C.M.S.

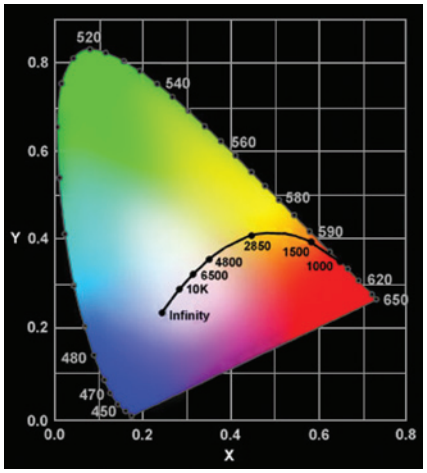
WHAT IS IT?
WHY DO WE NEED IT?
HOW DO WE MAKE IT WORK?

Terry Paullin teaches Imaging Science and other courses for the Imaging Science Foundation (ISF).

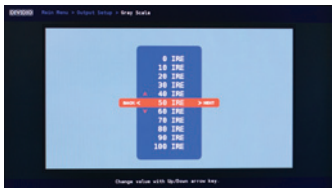
He has written articles/product reviews for major industry publications, including Widescreen Review, The Perfect Vision, The Ultimate Guide to A/V, WIRED magazine and CEPro and has maintained a monthly column (One Installer's Opinion) in Widescreen Review for the past ten years.

Mr. Paullin performs ISF monitor calibrations for private individuals. In 1988 he formed Front Row Cinema to design, build and calibrate Home Theaters for private residences.

CMS stands for Color Management System.
The term surfaced about two or three years ago on display products whose "CMS" adjustments fell far from the mark. They were two dimensional, hard to use and at the end of the day, did little or nothing to fix the targeted problems. As the technology has continued to mature, "CMS" has become a term that now has a broader meaning to encompass a wider variety of adjustments intended to "manage" all things that have a significant impact on color — specifically, grayscale, gamma and gamut.



Grayscale is a display of a gradual increase of light output from black (a.k.a. 0 IRE) to white (a.k.a. 100 IRE) whose color is constant. There are several standards for the right mix of Red, Green and Blue that yield a "white point", but the primary one for our purposes is the one used for broadcast video and Movie mastering called D65, or 6,500 Kelvin — an expression of color temperature. Most displays, under the banner of "Advanced Settings" or in a separate service menu, offer some degree of adjustment that effects color temperature.



Gamma refers to the non-linearity of the grayscale, that is, the amount of light a display puts out per unit of drive. It's usually expressed as an average with a single number, like 2.2 The reason this function has to be non-linear is because all modern display technologies must emulate the light output characteristics of the venerable CRT, which, were indeed, non-linear.

Here's the thing.

Previous to "Solid State" devices, all (video) content was captured by tube type cameras and rendered back on tube type displays. The inherent non-linear light output of these devices essentially cancelled each other out, presenting a mostly linear (smooth) light output to our eyes. As soon as we moved away from tube type devices we needed to make their replacements emulate this non-linear gamma behavior — hence the term "gamma correction". If we didn't do this, we would lose a trillion hours (plus or minus) of archived video content since the late '30s. (Lots of boomers still Love Lucy).

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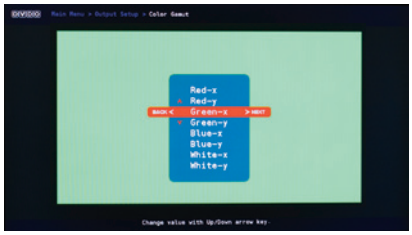
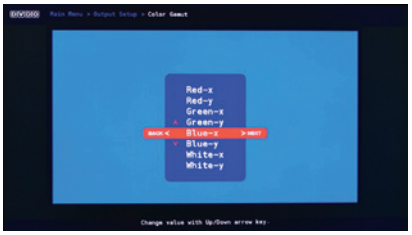
Today, we have the ability to "play" with gamma a bit. While there are generally accepted standards for what "gamma" should be, as we work in Home Theaters with very different ambient light environments, we may chose to "come out of black" faster or slower. For example, a pitch black dedicated theater might be happier with a gamma of 2.5, while a plasma hung in the sunroom may need a gamma closer to 1.8.





Gamut (often confused with Gamma) has to do with what points (x,y coordinates) on the C.I.E. chromaticity chart does the display place the primary colors of Red, Green and Blue. Secondary colors, Yellow, Cyan and Magenta are derived from these points. As my friend Joel Silver likes to say, "How big is the box of crayons" available to render an image. The larger the box, the more saturated the colors. We like saturated colors. Primary color points in CRT and Plasma displays are determined by the kinds of phosphors selected by the manufacturer. Other display technologies tend to filter a white light source. Specially "grown" LEDs are the new kid on the block. Just like color temperature, there is only ONE right place for Red, Green and Blue if we want to preserve the Director's Art and see what the Cinematographer had in mind. So when a manufacturer proudly proclaims he has 130% more colors, what he is really saying is that his primaries are 30% over-saturated (compared to HDTV standards), turning the Director's Art into something more like a cartoon. This is a serious color "artifact" that, as calibrationists, we need to fix. If the "box of crayons" the manufacturer used is too small, there is little we can do. If, however, the "triangle" of primaries is larger than it should be (the current trend), outboard video processing can bring these points back to where they belong. When this kind of correction occurs, from a color standpoint, you are turning a $1,500 flat panel into a $10,000 studio broadcast monitor!

So how do we bring all this magic into the living room? Simple. Employ the new iScan Duo from DVDO. While not the first box to accomplish these feats, it is, in this installer's opinion, the first to do it at an affordable price and, perhaps more importantly, with a user friendly menu system that lets you interact with the display in an easy, efficient way. To be clear, you can't make these advanced adjustments with your eye. You will need a colorimeter (analyzer) that reads x,y chromaticity and light output expressed in foot lamberts or candela/meter squared. A little experience wouldn't hurt either. The tools that the DUO brings to the table are an eleven-point grayscale adjustment capability (9 more than most conventional TVs) and the ability to "drag" the primary color points around to the limit of the "crayon box". Even if you can't nail the primaries to the exact ATSC specs, chances are you can make each one significantly better. With the aid of readily available CalMAN calibration software from SpectraCal, you can run multiple gamma curves at the push of a single button and then select from those choices built into the display or shape your own using the iScan Duo.

FINALLY, true CMS can be accomplished without the migraine of more complex adjustments or the second mortgage required to get them. Totally apart from comprehensive CMS, the iScan Duo has much more to recommend itself, including several flavors of advanced video processing from Anchor Bay, 8 HDMI inputs and an audio-only HDMI output so you no longer have to worry about what the AVR is doing to your pristine video signal, but those features are the subject of other publications.

I spec an iScan Duo into every system with a 50" or larger display — it's the best "referral insurance" I know of.

Terry Paullin

ISF Instructor

Home Theater Evangelist

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300 ORCHARD CITY DRIVE • M/S 131 • CAMPBELL, CA 95008

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sales@dvdo.com
www.dvdo.com

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