

Introduction to Color Management

by Chris & Trish Meyer, CyberMotion

How to color manage Artbeats clips in After Effects CS3.

After Effects CS3 has introduced the concept of “color management” to the motion graphics world. Color management is based on the admission that in the real world, nothing’s perfect: Different formats (such as video cameras, still image cameras, computer-generated imagery, etc.) have different biases when it comes time to capture or create an image. Likewise, different output formats and devices - such as television sets or web browsers - have different biases as well. Additionally, computer monitors also have their own biases. When all these devices have potentially different ideas of how “red” a rose is, how do you know when you’re seeing the truth? The answer is to identify each of these biases (also known as “profiles”) and to compensate for them as you travel through the processing chain.

In this article, we’ll give you an overview of how to set up a color managed workflow in After Effects CS3, with specific advice on how to best handle stock footage shots from Artbeats. There are essentially four pieces to the puzzle: The Project Working Space, the Input Profile, the Output Profile, and the Display Profile.

Project Working Space

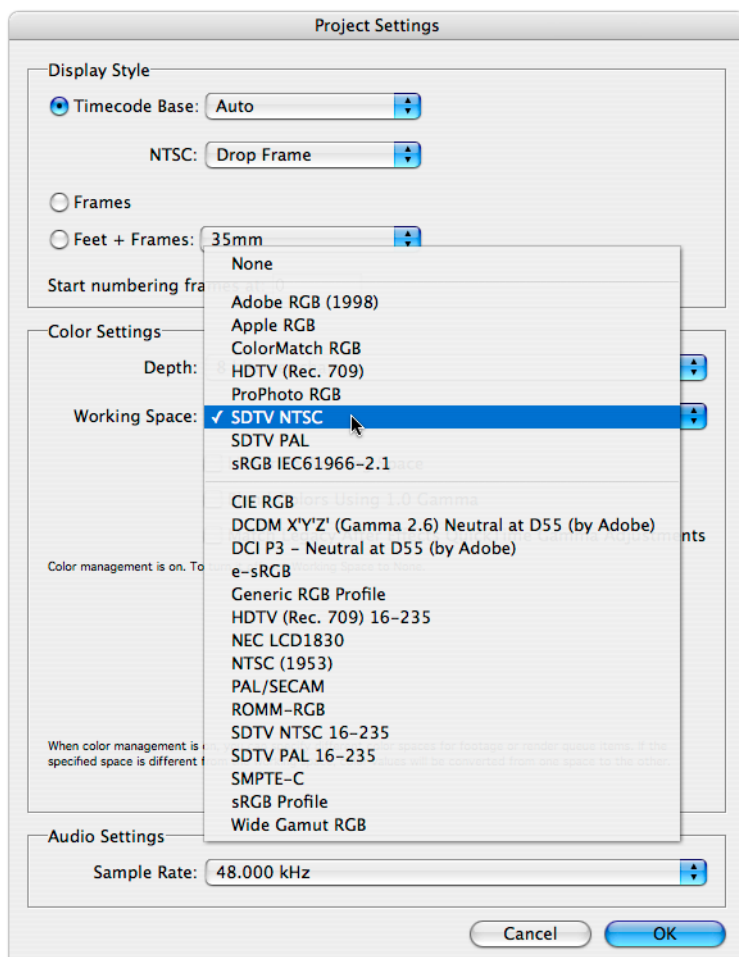
The Project Working Space (PWS for short) is the central reference color space you will be using in your project. It is set in File > Project Settings. Every source will be translated into that space, compositing will take place in that space, and the result will be translated from there into the output space. So obviously, it’s choice is very important.

The most common choice for the PWS is to make it the same as the format you expect to be rendering to. For example, if you are going to be rendering to a high definition video format such as HDV, set this to HDTV (Rec. 709); if you are rendering to a standard definition format such as D1 or DV using the NTSC standard, choose SDTV NTSC. By doing this, since the result of a composite in After Effects will already be in the same color space as your output, you’ll be cutting out at least one translation (and therefore, one less chance for math errors) in your workflow. This approach has another advantage if you are using the Video Preview feature inside After Effects, or are otherwise checking your work on an actual video monitor: Set the PWS to be the same as your external video monitor, and compositing will take place in the same color space as is being used by that monitor. (We’ll discuss monitoring in more detail later in this article.)

