

SONY

Teleproduction Glossary

# GLOSSARY

**A Reference Guide for  
Industry Terminology**



**SONY**

**Teleproduction Glossary**

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**T**he teleproduction business is both blessed and cursed with constant change. Whatever each of us is doing today will surely change by tomorrow. Time and again we find ourselves christened "instant expert" in some area where, to tell the truth, we are not as comfortable as we wish we were. Sometimes we are thrust into an area where we have not worked for years. New job responsibilities and new technologies create a constant challenge to our ability to remain current in our field.

**I**n response to innumerable questions from our customers, Sony has developed this Teleproduction Glossary to serve as a guide to the special language of our industry. This glossary covers digital and analog teleproduction systems in a manner intended to be clear enough for the novice yet sufficient for the seasoned professional. It is our hope that you will find this glossary to be a valuable and frequently used tool.

**N**aturally, as the industry changes this glossary must grow and change. We at Sony anticipate future revised editions. Surely there are no greater experts in the terminology of our business than those who work in it. Therefore, we solicit your assistance in keeping the glossary current and complete. In the back of this booklet there are forms to be used for your contributions. If you find a term we have missed or if a new term suddenly surfaces please take a moment and send it to us. This will make the subsequent editions of the "Teleproduction Glossary" even more valuable.



Peter A. Dare  
Vice President, Product Management



**A-B Mix**

A video switcher transition where the video from the A-Bus dissolves out while the B-Bus video dissolves or “mixes” in, hence the name “A-B Mix.” The amount that one particular bus’ video predominates is determined by the relative position of the switcher fader arm, i.e., when the fader arm is all the way toward the A-Bus side then only the A-Bus video appears at the output. As the fader is moved toward the B-Bus side, however, the A-Bus video becomes less visible and the video from the B-Bus becomes more and more visible. At the point when the arm is moved all the way toward the B-Bus side, only the B-Bus video is visible, without a trace of the A-Bus video.

**A-Bus**

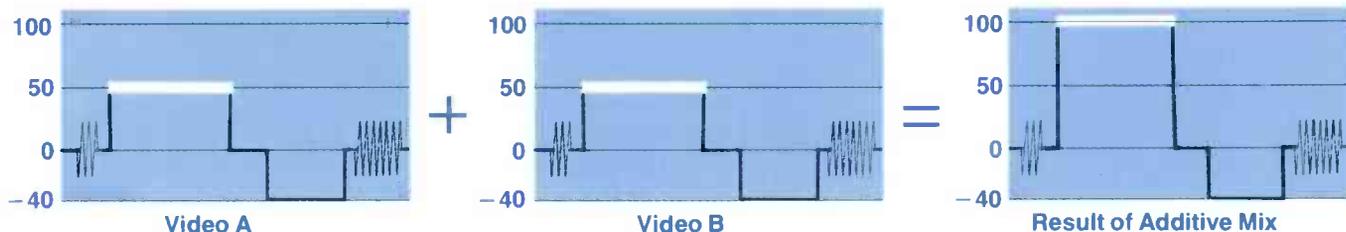
Any switcher bus designated “A”. See Bus.

**A/D**

Abbreviation for analog-to-digital converter.

**Additive Mix**

The type of video switcher mix where the video signals are simply added to obtain the final result. An additive mix results in an output which, at every point, is equal to the sum of the video signals being mixed. (Note that a clipping circuit should limit the final amplitudes to acceptable levels of about 100 IRE so that, for instance, if two 90 IRE signals are mixed, a 180 IRE signal is not seen at the output). See Non-Additive Mix.



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**Alias**

A form of distortion associated with signal sampling. See Anti-Alias, Sampling, A/D.

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**Analog-to-Digital Converter**

A device which transforms a signal from analog form to digital form. This is done by first taking *samples* of the analog signal at regular intervals. Each analog sample value is then *quantized* into a value suitable for use by the system. If these samples are taken often enough, the digital signal will be a faithful reproduction of the analog signal. To achieve this, the sampling frequency must usually be at least twice the highest frequency found in the analog signal being sampled. This minimum sampling frequency is called the Nyquist frequency. For example, if the highest frequency in the original signal is 2, Mhz (million cycles per second), then the Nyquist frequency is 4 million samples per second. If the original signal is not sampled at a high enough rate, the digital version will contain artifacts which are not found in the original signal. The resulting signal is then said to contain aliasing. Because of this aliasing, it is not a correct reproduction of the original. See Alias, Anti-Alias, Quantization Level, Sampling.

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**ANSI**

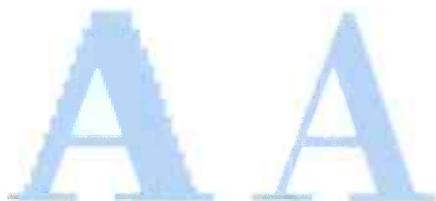
Acronym for the American National Standards Institute, a standards setting group.

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**Anti-Alias**

In connection with video signals, anti-aliasing is the electronic process of smoothing out the "stairstepping" which is often seen along the edges of diagonal lines or curved surfaces in a digital effect, digitally generated wipe pattern, or text from a character generator. This "stairstepping," or aliasing, would not be present if it were possible to sample the signal at an infinite rate. Although sampling at infinite rates would be ideal, due to technical limitations, sampling is done at finite rates and some degree of aliasing

is unavoidable. For this reason, devices such as character generators and digital effects equipment often have special circuits to soften, or anti-alias, the stairstep edges making them less noticeable. See A/D, Alias, Sampling.



**Without Anti-Alias Processing**

**With Anti-Alias Processing**

## Aspect Ratio

The relationship between the width and height of a video image. In NTSC, the aspect ratio is 4:3. On a video switcher the aspect ratio control provides the ability to distort the aspect ratio of a wipe pattern. For instance, a circle wipe can be transformed into a wipe with an elliptical shape. On a DME the aspect ratio control permits distortion of the video image itself. For instance, a tall thin person can be distorted into a short thin person (height change only) or into a short fat person (width and height change).



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**ASIC**

The acronym for Application Specific Integrated Circuit. This type of IC is designed to perform a particular job in a particular unit without regard to any possible other uses. Even though designing an IC is expensive, sometimes ASICs enable a manufacturer to reduce the final cost of a product when compared to the cost of the large number of separate (discrete) components that would be needed to perform the same function. ASICs usually reduce a unit's physical size and power consumption. ASICs are becoming very common in digital video equipment, for example, the Sony DME-450 uses 6 ASICs, which take the place of over 25,000 discrete components.

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**Assignable Wipe**

Switchers provide a selection of wipes which may be chosen by pressing the associated button on the control panel. Many switchers also have additional patterns stored in memory, called assignable wipes, which the factory has not assigned to a specific button. The manufacturer provides one or more wipe select buttons which have not been assigned to a particular wipe. The user can assign one of the additional wipes to each of the available buttons.

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**Auto-Phasing**

A switcher with auto-phasing has the ability to compensate for timing differences between its input signals so that it can perform transitions free of shifts. See Timing.

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**Auto-Transition**

A transition (e.g. a mix or wipe) which occurs without the use of a manual control such as a fader arm. Auto-transitions may be triggered from a button on the switcher, or externally, as in the case of an editor.

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**Aux Bus**

Same as Auxiliary Bus.

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**Auxiliary Bus**

Some switchers have extra switching busses that allow video signals connected to the switcher to be fed to external equipment such as digital effects systems, slo-mo VTRS, etc. An Aux Bus has no specific function for the switcher, it is a utility feature.

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**B**

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**B-Bus**

A switcher bus designated "B". See Bus.

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**Background**

1. Short form of the term Color Background.
2. One of the video sources involved in keying. Specifically, the background video is the video which has parts of it replaced with the key, or foreground video. When associated with chroma keying a weathercaster, for example, the background is the weather map and the foreground is the weathercaster. See Key.

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**Betacam™**

The Sony trademarked component analog video tape recording format consisting of the signals Y/R-Y/B-Y. Betacam format signals are recorded on oxide tape.

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**Betacam SP™**

The Sony trademarked Superior Performance analog component video tape recording format consisting of the signals Y/R-Y/B-Y. Betacam SP is recorded on oxide or metal tape.

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**Binary**

Term referring to a numbering system consisting of only two values, 0 and 1. Digital equipment uses this system because it is much easier to have individual electronic components turn off (state 0) and on (state 1) than it is to have the components assume definite voltage output values, as is required in analog equipment.

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**Bit**

A *Binary digit*. The smallest element of a digital word. See Binary, Byte, Digital Multiplication, Rounding, Truncation, Word.

