

AVID GUIDE for
AMA Workflow

RED

Media Composer 6.5
Symphony 6.5
NewsCutter 10.5

Avid Editing Systems

AMA for RED

Features in Media Composer 6.5,
Symphony 6.5, NewsCutter 1.50 and later.

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INTRODUCTION

AMA (Avid Media Access) is the Avid architecture for linking to file based media rather than ingesting it. This document is specifically about linking to RED files in your Avid Editing Environment.

This is the second Workflow guide you should consult. AMA is described and its workflows and features explored in the AMA Master Guide. This current document assumes you have read that guide, which contains most of the detail about how to perform AMA operations. The Guide you are reading now covers the specifics of RED within the AMA architecture.

AMA is essential to the RED workflow – it is the only way to access RED material on the Avid Media Composer family of products. For example, RED files will not import, any interaction with the files requires AMA linking.

This is not a full RED workflow guide, it explores the feature of Avid Media Access which itself is a part of many complete RED workflows. Complete RED workflows are covered in detail in Michael Phillips *RED WORKFLOW GUIDE*, available from the Avid web site.

For Series TV and high end production, RED offers an alternative to shooting film. Its increased bit depth, expanded dynamic range, shallow depth of focus, large frame size and relatively low cost make it attractive for many TV projects which might otherwise shoot in film or conventional High Definition. And that is what brings RED to your edit suite.....

RED CAMERAS

RED is the name of the company which produces the RED camera series popular in independent production and Digital Cinema. Currently there are three camera products: RED ONE; RED EPIC and RED SCARLET, briefly described below.



RED ONE

This is the original RED camera, now available with an updated sensor, the Mysterium-X™. This new sensor offers greater dynamic range and better low light performance than the original sensor.

RED ONE can record from 2K to 4.5K frames in various aspect ratios and frame rates. It records files as REDCODE™ 12 bit RAW at various quality levels.



RED EPIC

This is the current top of the line camera. It also uses the Mysterium-X™ sensor, but can record as large as 5K frame sizes at various frame rates and aspect ratios.

It supports much higher frame rates than the original RED ONE camera, from 300fps for 2K frames to 120 fps for 5K frames.



RED SCARLET

This is the latest, lower cost addition to the RED line costing about half as much as the RED ONE and 1/3 the amount of RED EPIC. It shoots 5K still images and 4K video. It will shoot 4K video at up to 30 fps, down to 1K video frame size at 120 fps. It offers 16 bit RAW files.

This is really a Hybrid camera, aimed squarely at folks who need high quality stills as well as Video in their work.

RED FORMAT

RED Cameras record very large frame sizes, indeed competing in quality with traditional Cinema formats, at a much lower overall cost. These frame sizes can be much larger than HD frame sizes, and are referred to commonly as “5K”, “4K” and so on. Here is a sample of some available sizes for the EPIC camera. By comparison standard HD video is 1920 wide x 1080 tall:

	WIDTH	HEIGHT	FRAME SIZE (MB)	ASPECT RATIO	MAXIMUM FPS
5K	5120	2700	13.8	1.9:1	96
4K	4096	2160	8.8	1.9:1	120
4K HD	3840	2160	8.2	1.78:1	120
3K	3072	1620	5.0	1.9:1	160
2K	2048	854	2.2	2.4:1	300

RED Cameras record video only in a format referred to as REDCODE RAW, or R3D files. This is a container format which holds the video, audio, timecode and metadata for each recording. The term RAW refers to the fact the data from the chip is recorded in its original form, with little modification. Since the recording is raw data, processing like white balance, color grading and to some extent exposure can be assigned or modified infinitely without ever degrading the original recording. When we AMA link to a R3D (RED) file we have a lot of adjustments we can make to the recording, and none are destructive.

BIT DEPTH: RED records with a bit depth of 12 or 16 bits per pixel. This translates into the reproduction of subtle color variations, and a color space with lots of room for adjustment and manipulation without visible artifacts appearing. This compares to typical TV video which is 8 bit in post, and when processed has a tendency to Chroma key poorly and degrade quickly.

SENSOR SIZE: The size of the sensor chip means the format has a shallow depth of field, a much sought after feature in dramatic shooting. The cameras are also capable of variable frame rate recording (slow motion and time lapse) at very high quality.

DYNAMIC RANGE: The dynamic range is the range of tones a camera can record. It is often given as a range in f stops. Many high end video cameras typically offer 7 f Stops of Dynamic Range. RED offers 13 stops. This means it captures more detail in the shadows and the highlights than cameras with less dynamic range. It is less prone to burnt out highlights and crushed shadow detail.

RAW: R3D files contain the raw data off the chip. This means you would not want to look at a RAW file displayed as an image... it would not be pretty for several reasons. But this is what is recorded in the file itself. The intent is that when you playback the file you adjust its display on playback to choose color space, gamma, white balance and many other characteristics. Since these adjustments are interpretations of the original data upon playback, you can change them as many times as you like, and the original recording never degrades. The 100th adjustment yields as good quality as the first!