If you don’t know what your output format will be, the next best choice is to set it to match a format that matches the majority of your sources (which we’ll also discuss in a moment). This way, you will be cutting out a translation on input.

Another approach is to choose a “large” color profile for the PWS that encompasses the widest possible range of colors during the compositing stage, and then translate from this to your required destination on output. This is a good choice for the most critical applications, such as going to film. In this case, Adobe suggests you use their ProPhoto RGB profile.

Figure 1: The Project Working Space in After Effects is set in the File > Project Settings dialog. A common choice is to set it the same as the format you will be rendering to, such as SDTV for standard definition video or HDTV for high definition video.



Tips & Tricks

More available at artbeats.com

ARTBEATS
FOOTAGE YOU CAN USE

Input Profile

After you have set the Project Working Space, you will now be allowed to set the Input Profile for each of your footage sources. To access this, select a source in the Project panel, and go to File > Interpret Footage > Main. In the dialog that appears, click on the Color Management tab, and set the Assign Profile popup to match your footage.

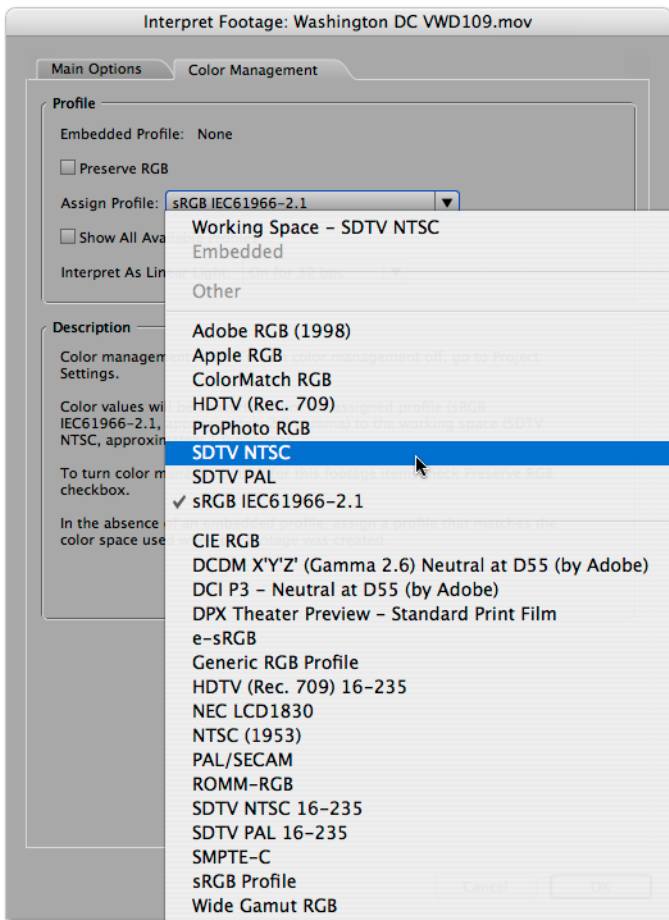


Figure 2: Verify that the correct color profile is being used for each clip. Open its Interpret Footage dialog and look under the Color Management tab. After Effects CS3 usually defaults to sRGB for Artbeats clips, which is wrong; change it to SDTV or HDTV depending on the video format of the clip.

This is where things get a little tricky. On the one hand, if you are running After Effects on a computer with an Intel processor, some formats - such as DV - will have the correct profile chosen for you automatically by a new technology in After Effects known as Media Core. On the other hand, if you are using an older (pre-Intel) Macintosh computer, or if your footage is in a format that Media Core does not automatically handle (such as Photo-JPEG encoded QuickTime

movies - the format used by Artbeats for most of their clips), then After Effects may pick the wrong format. For example, After Effects CS3 likes to default to sRGB, which is correct for most web and computer graphics, but wrong for video.

In this case, you will need to manually set the Assign Profile popup. But what's the correct choice? It depends on where the clip came from. Artbeats clips have been optimized for use in video projects, so if you have a standard-def clip, pick SDTV (NTSC or PAL, depending on your format); if you have a high-def clip, pick HDTV (Rec. 709, which is the official number of the HD spec).



Figure 3: What is the correct profile for a clip? For a V-Line clip such as VWD109 from the Washington DC collection (a), the correct choice is SDTV NTSC; for a synthetic render such as LAL113 from the Light Alchemy collection (b), it may be sRGB to better match the computer monitor the clip's creator may have been working on.