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**Bit Rate Change/Convert**

A process by which a digital signal sampled at one rate is converted into one with a different bit rate. As an example, at times it is necessary to convert a component digital signal which was sampled at 13.5 Mb/s into a 14.3 Mb/s rate for use by composite digital equipment. In this example, in addition to the bit rate being changed, the data format was also changed, because the composite and component digital video formats are different.

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**Black**

1. Common term for the completely dark appearance of a monitor when it has no input signal other than sync (and possibly colorburst).
2. The video signal which causes the monitor to appear as in Part 1, specifically, in analog video, a signal with sync and no other information above the black level.
3. In component digital video, of the 256 quantization levels used to describe the Y signal, level 16 corresponds to black. (Level 0 is reserved for sync and levels 1-15 cater to out of range signals in the black region.) See Color Black, Black Burst.

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**Black Burst**

A video signal which has no luminance or chrominance components (except burst), but contains all other elements of a video signal. Black burst is the most common reference signal used for timing.

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**Black Clipper**

A circuit which ensures that the luminance signal components do not extend below the black level. This circuit is often adjustable, especially in the case of a processing amplifier. See Black Level, Processing Amplifier.

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**Black Edge**

A technique used to place a narrow black border around the characters of a caption or title. Sometimes used as a general term to describe other modes such as colored edges, drop shadows, and outline. See Border, Borderline™.

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**Black Level**

In an NTSC composite signal, 7.5 IRE, the lowest point in the signal that luminance components are permitted. It should be noted that the color, or chrominance, components do not have this restriction. Also called Setup.

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**Border**

A thickened edging, similar to a picture frame, placed around a key signal, a digital effect, or along the edges of a wipe. The thickness, color and softness of the edge are generally adjustable. See Soft Border, Matte Generator.



**Wipe Without Border**



**Wipe With Border**

<b>Borderline™</b>	The trademarked proprietary system for black edging marketed by the Grass Valley Group.
<b>Box Mask</b>	A key mask which has four sides, just like a box. The size, position and shape of the box may be adjustable. See Key Mask.
<b>Burst</b>	See Color burst, Subcarrier.
<b>Burst Phase</b>	See Timing.
<b>Bus</b>	A means by which one input can be selected from among several different inputs. The output of the bus is then sent to a specific destination, such as a mix effects amplifier (M/E), a keyer, a DME, or the switcher output. A minimum of two buses are required for even the simplest mix, wipe or key operation. Many switchers have at least 6 or 8 busses. Also spelled "buss."
<b>B-Y</b>	A color difference signal. The letters stand for the words Blue minus Y. B-Y signals are used in many different places, such as in the Betacam™ and Betacam SP™ analog component video tape recording formats. See Betacam™, Betacam SP™.
<b>Byte</b>	A binary data group usually consisting of 8 bits, e.g. 10101010. See Binary, Bit, Word.

## C

### Caption Key

Same as Title Key.

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### C<sub>b</sub>

The blue component of the component video signal described by SMPTE-125 and CCIR-601. It is a mathematically scaled version of B-Y.

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### CCIR

The acronym for the Comite Consultatif International des Radiocommunications. A UN regulatory body responsible for all forms of communications. It adopts standards and makes recommendations. See CCIR-601-1, CCIR-656.

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### CCIR 601-1

CCIR Recommendation 601 —“Encoding Parameters of Digital Television for Studios.” This was a recommendation adopted in 1986 by the CCIR which concerned digital component video systems in both 525 and 625 line systems. CCIR-601-1 specifies sampling rates for video signals and is often followed in many high end digital effects systems. For main digital studio equipment, this document recommends sampling the luminance (Y) signal at 13.5 Mhz and the color difference signals R-Y (or Cr, a scaled version of R-Y) and B-Y (or Cb, a scaled version of B-Y) at 6.75 Mhz each. The ratios between the sampling frequencies give rise to the term 4:2:2. See CCIR-656, SMPTE-125.

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### CCIR 656

CCIR Recommendation 656 “Interfaces for Digital Component Video Signals in 525-Line and 625-Line Television Systems.” A companion document to CCIR-601 which specifies the signal

format to be used and the particular characteristics of both serial and parallel digital interfaces. CCIR-656 only allows for 8 bit interfaces. It is not in general use, especially in the serial domain, largely because it does not consider 10 bit systems. See SMPTE-125.

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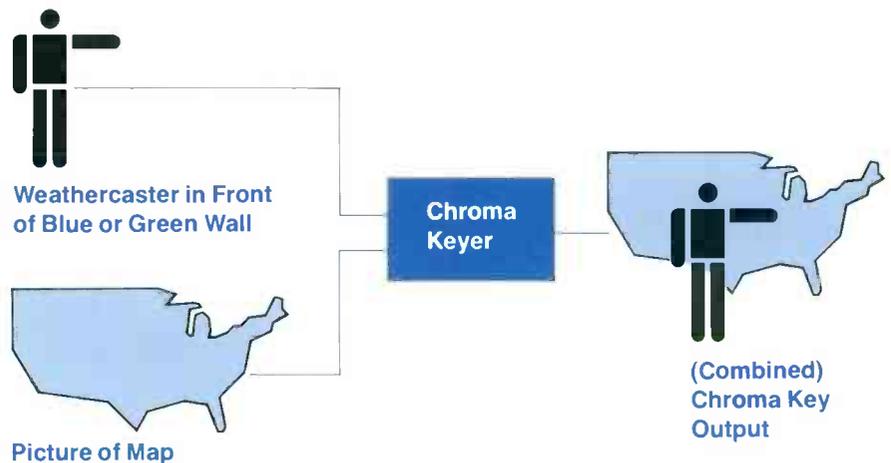
**Chroma**

Short form of the term Chrominance.

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**Chroma Key**

A type of key where the hole-cutting information is derived from a particular color rather than from a particular video level. A common example of a chroma key is when a weathercaster appears to the home viewer to be standing in front of a large weather map. In reality, the weather map is usually generated electronically and the weathercaster is standing in front of a solid blue or green screen instead of a map. A Chroma Keyer is used to place just the weathercaster in front of the map. The Chroma Keyer is adjusted to detect the presence of the screen color and then place anything that is NOT that color (in this case, the weathercaster) in front of the background video (the weather map). It should be noted that Chroma Keyers can also employ Linear Keying technology, resulting in a Linear Chroma Key. See Key.



There are different types of chroma keys, differentiated by the kind of input video used.

- 1. Encoded Chroma Key:** A chroma key which has only composite video as input sources. The disadvantage to Encoded Chroma Keying is that, since the keying is controlled by color information, the foreground (weathercaster) signal must be decoded into its color components before it can be used. Because of the difficulties in separating the color components from a composite signal Encoded Chroma Keys typically do not produce an output which is as natural looking as Component Chroma Keyers.
- 2. Analog Component Chroma Key:** A chroma key in which the foreground video arrives at the keyer in analog component format (e.g. RGB or Betacam™/Betacam SP™ (Y/R-Y/BY)). Since no decoding is necessary, a Component Chroma Key typically is more natural looking than an Encoded Chroma Key. An even better final result is obtained if both the Foreground and the Background sources involved are in component form.
- 3. Digital Component Chroma Key:** A chroma key in which the key switching signal is derived from the colors in the component digital domain. Since the color information is of a digital nature, it is possible to very accurately select the color to be excluded in the chroma key. A more precise color can therefore be selected, allowing the Chroma Keyer to distinguish between the screen color and a similar, but different, color in the foreground subject. The final result will have the advantage of not having areas improperly keyed because a color in the foreground video was very close to the color being keyed out.

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**Chrominance**

The color information in a composite video signal. This information describes the hue and saturation of a picture, but not the brightness. The brightness and contrast are described by the luminance component of the signal. The signals I, Q, R-Y, and B-Y are all examples of chrominance information.

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**Clean Chroma Key**

Sony system for producing high quality Chroma Keys.

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**Clip Level**

Same as Key Clip.

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**Clock**

A timing source in a digital system. Sampling in a digital system must be done at specific times. These times are determined by a clock. The clock is an oscillator which runs at a specific speed ( $4F_{SC}$  for example).

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**Color Background**

The output of a switcher's Color Background generator (also known as a Matte Generator). The color of the video is adjusted with "Luminance," "Chrominance," and "Hue" controls. Most often, this background is uniform in color but some systems allow variations, usually in the form of a gradual change from one color at one side of the picture to another color at the opposite end (usually called a Wash).

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**Color Bars**

A signal consisting of bands of color and sections of white and black areas. Often used as a reference signal. Several different variations using different levels of luminance and chrominance are in common use.

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**Color Black**

See Black Burst.

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**Color Burst**

A sample of the subcarrier frequency placed after the trailing edge of horizontal sync. It is used in determining the decoded phase (color) of a composite analog video signal. See Subcarrier.