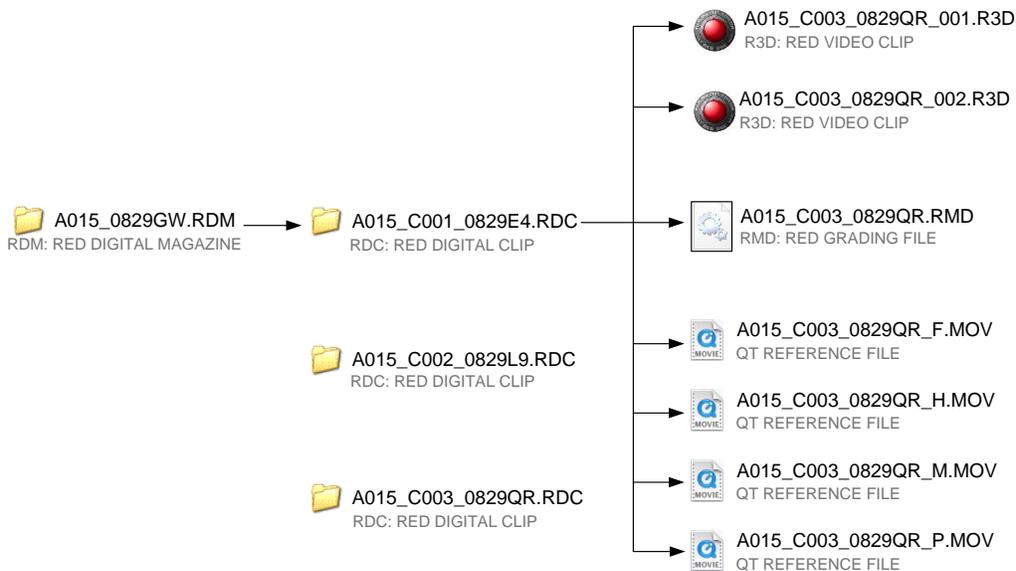
RED AUDIO: Red Audio is uncompressed mono, stereo or 4-channels.

RED FOLDERS and FILES

RED material may be recorded on 1.8 inch Solid State Drives or CF Cards. The SSD's are usually referred to as REDMAGs, a tribute to the idea of film magazines. Media of course can be copied to hard drives for backup and to free up cards for reuse.



The naming of files and folders on the record medium is very unique, and it is quite useful to know what the seemingly cryptic names actually mean. Refer to the diagram below as we describe the files and folders.



RDM: RED DIGITAL MAGAZINE

At the root of the record medium are folders which contain groups of recordings. They are referred to RED DIGITAL MAGAZINES, and are named with the extension .RDM. This is what you want to copy when you are creating Virtual Volumes, as it contains all the Camera Data. There can be only one .RDM folder per SSD card.



RDC: RED DIGITAL CLIP

Each recording is referred to as a CLIP, as indeed it is on other formats. The CLIP is actually a folder, containing all the material for that recording. It is called a RED DIGITAL CLIP and the folder has the extension .RDC added to it.



R3D: REDCODE RAW MEDIA

Inside the Clip folder are three kinds of files. The two shown at the top here are the actual recordings, indicated as .R3D files. Since R3D (REDCODE RAW) files split at 2 Gigabytes, you will see multiple R3D files here for a single, long recording. The _001 and _002 at the end of the file names indicate the sequence of these files during recording.



RMD: RED METADATA FILE

This is a grading file, indicated by the extension .RMD. It contains information used to alter the look of the recording on playback. It may be created in REDCINE X PROFESSIONAL to match the judgments made by an operator, possibly in this case by an operator on set at time of recording. This file is not always present. Grading files for older media may be indicated as .RSX or .RLS files



MOV: QUICKTIME REFERENCE MOVIES

The RED file can be displayed at several different stages of decoding to provide various resolutions of the movie. This is a function of its wavelet encoding. We have four QuickTime Reference files whose names end in _F, _H, _M and _P (Full, High, Medium, Proxy). These reference movies will not playback on just any computer. A MAC is required, with an R3D codec installed/binded on the computer. There is no QuickTime codec for Windows. These movies also only work if they are in the same folder as the file they reference, the original RED movie itself.

RED FILE and FOLDER NAMES

RED file names look cryptic, but every character has a specific meaning. In all the examples below, the two character HASH CODE is a pseudo random set of characters to make the file or folder name unique.

.RDM **RED DIGITAL MAGAZINE** **FOLDER** **example: A015_0829GW.RDM**

Contains CLIP folders, .RDC.

A	015	_08	29	GW
Camera	Reel	Month	Day	HASH code

.RDC **REDCODE DIGITAL CLIP** **FOLDER** **example: A015_C001_0829E4.RDC**

Individual folder for each shot (clip) taken by the camera

A	015	_C001	_08	29	E4
Camera	Reel	Take	Month	Day	HASH code

.R3D **REDCODE MEDIA FILE** **FILE** **example: A015_C001_0829E4_001.R3D**

The actual recording holding the essence, TimeCode and the Metadata for the recording. Since the recordings split at 2 Gb, multiple files may be present with an incrementing index number

