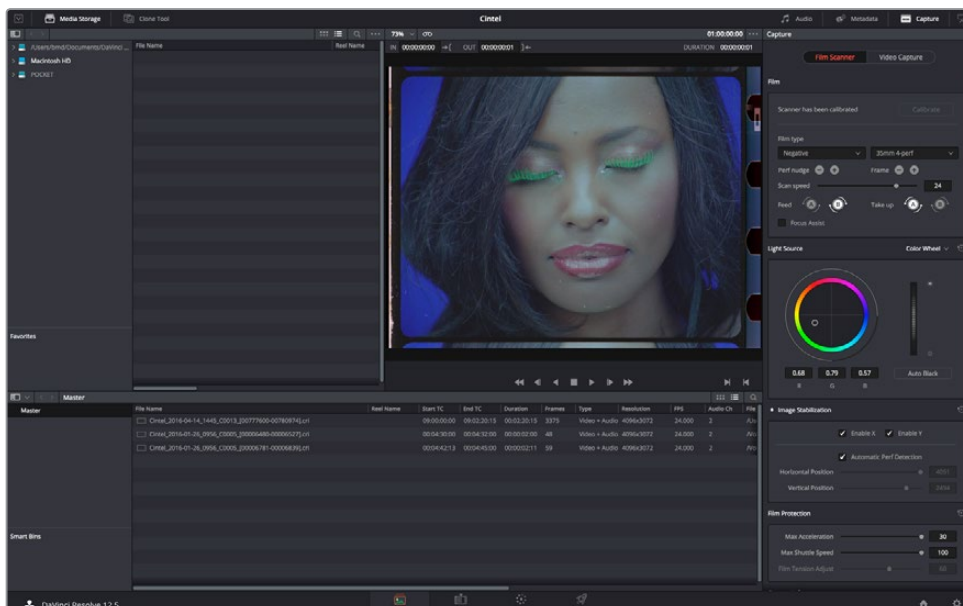
The raw Bayer pattern of each film frame scanned with the Cintel scanner sensor is saved with embedded scanner metadata as a 12-bit linear Cintel Raw Image (CRI) image sequence. When grading in Resolve, CRI raw images are automatically debayered as 12-bit log-encoded image data. The logarithmic encoding is similar, but not identical to, Cineon encoding; negative film is encoded using a gamma of 2.046 for density, while print film is encoded using a full-range Gamma 2.2 curve to ensure that no image data is clipped. Both of these logarithmic encodings can be converted to a linear color space using the “Cintel to Linear” 1D LUT, as a precursor to converting to other color spaces you may want to work in.

The film is scanned using the full sensor aperture of 4096x3072 for an extracted 35mm or 16mm image to accommodate waveform visibility for audio extraction and perforation visibility for stabilization, but 16mm is cropped to 2160x1702. The resolution of the resulting files depends on the source film format; Super 35 film is at the UHD resolution of 3840x2877, while Super 16 format scans are at nearly HD resolution at 1903x1143. The resultant files are approximately 22.4MB for a 35mm frame and 6.6MB for 16mm.

Cintel Raw Image files don't have dedicated debayering controls in Resolve. To control the quality of debayered CRI files, use the Decode Quality and Play Quality CinemaDNG settings of the Camera Raw panel of the Project Settings.

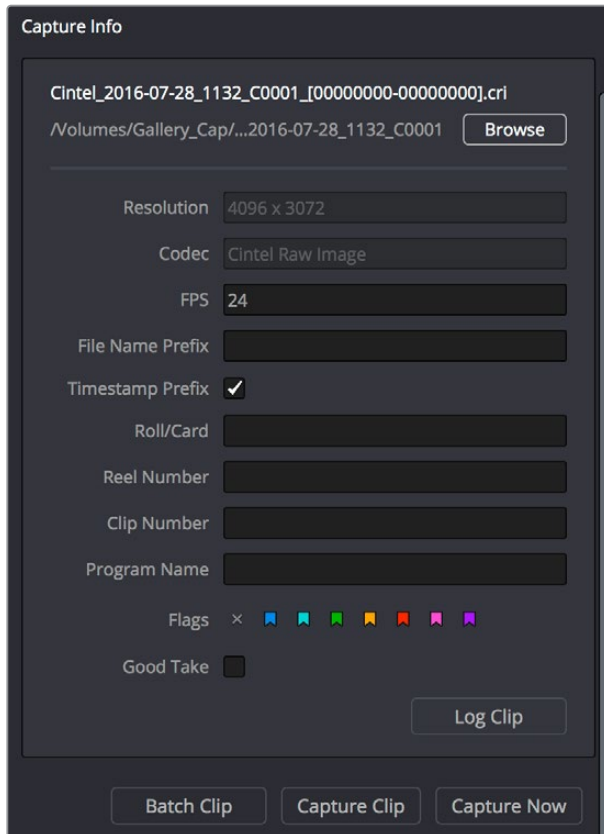
The Cintel Scanner Interface

If you have a Cintel Scanner connected to your computer, then clicking the Capture button in the UI toolbar at the top of the Resolve screen sets the Media page to control either the Cintel scanner or a video deck that's been connected to your workstation. For film scanning, open the Film Scanner panel to set up, calibrate, and choose options for logging or scanning a selected range of the currently spooled roll of film. If you want more room for viewing the Cintel scanner controls, click the full height button that's all the way to the right of the UI toolbar, and turn off the Metadata panel.



Cintel scanner controls in the Media page

- **Transport Controls:** These controls, while similar in appearance to those used while in Playback mode, now work to control the Cintel scanner. Additional controls appear for moving forward or backward a frame at a time.
- **In and Out Controls:** In Cintel Scanner mode, the In and Out buttons to the right of the Transport controls define a range of the film roll from which to capture.
- **Capture Info:** In Cintel Scanner mode, a set of capture metadata fields appears at the bottom of the Film Scanner panel. Populating the File Name Prefix updates the file name preview that's shown above in the Header, that also shows the file path, Resolution, Frame Rate, Duration, and Format (Cintel Raw Image).