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**Color Corrector**

A device used to correct for color errors (introduced into video by equipment during the production process) and to change colors for artistic purposes.

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**Color Difference Signal**

A signal which is obtained as the result of a subtraction (difference). For example, the Betacam™ format uses three signals, Y, R-Y, and B-Y. The B-Y signal is the result of subtracting the Luminance signal from the Blue video signal and the R-Y is the result of subtracting the Luminance signal from the Red video signal. See Betacam™, YIQ, YUV.

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**Color Timing**

Same as subcarrier timing. See Timing.

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**Component Video**

Video whose original elements have been retained separately rather than combined (encoded) into a single signal known as composite video. Component video is technically superior to composite video, especially when repeated encode/decode processes are required. This is often the case during the production process. Also, any time video components are combined into a composite format, such as NTSC or PAL, it is never quite possible to obtain the exact original signals again. The bandwidth restriction of the composite formats is only one of several reasons for this.

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**Component Digital Video**

Component video whose signal is represented digitally rather than in analog form. Often incorrectly referred to as D-1 (which is a component digital RECORDING format). See SMPTE-227M, SMPTE-125, CCIR-601, CCIR-656.

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**Composite Digital Video**

Encoded video whose signal is represented digitally rather than in analog form. Often incorrectly referred to as D-2, which is a composite RECORDING format.

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**Composite Video**

1. A video signal in which the luminance and chrominance components have been combined (encoded) as in NTSC, PAL or SECAM. Any time a signal is encoded, the quality of the final signal available is reduced because absolutely perfect decoding is not possible (decoding is required to view the final picture). Composite video may be represented in analog or digital form. The digital form is what is recorded in D-2 recording equipment. Composite video was developed in order to "squeeze" color information into the same broadcast bandwidth originally occupied by black and white. This avoided total replacement of all monochrome television transmitters and receivers. See Component Video.
2. A video signal obtained by combining parts of at least two video signals, for example by keying or matting.

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 **$C_r$** 

The red component of the component analog video signal described by SMPTE-125 and CCIR-601-1. It is a mathematically scaled version of R-Y.

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**Crossfade**

Same as Mix.

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**Crosspoint**

The video switch which selects the source required on a particular bus.

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**Cut**

A transition in which there is an instantaneous switch from one video source to the next.

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**D****D-1**

The Digital component video recording format used to record 4:2:2 signals onto 19mm tape cassettes. (Note that these cassettes are not interchangeable with those of the D-2 format.) The D-1 format is the highest quality tape recording format generally available today.

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**D-2**

A  $4F_{SC}$  sampled Digital composite video recording format. This format samples the analog video signal on the I and Q axes in NTSC (PAL samples at + and - 135 degrees) and records a digital representation of the composite video (NTSC or PAL) onto 19mm tape cassettes. (Note that these cassettes are not interchangeable with those of the D-1 format.) The D-2 format is generally considered to be the successor to Type-C 1" tape recording format.

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**D/A**

See Digital-to-Analog Converter.

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**Decode**

To separate a composite signal into its component parts.

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**Digital Active Line**

That part of a digital horizontal line which contains data related to the picture's luminance and chrominance information.

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**Digital-to-Analog Converter**

A device which transforms video from digital to analog form. See Analog-to-Digital converter.

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**Digital Multiplication**

The process of multiplying two digital numbers. Digital Multiplication is used in connection with mixes and other digital video processing operations. Any time two binary numbers are multiplied, the answer will have as many bits as both of the original numbers combined, e.g. multiplying an 8-bit number and a 10-bit number results in an 18-bit number. System design must consider how to process these larger numbers produced. The three possibilities are: truncation (simple to do, but sometimes unsuitable); rounding (more complex than truncation, but sometimes not good enough); or increasing the data handling capacity of the system (the most hardware intensive solution, but sometimes necessary).

To illustrate, if the following two 8-bit numbers are multiplied, the result is a 16-bit number:

$$\begin{array}{r} 10101111 \times 11001000 = 1000100010111000 \\ (175) \quad \times \quad (200) \quad = \quad (35,000) \end{array}$$

See Binary, Bit, Byte, Rounding, Truncation

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**Digital Switcher**

A switcher which accepts input video in digital form and performs all processing in the digital domain.

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**Digital Video**

Video which is described by discrete voltage levels (represented by numbers) as opposed to the infinite range of values possible with analog video. Among its advantages, Digital Video may be copied with little or no change from one generation to the next.

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**Dissolve**

Same as Mix.

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**DME**

Sony's term meaning Digital Multi-Effects.

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**Double Re-entry Switcher**

A switcher with two mix effects amplifiers, where the output of one can be fed into the other (re-entered) as a separate input. This allows more layers of processing to take place in a single pass through the system.

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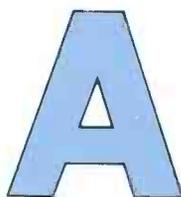
**Downstream Keyer**

A Keyer in a video switcher which electronically appears after all other switcher operator functions. Therefore, any operations performed on the switcher M/Es will not affect the downstream key video.

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**Drop Shadow**

A switcher and digital effects key function that gives the foreground key video the appearance of having a shadow. This function is often used with titling. Some characteristics of this shadow, such as width and position, are often adjustable.



**Original Video**



**Video With  
Drop Shadow**

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**DSK**

Acronym for Downstream-Keyer.

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**DVE™**

Acronym for Digital Video Effects, trademarked by NEC.

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**E**

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**EAV**

Acronym for End of Active Video. This is the point in the digital component video horizontal line where actual picture information ends. This term is used in connection with the digital video interface. See SMPTE-125, SAV.

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**Edge**

See Black Edge.

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**Editor Interface**

A feature which permits some or all switcher functions to be controlled from an external device. Editor interfaces may be serial, as in RS-422, or parallel as in the GPI. See GPI, Serial Interface, Protocol.

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**Effects Loop**

A switcher design feature where an M/E has an output which allows video to be sent to devices external to the switcher (e.g., a DME™) and then returned to the switcher for more processing.

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**Effects Memory**

A system capable of storing switcher or DME™ panel settings which may later be recalled to exactly duplicate an effect.

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**E-File™**

The Sony trademarked system for switcher effects memory.

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**E-Mem™**

The Grass Valley Group trademarked system for effects memory.

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**Encode**

The process of combining video signals, e.g. red, blue and green, into one "composite" signal. See Composite Video, Component Video.

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**External Key**

A Key where the hole in the background is cut by a dedicated signal called the Key Signal or Holecutter. A second signal, the Fill Video, is then placed in the hole. This type of Key allows very clean holes to be cut because the Holecutter signal is specifically designed by the source device for this purpose. One of the most common uses for External Keys is keying the signals from a character generator. The fill video may be colored letters with shadows already on them. A separate Key Signal would be used to cut holes in the Background Video of the correct size for both the letters and their shadows. See Self Key, Key.

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**F****Fader Arm**

The lever on a switcher used to control the progress of an effect. As an example, if the fader arm is controlling a wipe, as the arm is moved from one end to the other, the wipe progresses across the screen. Also called a Fader Bar.

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**Fill Video**

See Key Fill.

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**Flip-Flop Bus**

A switcher bus configuration where the video selected on one bus of the switcher is immediately transferred to the other bus at the completion of a transition. This type of bus is often associated with the Program and Preset busses of a switcher, the advantage being that the same bus of the switcher always determines what source is on air. If the Program and Preset busses are not the Flip-Flop type, the bus indicating the source on air depends on which one the associated fader bar is pointed toward.

<b>Foreground</b>	See Key.
<b>Four Field Sequence</b>	See SCH.
<b>Frame Synchronizer</b>	A device used to match non-synchronous video to a local reference.
<b>F<sub>sc</sub></b>	Notation for Frequency of Color Subcarrier, which in the NTSC system is approximately 3.58 Mhz. Often used with a prefix of 2 or 4, meaning 2 times 3.58 Mhz or 4 times 3.58 Mhz respectively. 4F <sub>sc</sub> , or 14.3 Mhz, is the sampling frequency used in D-2 composite digital tape recording equipment.

## G

<b>Generations</b>	The number of times a video segment has passed through equipment where any part of it was re-recorded.
<b>Global</b>	Term used in digital effects to describe the ability to apply additional manipulations to keyframes with previously stored digital effects.
<b>GPI</b>	Acronym for General Purpose Interface. In a switcher, this type of interface provides simple control of the most basic functions such as executing a transition by means of an external contact closure. The GPI is a Parallel Interface. See Editor Interface, Serial Interface.

## H

**Hard Key**

See Linear Key.

