Nucoda

Colour Grading and Finishing

Features & Benefits
Version 2015.2 R1

Doc Rev 5

DigitalVision
www.digitalvision.tv

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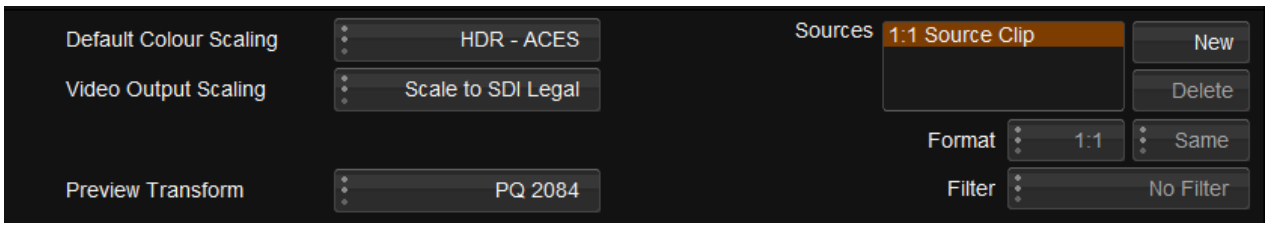
New project settings

New clip settings

The tick box has been replaced with a **Video Output Scaling** menu :
A new value - **Scale to SDI Legal** has been added, selecting this option is the equivalent of not ticking the old box. Additionally, it is useful when working in ST2084/12 bit output.

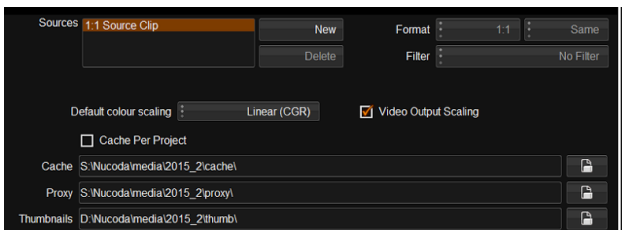
The ST2084 option (PQ Transform) becomes available when the project is set to Half and the colour scaling is set to HDR - ACES

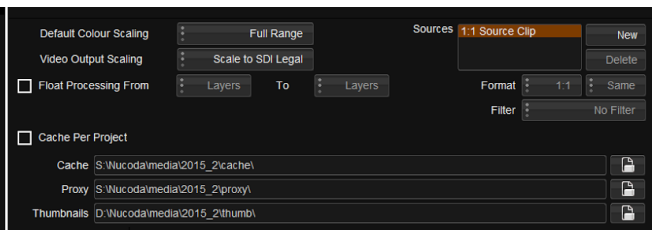


Default colour scaling - name changes

In the application Projects page the names of several items have been changed to better reflect the environment that we work in today. The changes are as shown below:

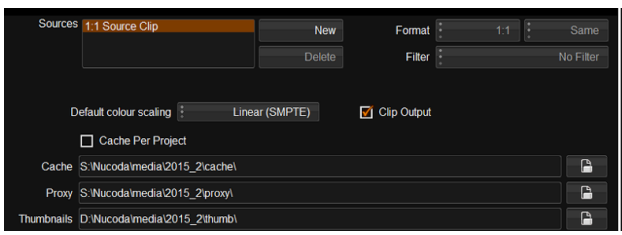
Linear CGR becomes **Full Range** - *Video Output Scaling* tick box is replaced by :
Scale to SDI Legal (*Default setting*) **or Clip to SDI**

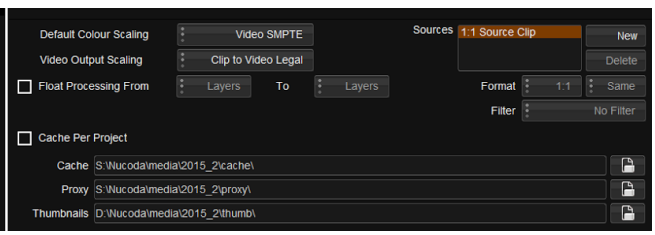




Linear SMPTE becomes **Video SMPTE** - *Clip Output* tick box is replaced by :
Clip to Video Legal (*Default setting*)

Film Log becomes **Cineon Log**





Video Output

Monitoring / Video output preferences

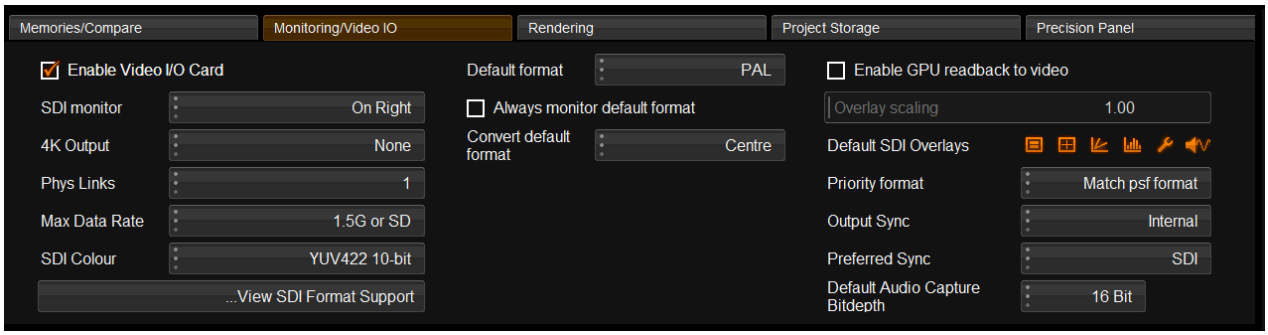
The video card preferences have been changed to better reflect what is actually happening with the hardware. With the previous arrangement selection of certain formats was not possible for the AJA card - this has been remedied with this feature.

In the Video IO/Monitoring preferences page, VTR Layoff UI and VTR Capture UI, the IO Mode option has been replaced with the following options:

- **Phys Links** - The number of physical links (i.e. cables) connecting outputs or inputs (as relevant to use case) of the video I/O card to the remote SDI device. The user must set this to reflect the connections they have made to a monitor or VTR.

- **Max Data Rate** - The maximum data rate that the remote SDI device can receive or will send and, if 3G, which levels of 3G are supported. The user must set this to reflect the capabilities of the remote device when performing video output or the output expected from the remote device when performing video input.