Editable capture metadata

Before you begin scanning, you may want to adjust the settings in the Cintel Scanner panel of the Project Settings, and you'll definitely need to adjust some settings in the Cintel panel of the Media page.

Capture Location in the Capture Info Section

Prior to beginning a film scanning session, you should scroll down to the Capture Info section of the Capture panel to make sure the scanned files are being saved to the directory and volume where you want them. Click the Browse button and choose a location from the File Destination dialog. It's good to do this first, as this step is easy to forget.

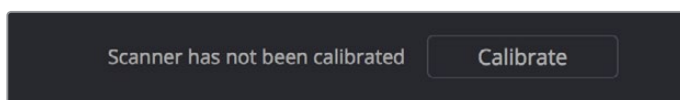
Your clips will be saved to independent sub-folders in the destination folder, with a timecode prefix in the file name. If you want to save all your clips into one master destination folder, deselect the Timestamp Prefix checkbox in the Capture Info section.

Cintel Media Page Settings

The following groups of settings appear to the right of the Media page Viewer when in Cintel Scanner mode to scan clips from film into the Media Pool.

Calibration

This option lets you calibrate the optics of the scanner to eliminate optical blemishes or dust that cannot be removed (this is not for dust-busting the film itself).

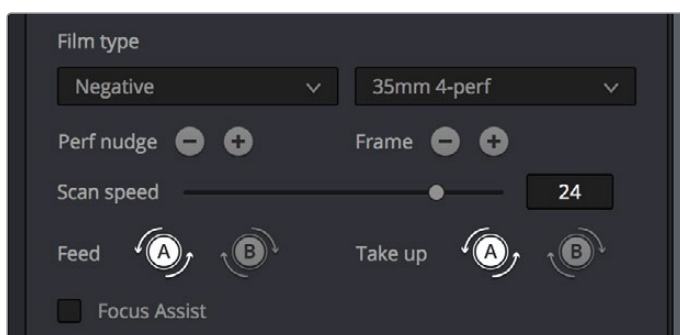


The calibration button underneath Image Stabilization

- **Calibrate button:** Lets you eliminate light optical blemishes and dust from the optics of the Cintel scanner via digital calibration. While it's recommended to spray dust the optics before scanning new material, it's possible over time for some blemishes on the optics to be unremovable, in which case using the Calibrate button will eliminate them from the scanned image. The skid plate does not normally need to be removed for calibration; however, in cases where there is severe dirt, remove the skid plate and dust it first. You must use the Calibrate button before you load film into the scanner, while there's nothing in the optical path, to remove any remaining optical blemishes or dust.

Film Type

These controls let you select the type of film you're scanning, align the film with the sensor, and choose what speed you're scanning at.



Film Type controls in the Media page

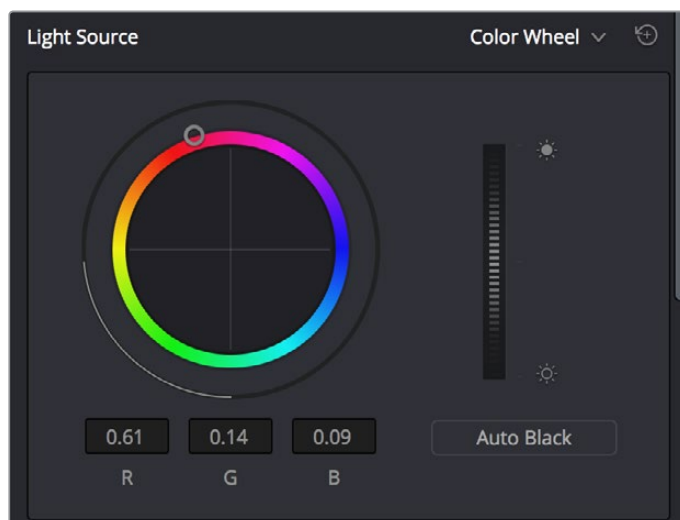
- **Film Type pop-up:** Lets you choose what type of film you're scanning. The choices are Positive, Negative, Interpositive, and Internegative.

NOTE: when scanning interpositive film, the increased density of the film requires slightly extended pulse durations from the light source. Normally, this does not affect the scan, however, a slight reduction in resolution may occur when scanning at above 12 frames per second. If you do notice a difference in resolution, simply reduce your scanning speed to 12 frames per second or less.

- **Gauge and perf count pop-up:** Lets you choose what reel type you're scanning, the choices are 35mm 2, 3, and 4 perf, and 16mm 1 perf.
- **Perf nudge buttons:** Used for making fine adjustments of the perf position relative to the scanner gate aperture. Command-J nudges up, while Command-L nudges down.
- **Frame buttons:** These buttons are push and hold to activate; when on, the film is slowly advanced to move the frame up or down and when released the film stops in place. This is useful for aligning the film frame with the scanner's sensor. Using the Perf Nudge and Frame buttons, align the visible film frame such that the bottom of the previous frame and the top of the next frame are just visible at the top and bottom of the Viewer, and the current frame is centered vertically (it's important to make sure the image in the Viewer is not zoomed in when you do this). Command-Left Arrow moves the frame up, while Command-Right Arrow moves the frame down.
- **Scan speed slider:** With adequate disk performance, you should be able to scan at 30 fps. However, if you're scanning to a slow hard drive, you can reduce the scanning speed to a frame rate that's suitable for your workstation without dropping frames.
- **Feed buttons:** Sets the wind direction of the left-hand side feed spool. While auto-detection will prevent incorrect operation, you should manually configure the reel winding direction based on how each film roll is wound.
- **Take up buttons:** Sets the wind direction of the right-hand side take up spool. While auto-detection will prevent incorrect operation, you should manually configure the reel winding direction based on how each film roll is wound.
- **Focus Assist check-box:** Enables luminance peaking on the scanner HDMI monitor output, which makes it easy to obtain optimum focus adjustments.