**Hexadecimal**

A numbering system used in conjunction with digital systems which uses 16 digits instead of 10. The digits and their corresponding decimal system equivalents are shown below:

DECIMAL: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15  
HEXADECIMAL: 0 1 2 3 4 5 6 7 8 9 A B C D E F

These "hex" digits may be combined in the same way as decimal numbers are. For example, the number 16 in decimal = F1 in hex.

**H-Shift**

A horizontal shift of the picture.

**H-Sync**

See Timing.

**H-Timing**

See Timing.

**High Tally**

Condition in which a button is illuminated very brightly to indicate that it has been selected. See Low Tally.

**Holecutter**

See Key.

## I

### I

One of the two color difference signals in the NTSC system. I comes from the term "In phase."

### IEEE

Acronym for the Institute of Electrical and Electronic Engineers. A professional society active in standardization issues.

### Interpolation

The processing of a number of existing points to obtain a new point. Interpolation is used in digital systems for picture size changes and other manipulation.

### IRE Unit

Acronym for Institute of Radio Engineers. As defined by ANSI/IEEE standard 205, "IRE units are a linear scale for measuring the relative amplitudes of the components of a television signal with a zero reference at the blanking level." In the NTSC system, the tip of horizontal sync is located at  $-40$  IRE, reference white level is at 100 IRE and a 1 volt peak to peak signal usually equals 140 IRE units.

## J

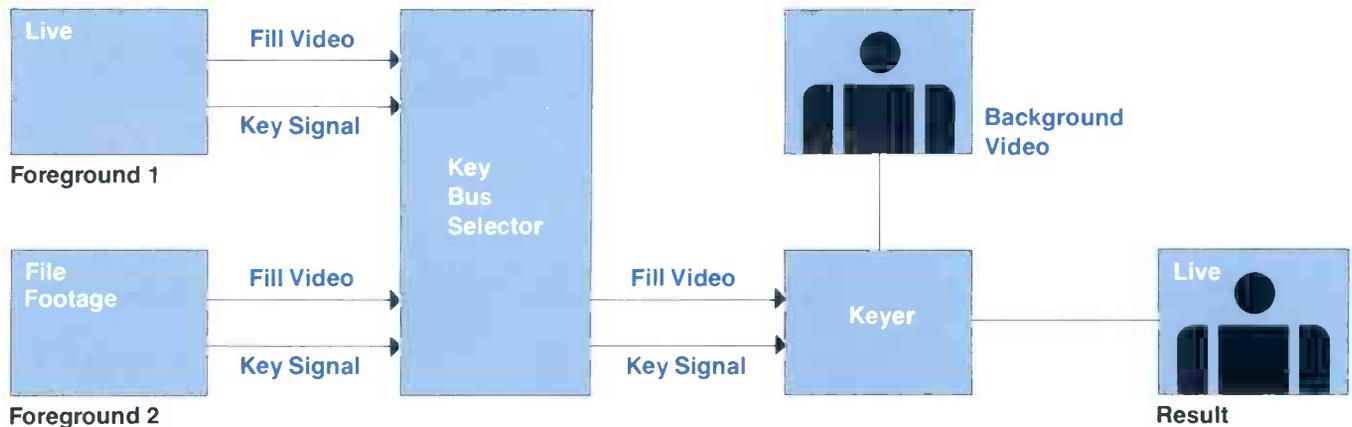
### Joystick

A control often found on switchers and digital effects equipment capable of moving in a  $360^\circ$  arc. Joysticks are often used to position wipe patterns in switchers or video itself in digital effects equipment.

# K

## Key

The process of superimposing video from one source (the Foreground video) on top of other video (the Background video). See Background, Chroma Key, Foreground, Key Bus, Hard Key, Key Clip, Key Fill, Key Mask, Key Signal, Linear Key, Matte Key.



## Key Bus

A switcher bus used to select the input to a switcher's keying circuits. See Key.

## Key Clip

A control used to set the threshold for the keyhole cutting circuits. A hole will be cut in the Background video in any place where the Foreground luminance level is greater than the clip level setting. Fill video will then be placed in these holes. See Key, Key Fill, Key Signal.

## Key Fill

The video which fills the hole cut by the keying circuits. Fill video does not necessarily have to be related to the hole cutting signal. For instance, the hole cutting signal may be obtained from a character generator, while the video to fill it is obtained from a video camera. See Key.

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## Keyframe

Keyframes are used in both switchers and digital effects devices to create a sequence of independent events. One keyframe is one event. A series of keyframes can be sequenced with linear and/or non-linear transitions to create a complex event which may then be executed with a single command.

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## Key Gain

The Key Gain control of a switcher adjusts the sensitivity of the keying circuits. It is adjusted to provide the desired edge sharpness. In the case of a Linear Key, if the Key Gain is adjusted to less than unity the Key video will be slightly transparent with Background video visible through it.

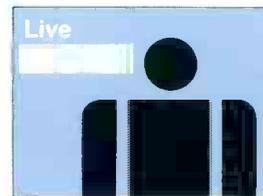
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## Key Mask

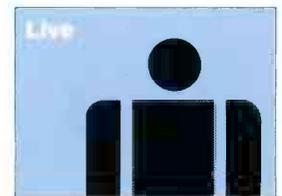
A key modifier which allows an operator to keep portions of the Foreground video from actually being keyed at the switcher output. For example, if two lines of text are showing at the output of a character generator, but only the top line is desired, a Key Mask could be placed over the lower line. When a Key is performed with this video, only the top line will be keyed. There will be no evidence that a lower line existed. Note that the Key Mask itself will not be visible at the switcher output. Key masks can also be inverted, whereby only the video outside of the mask will be keyed and all other video on that key bus will not be keyed. There are different ways to control the shape of a key mask. Some examples are with Box Mask controls, through the switcher's wipe generator, or through a switcher's external Key Mask input. See Box Mask.



**Key Result  
Without Mask**



**Key Mask**



**Final Key**

---

**Key Outline**

A switcher key function which causes only an outline of the Key Bus video to be "Supered" over the Background video rather than the video itself.

---

**Key Signal**

The signal used to cut a "hole" in the Background video into which Fill video (the Foreground) will be placed by a keyer. Key signals can come from several sources. In a Self Key, the switcher itself creates a Key signal from the video which will eventually fill the hole. In an External Key, the Key Fill is a separate signal connected to the switcher. This signal is usually supplied by the device that created the Fill video, e.g. a character generator or DME™. See Key, Key Fill, External Key.

---

**Key Video**

Same as Key Fill.

---

**L****Linear Key**

A Linear Key is a special type of Key which produces a smoother and more natural looking transition between the Foreground and Background objects than would otherwise be possible. Traditional "hard" keyers produce sharp, hard edges which tend to make the Foreground look like it is "pasted" on top of the Background. A Linear Keyer provides a smooth transition which makes the Foreground edge blend into the Background, making it look much more like a part of the original. A Linear Keyer accomplishes this by providing a Key Gain control which can be set to less than unity, causing the Foreground object to become slightly transparent. This creates a blending effect between Foreground and Background. If the gain is set to greater than unity, the effect is

much like a hard key. (A hard key may also have an adjustable gain, but it can not be adjusted down to unity). A Linear Keyer should be used with any video that does not have distinct edge transitions, such as the anti-aliased outputs of character generators. Without a Linear Keyer the edges would be poor because a "hard" key cannot generate a satisfactory key switching signal with video that does not have extremely sharp transitions from black to white.

---

**Look-Ahead-Preview**

A form of preview that displays what the output of a switcher will be after the next transition.

---

**Low Tally**

A condition in which a button is dimly illuminated to indicate that it has been selected but is not on line. See High Tally.

---

**LSB**

The acronym for Least Significant Bit, the digit furthest to the right (usually) in a binary number. See Binary, Bit, Digital Multiplication, MSB.

---

**Luminance**

The Monochrome component of a color video signal. Often designated "Y" such as in Y/R-Y/B-Y (Betacam™) component video.

---

**Luminance Key**

A type of Key where the holecutting signal is derived from the luminance level of the Key Signal. This is in contrast to a Chroma Key, where the holecutting signal is derived from chroma information.

## M

**M/E**

See Mix Effects Amplifier.

**Mask**

See Key Mask.

**Matte Generator**

See Color Background.

**Matte Key**

A Key where the hole is filled with the output of a Matte Generator. This type of Key always uses some video source other than the Matte Generator (e.g. a character generator) to determine the shape of the Key. Also called Matte Fill Key.

**Matrix Wipe**

Form of wipe where, instead of the regular wipe edge, the transition edge is in the form of a number of rectangular boxes which either move in a line across the screen or appear seemingly at random.

