Glossary of Video Terms for Color Grading

What you will learn:

Definitions of the terms that are used to define color spaces and color grading technologies, terms and tools.

Tektronix®

Glossary of terms for Color Grading

10-bit The number of levels available in a digital video signal. 10-bit offers 1023 levels, four times the accuracy of 8-bit, and vastly superior for telecine transfers and chroma-keying.

4:2:2 The sampling ratio used in the D1 (CCIR 601) digital component video signal. For every 4 samples of luminance there are 2 samples each of R-Y (Red minus Luma) and B-Y (Blue minus luma). Thus it has full black and white resolution, but only half the color information. The best digital standard in the early 1990's.

4:4:4 A sampling ratio that has equal amounts of the luma and both chrominance channels. The new digital component video standard that has full color information as well as full black and white information. 4:4:4 provides better color resolution than ever before, improves telecine transfers and chroma-keying.

8-bit The number of levels available in an older digital video signals. 8-bit offers 255 levels. D1 and Digi-Beta are 8 bit

Additive Color Color mixture by the addition of light of the three primaries, red, green, and blue.

Artifact The usually unwanted, visible effect caused by a technical limitation of a process or system.

Black Crushing Loss of low light (shadow) detail caused by adjusting luminance information below the Black Level.

Black Level Signal Level corresponding to minimum light output, (the shadow area).

Bleach Bypass/Reduction A cross processed film look resulting from a reduced or skipped bleach bath during color film processing. Some of the silver image remains and less of the color dye is coupled creating a distinctive contrasty faded look.

Bokeh Blurry, out of focus points of light

Burn Out 1) A loss of information in highlights usually as a result of a system clip or limit. 2) Instruction to a colorist to increase gain levels so much that the lighter parts of the image become white, and highlight detail is lost.

Chrominance (also known as chroma) 1) The color part of a video signal. 2) The property of light which produces a sensation of color in the human eye, apart from any variation of luminance which may be present.

Color Gamut In a system employing three color primaries to encode image color, each primary can be located on a CIE chromaticity diagram and these points connected as a plane figure. If the apexes are then connected with an appropriate value on the white point axis, a solid figure is produced enclosing the color gamut for that system. (On the CIE chromaticity diagrams, the points in x, y, z space approximates an inverted tetrahedron. In u, v, w space, they become a somewhat irregular four-cornered solid.) Colors within the color gamut solid volume can be reproduced by the system as metameric matches. Colors outside the color gamut solid volume cannot be matched. Note: The area of the cross-section from the color gamut solid is a function of the luma. Although it is advantageous to have the widest possible color gamut for the ability to provide metameric matches for the largest number of colors, the required transformations from origination colorimetry to colorimetry matched to available display primaries, for example, may require large matrix coefficients and, therefore, a signal-to-noise penalty. The choice of color gamut is a compromise between color rendition and signal-to-noise.

Clipping Electronic limits imposed to prevent signals exceeding maximum levels for white, black and chrominance. Hard clips simply remove all data at a define level. Soft clips attempt to retain some data by compressing the signal. See also Legal Color Limiting.

Color Balance The removal of color casts from an image. Also the removal of color casts from a camera or monitor.

Color Cast An overall bias of a single color, to an image, camera or monitor. May or may not be intentional. Examples include sepia toning, uncorrected tungsten lights on daylight film and tobacco filters.

Color Grading Adjusting the color balance and contrast of an image to compensate for unwanted flaws or deficiencies in a capture or conversion process, so that the image will more closely matches the original. Examples of flaws are overexposure, underexposure, or colorcasts and flaws include limited dynamic range or a change of color space. The goal is to achieve the “natural image”.

Color Enhancement A change to the image that does not necessarily reflect reality, but which is intended to add emphasis or meaning to the image. The colorist often uses shapes, keys, mattes and more specific tools to modify the “natural image” for aesthetic style, emotional value and visual impact. The term usually refers to digital post production tools rather than film lab systems. Enhancements may or may not be planned at the shooting stage.