Light Source

These controls let you adjust the scanner's light source to adjust the optimal Dmin (the minimum scanned signal value) and color temperature of the scanned material. Using the built-in software scopes in DaVinci Resolve, which can be opened in the Media page by choosing Workspace > Video Scopes > On, you can adjust these settings to make sure you're not clipping image data during the scanning process.



Light Source controls in the Media page

- **Master Offset control:** Adjusts the intensity of the light source used to illuminate the film, raising or lowering the RGB channels all at once. For typical camera negative, this lets you adjust the black point of the film image (the darkest part of the image, which in fact corresponds to the highlights of the film image) to sit just above the typical Dmin value of 95, as measured on the Histogram of the video scopes, which guarantees that the highlights won't be clipped by a Cineon-style LOG conversion. For positive film, simply adjust Master offset so that no part of the signal is being clipped.
- **Auto Black button:** Analyzes the current frame displayed in the Viewer and does an automatic adjustment to put the film base of the signal at the Dmin value of 95 for negative, or for print to set the white point to 90%.
- **RGB controls:** By default, a color balance control lets you adjust all three color channels by varying amounts to alter the color temperature of the light source used to illuminate the film, while the adjusted R, G, and B values are displayed in three fields below. Optionally, you can choose to put this control into Color Bars mode using the mode pop-up to the right of the Light Source title bar, which changes this control to three vertical Red, Green, and Blue color channel sliders.

Image Stabilization

These controls let you enable and disable as well as control image stabilization to eliminate vertical film hop and horizontal gate weave.

- **Image Stabilization enable/disable control:** The dot to the left of the Image Stabilization title bar lets you enable or disable the scanner's hardware-based image stabilization altogether. While hardware stabilization is typically desirable when you have high-quality perforations, you may want to turn this option off if the condition of the perforations is poor and you decide to use DaVinci Resolve's software-based stabilization instead. When Image Stabilization is enabled (the default), small white vertical (Y axis) and horizontal (X axis) detection overlays are displayed in the Viewer, highlighting which part of the film perforation is to be used as the reference for stabilization. These overlays are automatically hidden when recording.

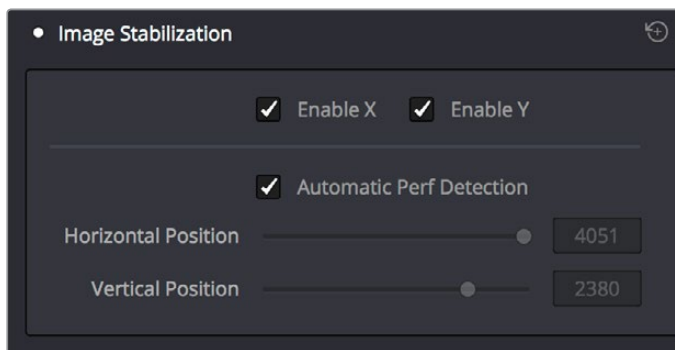
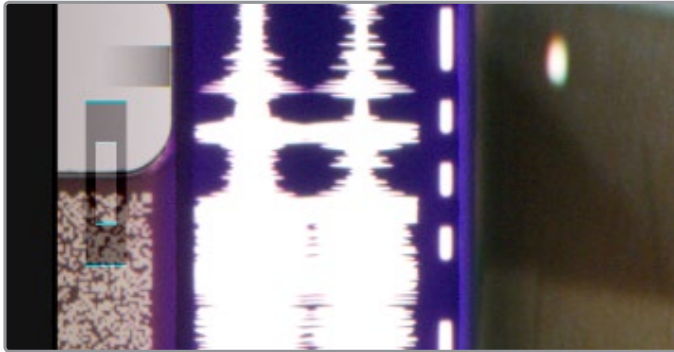


Image Stabilization controls in the Media page

- **Enable X and Y checkboxes:** Lets you choose whether to use hardware image stabilization to fix horizontal gate weave (Enable X) and vertical gate hop (Enable Y). If the results are unsatisfactory with both axes enabled, you can turn off the axis that's causing issues with stabilization.
- **Automatic Perf Detection checkbox:** When enabled (the default), the Cintel scanner attempts to automatically place the stabilization detection overlay at the best location, with reference to the perforation shown on the currently loaded frame, for the best stabilization result.

For optimum stabilization, the position of the overlay should resemble the following screenshot, with the box over the flat bottom area of the perf and the bar positioned in the middle of the perf. If the automatic positioning is not ideal, you can turn Automatic Perf Detection off, and manually move the overlay to a more ideal position, either by dragging it in the Viewer, or by using the Horizontal and Vertical sliders described below.

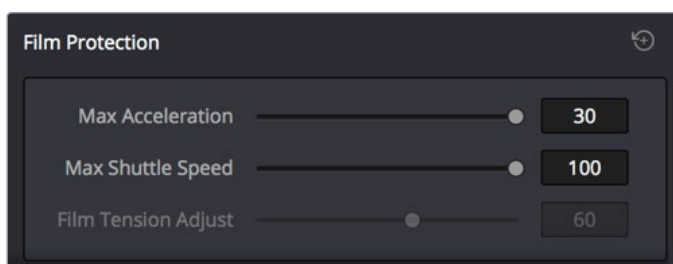


Hardware stabilization control correctly positioned over a perforation in the Viewer

- **X and Y sliders:** Used to manually reposition the stabilization overlay when Automatic Perf Detection is turned off. Ideal placement of the stabilization overlay should position the top box to surround the top flat edge of the perf, with the lower part of the overlay flush against and centered on the side of the perf. This enables hardware stabilization of vertical gate hop (along the Y axis), as well as gate weave (along the X axis). If the default position of the stabilization overlay is not ideal, you can either drag it to another location in the Viewer, or use the Horizontal and Vertical sliders to position it numerically.