A	015	_C001	_08	29	E4	_001
Camera	Reel	Take	Month	Day	HASH code	Index number

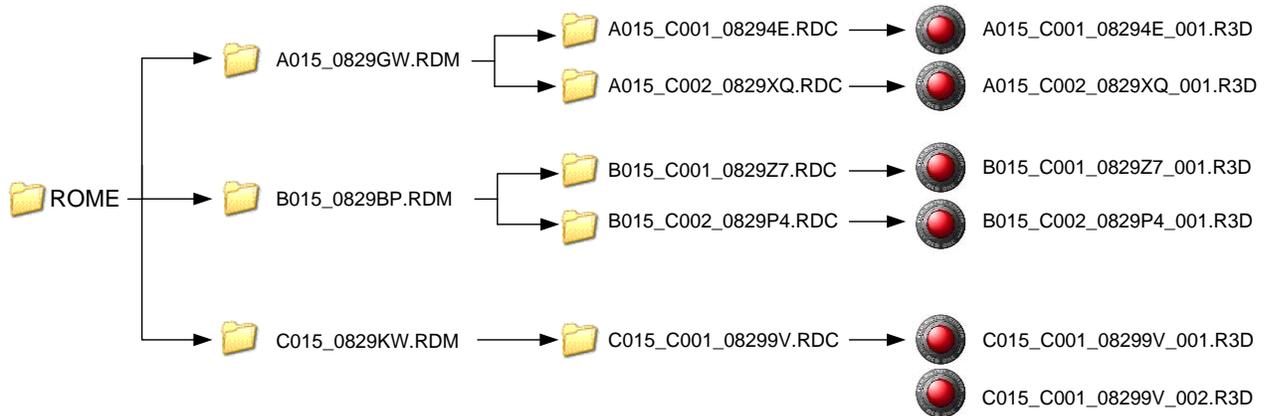
.RMD **REDCODE GRADING DATA** **FILE** **example: A015_C001_0829E4.RMD**

Previous releases also used .RSX and .RLX files for the same purpose.

A	015	_C001	_08	29	E4
Camera	Reel	Take	Month	Day	HASH code

What Folder to Link To

You may link to RED files by VOLUME using `LINK TO AMA VOLUME...` or you may link directly to the individual R3D files using `LINK TO AMA FILE(S)...` In both cases if a grading file (.RMD) is present with the R3D file it will be used as the SOURCE SETTINGS for the clip. Stated more completely, when linking to an R3D file if an .RMD file is present in the .RDC folder it will be loaded as the SOURCE SETTINGS. You might want to read that one more time referring to the diagram below.



If you use `LINK TO AMA VOLUME` remember you can link through three folders at once, two folders down from the one you select. Using the example above:

- Linking to `ROME` would load all 6 RED clips.
- Linking to `B015.....RDM` will link to the two RED clips buried within it
- Linking to `C015.....RDM` will load the two R3D files which are a single clip. They are a pair of spanned files created when a long recording automatically split at the 2 GB limit.

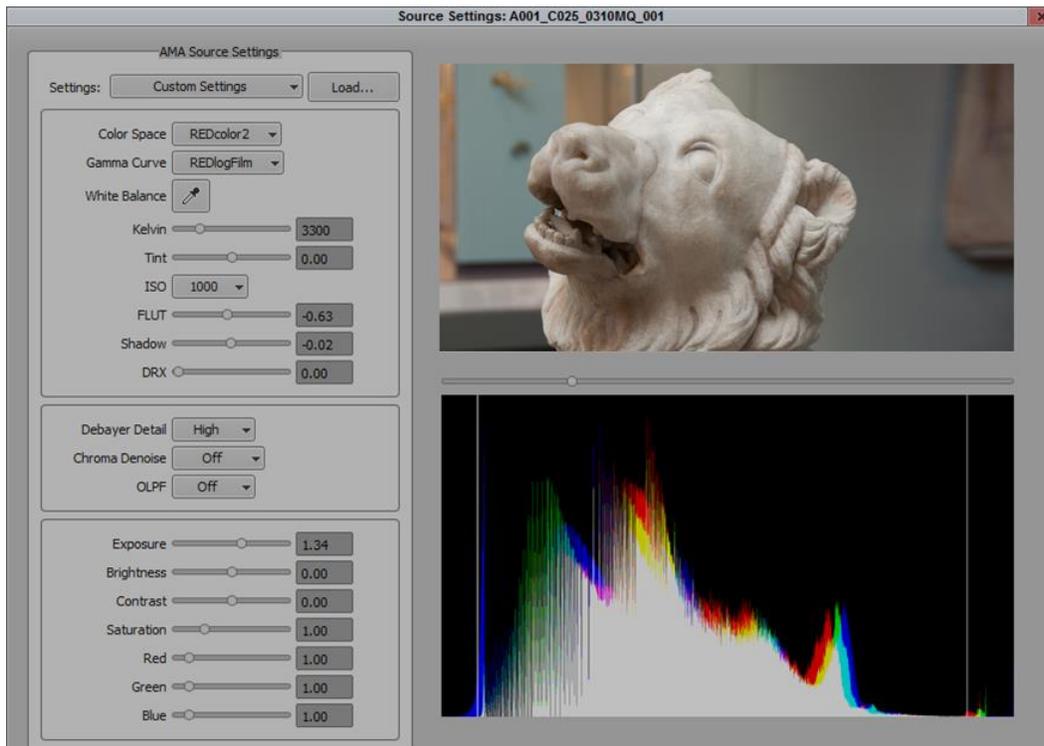
If you are use `AMA LINK TO FILE...` :

- Linking to `A015.....R3D` links to that one file
- Linking to `C015.....001.R3D` will link to that file and automatically span to the continuation of that recording in the file `C015.....002.R3D`

AVID SOURCE SETTINGS and RED RMD FILES

RED files are subject to interpretation... in a big way. Since the R3D file contains raw chip data, we can use the Avid SOURCE SETTINGS window to modify some of the appearance of the RED clip without modifying or degrading the original file in any way. The SOURCE SETTINGS are not suitable for performing full color correction – think of them as more for setting the initial interpretation for the file.