Color Temperature The precise measurement of light, in degrees Kelvin (K) which represents the color of light emitted by a black body when heated to that temperature. Tungsten light is about 3200K, skylight can be upwards of 10,000K. The black body curve used to measure color temperature is a range between red and blue two lights of the same color temperature can look different by containing more or less green. Warmer color temperatures are lower. Cooler temperatures are higher.

Contrast A term referring to how far the whitest whites are from the blackest blacks. , "Contrast" is the general term for the property called "gamma" (Y). If the peak white is far away from the peak black, the image is said to have high contrast. With high contrast, the image is very stark and very "contrasty", like a black-and-white tile floor. If the two are very close to each other, the image is said to have poor, or low, contrast and looks gray.

Digital Intermediate The process of manipulating color and other characteristics of digital images prior to theatrical release. It is similar to the telecine process which is intended for video and television formats. DI is currently used for both film and video markets and typically involves software and a data workflow rather than hardware and a tape based pipe line.

Display - Diamond Allows you to determine which colors are contributing to Gamut errors in the RGB domain.

Display – RGB Parade A waveform display of the video levels for Red, Green and Blue components. Where the signals are paraded side by side next to each other in RGB order.

Display - Spearhead Allows you to perform color adjustments in terms of lightness, saturation and value.

Display - LQV Allows you to see color cast in specific luma ranges (highs, lows, or mid-tones).

Dynamic A gradual change. Usually a dynamic is defined by two or more keyframes which determine start and end values and allow in between frames to be calculated (color) or generated (animation). In color grading a dynamic is a gradual change of parameter values over a number of frames. The term is sometimes used (misleadingly) to mean an edit transition such as a dissolve.

Dynamic Range 1) The difference between the brightest and darkest parts of an image. 2) The brightest and darkest detail a capture medium can record.

Flat 1) Low contrast. Flatness does not necessarily affect the entire density scale to the same degree. Thus, a picture may be "flat" in the highlight areas, or "flat" in the shadow regions, or both. 2) A video transfer is said to be “flat” if it is remains the same as the original and no changes or enhancements are applied.

Gain 1) The adjustment of highlight information (telecine). 2) The ratio of output signal to input signal of any electronic processing.

Gamma Since picture monitors have a nonlinear relationship between the input voltage and brightness, the signal must be correspondingly pre-distorted. Gamma correction is always done at the source (camera) in television systems: the R, G, and B signals are converted to R 1/g, G 1/g, and B 1/g. Values of about 2.2 are typically used for gamma. Gamma is a transfer characteristic. Display devices have gamma (or at least CRTs do). If you measure the actual transfer characteristic of a CRT used for either television display or computer display, you will find it obeys a power law relationship:

Light = Volts^gamma

where gamma is 2.35 plus or minus 0.1. CRTs have values between 2.25 and 2.45, 2.35 is a common value. It is a function of the CRT itself, and has nothing to do with the pictures displayed on it. CRT projectors are different, green tubes are typically 2.2 while red is usually around 2.1 and blue can be as low as 1.7. But there are no direct-view CRTs which have values lower than 2.1. Pictures which are destined for display on CRTs are gamma-corrected, it means that a transfer characteristic has been applied in order to try to correct for the CRT gamma. Users of TV cameras have to accept the characteristic supplied by the manufacturer, except for broadcasters who have adjustable camera curves (the video engineers adjust the controls until they like the look of the picture on the studio monitor in their area). Even so, no TV camera uses a true gamma curve, they all use rather flattened curves with a maximum slope near black of between 3 and 5. The higher this slope, the better the colorimetry but the worse the noise performance.

Gamut The range of voltages allowed for a video signal, or a component of a video signal. Signal voltages outside of the range (that is exceeding the gamut) may lead to clipping, crosstalk, or other distortions.

Gamut Displays Tektronix proprietary displays for monitoring gamut: Diamond, Spearhead and Arrowhead.