Film Protection

These controls are intended to allow delicate film to be handled gently by the Cintel Scanner. Fast acceleration and shuttle speeds can be hard on archival footage, so it's recommended to lower both of these sliders from their defaults whenever you're scanning older film.



The Acceleration and Shuttle Speed sliders should be lowered when scanning older, delicate archival film

- **Max Acceleration:** Changes the scanning speed to operate between 5–30 frames per second.
- **Max Shuttle Speed:** Changes the speed of shuttling from one section of film to another between 1–100 frames per second for 35mm film, and between 1-200 frames per second for 16mm film.
- **Film Tension Adjust:** Adjusts the amount of tension applied to the film. For example, when loading delicate archival film, or compensating for film shrinkage.

NOTE: There is no possible way you can damage the Im using the Film Tension Adjust setting. The adjustment values are very small and only gentle changes are all that's required to prevent sprocket picking.

Film Scanning Workflows

The following sections describe how to scan film using DaVinci Resolve to control the Cintel scanner. Throughout, the procedures outlined above are presented in the order in which you'll perform each step of the scanning process.

Before You Begin

Following the instructions that accompany your Cintel scanner, connect the Scanner to your workstation using a Thunderbolt cable. The Cintel scanner is compatible with either Thunderbolt 1 or 2, and either has the bandwidth to transfer the scanner's output to your computer.

Before turning your scanner on and loading film, you should first dust the gate to make sure your scans are as clean as possible. This can be accomplished using compressed air, but if the gate is extremely dirty, you can remove it to give it a more thorough cleaning. Once that's finished, turn on the Cintel scanner, open DaVinci Resolve and create the project you'll be using to scan film, then click the Cintel Scan button on the Media page. Next, click the Film Scanner tab to select the Cintel panel.

Before you load film into the scanner or do anything else, click the Calibrate button at the bottom left of the Cintel panel. While you should always dust the gate of the scanner before loading a new reel of film, clicking the Calibrate button eliminates any unremovable blemishes in the scanner's optics from the scans you're about to make.

Load and Align the Film

Load the film you want to scan. In the presence of an image, the scanner will automatically align a frame. You should note that the image may be framed incorrectly if you first load blank film leader.

Next, choose the Film type. If necessary, use the Perf Nudge and Frame buttons to manually improve the alignment of the framing bar to the scanner's sensor such that the bottom of the previous frame and the top of the next frame are just visible at the top and bottom of the Viewer, and the current frame is centered vertically. It's important to make sure the image in the Viewer is not zoomed in when you do this.

Focus the Scanner

Just as you need to focus the lens on a camera, you'll need to focus the projected film image on your scanner's sensor. To achieve perfect focus, turn on the Focus Assist checkbox in the Film Scanner capture settings of DaVinci Resolve. This superimposes a focus peaking overlay over the Ultra HD image that's output from the scanner's HDMI output, and is also displayed in DaVinci Resolve's Capture window. For best results, connect an Ultra HD display to your Cintel scanner, so that you can monitor at the maximum available resolution while you focus.

With Focus Assist turned on, focus peaking will detect the film grain of the scanned image whenever the film plane is in perfect focus. This enables the operator to focus the scanner even if the film image is out of focus. Simply monitor the Ultra HD output of the scanner while you turn the Cintel scanner's focus wheel. Your image will be in focus when the grain running throughout the image displays peaking outlines.

TIP: You can verify the focal adjustments you've made by checking the edges of your film's perforations. When these are sharp, your film will be in focus.

Other Ways to Focus the Scanner

Another accurate way to achieve perfect focus, if you don't have a display connected directly to the scanner, is to use DaVinci Resolve's RGB Parade scope to monitor the signal while you focus. Open the Video Scopes by choosing Workspace > Video Scopes > On. To see the Parade Scope in more detail, you can set the Video Scopes window to display only a single scope using the layout buttons at the upper right-hand corner of the Video Scope window, and then choose the Parade Scope from the pop-up in the scope title bar (if necessary).

To focus, watch the tops of the red, green, and blue scope graphs while you turn the Cintel scanner's focus wheel. Your image will be in perfect focus when all three color channels in the scopes are "peaking," or displaying the maximum amount of information at their highest point.

Check the Automatic Perf Detection Stabilization Overlay

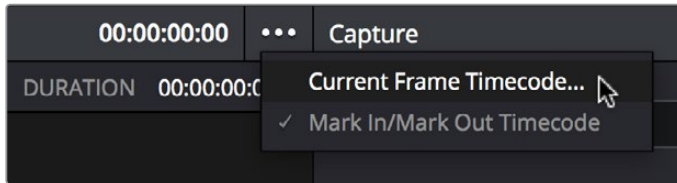
Next, play the loaded film and check that the automatic perf detection has found an appropriate section of the perf to successfully stabilize the film. If necessary, you can drag the stabilization overlay that appears in the Viewer so that the top box surrounds the top flat edge of the visible perf to make best use of the hardware-based stabilization built into the scanner.

Reset the Timecode for That Roll

To set the timecode for the roll of film you're about to scan, you need to locate the zero frame for that roll. It's standard practice to punch a small physical hole within the frame before the first frame of necessary film on a roll, to use as a permanent reference for whenever that roll is scanned. This is referred to as the marker frame, lab roll hole, or head punch. By always setting the first frame of timecode to match the marker frame, subsequent film scans will have the same frame count as previous scans, making it possible to rescan and reconfirm the same material whenever necessary.