Tips & Tricks

More available at artbeats.com

ARTBEATS
FOOTAGE YOU CAN USE

Of course, there can be exceptions to every rule: If you choose what you think the right profile should be, but the result doesn't look quite right, there are a few other options you can try. For example, if the clip is a purely synthetic 2D or 3D render, chances are the creator was looking at a computer monitor rather than a video monitor while creating it. If they were using a Mac, then Apple RGB may be a more accurate choice; if they were using Windows, then sRGB may be more accurate (as most Windows PC monitors default to the sRGB color space). Try both and see if one looks "better" (yes, we are talking a subjective judgment at this point - but it's a synthetic image to begin with, so there's no "reality" to worry about being faithful to).

If a clip looks washed out, then there is a chance it was encoded using a 16-235 video luminance range rather than the full computer 0-255 range. A good way to check your hunch is to add the clip to a composition, apply Effect > Color Correction > Levels, and look at

Figure 4: If footage seems to be lacking in contrast (a), apply a Levels effect and look at its Histogram (b). The gaps on the left and right ends of the Histogram are a clue that the luminance range of this clip might actually be 16-235. Remove the Levels effect, go back and change its Input Profile in the Interpret Footage dialog (c), and now the clip will have more contrast (d). (Clip TR1117 from the Artbeats collection Retro Transportation.)

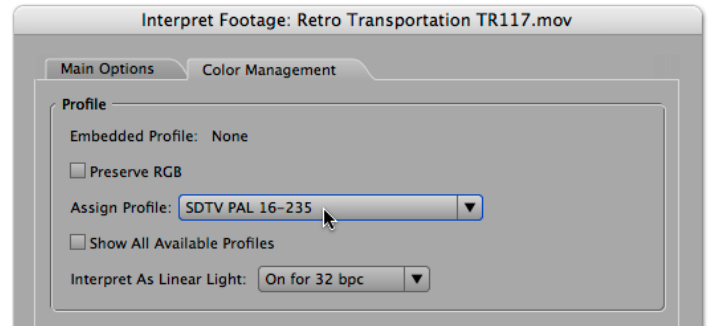


figure 4c

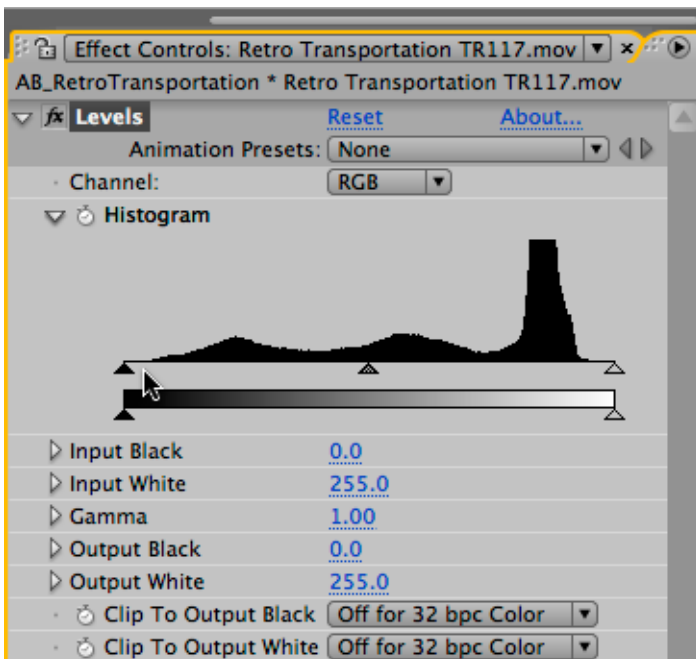
figure 4a



figure 4d



figure 4b



the Histogram in Levels: If you see gaps at the left and right ends of the Histogram, it's probably a 16-235 clip. Remove or disable Levels, then go back to the Interpret Footage dialog for this clip and set its color profile to SDTV or HDTV 16-235: The result should look better.

Output Profile

Unlike Input Profile, where you need to manage the color profile for each source, Output Profile is easy: You only need to set it once when you render. In the Render Queue, open the Output Module's options and click on the Color Management tab. Set the Output Profile popup to match the format you are rendering to, such as SDTV or HDTV. This defaults to matching the Project Working Space - so if you followed our earlier advice for setting the PWS to match your desired output format, you're already done.