- **SDI Colour** - The colour encoding that the user would like sent over SDI. While the application will deliver this colour encoding whenever possible, it cannot be guaranteed to be delivered in all cases and the application may choose to fall back to a colour encoding compatible with the other parameters and the video format in use.



When monitoring a stereo project, the application will deliver stereo video whenever possible. However, it cannot be guaranteed to be delivered in all cases and the application may choose to fall back to mono. (This was always the case but now the user will be informed.)

If one but not both of the user's desired colour encoding and stereo can be achieved, the colour encoding will be preferred and output will fall back to non stereo format.

Signal Status

The application informs the user of the actual SDI configuration in use.

For VTR Layoff and Capture, this is displayed in the relevant UI. For monitoring, it is displayed in the main project editor display. Coloured text is used to indicate general status.

- Red indicates that the required video format is not supported at all with the current number of physical links and maximum data rate. You will likely not have an image on your screen.
- Yellow indicates that the required video format is supported but with a fall-back colour encoding or, for stereo monitoring only, fall-back to non stereo output.
- White indicates that the video format is supported exactly as the user desires.

The Video IO/Monitoring preferences page has a new button "**...View SDI Format Support**".

Clicking this opens a dialog that displays, for the current Phys Links, Max Data Rate and SDI Colour settings and each video format available:

- Whether the format is supported at all and, if not, why.
- What kind of SDI link will be used for this format.
- What colour encoding will be used for this format and, if it is not the one desired by the user, why.
- Whether stereo will be available for this format and, if not, why.

SDI Support for Video Formats with Current Configuration

Format	Format Supported	SDI Link Type	Colour Encoding	Stereo Supported
HD 1080i 50	Yes	1.5G	YUV422 10-bit	No (Stereo needs 2 physical links)
HD 1080psf 25	Yes	1.5G	YUV422 10-bit	No (Stereo needs 2 physical links)
HD 1080i 59.94	Yes	1.5G	YUV422 10-bit	No (Stereo needs 2 physical links)
HD 1080psf 29.97	Yes	1.5G	YUV422 10-bit	No (Stereo needs 2 physical links)
HD 1080i 60	Yes	1.5G	YUV422 10-bit	No (Stereo needs 2 physical links)
HD 1080psf 30	Yes	1.5G	YUV422 10-bit	No (Stereo needs 2 physical links)
HD 720p 50	Yes	1.5G	YUV422 10-bit	No (Stereo needs 2 physical links)
SD 525 59.94	Yes	SD	YUV422 10-bit	No (Stereo needs 2 physical links)
SD 625 50	Yes	SD	YUV422 10-bit	No (Stereo needs 2 physical links)

Close

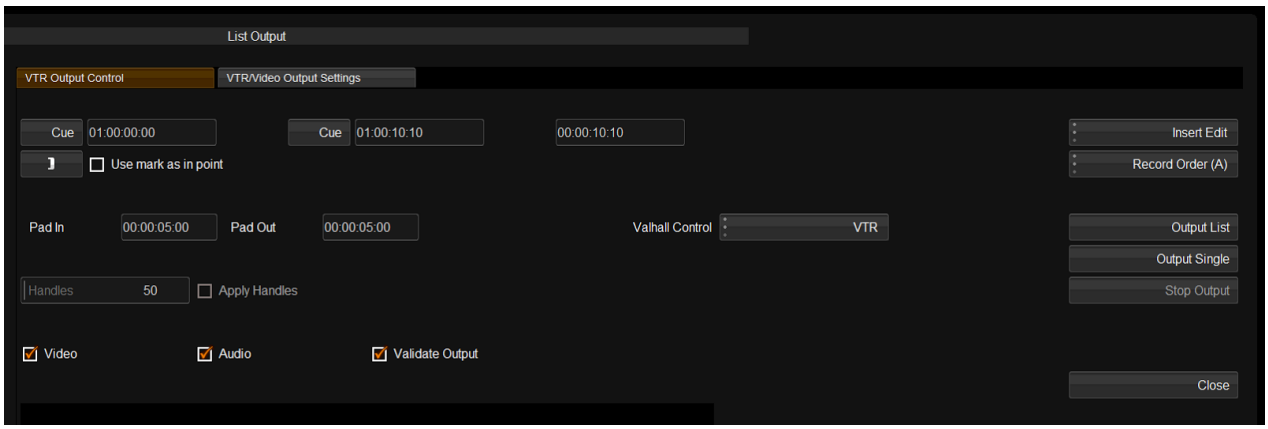
This should help gauge what SDI output to expect for their settings and to experiment with settings.

RGB444 12-bit colour can now be sent via 3G SDI; it's no longer limited to dual-link 1.5G. This enables it in stereo and quad-SDI scenarios as well as non stereo over a single cable.

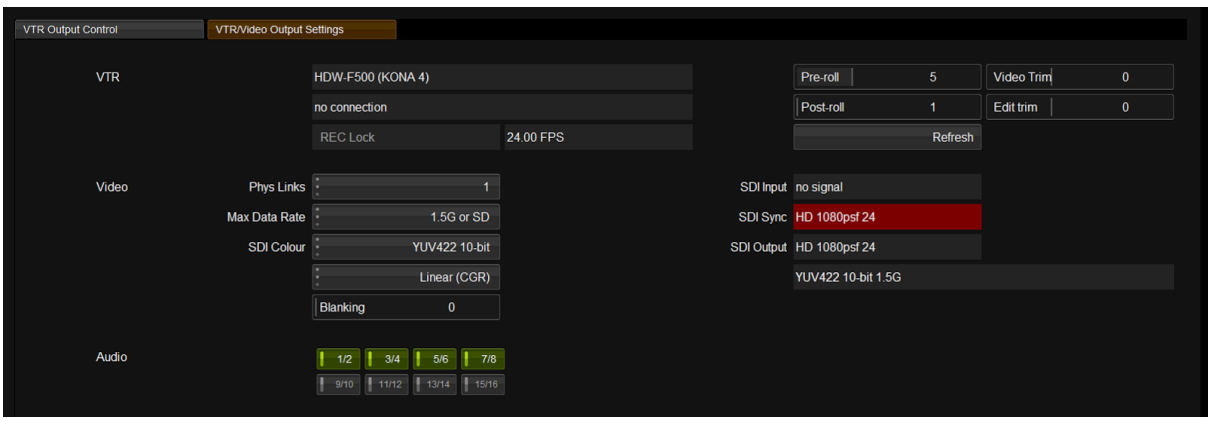
A new option to allow downscale of 4K HDMI output to HD has been enabled for the Kona 4.