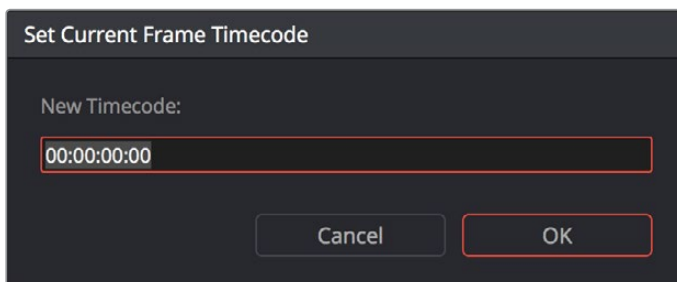
To reset scanned timecode at the marker frame of a new film roll:

- 1 Use the transport controls to locate the marker frame.
- 2 Click the Viewer option menu and choose “Current Frame Timecode.”



Choosing Current Frame Timecode from the Viewer Option menu

- 3 Enter a timecode value in the dialog box that appears. For example, if you’re scanning the first roll of a project, you can enter 01:00:00:00.



The Set Current Frame Timecode dialog

- 4 When you’re done, click OK.

Timecode cannot be negative, so don’t set the start frame to zero. Another common organizational technique is to change the hour number whenever you change rolls, to coincide with the film roll’s number, which makes it easy to track the correspondence between a scanned clip and the source roll and frame range it was scanned from.

NOTE: The Cintel scanner does not read Keycode, Aaton code, or edge code from camera negative. However, the Cintel Scanner does have “Options Interfaces” ports for adding optional third-party hardware in the future to accomplish this.

Choose a Location to Save the Scanned Frames

Once all this is done, scroll down to the Capture Info controls in the Capture panel, and click the Browse button to choose a location for the scanned files. You can use the other fields in this section to set what prefix (if any) you want to add to the name of the scanned files and enclosing folders, and what Roll, Reel, Clip, and Program information you want associated with the scanned media.

The Timestamp Prefix checkbox in the Capture info controls is selected by default and will save your clips to independent sub-folders within the destination folder, together with a timecode prefix in the file name. If you want to save all your clips together in one master destination folder, simply deselect the checkbox.

Check the Frame Rate

There's an FPS field in the Capture Info that identifies the frame rate of the scanned clips. Make sure this frame rate is set correctly to ensure that the header data of your film scans is correct.

Adjusting the Color of the Scanner

The Cintel panel gives you control over the exposure and color temperature of the light used to illuminate the film for scanning via the Master Offset and RGB Offset controls, in order to maximize the amount of information you're extracting from each frame, while preventing any part of the image from being irretrievably clipped. While it's true that CRI is a raw image format, there's no latitude beyond the internal data range used by DaVinci Resolve; be mindful that if you're clipping data in the built-in video scopes while scanning, it might be clipped permanently in the scanned media.

How often you'll adjust the color and exposure of scanned shots depends on how much variety there is in the scenes on a particular film roll. For example, some rolls may have many takes of the same scene, all of which have the same lighting and which can share the same adjustments. Meanwhile, other rolls may have a variety of different scenes with widely different lighting in each one, necessitating you to make individual adjustments for each scanned clip to maximize data quality.

This is important because the Master Offset and RGB Offset settings cannot be automatically changed between scanned clips in a log and capture workflow. This means that the current Light Source settings will be used for all clips you scan until you manually change those settings again, even for clips that you've logged from different parts of a film roll. This means that the log and capture style of working is only advisable in situations where it makes sense to log multiple clips that share the same Master Offset and RGB Offset adjustments.

Otherwise, it's recommended you make lighting adjustments on a clip by clip basis, as you scan each clip, in situations where you need maximum image quality for finishing. Keep in mind that the goal for these adjustments is to maximize image data from the scan, not to create the final look of the clips, which you'll accomplish later in the grading phase of work using the controls of the Color page.

To adjust the Light Source settings, find a typical image for the section of roll or for the first series of shots you're going to scan, and adjust the light source while viewing the built-in Video Scopes.

Adjust Master Offset to set the intensity of the light source used to illuminate the film, raising or lowering the level of the R, G, and B channels all at once. For typical camera negative, this lets you adjust the black point of the film image (the darkest part of the image, which in fact corresponds to the highlights of the film image) to sit just above the typical Dmin value of 95, as measured on the Histogram of the video scopes, which guarantees that the highlights won't be clipped by the Cineon LOG conversion that Resolve uses to debayer the CRI image for grading. For positive film, simply adjust Master offset so that no part of the highlights or shadows of the signal is being clipped.

TIP: You can turn on Show Reference Levels in the Waveform, RGB Parade, or Histogram scopes, and set the Low value to indicate the digital Dmin value of 95.

Once that's accomplished, adjust the RGB Offset controls to rebalance all three color channels by varying amounts to alter the color temperature of the light source used to illuminate the film, to produce the most useful (typically neutral) color balance in the scanned result.

Scanning One or More Sections of Film

After you've adjusted the Light Source, it's a good idea to stay organized as you scan each clip by entering all relevant metadata into the Metadata Editor as you go. The Capture group of metadata fields contains information for defining the File Name Prefix, Roll, Reel Number, Clip Number, Program Name, Flags, and whether a particular take is good. If you populate these fields before scanning a clip, that metadata will be written into the clip.