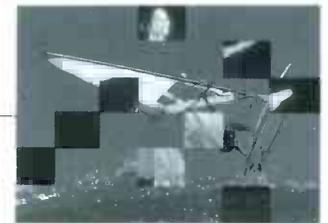


**Video A**



**Video B**

**Switcher**



**Output**

---

**Mix**

One way to transition from one video source to another in a switcher. In a Mix, the source currently on air appears to dissolve away while another video source simultaneously dissolves in, looking like a double exposure at the midpoint of the transition. See A-B Mix.

---

**Mix Effects Amplifier**

The part of a switcher where video signals are processed to create Mixes, Fades, Keys, etc.

---

**Modulation**

As it pertains to switchers, Modulation is the process whereby the edges of a wipe pattern can be made to “wobble” at a rate and amplitude which are adjustable by the user.

---

**Monochrome**

Black and white video. This type of video is represented by the Y portion of Y/R-Y/B-Y component video.

---

**Mosaic**

Digital effect which causes the displayed video to appear as if it is composed of many small square or rectangular tiles.

---

**MSB**

Acronym for Most Significant Bit, the digit furthest to the left (usually) in a binary number. See Binary, Bit, Digital Multiplication, LSB.

---

**N**

---

**NAB**

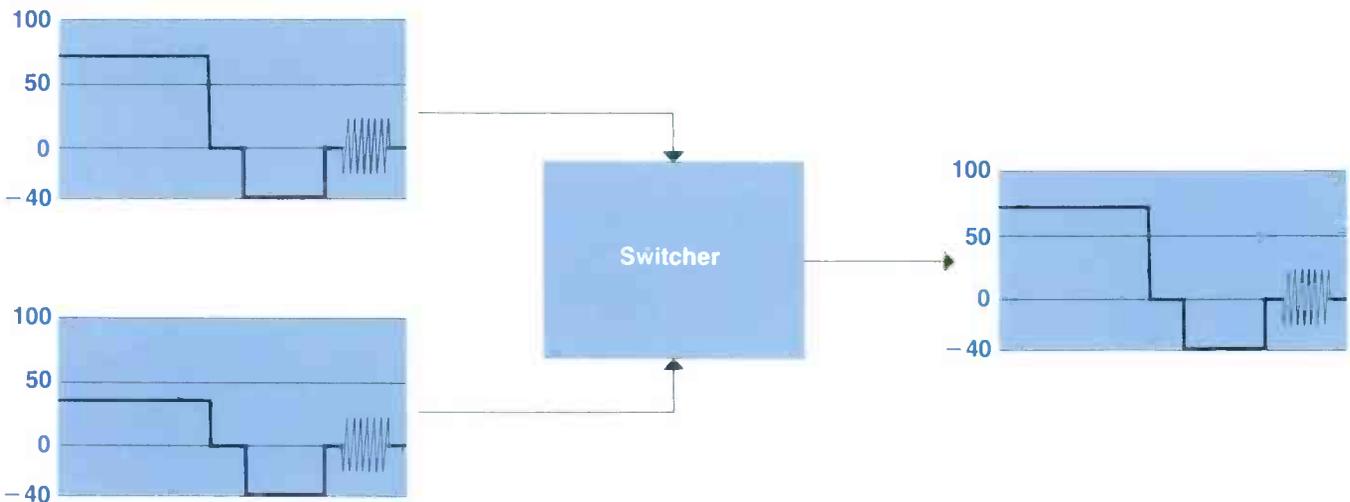
Acronym for the National Association of Broadcasters, an association which assists broadcasters in several ways including publishing technical information and sponsoring a number of trade shows and a large exhibition every year.

**NAM**

Acronym for Non-Additive Mix.

**Non-Additive Mix**

A type of Mix which, instead of resulting in video that is a simple sum of the inputs, results in video that, at every point, consists only of the input signal with the greater amplitude. See Additive mix.

**Non-Synchronous**

A condition where two video signals are not in time with each other. See Timing.

**Nyquist Frequency  
or Nyquist Rate**

Term used in connection with digital sampling. The Nyquist frequency is normally considered the minimum sampling frequency for correct digital reproduction of a signal. If a complex signal is sampled at twice the highest frequency contained within it, then it is sampled at its Nyquist frequency and aliasing due to sampling will not be present at the output. Note that there are sometimes additional engineering reasons for sampling a signal at higher than its Nyquist rate.

---

**NTSC**

1. Generally used to describe the 525 line 59.94 Hz color television broadcast system used in North America and many other parts of the world.
2. Acronym for National Television System Committee, which first devised the system in 1953.

**O****Outline**

See Key Outline.

**P****PAL**

Color television standard used widely in Europe and other parts of the world. It is a 625 line 50Hz system which reverses the phase of the colorburst on alternating lines. (Hence PAL or phase alternating line.) This tends to eliminate hue shifts in the signal. A disadvantage of the PAL system is that editing becomes more complicated than in NTSC because, instead of the 4 field NTSC color field sequence, PAL has an 8 field color sequence and it is important that edits occur on the correct color frame. See NTSC, SCH.

---

**Parallel Interface**

Switchers are normally concerned with two types of parallel interfaces: Parallel Control Interfaces and Parallel Video Interfaces. See Serial Interface.

---

**Parallel Control Interface**

An interface where each device function is controlled by a separately wired voltage or contact closure. In a Parallel Control interface, a contact closure on one wire might trigger a preset-to-program transition, whereas a closure on a different wire might trigger the DSK.

---

**Parallel Video Interface**

Refers to digital video. In parallel digital video, the video signal is divided among a number of signal lines for distribution. This signal is generally sent via 25-pin connectors.

---

**PGM**

The Program Bus.

---

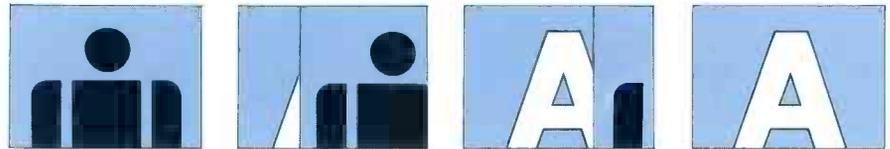
**Pixel**

A word derived from *Picture Element*. This is the smallest unique point of a digital video image. In Digital Video, a picture is divided up into thousands of Pixels, each specified by Luminance, Chrominance, and position information.

---

**Push Off**

Digital effect where a frame of video appears to slide out of view, revealing a second frame of video. See Push-On, Push-On/Push-Off.

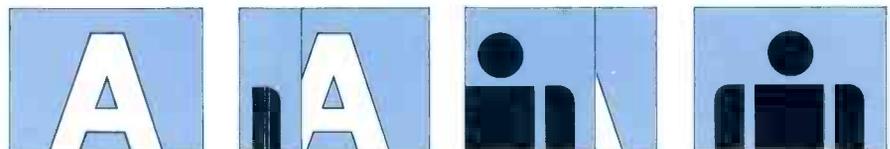


Original Video

---

**Push On**

Digital effect where a frame of video appears to slide into view on top of the previous video. See Push-Off, Push-On/Push-Off.

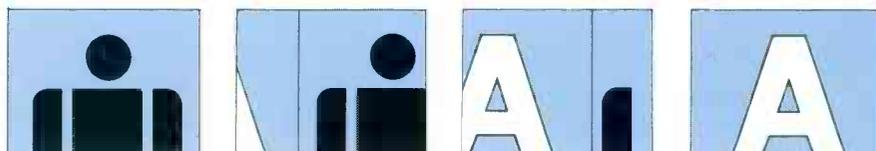


Original Video

---

**Push-On/Push-Off**

Digital effect which is a combination of a Push-On and a Push-Off. One frame of video slides out of view while another slides into view. This effect usually requires two channels of digital effects; one for the Push-Off, and one for the Push-On.



Original Video

---

**Preset Bus**

The Preset Bus is where the video that will next appear on line is selected.

---

**Proc Amp**

Short for Processing Amplifier.

---

**Processing Amplifier**

This device makes it possible to independently adjust many different parameters of a video signal, such as chroma level, burst level, black level, burst phase, etc. Proc amps are often used as a final step in the production process because at intermediate steps techniques such as the use of "Super Black" were used in order to achieve a desired final "look." (If the material were to be broadcast later, FCC regulations do not permit luminance components to extend below 7.5 IRE in the US.) See Black Clipper.

---

**Program Bus**

Selects the on-line switcher output signal.

---

**Protocol**

A set of rules and conventions used for the transfer of information between devices. For example, a Serial Interface protocol for an editor defines exactly what digital information is required for the editor to be able to control a switcher.

---

**PST**

The Preset Bus.

---

**Q****Q**

One of the color difference signals in the NTSC system. Q comes from quadrature, meaning 90 degrees out of phase with the I signal. See I, YIQ.