VTR Layoff UI Improvements

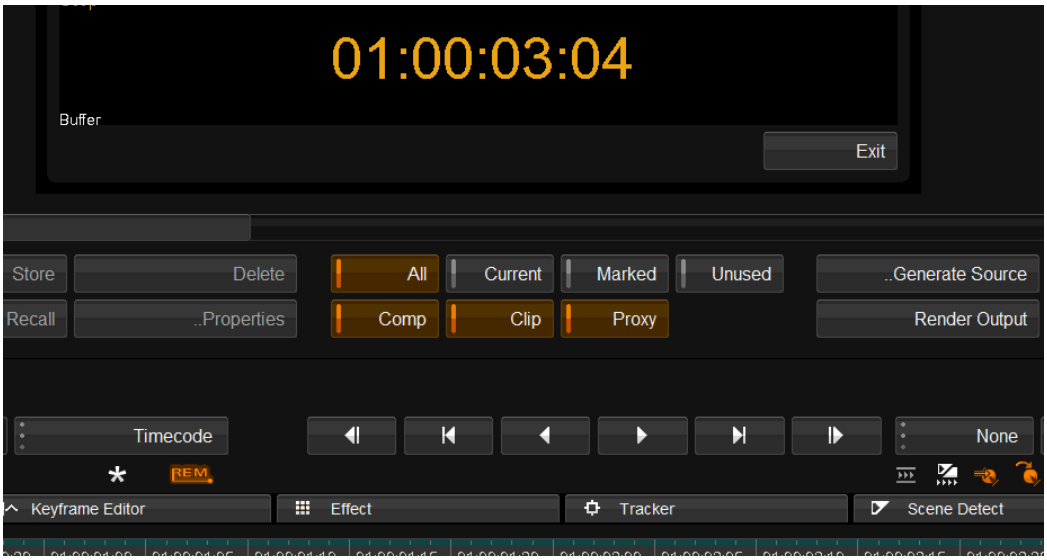
Layoff has now been implemented for AJA cards, in addition the following small features have been added:



- When performing a Crash record or Assemble Edit Layoff you should not have the option to disable audio, audio tracks should be forced to be on and the user notified that audio tracks will be enabled during layoff if currently switched off in the layoff window.
- Cue time edit field to perform cue-up when the user hits return
- Add "Cue In" and "Cue Out" buttons next to the In and OUT timecode boxes in the tape lay-off menu.
- Because of the delay between the VTR output and the playback window in the GUI (due to the playback buffer) users see the VTR version and the GUI version out of sync when laying back. Now the the user can choose whether the window is enabled or not.



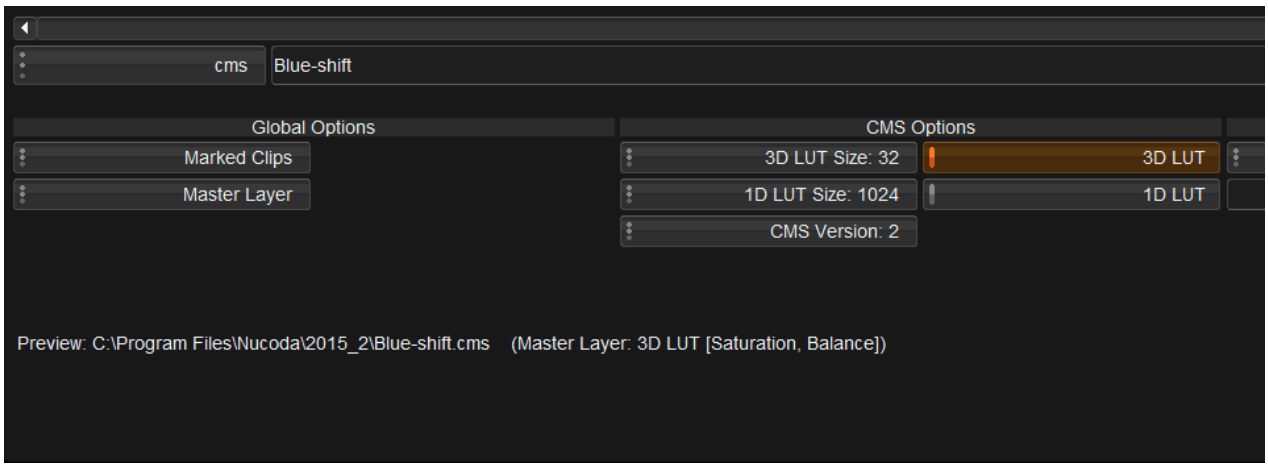
The REM timeline function that allows the application to be controlled by another device using the RS422 Port (Remote Emulation), has been updated to allow use with the AJA video cards (Kona 3G and Kona 4). It has been considerably improved.



