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Desktop Video: Glossary of Terms (Q-T) (8/93)

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TOPIC ---

This article describes desktop video terminology, words "Q" through
"T".

DISCUSSION --

Radio-frequency (RF) modulator
A device that makes your television set work as a monitor. See
modulator.

Rank
The brand-name of a device used for film-to-video transfer. See
telecine.

Raster
The rectangular, repeating pattern of lines scanned in a video monitor
or camera pickup tube creating the video image. The scan is a
continuous cycle regardless of the image content.

RCA connector
A connector typically used for audio and video signals, with some
professional equipment and most consumer equipment. Compare BNC
connector, XLR connector.

RCA connector
A connector typically used for cabling in both audio and video
applications.

Registration
(1) An adjustment associated with color monitors and projectors to ensure
that the three electron beams (the three primary colors) are hitting
the proper color dots/stripes on the phosphor screen, A similar
adjustment exists on color tube cameras.

(2) The alignment of film frame-by-frame in a camera, projector or telecine. Good registration is critical in order to eliminate gate weave. See gate-weave.

Resolution
A measure that shows to what extent details can be distinguished on the TV screen. Generally called horizontal resolution when referring to a video image. It can be evaluated by establishing the limit to which lines can be distinguished on a test pattern with the naked eye. A broader frequency band of the video signal permits a higher resolution.

Macintosh video has a bandwidth of 30 MHz, resolving color images at 640 pixels by 480 pixels. This exceeds the capabilities of an NTSC composite signal.

RF
Radio Frequency refers to a composite video signal superimposed on a very high (radio) frequency capable of being broadcast through the atmosphere. Standard television sets receive these signals, separate the composite signal from the RF, and then decode and display the composite signal.

Until recently, television sets were designed to receive only RF signals, which were applied to their antenna terminals. VCRs, videodisc players and some computers provide RF signals for use with televisions. The process of mixing composite video with RF, only to have it removed again by the television, further degrades the image quality.

RGB
Red, Green, Blue. Refers to three monochrome signals representing the primary colors of the image. RGB signals are provided on individual outputs with composite sync available either on a fourth output or combined with the green signal. RGB signals can be interlaced (timed to NTSC standards) or non interlaced (at higher sync frequencies).

RGB monitor
A type of color monitor that receives separate signals for each color (red, green, and blue). See also composite video.

RGB, RGB Format, RGB System
Red, Green, and Blue. The basic parallel component set, in which a signal is used for each primary color; or the related equipment or interconnect formats or standards. The same signals may also be called GBR as a reminder of the mechanical sequence of connections in the SMPTE interconnect standard. See RGB component. Compare component video.

Rise time
The time taken for a signal to make a transition from one state to another; usually measured between the 10% and 90% completion points of

the transition. Shorter, or faster rise times require more bandwidth in a transmission channel.

Rotoscope
A camera set up that projects live-action film one frame at a time onto a surface so that an animator can trace complicated movements. The completed animation film exactly matches the motion of the original action.

RS-170
The EIA (Electronics Industries Association) standard that defines the timing of broadcast video in the United States, Japan, and several other markets. It specifies a 15.75-KHz horizontal and a 60-Hz vertical interlaced scan frequency as well as other aspects of the composite signal such as voltage, sync levels and timing of blanking. Interlacing is the process by which two fields, called scan lines, are interleaved on the screen. Due to the limitations of video devices at the time the standard was being set in 1957, the speed of broadcast signals and picture tubes required the image to be displayed in parts.

The solution allowed the partial update of video pictures to remain unnoticed to the viewer. An RS-170 video frame contains 525 lines and is displayed 60 times per second—for a total of 15,750 lines, or 15.75 KHz. Of these lines, only the odd or even lines are displayed with each frame. A total of 60 frames per second allows 30 frames per second, or a 30-Hz update of each line.

Like the RS-343 standard, RS-170 is strictly a timing specification for monochrome video signals. By combining three such signals to control individual red, green, and blue sweep circuits, you can create a full-color system. The RS-170 mode is available with the Macintosh video card as a way for VCRs and large screen projectors, not capable of high-frequency scans, to interface with the Macintosh.

Compare RS-343, RS-170A, RS-170 RGB.

RS-170 RGB
Refers to RGB signals timed to RS-170 specifications. Since the red, green and blue signals are actually individual monochrome signals representing their respective colors, RS-170 RGB merely refers to three black and white signals sharing one sync signal which is either provided separately as a fourth signal or (usually) combined with the green signal. Compare RS-170A, RS-170.