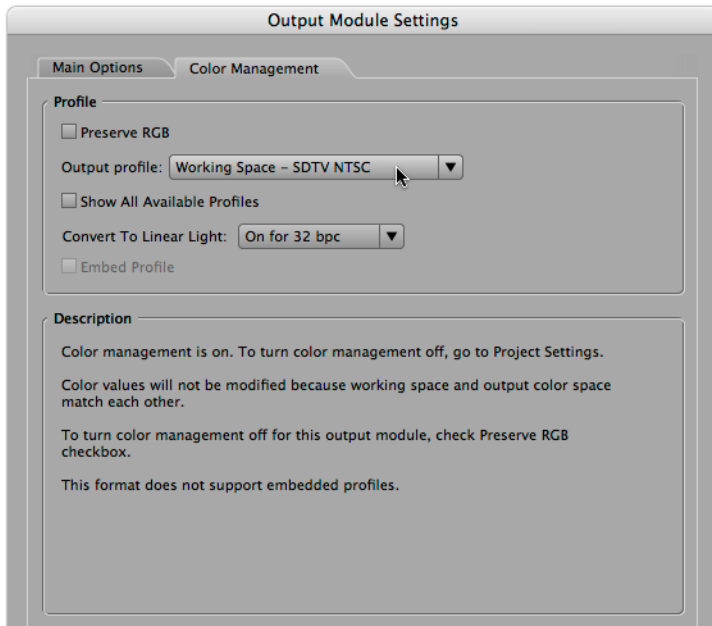


Figure 5: Set the Output Profile in the Output Module to translate colors from the Project Working Space to the file format you are rendering to. If they are the same, no translation is necessary.

The nice thing about this option is that if you are rendering to more than one format - such as video, but also a web version or a QuickTime client proof - you can add extra Output Modules to the same render, and give each one its own profile (for example, sRGB for the web, or Apple RGB if the client will be viewing a QuickTime proof on a Mac). After Effects can then translate the colors from its PWS to match the environment the clip will ultimately be viewed in.

Monitor Profile

Now that we have color management working throughout the After Effects image processing pipeline, that last step is making sure you're viewing the colors accurately while you're working.

If you are viewing your work on your computer monitor, you will want to make sure your operating system is using the correct profile for your monitor so that it can properly translate the colors being displayed inside After Effects. Under Windows, the place you will find this can vary depending on specific operating system; Control Panel > Display > Settings > Advanced > Color Management is a typical path. Most PC monitors either default to sRGB or have an sRGB option, so this is a good choice most of the time. On the Mac, look under System Preferences > Display > Color. In our experience, the Mac chooses a good profile if you are using a built-in screen or Apple Cinema Display, but its color profiles for other monitors don't look right. As most non-Apple monitors are made with the assumption they will be used under Windows, sRGB is a good alternative choice.

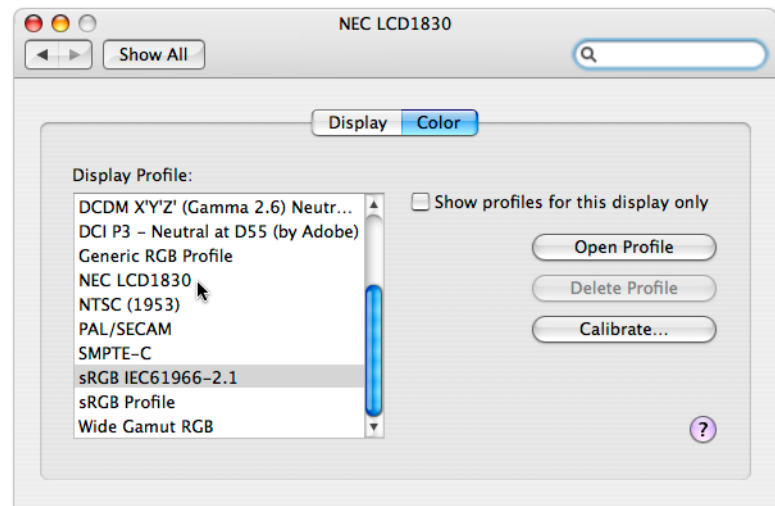


Figure 6: We sometimes have trouble with Apple's color profiles for non-Apple monitors. For example, even though this computer has an NEC LCD1830 display, and Apple has a profile for it, we get better results selecting the sRGB profile in the Mac's System Preferences.