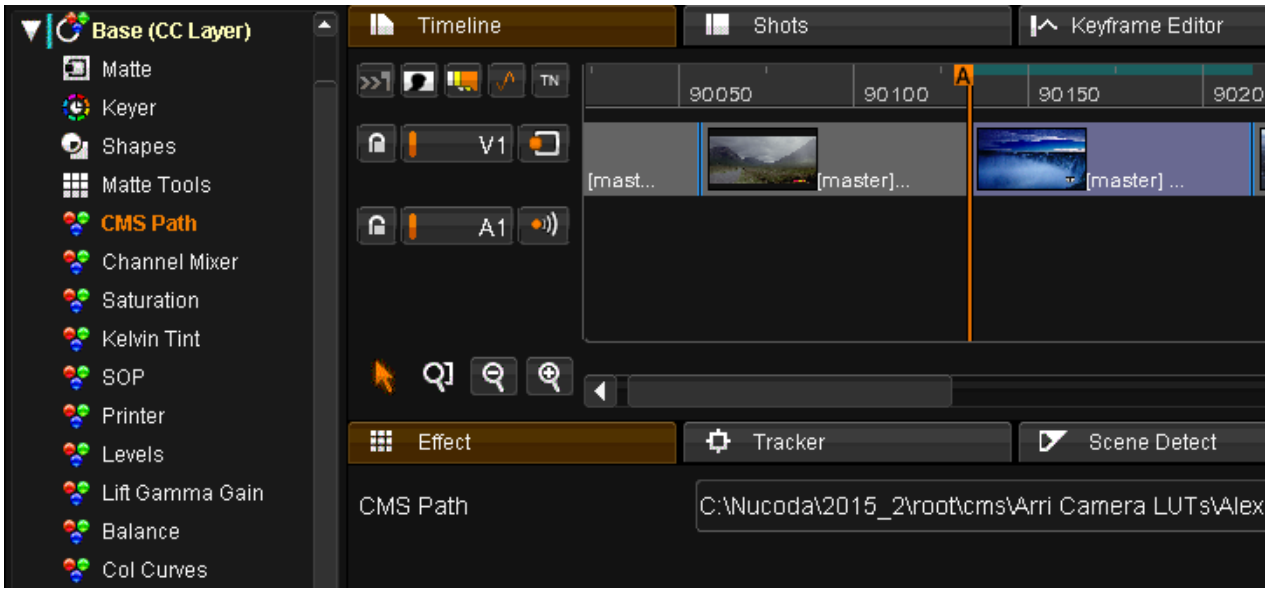
Please note, you will need a reverse RS422 connection - please contact support@digitalvision.se for information.

LUT and CDL export - The LUT export functionality has been improved.

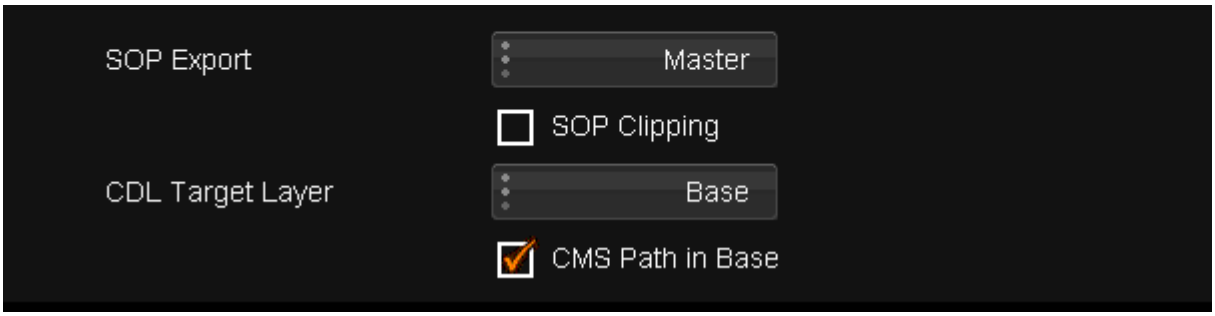
- Export LUT now can be a 1D or 3D LUT or a combination
- Now includes saturation values
- GUI updated to show clearly what is included in the LUT
- Support added to allow the export of a 33x33x33 .cube LUT, compatible with Resolve.



If a LUT has been imported into the Base Layer via an EDL this will also be included in the LUT export.

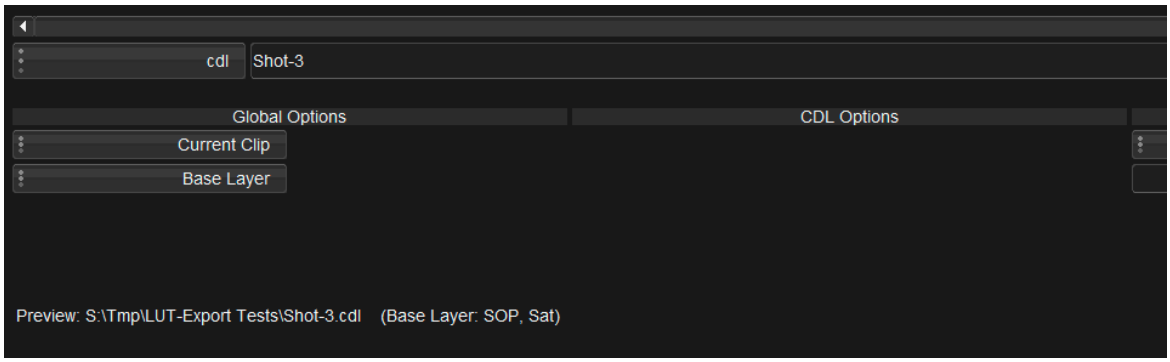


A new option has been added in Preferences to allow the addition of a CMS Path effect in the Base Layer.



CDL Export

In addition to the LUT export new functionality to allow CDL export has also been added. The exported file is a .cdl file, it is an XML files based on ASC CDL v1.01



FCP / Premiere - XML Import support for Nucoda and Phoenix

Features:

- Import of FCP version 5 XML Compositions in to Phoenix and Nucoda.
- Only single compositions are supported
- Support for Adobe Premiere FCP Compatible XML (PP 6.5 and higher)
- Support for conform from the user defined directories - automatic recursive search.
- Support for not linking on import but allowing the user to conform later
- Support for linear re-times and reverse effects
- Support for certain FCP/Premiere effects
- Support for bookmarks / markers
- Support for grade merging
- Ability to bypass effects if required
- Add a retime track containing full length versions of all clips in the sequence that have a retime effect applied. (Beta)
- Support for Audio (Beta) - please see Known Issues
- Choice of where to apply P&S - User FX or Master Layer

Requirements for compatible a XML

- XML's from FCP version 7 - Must be saved as version 5
- XML must not contain multiple sequences or bins
- For Premiere Pro - saved as FCP Compatible XML
- XML must contain a sequence

Known issues with XML import

- It is possible that retimes will not be accurate depending on retime values, this is being corrected. For now, users can use the pin value n the Retime effect to adjust the media

- Certain audio effects can cause an XML not to import, in this case, please turn off the import audio function on import.

- Although we have tried to cover most scenarios for XML support, it is possible that there could be issues with certain XML's. Please forward these to support@digitalvision.se

New Preferences

In the general.prefs there is now an additional preference for adding XML Media directories, similar to AVID.

```
XmlImport
  {
    MediaPath1 "E:\Videos\New Material\XML Testing"
    MediaPath2 ""
    MediaPath3 ""
  }
```

Users can use these to add particular paths to Nucoda or Phoenix for conforming. We will search all directories from this destination.