RS-170A
Twenty years after the drafting of RS-170, the EIA video signal standard proposal RS-170A evolved into what is known today as the NTSC composite video signal. RS-170A specifies timing of scans (essentially the same as RS-170: 15.732 KHz horizontal and 59.94 Hz vertical) and blanking as well as the 3.58 MHz burst required to decode the color signals. As adopted by the FCC for broadcast use, the standards are precisely adhered to and carry the force of law. For non-broadcast use, EIA standards are merely recommendations and are not enforced.

Specifications referring to RS-170A do not necessarily mean the signals are broadcast standard. RS-170 RGB, RS-170.

RS-343
An EIA (Electronics Industries Association) standard for non-broadcast high resolution monochrome video, specifying a 60 Hz non-interlaced scan with a composite sync signal with timings that produce a non-interlace (progressive) scan at 675 to 1023 lines.

While the Macintosh version of the RS-343 signal varies somewhat, it essentially follows the guidelines necessary for connection to RS-343 display devices. Therefore, with a display adapter (available from Covid , Extron, or Inline) the Mac can drive a RS-343 device (i.e. video projector or large monitor).

The major differences between Macintosh video and the RS-343 standard are: a separate TTL level composite sync signal on pin 3, the separate video lines used to produce RGB color, a vertical scan rate of 66.67 Hz to reduce screen flicker, and a voltage white level of 1 volt for its red and blue signals and 1.3 volts on its green signal. RS-343 provides for a 60-Hz signal but has been changed to 66.67 Hz on the Macintosh video card to prevent the screen flicker which is visible at 60 Hz. The inclusion of the analog composite sync found on pin 5 of the video card connector, called the green signal, allows for monochrome composite video.

S-video
A consumer form of component video (Y/C) used primarily with Hi8 and S-VHS equipment.

Safe title area
80 percent of the TV screen, from the center of the screen; that area of the display screen (and therefore of the camera scanning area) which will reproduce legible title credits no matter how poorly adjusted the monitor or receiver may be.

SC phase
The phase of the color subcarrier.

Scan converter
A device that changes the scan rate of a video signal and may also convert it from non-interlaced to interlaced mode. A scan converter allows computer graphics to be recorded on videotape or displayed on a standard video monitor.

Scan rate
The scan rate is the time it takes the electron gun to move across one line of the screen or repeat one entire screen. These values are known as the horizontal and vertical scan rates, respectively. The number of times a screen is redrawn each second. Computer display scan rates differ from standard video scan rates.

Scanning

The rapid movement of the election beam in a pickup device of a camera or in the CRT of a television receiver. It is formatted in a line-for-line manner across the photo sensitive surface which produces or reproduces the video picture.

SECAM

Systeme Couleur Avec Memoire. The television broadcast standard for France, the USSR and various eastern European countries. Like PAL, SECAM is based on a 50 Hz power system, but it utilizes a different encoding process and displays 819 lines interlaced at 50 fields per second. The color information is transmitted sequentially (R-Y followed by B-Y, etc.) for each line and conveyed by a frequency modulated subcarrier that avoids the distortion arising during NTSC transmission. SECAM is not compatible with NTSC or PAL, although conversion between the standards is possible.

Serial device control

Most professional video equipment can be controlled via an RS-232 serial port. The protocols used for controlling these devices varies from vendor to vendor, however, Sony's protocol is supported by most editing systems.

Signal-to-noise ratio (S/N)

An S/N ratio can be given for the luminance signal, chrominance signal, and audio signal. The S/N ratio is the ratio of noise to actual total signal, and it shows how much higher the signal level is than the level of noise. It is expressed in decibels (dB), and the bigger the value is, the more crisp and clear the picture and sound will be during playback.

SMPTE

Society of Motion Picture and Television Engineers, pronounced "simptee." An organization which studies and proposes standards for the film and television industry.

SMPTE format, SMPTE standard

In component video these terms refer to the SMPTE standards for parallel analog component video interconnection. The SMPTE has standardized both RGB and Y, Pr, Pb color difference systems (a version of Y, B-Y, R-Y).

SMPTE timecode

A coding scheme standardized by the Society of Motion Picture and Television Engineers (SMPTE). Frame accuracy is achieved through timecode, a method of coding a unique "stamp" on each frame. Timecode consists of four numbers representing hours, minutes, seconds, and frames, for example, 23:59:59:29.