Hue The property of light that discriminates one color from another.

Illegal Video A video signal that falls outside the appropriate gamut for that format. For instance, the gamut limits for an R’, G’, B’ signal are 0 mV to 700 mV and Y’ is 0 mV to 700 mV and P’b/P’r are +/-350 mV. If the signal falls outside of these limits it is an illegal value.

Latitude The range of exposure a film stock can tolerate and still give substantially correct reproduction.

Legal Signal A signal in which each component remains within the limits specified for the video signal format; that is, it does not exceed the specified gamut for the current format. For instance, the gamut limits for an R', G', B' signal are 0 mV to 700 mV and Y' is 0 mV to 700 mV and P'b/P'r are +/-350 mV. If the signal remains within these limits the value is legal.

Legal Color Limiting Method of clipping an electronic signal to conform to user defined maximum and minimum levels.

Low Key A scene is low key if the tonal range of the reproduction is mostly in the high density (shadow) range of the process and contains few mid tones or highlights.

Luminance The black and white, or brightness, part of a component video signal.

Monochrome An image consisting of only one color. Often used to mean Black and White.

Pluge "Picture Line Up Generating Equipment". Now used to mean a specific test pattern used to align the brightness of monitors. The pattern consists of black at -2%, 0% and +2%, and black, mid gray and white patches.

Primary Grading In colorist terminology "primary" gradings are those that affect the overall color balance of an image. The da Vinci 888 provides 64 Bit four channel (YRGB) Primary processing. Others refer to telecine gradings as "primary" and external gradings, such as those from a da Vinci as "secondary".

Saturation A measure of the dilution of a pure color with white light. The amount of color in a picture.

R, G, B Color Space A) An additive color space with colorimetric coordinates based on red, green, and blue stimuli or primaries. Color values are negative in certain areas outside the gamut defined by the R, G, B primaries. The R, G, B values used are intensities. B) The three linear video signals carrying respectively the red, the green, and the blue information. By convention the unprimed symbols signify that there is a linear relationship between the luminance in each spectral region and the corresponding video signal. The spectral composition of the luminance forming each of these signals is one of the specifications required of the video system. The recently adopted CCIR Rec 709 reflects worldwide agreement on the current definition of R, G, B primary colors. CCIR Rec 709 identifies this as an interim agreement to be superseded by preferred primary colors encompassing a wider color gamut as soon as the technologies and practices permit.

C) The colorimetric coordinates defined bythee nonlinear video signals carrying respectively the red, the green, and the blue information. By convention the primed symbols signify that there has been a nonlinear transformation of the video signals vs. luminance, relative, scene, with its resulting modification of the opto-electric transfer function.

Secondary Grading Color grading that affects only affect a specific color range within an image or a specific geographic region within an image (like a vignette or "window.")

Specular Highlights A very bright highlight reflecting from a highly reflective surface, such as glass, chrome, metal, highly polished surfaces or water.

Telecine A device that scans images from motion picture film, usually in real time. Telecines were originally designed for video transmission, and pre date VTRs. Modern telecines also output data at resolutions up to 4k.

Thin As applied to a negative, having low density, usually as a result of underexposure. The image from a thin negative will be very dark, with little or no shadow detail. Stretching the contrast will enhance film grain.

Waveform Monitor & Rasterizer A Tektronix waveform monitor is an instrument to measure or monitor video or audio signals – and may or may not include an integrated display. A WFM waveform monitor series has an integrated display that is ideal for space constrained environments. A WVR series rasterizer requires an external display to view the waveform displays.

White Balance Compensation for tints caused by ambient light. In simplest terms it is defined as daylight or tungsten but most digital cameras can be more accurately calibrated.

Glossary compiled with the help of Kevin Shaw; www.finalcolor.com

For additional Video terms, click here to download Tektronix' Video Glossary.

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Contact List Updated June 2013

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07/13 EA/WWW 25W-29176-0

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