By default the option for conforming to files is selected. We will check the designated directories for file with names matching those in the XML. A timeline is constructed and files are conformed to the clips.

Conformed files appear in the library.

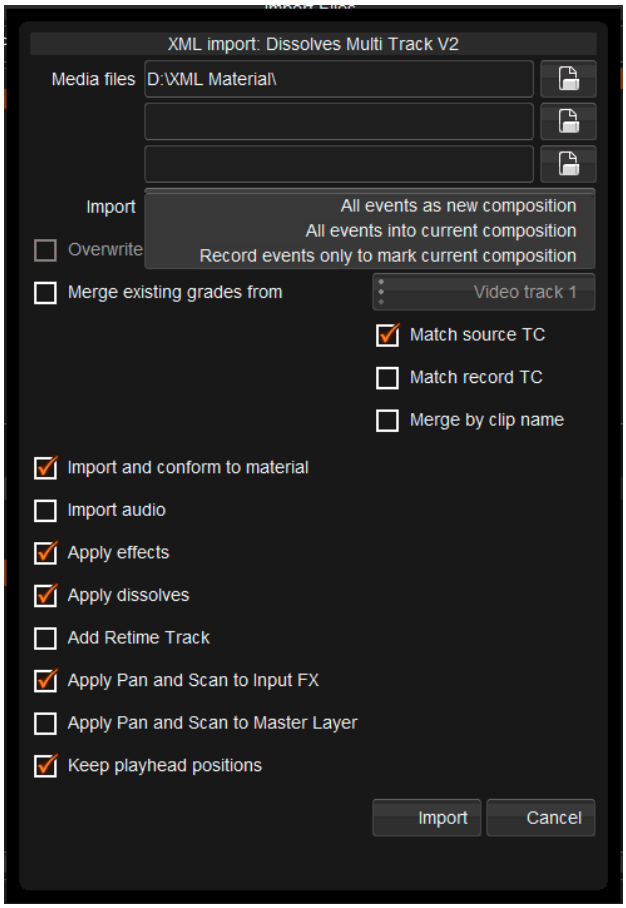
If the user chooses not to conform to material, reel names are retained and the user can conform the timeline at a later stage from the Conform menu

XmlConformId *setting*

Available settings
path - use the <name> value in the <file id> default
name - use the <name> value in the *<clip id>*

New Import dialog Import options:

Accessed via the “import” button on the GUI, browse to your XML and select it, pressing import will show the dialog box.



- Media Directories: User can browse or use predefined directories (up to three)

- Import:
    - All events into new composition - will create a new composition from the XML
    - All events into current composition: - will add composition to current composition on new tracks (you can import multiple compositions at once.
    - Record events only to mark current composition - apply cuts to material currently on the timeline

Merge existing grades

- Merge existing grades from:
  - Video Track (will merge grades based on tracks MidDown (will merge grades in a top down fashion, based on visible clips
  - Match source TC - Use Source TC as guide
  - Match Record TC - Use Rec TC as guide - useful for Stereo projects merging left and right eye grades
  - Merge by clip name

Selections:

- Import and Conform to material: If found, material will be set as found and linked to the clips on the timeline. You can always do additional conforming later in the conform window.
- Import Audio : Audio tracks will be imported - audio effect not currently supported
- Apply effects: Supported effects are applied to media (this includes retimes
- Apply dissolves: Will apply dissolves (even when other effects are ignored)
- Add retime track: Will add an extra track to the composition with full length versions of all retimed clips - these can be selected and moved to the end of the timeline, this allows the user to have the normal retimes and grade them, but to apply the grades to the original source media as well

- Apply P & S to input FX Transform will be applied to Input FX Layer
- Apply P & S to master layer: Transform will applied to P&S in master layer
- Keep playhead position: Will not reset playhead positions

Supported effects:

Effects not supported by Nucoda / Phoenix will be ignored on import.
The following effects are supported from FCP:

Basic motion effects:

- Scaling and rotation - including keyframes
- Opacity - including keyframes
- Crops (this is the equivalent to Blanking on Nucoda)
- Retimes (variable speed and freeze frames not supported)

Effects:

- Flip : Vertical and Horizontal
- Rotate: 90 Deg Clockwise and Counterclockwise - 180 Deg
- Transitions: Cross Dissolves, Fade to and Fade from black, Dip to black
    - Other dissolves will be treated as cross dissolves

Clip and Chapter markers:

- Clip markers are translated to segment bookmarks
- Chapter markers are translated to timeline bookmarks
- Most colours will be retained
- Comments will be translated

Going back to FCP or Premiere Pro from Nucoda / Phoenix

We do not export an XML from Nucoda at this point to facilitate a round trip to FCP or Premiere. However, to get material back to FCP or Premiere, export the clips as Quicktime Movies, with the export options set to Source TC all Tracks and make sure to keep the names of the original material. You can add variables on export to automatically place the clips in directories based on event numbers if there are potential clashes.

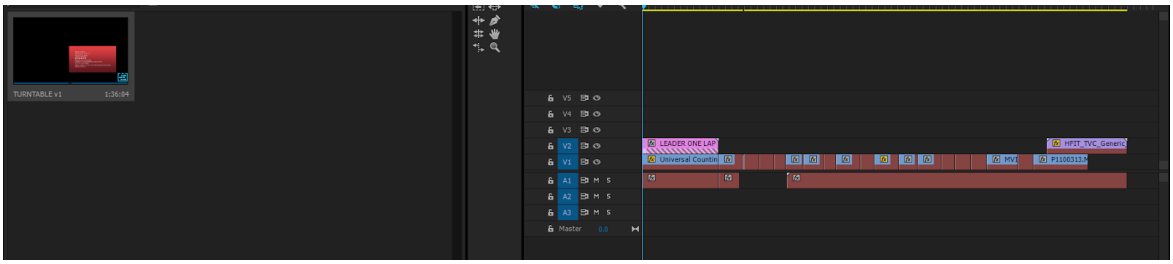
Notes on Adobe Premiere FCP compatible XML's

Not all effects are compatible between FCP and Adobe Premiere:
Premiere effects that have no FCP equivalent is ignored
There is no FCP equivalent of Flip
There is no equivalent to segment markers in Premiere

Notes on XML import and compatibility

If a sequence does not import, please check the console for errors that may help,the error “No Sequence Found” usually means that the are no sequences found, often the XML contains the entire project.load the XMl into FCP or PP and make sure that only the relevant sequence is selected and export again.