Since color video actually runs at 29.97 fps rather than 30 fps, two kinds of timecode have evolved: drop fame and non-drop frame. Drop-frame timecode literally drops certain agreed-upon numbers to compensate for the 0.03 fps discrepancy. Drop-frame timecode allows a 30:00:00:00 tape to really be 30 minutes long, which is critical in

broadcast applications. For non-broadcast applications it tends to do nothing but create problems, and non-drop-frame timecode is usually preferred.

Most of the low-end videotape formats, like VHS and Video 8 do not have timecode. They can count frame pulses on the tape, but are not frame-accurate. Sony has introduced "8mm timecode" in order to support more accurate editing applications with Hi8.

There are two basic techniques used to record SMPTE time code on videotape, see longitudinal time code (LTC) and vertical interval time code (VITC).

Snow
(1) Random noise on the display screen, often resulting from dirty videotape heads. (2) TV signal breakup caused by weak or no video reception.

Sound digitizer
A device for recording natural sounds and voices and storing them as computer files. Once digitized, the audio can be easily edited or used to create various effects. On the low-end there are products like the Farallon MacRecorder or Apple's built-in capability on some Macintosh models. With the AudioMedia card or Pro Tools interface from DigiDesign, CD-quality sound digitizing is possible with the Macintosh.

Split screen
A special effect utilizing two or more video sources so that two or more scenes are visible simultaneously on each part of the screen. Often used to make window-dubs of multi-camera shoots. A useful means for comparing two sources simultaneously. Permits a fast visual check of the phase and sync timing between two inputs.

Staircase
A pattern generated by the NTSC generator, consisting of equal width luminance steps of 0, +20, +40, +60, +80, and + 100 IEEE units and a constant amplitude chroma signal at color burst phase. Chroma amplitude is selectable at 20 IEEE units (low stairs) or 40 IEEE units (high stairs). The staircase pattern is useful for checking linearity of luminance and chroma gain, differential gain, and differential phase.

Standard, interconnect standard
The specific signal configuration, reference pulses, voltage levels, etc. which describe the input/output requirements for a particular type of equipment. Some standards have been established by professional groups or government bodies (such as SMPTE or EBU). Others are determined by equipment vendors.

Still video cameras
Still video cameras are cameras that look like something in-between a still and a video camera. The Sony Mavica records on a two-inch disk

that holds 25 frames or 50 fields on flexible disks which are erasable and reusable. The encoding is analog component, but with less bandwidth (and therefore a noticeably lower quality image).

Electronic still photography has been used for "electronic journalism," where images are shot in the field and sent by modem from any available phone. These cameras have already begun to replace still picture film cameras for many applications which do not require the high resolution and image quality of 35mm still picture film.

Sub-carrier
A 3.58 MHz signal modulated by color signals and combined with luminance signals to produce an NTSC composite video signal.

Subcarrier (SC, 3.58, 3.58CW)
This is the basic signal in all NTSC sync signals. It is a continuous sine wave, usually generated and distributed at 2 volts in amplitude, and having a frequency of 3.58 MHz. Subcarrier is usually divided down from a primary crystal running at 14.32 MHz, and that divided by 4 is 3.58. All other synchronizing signals are directly divided down from the subcarrier.

Subcarrier phase shifter
Special circuitry designed to control the phase relationships of the two portions of the encoded color signal so that they maintain their correct relationship during recording transmission and reproduction.

Switcher, video switcher
The switcher is the central router and mixer of video source material in an on-line suite. Switchers are generally analog devices, and are capable of performing analog effects as well as switching incoming channels. These effects include fades and dissolves, wipes and borders, and keys (opaque overlays based on replacing black or a particular color). In earlier days this was called the "special effects generator" or SEG.

Sync
 Short for synchronous. Refers to signals used to synchronize the horizontal and vertical scans of a video signal. This signal is derived from a composite or combination of horizontal and vertical drives, with some slightly narrowed and delayed pulses as well as the addition of equalizing pulses. When used, is usually accompanied by subcarrier.

Synchronization of video tape recorders
In order for any mixing or editing of video signals to occur, all source and record decks must be in sync with each other, running at exactly the same speed and in identical phase. You can picture the process as being similar to transferring goods between high-speed trains running alongside each other. In editing facilities, all decks are fed a common sync signal, called "house sync." See pre-roll. Without synchronization, each individual transport would all run at slightly different rates. Analog tape transports, being mechanical,

have small fluctuations in tape speed called "wow and flutter". The capstans on tape machines can slip over time as well, also generating changes in tape speed.