The absolute best approach is to create a custom profile for your monitor. Get a monitor profiler (Pantone, ColorVision, and Gretag Macbeth are popular manufacturers) and have it create a translation that matches your specific monitor and video card.

As hinted earlier, if you are using the After Effects Video Preview feature, your windows are being blasted out to your external video monitor without any additional color correction. In most cases, your external monitor will be of the same video format as your intended output. If not, then for critical color correcting, you will want to temporarily change the Project Working Space to be the same as your external monitor, so that After Effects will translate all of your sources into a matching color space before it creates the image you will be previewing.

Zooming Out

There is one huge fly in the ointment as of the time this was written (early 2008), and it has to do with differences in the way Adobe and Apple handle "gamma" tags inside QuickTime movies. Without dragging you through the gory details, in short: If your intention is to render a QuickTime movie that will look the same inside Adobe applications on Windows as it does inside Adobe applications on the Mac, go into Edit > Project Settings and make sure the "Match Legacy After Effects QuickTime Gamma Adjustments" option is off. On the other hand, if your workflow is from After Effects to an Apple application such as QuickTime Player or Final Cut Pro, then turn this option on. It defaults to off, but will be turned on automatically if you open a pre-CS3 project in After Effects CS3.

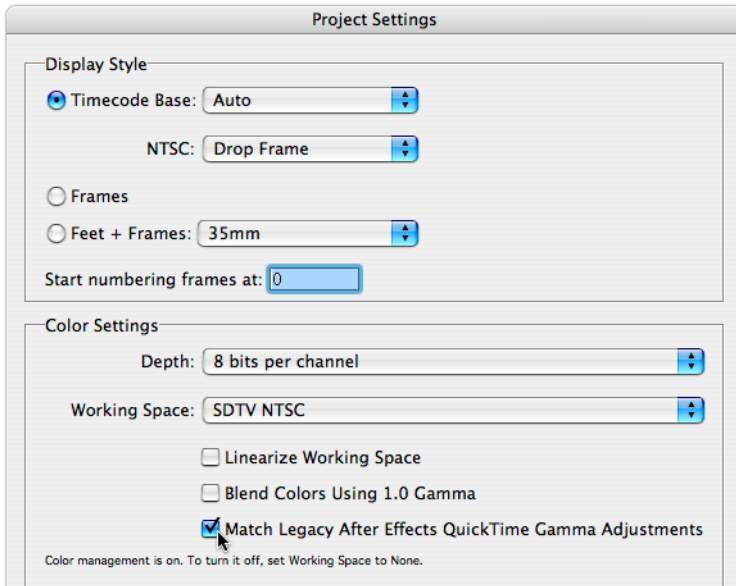


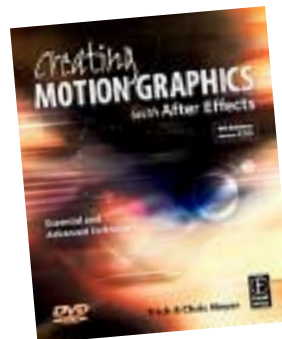
Figure 7: If your workflow takes you between Adobe applications on the Mac and Windows, disable the “Match Legacy Gamma” option. If your workflow takes you from After Effects to Apple applications such as QuickTime Player, enable this option (as we have here).

Adobe has done a nice job in making available additional information on Color Management in After Effects CS3. For a general background plus several example workflows, download and read their technical paper on the subject: http://www.adobe.com/go/learn_ae_colormanagementpaper. For more on the gamma issues mentioned above, visit http://www.adobe.com/go/learn_ae_quicktimegamma.

Color management may seem like a new, scary, complex thing to learn, but in reality, it’s the best way to go. After all, what’s the point in shooting, editing, and compositing the very best image you can, only to have your colors translated into the wrong space? Learn color management, and you can deliver the image you really intended to.

###

Chris and Trish Meyer are the founders and owners of CyberMotion (www.cybmotion.com), an award-winning motion graphics studio in Los Angeles that has created a wide variety of work for film, broadcast, corporate events, and special venues. They were one of the original development sites for After Effects, wrote the highly-acclaimed books *Creating Motion Graphics* and *After Effects Apprentice* (2007), and are long-time Artbeats users.



For even more tips and tricks, Chris and Trish Meyer have just released the fourth edition of their book *Creating Motion Graphics with After Effects*. Most of the examples use Artbeats footage at full D1 size. To learn more, visit: <http://www.books.cybmotion.com>.