Below is an example of a single selected sequence in Premiere Pro

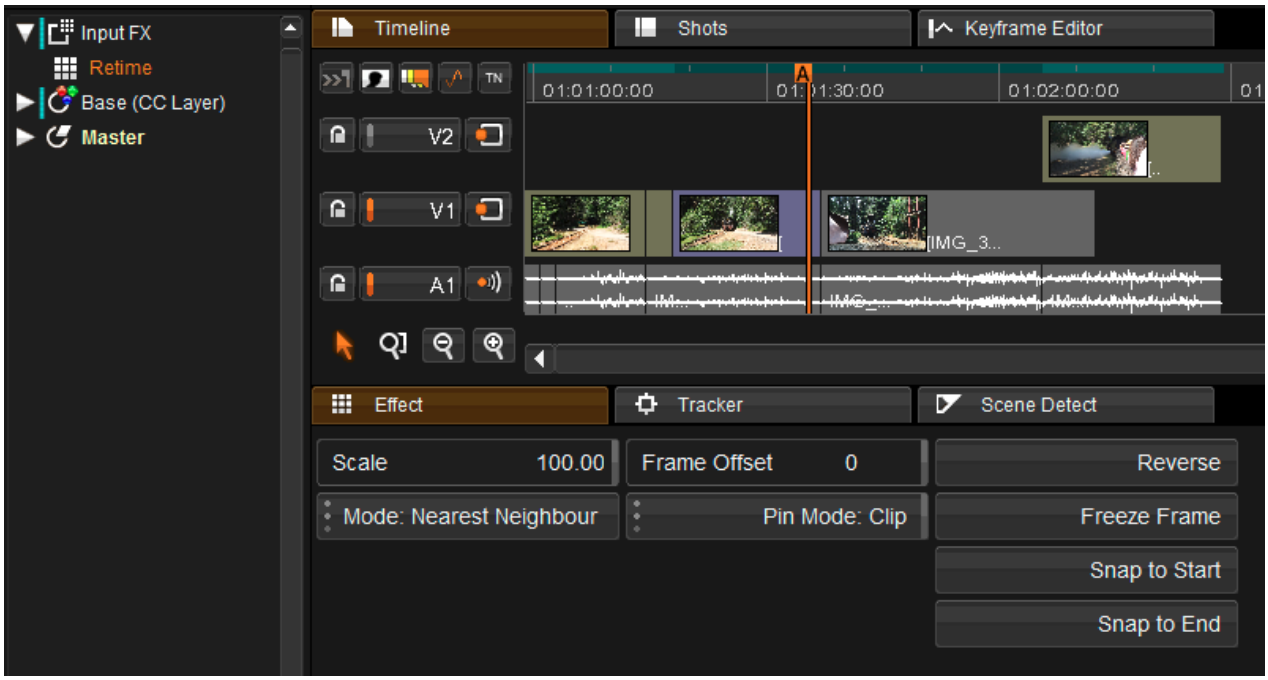


Malformed XML files will also report in the console
Very complex audio timelines or audio with a lot of effects may not load properly..
Mixed framerate XML is not supported
XML with multiple sequences are not supported

Tools

Retime tool improved

The retime tool has been updated to improve our support for retimes from EDL's, AAF's and XML's. This will also make it easier to use and understand.



New Freeze Frame, Snap to Start, and Snap to End options have been added to the tool for performing simple tasks.

Reverse retime easier to achieve by making a scale of -100% and pin of 0 reverse the clip such that [start, end] become [end, start]. Further changes in negative scale maintain the original start of the clip at the end of the clip, scaling the frames from the end backwards. The pin offset for forwards and reverse retimes directly controls the output frame at any position in the clip. An offset of +2 will change all output frames by +2, from what they were with the offset at 0.

Freeze frame: setting scale to 0 freezes the first frame in the clip, then change the pin will select which frame you want to freeze.

Display and enforce accurate trim handles taking into account retime (including reverse retimes) when in trim mode

Maintain integrity of retime (including reverse retimes) when

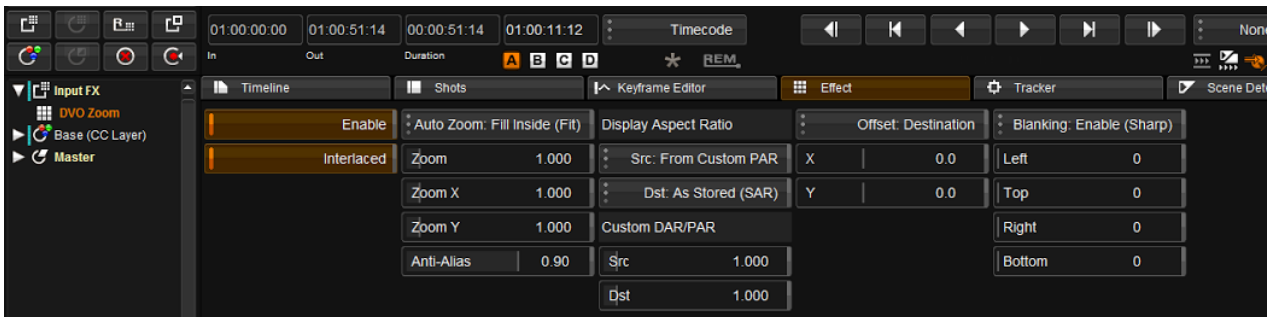
(i) cutting clip

(ii) trimming clip at either end

(iii) applying a transition or dynamic to either end

(iv) when exporting clips with handles and retimes

DVO Zoom

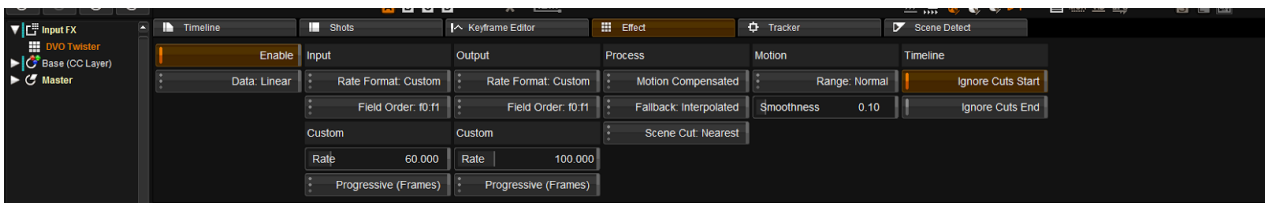


A new DVO Zoom tool has been added to the DVO Convert Tools. It uses an advanced new algorithm for scaling images (compared to DVO Upscale) and is similar to the new Thor Zoom tool.