With all of this accomplished, you can scan clips from film in one of three ways:

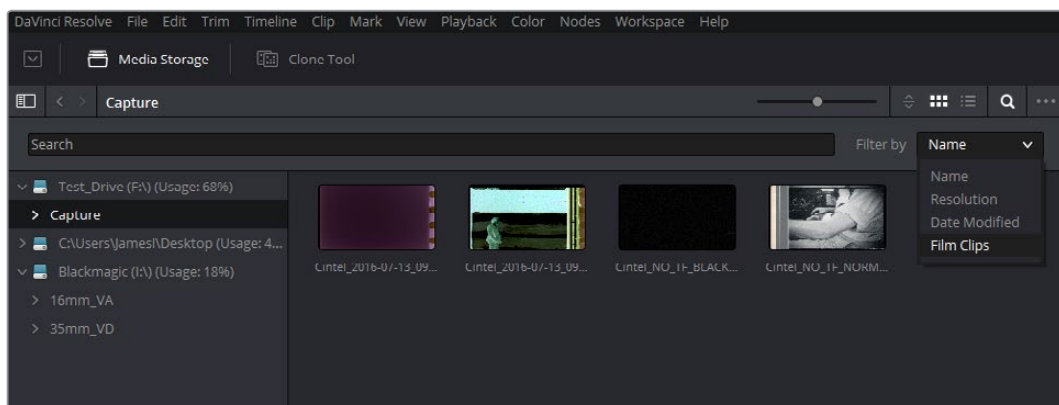
- **Capture Now:** Clicking Capture Now begins scanning near the current frame, ending whenever you click Stop Capture. Using Capture now, you can capture long sections of a roll all at once.
- **Capture Clip:** A more controlled means of scanning specific sections of film. After you've used the Transport controls and the In and Out button to define a section of film, clicking Capture Clip scans that one clip and then stops.
- **Batch Clips:** A way you can log multiple clips in advance of scanning them all at once using the current Light Source settings in the Cintel panel. Log each clip in advance by setting In and Out points for each section of film you want to scan, and click the Log Clip button to save that frame range as an unscanned clip in the Media Pool. When you click Batch Clips, all unscanned clips will be scanned one after the other until the job is complete. You can also select one or more unscanned clips, and only the selected clips will be scanned. Furthermore, you can import an EDL that corresponds to a particular film roll, and use the resulting logged clips for scanning.

For more information on Batch Capture workflows, see Chapter 11, "Ingesting From Tape."

Extracting Audio

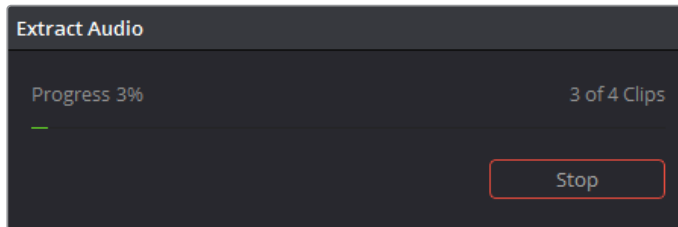
If the film you're scanning also contains an optical sound track, you can extract the audio in a separate step. There is a standard image frame to audio frame offset of 26 frames for 16mm and 21 frames for 35mm that DaVinci Resolve automatically aligns when extracting the audio. Select all of the clips that have an optical sound track, then right-click one of the selected clips and choose Extract Audio. DaVinci Resolve analyzes the overlapping optical track area of each frame and automatically generates a matching audio track, synchronized with the scanned image sequence. Each clip's audio will be automatically extracted, embedded in the clip, and saved to the same directory the scanned frames have been written to.

Each clip's audio will be automatically extracted, embedded in the clip, and saved to the same directory the scanned frames have been written to. A small audio icon will appear on the corner of your clip's thumbnail so you know there is a corresponding audio file.



You can filter the contents in the media storage to make it easier to manage them

To make extraction easier, you can filter the clips in the media storage by name, resolution, date modified, or by film clips only. Filtering your clips makes it easier for you to find and select exactly what you need. You can also make a large selection and extract audio from multiple clips at once by right-clicking on your selection and choosing Extract Audio... from the drop-down menu.

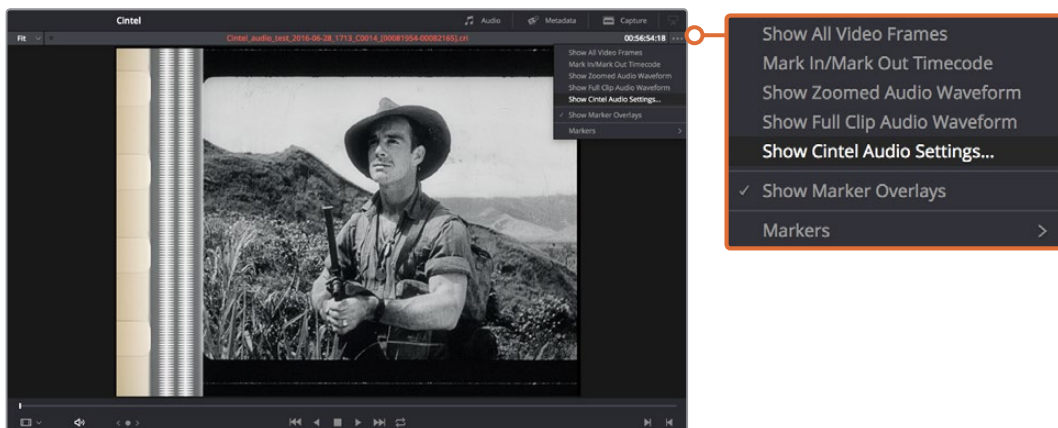


During audio extraction, an information box will appear to indicate the progress. You can stop the extraction at any time by clicking on the Stop button

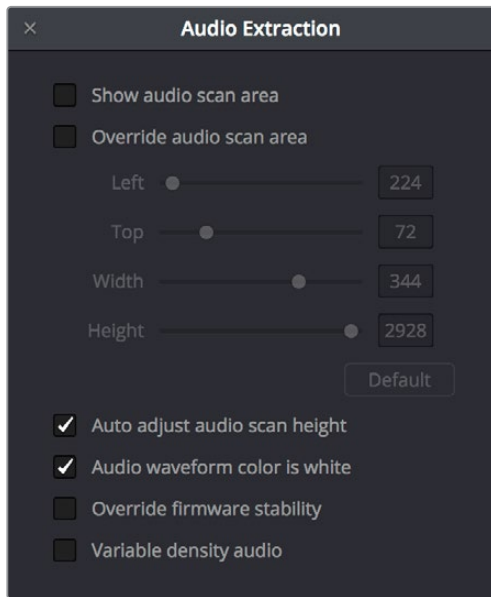
NOTE: If the Timestamp Prefix checkbox was deselected in the Capture Info section when your clips were scanned, and you want to have extracted audio automatically embedded in your clips, always remember to extract audio from the clips inside the Media Pool.