Select one or more clips. Right click on a selected clip and choose SET SOURCE SETTINGS. This option is not available in any menu. The window below appears:



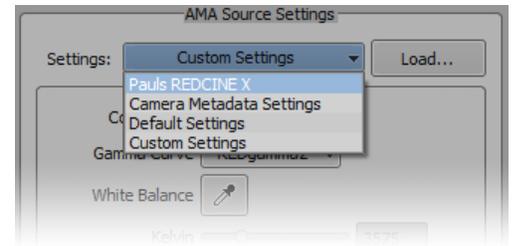
The available adjustments will be familiar for anyone working with this format. If you selected more than one clip then any changes you make here will affect all the selected clips.

If you open SOURCE SETTINGS for a single clip, and there is an .RMD file in its directory you will notice the .RMD file will be used automatically - the image and settings you see are those after the .RMD grading in REDCINE X PROFESSIONAL.

A RED file can bring as many as 97 different pieces of metadata with it (if an RMD file is in use), many of which are adjustable. The SOURCE SETTINGS window will not allow you to view or modify all these settings.

Some changes which may have been programmed into the .RMD file at the camera or in REDCINE X PROFESSIONAL may not be visible or adjustable, such as curve control, lift/gamma/gain, sharpness, crop and others.

You can however override the .RMD file settings by selecting one of several defaults in the SOURCE SETTINGS window. Of particular interest is the option at the top which allows us to choose different Settings from a dropdown menu.



- **Pauls REDCINE X** is a 'look' created for this individual clip in REDCINE X PROFESSIONAL, and named as you see here. This look is stored in the .RMD file in the directory with the video (R3D) file.

This capability allows the editor or someone else in the production team to view the clip in REDCINE X, grade the clip and have that information come with the clip into the Avid editing world.

- **CAMERA METADATA SETTINGS** adjust the clip to its look 'as shot'.
- **DEFAULT SETTINGS** 'zeroes' all the controls to the RED standard default
- **CUSTOM SETTINGS** appears as soon as you start making any adjustments to the settings here.

The **LOAD** button allows you to navigate to any .RMD / .RSX / .RLX file for any clip and load it for the currently selected clip or clips. This means you can grade one clip in a group using REDCINE X PROFESSIONAL, and if the others are similar assign this grading for all the clips at once.

It's interesting to note **SOURCE SETTINGS** are a clip attribute. This means you can duplicate a clip and apply a different set of **SOURCE SETTINGS** to it if you want the same video with different looks.

Editing with Graded Clips

When you edit a clip into a sequence, the material you edit in uses the clip's current RED source settings. If you change the RED source settings at a later point in your workflow, the sequence does not automatically adjust for the change. If you want the sequence to use the RED source settings for clips that you have changed since you edited, you must refresh the sequence. To refresh a Sequence load it into the Record monitor and choose the menu item **CLIP > REFRESH SEQUENCE > SOURCE SETTINGS**.

RED SOURCE SETTINGS

The RED source settings are described below. This information is from the RED AMA PLUGIN GUIDE available at www.Avid.com/ama:

COLOR SPACE	Camera RGB:	As close to RAW
	REC.709:	SMPTE standard color space for HD
	REDcolor (default):	Newest, more accurate color science from RED
	REDcolor2:	Better skin tones and color from RED
	REDSpace:	Based on the camera's RGB but more saturated

GAMMA CURVE	REC.709: a REC.709 gamma curve with a linear portion at black and a gamma at 2.2 curve
	REDLog: maps the 12-bit sensor data on to a 10-bit curve with minimal loss
	REDLogFilm: a way of containing a large dynamic range in a video file. Needs to be viewed through a LUT to convert it for viewing on a monitor.
	REDSpace: based on REC.709 but with more contrast
	REDGamma (default): gamma curve from RED with a smoother highlight rolloff

WHITE BALANCE Adjusts the color temperature of your image in one click. Use the eyedropper icon and then click a known white area in your RED footage to achieve the correct light or neutral balance. This option is equivalent to adjusting the Kelvin and Tint options. When you use the White Balance option, the system automatically adjusts Kelvin and Tint. It is recommended you adjust White Balance first before performing any other adjustments to the image for best quality. This change adjusts the entire clip and updates the histogram.

KELVIN Adjusts the RGB color to compensate for red - blue tinting of the scene at different color temperatures of the ambient light while you shoot. Common values are 3200 (tungsten) and 5600 (daylight). Click and drag the slider from 1700 to 9400. Default is 5600.

TINT Adjusts the RGB color to compensate for yellow - green tinting of the scene at different color temperatures of the ambient light while you shoot. This is valuable when the ambient light source contains a significant amount of yellow or green, such as fluorescent. Click and drag the slider from -100 to 100. Default is 0.00.

ISO Allows the ISO level to change from 50 to 2000. Default is 320.

FLUT™ The latest color science developed by RED. Allows you to balance your mid-grays in the center of the histogram without pushing highlight details over the edge.

