Calibrating Video Monitors

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When previewing video output, it's important that the video monitor be calibrated. Proper monitor calibration ensures that what you see today will match what you see tomorrow, and that the judgements and decisions you make based on what you see remain valid. Echo Fire provides built-in tools to make the calibration process simpler, allowing you to calibrate frequently.

Not everyone sees colors and brightness the same. If monitor settings were left up to personal preference, everyone's monitor would be set differently, making it impossible for people to agree on what video footage actually looked like and therefore what changes might be needed. By choosing a calibration standard we don't necessarily make the picture look its best—that's a subjective judgement in any case—but we attempt to make it look standard. If everyone viewing a project adheres to the same standard, then there will be much less disagreement over what, if any, changes are needed.

Monitor Differences

Even calibrated video monitors will differ in appearance due to a number of factors. Different monitors use different phosphors in the CRT. For NTSC, the standard phosphors are called SMPTE-C. For PAL, the standard phosphors are called EBU. If possible, choose a monitor with the appropriate standard phosphors.

Phosphors also wear out over time. In constant use, a video monitor can be significantly darker after only two years of use. For critical applications, it should be replaced. Some broadcast monitors have calibration probes that actually read the brightness and color values from the screen and automatically compensate for such phosphor wear. However, these are expensive and rarely found in most studios.

The white point, or color temperature, is another difference between monitors. The broadcast standard is a white point of 6500K. Most television sets, in an effort to produce a brighter picture, use a white point of 9300K or higher, making the image brighter, but also much bluer. If your video monitor has selectable white point, choose 6500K. If your monitor does not, be aware of the color shifts caused by the different white point.

Why You Want a Real Video Monitor

One of the first questions asked by people just starting with video is "Can't I just use my spare television for video monitoring?"

The answer is: yes, but you don't want to if you can afford a better alternative.

Monitoring on a television set is a big step up from trying to do it on a computer monitor. You get to see color differences (although with some other distortion) and interlace problems, which are the two main items that cause problems with computer-generated footage. But there are distinct advantages to using a real video monitor, despite the additional cost. And by real video monitor, we mean a monitor purpose-built for monitoring video signals, not for watching TV.

We've already discussed two of the differences: color temperature and standard phosphors. Color temperature is the more important of these and, fortunately, it's an option found on most video monitors. Standard SMPTE-C or EBU phosphors are nice, but do add to the cost of the monitor.

The big advantage of a real video monitor is that it comes with a "Blue Only" button. Pressing this button routes the blue color signal to all three CRT guns, giving you a black-and-white picture representing just the blue portion of the image. This serves two purposes: the blue portion of the image is often the noisiest, so viewing just blue gives you a better idea of how noisy your material is; but more importantly, using just the blue channel is an important part of the calibration process. There are solutions to the lack of a Blue Only option, but having it does make calibration much simpler.

Professional video monitors also offer a variety of other options, and you can spend as much money as you want buying the biggest, most

accurate monitor available. But having a monitor with standard phosphors, correct white point, and a Blue Only button will make video monitoring more accurate and simpler for you.

Calibrating the Monitor

To calibrate your video monitor, display a set of SMPTE color bars. Be sure that the bars you use are correctly calibrated. Depending on your video output board, codec, and other factors, the color bars must be generated differently. Using incorrect color bars will mean that your monitor will not be calibrated correctly.

Many of the "color bar" image files you'll find floating around on the 'net are not correct. One source of correct color bars is Test Pattern Maker, a free Macintosh utility program available from <http://www.synthetic-ap.com>.

Adjusting Chroma and Hue

To adjust the Chroma and Hue controls, first locate them on the monitor. They may be located behind a door, and the Hue control may be labeled Phase on some monitors. Some monitors also have a "control lock" function which disables the controls; if your monitor has such a lock, make sure the controls are unlocked. Next locate and engage the Blue Only control on your monitor. If your monitor doesn't have a Blue Only control, you can make the adjustments by viewing the monitor through a Wratten 47B dark blue photographic filter, which can be purchased at any well-stocked camera store. Some monitors have individual controls for the red, green and blue guns instead of a Blue Only switch; in that case, disable the red and green guns so you are left with a blue image.

With the Blue Only switch engaged, or while viewing through the 47B filter, you should see four brighter bars with three darker bars separating them. At the bottom of each of the four brighter bars is a small rectangular bar segment. Pay no attention to the other parts of the display.

You can now start adjusting the Hue and Chroma controls. The goal is to make the color and brightness of the brighter vertical bars match the rectangular bar segments below them using only the Hue and Chroma controls. Adjusting the Hue control mainly affects the two middle bars, while adjusting the Chroma control mainly affects the

two outside bars. Continue adjusting both controls until all four bars match. Once all bars match, turn off the Blue Only switch.

Adjusting Brightness and Contrast

Locate the Brightness control on the monitor. Find the sixth (red) bar on the screen. Directly below this bar at the bottom of the screen you should see three narrow vertical bars which are different shades of gray. If the gray bars aren't visible, increase the Brightness control until the three bars can be clearly seen.

Reduce the Brightness control until the middle gray bar just disappears from the screen. The three gray bars are known as the PLUGE (Picture Line-Up Generating Equipment) bars. The middle bar should be black, the right bar just barely visible as a very dark gray, and the leftmost bar should also be black and blend into the middle bar,

Depending on your video output card, and the codec it's using, the leftmost of these three bars may be missing and the same shade of gray as the middle bar. This is a limitation of the codec's ability to produce a blacker-than-black video level. While not ideal, it won't stop you from being able to calibrate your monitor: simply concentrate on the middle bar as you make the adjustments described.

Now locate the Contrast control. Adjust it until the white reference square at the lower left of the screen is bright enough to appear white, but not so bright that it is too bright to look at or causes the adjacent squares to glow. The Brightness and Contrast controls interact, so just keep adjusting them until you get the right combination of settings.

Once you have the Brightness and Contrast controls adjusted, the monitor calibration is complete.