It is designed to allow for up and down scaling of images and supports resolutions larger than 2K. It also works in Half Float.

DVO Twister (Updated)

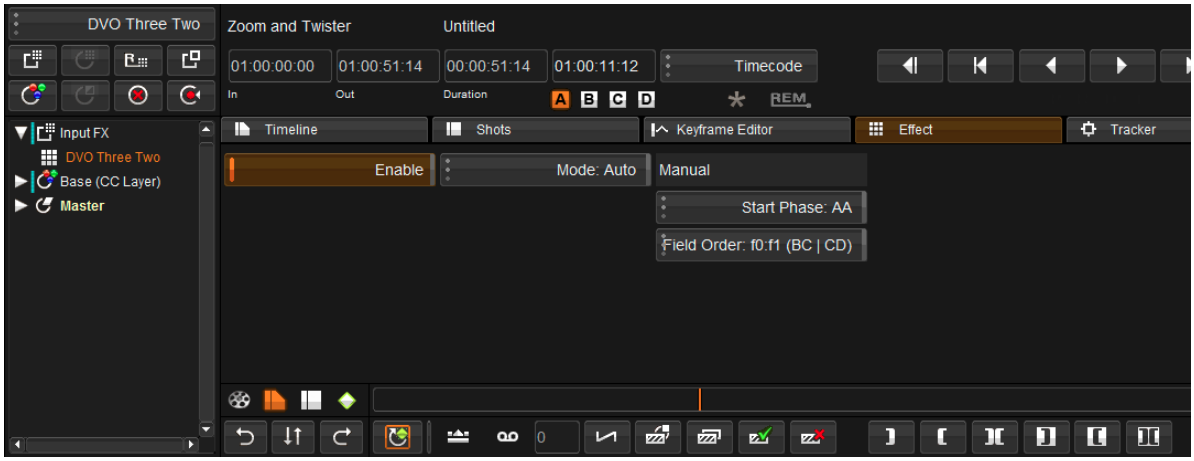
Work has been done to allow users to make cuts in clips with Twister applied, without the frame at the start of the cut being changed or updated. To use this function, add the cut, and then press the “Ignore Cuts Start” button

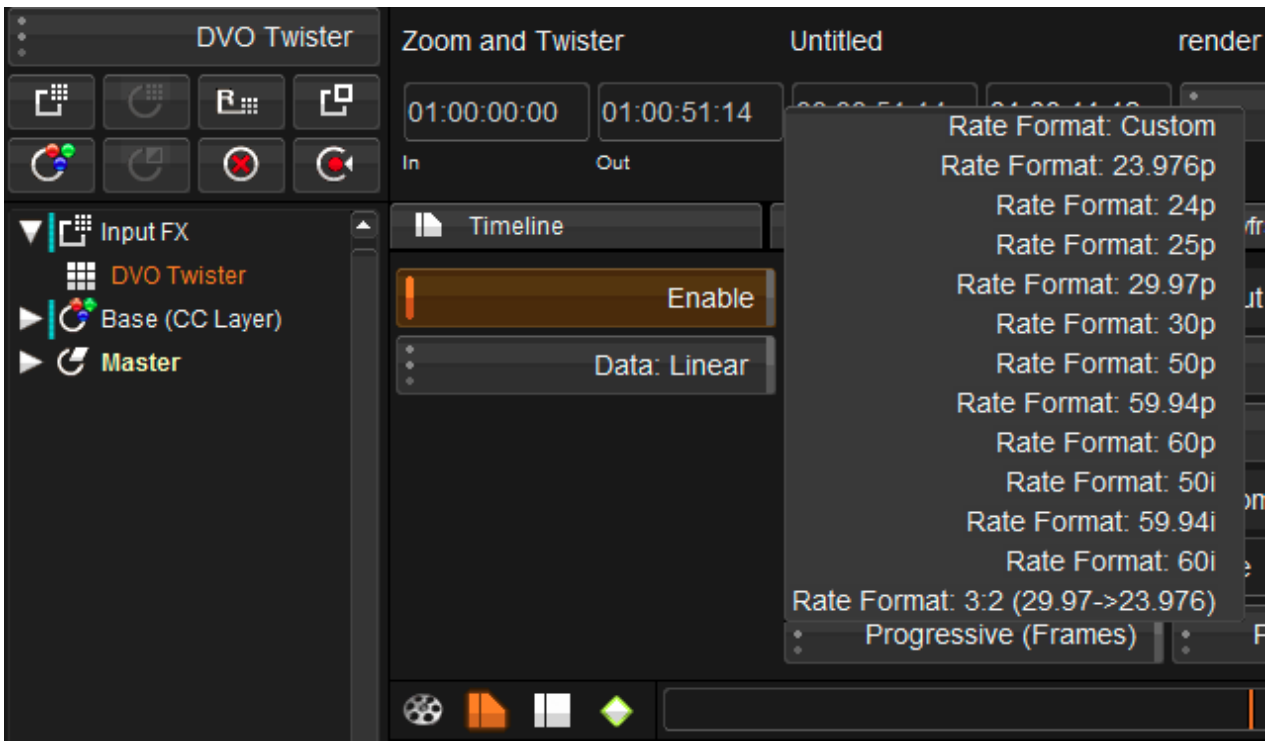


DVO Three Two

The DVO Three Two pulldown is designed for automated removal of cadence/broken cadence from images. It is available as standalone tool, or as part of Twister when converting from 29.97.