- SHADOW** Adjusts the overall black level of the image without affecting the white level. Click and drag the slider from 0.00 to 1.00. Default is 0.00.
- DRX** Lets you recover potentially lost dynamic range by extending and balancing highlights, taking into account the rendering intent of the desired Kelvin and Tint white balance. Click and drag the slider from 0.00 to 1.00. Default is 0.00.
- DEBAYER
DETAIL** Choose from High (default), Medium, or Low.
- CHROMA
DENOISE** Choose from Off (default), Minimum, Milder, Mild, Strong, or Maximum.
- OLPF** Controls the optical low-pass filter. Choose from Off (default), Low, Medium, or High.
- EXPOSURE** Allows adjustment to the clip exposure. Click and drag the slider from -7.00 to 7.00. Default is 0.00.
- BRIGHTNESS** Adjusts the overall brightness of the image. Lifts blacks without affecting the white level. Click and drag the slider from -10.00 to 10.00. Default is 0.00.
- CONTRAST** Adjusts the tonal range of the image, which usually improves sharpness and detail. When you increase the Contrast, it increases tonal separation between adjacent gray levels but decreases the total number of discreet gray levels in the image. Click and drag the slider from -1.00 to 1.00. Default is 0.00.
- SATURATION** Affects the intensity of the red, green and blue channels. As the value increases color saturation increases. As the value decreases, so does the color decrease. If the value is set to high, colors might clip. If the level is set to 0.00, a monochromatic image with only gray tones appear. Click and drag the slider from 0.00 to 4.00. Default is 1.00
- RED** Increases or decreases the camera's sensitivity to red light by amplifying the R channel digital video signal received from the sensor. At 0 (zero) no Red is visible, the image has a strong cyan cast. Click and drag the slider from 0.00 to 10.00. Default is 1.00.
- GREEN** Increases or decreases the camera's sensitivity to green light by amplifying the G channel digital video signal received from the sensor. At 0 (zero), no green is visible, the image has a strong magenta cast. Click and drag the slider from 0.00 to 10.00. Default is 1.00.
- BLUE** Increases or decreases the camera's sensitivity to blue light by amplifying the B channel digital video signal received from the sensor. At 0 (zero), no blue light is visible, the image has a strong yellow cast. Click and drag the slider from 0.00 to 10.00. Default is 1.00.

AMA RED METADATA

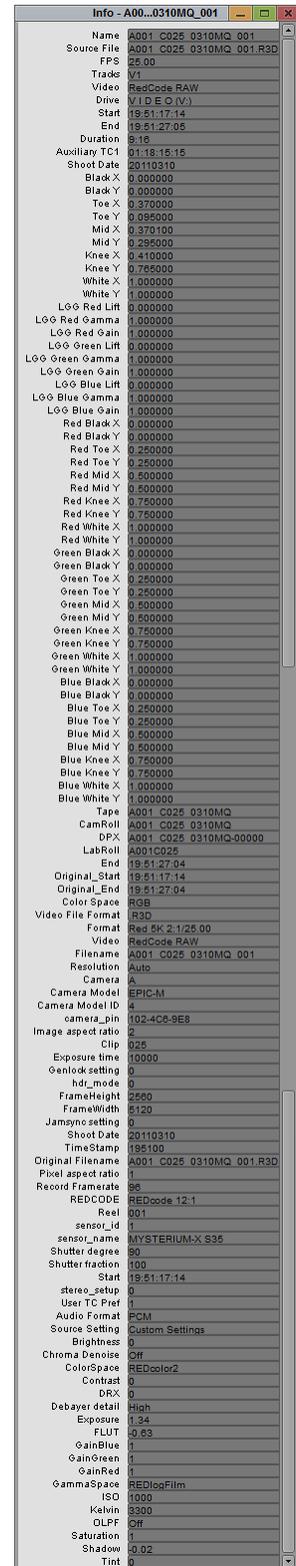
A RED file comes into the Avid editing system with about 97 pieces of metadata! It's useful to be able to look at this data to confirm such things as camera look settings, frame size, recorded frame rate, playback frame rate and much more.

You can add some of this information to your bin by selecting the bin and choosing the menu option **BIN > CHOOSE COLUMNS**. This could mean opening a lot of columns in a bin, and it can become quite cluttered.

Sometimes a `GET INFO clip` display, as shown here at the right, can be a good solution. You can peruse all the attributes of a clip quickly and easily. Don't confuse this display with the `GET INFO` command applied to a Source monitor. To see this larger, more detailed display shown here you must select a clip, right click on it, and choose `GET INFO`. Note that `GET BIN INFO` is also available in the context menu, and that's not what you want. (`GET INFO` is also in the `EDIT` menu, and available as `CONTROL I / COMMAND I`)

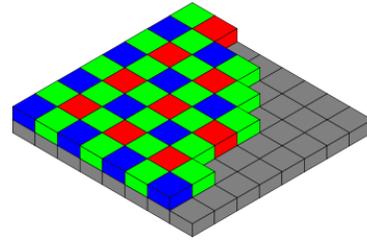
DOUBLE SYSTEM AUDIO

AMA Linked RED files are often accompanied by alternate audio recordings. AMA linked RED clips do support AVID AutoSync.



Debayering

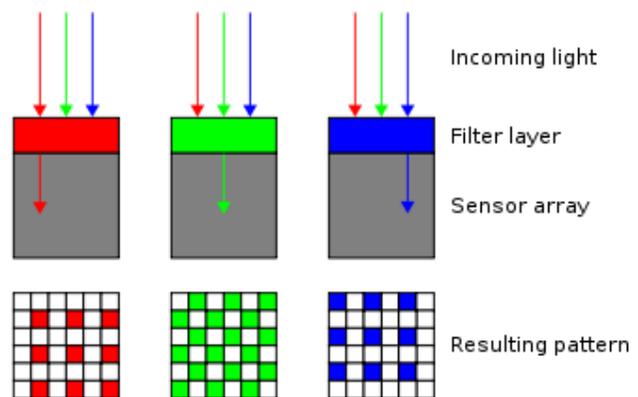
RED cameras have a single chip, and the three colors come from having the pixels on that chip sense different colors- each pixel senses either Red, Green or Blue. This is not the same as having three chips create an R, G and B value for each individual pixel.