---

**Quantization Level**

Digital systems are designed to represent voltages only in predetermined values called quantization levels. For example, if a particular system is only capable of storing the numerical equivalent of 1 millivolt steps, an actual value of 8.4 millivolts would be stored as 8.0 millivolts. See Alias, Sampling.

---

**R****RGB**

Red, Green and Blue color signal components.

---

**Rounding**

See Truncation.

---

**RS-232C**

An EIA Serial Digital Interface standard specifying the electrical and mechanical characteristics of the communication path between two devices using 25-pin D-type connectors. This standard is used for relatively short range communications and does not specify balanced control lines. See RS-422, Serial Interface.

**RS-422**

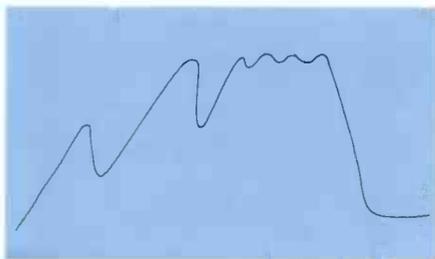
An EIA serial digital interface standard. This standard specifies the electrical characteristics of balanced voltage digital interface circuits. This standard is usable over longer distances than RS-232C. Although originally designed for use with 9-pin and 37-pin-D-type connectors, it is now often used with others, including 25-pin D-types. See RS-232C, Serial Interface.

**R-Y**

One of the color difference signals of the Betacam™/Betacam SP™ analog component video format. The letters are derived from the words "Red-minus-Y." See Betacam™, Betacam SP™.

**S****Sampling**

Before an analog signal can be processed in a digital system, a digital representation of it must be obtained. This is done first by measuring the value of the analog signal at regular intervals. The values obtained are called samples. These samples are then used to construct a digital representation of the analog signal. See Alias, Analog-to-Digital Converter, Anti-Alias, Clock, Digital-to-Analog Converter, Nyquist Rate, Quantizing Level.

**Analog Signal****Analog Signal With  
Sample Points Shown****Digital Samples Only**

---

**SAV**

Acronym for Start of Active Video. This is the point in the digital component video horizontal line where actual picture information begins. This term is used in connection with the digital video interface. See SMPTE-125, EAV.

---

**SC**

Common abbreviation for subcarrier.

---

**Scale**

A mathematical process of changing values by certain amounts. For example, SMPTE-125 and CCIR-601-1 use values for Y, Cr and Cb instead of Y, R-Y and B-Y for color difference signals. Cr is a scaled version of R and Cb is a scaled version of B. To be exact:  $Cr=0.713 (R-Y)$  and  $Cb=0.564 (B-Y)$

---

**SC Timing**

See Timing.

---

**SCH**

The relationship between cycles of Subcarrier to the leading edge of horizontal sync. This relationship is used to define the four color fields present in NTSC. A particular color field is specified by whether the Subcarrier associated with it is positive going or negative going at the 50% point of horizontal sync. SCH phase becomes very important during editing, as edits should only take place when the color fields of the two video sources match, or else an H-Shift may occur.

---

**Self Key**

A type of key where the holecutting signal is derived from the Luminance component of the video Foreground. If the key video is a pure white 100 IRE signal, there will be no problems. But when the signal contains varying degrees of Luminance information, it becomes difficult for the Key circuitry to decide where to make the changeover frame Background to Foreground video, resulting in "dirty" keys. Self keying is the opposite of External Keying, which avoids these problems.

---

**Serial Interface**

Switchers are normally concerned with two types of Serial Interfaces: Serial Control Interfaces and Serial Digital Video Interfaces. See also Editor Interface, GPI, Parallel Interface, Protocol, RS-232C, RS-422.

---

**Serial Control Interface**

This feature allows the transfer of information, usually control signals, by means of a sequential digital data stream. Since a serial data stream permits different commands to be sent sequentially on the same cable, it is preferred to a parallel interface because it allows much more control of a device while using far fewer interconnections. For instance, if a large switcher were to be fully controlled by a Parallel Interface, it might need more than one hundred connections. Controlling the same switcher with a serial port is generally accomplished with just nine wires in a single cable.

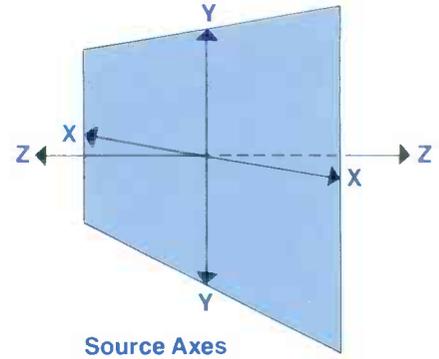
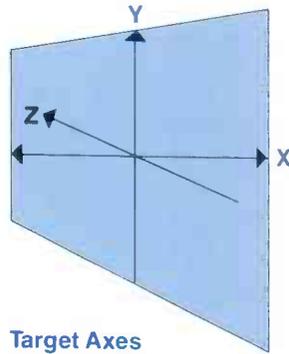
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<b>Serial Digital Video Interface</b>	Refers to Digital Video. In Serial Digital Video, a digital representation of the video signal is distributed via a single coaxial cable with BNC connectors. This attribute makes it more desirable than a Parallel Interface, which requires a multiconductor cable.
<b>Setup</b>	Another term for Black Level.
<b>SMPTE</b>	Acronym for the Society of Motion Picture and Television Engineers, a professional society active in television and film standards setting.
<b>SMPTE-125</b>	SMPTE Standard 125, Bit Parallel Interface for Component Video Signals. A Document describing the SMPTE approved parallel digital video interface.
<b>SMPTE-227M</b>	Proposed American National Standard for Component Digital Video Recording 19mm Type D-1 Format—Signal Content of Helical Data Records and of Associated Control Record. SMPTE document describing the video portion of the D-1 tape format record.
<b>Soft Border</b>	A border with edges that are not sharp transitions and so appear to be “fuzzy.” The extent of this “fuzziness” is usually adjustable. See Border.

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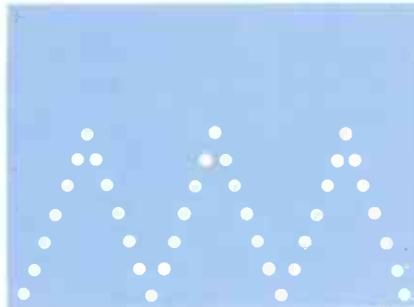
## Source Axes

In digital effects, video manipulation can be described by using two coordinate systems, each with an X, Y, and Z axis. One coordinate system refers to the video to be manipulated (the Source Axes), and the other coordinate system (the Target Axes) refers to the position of points in relation to the video screen on which the manipulated video will finally be seen.

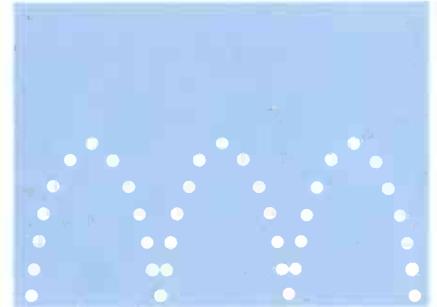


## Spline

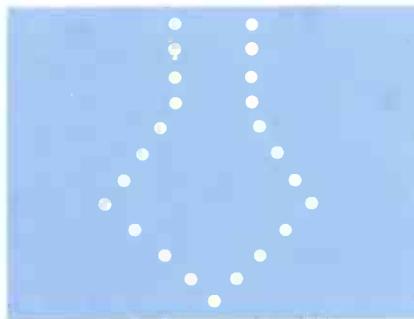
A curve whose shape is guided by a set of points. In connection with Keyframes, splines are used to specify the acceleration or deceleration of an image from one Keyframe to the next. The smoothness of a spline is used to give natural looking speed adjustments to objects. As one example, when a ball bounces its speed is not constant, but increases as it goes down and decreases after it hits the ground and bounces up. When the ball's height reaches a peak, the process repeats. By using splines as an acceleration control, it is relatively easy to give any video this smooth, natural looking movement. In graphics, the spline curve itself may be used as part of the video. A set of points are first plotted and then a spline would be created based on these points.



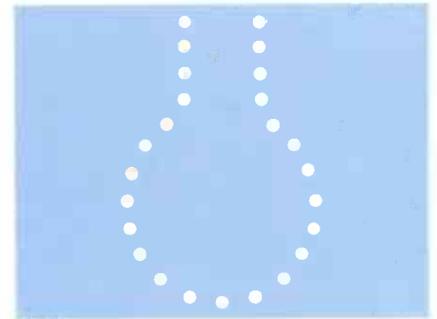
Original Trajectory



Trajectory Modified With Splines



Original Trajectory



Trajectory Modified With Splines

---

**Spotlight**

A video effect which raises the video level in a selected circular area of a picture. The result is that the area appears as if a spotlight were shining on it. The location and diameter of the spotlight are adjustable.