Audio Extraction Settings

Normally, once you have selected the film type, the automatic features in DaVinci Resolve will extract your optical audio perfectly. However, the condition of the optical track can vary with the condition of the film being loaded and in some instances this can confuse the automation. If this happens, you can bypass the automatic features and make adjustments manually.



For manual adjustments, open the 'Audio Extraction' settings window by clicking Show Cintel Audio Settings in the Inspector options near the top right of the Viewer



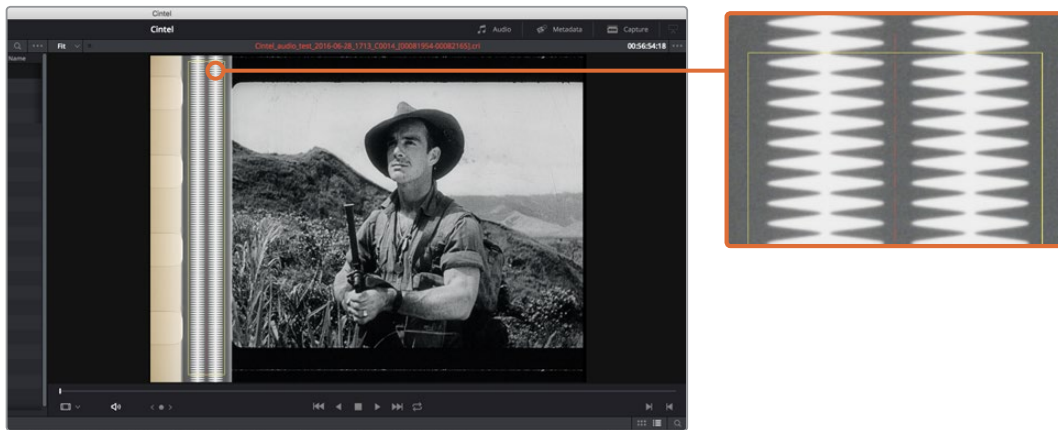
The Audio Extraction settings let you make manual adjustments if needed.

Audio extraction settings let you make the following manual adjustments:

- **Show audio scan area:** This checkbox turns the audio scan area guides on or off. The guides are displayed as a box on the side of the frame covering the optical audio scan area and show what optical information will be used during extraction. The position of the guides will conform to the film type you have selected; however, you can change the position manually if you need to. The audio scan area guides are also great indicators to show you what is happening during the extraction process so you can identify any potential troubles and make manual adjustments.

Inside the box is a thin red line. This line is the mid point detector, which detects the separation between stereo audio channels. When mono sound is detected during audio extraction, the mid point detector disappears and the guides will adjust automatically to suit the width of the mono optical track.

TIP: If you need a closer inspection of the audio scan area guides, you can zoom into the Viewer and move the Viewer position up or down, and left or right. Simply choose the amount of zoom from the sizing options at the top left corner of the Viewer, then click and drag the Viewer with your mouse or track pad.



When Show Audio Scan Area is turned on, the audio area guides will be visible so you can see exactly what information is being used and monitor the extraction process

- **Override audio scan area:** This setting provides sliders for adjusting the horizontal and vertical positioning, width, and height of the audio scan area guides. These settings include:
 - **Left and Width:** If your film type is such that audio appears on the right side of the frame, you can simply adjust the Left slider to move the guide box to the right. Normally, this will happen automatically if you have the corresponding film type selected, but the setting gives you more flexibility for adjustments if you need it. Similarly, the Width setting is used to adjust the width of the scan area.

These are helpful tools for making subtle adjustments to the side edges of the guide box if there are unwanted elements inside the film's optical audio area. This can happen due to perforation wear and tear, or varying print qualities, and can sometimes interfere with the quality of the audio extraction. You can help avoid this by making a subtle movement to the side edges to keep the stray elements outside of the guide box.

- **Top:** Adjusts the vertical position of the guide box.
- **Height:** Sometimes film frames on older rolls of film may be slightly smaller than normal due to shrinkage over time. When making manual adjustments to the guide box, you can make adjustments for film shrinkage using the Height slider.
- **Auto adjust audio scan height:** This setting is on by default and automatically adjusts the guide box height to align with the audio waveform at the top of each frame. The automatic feature works well for normal audio conditions; however, if during extraction you notice the box moving randomly and the quality of the extraction is affected, it may be due to similar features in the audio track overlapping between frames. If this occurs, deselect the checkbox and try the extraction again.