Set the input to : 3:2 (29.97 -> 23.98) and ensure you are on a 23.98 composition.





THOR - Hardware Accelerator for HD / UHD and 4K

Thor Ultra 1.1

Thor Ultra contains three tools:

- Thor Clean - Noise and grain reduction with clip based analysis
- Thor Zoom - high quality upscale algorithm for HD to UHD and 4K conversions
- Thor Sharpen - high quality image sharpening

- All three tools are presented in a single GUI to allow optimal processing order and are 16 Bit.

Thor Clarity 1.1

- Noise and grain reduction with clip based analysis.
- The full version of Thor Clarity, will be delivered in Q3 2015 and users who purchased Thor Clarity at launch will receive an upgrade to this version. When released, both processors will be used for Thor Clarity

File Formats

ProRes

Our Apple ProRes support has been updated to the latest version and now includes support for the import and export of Apple ProRes 4444 XQ: The highest-quality version of Apple ProRes for 4:4:4:4 image sources (including alpha channels), with a very high data rate to preserve the detail in high-dynamic-range imagery generated by today's highest-quality digital image sensors.

Apple ProRes 4444 XQ preserves dynamic ranges several times greater than the dynamic range of Rec. 709 imagery—even against the rigors of extreme visual effects processing, in which tone-scale blacks or highlights are stretched significantly.

Like standard Apple ProRes 4444, this codec supports up to 12 bits per image channel and up to 16 bits for the alpha channel. Apple ProRes 4444 XQ features a target data rate of approximately 500 Mbps for 4:4:4 sources at 1920 x 1080 and 29.97 fps.

During the course of this development the reading of ProRes files has also been improved. Two new environment variables have been added in relation to this;

- NUMBER_OF_QT_THREADS:
  - number of threads to use for reading Quicktime files (although at this point only affects prores). If left unset, defaults to using NUMBER_OF_PROCESSORS
- PRORES_IO_BUFFER_SIZE:
  - if set, defines the size (in MB) of the buffer ProRes will use for IO. Note that increasing this may increase *average* performance over a large number of frames, but it also makes performance less even. So in practice setting this probably decreases your chances of getting realtime playback. Useful for R&D testing/experimenting, however.

Note: Export of ProRes XQ is only available in Half projects.

Arri RAW - Latest ARRIRAW_SDK_5.0.0b6_x64

This new SDK includes the latest version of the ADA-5 debayer and supports the new image formats that will be available with the ALEXA 65 camera.

• Support for ALEXA 65 footage of 6560 x 3100 px: native, 4K and 2K resolution

• Support for ALEXA 65 footage of 5120 x 2880 px: native resolution

• Support for ALEXA 65 footage of 4320 x 2880 px: native resolution

Mono DPX support updated

Monochrome DPX support has been updated with the addition of 2 line items that can be added to the Clip.Prefs file. You can only use one set of values at a time.

This solves a problem with loading Scanity Mono DPX Files.

luma10PadLines	false
luma10NeedsShifting	true

Please note that these properties will also change the output format to match that of the imported files.

eg:

```
DPX
 {
     extension "dpx"
     colourSpace ""
     luma10PadLines false
     luma10NeedsShifting true
 }
```

Extended Formats - file formats supported for Import

RAW Formats - Debayering accelerated with GPU	
Canon RMF	Cinema DNG ● Ikonoskope ● IndieCam ● Magic Lantern ● OneCam ● BMD & Pocket Camera
Codex ● .cdx RAW	Panasonic ● .vrw RAW
Phantom ● Miro ● 4K Flex	

Other Formats	
AVI	JPEG 2000 ● JP2 ● MXF ● MXF (DCP)
MOV ● CineForm (SI-2K) ● DV100 ● AVCi 100 ● MPEG-2.	MXF AVC Intra 4k ● Intra 4K and UHDTV
MXF Sony MPEG HD ● Canon ● XDCAM	MXF HDF01a ● ARD_ZDF HDF01a
MXF_Omneon_MPEG_HD ● XDCAM	MXF_Avid_MPEG_HD ● XDCAM
MXF P2 AVCi ● P2 AVC Intra	MXF P2 DV
MPEG-4 ● XDCAM-EX ● GoPro	MXF Avid OP1a ● Arri DNxHD
MXF_Avid_DS	MXF_Sony_IMX
MXF_CBR	MPEG_2_Transport
YUV_Image	Photoshop_PSD

GUI Updates

- AJA Kona - an option displaying the type of reference being used has been added
- The Add Composite button is now always active and will add a Composite Over effect by default - for other composite effects, select the desired effect before selecting Add Comp
- Updated masks and grid example files - Added 2.39 and 1.66 Mask and grid to list
- DVO tools capable of working in Half float have been labelled (H)

CLI Updates

The *Command Line Interface* (CLI) functionality has been improved.

Please see the updated CLI section of the manual.

For help on all CLI operations, type :

<application> --help where <application> is *nucoda*, *phoenix_refine* etc.

- Audio Export - *exports audio data*
  - --export-audio [bits b][channels c][files f][retime r][audioOnly]
  - bits b = bit depth (b) of audio output (16/24) defaults to 16
  - channels c = number of audio channels (c) to export (1/2/4/6/8) defaults to 2
  - files f = number of audio channels (f) per output file (1/2) defaults to 2
  - retime r = retime ratio (r) of the audio output. Defaults to 1.0
  - audioOnly = exports audio only

- Export Burn-In - *burns requested information into the exported media*
  - --burn-in <Dailies-info-all|Lrg-TC|Location|Location-Sml|Greyscale|All_Clip_Info|Source_Clip_AV|File_Location|TC_Location|Quad_Location|BITC|Digital_Vision|TC_HUD_1|TC_HUD_2|TC_HUD_3|TC_HUD_4|RAW_HUD|Scene_HUD|Clip_HUD>

- Set In/Out points for export
  - --in <inPoint> sets the first frame to be exported (zero based frame number from start of composition)
  - --out <outPoint> sets the last frame to be exported (zero based frame number from start of composition)

- Auto trim single clip after applying CLI Twister/Pulldown
  - The correct duration is calculated when a note with the relevant effect is applied. Remember that the timeline must be in the format you are converting **TO**

Bug Fix

- When importing and splicing source files via the CLI, audio isn't imported and spliced along with the video.

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