---

**Subcarrier**

The 3.58 Mhz (in NTSC) sine wave that is used as a color reference signal. A sample of the Subcarrier (shifted in phase by 180 degrees) that was present when a frame of video was created is placed before the start of each horizontal line. This sample is usually 9 cycles long and is called the Color Burst. In a displayed picture all of the colors present in a particular horizontal line are derived from phase differences between the Color Burst and the Subcarrier.

---

**Sub-Nyquist Sampling**

The sampling of a signal at less than twice its highest frequency. See: Nyquist Rate, Sampling, Alias.

---

**Super**

Short for Superimpose, the same as a key.

---

**Super Black**

Video with luminance components below 7.5 IRE. This is not a "legal" signal in NTSC for broadcast signals, however, in the production process luminance levels below 7.5 IRE are sometimes used in order to achieve a desired final look. Super black signals are often used to accomplish certain Key effects. It should be noted that the component digital format does not specify a setup level.

---

**Sync**

Analog video signals conjoin both vertical and horizontal Sync pulses. For timing reasons, switchers are normally concerned with horizontal Sync pulses, the 15,734 Hz (in NTSC) signals that define the start of a horizontal line.

---

**Synchronous**

See Timing.

---

**T****Tally**

An indication that a particular device is "on line." This indication, usually a lamp or LED, can either be on the switcher itself, or on a remote piece of equipment, such as a monitor or a camera. A source's tally is activated automatically when the source is selected via the switcher's program bus.

---

**Target Axes**

See Source Axes.

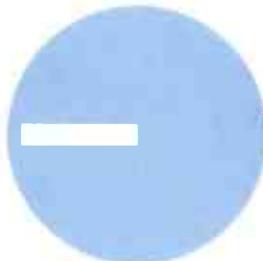
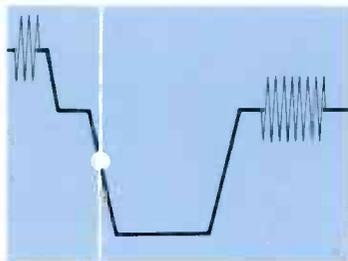
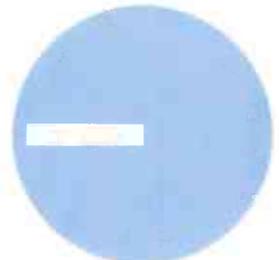
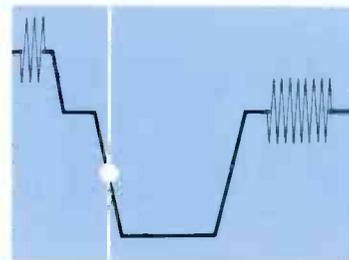
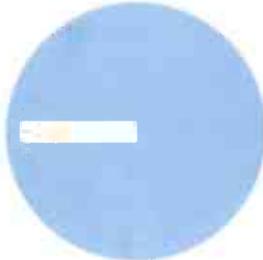
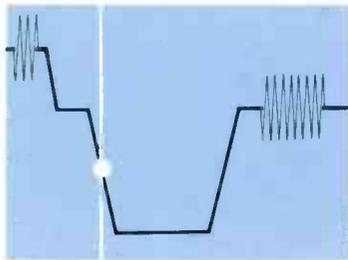
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**Tile**

Same as Mosaic.

## Timing

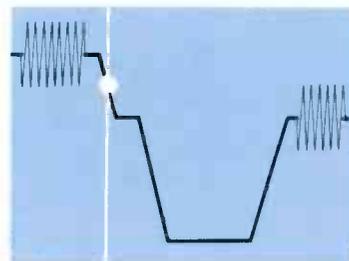
In order for a switcher to produce correct transitions between two video sources, they must be properly timed, or synchronous. When two video sources are properly timed this means that their synchronizing signals (Sync, Subcarrier, Color Burst) are all arriving at the switcher at the same relative time. It should be noted that in component video systems, only horizontal timing is required. The diagram below illustrates how timed and untimed signals might appear on an oscilloscope.



Horizontal

Subcarrier  
(Color Burst)

Signals Properly Timed



Horizontal

Subcarrier

Signals Not In Time

There are three separate aspects to timing in the analog domain:

- 1. Horizontal (H) Timing**, which refers to proper synchronization of the horizontal sync pulses. An error in H-timing results in horizontal shifts during transitions.
- 2. Subcarrier (SC) Timing or Color Timing** refers to the proper synchronization of the 3.58 Mhz color Subcarrier signals. An error in SC Timing results in color shifts during transitions. Note that equipment sometimes labels the Subcarrier Timing adjustment *Burst Phase*.
- 3. Subcarrier to Horizontal (SCH) Timing**, which describes the relationship between Horizontal and Subcarrier signals. This type of Timing is particularly important in editing applications because an SCH error can introduce color framing errors which, in turn, result in H-shifts at edit points.

---

**Title Key**

A Key where the input is derived from a title source such as a character generator. Also known as a Caption Key. See Key.

---

**Transcode**

To convert from one signal format to another, e.g. composite digital 4Fsc video (which has a clock rate of 14.3 Mhz) to component digital video (which has a clock rate of 13.5 Mhz).

---

**Transition**

The term describing the changing from one video source to another in a video switcher or DME™. This change may be in the form of a wipe, fade, mix, bringing in keys, etc.

---

**Triple Re-entry Switcher**

A switcher with three Mix Effects Amplifiers, any one of which can be used as an input to the others. This type of switcher allows substantial video processing capability in one pass through the system.

---

**Truncation**

Digital signal processing equipment is designed to handle numbers of a specified length. If a number must be processed which is too long (as could be the case after digital multiplication) then it must be shortened. Two ways in which this may be done are either by truncation or by rounding. In truncation, the least significant bits are simply dropped. In rounding, the number that is too long is evaluated (often using complicated mathematical procedures) in order to produce a new, shortened number. See the examples below:

Original 16-bit number:	1011010011101011
Resulting 8 bit number after truncation:	10110100
Possible resulting 8-bit number after rounding:	10110101

The difference in the two numbers may be small but, depending on the circumstances, the difference could be significant. This is especially true when the length shortening process must be repeated before a final result is obtained. See Digital Multiplication.

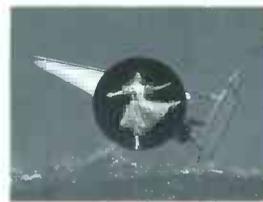
## W

### Wash

See Color Background.

### Wipe

A shaped transition between video sources. Unlike a Mix, where the original video source becomes less distinct over its entire area at once, and a new source becomes visible in its place, in a wipe, both the original video and the new video are clearly seen with a definite transition point where one source ends and the new one begins. The transition may be either straight, as in a vertical wipe, or curved, as in a circle wipe. See Border.



Examples of Different Shaped Wipes

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**Word**

A group of bits that are handled as a group, rather than one at a time. Typical word sizes in video processing are 8-bit, 10-bit, and 16-bit words. See Binary, Bit, Byte.

---

**Y**

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**Y**

The Video Luminance signal.

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**YIQ**

The Luminance and Color Difference Signals of the NTSC system.

---

**Y/R-Y/B-Y**

The Luminance and Color Difference Signals of the Betacam™/ Betacam SP™ component video tape recording format. See Color Difference Signal.

---

**YUV**

The Luminance and Color Difference Signals of the PAL system.

---

**Numbers**

---

**2F<sub>sc</sub>**

See F<sub>sc</sub>.

---

**4F<sub>sc</sub>**

See F<sub>sc</sub>, D-2.

---

**4:2:2**

The ratio between the digital component video sampling frequencies, specified in CCIR-601, for main digital studio equipment. The frequencies are 13.5 Mhz for Luminance, and 6.75 Mhz for each of the two Chrominance signals. See CCIR-601-1, SMPTE-125.

---

**4:2:2:4**

A signal which consists of a 4:2:2 signal for Luminance and Chrominance information plus a key signal sampled at the same rate as the luminance signal. A 4:2:2:4 signal is often transmitted in two parts. One part is a regular 4:2:2 Luminance/Chrominance signal and the other is a separate 4:2:2 signal which carries the key information. Since the second 4:2:2 signal actually contains only Luminance information it can be referred to as a 4:0:0 signal (the chrominance channels are still there but are unused). The 4 is then added to the end of the term 4:2:2 to signify that it is not a Luminance term or a Chrominance term, but is a Key channel term. See CCIR-601, CCIR-656, SMPTE-125.