Camera chip with mosaic of pixels sensing different color values

The process of taking the Red, Green and Blue data from adjacent pixels and creating a true RGB image from it is called Debayering. All RED files must be Debayered before they can be converted into any other video format.

There is a lot of leeway in how this processing can be done, and it can be performed at different quality levels. Indeed, there is the chance that as new algorithms are developed in the future, older RED files can be reinterpreted differently, presumably to deliver higher quality images. In fact, this has already happened in the RED world with the introduction of new ways to debayer older RED files.



Debayering can be applied at several different quality levels. FULL of course takes the most processing, and results in the highest quality final image. Conversely, Sixteenth will process much faster and is of quite a bit lesser quality.

There are several points at which you will need to make decisions about the debayering level for RED files in your editing application.

SCREENING RED FILES

When we are screening in the editing system, the VIDEO QUALITY switch will choose between three quality levels of Debayering and will show an obvious on-screen difference in the image.



For consistent real time playback, you will likely need to select DRAFT quality while editing directly with AMA linked RED footage. Remember this setting does not affect renders or transcodes.

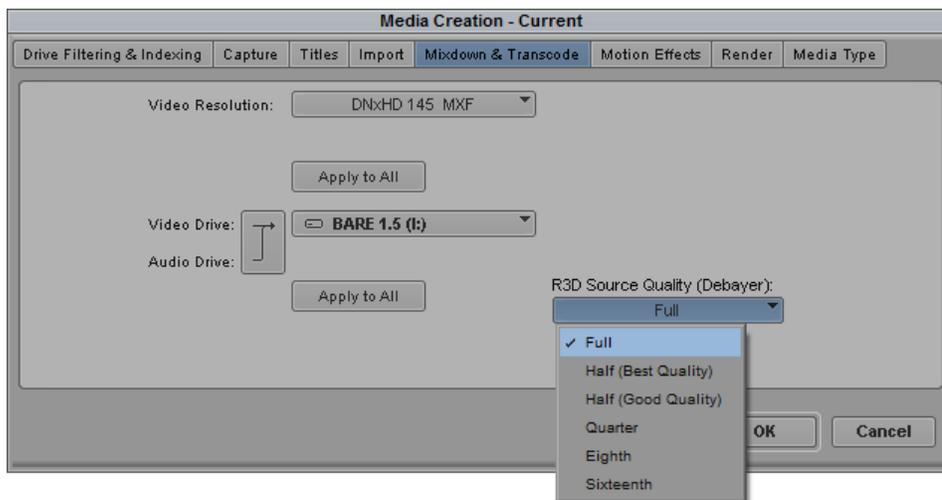
TRANSCODING AND RENDERING RED FILES

Many RED workflows require the Transcoding or Rendering of RED files into other formats- often an Avid format such as DNxHD. The level of debayering will affect the transcode times significantly. Note you cannot render or transcode into .RED, only into other Avid supported codecs.

To control the amount of debayering used we make adjustments in your MEDIA CREATION settings. For renders, use the RENDER tab, for TRANSCODES use the MIXDOWN & TRANSCODE tab.

There are six levels of debayering available.

- If you are transcoding to DNxHD the setting HALF (BEST QUALITY) has been deemed by many to be of excellent quality, and of course transcode more quickly than FULL debayer.
- If you have a RED ROCKET card installed, it will only be used if you choose FULL debayering.



REDCINE X PROFESSIONAL

REDCINE X PROFESSIONAL (previously REDCINE X) is an application from RED which is of interest to every RED user. It is available for download free from www.red.com/support. With REDCINE X there are many things you can do to screen, prepare and export RED footage. Even a basic user can:

- Screen their files. The RED codec is proprietary and RED files are protected from playback outside approved RED environment. The number one reason to use REDCINE PROFESSIONAL X is to screen your files.
- Perform a basic color correction and color grading
- Convert (Transcode) RED files to other formats
- When using a non-AMA workflow, CROP within the RED frame, and export this cropped material in various formats including DNxHD.



REDCINE X PROFESSIONAL showing an HDTV frame being extracted from a RED 5K (5120 x 2160) frame

RMD FILES

One of the reasons to use the RED format is for the control over the look of the image, and exploitation of the dynamic range available. This can happen by bringing your finished program for final grading with a colorist. On projects without a professional grading stage, REDCINE PROFESSIONAL X can be used to grade each shot, or groups of shots. The results of course will vary depending on your monitoring capabilities and grading skills.

The mechanism used by AMA to transfer the grading decisions you make to the Avid environment is the .RMD file mentioned earlier. When using REDCINE X PROFESSIONAL, as soon as you select a clip, even in the Browser, and begin manipulating it an .RMD file is automatically created (if one does not exist) or modified (if one does exist) and stores the look you create for this individual clip in the CLIP folder as an .RMD file.

Earlier, in the section on SOURCE SETTINGS we saw that some of these adjustments in this .RMD file can be modified by the SOURCE SETTINGS themselves in Avid editing systems. Also, a preferred .RMD file can be applied to multiple clips in a bin.

What if you don't like the settings from the supplied .RMD file? What if settings you want to change from the RMD file are not accessible in the Avid editing system?

You could go back to REDCINE X PROFESSIONAL and remake the RMD file, or you could remove the .RMD file from each Clip folder and not use it at all. There is another way.

Remember in SOURCE settings we have a dropdown Settings menu which offers some presets. Two are CAMERA METADATA SETTINGS (display clip as shot) and DEFAULT SETTINGS. Selecting either of these will override and replace the .RMD settings within the Avid editing application.