With disk-based systems there is no mechanical transport and no tape. Instead, the playback and record speeds are controlled by quartz crystal oscillators. However, no two oscillators are exactly the same, and an oscillator's frequency can vary with time and temperature. What all this means is that any two transports, even when started at exactly the same time, will begin to drift apart over time and the audio on the different systems will eventually drift out of sync. Synchronization is achieved in these systems by constantly checking to see the current SMPTE frame, and adjusting the playback speed to keep all devices locked. In analog systems, this is achieved by automated motor speed control. In digital systems it is achieved by adjusting the playback sample rate. See sync, SMPTE time code.

Synchronous
Able to perform two or more processes at the same time, such as sending and receiving data, by means of a mutual timing signal or clock. Compare asynchronous.

Synchronous transmission
A transmission process that uses a clocking signal to ensure an integral number of unit (time) intervals between any two characters. Compare asynchronous transmission.

Telecine
(1) A device which consists of a projector without the lens and a video camera aimed directly at the illuminated film to record it. A telecine projector incorporates a five-bladed shutter splitting the film into 1/120 second flashes and resulting in two exposures of film for each video field. Since these would not necessarily be of the same film frame, the video fields would often have two different images superimposed. This can cause problems with videodisc still framing.

(2) A Rank or Bosch. These are the highest-quality devices for film-to-video transfer. Unlike a telecine projector, they do not use a lens. Instead, a dot of light on one side of the film and a light sensor on the other side is used to scan the film. The Rank uses a small picture tube as the source of the dot of light. This is called a flying-spot scanner. The Bosch uses a one-dimensional CCD array. Both the Rank and the Bosch produce excellent results. The Rank has the advantage of changing the scanning size electronically, allowing control over the size and position of the film area being scanned. Both of these machines have highly developed methods of color correction, allowing very selective work. For example, a single shade of color in a particular area of the picture can be changed without affecting anything else.

Television receiver
A device capable of accepting video signals broadcast as RF. Also capable of producing a demodulated video signal output from a off-air

input signal. Compare monitor.

Test pattern
An optical guide for television camera reference alignment.

Time base corrector (TBC)
A time base corrector, or TBC, is a device which corrects the timing
irregularities that occur during VTR playback.

Since synchronization between videotape decks is so important, it is
imperative that all decks perform at precisely the same speed. Speeds
always vary, at least slightly, due to VCR velocity errors and tape
stretch. TBCs are essential for any kind of multiple mixing of input
from videotape source decks, including wipes, dissolves, and overlays.
Each source deck must have its own TBC, and each must be synchronized
to "house sync."

TBCs are also used simply to "clean up" the timing of a recorded video
signal. These TBCs act like black boxes, taking in unstable video and
putting out stable video. Because they work alone, without house sync,
they are often called standalone TBCs.

Time base stability
The maintenance of the scanning process to very close tolerances. See
time based corrector.

Time code
See SMPTE time code.

Time code editing
By recording a sequential time code along with the video and audio
material, you can obtain a precise reference for editing. Each frame
has its own number or code which tells the time in hours, minutes, and
seconds, and includes a frame number. The industry standard code is
called SMPTE time-code .Time code permit very fast and accurate
editing. Automatic editing is possible using an edit controller. See
EDL, edit controller. Compare control track editing.

Timecode, 8mm
8mm timecode is a proprietary form of timecode used by Sony with some
of their Hi8 products. Compatibility problems in time-code editing
environments is solved by using a third-party device made by Horita
that converts the timecode from the Sony EVO-9850 and EVO-9800 editing
decks to standard SMPTE time code.

Title generator
A black and white camera that is used to shoot titles which are
electronically superimposed on the video picture while shooting or
during editing. Title color can be selected and changed independently.
A more sophisticated device know as a character generator (CG) can
generate titles directly.

Tracking

The angle and speed at which the tape passes the video heads.

Transcoder
A device used to convert from one video component set to another. For example, to dub a Hi8 tape to Betacam SP with the highest possible results, you would need to use a transcoding TBC which includes a transcoder capable of converting the Hi8 (Y/C) signal to the Betacam SP component (Y, R-Y, B-Y) signal.

TTL RGB
A type of video monitor that can accept only a limited number of digital values and display only a correspondingly limited number of colors. Compare analog RGB.

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