---

**4:4:4:4 or 4x4**

A digital video signal which has identical sampling rates for the Luminance, Chrominance and Key Signals. A 4:4:4:4 signal, sometimes called 4x4, is usually transmitted as two separate 4:2:2 signals. These signals are generally referred to as 4:2:2 and 2:2:4. The first signal contains the wide band Luminance signal and half of the wideband color signal. The 2:2:4 signal contains the other half of the wide band Chrominance signals and the Key Signal. If the two signals are combined the result is as shown below:

FULL LUMINANCE AND 1st HALF CHROMINANCE	4:2:2
FULL KEY SIGNAL AND OTHER HALF CHROMINANCE	+ 2:2:4
RESULT	<hr/> 4:4:4:4

See CCIR-601, CCIR-656, SMPTE RP-125.



**D**o you have any "pet" teleproduction terms or phrases that you feel we overlooked? If you do, why not send them to us? We may be able to include it in our next edition of **THE TELEPRODUCTION GLOSSARY**. Just type (or print legibly) your term, along with its definition, in the space provided below. Please be as clear and concise as possible.

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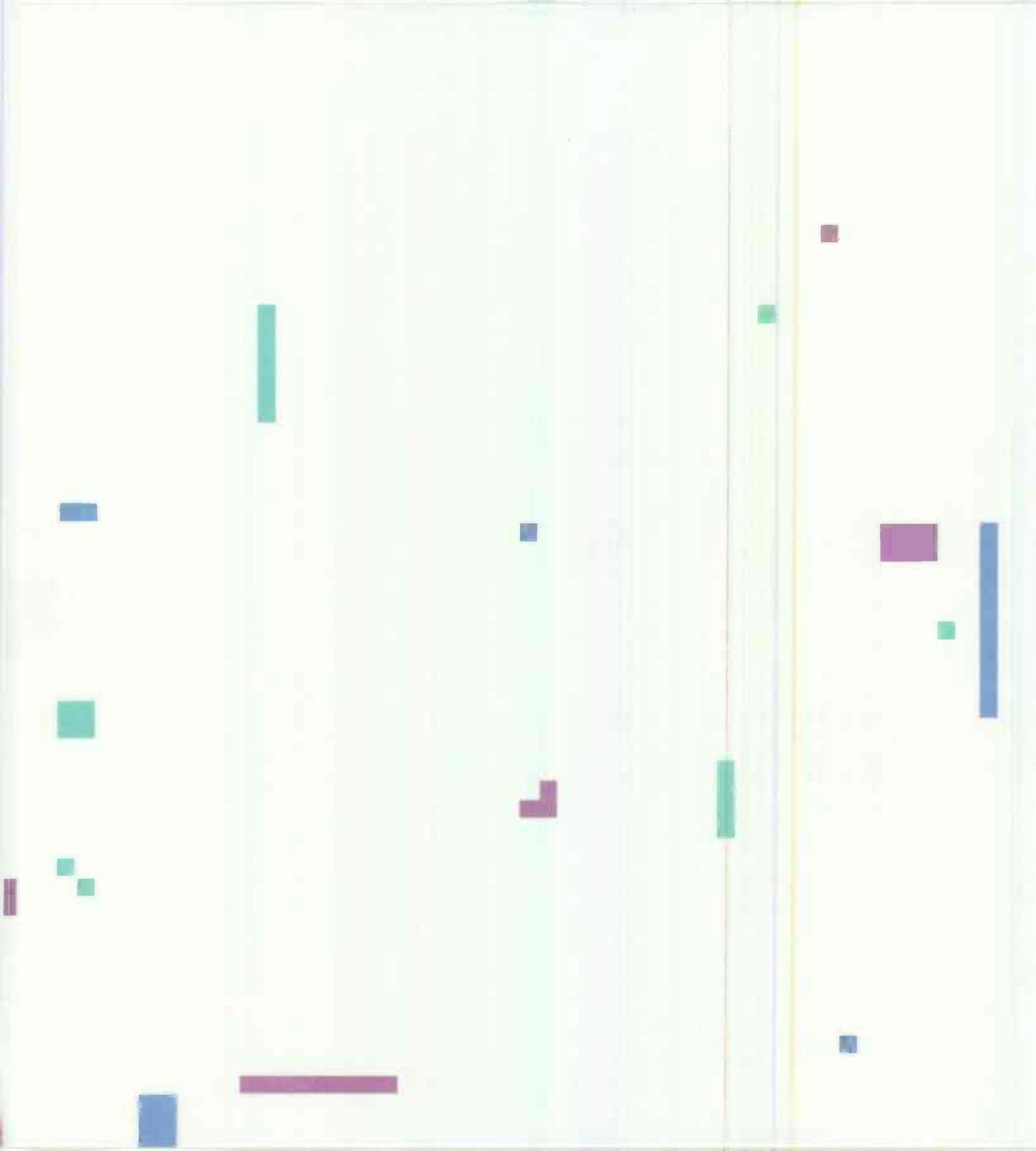
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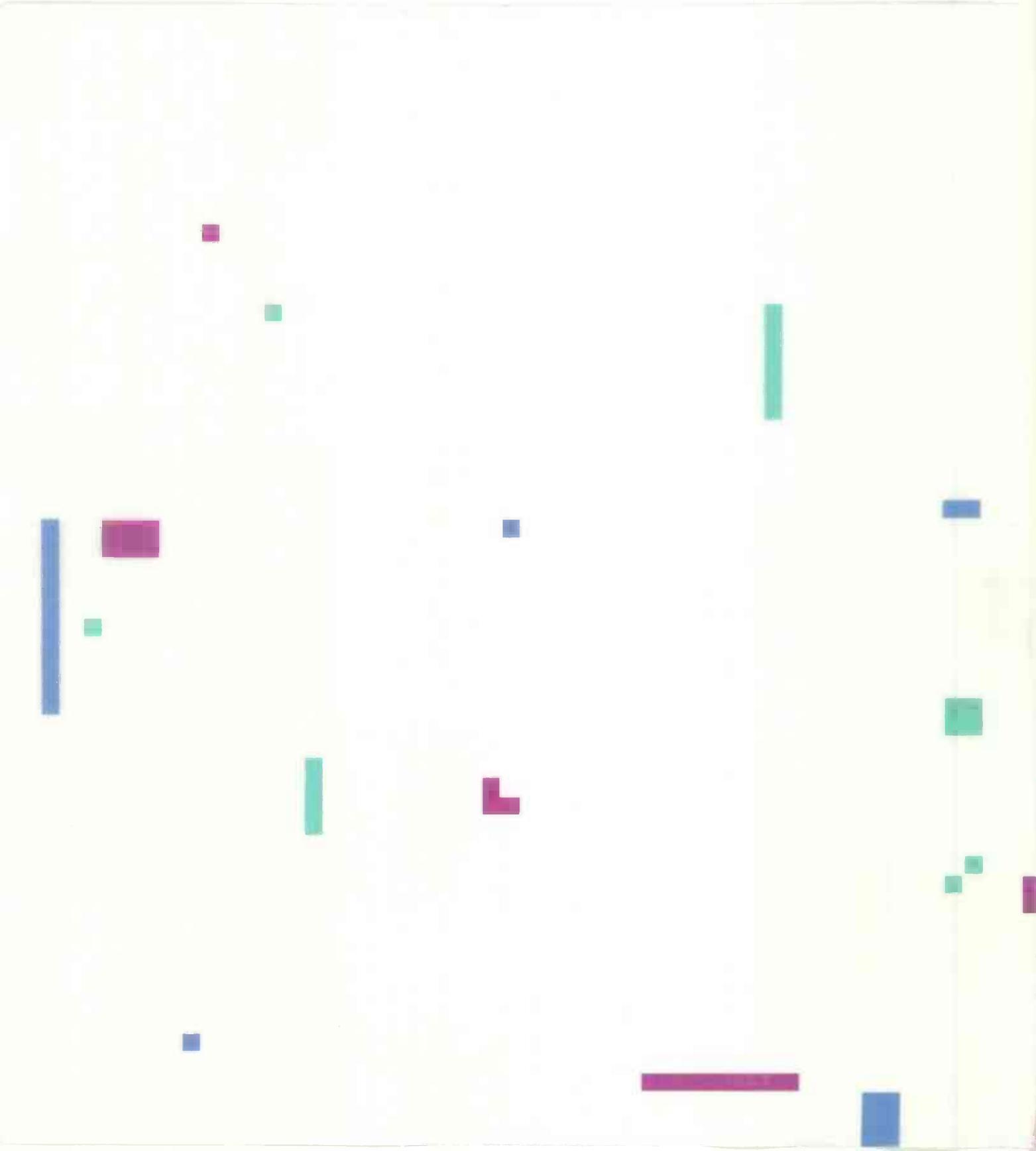
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