RED ROCKET

The RED ROCKET card is designed to reduce Transcode, Render and Mixdown times when converting native REDCODE RAW (R3D) files into other formats. Many workflows require transcoding the R3D files to DNxHD for finishing, or QuickTime dailies. This card can accelerate that process.

Avid only recommends using the Red Rocket card with Media Composer software and local storage. Use of the card with Unity, ISIS, Interplay, NewsCutter, Symphony, DNA or DX hardware is not supported.

Red Rocket supports Transcode, Render and Mixdown only. It does not accelerate playback of R3D files in the Media Composer. You must have the proper drivers installed to take advantage of the Red Rocket card.

When installed on a Media Composer, the card *is not used* unless TRANSCODE is set to FULL debayering. This is selected in your MEDIA CREATION SETTINGS, on the MIXDOWN & TRANSCODE tab.

If you have large volumes of raw material to transcode, the card can be used with REDCINE X PROFESSIONAL on a separate computer to perform batch Transcodes.



RED ROCKET PERFORMANCE ON MEDIA COMPOSER

REDCODE RAW R3D files are very demanding to Transcode. In some Media Composer tests, software transcodes at the highest debayer quality can take much longer than the clip. Of course lower debayering levels will lead to faster Transcodes. The RED ROCKET card provides Media Composer acceleration so Transcodes, mixdowns and Renders take less than 2x realtime.

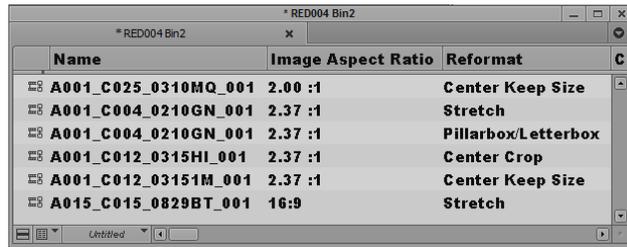
The length of the transcode and the final quality depends on the selected Debayering quality you use. You can choose this in your MEDIA CREATION settings, on the MIXDOWN/TRANSCODE tab. **YOU MUST SELECT FULL HERE TO ENABLE THE RED ROCKET CARD.** This setting does not affect the playback quality within the application – this is a separate setting made with the quality switch in the timeline.

These are some (unscientific) Media Composer transcode averages with my z800 workstation using RED EPIC 5K video at 23.98 fps:

RED ROCKET	Approximately 1 to 2 x realtime
SW TRANSCODE, full debayer	10 x clip duration
SW TRANSCODE, ½ best debayer	5 x clip duration

RED ASPECT RATIOS

RED files come in many aspect ratios, a few are shown here. If the clips original aspect ratio does not match your Project aspect ratio in the Avid, then the clip needs correction.



Name	Image Aspect Ratio	Reformat
A001_C025_0310MQ_001	2.00 :1	Center Keep Size
A001_C004_0210GN_001	2.37 :1	Stretch
A001_C004_0210GN_001	2.37 :1	Pillarbox/Letterbox
A001_C012_0315HI_001	2.37 :1	Center Crop
A001_C012_03151M_001	2.37 :1	Center Keep Size
A015_C015_0829BT_001	16:9	Stretch

We discussed in the *AMA MASTER GUIDE* the details of how to use two columns to monitor and control the clips aspect ratio. Display the `IMAGE ASPECT RATIO` and `REFORMAT` columns, the click in `REFORMAT` column to select the type of aspect ratio correction (reformatting) you would like to use. This adjustment can be done with either one or many selected clips simultaneously.

Please read the full description of this feature in the *AMA MASTER GUIDE*.



Sample Workflows

There are many ways to work with RED footage, but this is a document on using AMA with RED, so we present here a limited set of examples which use AMA. By all means do acquire and read Michael Phillips excellent and complete *RED WORKFLOW GUIDE* to explore many other options for working with RED media. It is available at www.avid.com/red.

The four Workflows we consider here are:

- **1 NATIVE RED EDIT in MEDIA COMPOSER**
Using a Media Composer to AMA Link to RED files, EDIT and then screen or output in HD.
- **2 TRANSCODE RED and EDIT in MEDIA COMPOSER**
AMA Link and transcode to create HD or SD media for editing and output.
- **3 RED to SYMPHONY FINISHING**
Symphony offers Universal Mastering and excellent color grading capabilities.
- **4 RED to DS FINISHING**
DS is Resolution independent, and offers the maximum flexibility while conforming from native RED files

We begin with a few judgments and basic decisions. Here are three considerations, as an example:

TRANSCODE ALL FOTAGE

If an HD or SD quality master are sufficient, we can transcode all raw footage to Avid HD, SD, or an Offline resolution and edit in this less demanding format. We must also transcode if you wish to use Multicam or work with the files in a shared storage environment. Finally, if you have a lot of RED footage transcoding will reduce your media storage footprint while editing.

TRANSCODE TIMELINE

If the edit is very simple it may be possible to perform the edit using the original RED footage and transcode the final Sequence. There are lots of variations on this theme. You might review all the raw footage and place selects in a Sequence- which is now a selects reel. Transcode the final Sequence, and then cut the final show from this much smaller volume of transcoded material.

OFFLINE EDITING

We can use a transcode workflow not to produce a final video program, but to generate any number and type of data files to do various conforms later on. We can edit at low resolution (this could be HD for a film master!) using transcoded RED files and generate EDL's (Edit Decision Lists), AAF's (Advanced Authoring Files) or AFE's (Avid File Exchange). The original RED files and these documents can then go on to Avid Symphony or Avid DS, among other systems, for finishing.