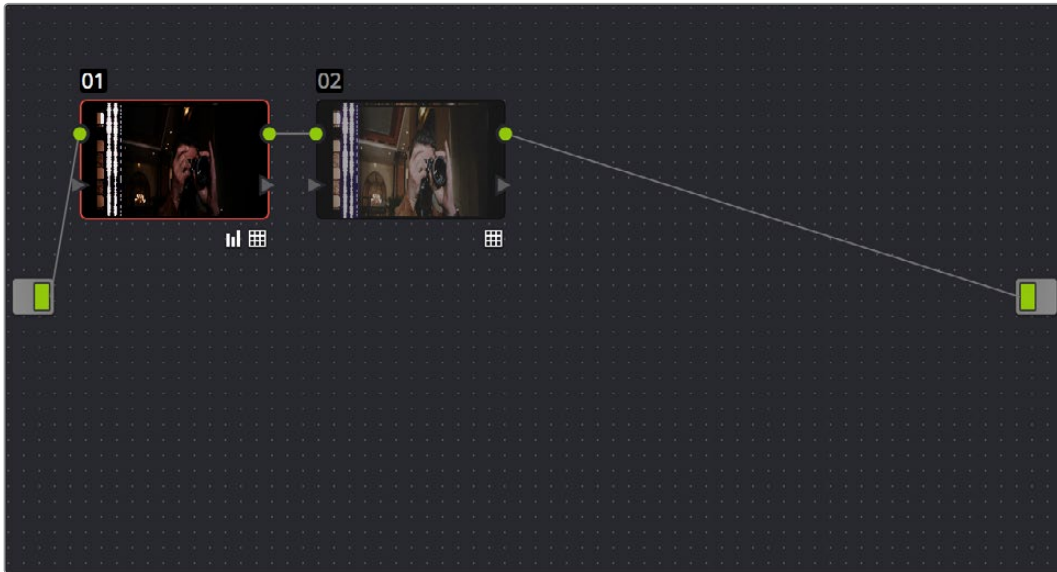
TIP: If deselecting the Auto Adjust Audio Scan Height checkbox, make sure the Height setting places the guide box at the optimal position for the frame. Making manual adjustments can help if you need them, but don't forget to turn the automatic features back on afterwards.

- **Audio waveform color is white:** Depending on the scanned film type, the audio waveform may be black or white. If the waveform is white, make sure the corresponding checkbox is enabled. This will ensure the white information in the waveform is used during audio extraction. If the waveform is black and the surrounding audio area is white, disable the checkbox so DaVinci Resolve knows to use the black information in the waveform. Other automatic features, such as mid point and mono detection, also rely on this setting being set correctly.
- **Override firmware stability:** In rare instances, the condition of the film may have created large movements in the frame due to the internal firmware stabilization. This can cause the audio extraction guide box to misalign with the optical track. If this occurs, enabling “Override Firmware Stability” lets the audio extraction guide box to track the film perforations independently and adjust its positioning for potentially better results.
- **Variable density audio:** If your film contains variable density audio, make sure you select the Variable Density Audio checkbox so DaVinci Resolve knows the type of audio to extract. The default state is set to Off for variable area audio soundtracks.

TIP: If you haven’t used variable density audio before, you can visually identify it as a tight sequence of shaded lines, similar to a bar code with the lines squeezed closer together. By comparison, Variable Area soundtracks appear as an audio waveform.

Grading and Sizing Scanned Media

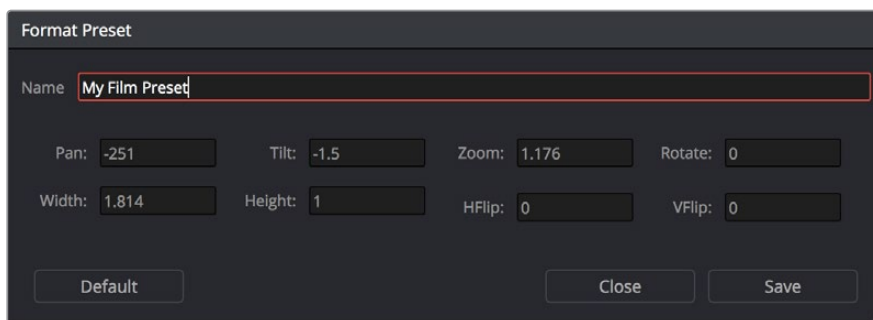
A pair of 1D LUTs, “Cintel Negative to Linear,” and “Cintel Print to Linear,” have been provided to help you convert scanned media to a color space in which you can do further work. You can apply these LUTs via a node in the Color page to convert the original scans to a Linear color space. However, if you want to convert the image to Rec. 709 or to Cineon for further adjustment, you’ll want to apply a second LUT in a second node. In general for Negative film, it’s best to ‘color invert’ after the second LUT is applied. Furthermore, normally some grading is required on the Linear data to remove black offsets (due to Dmin) for proper conversion into the destination color space. There are a variety of VFX IO LUTs available in the 3D LUT submenu of each node’s contextual menu that let you convert an image from Linear color space to any other color space you want to work within. For more information, see the section on “Applying a LUT Within a Node” in Chapter 30, “Working in the Node Editor.”



Using three nodes to convert a film scan using LUTs, node 1 converts from Negative or Print to Linear, node 2 converts from Linear to Rec. 709, and node 3, if required, inverts the color

NOTE: Applying a LUT within a node will clip any image data falling below 0 and above 1. To correct for this, you can use the Lift/Gamma/Gain controls within any node with a LUT applied to adjust your image levels prior to the transform applied by the LUT within that node.

Depending on the format you're scanning and the way the material was shot, you may need to also resize the resulting scans, resizing, zooming, stretching, panning, and tilting to create the final framing you require. You can use the Input Sizing mode of the Sizing palette in the Color page to create the necessary framing, and save a sizing preset (by clicking the Create button and entering a name in the resulting dialog). Once you've created an appropriate sizing preset for a given type of media, you can apply that preset to multiple film scans all at once, in either the Color page or in the Media Pool using the Change Input Sizing Preset command, found in the contextual menu of selected clips. For more information on sizing in DaVinci Resolve, see the "Transforms and the Sizing Palette" section of Chapter 29, "Color Page Effects."



Creating a sizing preset in the Sizing palette of the Color page