Workflow 1

RED MEDIA COMPOSER COMPLETE

This is a simple and fast way to work with RED, but somewhat limiting. Remembering the frame sizes and data rates of this format, this is a workflow which is very demanding on the editing system. Don't even think about effects and multiple layers!

You might be using the Media Composer on set to screen and rough cut some rushes before they move on to the next scene, or to create dailies in other formats for later screening. You might be putting together some shots for a quick screening, or using the Media Composer as a transcoding machine to convert selected RED takes into DNxHD for use in your Broadcast program.

- Link to the RED files via `LINK TO AMA VOLUME...` or `LINK TO AMA FILE(S)...` If you have done any pre-grading in REDCINE X, and individual grading files are in the CLIP folders, these REDCINE X adjustments will be applied to each clip.
- SOURCE SETTINGS can be used to further modify the clips, one at a time or in groups. You can also load and apply a REDCINE X grading file to one or more clips.
- In your SETTINGS > MEDIA CREATION select the MIXDOWN &TRANSCODE tab. Select the amount of debayering to use for any transcoding you might perform. If you have a RED ROCKET card set this to FULL or the card will not be used.
- Edit. You may want to work with your timeline set to DRAFT mode for better performance.
- Output your final program. Playout using the original Red files may not be an option. You may wish to Transcode final *Sequence* to HD or SD using the debayer settings of your choosing.

Workflow 2

AMA RED TRANSCODE for HD or SD EDIT

We would transcode to get better performance while editing. We also need to transcode to use MULTICAM or move our media into Shared storage. We might transcode to an offline resolution (HD DNxHD 36) to produce information for a higher resolution conform, or we might transcode to high resolution (HD DNxHD 175) to produce a true HD master.

- Link to the RED files via `LINK TO AMA VOLUME...` or `LINK TO AMA FILE(S)...` If you have done any pre-grading in REDCINE X, and individual grading files are in the CLIP folders, these REDCINE X adjustments will be applied to each clip.
- SOURCE SETTINGS can be used to further modify the clips, one at a time or in groups. You can also load and apply a REDCINE X grading file to one or more clips.
- In your SETTINGS > MEDIA CREATION select the MIXDOWN &TRANSCODE tab. Select the amount of debayering to use for any transcoding you might perform. You might consider using HALF (BEST QUALITY) to save transcoding time. If you have a RED ROCKET card set this to FULL or the card will not be used.
- TRANSCODE to your final editing resolution, such as to DnxHD 175 for high resolution, or DnxHD 36 for low resolution
- Edit.
- Output your final program. If the transcode resolution was your finishing resolution, a standard file output or digital cut is possible because of the transcode.

Workflow 3

OFFLINE MC online SYMPHONY

Avid Symphony is a well-respected finishing tool. It offers two big features beyond what is possible on a Media Composer: exceptional color correction and a feature called Universal Mastering. This last feature allows you to output your show at different frame rates.

These two features make Symphony a common choice for Series Television, where high quality masters are required, and they are required in distribution formats for North America and Europe where the frame rates are different.

- Follow workflow 2 (previous page) to the EDIT stage. If you are going to finish in HD, consider when transcoding using a 10 bit Resolution to allow better color adjustment in Symphony.
- Copy the Project from the Media Composer over to the Symphony system

If finishing in HD on Symphony:

- Move the HD files to Symphony and finish the edit.
- Output the final program as a file or Digital cut. Output multiple versions of the program if required, as this is possible using Symphony's Universal Mastering capabilities.

If finishing using original RED files on Symphony:

- On Symphony, ensure the DNx versions of the files are *not* online, or the RED media will not relink to the clips
- In SYMPHONY, relink to the RED clips first, before opening any bins which contain Sequences or you may use some custom metadata.
- Finish color grading the program, refine effects.
- Transcode the final Sequence to a DnxHD resolution
- Output the final program as a file or Digital cut. Output multiple versions of the program if required, as this is possible using Symphony's Universal Mastering capabilities.

Workflow 4

AMA Offline for RED Conform on DS

AVID DS is the best device for RED conform on the market. Avid DS will link directly to REDCODE R3D files and work with them in a resolution independent environment. You can use it to create a High Resolution master from your RED files- right up to 5K masters. This makes it attractive for outputting film sized projects suitable for conversion for theatrical distribution.

AVID DS offers exceptional matting, tracking, 3D and color grading tools. All Media Composer timeline information is automatically re-created natively in high resolution, including effects, titles, and color data.

It has the capability to output your final program in several formats, as it supports Avid's Universal Mastering concept.

Again, see the RED workflow document for details, but the basic steps might be:

OFFLINE ON MEDIA COMPOSER or SYMPHONY

- Link File or Volume
- TRANSCODE Possible to DNxHD 36
- Edit
- OUTPUT Export AFE (Avid File Exchange) file
- Transfer to DS Bring RED Files and AFE

DS ONLINE WORKFLOW

- Link to RED AMA files
- INPUT AFE
- Create final High Resolution show in DS
- Output required format

RED REFERENCES

RED Website <http://www.red.com/>

RED User Forums <http://www.reduser.net/>

Wikipedia RED page http://en.wikipedia.org/wiki/Red_Digital_Cinema_Camera_Company

Red Camera Enthusiast's Forum <http://www.redcamcentral.com/>